

# Coastwatch Autumn 2013 Survey Results

ADVANCED DRAFT

**ALL IRELAND**



## ACKNOWLEDGEMENTS

### Surveyors

We would like to thank the over 900 volunteers who gave their time, observations and effort for this latest Coastwatch survey. Those who explicitly agreed to be listed in public acknowledgment are recorded overleaf. For groups who sent hard copy of questionnaires, the lead name is listed.

### Regional Coordinators

A big thank you to our regional coordinators from Coastwatch groups, universities and local authorities who informed others, went out themselves and trained in Meath **Leo Boyle** and **Declan Collins**, Dublin N **Michael Walsh**, Dublin S **Katharine Keogan**, Dun Laoghaire **Rory Keatinge**, Wicklow **Maira Byrne** (Env. Officer) and **Deirdre Burns** (Heritage Officer Wicklow County Council), Wexford **Cliona Connolly** (Env. Officer Wexford County Council), Waterford **Alan Walshe**, Kerry **David McCormick & Team** Tralee Bay Wetlands Centre, Galway **Dr. Elaine O 'Riordan** Galway County Council Bidi Project, Mayo **Anthony Brogan**, Donegal **Lucy White, Trish Murphy & Rose Kelly**, Northern Ireland **Monica McCard** (Queens University).

Core Team apart from those who acted as regional coordinators:

**Dave Convery, Fionn O'Brien, Matt Tutt, Conor Pyle, Laetitia Beschus and Alice Michieli**

Survey and report planning and coordination: **Karin Dubsy and Ángel Duarte Campos**

### Further Help

Bathing water map data and consultation: EPA, especially Dr. Micheal Lehane;

Follow up film on New Zealand Flax as invasive alien species, **Ronan Carvill**

Results document edit **Erin Bucci and Nuala Freeman**

### Sponsorship

We would like to thank the Dept. of the Environment, Community and Local Government for support and indirect sponsorship from regional coordinators who hosted training sessions and travelled to shores.

## SURVEYOR LIST – Names of those who specifically authorise publication

Aine Walsh	Fionn O'Brien	Michael Bloor
Alan Walshe	Francois Gunning	Michael Walsh
Alex Lawless	Fred O'Sullivan	Mick Berry
Alice Michieli	Gary Robinson	Monica McCard
Andrew	Ger Wooly	Neil Dempsey
Andrew Bourke	Gerard Scollard	Noel Cahill
Andrew Cox	Gerlanda Maniglia	Noirin Cummins
Andrew Harrington	Graeme Smith	Nuala Freeman
Andy Kelly	Hall Family	Odhran
Angel Duarte	Hannah Tilly	Padma
Angela O'Flynn	Jago Brodie	Padraic
Annetta Zintil	James Cosgrave	Paul Dubsy
Anthony Brogan	Jeanette	Peadar Ó Conghaile
Aran Lafferty	Jennifer Corbett	Peter Craven
Aran Okeeffe	Jennifer Logan	Peter White
Ardscoil Ris	John Moriarty	Phil Pearson
Arklow Coastcare	Jon Wolley	Phil Keogan
Barry	Jonathan Mason	Presentation Prim. School 5th class
Blennerville National School	Joseph McAuley	Presentation Prim. School 6th class
Brian Killeen	Karen Colgan	Richard Bono
Bridget Flemming	Karen Taylor	Rita McAuley
Carlingford Adventure Centre	Karin Dubsy	Robert
Caroline Baird	Kat Keogan	Rory Keatinge
Cathleen Ní Chonghaile	kate toullis	Rose Kelly
Causeway Comprehensive TY	Kathleen Simmons	Roslyn Nicholson
CBS Secondary School The Green Tralee	Kerri Whiteside	Rush Sailing Club
Claire Horan	Kerry Branch CW	Sandrine
Clann Uí Dhomhnaill	Keith Hardy	Sandrive Daly
Clare Scott	Laura Mc Gurdy	Sarah Gibson-Brabazon
Cleas	Laura Wiggins	Scoil Chiarian Naofa
Clontarf Scouts	Laurence	Seamus McGinley
Colin Heaslip	Lily O'Neill	Sean Slattery
Conan Lynch	Linda Daniels	Shannen McEwen
Conor Bush	Linda O'Dwyer	Sinead Kelly
Dave	Lucy Blute	Stephen Kennedy
Dave Convery	Lucy Dillon	Stephen Rooney
David McCormick	Lucy Weir	Thomas
David Tilly	Lucy White	Thomas Coyle
Dawn Diamond	Maire O'Brien	Tim Regan
Declan Collins Leo Boyle	Marguerite Carthy	Tommy Weir
Deirdre Burns	Marian Duff	Trevor Orr
Diane Orr	Mark Daly	TCD Env. Society
Edward Farren	Mark Boyder	Trish Murphy
Elaine O'Riordan	Mark Daly	Wicklow Tidy Towns Group
infoEmer Doyle	Marlene Bean	Zac Longeran
Emma Anderson	Matguerite Carthy	Zoe Stevenson
Enda Craig	Matt Tuite	
Esvy Bell		

# TABLE OF CONTENTS

HISTORY OF COASTWATCH AND NETWORK AIMS.....	5
EXECUTIVE SUMMARY .....	6
INTRODUCTION .....	8
METHODS.....	9
RESULTS PART 1: COAST SURVEYED AND ITS CHARACTER .....	10
1. Coast Surveyed.....	10
2. Access to High Water Mark .....	11
3. Hinterland.....	12
4. Inflows .....	14
RESULTS PART 2: BIODIVERSITY .....	18
1. Habitats & Select Plants .....	18
SPLASH ZONE HABITATS.....	18
INTERTIDAL HABITATS .....	21
2. Animals found.....	23
3. Extra Biodiversity Questions.....	27
Fish.....	27
Worms .....	28
4. New species and Invasive Alien Species.....	31
RESULTS PART 3: WASTE, LITTER AND POLLUTION .....	35
1. Large Waste.....	35
2. Litter Counts: drink containers, plastic bags, tyres and other .....	41
3. Presence of Small Litter .....	50
4. Micro-litter .....	57
5. General shore littering and shore cleaning .....	63
RESULTS PART 4: SURVEYOR VIEWS AND KNOWLEDGE .....	65
1. Familiarity with the Area .....	65
2. Designations: Type of Designations and Awareness .....	66
3. Surveyors perceptions and value of the coast .....	73
4. Threats to the Shore.....	78
ANNEXES .....	80

## HISTORY OF COASTWATCH AND NETWORK AIMS

The Coastwatch Europe (CWE) survey was first designed and tried in Ireland in 1987 by the International Co-ordinator, in cooperation with the Irish Times. With EC aid, the survey was then disseminated to eight European countries in 1988. The first large scale survey was carried out in 1989 in Norway, Denmark, Ireland, Netherlands, Portugal and the UK, and on a pilot scale in Iceland, Germany, Belgium and Italy. Participation grew in 1990 with Latvia, Spain and Sweden joining. In 1991 the survey area was further increased with the inclusion of Greece, Estonia, Lithuania and Poland. In 1992 France, Bulgaria, Ukraine and a corner of Finland were added and in 1993 Russia joined. In the same year, Japan brought 50 volunteers for training and then tried the project at home. In 1996 Romania joined. It was the year in which international coordination handed out analyses programmes to national teams to start reporting results at home and focus on follow up work to improve matters on the ground – provide the coastal public with information and deal with democracy issues – public participation in coastal zone management, planning and access to information. Several post graduate projects developed and PhDs were completed using Coastwatch methods. A faecal streptococci water pollution test kit design by Prof. Ronald Russell with students was later used internationally. Coastwatch was supported by EC project funding to do joint training, data gathering and problem solving follow up work. Depending on country and time period, coordination was carried out by volunteers, part or fully funded teams.

The survey is one base project shared by the Coastwatch Europe network members. General network aims put the role of the survey into context:

1. Training and education of volunteers and students in fieldwork, basic reporting methods and relevance of Coastwatch shore quality and problem survey results obtained to policy and legislation (from local to national, EU and international conventions).
2. Gathering baseline data about the European coast for use by local communities, authorities, governments, research organisations and NGOs.
3. Raising awareness of our coastal zone as a rich, diverse European commons and as a valuable shared resource, for which we have responsibility.
4. Giving back up and expertise to members of the public wanting to participate actively in coastal zone management (CZM), or specific protective and remedial action.

With time, the focus broadened from waste and pollution to the natural environment and to coastal social and human rights issues. Lawyers joined national teams in several countries. Free legal and scientific aid was offered and significant law enforcement cases were taken, as well as specific waste product changes achieved. As follow up work grew, national questions were added to the base survey questionnaire. The network went through a national focus period.

As the new EU Marine Directive (MSFD) is starting to be implemented, network members are planning an international survey once more. A new Google Earth, GIS and social media based survey approach was successfully designed by our Spanish volunteer researcher in Ireland. This will be presented for international use in the spring 2014 meeting for network members and use in the Coastwatch Europe autumn survey.

## EXECUTIVE SUMMARY

Results for the island of Ireland Coastwatch 2013 shore survey are based on reports from >900 volunteers reporting on >600 survey units (where 1 s.u. is ~ 500m shore length). After removal of duplicates, 547 survey forms were used in the report. After further stripping out (partially) inaccessible sites 498 s.u. were used in the analyses of biodiversity and litter parts of the 2013 report. This represents ~ 3.7% of accessible island of Ireland shore and includes some islands off the island of Ireland – like Inis Oírr.

**Survey Method:** Volunteers from all walks of life chose and booked their survey areas online, or through regional coordinators who sometimes joined groups to cover a longer stretch of coast. After preparing, they carried out a snapshot audit of their s.u. from hinterland down to low water completing survey questions and water tests while on the shore. Some collected micro-litter samples. The survey ran Sept. 15<sup>th</sup> to Oct. 15<sup>th</sup> with extension until 31<sup>st</sup> Oct. Results were returned online or by post for analyses, and mapping using GIS.

### BIODIVERSITY HIGHLIGHTS

Volunteers looked for special sensitive inshore habitats and species.

**Honeycomb worm *Sabellaria* reefs** were found on new sites around Rathmoylen Co. Waterford. These biogenic reef creations, are well camouflaged. Surveyors sent photos to verify records which came from counties Wexford, Waterford, Kerry, Galway and Donegal. The Waterford reef may now be the longest in the country, stretching from the Hook peninsula into the Waterford estuary and out west past Tramore Co. Waterford. In N. Ireland, a reef was located at Little Deer Park Glenarm on the Antrim coast.

**Native Oyster *Ostrea edulis*.** Live native oysters, which are now very restricted in distribution were reported from Tralee Bay, Galway Bay and Lough Swilly, as well as two other sites outside the present officially known range. Old shell halves were widespread, reminding us that this was a common shellfish.

**Biodiversity Hotspots** were found where shore life was just breath-taking with a huge diversity of molluscs and seaweeds like the Galway/Clare border shore in Galway bay. Surveyors found scallops and native oysters, sea grass, and restricted limestone lovers like the strawberry anemone, all in adjacent survey units.

**River bed Quarry:** The unlicensed **cross border quarry** on the apex of Lough Foyle at Inis More (cSAC for salmon) covered in the 2012 survey by Donegal Coastwatchers has been halted by court order.

### CHANGE

This autumn's survey yielded more Jellyfish observations than in any previous survey. The most northerly record of triggerfish was made at the end of the survey and natterjack toad tadpoles were found in Kerry splash zone ponds. Nature appears to have responded to the abnormally long warm summer, which drove sea temperatures up - the type of weather conditions and sea changes predicted with climate change.

A change in the mussel spat fall appears to be happening with no spat records on Irish Sea shores surveyed and reduction noted in size of old mussel beds like Rogerstown North Co. Dublin.

### BIODIVERSITY LOWLIGHTS and CONCERNS

#### Invasive Alien Species

**Plants:** Japanese Knotweed and *Spartina* grass were reported from the water's edge of further sheltered areas and from more exposed areas of the Wexford coast New Zealand flax and Sea Buckthorn as large monocultures, the latter especially in dunes. Japanese seaweed *Sargassum* records came from one Tramore site in 5 s.u..

**Animals:** The Pacific Oyster *Crassostrea gigas*. (also known as Japanese or Gigas oyster) was reported growing on rocks in Lough Swilly, Donegal, Galway Bay and in Clew Bay Mayo. These are Natura 2000 sites with previous invasive Gigas oyster record. In Lough Swilly and Galway bay the Coastwatch survey findings represent further spread within those sites.

#### Habitat Damage and Waste

Inappropriate erosion control, wetland infill, vehicle tracks, bait digging without backfill and aquaculture were the most widespread splashzone and intertidal damages noted. Examples included historic construction waste dumped as erosion control at Dublin's Ringsend Park and new as in Bannow Bay, Co. Wexford and Dungarvan town Co. Waterford. In Youghal a wetland between old landfill and harbour part in filled last year has extra material added. In Bray, Don Laoghaire Rathdown, the old dump is falling into the sea. New damage records included protected saltmarsh infill with earth and stone in Trabeg, Tralee bay. Defunct aquaculture installations were reported from 52 locations including Lough Foyle.

## WASTE AND LITTER

Waste and marine litter were reported from large down to micro level with some items counted, others just recorded as present or absent. Select results are expressed in this report as possible indicators for the new marine law (MSFD) Litter Descriptor, also exploring what 'Good Environmental status' may be.

**Tyres** were reported on 21% of the coast - usually as single occurrences, while large clusters are associated with used tyre crab traps in estuaries. **Landfill materials** were noted in 1 of 5 sites. All municipal waste dumps build into the shore are now officially closed and 3 dump faces were included in the 2013 survey. Of these the old Bray dump is actively eroding. **Household refuse** in bags or sacks was reported in 7.7% of surveyed areas. There was a welcome absence of farm animal carcasses.

**Drinks container litter** was the most widespread macro litter encountered and increased slightly over 2012. While hot 2013 summer weather, with more people on the shore would have increased the use of beverage containers near and on waterways, there has also been a trebling of sites deemed to have been cleaned in the week of the Coastwatch survey. **Plastic bottles** were noted in 85% of s.u. and 14,910 plastic bottles were counted - an average of 30/s.u. An increase in volume and range over the previous year and joint highest ever. However, **can** counts of 4339 distributed over 63% of shores (9/s.u.) was the lowest count ever. This count is less accurate as modern can body metal dissolves quickly and grey metal pieces are easy to overlook. The 267 can holders in 13% of s.u. add to the drinks can litter. **The 1393 (3/s.u) glass bottles**, almost doubles the average per s.u. found in 2012. **Tetra pack** containers remain least frequent with a count of 683 averaging at 1/s.u.

There were one or more **plastic shopping bags** in 47% of survey units. The average count of 2.7/s.u. is slightly higher than in 2012 and just above the upper range of  $2\pm 0.5$  bags/s.u. maintained since the bag tax was introduced. While highest in the areas where most drink container were found, single bags showed a larger spread than in 2012. The small NI sample had less plastic bag litter but with a wider spread (54% of shores).

Mapping surveyor reports of other small litter, shows that after 'plastic bottles', the most widespread **litter** was a mixed category of fishing/angling/aquaculture gear. 'Clothing' including shoes and gloves ranked third and 'Other plastics' fourth. A question asking surveyors did they see litter which may cause animal harm, brought a range of answers with balloons mentioned several times.

Surveyors reported seeing visible lines or patches of micro litter on 86 sites (17%). This new question data is only indicative. The 45 sediment samples posted to Coastwatch from micro litter spots were analysed and polystyrene beads returned as the most common litter item under 10X magnification.

## INFLOWS

**Stream, drain and piped discharge quality** reported were an improvement over previous years, however in contrast to previous years, most surveys took place before autumn rains started and this may have influenced results for nitrates. While numbers and volumes were low, 8 of the 416 inflows carried oil and 15 sewage &/or sewage fungus. Nitrate tests carried out by surveyors on 81 inflow water, showed that in just over half tested, nitrate levels were below detection by our field test method (10 mg/l) - an improvement over the previous year.

## SURVEYOR CONCERNS AND BACKGROUND INFORMATION

**Knowledge of protected sites has improved this year.** Correct identification of Natura 2000 sites continues to increase and was now correct in 50% of sites, but NHAs are still unknown. Training sessions are thought to have helped.

**Shore cleaning** in the week before the survey is the highest on record. Shore cleaning has increased steadily from 1-2% in the 1990s, to 4% in 2012, to 12% of shores for which surveyors had that information in 2013.

Surveyors who reported **threats to the shore** mentioned erosion most frequently as in all previous years. This was followed by water pollution and recreational abuse. Aquaculture has come up from a very low base to now rank 4<sup>th</sup> overall but highest in some west coast locations. The threat of construction in the coastal zone is well down from peak Celtic tiger days.

**Shore values** which ranked highest were nature related and included in half of all value responses. This was followed by landscape (30%) and ambience and particular coast use. Cleanliness ranked sixth (8%).

## INTRODUCTION

The Coastwatch shore survey is designed to give an overview of the state of the coast (see questionnaire, Appendix 1). It involves volunteers from all walks of life, checking chosen 500m stretches of coast once around low tide, and jotting their observations down on survey questionnaires while on the shore. They then transfer that information to an online survey form, or post it to the Coastwatch national team for data input.

The observations and surveyor local knowledge cover a wide range of coastal quality indicators. Some are easy to see and report on while others require training and extra effort, or careful survey timing to check for low water shore life. A subset of the data collected could be very useful for monitoring under the Marine Strategy Framework Directive (MSFD). The monitoring programmes are being developed by governments across the EU for delivery by mid June 2014. The Directive provides for public participation.

### Identification of Survey Units

A survey unit (s.u.) is a stretch of shore approx. 500m long as measured along mean high tide mark. The width of shore covered by surveyors is from hinterland edge down to shallow water at low tide.

In previous years the coast had been divided into 5 km long survey blocks on Ordnance Survey paper maps. A map extract was posted out to block coordinators, who then subdivided their block into 500m survey units and planned the survey together, often with social collating and feedback sessions. The unique ID code of each survey unit, noted on the map and then the top of the questionnaire, was based on the CORINE system: First a country code, then county, then 5km block and finally s.u. code, moving in clockwise direction in each country. In Ireland that was from the Carlingford border in Co. Louth, to L. Foyle in Co. Donegal, and from Co. Derry/Londonderry to Co. Down in Northern Ireland.

In 2012 a pilot system was developed for quicker and more informative access to the survey map. The coast was divided in 500m survey units using open source GIS. The base coastline feature was extracted from the Open Street Map project. This had some limitations. The coastline feature was uneven, with a poor match to the actual coast along the Atlantic seaboard. To have access to the map, surveyors were asked to download a KML file, which many surveyors found challenging.

The system was improved for the 2013 survey with a complete re-digitizing of the coast to provide required detail throughout. The 500 m s.u. lengths stretch into estuaries and include all coastal and some transitional waters as currently set under the Water Framework Directive (WFD). This approach yielded 15,644 survey units – i.e. 7822 km of coastline for the island of Ireland. Unfortunately the re-digitisation loses the exact new 2013 survey unit to 2012 survey unit map overlay opportunity, but broader comparisons are still possible and from now on site locations should be settled. Maps may only be extended higher up estuaries or to include more islands, but the position of established survey units will remain in place to allow direct comparisons of data from a survey unit over time.

Maps are displayed on the WorldMap platform, an open source project developed by Harvard University ([www.worldmap.harvard.edu/maps/cwsurveyunits](http://www.worldmap.harvard.edu/maps/cwsurveyunits)). When opened it displays the coastline of Ireland north and south, coloured alternating blue and white, with each colour segment denoting a 500m s.u. When a coloured line is clicked, it turns red and the unique ID code pops up. This code is noted on the hard copy survey form. The map may be printed as screen shot, or end points sketched, or checked on the phone when out surveying, where there is internet access on the shore. The platform allows users to switch the background from a variety of satellite images and roadmaps, facilitating a more accurate identification of the start and end point of the coastal units and of features.



## METHODS

The Coastwatch 2013 survey materials were available online, but also distributed through the (regional) coordinators by post on request. The full set comprised of:

- **Survey Questionnaire 2013:** The international Coastwatch base questionnaire with extra Irish questions and an Irish biodiversity poster for species identification. (Reprinted inside back cover)
- **Survey Guide Notes:** With detailed instructions on how to participate and survey question explanations.
- **Water quality test kits:** Nitrite/nitrate with colour charts and instructions for use in fresh water inflows.
- **Sample containers:** For the micro-litter study along with instructions on how to take the samples.

**Finding surveyors, booking areas and monitoring progress:** Surveyors were invited to participate via newspaper, Facebook, Conservation Volunteer notices and environmental group networks. To book a survey site, surveyors were asked to go online and chose one or more survey units (as shown on Figure 1 below).

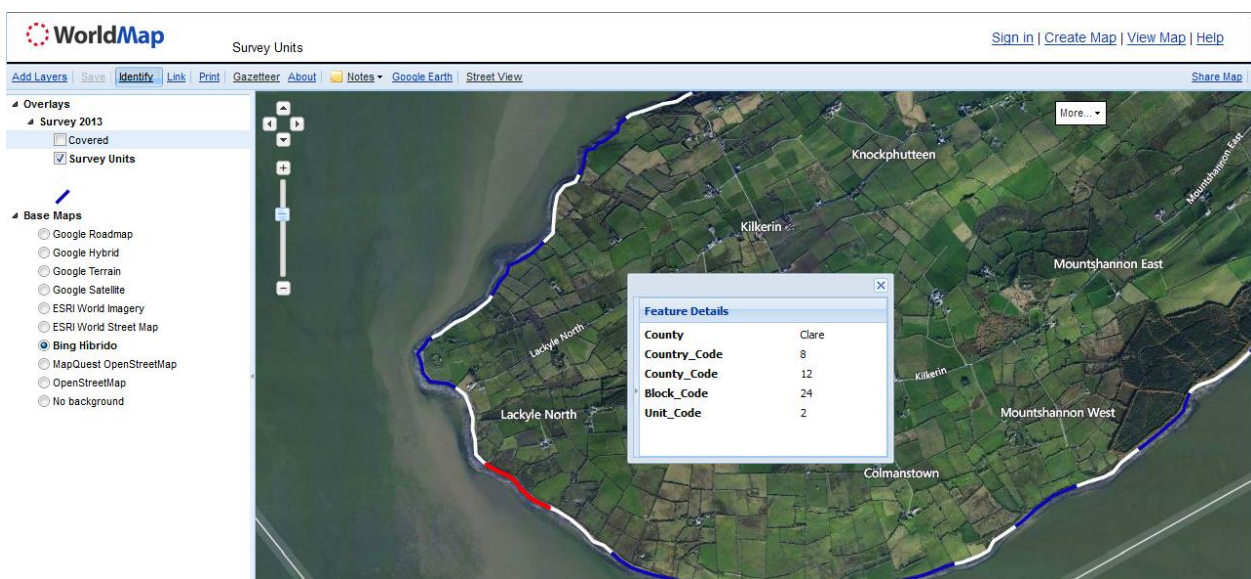


Figure 1. Worldmap online viewer of coast with 500m survey units and highlighted red survey site ID in window.

The surveyor or group leader would then inform the regional or national coordination team that the site was booked. On request coordinators helped chose sites and provided hard copies of site screen shots with codes and survey materials as a pack to surveyors.

Progress in bookings and results forms received back by central coordinators was shown in 3 day and later weekly updates of the booked and surveyed sites on the Worldmap web map viewer.

**Coordination and communication:** A request for regional coordinators went out to those who had done the task before with some new contacts. They ranged from local authority environment officers, environmental groups, teachers, fishermen, scientists. The main regional coordinator tasks were to inform their network of contacts, answer surveyor questions regarding site allocation, and to carry a stock of test kit and questionnaire materials so surveyors could drop in and collect these.

Thanks to Environment Fund sponsorship some 17 training sessions were organised, with the regional and national coordination team help. These focussed particularly on the biodiversity questions.

**Data compilation and analysis:** Surveyors entered their data directly via the online input form on the Coastwatch website, or posted the questionnaire and any sediment samples to TCD, for data input. Data was reviewed, analysed and mapped. Unusual finds were followed up by contacting surveyors. Where several surveyors had covered the same survey unit the results were compared and only one, normally the first, or the most detailed was used in the final analysis.



## RESULTS PART 1: COAST SURVEYED AND ITS CHARACTER

### 1. Coast Surveyed

In 2013 approximately 600 s.u. were completed on the island of Ireland. A few of these were lost due to a problem with the input program, some were duplicates and some not accessible. That left 547 s.u. for use in the main results analysis – or 3.7% of the island of Ireland coast.



Figure 2. Areas surveyed in the Coastwatch autumn 2013 all Ireland survey

Northern Ireland which only started the new GIS method survey on a pilot basis delivered 26 survey sites and the Republic of Ireland carried out 521 surveys. The graphs below show the amount of coast covered in each county. Waterford had the most surveys with 115 surveys returned, followed by Kerry with 81 sites. The short Meath coast had the best representation with its entire coastline covered by surveyors.

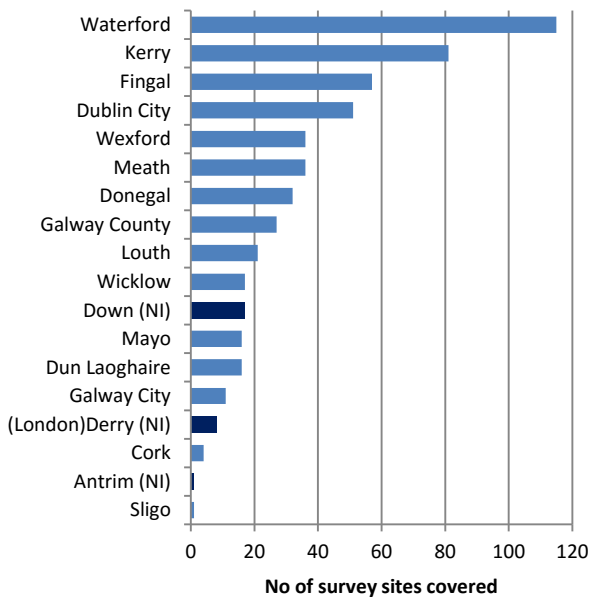


Figure 3. Survey units by County (N =547 s.u.)

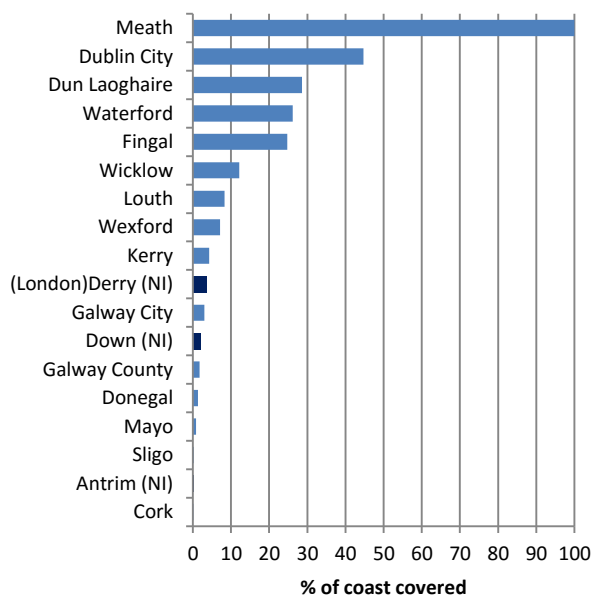


Figure 4. Percentage of coast covered by county

Most surveys were carried out on weekends and during spring tides. The highest peak coincides with the official end of the survey. The survey was extended by another two weeks, as seen in figure 5 below.

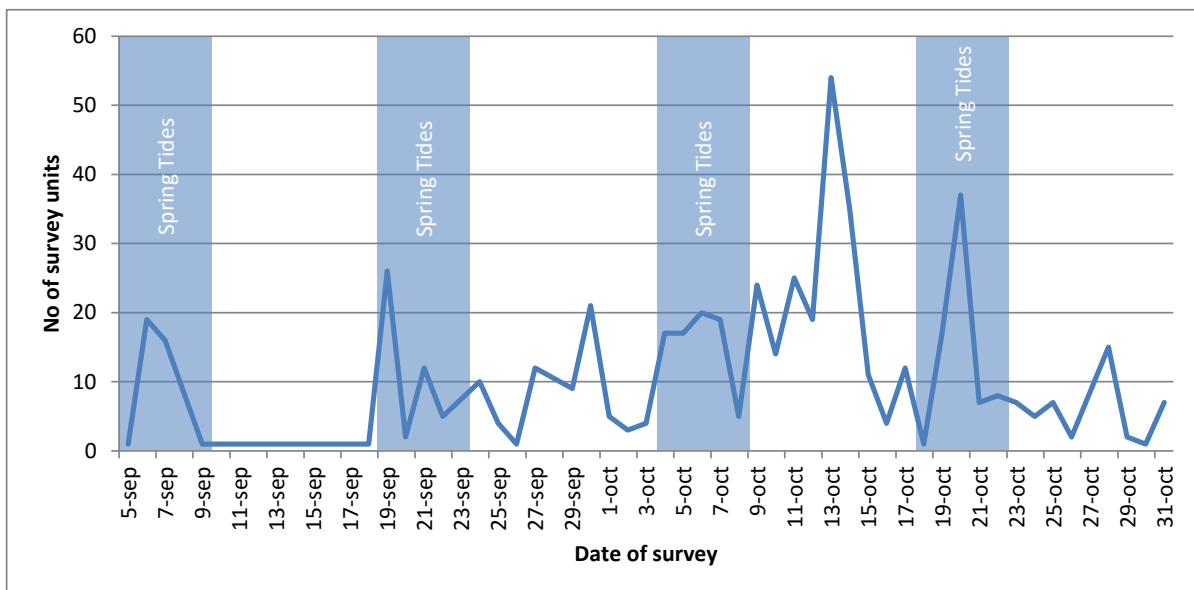


Figure 5. Date of the surveys. (N= 547 s.u.; Source: Question A4). The blue bands indicate the occurrence of spring tides.

## 2. Access to High Water Mark

Volunteers were asked to note whether there was access by foot, wheelchair or car to the high water mark. It is important to know the access to the coastline in case of an emergency and to have up to date information after storms may have damaged access. Some areas are completely inaccessible from land due to steep cliffs or prohibited areas, but it is possible to access the shore via another survey unit.

Results show that 419 s.u. (77%) were accessible by foot and 166 (30%) by vehicle. Access was prohibited (or restricted) in 21 s.u. Of the 110 s.u. which surveyors describe as difficult to access 49 (4%) were

inaccessible both from land above and via another survey unit. Surveyors usually include inaccessible sites, when sandwiched between accessible ones in a longer stretch of coast. As inaccessible sites miss information on sections B, C, D and E they are omitted from the result analyses of those sections.

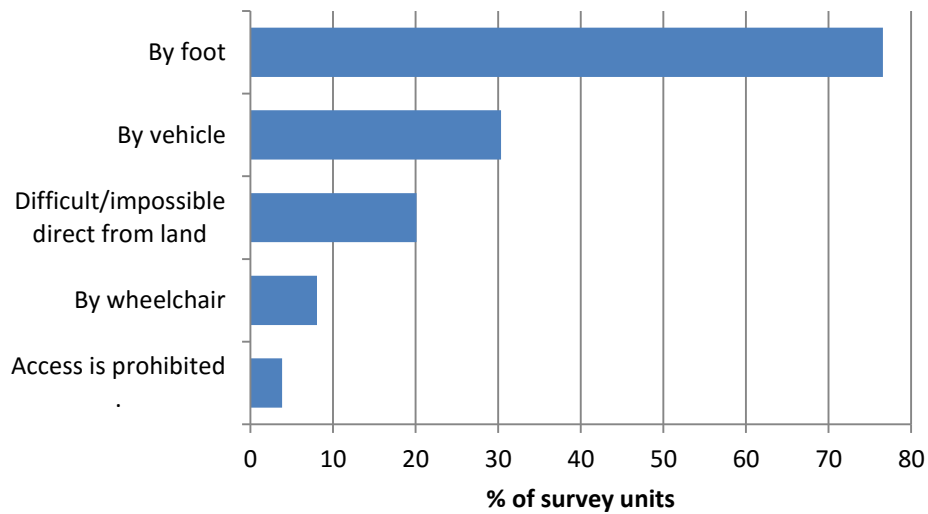


Figure 6. Type of access to survey units (N=547 s.u)

### 3. Hinterland

The immediate hinterland is described (for this survey purpose) as the first up to 500 metres of land, immediately above the splash zone of the survey unit. Often it includes a sea road which may be vulnerable to erosion.



Closed sea road in N County Wexford as erosion threatens. Picture by Paul Dubsky.

The limits of the shore aren't always clear and soft shores may change dramatically in storms. The Foreshore Act is currently being amended. The definitions below may help:

**Shore definitions in the Foreshore Acts 1933-2005:**

The **“Foreshore”** means the bed and shore, below the line of high water of ordinary or medium tides, of the sea and of every tidal river and tidal estuary and of every channel, creek and bay of the sea or of any such river or estuary; (referred to as the intertidal and sub-littoral in the Coastwatch survey.)

The **“seashore”** means the foreshore and additionally every beach, bank, and cliff contiguous thereto and includes all sands and rocks contiguous to the foreshore (in the Coastwatch survey that means extending landwards to the upper limit of the splashzone). However in the Irish translation of the Act, the landward end of the seashore is defined by ‘where marram grass (if present) ends’. Marram grass can extend well beyond the foredunes in areas where wind can move sand inland. The Forshore act “seashore” is normally equivalent to a Coastwatch ‘splashzone’, except where marram grass is found further inland.

**“Tidal lands”** means the bed and shore, below the line of high water of ordinary spring tides, of the sea and of every tidal river and tidal estuary and of every channel, creek, and bay of the sea or of any such river or estuary – i.e. right up estuaries into the tidal, but already fresh water apex.

The graph below shows the percentage of survey units for each given hinterland, ranked from most to least frequent. Most s.u. contained several types. The dominant hinterland type was ‘village or town residential’ which was found in 34% of the s.u. - a slight shift towards residential areas in the 2013 survey compared to 2012 where it was ‘Farmland: rough grazing’ was second at 26%.

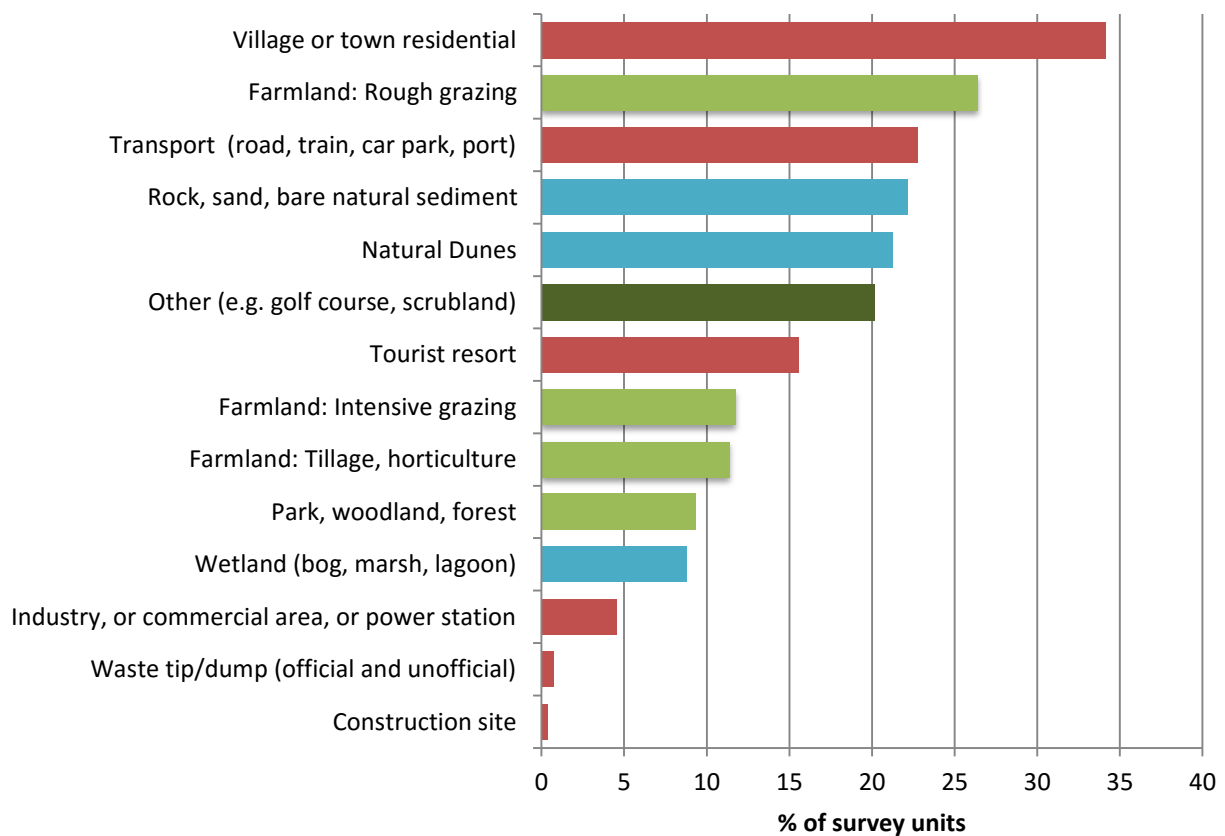


Figure 7. Percentage of survey units for each hinterland category

In this year’s survey, there were some alterations to the hinterland types. Scrubland was moved from ‘rough grazing’ into the residue ‘Other’ category to pick up rough grazing and any changes in this land use in future years. Of those who recorded ‘Other’ hinterland and provided further information, 36 units were noted to be golf course and 15 scrubland. Many more may have seen some scrubland in the hinterland without noting it.

There is a higher percentage of coast in urban/residential areas this year, from 32% to 34%, which may account for the small amount of scrubland. However, the bias towards beaches is no longer present.

## 4. Inflows

The inflows section in the survey looked at four types: rivers, seepage, drains and pipes. In urban areas most of the small rivers and streams have been piped and are no longer visible above ground. Surveyors walking each survey unit are requested to count the total number of inflows and give details on up to four.

As August and September of 2013 were much drier than usual, many normally active inflows were dry. Rainfall during August was below average almost everywhere, with parts of the West and Midlands reporting the lowest average rainfall. Belmullet recorded its driest August since 2005. Monthly rainfall values at some stations in the North, Southeast, Southwest and Midlands were the lowest for September in at least six years.

The EU Water Framework Directive requires all member states to protect and, if necessary, improve the quality of all our inland and coastal waters and to prevent their further deterioration. We need to know the state of our waters if we are to comply with this Directive and take action is needed. The condition of the inflows can affect the state of coastal waters especially in shallow enclosed areas where pollutants carried downriver into the sea may settle in estuarine muds.

### Types of Inflows

A total of 416 inflows were recorded this year. Piped inflows were the most common making up 40%. The majority were small pipes that take run-off from the nearby roads and footpaths in town or act as field drains in the country. They might only have water for a short time after rainfall.

Just under one third (28%) of all inflows were rivers or streams, with large rivers accounting for only 3%. Drains and seepage made up the remaining 32% of inflows.

Due to the generally dry weather, the seepage recorded this year is lower than in previous years. If there was no bad smell (seepage from septic tanks or other source of pollution) then these seepage areas may be exciting freshwater zones supporting interesting vegetation and sometimes calcite deposits.



Bannow Bay. Picture by surveyor.

For a given amount of rain falling on an area, the portion retained or running off as inflows into coastal waters, depends on a number of factors including the geology and land use of the hinterland. In picture opposite water is seeping out from the eroding rock covered in green algae. Here (inner Bannow Bay) we found high nitrate levels but in small volumes.

Natural vegetated terrain can hold water and minimise run off, allowing the water to infiltrate and slowly move. Urban landscapes tend to be more sealed and cause rapid run off and dragging more residues.

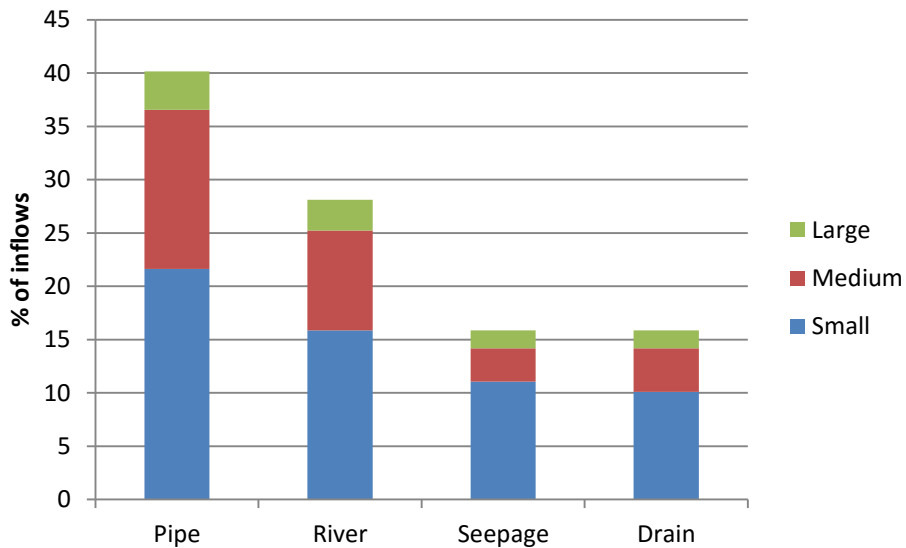


Figure 8. Type and size of inflows. (N=416 inflows; Source: Question B2. Totals: Pipes 167; Seepage 66; Drains 66; Rivers 117)

### Water Quality Indicators

Surveyors were asked to examine any inflows and record potential and real signs of pollution listed - bad smell, discolour, dead fish, dumped debris, sewage and oil. Additionally some had access to nitrite and nitrates test sticks and recorded water nutrient levels.

Discolour/scum/froth was the most common observation with 50 instances (9% of inflows) found. In high autumn rainfall years we expect this parameter to be mainly due to natural discoloration and foam from high turbulence and silt carried in flood waters but this year was too dry for this to be the case.

The next most common was a bad smell with 21% of inflows affected. This is usually due to contamination from septic tanks, sewage treatment works or farm waste.

The worst inflows showed signs of 6 different types of pollution. There were 5 such cases (with 3 of them in Co Down) and 3 cases with 4 poor quality indicators. There were 8 cases of oil pollution and 15 cases of visible sewage or sewage fungus, most of them occurring in rivers.

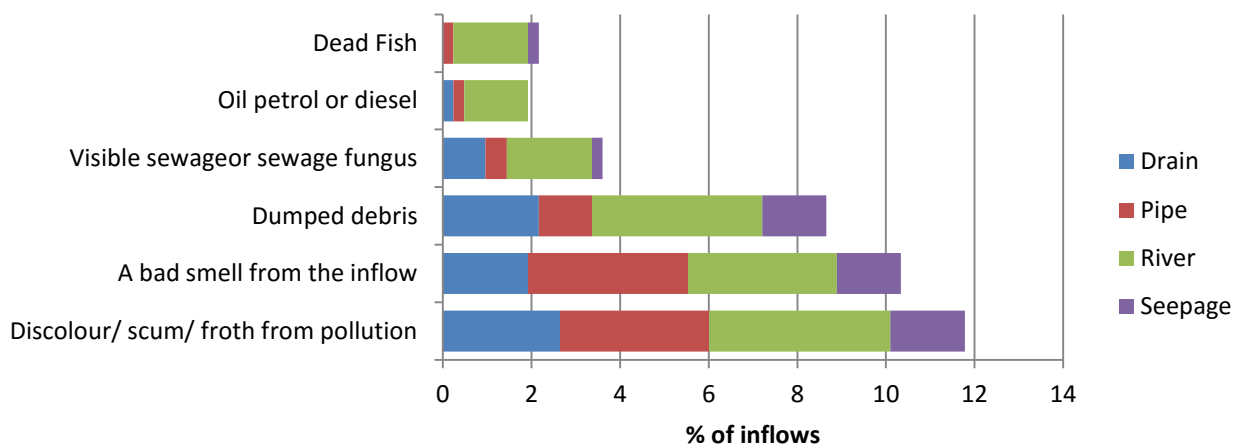


Figure 9. Percentage of rivers, drains, piped inflows and seepage reported with water quality issues when surveyed. (416 inflows in 498 survey units)

## Animal life on inflows

This year surveyors found animal life on 58 inflows (14%), a significant increment from 2012 when animal life was found only in 6% of inflows. This is good news as animal life is a good indicator of the absence of pollutants. Of the 58 inflows with records of animal life, 30 were fish and the remaining 28 correspond to any other form of life such as insects, birds etc.

## Nitrates

Nitrates and phosphates are the key nutrients that are needed for life, but become a problem when present in oversupply causing eutrophication. Simple field detection kits are produced by several companies including Merck, who also produce an individually wrapped version of nitrate/nitrite tests which are affordable and robust for widespread use.



Figure 10. Colour chart for nitrate/nitrite testing. Students from Ardscoil Ris, Dublin surveying at Clontarf. Photo Michael Walsh.

Apart from visual and smell information surveyors who sent a request were also furnished with individually wrapped Merck Nitrate/nitrite test kits, colour charts and instructions to test their inflow once during the survey. Results for 81 of the 416 inflows encountered are presented in the pie chart figure 11 below.

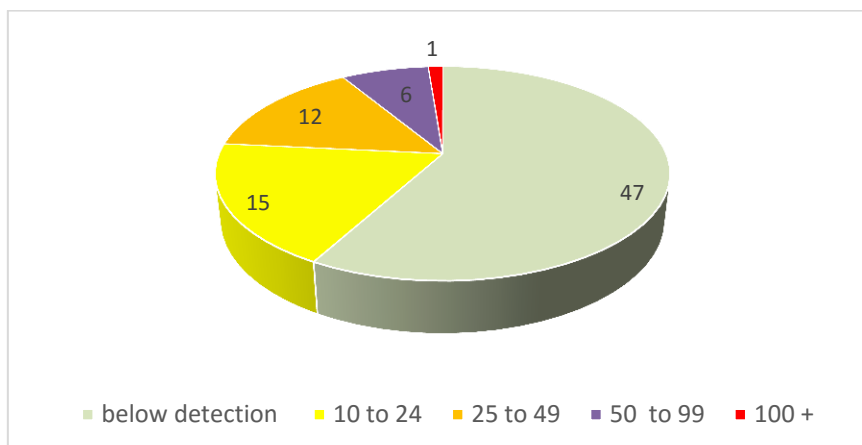


Figure 11. Nitrate concentration (mg/l) of inflows (N=81 inflows; Source: Question B2).



Nitrites: There were 12 reports of nitrites ( $\text{NO}_2^-$ ) detection with all others not reporting and assumed to be below detection as this form of nitrogen quickly reverts to the more stable nitrate ( $\text{NO}_3^-$ ).

Nitrates: While the tests do not go down to background levels – which can be as low as 4mg/l in some clean streams, 53% of all inflows tested had nitrate levels below detection – that is below 10mg/l  $\text{NO}_3^-$ . This is a very encouraging result and now brings two consecutive years where more than half of tested inflows had nitrate levels <10mg/l. Water in fifteen inflows had nitrate concentrations between 10 and 24 mg/l. That still left 12 inflows (14%) with 25-49mg/l which is a significantly raised nitrate level and 10% above 50 mg/l  $\text{NO}_3^-$  with one of these breaching the 100mg/l concentration. The previous year 20% of the inflows had 50 or more mg/l  $\text{NO}_3^-$ .

While it is likely that the exceptionally dry autumn prevented nutrient loss from farm and garden soils, it should also be noted that this time the highest nutrient level horticulture sites were not included in the nitrate tests.



Photograph of stream inflow. Picture by surveyor.



## RESULTS PART 2: BIODIVERSITY

Our shores are host to a wealth of biodiversity. In Irish waters alone, there are over 450 species of seaweed, some of which aren't found anywhere else in the world. Biodiversity is fundamental to our economy and some of the life found along our beautiful coastlines draws visitors from all over the world. Yet nature often takes a backseat to many other activities, and the abundance of life on our shores has declined in many places. There are people who are working hard to protect our coastlines, but without the support of those who really enjoy these areas every day, they often fight a losing battle. Increasing knowledge and support on the subject of coastal biodiversity is so important, and spreading awareness and encouraging the public to open their eyes to the wildlife around them is what we attempted to do with this part of the survey.

Some species can be spotted at a glance because they are found in easily accessible areas on our coasts, like rock pools and sandy shores. They stand out, or are common enough that people will notice that they're there, even if they're not looking for them in particular. Limpets, common wracks and shore birds are a few examples of those species of which a lot is known about their abundance and distribution. Many other species are just hidden away under mudflats or are small well camouflaged like chitons and go unnoticed. Habitats like sea grass beds that grow in the intertidal zone can be overlooked simply because they are quite similar to some green seaweeds and maybe mixed with them. Extra effort was made to have fieldwork training sessions to help discover fragile less known shore life like honeycomb worms.

### 1. Habitats & Select Plants

In question C2 surveyors were asked to note what the splashzone was mainly composed of, with options of important wetland habitats - salt marshes and reed beds, to sand gravel shingle and rock. There were also two man-made constructions: an option for buildings, quays etc. and one for erosion control measures.

#### SPLASH ZONE HABITATS

Salt marsh was reported in 40 out of 498 (8%) s.u., salt marshes are a habitat listed in the EU Habitats Directive and many are designated as part of large coastal Natura 2000 sites. These are invaluable to coastal ecosystems aiding the nutrient cycling between terrestrial and marine systems, and stabilizing the coast by trapping sediment, which buffers against wave action. The saltmarsh channels can be important for fish nurseries and the grass is very rich in nutrients so favoured by geese and for summer grazing. In 1998 an inventory was done in the ROI, identifying 238 salt marshes around the country.

Although threatened by overgrazing, from land reclamation and infilling for agricultural use, the latest available survey of saltmarshes by the NWPS (2009) concluded that this habitat is in overall good condition. Coastwatchers recorded more frequent flooding in several sites, more raised banks to overcome the flooding and some infill turning marsh into raised made ground. That included one now being addressed by Kerry County Council at Trabeg estuary. The surveyor noted: 'this whole area was salt marsh, but is now freshly filled in. Additional piles of sand and mud have been brought in and a large pile of railway sleepers.'



Figure 12. Map and photos of Trabeg Co Kerry unauthorised protected saltmarsh infill Oct 2013 photo surveyor

Reed beds were found in 4% of survey sites (20 out of 496). These are wetlands covered in long grasses, usually dominated by *Phragmites australis*, the common reed. While young reed beds will colonise open water, as a reed bed ages, it will begin to retain a sediment layer, and as a result also functions well as flood control. Although not listed in the EU Habitats Directive, reed beds are very important for biodiversity, providing a range of habitats (across their dry and wet areas) for many species of invertebrates, amphibians and fish, as well as small mammals and birds. Reed beds are incredibly efficient at removing microorganisms from water (using them for their own growth), and as a result are often artificially constructed to treat sewage.

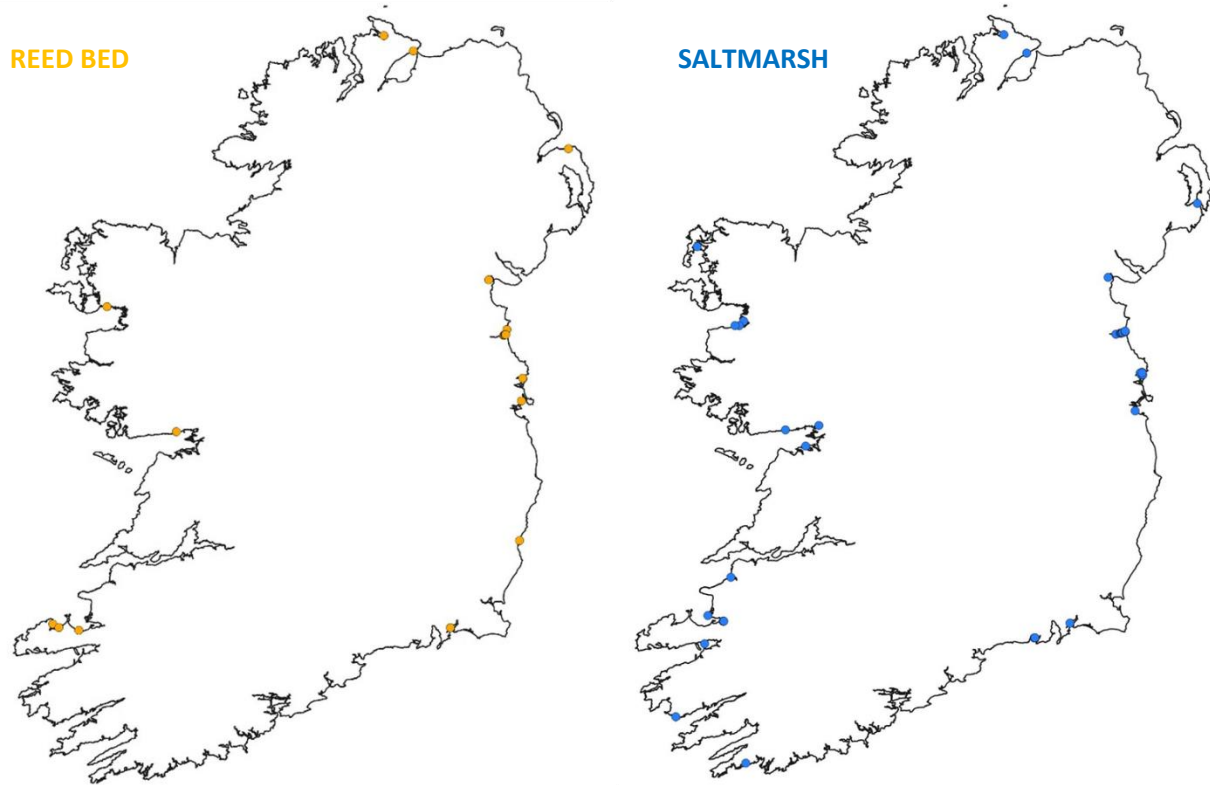


Figure 13. Mapped records of reed bed(left) and saltmarsh (right) habitat encountered on surveyed shores ( N=498).

**Marram grass** was found in 12.5% of sites, matching the areas where either known dunes exist, or narrow transitory dune fringes have developed, which grow and contract depending on wind and currents. Marram grass has long matted roots which bind sand and can provides stability. With erosion being of particular concern in some survey units, marram grass is important in the maintenance of mobile resilient coastal ecosystems. After erosion events, one can see the long roots hanging down with root nodes ready to sprout new plants once buried by blown sand. In the 2013 results there are areas of dune growth at Baltray North of the Boyne estuary, the flat dunes of Bull Island, Dublin Bay and the tip of the Tramore sand spit. Areas of accretion can be right beside steep eroding dunes. One unusual occurrence of marram grass is high on boulder clay banks. e.g. in North Wexford . Here the wind can be seen fetching sand off the beach and throwing it high up onto the sea bank where it sticks like a veneer. If the veneer is thick enough marram grass seeds can germinate and grow. Marram grass can be out-competed by other species including sea buckthorn and New Zealand flax – see invasive alien species below.

Other plants mentioned were the waxy edible Rock Samphire frequent on the south and east coast.



(Left) Sea buckthorn taking over marram grass foredune and (right) Rock Samphire. Pictures by Karin Dubsky.

## INTERTIDAL HABITATS

Question D3 asked surveyors to look for plants in the intertidal and results are graphed below with potential problem plants marked in red and those listed as EU habitats in green.

Brown seaweeds were found in 76% of shores - this was followed by dislodged seaweeds on the tide line. Green seaweed in patches or bands was found in 41% of shores and green seaweed carpets which are taken as nutrient enrichment (eutrophication) indicator in 16%. The rarer the plant the more scope for misidentification. At time of going to press the highly valued sea grass *Zostera* reports and the Cord grass as potential invasive are still being verified and may have to be revised down, but Glasswort records at 6% of survey sites are confirmed.

The responses were similar to those in 2012 and previous years, though carpets of green seaweed used to be more frequent a decade ago.

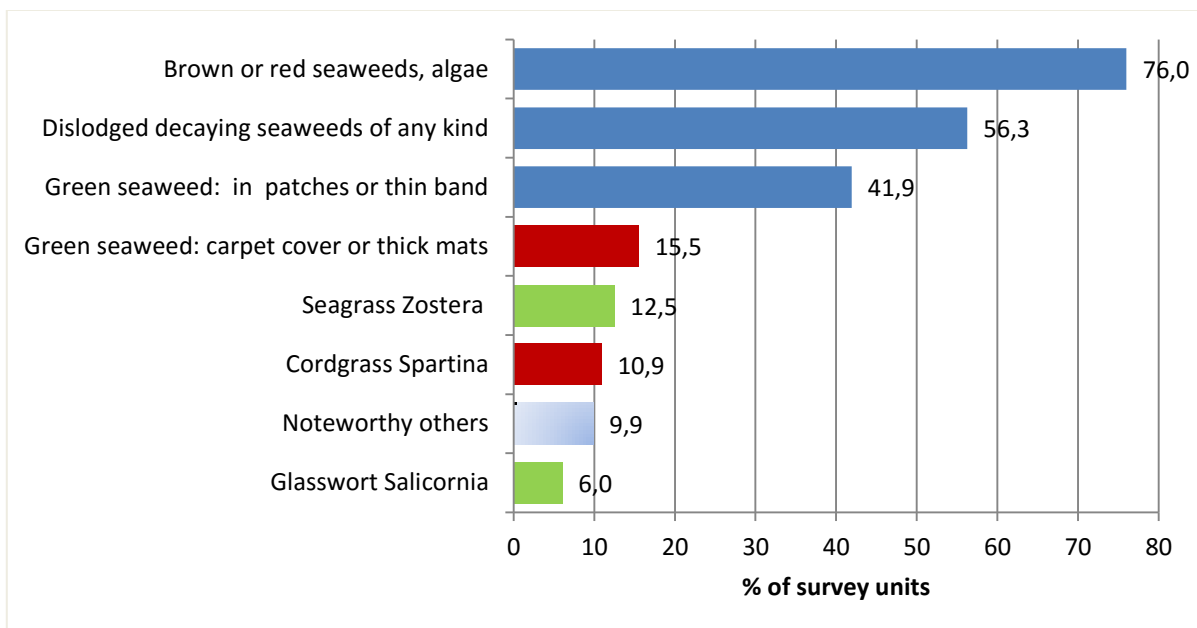


Figure 14. Percentage of survey units where set plants or seaweeds were recorded in the intertidal or edge to splashzone (N=498; Source: Question D3)..

### Seaweeds

Seaweeds, along with phytoplankton, are the main primary producers in the marine environment. As they need light to photosynthesis, they are found in relatively shallow waters, although some large macro algae like kelp, can be found as deep as 30m below the surface in the clear waters off the west coast. Kelp is described as a keystone species, which is one whose presence affects the survival and abundance of many other species in the ecosystem and whose removal is likely to result in a change in makeup of community and possibly physical environment. As well as producing oxygen and providing habitats and food for a variety of invertebrates and fish, brown and red seaweeds are valuable to our economy. In Ireland, seaweed is harvested for food and nutrition, in health and beauty treatments, and also used in the agricultural industry.

In this survey, brown and red seaweeds were found IN 75% of the s.u., indiscriminate of the dominant substrate (i.e. rocky shores, boulders, sand or mud). Virtually all our shores support a mix of features, sediments and habitats. A sandy or muddy shore may appear to lack the hard base for brown seaweeds to grow from, but a few boulders or other anchors can overcome that problem.

Green seaweed patches were found in over half of the sites. They are usually associated with fresh water inflows and muddy shores. Thick carpets of green seaweeds associated with. In 16% of survey units tend to be signs of nutrient enrichment e.g. from sewage or agriculture. The long good weather might have encouraged carpets to form and remain in situ in October while in a stormy year the carpets are moved by the sea. In Bannow Bay oyster catchers were observed moving around on the seaweed carpet when foraging, leaving characteristic saddle shaped patches where they were feeding – see photo below.



Photos of Oyster catcher clearance in *Ulva* seaweed carpet Bannow Bay and regional coordinator Kat Keaghan in Galway Bay finding dislodged *Zostera marina* strands on a muddy sand, dotted with boulders where brown seaweeds flourish.

**Cordgrass** (*Spartina*) is classed as an invasive species, as it can take over large areas of mudflat and saltmarsh pans, and can inhibit the extent of *Salicornia* habitats and areas occupied by sea grass *Zostera*. It was recorded in 11.5% of survey units (See new and invasive species section page 31 for more details).

**Glassworts** (*Salicornia*) are small fleshy edible plants reported from 6% of shores. They are found in salt marshes and on high intertidal mudflats. With climate change and sea level rise this habitat protected under the EU habitats directive is being squeezed.

**Seagrass** (*Zostera*) is possibly the most interesting of the plants selected for the survey, as it is a very useful indicator of local water quality. It's very sensitive to disturbances like aquaculture, pollution and trampling (OSPAR<sup>1</sup>). The sublittoral Sea grass *Z. marina* requires good water transparency for photosynthesis, and is listed as a "good" and "high" water quality indicator under the Water Framework Directive, MSFD and Habitat Directive. Seagrass communities also provide ecosystem services to local habitats. They maintain fisheries and biodiversity by providing foraging, refuge and nursery sites to many commercially important fishery species. Structurally, their compact root system retains sediment. In Ireland there are two main species of *Zostera*, which occupy different areas of the intertidal. The survey didn't discriminate between the species.

*Z. noltii* is found in the mid to high intertidal zone, and is in danger of encroachment by the common *cordgrass*. It is the main food of Brent Geese, who winter almost exclusively in Ireland. The second type, *Z. marina* is found in the sublittoral zone and forms dense beds in sheltered bays and lagoons. When washed up on the shore it looks like black tape.

Surveyors found *Zostera* spp. in 12.5% of shores - 65 out of the 498 accessible survey areas. However as sea grass dislodges easily and many surveyors are now trained to identify dislodged sea grass, this count

---

<sup>1</sup> [http://www.ospar.org/html\\_documents/ospar/html/p00426post%20bdc%20version%20sw%20zostera\\_assess\\_final.pdf](http://www.ospar.org/html_documents/ospar/html/p00426post%20bdc%20version%20sw%20zostera_assess_final.pdf)

is a composite of sea grass beds and sea grass washed up on the shore from a bed which may be well away from its source. So further confirmation surveys will be undertaken over coming months.



Photo of Galway surveyor tasting dislodged *Zostera marina* and *Zostera noltii* off Inch Island Donegal.

In the Coastwatch 2012 survey two new areas with seagrass beds were discovered, in Lough Foyle (Co. Donegal) and Tramore Backstrand (Co. Waterford) where it had disappeared and now recovered. This is an exciting find for Irish coastal biodiversity, but unfortunately these habitats are yet to be updated on the OSPAR website (OSPAR is concerned with the protection and management of marine resources in the North Atlantic). Currently, OSPAR reports intertidal *Zostera* communities on all Irish coasts. Subtidally, they have only been recorded on the south, west and north coasts. The habitat is under threat in Ireland (Kelly pers. comm.) but up to date information is imperative for the successful monitoring and conservation of these communities.

## 2. Animals found

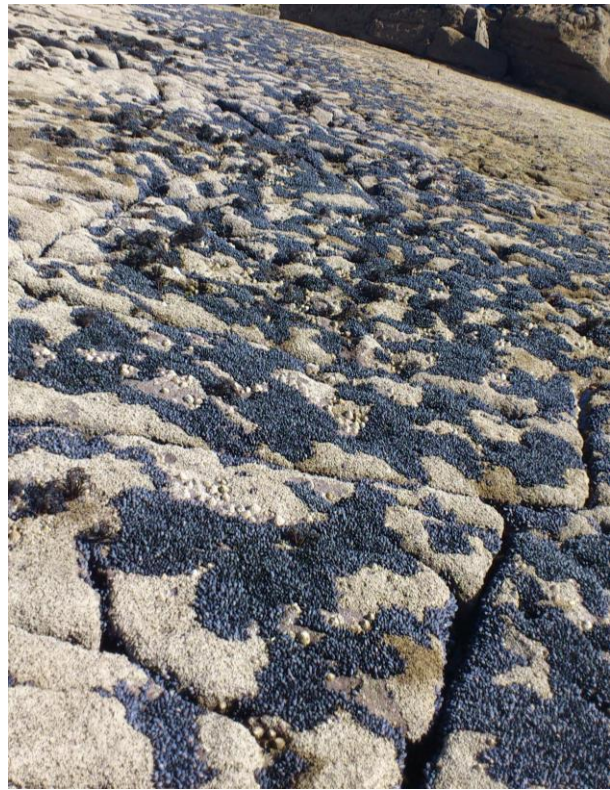
Surveyors were also asked for basic counts of animals along their survey units. For some animals - like worms, crustaceans and select shellfish like mussels just presence/absence data was collected and notable find reports invited in comments. While for birds, seals and rats counts were requested.



Picture by surveyor.

**Mussels:** A change in the mussel spat fall may be happening. In previous years we would get photos and notes about small mussels carpeting rocks and large intertidal mussel beds along the Irish Sea. This year we received none for the Irish Sea, but some good records from the south and west coast. Expanses of old mussel beds like Rodgerstown N Dublin are getting silted up and disappearing with very little recruitment. As the mussel is such a high calorific value high density organism important

in the diet of young flat fish and many bird species, as well as being the shellfish of highest economic value in Ireland with extra harvesting pressures building up in both intertidal and sublittoral Irish sea beds in recent years, this warrants further research and is prioritised by Coastwatch in follow up work.



Photos Rock in Bannow Bay Co Wexford teeming with life – barnacles, limpets, winkles and mussels (Karin Dubsy). A mussel spat fall at Rathmoylen (Andrew Cox). Goose barnacles live in deeper water attached to rocks or floating moorings or pots. As seen when swept up like this one off Wicklow (Matt Tuit).

**Goose barnacles** as photographed above, swept up attached to a whelk pot are crustaceans like crabs, but they attach to rocks and objects in deeper water. The more familiar intertidal barnacles which look like little ‘volcanoes with trapdoor lids’ are seen as the whitish pattern on the photo above between the patchy carpet of blue-black juvenile mussels.

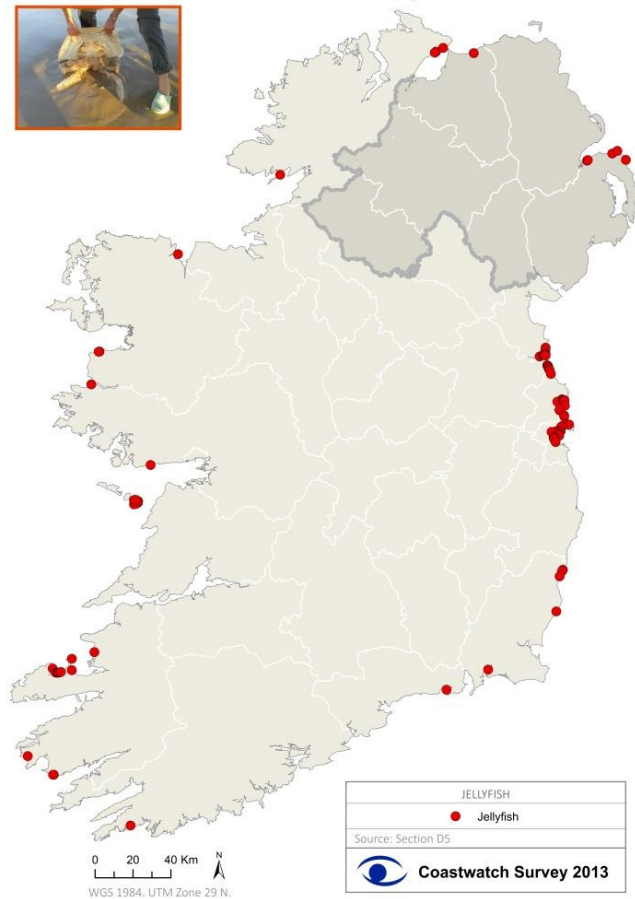
**Jellyfish** (both alive and dead) were found in 20% of the survey units - see figure 15 below. This is a marked increase from last year, where they were reported from only 6% of survey sites.

The records included an about 1.5m diameter lions mane jellyfish stranded on Achill island – see photo of Coastwatcher Oisin Mason lying beside it - and a mass of small brownish jellyfish around the Clare Galway coast which was reported by Aran Island surveyors a week before it was reported to have killed thousands of Clare Island caged salmon<sup>2</sup>.

<sup>2</sup> [http://www.mayonews.ie/index.php?option=com\\_content&view=article&id=18764:jellyfish-kill-up-to-20000-clare-island-salmon&catid=23:news&Itemid=46](http://www.mayonews.ie/index.php?option=com_content&view=article&id=18764:jellyfish-kill-up-to-20000-clare-island-salmon&catid=23:news&Itemid=46)



## JELLYFISH



Photos Small jellyfish fascinate by Laura Mc Gurdy and Stranded Giant Lions main Jellyfish by Rachel Dwyer Mason:



Figure 15. Jellyfish reports mapped for the 2013 survey.

## Animals Counted

### Birds

Birds were once again the most widely reported vertebrate species, possibly as they are the easiest to spot from the coast. A much larger number of birds both alive and dead were found this year. Surveyors reported 15 173 live birds and 67 dead in 498 s.u., compared with 9550 and 32 in 2012 in 389 s.u. Species names were not asked for though recorded by some surveyors. Where names were provided waders were common and seen all along our coastline. Beautiful pictures submitted included one of the protected Chough at Garrettstown Co. Cork by Nuala Freeman.

Picture by Nuala Freeman.



### Marine Mammal Counts

Only 2 live cetaceans were spotted this year, but there were 73 live seals and 12 dead seals reported and 15 live rats.



Photo of Seal pup on the Wexford coast.

**Seals:** most were found singly or in small groups, with seal colonies reported from 4 sites: Brides Head, Wicklow; Roney point, Wexford; Carrickfinn, Donegal and Ardmore, Mayo. This information augments last years' seal colonies in different survey areas not covered in 2013.

**SEALS (alive and dead)**

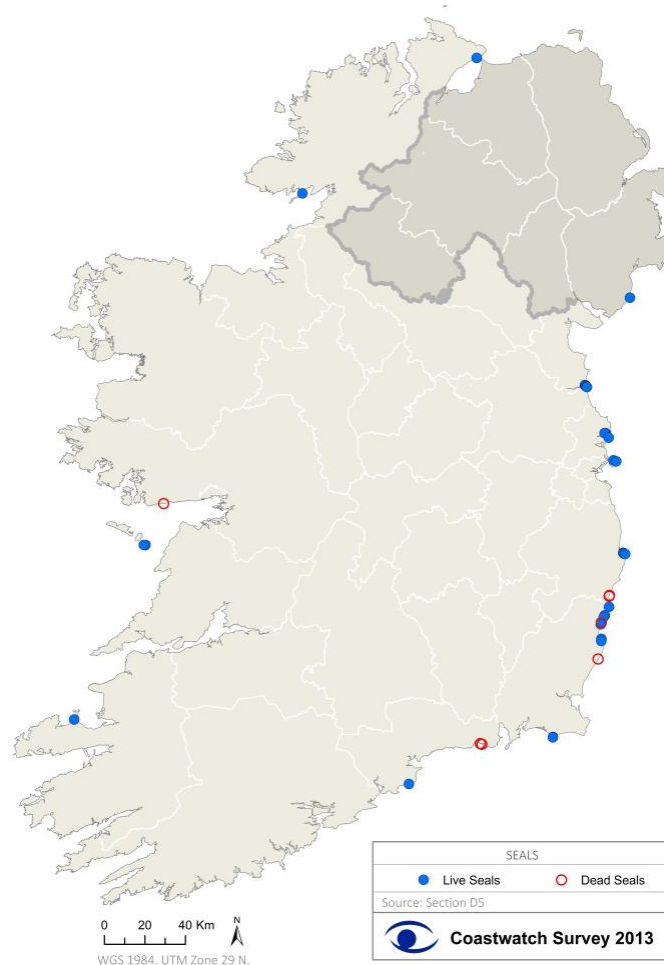


Figure 16. Seals (alive and dead).

The number of dead seals and reports of seal culls in several areas this summer and autumn is of concern and is being followed up by the NPWS and the Irish Seal Sanctuary.



Dead seal washed up on Seafield beach, North Co. Wexford. Picture by surveyor.

### 3. Extra Biodiversity Questions

At the end of the survey, those surveyors who had a special interest in biodiversity or had found a particularly wildlife-rich shore were asked to complete extra questions. Unfortunately, our new online input form had teething problems in this section and data collected was recorded in clusters. We do not have an overall view of the distributions and abundances of some species, however we can still make some limited observations:

#### Fish

Fish are of special interest as key component of coastal biodiversity and as a business sector. Not only for commercial fishing but in tourism such as recreational angling and diving. Observations from shore without using nets, or rods are of course a tiny selective snippet of what is in coastal waters and is bias towards the rock pool inhabitants and those which are in tidal channels, under seaweed and boulders. Pllice an important commercial species spend their first year in shallow estuaries and bays may be seen in intertidal mudflat pools and channels where thousands may be spotted and

The large number of Coastwatch observations are mapped below with live fish recorded right around the country – under stones, in pools, in inflows, tidal streams and shallow water seen from the intertidal or shore, or looking down quay walls.

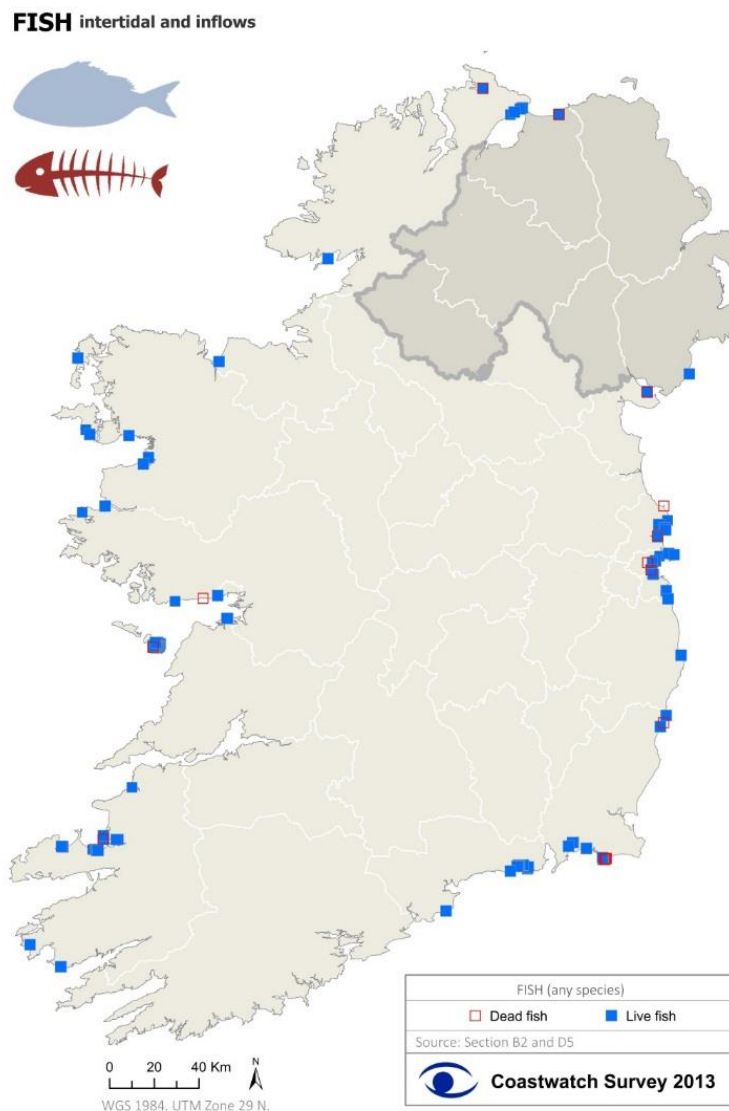


Figure 17. Fish (alive and dead).

The most unusual fish find was reported from Lough Foyle where Edward Farren and William Guildea in Moville found a large warm water triggerfish. This was the latest and furthest north sighting on record. Fish egg capsules or mermaids purses of ray, skate and dogfish give an indication of presence of these species in breeding condition in the wider area.



Photos (top) of typical intertidal fish and egg case assortment reported from many sites and (bottom) a rare Trigger Fish from Moville, Lough Foyle. Pictures by William Guildea.

### Worms

The Ragworm (*Nereis*) was found most commonly in our survey, which is not surprising as it is widely distributed around all coasts of Britain and Ireland. Although not protected by law, ragworms are incredibly important for oxidising the sediment. They are also an important food for many species of bird found on our shores.



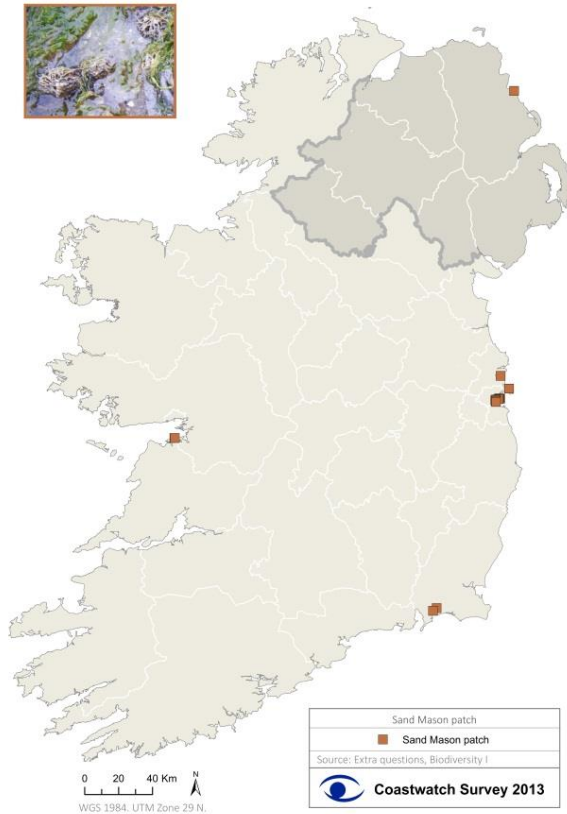
Ragworm found in Dublin Bay. Picture by surveyor.

In areas such as Sandymount Strand in Dublin, which is a Natura 2000 site, the abundance of ragworms is invaluable for avian biodiversity. However it is also highly sought after as fishing bait. Some bait diggers leave craters behind with anoxic lower sediments on the surface, creating quite disproportioned damage with a change in surface still seen a month later (in the right picture below).



Lugworm intake hole and cast; fresh and week old damage caused by bait digging without back fill. Pictures by Karin Dubsky.

**SAND MASON PATCH**



**Lug worm casts**

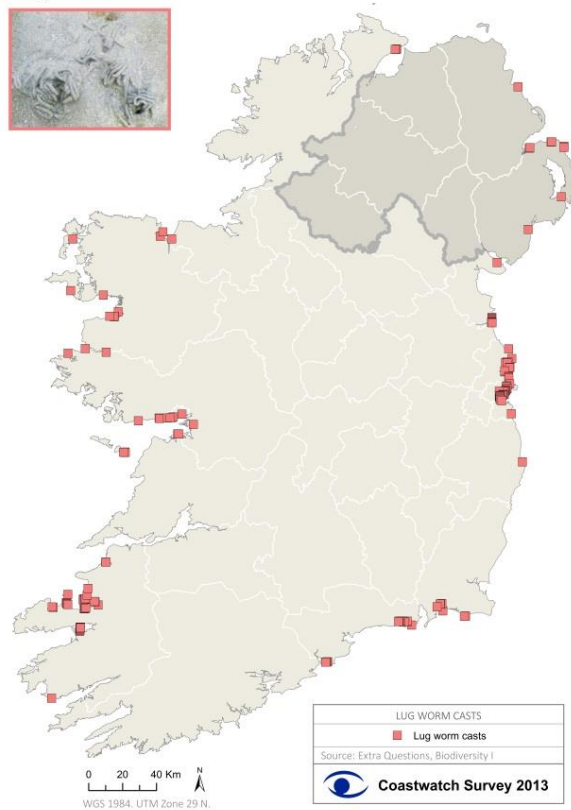


Figure 18. Sand mason patches and lug worm casts.

Sand mason (*Lanice conchilega*) patches also provide shore birds with food, and are found quite widely across British and Irish coasts (although not everywhere). These worms were not reported widely throughout the survey, but it is thought that with more publicity and identification training, this would change.

Sand mason. Picture by surveyor.



### **Honeycomb worms: *Sabellaria***

*S. spinulosa* is a small polychaete worm which constructs tubes out of fine sediment (sand, gravel and shell material) in the subtidal and intertidal range of the coast. In much of its geographic range, it does not form biogenic reefs, but when conditions are favourable and the worms congregate in large numbers, these tubes can fuse to form large rigid reef structures. In Galway Coastwatchers have observed reefs being built simultaneously by thousands of worms moving in rhythm. These reefs also provide substrate to burrowing animals, crevices for shelter, and are important pillars for biodiversity.

*Sabellaria* does not seem to be sensitive to chemical contaminants or changes in water quality, but it is particularly vulnerable to physical damage. As of 2004, it is listed as an OSPAR threatened and declining species and the NPWS lists the species as biogenic reef species and describes it as '*widespread but uncommon*'.

Our 2013 survey found Honeycomb reefs in 13 areas as mapped below with 2012 results for further areas not mapped this year. In all sites where *Sabellaria* was found in 2012 it was present in 2013, but the state of reefs had changed in some cases. A new reef was found by Andrew Cox on the Waterford estuary coast as Rathmoylan. The combined records of 2 years suggest the Waterford estuary reef may be the longest in Ireland, stretching from the Hook peninsula in Co Wexford across into Co Waterford past Tramore.



Thin encrusting honeycomb worm reef at Rathmoylan Co Waterford. Photo Andrew Cox Newtown School.

Our results differ from those on the OSPAR website, which show the honeycomb worm predominantly along the east coast. The records kept by the National Biodiversity Data Centre do not state whether records are of reefs or individuals. As honeycomb reefs can be ephemeral, and have a rich fauna associated with them, this marks important discoveries by Coastwatchers around the country. More follow up study is required to establish trends in their distribution.

### 'HONEYCOMB' SABELLARIA REEFS (2013 and 2012)

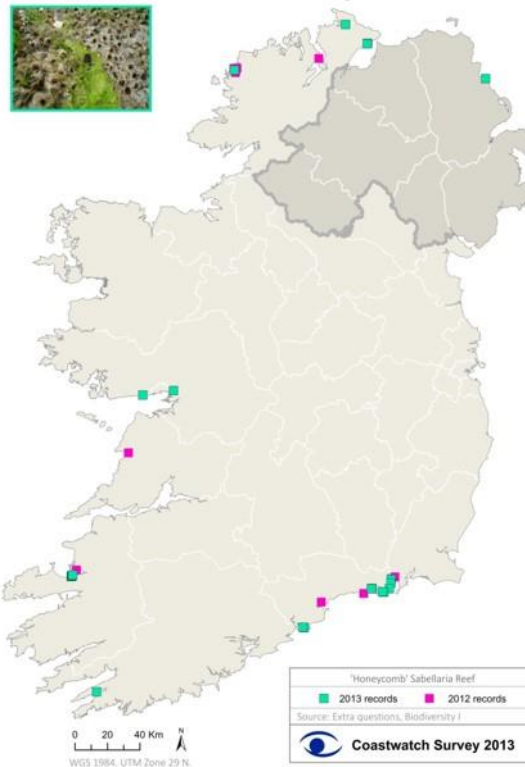


Figure 19. Honeycomb reef distribution in 2012 and 2013.

As all but one of our results has now been checked it indicates the value of citizen science in locating and monitoring such species. Further study and the update of official records are being explored.

## 4. New species and Invasive Alien Species

Surveyors were asked to note whether they had seen new species in the water or on the shore that were not previously there in the last few years. The majority of surveyors did not know whether there were any new or invasive species in their survey unit (52.6%, 261/496). There were only 17 units where surveyors were aware of new or invasive species (3.5%), so this is not indicative of the presence or absence of IAS along Irish coasts. Encouraging people to watch out for changes to their shoreline is important, as it is the eyes that see an area the most that will be the first to notice the difference.

**Invasive alien species** are herein defined as plants or animals which did not originally occur in Ireland, before human colonisation of the country and which are also expanding their numbers and distribution so as to cause a competitive threat to such native fauna and flora. Invasive species have been introduced to Ireland from other countries or continents, either intentionally or accidentally. In the absence of their natural predators or parasites, such introduced species may increase rapidly in number and spread “out of control” colonising and monopolising habitats vital to the survival of native, Irish wildlife. Such species are seen to be a threat to native biodiversity, man’s uses of resources and often have negative economic impact. Prevention and once seen action to remove or prevent their further spread and restore native biodiversity are important and considered just now in a draft EU Regulation.

Invasive Alien Species, also referred to as Non indigenous invasive species, are considered such an important threat to our seas that they are one of eleven ‘Descriptors’ in the Marine Strategy Framework

Directive (MSFD). In essence that means - if an area is to be judged as at 'Good Environmental Status', then there will be adequate information available and either no invasives or at least control of such species so they are not causing environment or economic damage. It is important for Coastwatchers to be able to recognise at least a core set of high concern species and know who to notify of possible finds. The National Biodiversity Data Centre has recently published ID sheets of common invasives in Ireland and reporting instructions. See <http://invasives.biodiversityireland.ie/id-sheets/> for more details.

Note that the list of high concern species can easily get out of date as a species like New Zealand Flax may be introduced but not invasive for decades, then suddenly start spreading. By the time this spread is realised and considered by those amending the lists, a few years may have past. Hence in the Coastwatch results below both official high alert and others reported as spreading by Coastwatch surveyors are both included.

This year, Coastwatchers noted the following invasive species:

Pampas grass (*Cortaderia selloana*) – Amber listed on the invasive species database, as it has become widespread, but on the “uncertain list”, as it is not yet known the conservation risks and the extent of damage it can cause due to lack of data.

Japanese knotweed (*Falopia japonica*) – An established invasive species and a large detriment to terrestrial and marine habitats. It is known to vigorously outcompete native plants, damage hard surfaces and can block up rivers and inflows, causing floods and sedimentation impacts. Japanese knotweed spreads through movement of rhizome fragments, which means if it is cut and the fragments are moved, it can cause colonize new areas.



Japanese knotweed flourishing in Schull, Co. Cork around the harbour and other sites, but often not identified until it flowers. Picture by Karin Dubsky.

Cordgrass (*Spartina anglica*) – An established invasive plant that is around sheltered coastal areas. It was originally planted in Ireland to stabilise mudflats, due to its deep root structures. Unfortunately it is often found in the same areas as *Salicornia* mudflats, and high intertidal *Zostera noltii* sea grass beds – eg Boyne estuary. While it is found on the most unwanted list in Ireland, there are sites such as Tramore backmarsh Co Waterford, where it grows over waste dump edge rubble and has a very rich associated native biota. So while sightings should be reported to [www.invasivespeciesireland.ie](http://www.invasivespeciesireland.ie) indiscriminate removal is not advised.



New Zealand flax (*Phorium tenax*) - A garden escape listed as "problematic" in the invasive species database. Found mainly on the coasts of the South and Southwest, its robust and fibrous leaves provide shelter against windy coastal habitats. As it's quite a large plant (4m in height during summer months) it is considered useful in gardens for privacy and as a shield from the wind. Unfortunately, its high tolerance to exposed conditions and ability to grow in many different soil types means that once it breaks out of the garden it can thrive. As it doesn't yet cause widespread harm to the ecosystems it's found in it's not considered invasive. Yet, as it is found outside of its natural range, it should be monitored to ensure its status does not get upgraded.



New Zealand flax Ardamine. Picture by Ronan Carvil.

Wireweed (*Sargassum muticum*) – A highly invasive seaweed originating from Japan, found on all Irish coasts. Although quite innocuous in its home range, under the correct conditions it can become virulent (as it is highly tolerant to changes in environmental parameters), and is known to directly compete with rare seaweed species like *Bifurcaria bifurcata*. It can grow up to 10cm in a day, forming dense mats along the surface of the water. This species has been reported on Templetown and Tramore beach in recent surveys, and this year was recorded as growing at the entrance of Bannow Bay by Karin Dubsky.

Slipper limpet (*Crepidula formilata*) – Classed as a high impact invasive species, the slipper limpet can compete with our native oyster for food. It reproduces rapidly, and can therefore form dense colonies, which can ultimately alter the make-up of the sediment, affecting local species' distribution. Coastwatchers noted live and dead samples in various areas around North Co. Dublin, Carlingford, Wexford, Oranmore, Aghleam, and in Lough Foyle, but these data do not emulate the records of the National Biodiversity Data Centre. Follow up is necessary.

Gigas oyster (*Crassostrea gigas*) – This oyster is a globally invasive species outside its home range. It is used in aquaculture worldwide. There are two main invasive problems associated with it in Ireland: It has been shown to carry diseases and parasites which can spread to native oysters– such as Bonemia which is an oyster wasting disease now affecting native oysters in Donegal and it can spread and colonize high value inshore habitats from mid intertidal down into shallow water. Here it competes with other filter feeders for food and can quickly out-compete native species for space. Last year Coastwatchers reported it from Lough Swilly and Lough Foyle where it grows N and S. In 2013 it was observed in a new area of Lough Swilly and at the Clare coast end of Galway Bay. In NI authorities funded an intertidal Gigas oyster cull in Strangford Lough which appears to have been successful. In the Republic native oyster fishermen took the initiative to fish the shallow water 'loose' Gigas oysters and a fishermen – Coastwatcher group drafted and tried intertidal Gigas oyster cull methods which lead to an agreed efficient protocol (available from Coastwatch coordination). So far there has not been a full bay sized cull in the Republic and Gigas is still being cultivated in Natura 2000 sites here on the strength of licenses which ran out up to 9 years ago even in areas where we are now seeing the invasive problem and have known sensitive habitats like sea grass beds and native oysters.

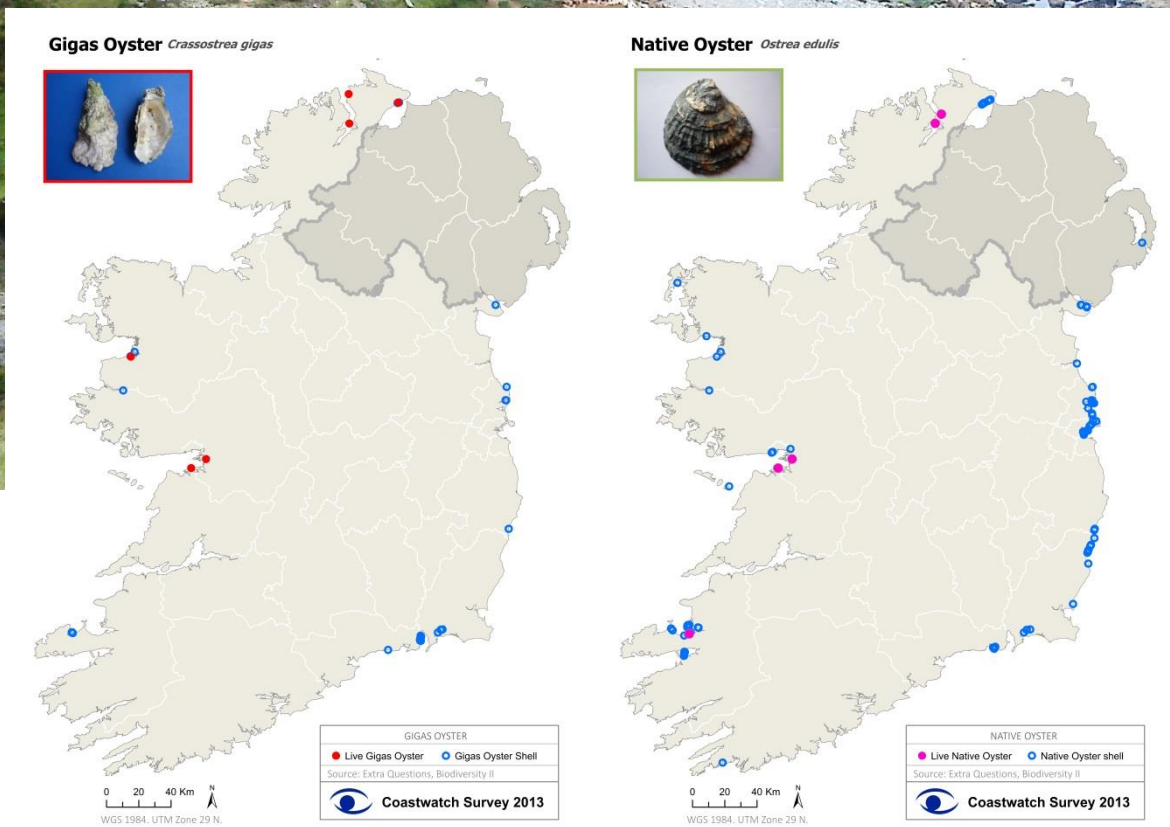


Figure 20. Gigas Oyster and Native Oyster distribution 2013.

The map on the right of Figure 20 above shows Coastwatcher records of shells and live native oysters *Ostrea edulis* as consumed by our forefathers for thousands of years. The map shows the empty shell records which highlights how widespread this shellfish was around the island of Ireland. Today it is reduced to a few bays and estuaries North and South. However in the North there is a native oyster species action plan and in one site a micro hatchery of local bloodstock supports the restoration of that population. That care taken both by authorities and local fishing communities could become an All-Ireland phenomenon with support of new common fisheries policy and EU funding . Coastwatchers would like to see one all Ireland species action plan with restoration policy and action to enhance populations and address pressures as those from Gigas cultivation.

## RESULTS PART 3: WASTE, LITTER AND POLLUTION

The 2013 Coastwatch survey included 5 waste and litter questions. The first 3 form the core traditional Coastwatch base questionnaire to monitor shore litter. In E1 surveyors look out for large waste. If an item covered in the question is found, the surveyor ticks the appropriate category box. While there is no attempt made to quantify, large amounts of waste tend to be highlighted by surveyors in extra notes and photos. In question E2 a selection of prioritised litter items are counted. That is – (i) various types of drinks container packaging, (ii) plastic shopping bags, (iii) tyres and (iv) a new experimental ‘damage to nature’ category, set to get the surveyor thinking of litter impacts and anything which might have been locally observed damaging nature. In question E3 presence/absence of 14 smaller litter items, as well as oil and tar are sought. Surveyors are also asked to flag any notable other litter not covered in that list. An Irish pilot question ‘E3 part 2’ introduced in 2012 examines what was then referred to as ‘micro litter’ from just visible to the naked eye to 2.5mm on tideline sediments and finally question ‘E3 part 3’ asks surveyors to look back over the shore and note which area was most littered.

### 1. Large Waste

Volunteers were asked to look out for six categories of large waste on the shore. Results show that a quarter of survey sites (173 of 498 s.u.) had some sort of large waste present. Landfill materials was the most common and seen on 20% of surveyed sites, followed by large metal objects (14%) Household furnishings ranked third (8% of s.u.) and shipwreck fourth at 4%. Dumped crops were least frequent as in all previous surveys in Ireland.

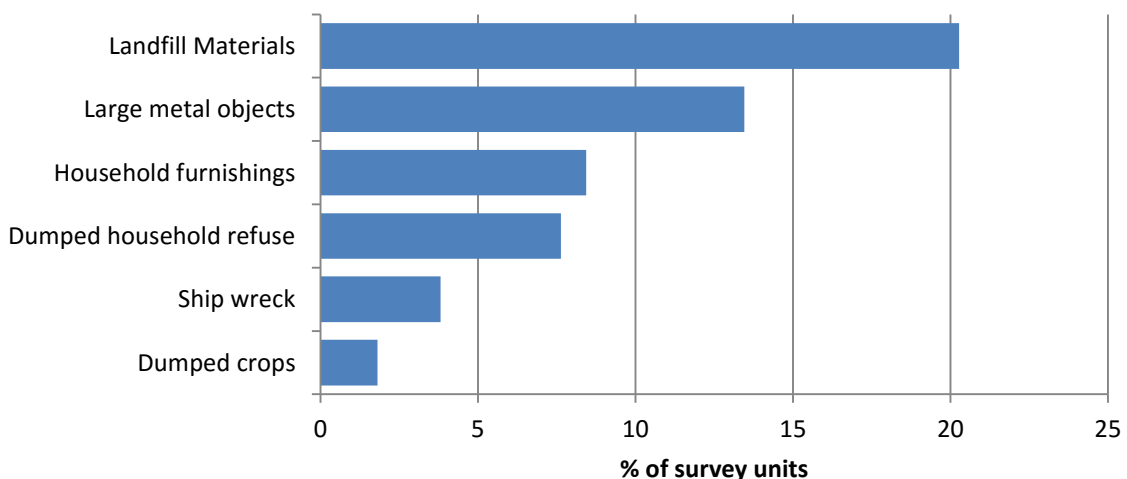


Figure 21. % of survey units where large litter items were recorded. Question E1 2013 All Ireland CW survey.

A comparison of 2012 and 2013 results shows a similar ranking, except for ship wreck and dumped household refuse, which have reversed positions. Reported occurrence too is similar, apart from the 2013 decrease in large metal items. Looking back, the first survey in 1987 showed a much worse situation with heavy metal waste twice as common (from 26 to 13.5% of survey sites). Surveyors

suggested that the price of metal may have helped prevent further intentional dumping and could be encouraging selective removal from the shore.

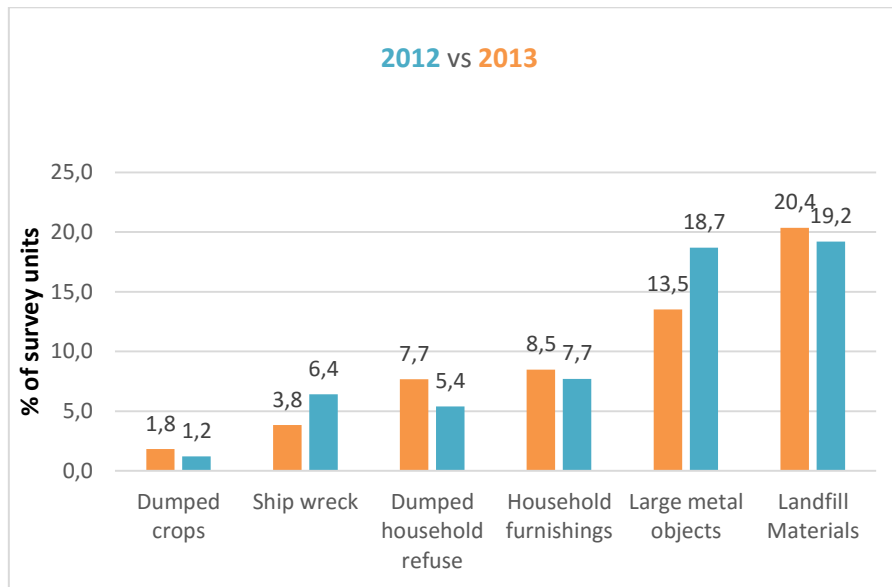


Figure 22. Percentage of survey units where large litter items were recorded. (Orange = 2013 N= 498 s.u. Blue 2012 N=389 Question E1).

### Used Tyres

In the 2013 survey 21% of survey units had one or more tyres littering the shore. Tyres thus rank first in large waste items seen in a survey unit. This record is contained in the count data for question E2, but can be usefully added to large litter results as the tyres are usually too awkward and heavy to move in handpicked litter clean ups, due to weight of sediment lodging in the rim and/or organisms growing on the outer surface.

Old tyres are a priority waste stream and not supposed to go into landfill sites. The shredded rubber compounds have various uses and the whole tyres too are often used as buffer between boats, on quay walls. In recent years they have also be seen set in long lines on intertidal shores to attract peeler crabs. These catch traps which have no permits belong to those who set them and regularly check them for the crabs used as fishing bait. But ownership vanishes when the tyre sinks too low into silt to be useful.



Tyres are often warmer than surrounding shores. So nice to sit on as surveyor, or in as peeler crab. Photo Nuala Freeman.

### Dumped Domestic Waste

The occurrence of dumped domestic waste in heaps and bags has come down from the highest ever in 1997 with >21% to the just under 8% today. While that is still unacceptable, the attitude to dumping really has changed.

The Household waste category had been higher in Ireland than in any other North European country surveyed, when international survey comparisons commenced in 1989. From 1989 it reduced to 20% in 1991. In 1992 however the problem worsened significantly and volunteers reported 31% of the surveyed Irish shores with dumped household refuse. Comments linked this large increase to the 'pay by the bag' refuse charge which had been introduced in the months prior to the autumn survey. The 2012 occurrence of this large waste category in 5.4 % of shores was the lowest recorded in the Republic in 25 years! Even with the rise to nearly 8% in this year's survey, it is still among the lowest dumped domestic waste occurrence results.



Dumping on beach edge at Achill Island, Co. Mayo. A surveyor reported it and perpetrators cleaned up. Photo Nuala Freeman.

### **Other Large items**

The internationally agreed waste categories in our survey are restricted to the six categories of large waste presented above and tyres counted in question E2. Other noteworthy items may be mentioned by surveyors in extra notes (Question F6).

Among extra notes 'large plastics' were mentioned by several rural surveyors in the context of farm silage bale wrappings which were unknown when the survey started 26 years ago, while white or transparent plastic sheeting was noted in several urban spots such as Dublin Bay – see David Convery's case study note page 53. Another item not covered in question E1 as large item is large netting whether fishing or as in the picture below, which may be hay bale wrap.



Silage bale wrapping and hay bale type netting caught in overhanging trees on the shore. Picture by surveyor.

A very positive absence noted was dead farm animals. Stock included sheep and calves as well as pets – e.g. ‘a sack of dead kittens’ - featured in the first survey in 1987 from 6.6 % of surveyed sites and remained a diminishing feature until the last two surveys when they were not mentioned once. Change in attitude to pets and the excellent department of agriculture livestock tracking system are thought to be the main reasons.

### **Addressing some of the large litter and waste**

#### Landfill materials

The use of demolition materials as do it yourself erosion control was remarked upon by several surveyors in different counties and photos highlight that considerable volumes can be involved when a whole field front is decorated by such materials.



End of tillage field erosion control using demolition waste in Bannow Bay Co Wexford. Photo Alice Michieli and mixed C&D waste and earth and stones at the edge of Tramore backmarsh, Co Waterford.

The issue is complex. Landowners want to halt erosion and raise embankments around low coastal land to keep floodwaters out. While understandable, there are potential and often predictable consequences for others. Floodplains that can no longer flood may lead to flooding elsewhere. Apart from the urgent need to consider this bigger picture there is the issue of material used in erosion control - as in the Bannow Bay picture above, or when strengthening an old dyke. Storms may pull the defence apart and strew that waste over a larger area, or grind it down into smaller material and micro litter. As demolition waste can contain hazardous materials like asbestos, waste law is clear: You cannot dump this without a waste permit. A foreshore license is needed for other erosion control and in case of locations in or near Natura 2000 sites, an extra appropriate assessment is needed. We have many shores which would naturally melt into the soft low lying hinterland but has been drastically altered with visual effects like

sore fingers as captured on the right picture below. On cliff shores these 'sore fingers' may dominate the view for shore visitors, but may not impede the sea side villa owner's view -- as on the left picture below.



White erosion control sand and mortar sacks which the sea is taking apart at Kilpatrick dunes, Co Wexford (left) and Construction waste dumped onto the edge of the Dungarvan harbour Natura 2000 site is in the same position as in 2012 (right). Picture by surveyor.

Some areas mentioned in the 2012 survey as requiring attention were resurveyed. The Dungarvan Co Waterford shore SPA edge is still a long line of C&D waste, similar to Ringsend Dublin city Nature Park (previous dump) high water mark and splashzone, which one 2013 surveyor described as 'a disgrace'. The water's edge from Tramore, Co Waterford car park to old dump as well as the so called 'Driver's dyke' also need a nature friendly make over.

### Coastal dumps



In 1987 when the Coastwatch survey started there were more than 20 active coastal landfill sites in the Republic and Northern Ireland with one at Culmore point serving both Derry and Donegal. Most were run by local authorities. In some, waste was being dumped directly into the intertidal and splash zone. Coastal dumps also



referred to as 'landfill sites' may now be closed, but seaward edges are in urgent need of monitoring and attention. The eroding Bray dump, surveyed in 2012 and flagged as of concern, was photographed again this year by another surveyor, who noted that the sea is mining the dump front and sent this picture.

Photos of Bray legacy landfill site in urgent need of remedial action. The dump face is eroding and dropping waste onto the foreshore. The sea is now mining smaller waste items, as against large metal seen by other surveyors last year. Picture by surveyor.

### Baled Waste

In 2012 the Donegal Coastwatcher Trish Murphy reported a large bale of waste on the shore wrapped in what looked like silage plastic. Dr Murphy followed up promptly by asking Donegal county council to move the lump before it would unravel. We could not identify the source at the time. In 2013 Declan Collins noted such size and shape bails being brought to Drogheda port and later loaded for shipment to

Poland. The odour and enquiries confirmed this as wet black bin waste for export and incineration. Several ports are now exporting domestic waste in this fashion.



Wrapped waste in Drogheda port (left), photographed during his survey of the opposite bank of the Boyne estuary by Declan Collins. Rubbish bale on Moville beach autumn 2012 survey (right) photographed by Patricia Murphy.

As pointed out by Dr Murphy *'The baled waste find on the shore raises questions about how the bales are secured on board and what regulations are in place to avoid loss at sea and spill of its contents. A large object like this floating out at sea also represents a shipping hazard for smaller vessels and due to its size would be notifiable to the Coastguard'*.

### Large Metal

The 'Large metal objects' category was diverse, including dumped material like old gates, defunct objects and sea damage beach access steps barely held in situ. However the first survey in 1987 showed a much worse situation with heavy metal waste twice as common. The biggest positive change noted is the removal of the Dublin Ringsend metal merchant's hills of metal scrap at the water's edge.



Defunct oyster trestles found in many estuaries and beach access stairs in Co. Wexford. Picture by Surveyor.

Photos and comments suggest there are some rural, resort and urban differences in this waste category. In rural areas the largest concentration of junk metal appears to be in agriculture and aquaculture related such as abandoned shellfish farm trestles. Examples were found in Dundalk Bay, Bannow Bay, Co. Wexford, Galway Bay and Lough Foyle, Co Donegal. Trestles are erected in the intertidal to hold oyster grow bags. Over time they rust, weaken, bend and break. Those in inner bays often become buried in silt as pseudo faeces built up and currents are slowed down. This in turn creates low mounts which are a further impediment to scouring. Storms may reorganize the metal junk, so suddenly spikes stick up, which can threaten other shore users like canoeists. Large metal waste such as the aquaculture trestles could usually be traced to present or former shore users, as most aquaculture operators had a license. However we know of no Irish trestle management guidance to minimise nature damage on removal.



There is also ambiguity as to whose duty it is to pursue owners to clean up especially if the license has run out years ago, or the company is no longer trading.

The source of large metal objects is often erosion control or beach access installed by home owners in the optimistic calm of summer. As one cannot simply click on a coastal map to see foreshore licenses yet are not on line yet and appear to have no permit and are prone to winter storms. There is a peculiar ‘urban’ metal fingerprint which appears to be a combination of accidental loss and vandalism - with bins, bikes, crash barriers and super market trolleys among the items mentioned by surveyors.

The difference in sources should inform both future prevention and cleaning ups. Regarding waste removal from sensitive sites, it is vital that guidance and supervision are provided to minimize habitat and archaeological damage.

## 2. Litter Counts: drink containers, plastic bags, tyres and other

Surveyors were asked to count 7 types of litter - that is 5 drinks packaging items described by material, as well as plastic bags and tyres. The Coastwatch counts have a historic base and are closely linked to national and EU waste policy. They are agreed internationally. Additionally surveyors were invited in the past to either count or estimate one other common litter item found in their s.u. The ‘Other’ results can lead to addition or substitution of a new item in the litter count in subsequent years. In the last survey the wording was changed to ‘Other damaging to nature’.

In the autumn 2013 All Ireland CW survey 90% of shores had one or more counted litter item at time of survey. That is 21,756 drinks containers were found in the 448 survey units. Only 51 survey units were drinks litter free. The amounts of drinks containers by packaging type are tabulated below (Table 1) along with 2012 and five years earlier 1998 comparison.

Items counted from least to highest occurrence	No. of s.u. and (%)	No. of items	No./s.u.	Trend since 2012	Trend since 1998
Can holders	66 (13.3)	267	0.5/s.u.	↗	↘
Paper outer bricks and tetrapacks	142 (28.6)	683	1.4/s.u.	--	↓
Glass Bottles	226 (45.4)	1393	2.8/s.u.	↑	↘
Metal Cans	314 (63.0)	4339	8.7/s.u.	↓	↘
Plastic Bottles	424 (85.1)	14 910	29.9/s.u.	↗	↗

Table 1: Total number of drink containers, can holders, shopping bags and tyres on the surveyed shore counted in Coastwatch autumn survey 2013. (All Ireland N=498 s.u.)

Drinks container counts rose steadily in the early 1990s in Ireland. Then drinks can litter stabilised and even started to reduce, while bottles continued to rise throughout the early 21st century in line with arrival of the ‘Oties shore (wo)man’ phenomenon with phone in one hand and water or energy drink held in the other.

The average shore litter load of 30 **plastic bottles** per s.u. this year is a rise from (26/s.u.) last year and puts results back into the middle of the 24 - 35 bottles/s.u. count range obtained over the last 12 years.

The **can count** has improved most over the years and is now down to just under 9 cans/s.u. from 19/s.u. in 1997. Apart from a shift towards drinks in bottles, a contributing factor may also be the use of a lighter metal which appears to dissolve from the centre. The can pieces are difficult to see and dissolve or sink much faster into sediment than the old whole cans.



Different drinks container litter from Tetrapack and plastic bottle to degrading can and can holder to a sign pointing to a particular problem with drinks can litter. Surveyor pictures

Drinks container packaging was the most widespread macro litter found. Taking counts on 498 fully accessible sites only, the results show a slight increase in the drinks container load compared to 2012. This might be expected with the much higher number of people on the shore in the warm 2013 summer. However there has also been a trebling of sites deemed to have been cleaned in the week of the Coastwatch survey - from 4 to 12% of shores. Compared to 2012 the drinks container load has changed:

The 14,910 plastic bottles were noted in 85% of s.u. - an average of 30/s.u. This is an increase in volume and range over the previous year and joint highest ever. Can counts reduced to 4339 distributed over 63% of shores. A welcome reduction, but the count is less accurate as can body metal now dissolves quickly and the ends are difficult to see. Glass bottle counts per survey unit have almost doubled with 1393 counted in the 2013 survey (3/s.u) Brick/Tetrapacks were the least frequent containers with 683 or 1/s.u. If one ranks the 6 consumer waste litter categories by quantity found (Figure 23) it matches the ranking for distribution (Figure 24) from the most numerous and widely reported plastic drinks bottles down to can holders which had the lowest count and most restricted occurrence.

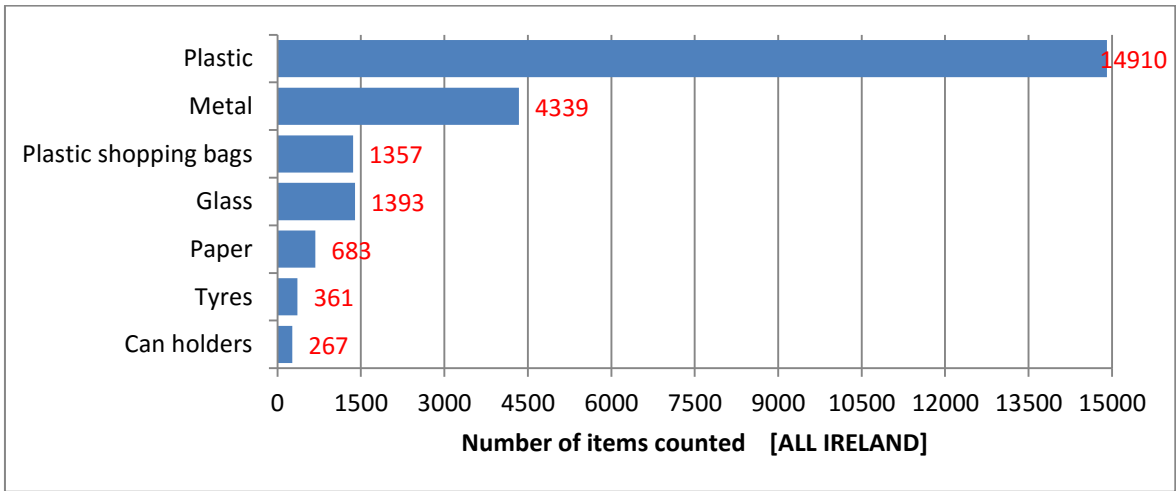


Figure 23. Number of drink containers, can holders, shopping bags and tyres on the surveyed shore 2013. (All Ireland N=498)

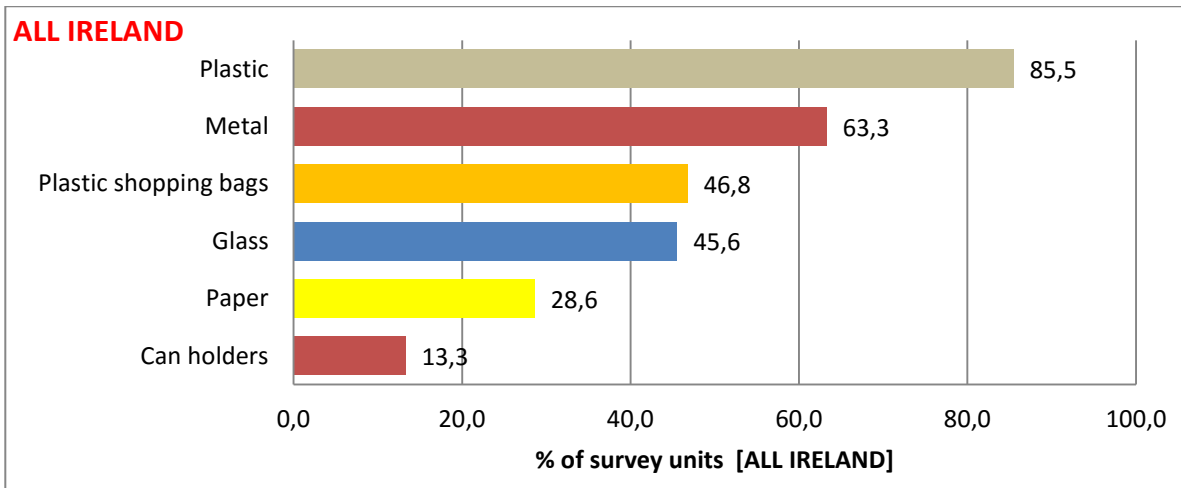


Figure 24. ALL IRELAND Percentage of s.u. where drink containers, can holders, plastic shopping bags and/or were tyres found anywhere on the shore.

(NB – due to large Rol sample (N= 471) the results expressed as percentage for Rol is the same as for All Ireland N=498)

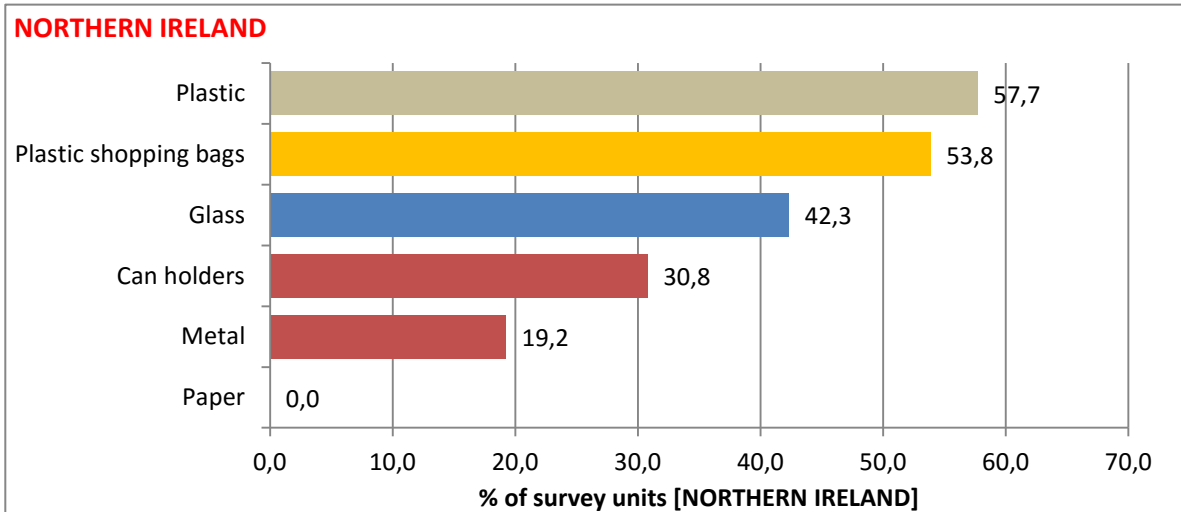


Figure 25. Percentage of NI shores with drink containers, can holders and plastic shopping bags on the shore. (N=27)

Drinks container and plastic bag litter distribution was also graphed for N. Ireland and compared to the All-Ireland and Republic of Ireland results (see Fig 24 & 25). Bearing in mind that the very small NI sample size is not representative of the varied NI coast the 27 NI s.u had a much lower plastic bottle count of 1.6/s.u. (41 in 27 s.u) than the 30/s.u. in the Rol. There were also less plastic bags per survey unit (1.5 as against 2.5) but with wider spread 54% of NI shores as against 47% of s.u in the south. While the Northern Irish drinks can count was extremely low with 0.3 cans/s.u., there were twice as many can holders than cans, bringing can holders to the same densities as those in the Republic. Surveyors in NI did not report seeing any paper drinks containers.



Happy Co. Down surveyors with very few drinks containers in sight. Picture by Monica Mc Card.

From Coastwatch fieldwork over years, the unusual drinks container finger print in NI with more six pack holders than cans is typical for recreational sites which are being cleaned. The transparent can holders

are easily missed while the drinks containers are removed. Indeed surveyors in NI indicated 27% of survey units were cleaned in the week before the survey, as against 12% for the republic of Ireland.

#### Coastwatch Count interpretation/limitation

When surveyors got tired of counting they noted 'more than' a given figure (e.g. 100+) we took the count as that figure plus 1.

Several surveyors noted accumulations of dislodged seaweed with litter caught in and under it, while others observed recent heavy shore accretion with new sand burying everything including litter. We just took the count and did not adjust it upwards. Taking all these factors together we believe the Coastwatch counts can be considered conservative.

#### **Litter Mapping**

In 2012, an effort was made to visualize level of littering with drinks containers, can holders and plastic shopping bags. The survey units were divided into three cleanliness groups: less than 10 items, 10 to 150 items and more than 150 counted items. These degree of littering groups was then mapped with colour coding for 'clean', 'somewhat littered', or 'badly littered'.

The same procedure was repeated for 2013 data - see map figure 26 overleaf. The categories are somewhat arbitrary and the scale was considered too generous by some Coastwatchers. The scale question needs further discussion and field trials, especially as it is directly relevant to the new Marine Directive (MSFD) Good Environmental Status (GES hereafter) decisions.

The map shows that the (red coloured) badly littered shores tended to be around urban and estuarine shores. These have the highest population densities adjacent to the shore and upstream where rivers feature. So if the urban and rural population littering habits are similar then this pattern is to be expected. On the other hand, urban areas have a far greater bin density than rural areas, visible anti-litter campaigns and official street cleaning. Shore litter results suggest these official anti-litter measures are still not coping. Potential new ways are addressed on page 49 below.

With climate change predicted to bring warmer and drier summers, more and more people are likely to seek out the coast. While there is no good shore use data set, the summer and autumn of 2013 saw unprecedented high temperatures in Ireland with prolonged periods of little or no rainfall, which in turn, had many Coastwatchers observing an increase in the number of beach users.

## LITTER COUNTS Drinks containers, can holders and plastic bags

- 1 South Louth, Meath, Fingal, Dublin City and Dun Laoghaire
- 2 Bannow Bay and East Waterford
- 3 Dingle Bay and Tralee Bay
- 4 Inis Oírr (Aran Islands)

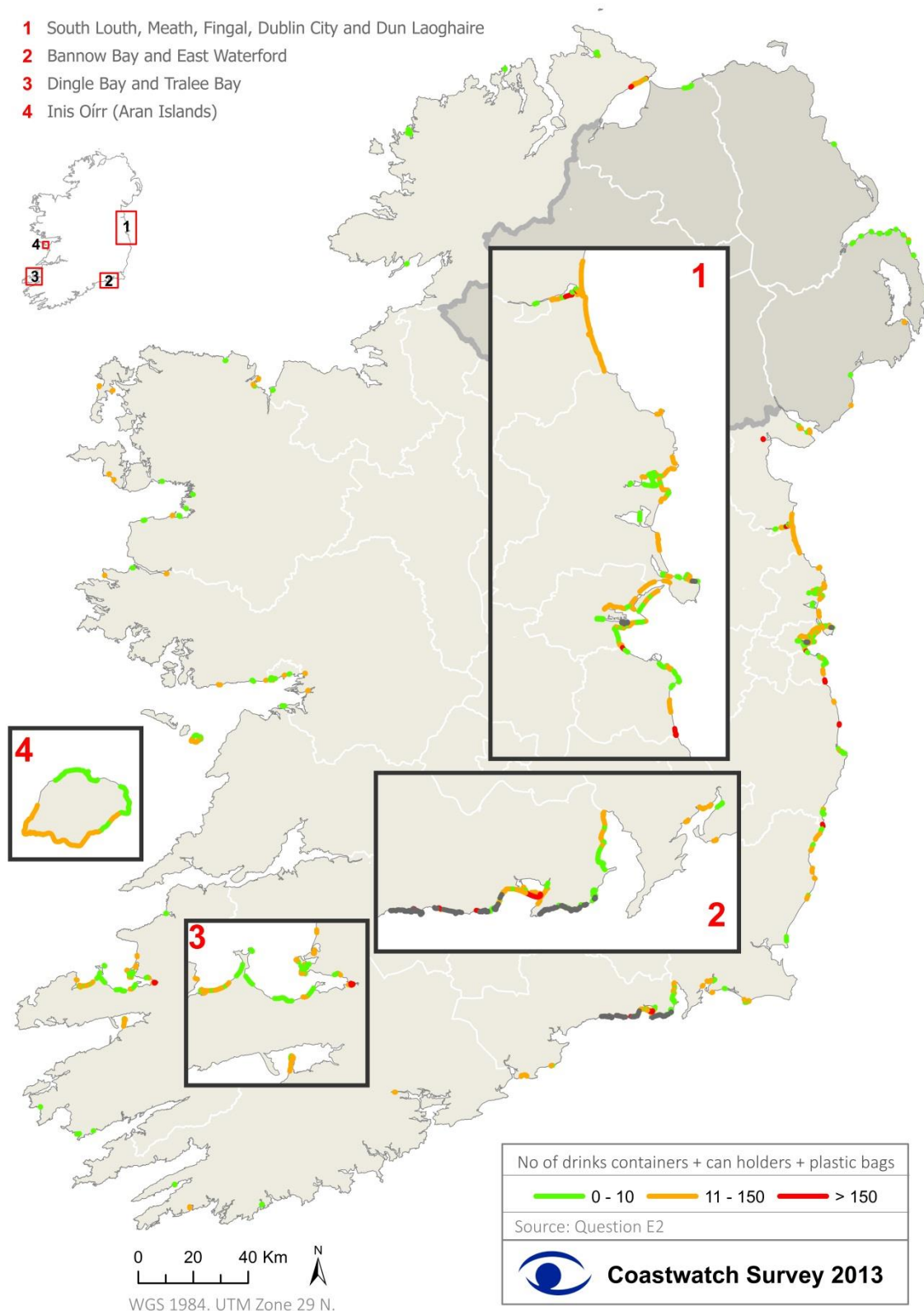


Figure 26. Density of Drinks containers, plastic bag litter on the coast of Ireland N and S.



### Plastic bottles

Plastic bottle stood out as the most common drinks litter by far with 14,910 bottles counted and one or more found in 85.5% of s.u. (see Fig 24) While the average count is 30 bottles/s.u. the distribution and surveyor comments show that these drinks containers occur in clusters. In 2013 two survey units - both in the Republic – returned an estimated count of over 1000 bottles. While an estimated 100 -1000 bottles were recorded in 30 of our 498 s.u. If the average is recalculated omitting the two highest counts it falls to 25.5 bottles/s.u.

Some bottle clusters are likely to be part of local drinking, while others have spent time in the sea and been washed back onto the shore, piling it up in a small deposition area. Currents and winds can carry the light litter from a wider area and dump it on a given stretch of shore almost as though a sweeping brush had been at sea with the shore as the dustpan. The difference between the drinking spots and sweep area deposit areas tends to be in the other wastes recorded and the high prevalence of closed bottles on the sweep beaches, suggesting that containers without lids fill with water and are less likely to be swept up. A lid count might be a proxy for bottles in the sea.



Plastic bottles on the coast. Picture by surveyor.

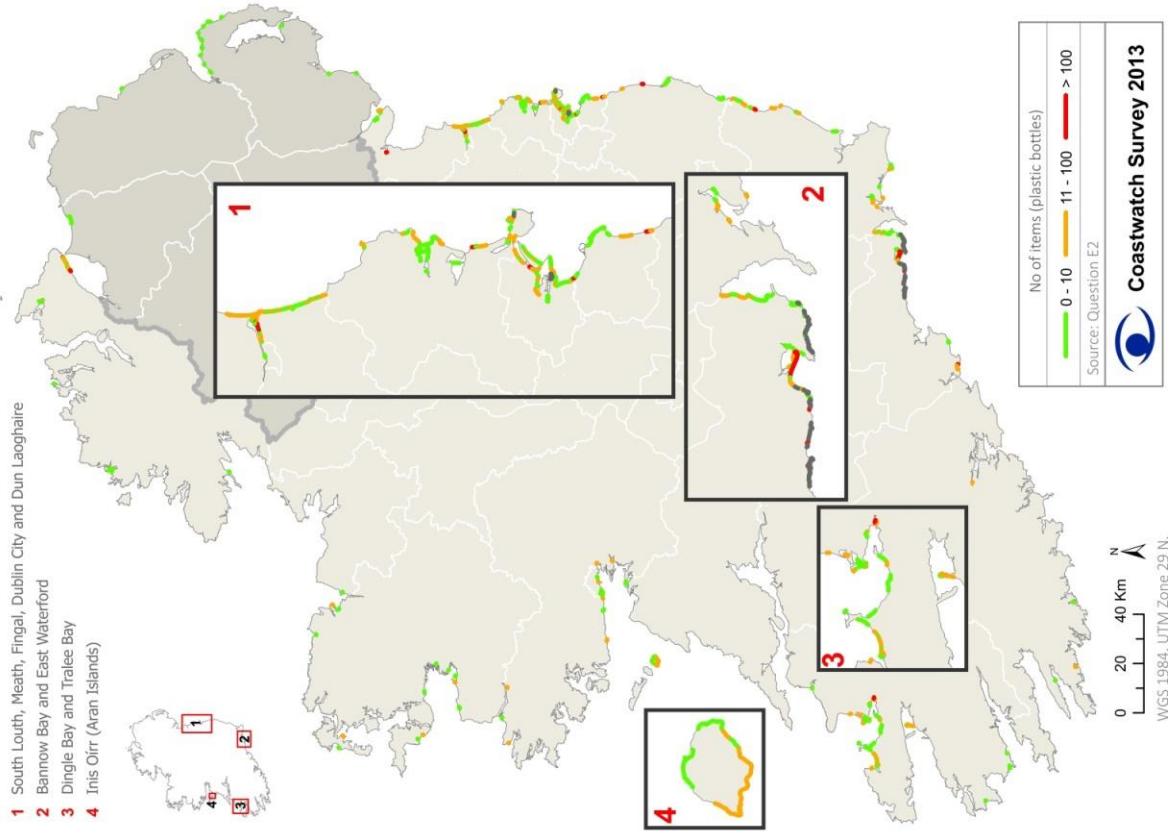
The maps (figure 27 a and b) overleaf show plastic drinks bottle distribution in survey sites. Map 27a presents surveyor counts in 3 densities – 0-10, 11-30 and 30+ plastic bottles. As for the general drinks litter and bags map earlier, these littering bands are a tentative exploration of what people may get to later know as one of many indicators of Good (or not so good) Environmental Status. The second map on that page (27b) uses a more generous scale, where clean is still 0-10 cans, but instead of considering somewhat littered as shores with 11-30 bottles, we widen this middle band to 11 – 100 bottles.

A quick comparison shows less red (badly littered) sites especially on the East coast. In number of sites deemed badly littered the statistic would then be 7% or 15% of shores.

There is an urgent need to back actual band width with good field work on shore litter and the value judgement of enough shore users before deciding on final bands for official use in reporting on the

## PLASTIC BOTTLES

- 1 South Louth, Meath, Fingal, Dublin City and Dun Laoghaire
- 2 Bannow Bay and East Waterford
- 3 Dingle Bay and Tralee Bay
- 4 Inis Oírr (Aran Islands)



## PLASTIC BOTTLES

- 1 South Louth, Meath, Fingal, Dublin City and Dun Laoghaire
- 2 Bannow Bay and East Waterford
- 3 Dingle Bay and Tralee Bay
- 4 Inis Oírr (Aran Islands)

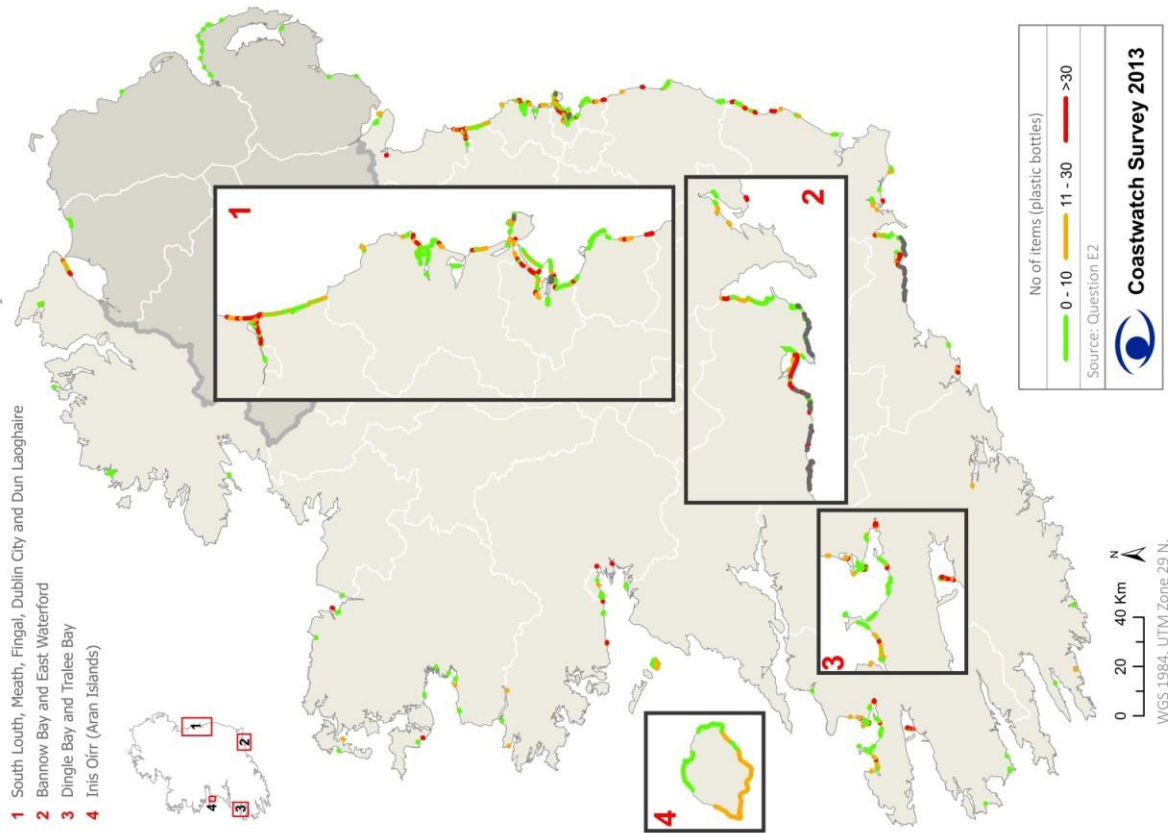


Figure 27 Drinks bottle litter on the shore of Ireland N and S mapped in three density bands. 27a – counts up to 10 bottles as clean, 10 to 30 as moderately littered and > 30 badly littered. Fig 27b ( above a) deems 10 to 100 bottles moderately littered and > 100 badly littered.

## Plastic Bag Counts

One or more plastic shopping bags were reported from half the 498 sites included in our 2013 report. That spread applied to both North and South. The total count came to 1,357 which is 2.5/s.u. All Ireland and also for the Republic (1,316 bags in 471 s.u.) The average NI count was much lower 1.5/s.u. (41 bags in 26 s.u.).

This litter count was introduced in 1997 due to public concern about plastic bags in trees, ditches, river banks and the shore. The 1997 average count in the Republic came to 14 plastic shopping bags/s.u. It then rose every year until the plastic bag tax was introduced in the Waste Management (Amendment) Act 2001. The next - autumn 2002 – Coastwatch survey showed a sharp drop and in subsequent years it stayed at 2/s.u. +/- 0.5 for every survey. The bag levy has been increased twice since then. This year's plastic shopping bag count yielded an upper limit count, while the small NI sample had a lower end of our range count.

Tackling the residue: this shopping bag litter appears to be associated with locations which have a high drinks container count and with angling waste. Angling litter doubled this year (see page 50) and was more widespread. Bait is sold in plastic boxes which are then placed into plastic bags to go to the shore. Containers and bags may be lost on a windy day – even with lugworm content as this Galway picture shows.



Bait box with last worms escaping

Cans bought in off license and supermarkets for outdoor drinking are also usually carried to the shore in plastic bags. Indeed some diligently collect the empty drinks containers, put them back into those same plastic bags and then leave them on the shore.



## Addressing Drinks Container and Plastic Bag litter

From Coastwatch survey results across Europe, our drinks containers load is consistently in the group of high litter countries. There is a significant link between deposit on return systems and reduction/low numbers of drinks container litter in all countries where this economic instrument was introduced or maintained (<http://www.zerowasteurope.eu/2010/09/beverage-packaging-and-zero-waste>)

Box below summarises 3 main approaches to managing drinks container litter.

The three main ways to deal with empty beverage packaging:

1. Refilling (normally with deposit)– bottles are used by the customer, transported back to the filler (producer), rinsed, refilled and transported back to the customer for use. Glass bottles can be refilled over 50 times as we see in the pub trade where the relic of our old refill system is still maintained. Where this loop covers a small area – as our milk bottle refill system did – the result is near zero litter, minimum environmental impact and considerable cost savings for those in charge of waste management. A refillable PET-bottle can be returned with weekly shopping and the bottle is so light that any litter which is spotted will be picked up and can be carried for some distance.
2. One-way with deposit – bottles/cans are used only once. The sorted packaging is returned but may go to recycling companies where it enters the waste resource market. Depending on price some or most will be used to produce new drinks packaging. Still aiming for zero litter but a higher environmental impact than the first option, especially where the (re)make of the container requires a high temperature.
3. One-way without deposit – bottles/cans are used by the consumer and disposed of – usually in mixed recyclables. The producer may pay a fee to an organisation to handle the waste and depending on the waste market the mixed green bin loads are separated or passed on to incinerator ‘recovery’.

When our Coastwatch surveys started, oil prices were low, carbon emissions were academic concerns and there were other shore problems which exercised people like sewage and oil. While sanitary waste became less frequent on our shores, numbers of drinks bottles rose. The same happened right across Europe. One way no deposit systems introduced in the 1990s when speed, mechanisation and obsolescence stood for ‘modern’ and it was the cheapest option for producers were beginning to be questioned. By 2000 the beverage container policy reviews were seen. Litter, waste of raw materials, rising raw material costs and greenhouse gas emission concerns lead to reintroduction of deposits on return in a number of European countries.

On the island of Ireland we still have the third system described above. To the consumer, the empties have ‘no value’ and thus there is neither an incentive to avoid littering nor to pick such containers up.

Research carried out by Coastwatch on public acceptance of a deposit on return system in spring and summer 2013 suggests that there is a strong public backing for such a scheme, with 89% of those asked in favour (Dubsky et al 2013). Given the recent successful approach in Scotland and Spain of testing the modern deposit on return in trial areas, several Irish environmental groups lead by Coastwatch and Voice are calling for similar deposit on return trials in Ireland. These could be chosen for different situations: one where a lot of drinks containers are going to be used. Imagine St Patrick’s Day going green in this environmental sense and empty cans and bottles not floating down the Liffey into Dublin Bay that day. Other pilot schemes could apply the deposit on return in different locations and circumstances like a small town, a university, a harbour.

### 3. Presence of Small Litter

Apart from the litter counts above, surveyors were asked to walk their shore from splashzone down to the water's edge and note presence/absence of 14 categories of smaller litter items. Figure 28 below shows the percentage of survey units in which a given litter category occurred. As previously for drinks container waste, surveyors identified both local litter sources and long distant travellers. Apart from the 86% of shores with plastic bottle litter (not shown here), the fishing, angling and aquaculture gear category was the most widespread occurring in 3 of every 4 sites. This was well ahead of the next most common categories of Textiles/clothing and 'other plastics' which were recorded in 46 and 45% of s.u. respectively. All other wastes were below 40%, down to medical waste which was found in 9 s.u. (2%).

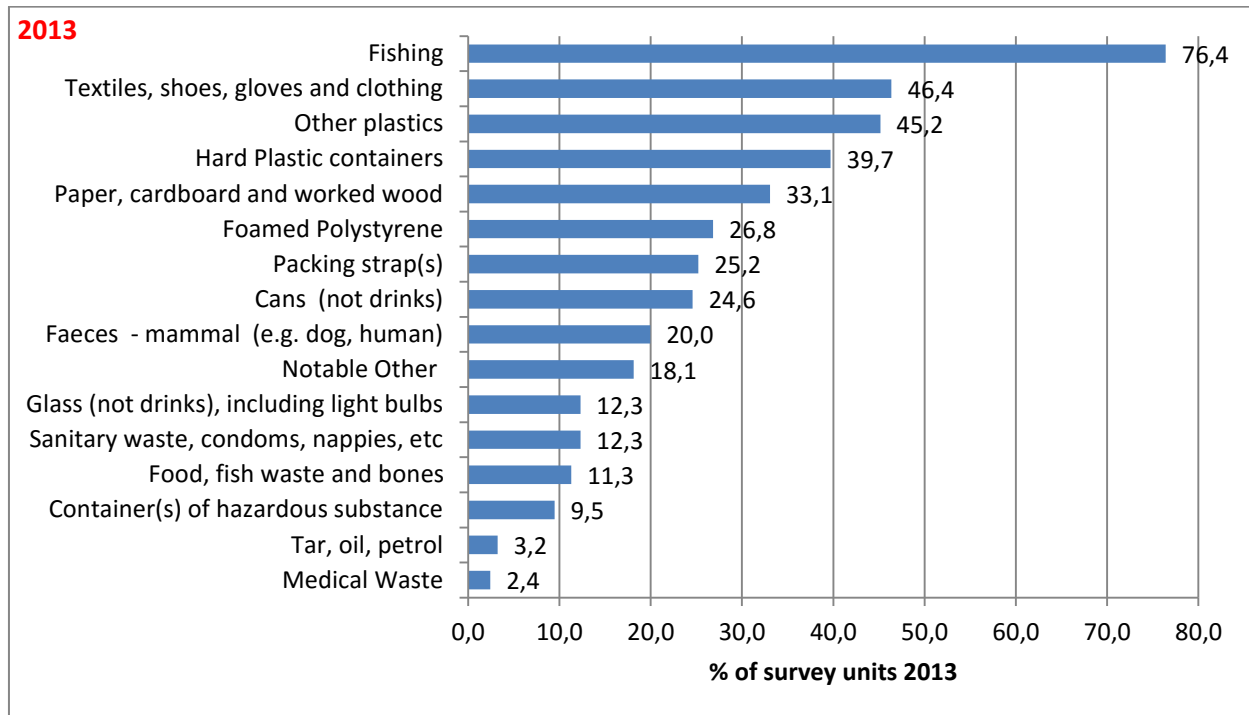


Figure 29. (N=498 s.u.; Source: Question E3) Percentage of shores with litter items present in 2013

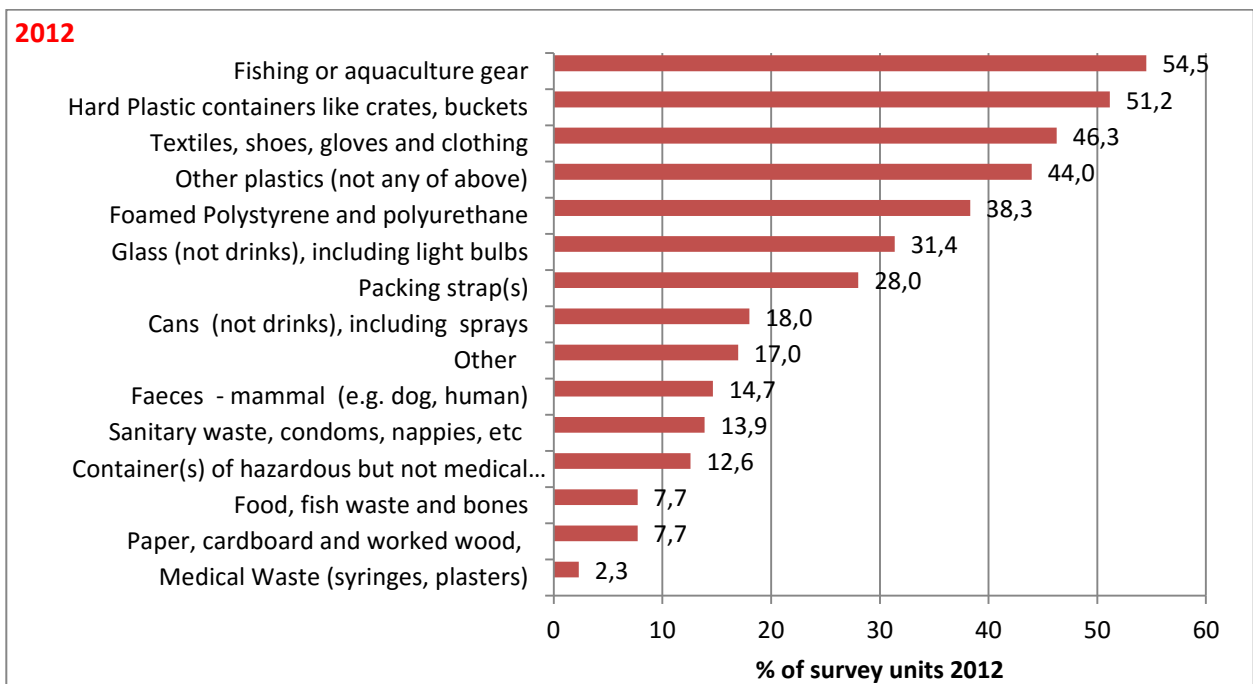


Figure 29. (N=389 s.u.; Source: Question E3) Percentage of shores with litter items present in 2012.

Comparison with the 2012 data (Figure 29 above) shows a massive increase in fishing gear from being reported in 54% to 76% of s.u.

A further question, breaking the mixed fishing related question into three categories was answered by surveyors of 231 sites. The resultant 380 source notes on fishing/angling/aquaculture gear are represented in the pie chart below. In 2013 commercial fishing related waste made up 61% of these 231 s.u., while in 97 survey units at least part of the waste came from angling, making up 25% of the mixed fishing litter load. Aquaculture litter like netlon bags and hooks was reported from 52 sites (14%).

Comparing the relative contributions of the 3 different sources over two survey years shows large differences. In 2012, 80% of the shore fishing litter came from the fishing industry, 15% from angling and only in 5% from aquaculture. This year’s survey showed angling tripling as contributor to the fishing litter load. One angling shop suggested that the increase may be explained partially by weather, with possibly more amateur angling and more night time sea fishing taking place in good weather and hence leaving more opportunity to lose gear. Also the survey in 2013 may have included more angling spots.

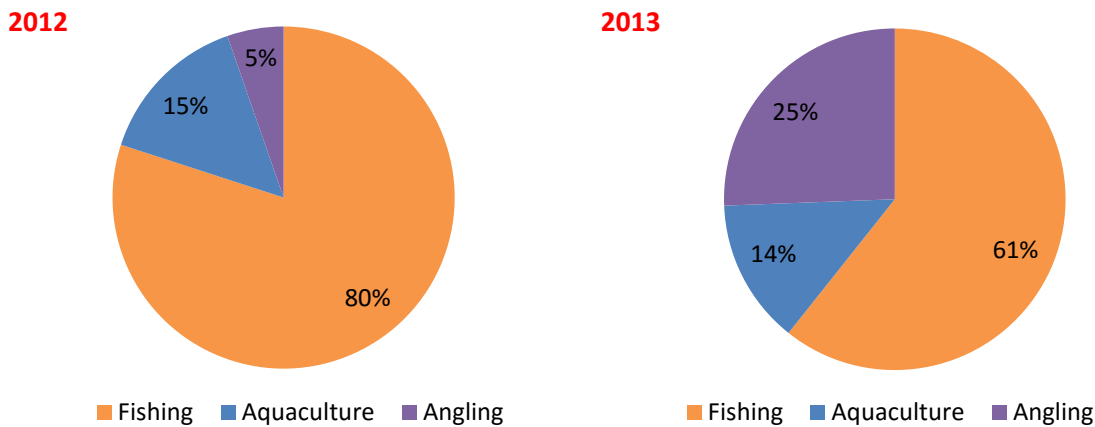


Figure 30. Surveyor reports on sources of the fishing gear in survey units (Left: 2012 CW survey, report on fishing &/or angling &/or aquaculture litter source N= 212. Right 2013 CW survey, N=380).



A netlon oyster grow bag and Entangled ropes swept up in Bannow Bay, Co. Wexford. Picture by Alice Michieli.

Some large fishing gear is so heavy that it is still in position on rock armour a year later. Photo Poulshone, Co. Wexford, 2012 Justin Byrne, seen again in 2013.

One recent aquaculture litter source reported by both divers and some fishermen on the west coast is plastic rope culture stockings which may be seen around long line mussel aquaculture. As the data arrived after the survey period it is not included in this survey report but will be picked up in follow up work.

**Polystyrene** was another notable change from 2012 data is the apparent reduction in polystyrene litter. However this category was changed in 2013 from previous polystyrene and polyethylene to only covering polystyrene. This material breaks into small beads which are a danger to wildlife.



Polystyrene on shores here Clogga Co. Wicklow and broken into small beads by the waves. Picture by surveyor.

To put our human design accomplishments into context it is noted that Common Whelks also use a blow process to create clumps of eggs. The structure has similar lightness and insulating qualities which manufacturers of polystyrene praise. However they do not fall apart as easy and egg balls, are biodegradable, lasting not much longer than it takes for tiny whelks to grow and hatch.

**Medical waste** has reduced steadily and is now very rare. This is linked to the increase in functioning sewage treatment and closure of coastal landfill sites which were the two main sources.

**Sanitary waste** was recorded on 12.3% of shores. Observations cover a range of items with sanitary towel remains most common in Ireland. It may include cotton buds and occasionally includes nappies buried in sand by beach visitors and dug out again by wind and sea. This litter has reduced to half of what it was 14 years ago.

**Sewage Pollution:** An extra question (E3 part 2) was directed at surveyors who know their shore very well and asked for the frequency of sewage pollution events. In almost half of the s.u. surveyors passed on this question. Responses from 238 survey units indicate 35% were considered to be reliably free of sewage pollution and nearly half (48%) thought there could be rare events. The remainder broke down into 14% with occasional problems and 4% deemed to suffer ‘usually’ or ‘frequently’ from sewage pollution. That includes black spots where treatment is planned but still awaited such as Moville in Co. Donegal.

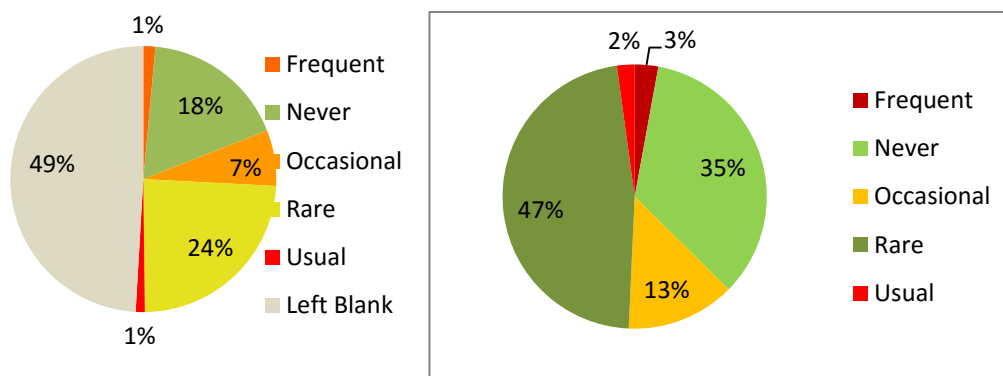


Figure 31. Frequency of sewage pollution incidents (a) (N=498 s.u., Source: Question E3part 2). And (b) 238 sites with responses from surveyors who knew the area well.

**Case Study Dublin Bull Island to Sutton.** Comments by Dave Convery, who went out with several surveyor teams.

Many surveyors commented on people taking advantage of the fine autumn weather and bringing drinks to the beach, with some noting evidence of beach bonfires.

The mainland beaches near the North Eastern tip of Bull Island were very littered, with both general litter such as drinks, cans and plastic wrappers and larger items such as rusty wheelbarrows, burned wood/polystyrene, and rubber tubing. The pictures below show a snapshot of this. Note that nothing was moved to accommodate more rubbish in a single photo.



Snapshot of litter problem on Sutton strand which go beyond the usual drinks container litter. Here ‘damage to nature’ litter included suspect container, a lot of lids, piping and straps and large plastic sheeting.

One surveyor comments reflected the general view well: *‘If Ireland is to fully embrace its natural beauty and sell itself as a tourism hotspot, there must be a greater effort and investment by the powers that be and the general public to change our littering habits.’*

A widespread surveyor view was that lack of bins in and around the urban beaches exacerbates the litter problem and that looking at ways to address the problem in a win win manner. Economic instruments enticing consumers to return empty drinks containers should be tested, especially in urban areas as shops to return the bottle or can are close by. The chance of someone picking up stray drinks containers, washed in or down a river, is also high, due to shore user numbers and at the same time the maximum number of people (and voters) would notice an improvements in shore cleanliness.

OSPAR agreed to develop a regional Action Plan on Marine Litter by 2014 and assist EU member states to implement the Marine Strategy Framework Directive Litter measure obligations. In 2013 the preparations included a large international conference in Berlin and a recent workshop in Hamburg, both providing valuable opportunities for information exchange and furthering the plan.

## Monitoring

A draft scheme for using the OSPAR beach monitoring for assessing the litter load for the MSFD was presented at both meetings. This is based on using OSPAR litter data only and sets out how to use data as indicators – see [http://www.marine-litter-conferenceberlin.info/userfiles/file/online/posters/University%20of%20Osnabrueck\\_2.pdf](http://www.marine-litter-conferenceberlin.info/userfiles/file/online/posters/University%20of%20Osnabrueck_2.pdf)

The scheme is well thought out and would seem to be achievable. But results will depend on whether the number of sampling sites is large enough and representative and whether timely information is widely available to influence behaviour, budgets, and laws.

Citizens and those contributing towards reducing or adding to the marine litter load need timely and accessible information to respond to. With modern technology and GIS mapping it is quite possible to create updated litter maps at least annually. It is envisaged by Coastwatch to start producing interactive result maps on a number of parameters from 2014. A pilot version will be presented at the international Coastwatch meeting in 2014.

The waste and litter questions are the oldest in the Coastwatch survey and formed the core of the first 1987 Irish survey. As Coastwatch spread, adaptations and counts were introduced. Coastwatch pre dates OSPAR marine litter monitoring methods. The two approaches are complementary, as noted in Appendix 2 of 2012 results.

The OSPAR method records the amount and type of litter found in great detail on 4 reference beaches in Ireland. The standard survey unit is 100m (rather than the Coastwatch 500m) and all items are picked up and counted. While together these 4 beach sections are not quite one full Coastwatch survey unit which covers all types of shore, the careful detailed recording and higher monitoring frequency of 4 surveys per annum have made the OSPAR work an important contribution to monitoring marine litter in the NE Atlantic over the last decade.

Coastwatch presence/absence data over large stretches of accessible shores records how common and widespread given waste and types of marine litter are, while the count question (E2) for select common consumer goods and tyres once per year can be handled like OSPAR counts.

There is clearly scope to inter-calibrate the two methods and synchronise surveys on OSPAR reference shores in the Coastwatch autumn survey to then have a direct comparison and maximise data use. The combined result should provide sound support for the implementation of the Marine Strategy Framework Directive litter descriptor.

Table 2. Comparisons of Coastwatch and OSPAR shore litter monitoring and results

METHOD CRITEREA	COASTWATCH	OSPAR	Key overlap (& options)
Standard survey unit (s.u.)	500m shore splashzone to water's edge	100m shore + 1 km around the 100m for >0.5m ítems. (where possible)	Same shore width
How often	1 every autumn (augmented by a spring survey in training areas)	4 per annum, one in autumn.	1 of 4
How much	As much as possible. In Ireland that is generally 300-1000 s.u. In 2012 = 389 s.u. with litter data = 195 km of shore in total	4 sites 0.4 km core zone and 4 km for large ítems (>0.5m)	Shores can be shared in autumn if the CW is carried out 1st
Where	All accessible shores, including those cleaned and those with rocks and litter traps	Beaches with ideally no cleaning apart from the 4/annum OSPAR cleaning.	
When	Every autumn, same month or week, cl región specific in N to S bands In Irl <b>mid-Sept to mid-Oct</b>	Mid-Dec/mid-Jan, April, mid-June/mid July, <b>mid-Sept/mid-Oct.</b>	Autumn survey
How	Walk the shore around low water and record marine litter among other shore data. Deal with clean ups in follow up targetting worst áreas or specfic issues (like illegal dumping)	Focussed litter survey. Walk the shore, identify, record and remove litter ítems. Use rake or gloves to find litter in debris or sand. Dispose of collected waste.	Similar, but a 100m focussed litter search will find more.
What is recorded	<u>Presence/absence</u> of 6 large waste in categories, <u>7 Counts</u> - drinks containers, plastic shopping bags and tyres. <u>Presence/absence</u> of 16 select small litter ítems and óther'	All macro waste ítems in 100m in > 110 categories are counted, and large ítems only (> 0.5m) over 1000m. Some categories are the same ítems but in a size range, like <b>Paraffin or wax pieces</b>	Tyre counts are directly comparable over the 1000m, other counts in 100m. Rest in trends only.
Count data	An ítem is counted if it is identifiable, even if broken – i.e. A glass bottle with a missing part is counted as bottle, but a glass bottle broken into umpteen pieces is just ticked as broken glass and not counted. Broken drinks cans are counted if the base piece has some of the body metal left (i.e. the top alone is not counted)	A broken but identifiable plastic bag, can or bottle is counted as one ítem even if broken up into many separate pieces.  (Note though if a string or rope has broken to such pieces, the surveyor is instructed to count each individual piece).	Methods are virtually compatible. Tiny difference for broken ítems. NB –A rope count may be introduced in CW 2014.
Use for addressing sources & tackling the existing litter load.	Coastwatch is likely to pick up local illegal dumping and local point sources. Trend data over time and between countries has been used for common waste (e.g. plastic shopping bags, drinks containers and can holders)	OSPAR may pick up trend data within and between countries and can follow seasonal variations. But the small sample size and shore variability would require a very long sampling period.	Combining data should bring significant extra benefits

UNEP and OSPAR beach litter results 2001-2006 are remarkably constant for top marine litter categories. Taking the top 10 litter items on the OSPAR reference beaches and comparing these to Coastwatch results for most widespread litter, highlights the key litter issues we need.

<b>Coastwatch Top 10 litter items - Most widespread on our shores. 2013 survey All Irl only</b>	<b>Latest OSPAR Top 10 litter items Most numerous on reference shores (OSPAR 2009)</b>	<b>Comment on the OSPAR list</b>
Plastic drinks bottles	Plastic/polystyrene pieces <50cm	CW has no size distinction
Fishing and Aquaculture gear	Rope/cord/net <50cm	CWers would classify as fishing and aquaculture gear.
Metal drinks cans	Cotton bud sticks	Cotton buds are included in sanitary litter in CW. A worryingly high ranking!
Textiles, shoes, gloves joint with Plastic shopping bags	Plastic caps/lids	NCC for Lids in CW ->other plastic, but a count on some CW shores might be tried in 2014.
Other plastic	Crisp/sweet packets	CW would put Crisps/sweets with other plastic
Glass bottles	Plastic/polystyrene pieces >50cm	CW has no size distinction and polystyrene is a separate category
Hard Plastic containers (not drinks bottles)	Plastic drink bottles	Identical definition for drinks bottles
Paper, cardboard, worked wood	Rope/cord/net >50cm	CW classifies as Fishing and aquaculture gear unless of other origin
Paper outer Tetrapack/brick drinks containers	Plastic food containers (incl. fast food)	Not exactly comparable as CW including non food containers. CW small ones like yogurt are marked as 'other plastic'.
Polystyrene	Ind. packaging, plastic sheeting	CW does not have sheet, but it is noted by surveyors and could be counted.

Table 3: Top ten Coastwatch litter categories ranked by how widespread it was from

When the Coastwatch survey litter categories are presented ranked by how widespread they are, This year 5 (last year 7) of the top 10 Coastwatch marine litter categories. occurred among the top ten counted OSPAR marine litter types. The match isn't exact except for plastic drinks bottles.

In terms of products Plastic drinks bottles ranked both highest in the CW survey as it had the widest distribution among the 448 survey sites and in number of bottles counted. However it ranked 7<sup>th</sup> in count on the international mean of OSPAR reference beaches. Polystyrene pieces ranked 1<sup>st</sup> (small pieces) and 6<sup>th</sup> (large) in OSPAR counts and featured as 9<sup>th</sup> most widespread litter in the Coastwatch surveys. In the case of Coastwatch the polystyrene beads would not be included as recorded in micro litter.



## 4. Micro-litter

Micro-litter is an emerging area of pollutant research across the world. An increased number of recent publications show the harmfulness of small pieces of inorganic matter lying on the shores, sinking into mud and sediment, or drifting at the sea surface. However, having little to no standardization, the data is weak.



The definition used by Coastwatch for micro-litter in the survey and results is “particles visible under 10-fold magnification up to 1 cm diameter or up to 3cm length for filaments and fibres.” There are different definitions in use – e.g. up to 5mm and In some most recent research papers, micro-litter is divided into meso litter – visible to the naked eye and micro litter below that.

### Micro-litter Sources:

Micro-litter comes from a huge range of sources. It is created either by the breakdown of larger objects including ones specially designed to do so - the dolly net buns, or enters the marine environment as large micro litter – the ~1cm diameter hard plastic pellets used to make plastic products, or invisible to the naked eye micro litter in industrial or sewage treatment waste discharges. Synthetic textiles and beauty products are two common forms of micro-litter. Our popular Fleecies release polyester fibres after each wash - see (<http://www.ucd.ie/news/2011/10OCT11/241011-Washing-machines-deposit-microplastic-around-worlds-shorelines.html>) and many modern beauty products contain plastic micro beads. (<http://www.pelletwatch.org/>)

The large items recorded in our litter questions break down into billions of tiny fragments which highlights the need for both prevention and clean ups.

Micro-litter was included for the second year in our Irish survey because of the following main concerns:

- Once in the oceans or on the shores micro-litter is virtually impossible remove.
- Some micro-litter is toxic – such as old boat paint flecks, laden with TBT.
- Some, including many plastics, become toxic because they attract and pick up pollutants from the environment.
- Micro-litter can be ingested as food by smaller organisms. Many non-food selective plankton organisms are incapable of separating plastic particles from their natural food. After ingestion, micro-litter is transferred throughout the marine food web to the upper levels. Moreover, the University of Exeter showed that lugworms feeding on sand with a high concentration of micro-particles had a decline in population. The loss of species at the base of the food web can have severe consequences on predators, along with habitat and sediment. In a recent shearwater study, adult birds were observed feeding their chicks plastic fragments with a mean size of 10±5 mm (hence the Coastwatch upper size limits.)
- <http://www.sciencedirect.com/science/article/pii/S0269749113005411>  
<http://www.theguardian.com/environment/2013/dec/02/microplastic-pollution-harms-lugworms-sea-oceans> <http://www.sciencedirect.com/science/article/pii/S0025326X13001574>

## A main target for Europe

The EU Marine Strategy Framework Directive defines the status of marine ecosystem with eleven indicators or Descriptors, with Descriptor 10 – marine litter including micro litter. A huge number of studies related to micro-litter is now under way in Europe. Many – including Coastwatch in the new micro litter section are searching for cheap and effective methods to collect micro-litter information for the new Marine Directive.

The EU taskforce working on this descriptor have set the context as follows:

*“Quantities, composition and distribution of litter, including the distribution and concentrations of degradation products of litter (micro particles in sediments and the water column) as well as impact rates on organisms and the potential chemical pollution resulting from plastics are good trend indicators of degradation through marine litter and monitor direct harm in the marine environment.*

*Monitoring the quantities and distribution of litter in the different compartments of the marine environment will give a basis for actual and potential assessment of socio-economic and ecological impacts of litter. Impacts on organisms, distribution and concentrations of micro particles and chemical burdens monitor direct harm to the marine ecosystem.”*

### **MARINE STRATEGY FRAMEWORK DIRECTIVE. Task Group 10 Report. Marine litter.**

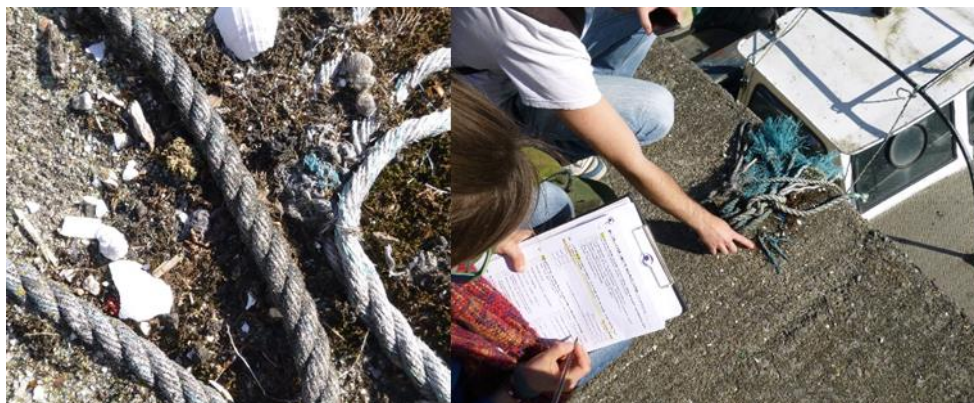
The first Irish Article report (Ireland’s Marine Strategy Framework Directive Article 19 Report Marine Institute Oct 2013) noted there have been ‘no assessments of litter in the water column or on the open sea surface in Irish waters’. However, to follow these EU directives, the Irish government set objectives such as: ‘The amount of litter, and its degradation products (include small plastic particles and micro plastic particles), on coastlines and in the marine environment is reducing over time and are at levels which do not result in harmful effects to the coastal or marine environment.’

**The aim during the autumn 2013 Coastwatch survey** was to collect and characterise micro-litter samples in standardized fashion and try to answer the following:

A – Where on the shore is the visible micro-litter most likely to be found?

B – What does it consist of?

C – Can the information help or guide us on what action to prioritize to reduce micro-litter?



Surveyor Training in Wicklow Harbour. Finding Micro litter - Photo Karin Dubskey

## Materials and Methods

Clean, standardized, 10ml plastic sampling containers were obtained to collect the samples. Labels were added to note sample details. A micro litter key designed in 2012 was amended – see figure below an. The printed key and survey instructions were packaged and handed out in training sessions as well as posted on request.

Surveyors were instructed to:

1. Walk around their shore searching for a visible micro-litter deposit. If found, photograph the highest density micro-litter area and complete question E4 of the survey questionnaire using key below.
2. Take the 10ml container to scrape the surface on ~30cm length along the littered shore surface to pick up a sediment sample with tiny litter. Close the lid. If what you find is most seaweeds or bryozoans, then collect the seaweed mulch litter by hand over that distance.
3. Label containers with location survey code, name and contacts before posting to TCD.

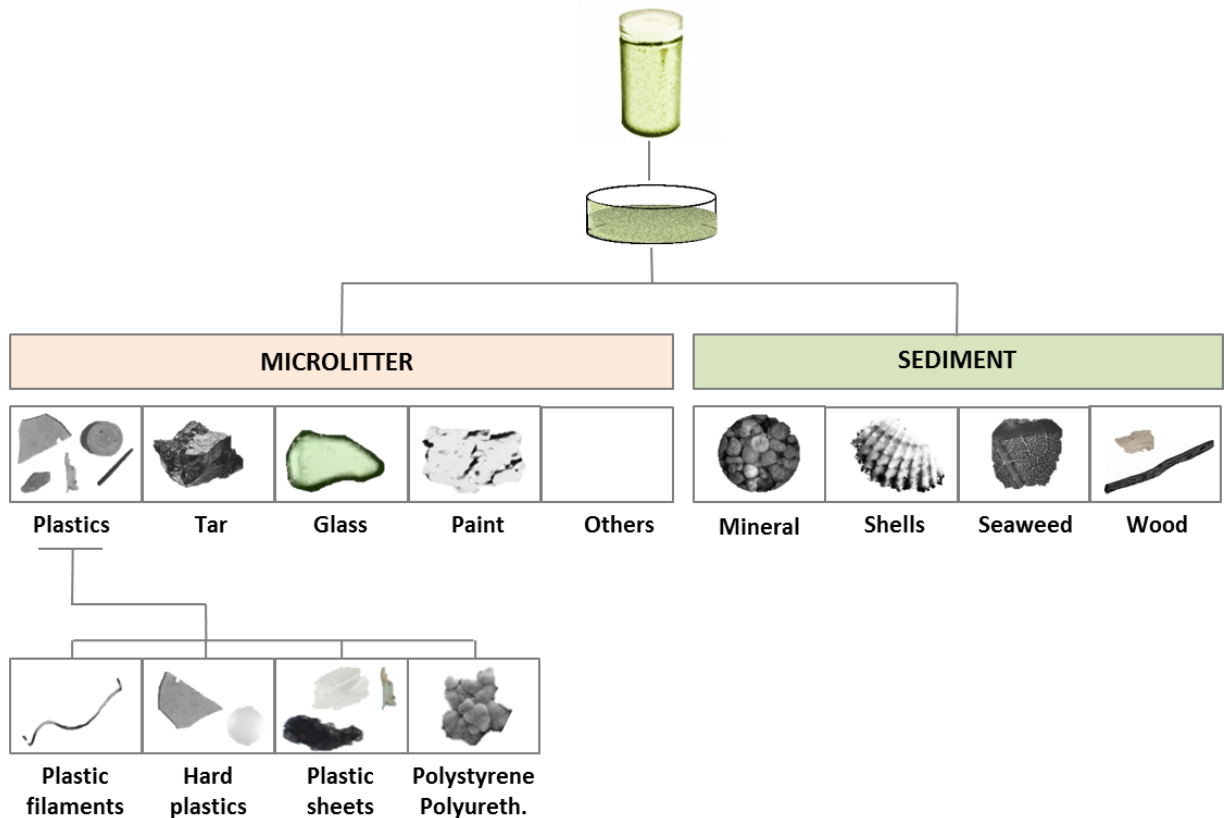
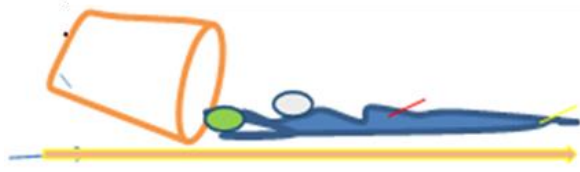


Figure 32 – Micro litter identification key used both in the field and under the microscope to characterise micro litter samples.

As figure 31 shows, sediment and micro litter were both included in the key. Micro litter was divided into 5 material categories: general plastics, including polystyrene/polyurethane, glass, tar and paint. Plastics were then further divided into 4 sub-categories according to their physical characteristics: Plastic filaments, hard plastics and plastic sheets and blown polystyrene or polyurethane fragments.

### Sample processing and analysis

Samples returned to TCD were emptied into a petri dish and the sediment type (sand, silt, mud, and organic) noted. The sorting of the samples and extraction of litter was done by visual inspection, first with the naked eye and magnifying glass, looking for the bigger pieces of litter, then the binocular microscope (using a spatula to move the sediment in front of the lens and inspect litter pieces). The ~30 minute/sample inspection effort used criteria for the visual identification: like Material Thickness, Colour (homogeneity, brightness) Texture and Behaviour when pulled and cut. When in doubt a second volunteer's opinion was sought.

A second characterization was done by size. The size range of the selected pieces was from <1mm (visible with binocular microscope) in 5 categories: <1mm; ≥1-2mm; ≥2-3mm; ≥3-4mm; ≥4-5mm; ≥5mm-10mm except for fibres where up to 3 cm lengths were included in the record.

### Micro Litter Analyses Results

Forty-eight samples were received and stored at room temperature. Three were discarded as too smelly. Surprisingly 21 of the 45 analysed contain no micro litter by the time they were analysed. Some of these especially ones with much seaweed and wood contained dead sand hoppers and other organisms. Whether nearly half of the surface samples were free of micro-litter although surveyors thought they were littered or - as we suspect - most contained pieces which were ingested or dissolved cannot be ascertained for sure. The 198 litter pieces characterised were concentrated in 24 of the 45 sediment samples.

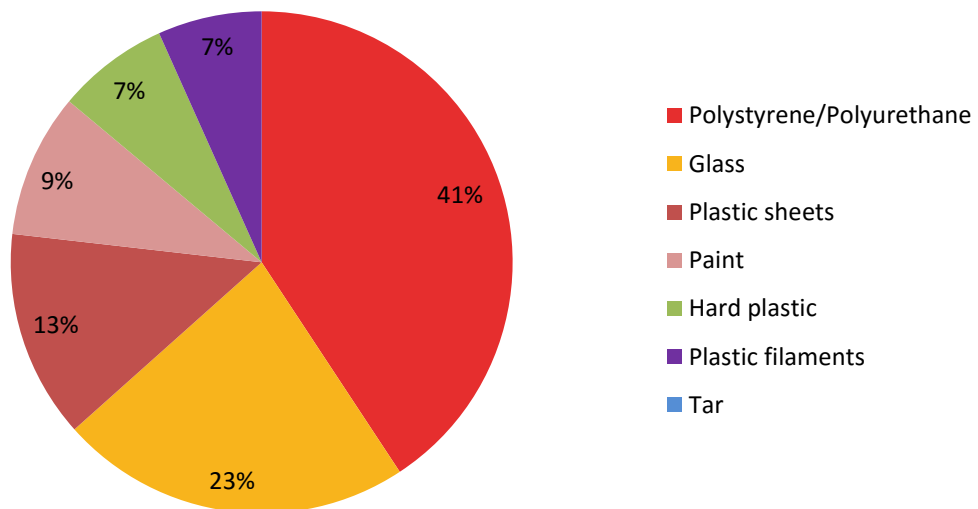


Figure 33. Percentage of each type of micro-litter. (N=198)

### Micro-litter Material and Shape:

As we can see in figure 33 above, the dominant micro-litter was expanded polystyrene and polyurethane (41%). During analyses all but one were identified all as polystyrene. The four plastics – Polystyrene, hard plastics, plastic sheet and plastic filaments together made up 68% of micro litter, pieces of glass contributed 23% of the load but as low concern inert material and paint 9%. Tar was not found in this sample set.

Table 4 - Percentage of litter pieces of a given size and material. (N=198)

%	<1 mm	≥ 1 to 2 mm	≥ 2 to 3 mm	≥ 3 to 4 mm	≥ 4 to 5 mm	≥ 5 to 10 mm	TOTAL
<b>Polystyrene/Polyurethane</b>	0.00	33.51	0.00	0.00	0.00	7.22	40.72
<b>Plastic sheets</b>	0.00	0.00	10.82	0.00	1.03	1.55	13.40
<b>Hard plastic</b>	5.15	0.00	0.00	0.00	0.52	1.55	7.22
<b>Plastic filaments</b>	1.03	0.00	0.00	0.00	0.52	5.15	6.70
<b>Glass</b>	3.09	18.56	0.00	0.00	0.00	1.03	22.68
<b>Paint</b>	0.00	0.00	2.58	2.58	0.00	4.12	9.28
<b>Tar</b>	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>TOTAL</b>	9.28	52.06	13.40	2.58	2.06	20.62	100.00

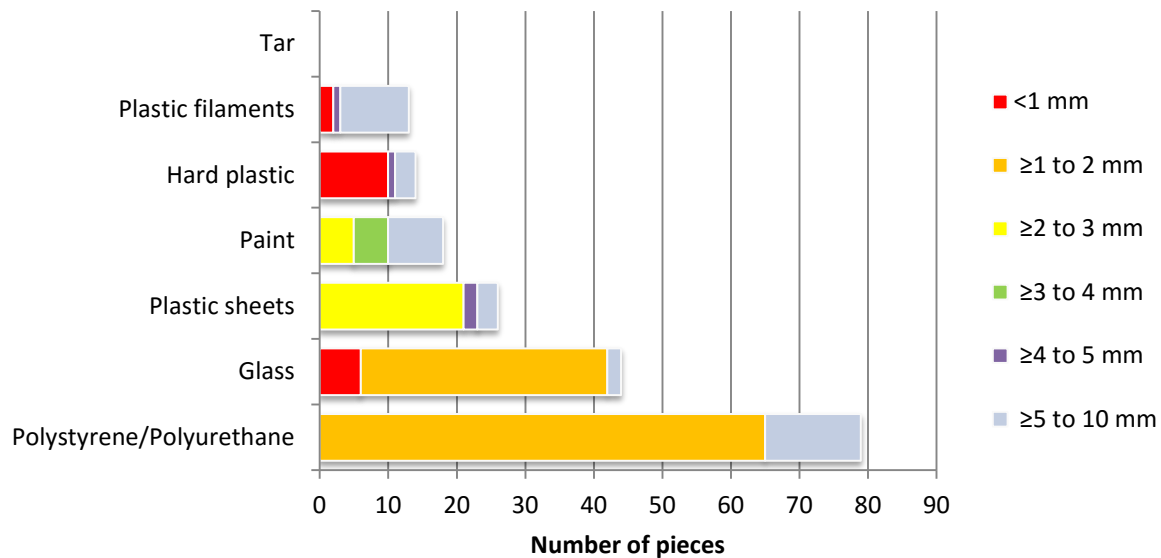


Figure 34. Number of pieces by type and size (N=198)

Figure 24 and Table 3 above show that a full range of litter sizes were represented, but the most commonly found was 1 and 2mm (52%). This size bracket is represented by mainly glass and polystyrene beads. 20% of the micro-litter belongs to the largest size class, composed of every material. The smallest class (<1mm) representing 10% of items found was mostly hard plastic and glass. Very few particles from 3mm to 5mm were found.

**Comparison with data from 2012:** With the small amount of samples, the sampling sites can influence results unduly. Here very limited observations only: The 2013 samples which had litter contained more of it and the particle size distribution was more evenly spread this year. It was dominated by the 1mm to 2mm size range in 2012. The 2013 composition with higher glass and paint pieces reflects that more urban and harbour source samples were included than in the 2012 pilot. Some tar was found (3%) in 2012 whereas none was found this year.

**Conclusions and future plans:** The two preliminary micro litter sampling trials received very positive reaction from some surveyors including school teachers who highlighted the awareness raising benefits and potential use in follow up class work. From analyses and surveyor comments we are beginning to see possible site specific micro litter finger prints with more paint, fibres and glass around harbours and a very high micro litter load in some dislodged seaweed shore deposits. The latter is of real concern as here sand hoppers and other shore macro invertebrates known to be susceptible to ingestion of micro litter are concentrated and it is here where waders forage. Much of this micro-debris is or reduces down to natural food size. A transfer of micro-plastics including polystyrene beads in the food web through plankton organisms has also been shown (Mysid shrimps, copepods, rotifers, polychaete larvae and ciliates) (<http://www.science-direct.com/science/article/pii/S0269749113005411>).

Some micro-plastics can be made of pollutants, or attract pollutants, chemicals, hydrocarbons and antimicrobials. Because they are highly persistent, they can be stored in the organism's tissue and lead to many disturbances. This accumulation will impact the growth and fitness of the organism. Lugworms, which are an indicator species, were shown to have lower energy levels in highly contaminated sediment. (<http://www.theguardian.com/environment/2013/dec/02/microplastic-pollution-harms-lugworms-sea-oceans>). Small organisms, which are often at the base of the food web, eat micro-litter first. The decline of their population can affect predators and possibly the environment. For example, the lugworms decline would impact its predators, such as wading birds and flatfish. It will also affect organisms living in the oxygenated sediment, as it plays a crucial role in oxygenation.

As it is so important that we avoid build-up of micro plastics in our oceans Coastwatch will continue to refine this new micro litter survey section and seek to carry out follow up work in this area - researching micro-pollutants, identifying and helping to address their sources. Such research should include citizen science so that findings are turned into action as citizens have contributed to and are interested in the results.



Two litter items at first sight, but > 300 when a 25cm square quadrat of this tide line deposit was examined in more detail.

The weaknesses in our present sampling method include a lack of standardisation on source. While we ask for a 30 cm long sample in a standard size container, future work should seek to use set sites – like harbour sediments for older loads and slip ways and/or plankton net samples for more recent inputs. Seaweed rich tide marks on shores would be an important sample source if one could standardise this. Micro-litter work will be proposed for international Coastwatch work in 2014 and the ideas and trials of some other Coastwatchers across Europe reviewed.

## 5. General shore littering and shore cleaning

While large waste tends to stay in situ until a major planned removal event takes place, or it breaks apart into smaller litter items, the small litter can be removed by wind, sea, local authority, community or individual volunteers. Question F2 was included in the survey to inform us whether there had been a recent cleaning event and F3 asks surveyors to report on recent weather.

**Cleaning:** Approximately 12% of s.u. in the Republic and 27% in N Ireland were known to have been cleaned in the week before the survey (see Figure 35 a and b ). In bathing areas it may have included the last beach clean before the new extended bathing season end. There has been a welcome increase in litter clean ups, ad hoc and organised ones by An Taisce’s Coastcare groups and local authority efforts. Looking back to earlier surveys this is a large increase. In the 1990s and early 2000s between 2-4% of shores were thought to have been cleaned in the week before the survey.

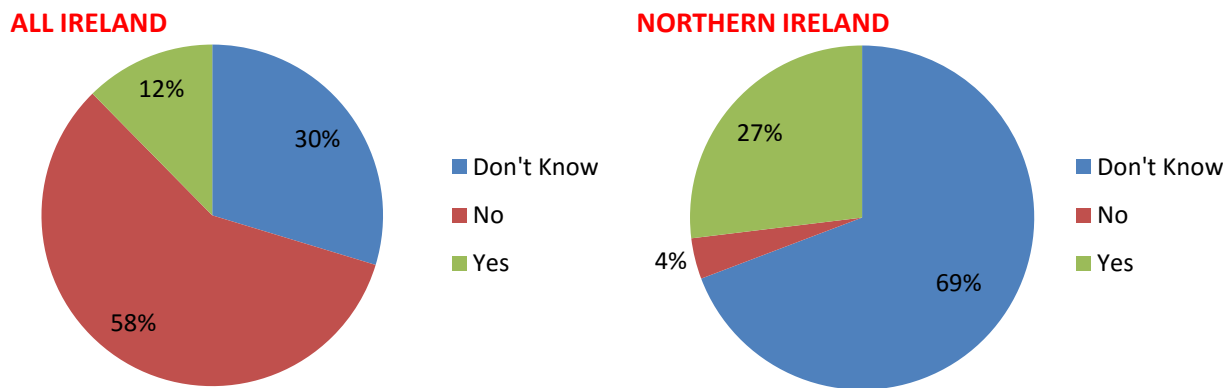


Figure 35. Surveyor responses to question F2 - was the shore cleaned within the week before the survey? All Ireland(N=498) and NI (N=26).

Surveyors were asked which shore area was most littered in question E3, part 3. The pooled responses in Figure 36 below, show that just over half considered the splashzone most littered – down from more than 2/3<sup>rds</sup> of shores had most litter concentrated in the splashzone the previous year. Depending on the shore this can be a composite of spring tides carrying litter up into that zone, meeting litter from land, as well as recent litter dropped by those using the splashzone especially walkers on the shore. The next highest litter concentration was on and in the last tide mark. Only 5% of intertidal areas were reported to be most littered.

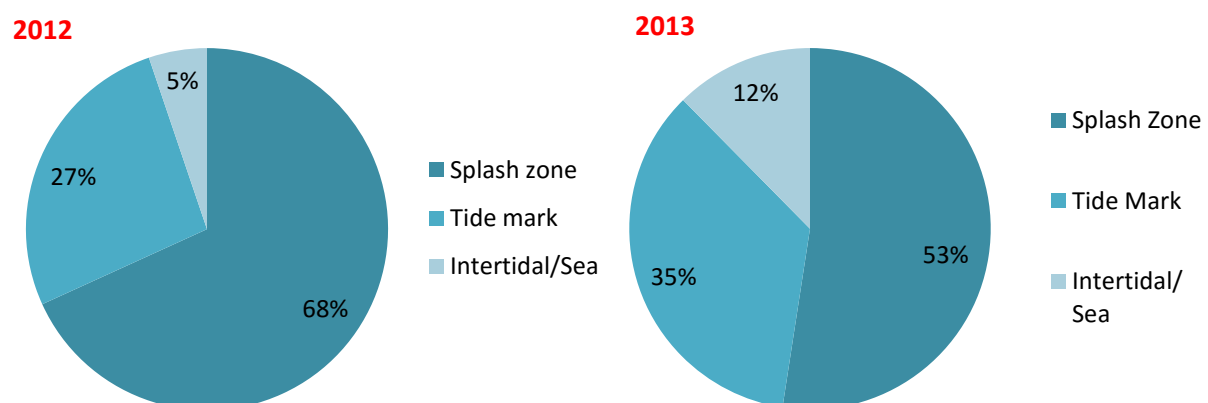


Figure 36. Comparison of which area of shore was most littered 2012/13 results (2012 N=389, 2013 N=498).

In 2012 the majority of survey units had highest concentrations of shore litter in the splashzone (68%) followed by the tide mark (27%) and least in the intertidal or floating on the adjacent water (5%). In 2013 the result was quite different with only just over half of the survey sites being most littered here and 35% characterised by maximum in the last tidemark. The intertidal was most littered in 12% of s.u.. We believe that several factors may have contributed to this picture - more shore cleaning would have removed the splashzone waste, the good stable autumn weather prolonged recreational activity and litter opportunity which would be reflecting in recent tide mark and intertidal litter.

What they said:

Angela O Flynn Fingal and Maire O Brien, Portmarnock beach comment on a shore which receives a lot of waste deposited by the sea from further south as well as local beach users: *'this result (with lower splashzone waste accumulation) validates our litter collection every 2 weeks'*. Patrick and Annette O Brien Portrane about their cliff shore: *This s.u. is now much cleaner than in earlier surveys*. On Carlingford Lough a survey of Carlinford village shore drew comments from a visiting group of Russian students, reported by Dave Convery: *This was very well kept section of shore and very clean*.

Against that we had others as in Howth Harbour, where the surveyor walking the shore beyond the harbour wrote in despair: *This shore is terrible, so littered!*

## RECOMMENDATIONS

A full set of recommendations will be published separately after conferring with surveyors. Here just preliminary monitoring recommendations on MSFD shore litter Monitoring:

We recommend a combination of methods to monitor marine litter for the MSFD: The OSPAR beach litter method for detailed analyses of the litter load on well selected small shore reference sites, the Coastwatch survey for large areas of shore, with wide public participation and follow up litter studies designed to be able to compare results in as many other sites as possible.

We need timely result feedback and local authority and stakeholder involvement in follow up action to prevent, manage and clean up. The two main methods OSPAR and Coastwatch should be inter-calibrated.

Coastwatch count data in question E2 could be used now to contribute to that MSFD shore litter monitoring programme. The Coastwatch questions E1 of large waste and E3 identification of most littered part of the shore should dovetail with the OSPAR 1 km screen survey. Coastwatch surveyors may also be prepared to add quantitative information to their E1 large item reports to add further value.

Material Impact Assessments are needed to minimise new often totally avoidable marine litter problems arising as with micro beads.



## RESULTS PART 4: SURVEYOR VIEWS AND KNOWLEDGE

### 1. Familiarity with the Area

A question was posed on our questionnaire in order to determine the degree of knowledge of the surveyed areas. The following graph shows how well the surveyors knew the sites undertaken.

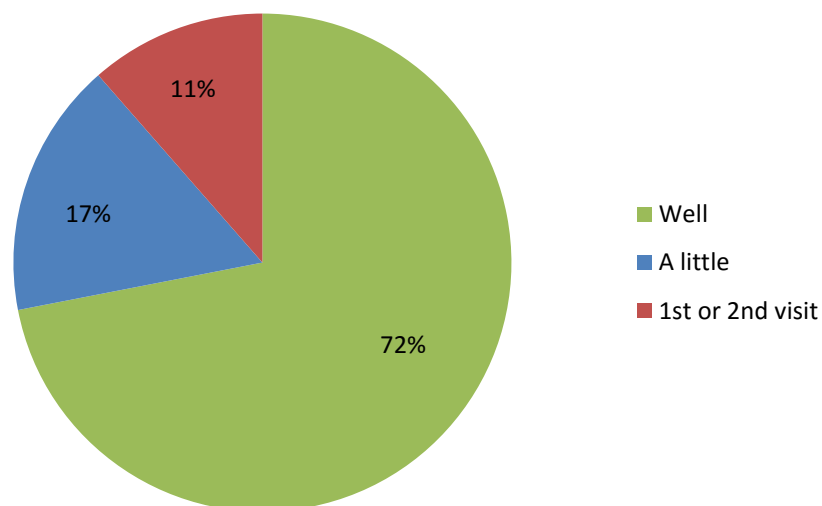


Figure 37. How well do you know the site? (N=526 s.u.; Source: Question A5). Surveyor's familiarity with survey area.

Almost three quarters of the sites chosen were well known to surveyors, putting them in a position to use their background knowledge as well as observations on the day. This adds value to the citizen science as it means that they are able to note changes, identify possible problems and may be interested

This figure is significantly higher than last year (61%). About 17% said they knew their area a little and 11% had only been there a couple of times.

## 2. Designations: Type of Designations and Awareness

In question A6 surveyors were asked if they knew whether the survey site was officially designated or not.

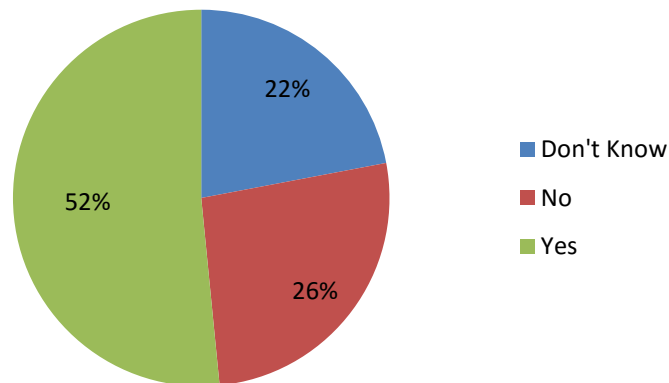


Figure 38. "Is this unit an officially designated area?" (N=547; Source: Question A6).

In 22% of cases surveyors indicated that they didn't know if the area was designated or not. This is an improvement from last year when 31% didn't know and it can be partly attributed to a larger number of training events organized by Coastwatch. If the answer was 'Yes' they were also asked to indicate in question A7 which designation they believed applied. A range of international and national Natura, as well as select EC law, linked human use designations were included - see Table 4 below. Guide notes explained the meaning of the designations and indicated where to get information. Additionally volunteers were requested to indicate if the site was used for bathing or aquaculture but not designated. Unfortunately due to a problem on the layout of the online input form, these use and designation categories were lumped together making this data unusable for analysis. Another 'noteworthy use or designation' could also be entered.

Table 5. Designations and uses listed in question A7.

UNESCO - Biosphere Reserve	Designated 'Bathing Water' - or used as
RAMSAR Site	Designated 'Shellfish Water' - or used as
Natura 2000 site (SPA &/or SAC)	Access for vehicles
National Park	Other use, or use designation.
NHA or pNHA [IE] / ASSI [NI]	
Other Nature designations	

When results were returned, the locations of the surveyed sites were mapped and compared with maps of the official designations. The following sources were consulted: Department of the Environment Northern Ireland: Natura 2000 (SAC, SPA), Areas of Special Scientific Interest, RAMSAR sites, Shellfish Waters, Bathing Waters [www.doeni.gov.uk](http://www.doeni.gov.uk) Natural Parks and Wildlife Service: Natura 2000 (SAC, SPA), Natural Heritage Areas (and pNHA), and National Parks. [www.npws.ie](http://www.npws.ie) Environmental Protection Agency: Bathing waters [www.splash.epa.ie](http://www.splash.epa.ie) Department of Agriculture, Food & the Marine: Shellfish waters [www.agriculture.gov.ie](http://www.agriculture.gov.ie) Irish RAMSAR Wetlands Committee: RAMSAR sites [www.irishwetlands.ie](http://www.irishwetlands.ie) Marine Irish Digital Atlas: RAMSAR sites [www.mida.ucc.ie](http://www.mida.ucc.ie) UNESCO: Biosphere Reserve [www.unesco.org](http://www.unesco.org)

Some issues were found when checking the official boundaries of the designation, in particular the RAMSAR sites. In the Republic of Ireland there are no official boundaries available for these wetlands. We used the boundaries provided by the MIDA which gives the following description of the data:

*“The dataset represents the areas protected under the RAMSAR Convention on Wetlands and relevant information about them. The polygons were compiled from SACs, SPAs, and NHAs, and therefore provide only general boundaries of RAMSAR areas.”*

To minimize this inaccuracy we applied a 1km buffer around Ramsar sites and used other known site boundaries.

Results of this background research, show that 83% of survey sites were in, or part of a protected area. As displayed in graph 39 below surveyors were most likely to be in a pNHA, followed by the Habitat Directive SAC designation and the Bird Directive SPA. There were no surveys in National Parks this year.

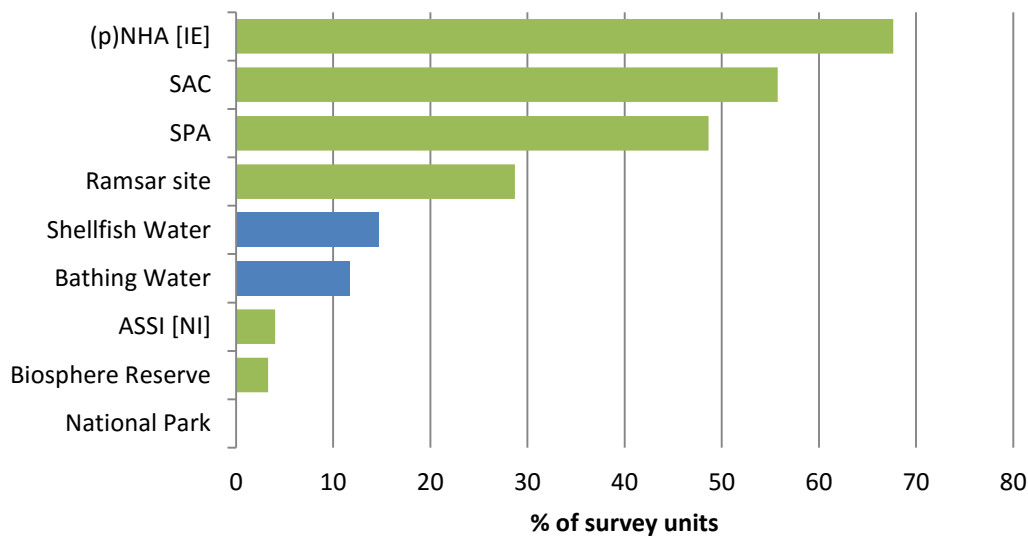


Figure 39. Percentage of survey units which were designated or part designated by type of designation. (N=547; Source: NPWS; Department of Agriculture, Food & the Marine; EPA; Irish RAMSAR Wetlands Committee; Department of the Environment Northern Ireland, UNESCO)

These results were compared with the answers given by surveyors to questions A6 and A7 to check whether they were aware of being within a designated site or not. Figure 40 below shows the percentage of s.u. that were designated but not noted by the surveyors, ranked by designation.

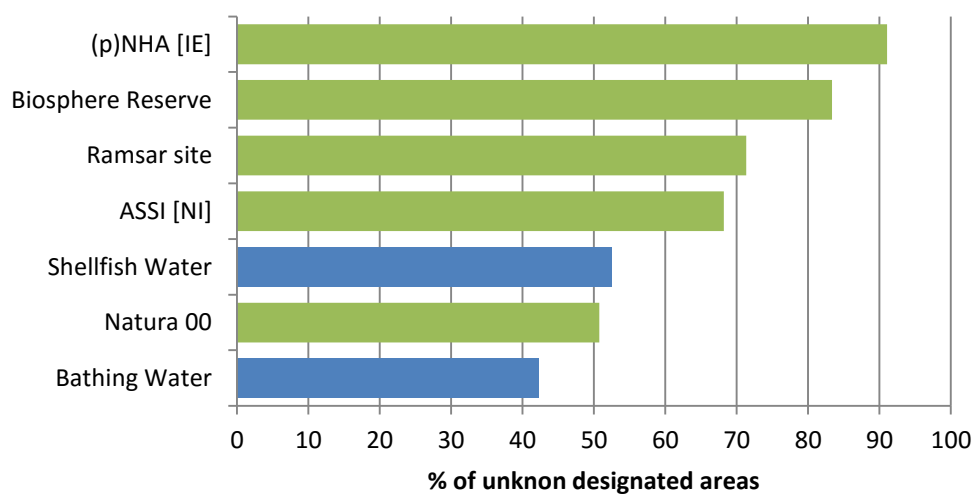


Figure 40. Unawareness of designations. (N=number of actual designated sites; Source: Questions A6/A7; Percentage of survey units that were designated but not noted as designated by surveyors).

Additionally maps were produced showing locations of designated coastal areas and surveyed areas. The surveyed coast is colour coded to indicate whether surveyors correctly identified the designation (green), or either didn't know or had indicated that it wasn't designated (red).

## Results

The least known designations by far are Natural Heritage Areas (Rep. of Ireland), Biosphere Reserves, RAMSAR Sites and Areas of Special Scientific Interest [NI].

This year saw a much larger number of volunteers identifying **Natura 2000 sites (SACs and SPAs)** correctly. In the 2012 survey 41% of s.u. which were in Natura 2000 sites were identified correctly. Now in 2013 this figure increased to 50%. This improvement might be partly explained by other surveyors and areas being included, but could also have been helped by the focus on Natura designations in most training events organized by Coastwatch (national and regional coordination) in preparation of the survey. Correct or incorrect identification of Natura 2000 sites is shown in Figure 41 overleaf.

Awareness of **RAMSAR** sites is as high as last year, over 70% in case of the wetlands. But looking at the map there are two visible clusters of sites where RAMSAR areas were identified correctly, Tralee Bay (Co. Kerry) and Bannow Bay (Co. Wexford) If we look at reasons for this two 'high awareness areas' we find the Tralee Bay Wetlands Centre whose team coordinated the Coastwatch Survey in Kerry and where visitors are introduced to the fresh and saltwater habitats. On the other hand Bannow Bay was the location chosen for several events to celebrate the World Wetlands Day over recent years.

Only 1 in 10 surveyors knew they were within the boundaries of a proposed Natural Heritage Area **(p)NHA**, which is no surprise as these national RoI designations are not mentioned in standard media, nor displayed at sites and generally forgotten. For the NHA equivalent in NI - **Areas of Special Scientific Interest** - the level of unawareness rises to 68%. Both north and south these areas are designed to protect fauna and flora as well as the geological and geomorphological features. *'They have a well-defined boundary and largely remain in private ownership. The underlying philosophy is to achieve conservation by co-operation and in this, the part played by landowners is fully recognised and appreciated'* [Dep. of the Environment NI].

In county Antrim one surveyor who was on that site on her '1st or 2nd visit' thought that the area wasn't designated in question A6 but noted ASSI designation in question A7. Our Guide notes invite surveyors to complete the A 6 'Is this site designated' question without research and then check whether they were right before completing question A7. We also provide links to the designation data bases. This is a useful way to increase local knowledge if surveyors are meeting to plan a survey but not suitable for analyses due to lack of controls.

The case of the World **Biosphere Reserves** is special because there are only two on the island of Ireland and only one in a coastal area - Bull Island. Here the level of awareness went from a 7% of units correctly identified with this designation in 2012 to 83% this year.

## NATURA 00 Awareness of designations

- 1 South Louth, Meath, Fingal, Dublin City and Dun Laoghaire
- 2 Bannow Bay and East Waterford
- 3 Dingle Bay and Tralee Bay
- 4 Inis Oírr (Aran Islands)

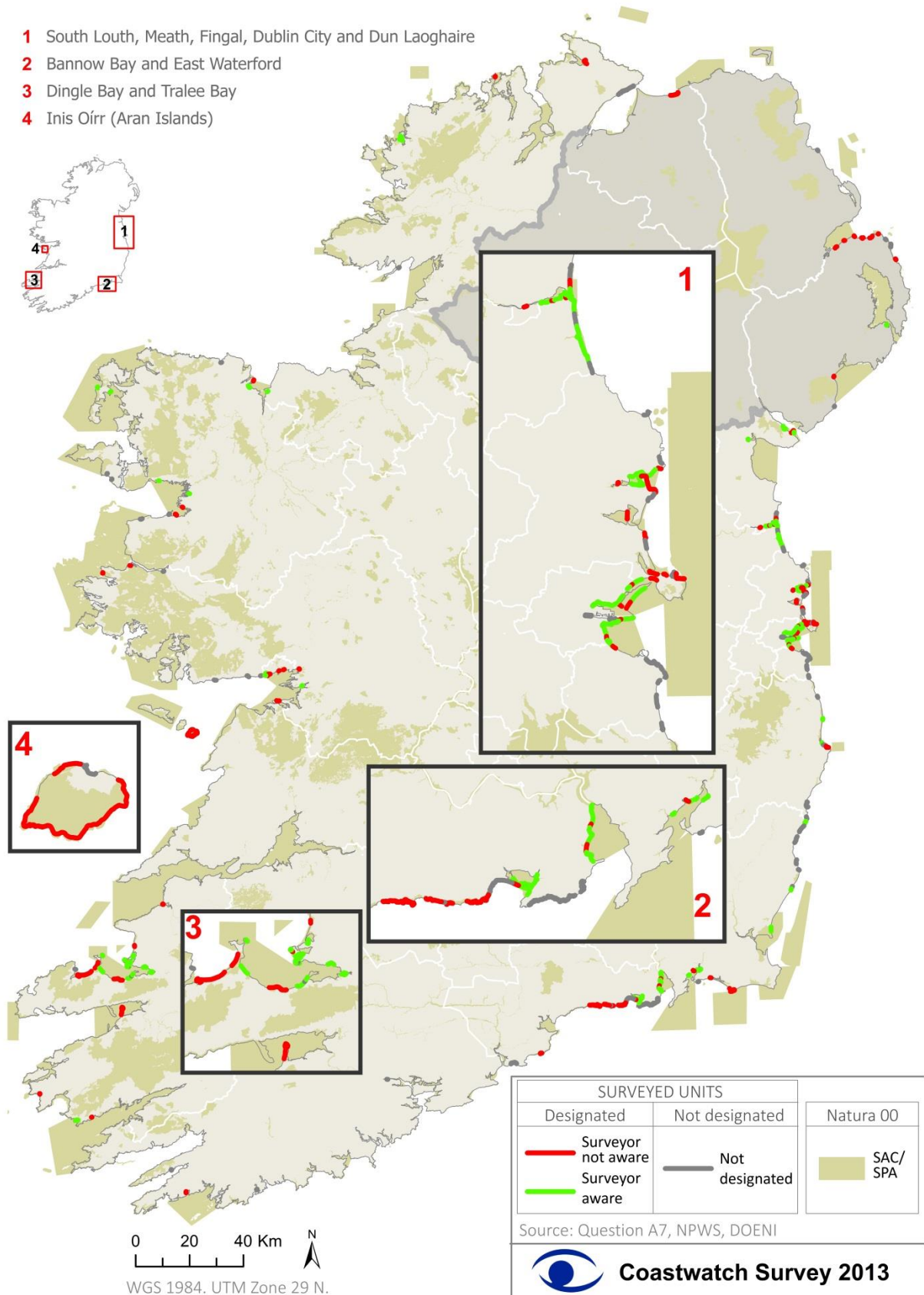


Figure 41 Surveyors awareness of their survey area being part of a Natura 2000 site mapped with correct identifications of designation in green and mistaken designation or lack of designation in red.



Galway school (Scoil Chiarian Naofa, Doorus, Kinvara) training event with Galway Biodiversity officer and regional coordinator Elaine O'Riordan. Picture by Karin Dubsky.

Natura 2000 sites form a network to protect the most threatened habitats and species across Europe. In coastal areas that network is wide open to both damage and help in implementation. The level of awareness could be described as encouraging with half of the surveyors correctly identifying their survey area to be in or part of a Natura 2000 site. But it should be kept in mind that part of the people who participate in the Coastwatch Survey are scientists - volunteers actively involved in environmental activities. All of the surveyors have information on this topic in the survey guidelines and some even received training from members of the core Coastwatch team. However most coastal Natura 2000 sites have no public notice showing the designation and it (guidelines? What is "it") isn't an integral part of school education, so children will not be pulling their parents forward. There is no coastal award for habitats in good conservation status or any other positive talking point around this.

**Bathing waters** are in a higher profile designation with the annual media alert linked to the Blue Flag, which is awarded to high quality designated bathing waters that have 'added extras'. Also designated bathing waters should, and generally do, have a sign showing water quality monitoring data and the beach profile with a lot of shore and hinterland including possible pollution discharge point information.

Eleven percent of the surveyed sites included designated bathing water. Of these 64 designated sites, 58% were identified correctly as designated. The sunny weather we had this autumn (prolonging the bathing season might have contributed to more areas being notified as designated than are. The map showing designated bathing waters and surveyor understanding of whether it was designated (Figure 42 overleaf) shows a good match but highlights that locally where many people swim it might be assumed that the area is designated while in fact it isn't. Or as in case of Sandymount S Dublin Bay, it is too shallow to swim but the area is still designated.

# BATHING WATERS Awareness of designations

- 1 South Louth, Meath, Fingal, Dublin City and Dun Laoghaire
- 2 Bannow Bay and East Waterford
- 3 Dingle Bay and Tralee Bay
- 4 Inis Oírr (Aran Islands)

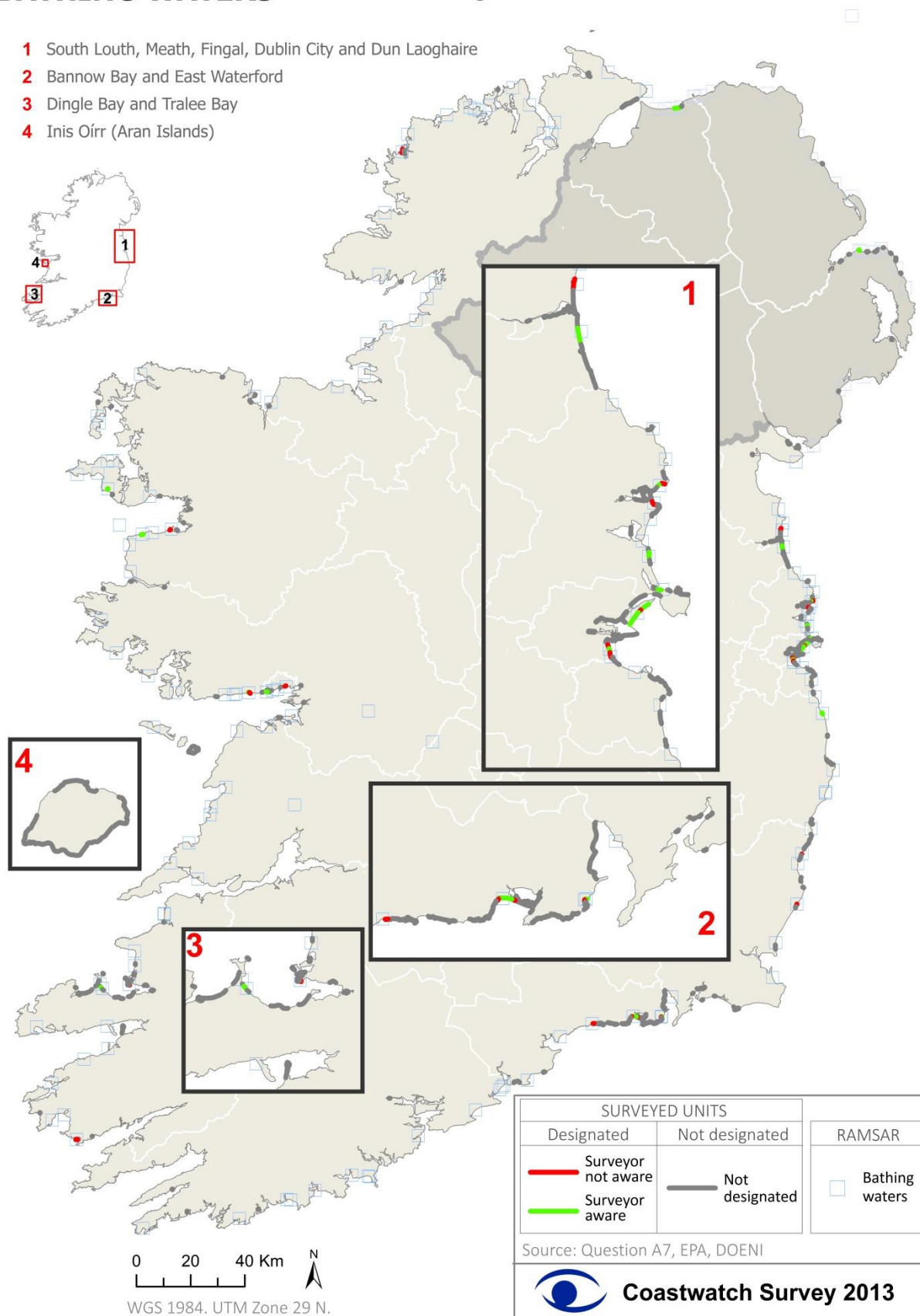


Figure 40 Map showing surveyor knowledge of shore/marine area nature designation, where correct identification of one or more

Figure 43. Surveyor awareness of bathing waters.

**Shellfish waters** show the biggest shift. In the previous survey 90% didn't know they were in an area designated under the Shellfish Water Directive. This year only 52% failed to identify this designation. This improvement is clearly related to the information signs recently installed by BIM who have come up with another designation – the Special Unified Marking Scheme – which we found under 'other designation' in our results.



Shellfish water information sign. Picture by surveyor.

### Awareness of designated sites

Looking at these results it is safe to say that public awareness of which areas are designated is improving but still poor. It does not help that further designations starting in 'Special' are added without consultation – as in the shellfish poster example above. Several surveyors remarked that they would have liked to have seen Natura 2000 site information on these panels – or shared posts. A planned integrated signage approach is overdue.

It is vital to improve knowledge about protected sites amongst the people who live within or surrounding these areas, as they can play a key role in their use, management and protection. Ideally their involvement would have begun at an early stage during the actual site designation process as many of those living locally and interested enough to give their time for our survey would have had valuable information to contribute.

While that is looking at past practise, there is an opportunity to apply this participatory approach when creating the inshore element of the coherent network of marine protected areas' as required under Art. 13(4) of the MSFD. EU Member States need to include into their programmes of measures “*spatial protection measures, contributing to coherent and representative networks of marine protected areas, adequately covering the diversity of the constituent ecosystems, such as special areas of conservation pursuant to the Habitat Directive, special protection areas pursuant to the Birds Directive, and marine protected area as agreed by the Community or Member States concerned in the framework of international or regional agreements to which they are parties*”.



The way to get citizens to become aware of which sites are protected, is making information easily available to them (on site information, online information etc.) and making sure that it effectively reaches out through training events, information centres etc. In this regard environmental groups and NGOs can play a vital role.

Our survey shows that this approach works. Examples include: the Shellfish Waters information billboards, the Tralee Bay Wetlands Centre, the Wetland events in Bannow Bay and the Coastwatch training events leading to the 2013 survey.

The information and participation of local people is key as they live and have day to day interactions with these areas, therefore they are the ones that can, better than anyone, report any misuse or damaging activity. They are also the main users of the territory having the ability to transform and/or preserve it. If citizens aren't aware of the reasons for a designation, if they don't have a good understanding of its ecological, economic and cultural values a designation is not fulfilling its purpose.

As Ireland is part of the OSPAR convention it is also useful to look at the information and expertise available here. OSPAR 2003 adopted guidance documents on [identifying and selecting](#) sites to include in the OSPAR network and on [managing MPAs](#) as part of the network. OSPAR has since augmented this guidance through the development of the concept of ecological coherence. Several products have been issued including [guidance on developing an ecologically coherent MPA network](#), a [scorecard to assist with MPA network design](#), and a [background document on assessment of ecological coherence](#). OSPAR has also agreed a [scorecard to assess the effectiveness of management of OSPAR MPAs](#) and a [guidance document on good practice for communicating with stakeholders in the establishment and management of MPAs](#).

### 3. Surveyors perceptions and value of the coast

A new question (F5) was included last year asking surveyors: 'Is there something you really like or love about this survey unit? What is it?'

The purpose of this question was twofold – to round the survey off with something positive and reflective as well as satisfying curiosity as to what people value about their shore. There were only 140 responses (less than in 2012 when we had 197 responses to the question), which leaves it open whether surveyors that didn't feel there wasn't anything they really liked. We also believe that one partial explanation is that it required reflection. In training sessions some surveyors said they had never thought about it.

In some cases surveyors mentioned a number of attributes – e.g. Karen Taylor and Brian Killeen said: *"love the wildlife and peacefulness of this area. I walk my dog here every week. I would like this area to remain untouched and protected."* In such cases all aspects were noted.

Taking out a *'we missed school for it'* that we wouldn't know how to categorize, answers were grouped into 6 categories of what surveyors liked about their shore: landscape, natural values, cleanliness, quietness and or ambience, use of the shore and others. This categorization has a certain degree of subjectivity but provides an indication of what was on the top list of positive attributes.

The categories are presented in rank order in figure 44 overleaf. The results show that nature and its values were mentioned most frequently (50% of all comments), followed by landscape. The results in 2012 showed the same rank order. This was followed at some distance by the **landscape** (30 %).

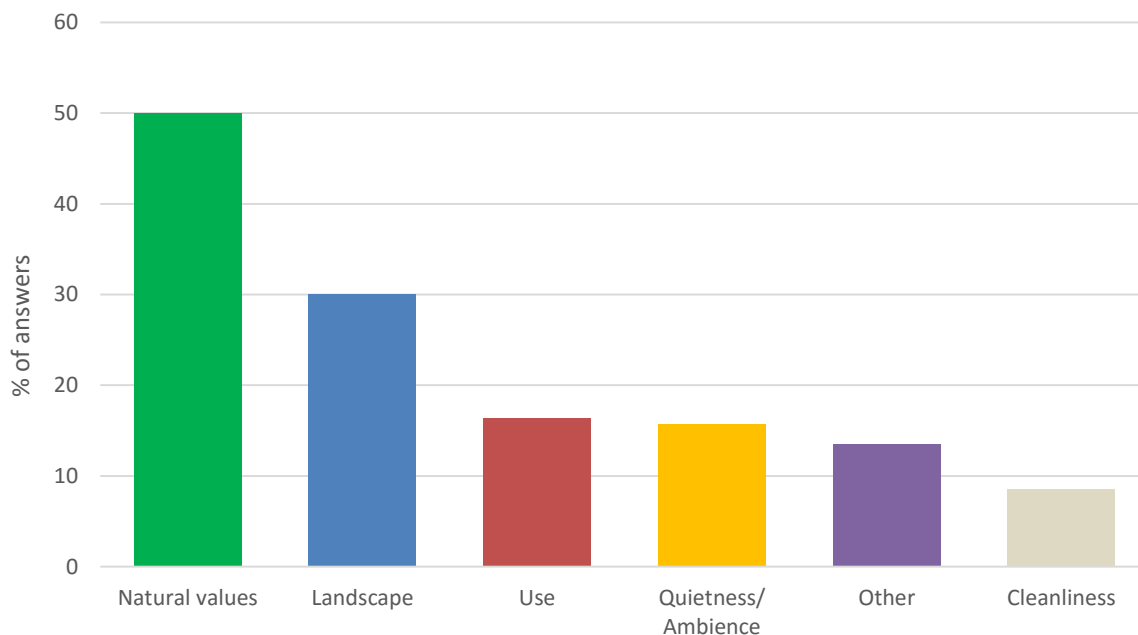


Figure 44. Different aspects of the shore valued by the surveyors. (N=140; Source: Question F5)

The **use** of the shore ranked third and was mentioned for 16.4 % of the surveyed areas where we had a response. Having an enjoyable use of the coast depends largely on the good quality of the other attributes. Good snorkeling is linked to seeing interesting things under water. A walk on the beach becomes more enjoyable in a beautiful landscape and with the chance of seeing birds, or a seal popping up (as a lot of surveyors indicated on their answers). If the shore is full of litter, or polluted the use value is impaired.

Shore **ambience** ranked fourth with 15.7 % and most comments related to the lack of human traffic, noise, warmth, shelter and the natural roughness. About 13% of those who answered liked **other** aspects of the shore mostly related to the experiences lived on the past or while carrying out the survey.

The **cleanliness** of the shore was noted in only 8% of the answers. Many interpretations are possible about the role of cleanliness in shore attractiveness. For example: would more surveyors put this forward as something they love about their shore if the coast was cleaner? A corollary question: ‘What do you dislike about this shore?’ There were 3 cases where surveyors emphasized what they disliked about their sites, all of which were related to litter and/or pollution. Two in the Dublin area: *“This survey unit is a disgrace!”* said a surveyor at Ringsend, *“There was nothing I liked about this survey unit. It’s a horribly dirty place!”* stated Kat Keogan, and one in Co. Kerry where Laura, Padma and Jago Brodie noted *“Don’t like this beach as always very littered”*.

A selection of comments are quoted below from surveyors whose names we are authorized to include:

**Nature values:** Our surveyors noted a range of different biodiversity, form and process aspects that were important to them, some including photos and detailed observations: this included the variety of birdlife, the heterogeneous habitats, natural formations...

Gerlanda Maniglia: *“teeming with bird life and seals”*

Kevin and Conan Lynch: *“[...] great diversity in a short space”*

Aina Walsh and team in the Boyne estuary: *very species rich boulder walk way out into the river centre with zonation and excellent education fieldwork potential.*

Kat Keogan and Alice Michieli: *“The brent geese! The tide was covering the seagrass beds when we arrived and they were all swimming around eating it from above, but on the way back the tide was out and there were about 50 geese eating the grass. The sound of 50 geese eating seagrass is really funny!”*

Anthony Brogan: *“Good numbers of Dunlin feeding in circular patches of sand on beach, rotting Kelp supporting foraging Starling, Wagtails etc. Oystercatcher probing in wet sand near water mark. Cormorant roosting on exposed rock outcrops.”*

Alan Walshe/Clare Scott: *“The embankment next to the salt marsh offers a great place to see curlews and over wintering bird.”*

David Tilly: *“the new large lagoon is forming with sea asparagus ”*

Lucy Weir: *“[...] there is a colony of seals here and that this is very rarely visited by humans”*

Angela O'Flynn and Maire O'Brien: *What a shore “Geologically rich , fossil rich, biodiversity rich ”*

Andrew Cox: *‘The honeycomb worm reefs here are quite special’.*

Harold School Glathule (Dun Laoghaire Rathdown) students exploring Sandycove shore (as in photo below Joyces Tower): *We love these rocks and pools most! They are wild!*



Photo of outer Dublin Dublin Bay south shore at Joyces Tower sandycove

### **Landscape:**

Cleas: *“The view across to the Cliffs of Moher is lovely”*

Alan Walshe: *“ Outstanding Scenic Views of Tramore Bay”*

Noel Cahill: *“Great view of the Mourne mountains on a fine day”*

Alice Michieli: *“[...] beautiful old bent trees lining the top of the shale cliffs”*

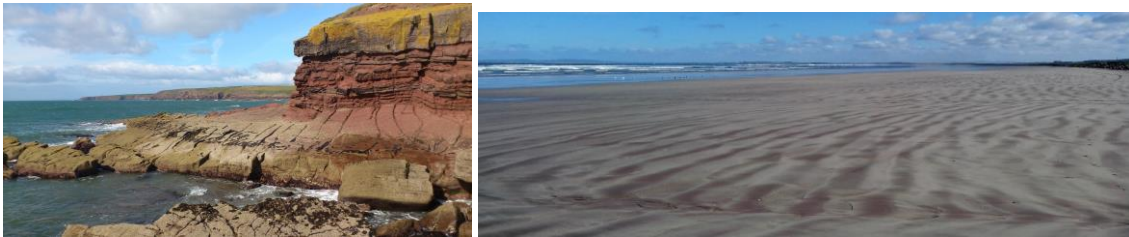
Stephen Rooney: *“Great views down the coastline, good location to spot seals.”*

Others liked the human elements of the landscape:

Ardcoil Ris: *“Good view of Dublin Port”*

Declan Collins and others: (we like) *“The little semi natural cove in town among the sea walls and quays and the exposing train viaduct”*

These comments illustrate that for landscape to matter, the large visual elements of natural features mountains, rivers, sea and the detail like sediment patterns on the shore and vegetation are important. and the built environment in the hinterland and out to sea are important It appears that both beauty of some landscapes and identity are important. Human activities change natural landscapes over the time, producing unique landscapes for each culture, region and society. This is reflected in the comments of the volunteers.



Waterford estuary geology ( by Andrew Cox and Fermoylan shore sediment patterns by Laura Mc Gurdy

**Cleanliness and clear water:** lack of litter and pollution. Surveyors in several sites mentioned something that should be normal:

Rory Keatinge: *“[...] near centre of capital city. Remarkably clean”*

Sarah Gibson-Brabazon: *“I really like how clean the beach is, it isn't an overly used area so it doesn't get polluted.”*

Alice Michieli: *“The pure clean foam is nicer than snow.”*

Dave Convery: *“Very well kept section of the shore and very clean”*

**Ambience:** The absence of disturbing human uses or activities, as well as warmth and shelter:

Deirdre Burns & Esvy Bell: *“Peaceful natural area within a short walk of town.”*

Seamus McGinley: *“Peaceful place away from city”*

Jennifer Logan: *“It is a nice quiet area”*

Cathal: *“The calmness of the area observed”*

**Use:** In this category comments refer to uses or activities carried out in the shore, like walking, swimming, fishing, practicing sports etc.

Alex Lawless: *“It provides an area for people to walk.”*

Kathleen Regan: *“It's a good surfing/walking location”*

Rose Kelly, Trish Murphy: *“great area for bathing”*

Laurence and Thomas Coyle: *“The multi-purpose use of this area, fishing, bathing, rowing, regattas, kayaking, sailing.”*

**Others:** A variety of comments that didn't fit in any of the above categories were left, but most of these have a common thread – memory or related to the experiences during the survey:

Joan Lennox: *"The sound of the sea as it carries to and from the shore pebbles and gravel making nice swishy sound"*

Tim Regan: *"Got to rub a dogfish!"*

Ger Woolly / Mick Berry: *"Just like doing the survey here – wouldn't mind doing a few more"*

Linda O'Dwyer: *"The guy playing the saxophone on the pier"*

Peadar Ó Conghaile: *"Having "fished" the rockpools, gathered seaweeds, observed nature and the Atlantic from here and have farmed the hinterland this unit is very special to me."*

Others mentioned the history of the place:

Cathleen Ní Chonghaile: *"This area has seen so much human activity over many years -with seaweed being gathered by the islanders for food and land use and for sale and still they left no footprint [...]"*

To conclude, perhaps the most important preliminary findings in this new shore value question, is the importance of nature and landscape. If we look at future shore and inshore water uses and spatial planning this needs to be uppermost of planners minds.

Ireland has an extraordinary diversity of coastal environments and features due to its geological history and geographical position. While as an island our land based species diversity is lower than that of mainland Europe, our marine biodiversity is our strength. Even urban areas like Dublin Bay or Belfast lough have very high biodiversity value as recognized in the many Nature designations for which the bay qualifies. Landscape is also a highly valued attribute and it is the visual reflection of our natural and cultural heritage.

The elements of the shore that are treasured by people need to be highlighted to develop awareness on how fragile and how complex ecosystems are. To protect shore birds or sea shells you love seeing, a range of other species and habitats need to be in good state of conservation.

Some volunteers wrote about the risk of losing what they liked about their survey sites and the need to protect it: Peter White: *"It's a beautiful refuge for birds and shellfish but aquaculture is increasing"*; Lucy Weir: *"This is an amazing piece of coastline and needs a lot more protection from human exploitation in or simply being taken for granted"*; Diane and Trevor Orr: *"Birds at risk are: oystercatcher, blacktailed and bar tailed, godwit"*.

Others told us about something they used to love but that is now gone: *"This unit of the Boyne estuary was where mussels were harvested for generations until the river was deepened"*.

If enjoyment of areas we love is important for well-being, then we have quite a challenge on our hands in urban areas. How do you protect and restore nature and provide for mass access? to this these values in urban areas like Dublin Bay where high numbers of citizens would benefit. Here surveyors have pointed to a number of factors which threaten biodiversity, scenic value and cleanliness.

## 4. Threats to the Shore

Surveyors were asked to record if they had seen **evidence** of any **serious risk** and/or knew of **imminent planned change for the worse** to their survey unit. Nine common threats were listed to assist with considerations, as well as an “other” option, where detail was requested to alert us to emerging threats.

In previous years the survey included eight threat categories. In 2013 Invasive Alien Species (IAS) – was added on demand in the first training workshops. Unfortunately the survey data input programme was not updated to mirror this amendment. Hence surveyors who saw IAS and marked this threat during fieldwork then logged the threat as ‘other’ on the computer.

A total of 347 threats were logged in the 2013 in 173 survey units.. Figure 45 below shows the number of survey units in a given threat category. On the questionnaire, water pollution was given as one threat option as well as subdivided by types: sewage, radioactivity, oil, industrial pollution, and agriculture. In the graph, water pollution threat types were pooled.

Figure 45 shows ranked threats with erosion as the most frequent with 94 sites, water pollution came second with 79 sites and three uses followed - recreation, aquaculture and beach mining/quarrying. Waste tipping/infill ranked next and was followed by ‘ other’ which included six sites where invasive alien species were listed as threat. Construction is down to its lowest level for over a decade despite of coastal wind farm developments which are being planned. Off Dalkey and Killiney the proposed gas pumping registered as a named threat while several of the surveyors around Galway bay noted the BIM salmon farm application as a threat.

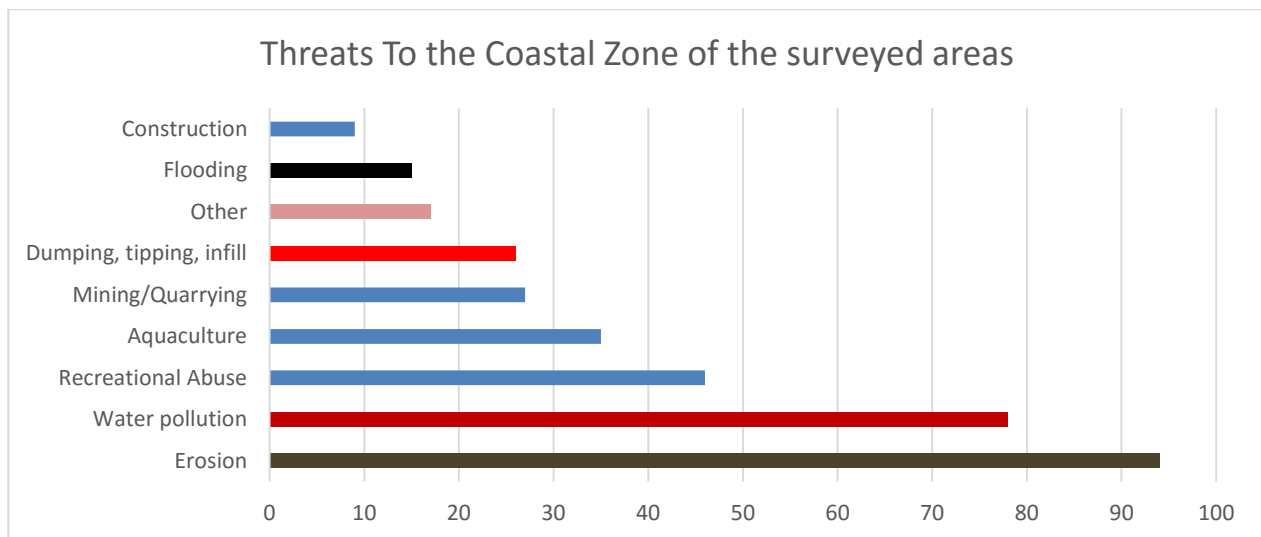


Fig 45 Evidence of serious risk &/or planned change for the worse. (N= 547, 176 s.u.; Source: Question F4)

Bearing in mind that there is no direct comparison and 2013 saw a significant increase in survey area covered, over 2012, the number of threats and number of survey units where any threat was listed are higher in 2013 than the previous year.

**Erosion:**

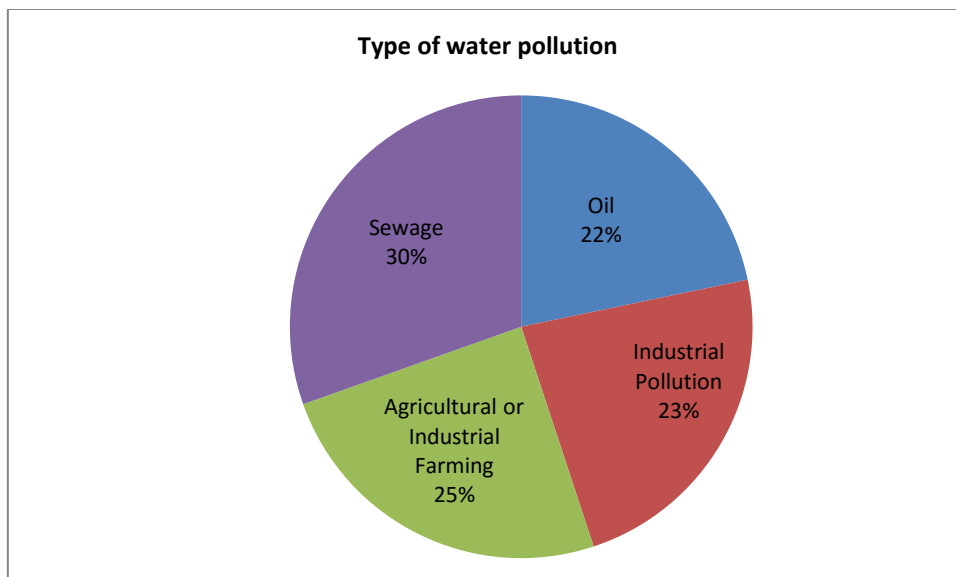
It must be emphasised that the survey took place in generally good weather after a long warm summer. There were no severe storms forecast in the survey period. The winter storms which caused severe wide spread land loss to erosion including infrastructure and houses took place after the survey. Erosion has ranked in first threat position persistently in every Coastwatch survey in the republic of Ireland and among the highest in NI.

Coastwatch follow up in previous years suggests that this reflects a wider population concern and is not just indicative of an island with unpredictable weather and changing coastlines. There is also a political gap, with lack of public policy on erosion management, lack of clarity regarding responsibility for action and guidance for local authorities and individual land owners. Further, the lack of information and no public participation in erosion management planning both locally and nationally has led to a lot of unlicensed self-help erosion control, which may be excellent for protecting a given plot of land, but may also lead to enhanced erosion next door, or damage to valuable habitats like sand martin nesting nests. These weaknesses combine to create an unease and helplessness which needs to be addressed urgently. Coastwatchers have decided to concentrate on this theme for follow up action in the Republic – addressing the Office of Public Works which now has ultimate responsibility for both erosion and flooding as well as new Foreshore Bill which is due to be published in 2014.

**Water Pollution**

In 79 s.u. a threat of water pollution was recorded. In 69 of these survey units surveyors specified the source(s). While 5 water pollution options were given in the questionnaire, results show no surveyors considered radioactivity as an immediate threat. The 4 other sources ranged between 15 and 21 sites.

Sewage was the most frequent threat reported 21 s.u. (30%) of specified water pollution threats. Agriculture and Industrial pollution made up a quarter of each and oil pollution was least frequent water pollution threat – but still recorded in 15 sites.





**A Background information on the 500 m survey unit & surveyor(s)** office use

**A1** Country code  County code  Block code  Unit code or GPS coordinates at start of survey unit

**A2** Name of survey unit or area   
Map name  Local name/landmark

**A3** Name and address of surveyor(s)/school/group   
Name (Please write very clearly!)   
Address   
Telephone  Email  Please write very clearly!

**For your privacy:**  
Would you like to be named as surveyor and results contributor?  
 Yes  No

**A4** Date of survey  
Day  Month  Year

**A5** How well do you know this site  
 Well  A little  Here on 1<sup>st</sup> or 2<sup>nd</sup> visit

**A6** Is this unit (or part of) an officially designated area? (see Question 7 and survey notes)  
 Yes  No  Don't know

**A7** If yes, please tick which nature or human use designations you believe or know apply:-  
If used for bathing, aquaculture, whether or not officially designated, mark box 'U'.

- (UNESCO) Biosphere Reserve  'Bathing Water'
- Ramsar Site  'Shellfish Water'
- 'Natura 2000' site (SPA or cSAC)  Access for vehicles (e.g. route to fields)
- National Park  Other use, or use designation incl. boat mooring: .....
- (p)NHA (Natural Heritage) or ASSI in NI
- Other Nature designation: .....

**A8** Is there direct access to your coastal unit from land down to high water  
 by vehicle  by foot  by wheelchair  Difficult/impossible direct from land, only via sea or another survey unit.

Access is prohibited



**B Influences from land** (Immediate hinterland up to 500m beyond the splash zone)

**B1** What is the immediate hinterland mainly devoted to?  
(Tick up to five boxes if necessary)

<input type="checkbox"/> Farmland: Intensive grazing	<input type="checkbox"/> Village or town residential
<input type="checkbox"/> Farmland: Tillage, horticulture	<input type="checkbox"/> Tourist resort
<input type="checkbox"/> Farmland: Rough grazing	<input type="checkbox"/> Waste tip/dump (official and unofficial)
<input type="checkbox"/> Park, woodland, forest	<input type="checkbox"/> Industry, or commercial area, or power station
<input type="checkbox"/> Natural Dunes	<input type="checkbox"/> Transport underline (f. road, train, car park, port, other)
<input type="checkbox"/> Wetland (bog, marsh, lagoon)	<input type="checkbox"/> Construction site
<input type="checkbox"/> Rock, sand, bare natural sediment	<input type="checkbox"/> Other, please state: (e.g. golf course, scrubland)

**B2** Please count all inflows into your s.u. as you walk. Give details of up to 4 inflows in the order encountered. If there are more than 4, choose the most important in terms of potential pollution impact.

**Hint:** For each inflow work down the questions:  
What type of inflow? Enter 'P' for Pipe, S for Seepage, D for Drain, or storm drain or irrigation canal, R for River, stream or natural lagoon inflow.

	Inflow 1	Inflow 2	Inflow 3	Inflow 4
Size of inflow: Small, Medium, Large	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tick if you observe:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Animal life in/on inflow water. If fish seen add F	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A bad smell from the inflow	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Discolour/scum/froth from pollution	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dead fish	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dumped debris	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Visible sewage or sewage fungus	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oil, petrol or diesel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If you have access to test kits complete for those tests you carried out:  
Did you detect Nitrite? Please circle + or -  +  -

What levels of Nitrate (NO<sub>3</sub>) did you find?  
Write in approx. concentration mg/l of NO<sub>3</sub>

What is inflow water temperature? (C)

How acid or basic is the water? pH test

THE TOTAL NUMBER OF INFLOWS FOUND IN THIS SURVEY UNIT WAS:





**C SPLASH ZONE** (The shoreline from mean high water up to spring high watermark)

**C1** Indicate the approximate width of splash zone. (Tick more widths if area is not uniform)  
 0-1m  1-5m  5-50m  50-250m  > 250m

**C2** What is your splash zone covered in? (Tick up to five boxes)

<input type="checkbox"/>	Saltmarsh	<input type="checkbox"/>	Sand, gravel, stones	<input type="checkbox"/>	<b>Building, construction</b> (not erosion control)
<input type="checkbox"/>	Reed bed	<input type="checkbox"/>	Natural rock	<input type="checkbox"/>	<b>Hard erosion control</b> , (walls, rock armour)
<input type="checkbox"/>	Other vegetation e.g. marram grass on drift line plants				



**D INTERTIDAL** (From low to high water) + see **optional extra biodiversity questions**.

**D1** Estimate the average width of the intertidal area at low tide. (If width varies, please tick 2 boxes)  
 < 5m  5-50m  50-250m  > 250m

**D2** What is the intertidal surface mainly composed of: (Tick max. four boxes)

<input type="checkbox"/>	Solid rock	<input type="checkbox"/>	Sand
<input type="checkbox"/>	Boulders (>20cm ø)	<input type="checkbox"/>	Silt or mud
<input type="checkbox"/>	Gravel (0.2 – 20cm ø)	<input type="checkbox"/>	Other (e.g. walls)

**D3** Which of the plants and seaweeds did you find in the intertidal area at time of survey?

See identification notes

<input type="checkbox"/>	Glasswort <i>Salicornia</i>	<input type="checkbox"/>	Green seaweed: (Ulvas mainly) in patches or thin bands
<input type="checkbox"/>	Cordgrass <i>Spartina</i>	<input type="checkbox"/>	Green seaweed: carpet cover or thick mats
<input type="checkbox"/>	Sea grass <i>Zostera</i> (S Europe <i>Posidonia</i> )	<input type="checkbox"/>	Dislodged decaying seaweeds of any kind
<input type="checkbox"/>	Brown or red seaweeds, algae	<input type="checkbox"/>	Noteworthy? .....

**D4** Any new or recent species of animal, plant, or seaweed which appeared in this area?

<input type="checkbox"/>	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>	Don't know	Notes? .....
If yes and you think or know it to be an invasive alien species (IAS) ( link) please note in F						

**D5** Indicate which of the animals listed below you found alive or dead:

	Alive	Quantity	Dead	Quantity
Jellyfish	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
Worms or worm casts	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
Shellfish (E.g. cockles, winkles)	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
Crustaceans (e.g. crab)	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>
Fish	<input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>

Note-worthy? .....

If yes, we would love you to try extra biodiversity questions page.

**D6** How many visibly oiled birds (alive or dead) did you see during your survey?

Number of live oiled birds: <input type="text"/>	Number of dead oiled birds: <input type="text"/>
--	--



**E LITTER, WASTE AND POLLUTION** (at all shore levels)

**E1** Tick major item(s) found on your survey unit anywhere from start of hinterland to water  
 If found, please give extra information in the extra questions at the back

<input type="checkbox"/>	Landfill Materials (e.g. concrete, rubble, debris from sea defences)
<input type="checkbox"/>	Large metal objects (e.g. abandoned vehicles, girders, machines, aquaculture trestles)
<input type="checkbox"/>	Household furnishings (e.g. beds, carpets, pieces of furniture etc.)
<input type="checkbox"/>	Dumped household refuse in bags or piles of rubbish
<input type="checkbox"/>	Ship wreck, or parts of ship wreckage
<input type="checkbox"/>	Dumped crops (potatoes, etc.)

**E2** LITTER count: drinks containers, can holders, tynes, and plastic shopping bags found anywhere on the shore. If number too large, just estimate. Tip: use dashes (---) to tally while counting

Drinks Container Counts: Plastic  Metal  Glass  Paper

Other Litter Counts: Can holders  Plastic shopping bags  Tyres (half-or-more of a tyre)

Name & count a 'damage to nature' litter found:

**E3** Tick which of the following items of general litter or pollution you found on your unit.

<input type="checkbox"/>	Fishing or aquaculture gear (nets, lines, bags. If you know, tick source (s) → Fishing <input type="checkbox"/> Aquaculture <input type="checkbox"/> Angling <input type="checkbox"/>
<input type="checkbox"/>	Packing strap(s) <input type="checkbox"/>
<input type="checkbox"/>	Textiles, shoes, gloves and clothing <input type="checkbox"/>
<input type="checkbox"/>	Hard Plastic containers like crates, buckets <input type="checkbox"/>
<input type="checkbox"/>	Paper, cardboard and worked wood, <input type="checkbox"/>
<input type="checkbox"/>	Food, fish waste and bones <input type="checkbox"/>
<input type="checkbox"/>	Faeces - mammal (e.g. dog, human) <input type="checkbox"/>
<input type="checkbox"/>	Glass (not drinks), including light bulbs <input type="checkbox"/>
<input type="checkbox"/>	Cans (not drinks), including sprays, <input type="checkbox"/>
<input type="checkbox"/>	Notable Other: ..... <input type="checkbox"/>

Sanitary waste, condoms, nappies, etc

Medical Waste – syringes, plasters ...

Container(s) of hazardous but not medical substance (e.g. chemical drums empty or full)

Other plastics (not any of above)

Tar, oil, petrol. If found, add note in F6. If serious, contact authorities & Coastwatch

**E3 part 2: Micro litter pilot:** Is there an area where you see lots of tiny litter threads, bits, beads?  
 Yes  No  Add any note in F6. Tick  if you took a sample (see guide notes).

**E3 part 3:** Looking back, which area was most littered? If several, tick more than one.  
 Splash zone  Tide mark  Intertidal/Sea?

## EXTRA QUESTIONS Coastwatch Survey 2012

### Biodiversity:

- I **Worms: did you find any colonial worms, or large patches with lots of:**
- Lug worm casts  Honey comb Sabellaria Reef  Sand mason patch   
 please take photo if Sabellaria: if GPS available: \_\_\_\_\_  
 Mark on map & look for shore marker to find it again. (latitude, longitude)
- II **Sea shells** NB - if you have time, collect all types of empty shells as your own shore record
- Double-tick if found alive. Mussel  Limpet   
 Tick once if only empty shells. Native oyster  Slipper limpets   
 Circle box if lots found. Gigas oyster  Dogwhelk   
 Cockle  Shellfish eggs

### III Fish Nursery (area where fish hatch, and/or juveniles stay)

- Did you see juvenile fish? Yes  No
- ...if Yes, where? \_\_\_\_\_  
 Estimate how many \_\_\_\_\_  
 What type or species? \_\_\_\_\_
- Seen juvenile fish here before? Yes  No   
 If yes was it in the past months?  years?
- Found fish egg case (s) -mermaid's purse today? No   
 Yes I found some  found lots
- Comment? \_\_\_\_\_

### Harvesting from the sea

#### Harvesting from the wild and Aquaculture:

Mark A for Aquaculture and H for commercial harvesting

- Seaweed  Mussel  Oyster  Winkle  Clam   
 Crab  Lobster  Other \_\_\_\_\_

#### Comment on methods and photos v welcome.

Other shore use? \_\_\_\_\_

### Shore Changes and use changes if you know this area well...

- I Any changes of note to wildlife, use or habitats over the last decade?

NB See 'The Shore Thing' as climate change indicators project on rocky shores

## F GENERAL OBSERVATIONS

### F1 Has recent weather made the appearance of your coastal unit change?

- Yes, looks cleaner than usual  No, recent weather is insignificant   
 Yes, looks worse than usual  Don't know

If there are other reasons for changed appearance, please note space at F5 below.

### F2 Has the shore been cleaned within the last week?

- Yes  No  Don't know

### F3 Is there any planned change of character (positive or negative) which is imminent for this coastal unit? (if 'yes' describe in space at F5 below)

- Yes  No  Don't know

### F4 Tick if you have evidence of a serious risk and/or imminent planned change for the worse from any of the threats/activities listed below to your s.u. or adjacent sea/land.

Please mark the box with an O, if this is ongoing, or planned but you think it is not a threat, serious risk or change for the worse.

- |   |  |   |
|---|--|---|
| <input type="checkbox"/> Erosion                  | <input type="checkbox"/> Water pollution           | <input type="checkbox"/> Sewage                             |
| <input type="checkbox"/> Flooding                 | <input type="checkbox"/> Recreational abuse        | <input type="checkbox"/> Radioactivity                      |
| <input type="checkbox"/> Mining/quarrying         | <input type="checkbox"/> Aquaculture               | <input type="checkbox"/> Oil                                |
| <input type="checkbox"/> Construction             | <input type="checkbox"/> IAS (Invasive Alien Spp.) | <input type="checkbox"/> Industrial pollution               |
| <input type="checkbox"/> Dumping, tipping, infill | <input type="checkbox"/> Other: _____              | <input type="checkbox"/> Agricultural or industrial farming |

**ACTION: In case of threat which requires immediate action, call relevant authority or Coastwatch**

### F5 Is there something or things you really like or love about this survey unit? Tell us:

### F6 Comments or observations: If adding an extra page, please include your survey area code.

Thank you so much for all your work! If interested to try extra Nature &/or shore use questions &/or give your verdict on pressures and impacts for the new EU law Marine Directive, then -> Extra Questions'.

Data return, comment and queries? Contact Coastwatch on facebook on [www.coastwatch.org](http://www.coastwatch.org) or contact Karin [kubusky@coastwatch.org](mailto:kubusky@coastwatch.org) 086 8111 684

## APPENDIX 2

### National Policy Context: Extract from our National Biodiversity Action Plan, Ireland 2011-16

#### TARGET 13: Substantial progress made towards “good ecological status” of marine waters over the lifetime of this Plan

In order to reduce biodiversity loss and eventually achieve recovery, it will be necessary to identify and subsequently put in place effective measures under the marine spatial plan that Ireland is legally required to develop under the Marine Strategy Directive. These measures will be challenging and will include improving the water quality of rivers and estuaries feeding into marine waters (in line with the Water Framework Directive), reducing and eventually eliminating untreated effluent discharges directly into bays and estuaries, making effective contingency plans to protect the coastline from oil spillages, regulating fishing more effectively (through national and EU measures), ensuring that aquaculture operations are carried out in accordance with best environmental practice, and ensuring that future energy generation infrastructure does not damage marine habitats.

#### ACTIONS

13.1 Develop a marine spatial plan for Ireland.

13.2 By 2015, identify programmes of measures designed to achieve good environmental status as required by the Water Framework Directive and Marine Strategy Framework Directive and in line with the OSPAR Convention.

#### INDICATORS AND OUTCOMES

- Publication of marine spatial plan
- Publication of programme of measures to achieve good environmental status

#### OBJECTIVE 6: To expand and improve on the management of protected areas and legally protected species

##### HEADLINE TARGET: Biodiversity loss of protected habitats and species halted by 2016

#### Conservation of Protected Areas

Protected areas are central to conservation policy. They enable us to protect key habitats and species and provide refuges for the movement and migration of species. Globally speaking, protected areas are estimated to provide livelihoods for 1.1 billion people. Protected areas are the primary source of drinking water for over a third of the world’s largest cities and play a major role in ensuring global food security. It has been estimated that investment in creating and managing protected areas across the world will yield returns of the order of 25:1 to 100:1. Governments

around the world are increasingly looking at protected areas not only to conserve biodiversity but also to secure vital ecosystem services and enable adaptation to the impacts of climate change. Statutory Nature Reserves are set aside strictly for nature conservation, while our six National Parks, covering in total over 60,000 ha, are managed for both nature conservation and public recreation. Protected areas also overlap with many of the country’s scenic landscapes, which are the most economically important areas for tourism.