COASTWATCH

AUTUMN 2015 SURVEY RESULTS

ALL IRELAND

Version - June 2016

This is a draft of the Coastwatch Resutls 2015 and it is not a complete version of the Report

We apologize for possible mistakes or omissions

All picture acknowledgments will be included on the definitive version of the Report.

Acknowledgements

Surveyors:

We would like to thank the over 1000 volunteers who participated in this 2015 survey and apologise that we only list one contact surveyor, rather than all names in a group or school class. A similar big thank you goes to those, who surveyed but did not wish their name to be publicised and those whose data arrived too late to be included in this report.

Your fieldwork and observations, handling of new online input forms, responses to requests for more information where you reported an unusual find and your wonderful photos have made this survey report possible and special.

Surveyor list overleaf

Northern Ireland

We are delighted to acknowledge our new Northern Ireland partners Ulster Wildlife and Dave Wall as coordinator. A NI report drafted by the Ulster Wildlife team is being prepared and will be presented both as part of the All Ireland picture and separately at the international Coastwatch meeting in spring 2016.

Regional Coordinators:

A special thanks to our RoI regional coordinators for their work, organising training events and surveying. Listed in clockwise direction: Brendan Mc Sharry, Louth county council, Declan Collins (Coastwatch Meath) Michael Walshe (Dublin) Patrick Brady Dublin City with Dublin city council support, Rory Keatinge and Roselyn Shaw (Dun Laoghaire), Annie Falomo, National Sealife Aquarium. (Wicklow), Karin Dubsky (Wexford) Bernie Cork Dr. David McCormick (Tralee Wetlands Centre, Kerry) Dr. Elaine O'Riordan (Galway county) Anthony Brogan Mayo and Lucy White, Rose Kelly and Trish Murphy (Donegal).

Coastwatch core team volunteers for this survey shared work as follows:
Survey planning, pilot surveying, testing new questions, harbour questionnaire, training, paper return data input, verifying results and developing a result exhibition:
Karin Dubsky, Deborah Carlin, Roselyn Shaw, Michael Walsh, and Patrick Brady.

Social Media: Rana Rassouli (Facebook) and Conor Pyle (Web)

On-line Data Input programme, island coast digitising, survey progress map updates, results analyses and GIS mapping: *Angel Duarte*.

Results Report by Karin Dubsky and Angel Duarte, in cooperation with Rory Keatinge and Keith Browne, edits by Dr. Michael Gunn, Roselyn Shaw and Paul Dubsky.
Report Pictures by Coastwatchers as indicated in text.

For this year's focus on biodiversity and Dublin Biosphere Coast a special thanks to Niamh Ni Cholmain and all in Dublin city and Dublin biosphere for their support.

Sponsorship

We would like to thank the Dept of the Environment Water Section for core funding and acknowledge EC funding under the FP7 Citclops project for new water colour and transparency app and training support. Benefit in kind was given by many, including all regional coordinators, with the Foyle 'Celebrate Water! and Tralee Wetland Centre extending their help to hosting trainers and organising events.

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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 (national newspaper), With EC aid the survey method was then disseminated to eight European countries in 1988. The first large scale survey was carried out in 1989 in six countries: Norway, Denmark, Ireland, Netherlands, Portugal and the UK, and on a pilot scale in four more: 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 including PhD projects developed including f. streptococci water pollution test kits. Coastwatch was supported internationally by EC project funding to do joint training, data gathering and problem solving follow up work. Depending on country and time, coordination is in the hands of solely volunteer, to fully waged teams.

The survey is the common 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 shore quality and problem 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 NGO's.

3. Raising awareness of our coastal zone as a driver of European commons and as 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), protective and remedial action.

With time the focus broadened from waste to natural environment and to linked social and human rights issues. Lawyers joined national teams in several countries, so free legal and scientific aid could be provided and significant development, specific waste law and product changes were achieved. As follow up work grew, more extra national questions were added to the international survey questionnaire. The network went through a local and national focus period. Coastwatch international coordination hosted by Trinity College sought research funding and became partner in 'Citclops' EC FP7 funded research project which brought a whole new perspective of interpretation water colour and transparency, algal blooms and use of apps to record water colour with time and location on the web – the 2015 launched Eyeonwater app. The Google Earth, GIS based and social media survey approach designed by our Spanish volunteer researcher in Ireland proved successful and is now being used in Portugal, Spain, UK and Ireland with pilot areas in other countries.

EXECUTIVE SUMMARY OF IRISH SURVEY RESULTS

Results for the island of Ireland Coastwatch 2015 shore survey are based on reports from >1000 volunteers reporting on just under 600 survey units (where 1 s.u. is ~ 500m shore length). After removal of duplicates and inaccessible sites where only hinterland information was provided, **552 survey** forms were used in the report. This represents 3.6% of our 7900 km of island of Ireland coast as mapped by Coastwatch. It includes some islands off the island of Ireland like Dalkey Island, Inis Oírr and Coney Island. The survey yielded 81 from NI and 483 from the Republic.

Survey Method: Volunteers from all walks of life chose and booked their survey areas online, or through regional coordinators. 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. Results were returned online or by post for input, clean up and analyses, then select results were mapped using GIS.

Timing: Sept 18th to Oct. 15th with extension until 31st Oct.

BIODIVERSITY

Dunes: important as natural erosion control, with specialised plants which trap more sand were reported were mapped for the first time and overlaid on official NPWS data (2013). While some old dunes like Portrane in Fingal have been eroded badly, 13 extra sites were found and verified. Some were old established dune pockets, others neat new developing white dunes as in South Dublin Bay. Of concern is that surveyors also reported sand mining at one of these sites - Baile An Reannaigh in Co Kerry.

Seagrass beds - both intertidal and the long *Zostera marina* - the edible forests of the sea - were reported from 58 sites. In 32 of these the protected grass was found growing, in the rest surveyors noted Z marina only swept up. This is a priority habitat and easily damaged by dredging, aquaculture and trampling.

Honeycomb worm *Sabellaria* **reefs** which like seagrass beds are very fragile and restricted in distribution was reconfirmed on most established sites found in earlier Coastwatch surveys, except the inner most Waterford estuary site at Woodstown. The Waterford estuary reef straggling the shore on both sides and confirmed present beyond Anne's town on the Waterford coast now. It will be studied in more detail in 2016 as it is likely to be one of the largest in Europe. These biogenic reef creations, are easy to miss when you are walking the shore as the worms make them out of shore sand, but can look like cheddar cheese on a toasty from the air.

One hundred **live seals** were recorded dotted around our coast in 37 sites. Another 6 were found dead one believed shot. Other dead animals included 2 headless **leatherback turtles** one in Morriscastle, North Wexford and one in Ballybranigan Co Cork.

Birds were most widespread and numerous animal mentioned. Forty one **dead birds** were recorded most on the East coast. Guillemots were named several times.

Shellfish are widespread as both empty shells and live animals. A seashell poster was prepared for the Dublin area which has a high mollusc species diversity. The poster in English and Latin was translated into Irish by Dublin city council and will be on the Coastwatch website for free download from Dec 15th.

The **blue mussel** was the most common shell found but old mussel beds are reported to be shrinking. Limpets were the most common live mollusc reported and highlights the low oil pollution incidents on our shores. Limpets were wiped out along most of the Dutch/Belgian/German North sea coast in the 1980s.

A group of students on Hook Head had a puzzling find of baby **blue-rayed limpets** on sea spaghetti – prompting the question how the juveniles travel from there to the Kelp beds where the adults are found.

The Native Oyster *Ostrea edulis* whose shell halves were widespread as it once was a common shellfish, is now very restricted in distribution and under threat. It was reported from Carlingford lough outside the officially known range in a **lough biodiversity hotspot.** Surveyor photos and accounts, show it teaming with tunicates, peacock worms displaying, huge diversity of molluscs and seagrass with flocks of

shorebirds feasting on them. On the downside surveyors noted active dredging for mussels which even satellite image can show up. Dogwhelk Nucellus were mapped and found to be widely distributed. A follow up harbour survey is planned with focussed search of this species as a TBT contamination indicator.

Jellyfish: This autumn's survey came after a cold water summer and yielded only 50 sites (9%) with jellyfish, far less than in the 2 previous surveys (14% in 2014 and 20% in 2013).

CONCERNS

Invasive Alien Species *Spartina* grass was reported encroaching on open mudflat in Tralee bay and other sites. Small patches were reported for the first time in the Dublin Bay biosphere at Merion gates where seagrass and Salicornia are at risk if it spreads. New Zealand flax and Sea Buckthorn form large monocultures straddling the splashzone, the latter especially in dunes. Japanese seaweed *Sargassum* records came from a known site in Tramore Co Waterford and a new site at Bulloch harbour Dun Laoghaire. The Pacific Oyster *Crassostrea gigas*. (or Gigas oyster) was previously reported by surveyors growing on rocks in Lough Foyle and L Swilly (Donegal), Galway Bay (both Co Clare and Connemara end) and in Clew Bay (Mayo). These are Natura 2000 sites with known invasive Gigas oyster record. During the 2015 survey Coastwatchers reported seeing then in new Carlingford North shore sites and on the Dingle peninsula (not yet verified). There were several slipper limpet reports, one from a known Belfast lough site, the others are still being verified.

Habitat Damage is like a sad literny where damaged sites reappear in successive surveys

Inappropriate **e**rosion control wetland infill, vehicle tracks, bait digging without backfill and aquaculture were the most widespread shore damage types noted. Most construction waste dumping as erosion control such as at Dublin's Ringsend Nature Park is historic rather than recent, but that still requires attention and in follow up work Coastwatchers have explored options with more secure erosion control, natural look and biodiversity enhancement. In Youghal a wetland behind seabank between old landfill and harbour has received more waste and in Co Clare an infilled wetland North of Lahinch will hopefully soon be restored as infill was found to be illegal. In Bray, the old closed dump is still falling into the sea. Aquaculture installations were reported to now extend along approx. 15 km of shore on the Donegal side of the lough. These are unlicensed and causing visible seafloor damage as well as increasing the risk of further Gigas oyster settlements.

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 as potential indicators for the new marine law (MSFD) Litter Descriptor, also exploring what 'Good Environmental status' may be.

Tyres were reported on 23% of the coast and are now the most wide spread large litter type. While most counts provided are for 1-4 tyres, large clusters are associated with tyre traps to catch peeler crabs.

A cluster of bicycle tyre litter in the splashzone near Warren point was reported and thought to arise from tyre changes on adjacent cycler rest and car park.

Landfill material– the make shift erosion control and convenient waste disposal option was noted in 1 out of 5 sites and household furnishings in 14%. **Household refuse** in bags or sacks was reported in 7% of surveyed areas.

When drinks containers, lids, lighters and plastic bags were mapped, the highest litter density was on the Irish sea coast and most but not all associated with rivers and towns.

Drinks container litter was the most widespread litter encountered and increased over 2014 as more urban shores were included in this year's survey. **Plastic bottles** were noted in 83% of s.u. in keeping with previous years and 14415 plastic bottles were counted. This is now expressed in new OSPAR compatible 100m averages as 3.9 bottles/100 m of shore. Surveyors also counted **5 726 cans** distributed over 68% of shores (2.4/100 m). This count is less accurate as can body metal now dissolves quickly and grey metal

pieces are easy to overlook. The 1341 or 0.5/100m **glass bottles** were distributed over 45% of sites**. Tetra pack** containers remain least frequent with 41% of sites reporting this litter and a count of 1057 averaging 0.4/100m. A new bottle lid count introduced this year yielded 2876 dispersed over half of all survey sites.

There were one or more **plastic shopping bags** in 46% of survey units. The count of 1240 came to an average of 0.5/100 within the same low count range as in previous years. The NI count of 302 bags came to 0.8/100m which is a little higher than in the south.

Mapping surveyor reports of small litter seen, shows that after plastic bottles and cans, the 'rope and string' category was the most widespread litter (64% of shores), followed by 'other plastics' (60%) , textile (56%) bottle lids (50%), hard plastic containers (46%) and polystyrene (43%).

The combined category **of fishing/angling/aquaculture** gear was found on 38% of shores and dominated by net pieces. Other litter of note mentioned were balloons and cotton buds.

Surveyors reported seeing visible lines or patches of micro litter on 27% of shores. While samples were not analysed notes of seeing hard plastic pellets and polystyrene beads, fibres and paint flecks were the most frequently mentioned.

INFLOWS

Stream, drain and piped discharge quality was similar to 2014 where most surveys took place before autumn rains started, which would tend to improve nitrate readings. The 432 inflows recorded in 216 su. 207 of these were tested for nitrates.

Nitrate tests carried out by surveyors on 207 inflows, showed that 35% nitrate levels were below detection by our field test method (10 mg/l threshold) and 31% below 25mg/l. But 34% were above 25mg/l and of these 24 breached the legal 50mg/l NO3 limit which is dis-improvement over the previous year. As observed in the past the high nutrient inputs are in one horticulture area of Fingal and then mainly distributed over the SE and S coast.

68% of survey sites were described as never or very rarely effected by sewage. Discolor scum and froth were reported on 12%, a bad smell was noted for 7%. In or along the banks of 2 % invasive alien species were recorded and similar numbers had visual signs of sewage or sewage fungus. In 4 cases inflows were reported to carry oil.

BACKGROUND INFORMATION AND SURVEYOR CONCERNS

Shore cleaning in the week before the survey was sought to have taken place on 10% of shores the second highest on record. Breaking that down it was 9% in the Republic and 14% in the North. Shore cleaning has increased steadily from 1-2% in the 1990s, to 4% in 2012 and now 10 to 12%.

Surveyors who reported **threats to the shore** mentioned erosion most frequently as in all previous years. This was followed by water pollution, with recreational abuse in third place and invasive alien species in fourth.

Aquaculture which ranks highest in some west and north coast locations was low due to less surveying in this area. The threat of construction in the coastal zone is still well down from peak Celtic tiger days.

Mapping the 131 threat of erosion sites shows threats were all noted in the republic and most were south of a line from Fingal to Galway bay. In 52 of those some sort of erosion control was recorded. In another 170 sites hard erosion control was also recorded but evidently trusted sufficiently to not report erosion as an imminent threat.

The report is illustrated with over 50 maps and graphics, some look at findings over several years. Over the last 3 years, Coastwatchers have surveyed 1267 individual survey sites (8% of the irish coasts mapped by Coastwatch), 115 of these were surveyed every year (2013, 2014 and 2015), 220 were covered in two of the three years and 932 only once.

INTRODUCTION

The 2015 Coastwatch survey marks 28 years since the survey was designed and run first with the Irish Times (1987). While the basic surveying – a set area around low tide – has remained the same, today's technology with online maps for survey site mapping and choice, Facebook as information channel and the online survey data input option have dramatically changed how we engage and has created opportunities for comparing and contributing valuable extra information to official monitoring schemes and results display.

The All Ireland results in this December report are presented as a draft. Some results are still being verified. We would be very pleased to receive comments and corrections to improve the final report to be published in February 2016 and presented in March when other parts of Europe are ready.

The All Ireland survey ran from Sept 15th to Oct 15th, with further reports accepted until the end of the month. Results covering **564** survey sites are being launched on Dec 14th by *the Ardmhéara/Lord Mayor of Dublin Críona Ní Dhálaigh.* The event also included a half day Marine law (MSFD) workshop on the programme of measures to bring our seas to 'Good Environmental Status' by 2020.

The survey carried out by volunteers assesses the coast in 500 m survey units, with information gathered then pooled and mapped. Apart from factual reports on various animals, plants, types of litter, there are also personal views sought about the coast surveyed.

Figure 1Leatherback turtle found in Ballycronin by Mary Loby.

METHODS

The Coastwatch Survey is carried out by members of the public. It involves walking a chosen piece of coast once around low tide. The surveyors are asked to fill in a questionnaire for each survey site, designed to give an overview of the state of the coast – see www.coastwatch.org

A survey site or survey unit (s.u.) is a stretch of shore approximately 500m long as measured along mean high tide mark. The width covers the sea shore from start of the hinterland down to shallow water at low tide. Four years ago the coastline which had been divided into 500 metre units by hand was re-digitised using GIS, improving the accuracy. As in previous years each coastal unit was given a unique code based on the EC NUTCODE system, with counties numbered in clockwise direction, a further numerical codes for the 5 km blocks within each county and finally the 10 units within each block. Island around Ireland were only digitised on request.

Surveyors go line bit.do/cwsurveyunits bring up the map with blue and white survey units, zoom in and click on a chosen s.u. which then brings up the survey area code to be copied onto the survey questionnaire. Most volunteers now photograph that map with their smart phone so they can look at it and zoom in on features when out in the field.

Those who do not have online facilities are helped by regional or national coordinators by sending them hard copies of survey forms and of an area to survey discussed over the phone or in training session.

Materials

The materials for the Coastwatch Survey 2012 were available online, or distributed through the regional coordinators by post on request.

- **Survey questionnaire 2015:** available online and in hardcopy, with a biodiversity poster for species identification.
- **Survey Guide notes:** also available online, with detailed instructions to participate in the survey and indications on how to fill in the questionnaire. Further instructions on how to find a survey site or how to share photos and videos were also available online.
- **Water quality test kits:** Nitrite/nitrate tests with colour charts were distributed by the coordinators and posted to surveyors on request, as well as demonstrated and handed out in training sessions.
- **A Harbour survey form** and instructions to download an app 'Eyeonwater', to use when surveying the deeper water around harbours and piers.

Booking areas and monitoring progress

To book a survey site surveyors filled out an online booking form (now closed) This information was then used to update the online map and colour code booked areas yelllow so others would not duplicate the

effort. As this step was done manually there was still a lag of up to 48 hours between booking map updates. As the survey progressed and data was returned, the online map also showed areas which were surveyed and data entered into the results database.

Coordination and communication

Regional coordinators were engaged again as volunteers in most counties. Their main tasks was to answer surveyor questions, to allocate survey sites, to coordinate groups and to distribute materials. Some also carried out training for new surveyors and did extensive survey work.

The surveyors were targeted through the existing network from previous surveys, some national and regional media and this year specially focusing on social media. Where possible training sessions were provided to groups and individual surveyors.

Data compilation and analysis

The surveyors were given two options to return the completed questionnaires. The first option was to enter the data directly on the online input form on the Coastwatch website. The second option was to post hard copies of results. In this case the data was entered using the same input form by Coastwatch volunteers in Trinity College Dublin.

After the data was inputted it was transformed into a spreadsheet to be checked and analysed. If there were questionnaires with missing information, missing locations or any doubt about the data the surveyors were contacted. In the case of any inaccessible sites only Section A of the questionnaire is filled in. For the rest of the sections these data sets are omitted from the analysis.

Verification

Special information like new seagrass bed locations or beaching of large animals was also followed up and photos sought. Where possible the special finds were also verified by an experienced Coastwatcher and advice given who else to contact or any follow up work where needed.

RESULTS PART 1: COAST SURVEYED AND ITS CHARACTER

Surveying and Coast surveyed

Surveyors are asked to state the date on which they carried out their Coastwatch shore audit. As figure 1 below shows surveying began just before the official survey start which was data collected in training sessions, then building up to a steady 10+-3 sites until end of October, There were three peaks of > 20 survey sites/day of which one on October 9th was greater than 50.

The first serious technology upset was experienced since changing to online methods as the Coastwatch website went down on day 1 of the survey for 3 days, so no one could book or get information. This also cost us the television feature coverage which had been planned and the usual new surveyor surge national media publicity brings in the Republic. In the North the new coordinator started almost from scratch as the previous ecology group which had done most surveys had dissolved.

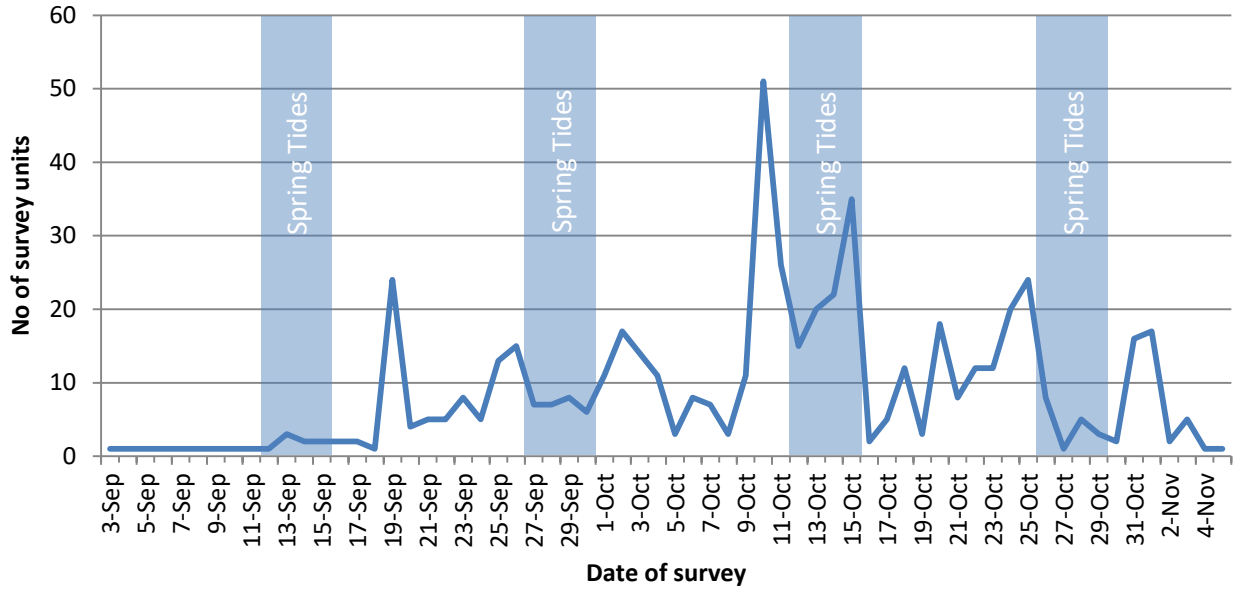


Figure 2 Survey fieldwork over time expressed as number of survey units done per day (Coastwatch survey 2015)

Bearing all this in mind the results include more established surveyors and despite a slight decrease in survey reports an increase in school groups and recreational interest groups like surfers, diving clubs and youth groups. Many of these joined as individuals or pair surveyors last year, but brought their group in this year. Another difference noted was the detail in biodiversity question responses and hence extra information gathered.

The total number of units surveyed in 2015 was 564 (81 in Northern Ireland and 483 in the Republic of Ireland). Of these, 12 were inaccessible (11 where access was impossible and 1 where access was prohibited) and are only used for the analysis of Section A. This accounts to 282 km of the Irish shoreline (3,6% of the coastline mapped by Coastwatch).

Map 1 – Coast covered in 2015 Coastwatch Survey.

The most surveys - see Figure 1 - were carried out along the Dublin Fingal coast (109 s.u.) , this was followed by Wexford (73) and County Down NI (52). Of the other counties Cork saw a good increase over last year (39su) and Kerry held its own with 37 sites. There were 32 s.u. included from Waterford and 10 too late for inclusion in results analysis. County Galway ranked next with 29 sites, closely followed by Dun Laoghaire and Donegal. Louth, Clare, Antrim, Sligo, Derry and Wicklow all covered more than 10 survey sites. Smaller than usual contributions came from Mayo, Galway city and county Meath. Limerick and Leitrim unfortunately did not return any surveys.

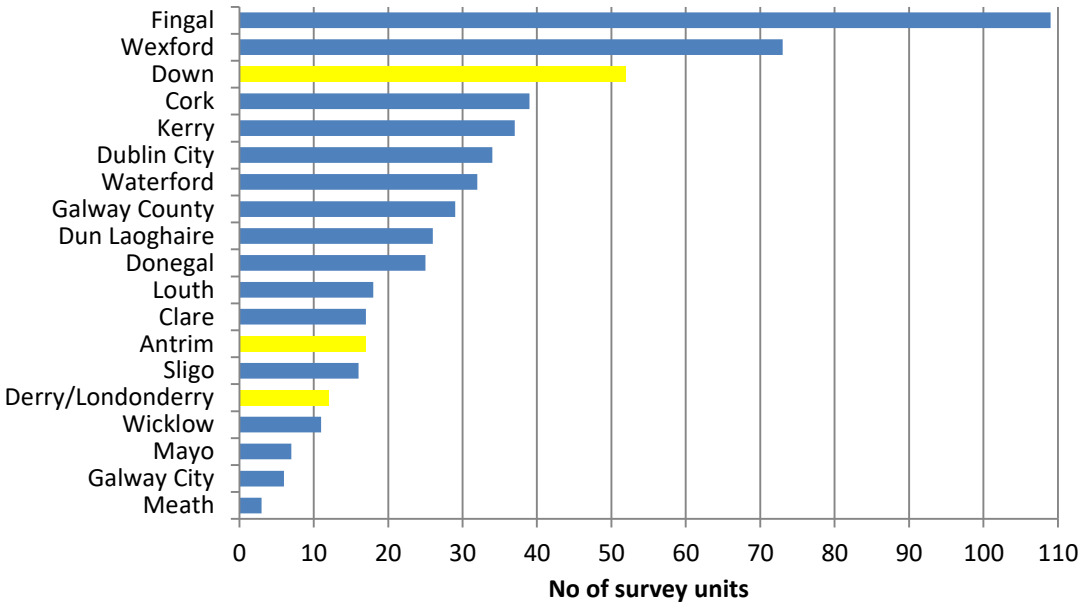


Figure 3 Number of survey units included in the 2015 Coastwatch survey (Dec 2015 Coastwatch report) by county, separating Ireland North and South by colour.

When expressed as percentage of coast surveyed, then the Dublin region had by far the highest coverage. With UNESCO confirmation of the new Dublin biosphere reserve boundaries to stretch from Portrane to Shankhill, Dublin biosphere partners supported training events and display of survey materials resulting in the highest coverage of this area ever achieved.

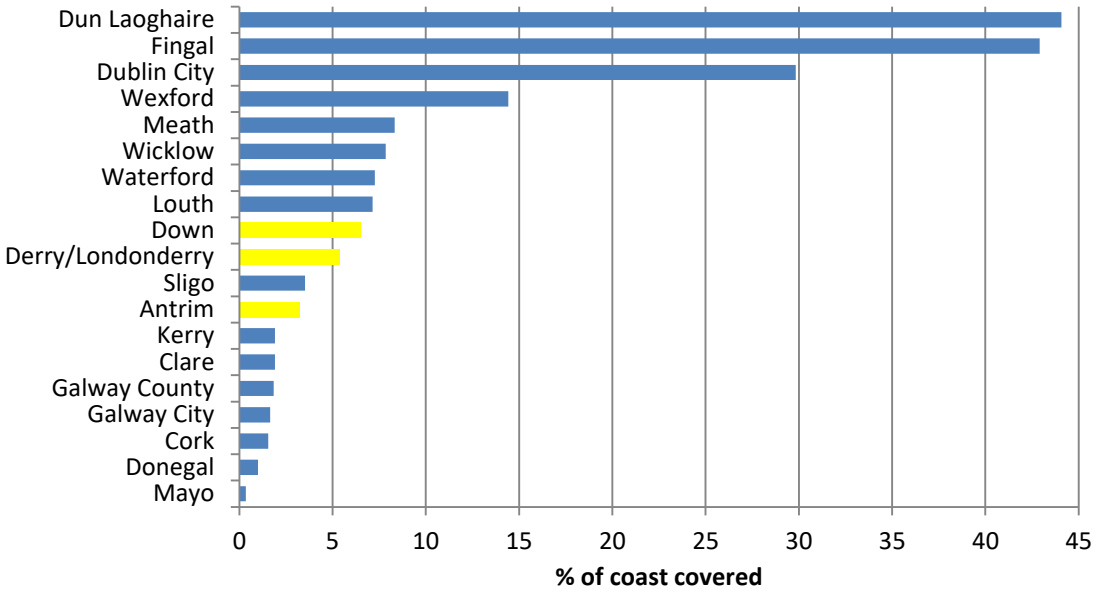


Figure 2 Percentage of coast covered in the 2015 Coastwatch survey by county, separating Ireland North and South by colour. (Dec 2015 Coastwatch report)

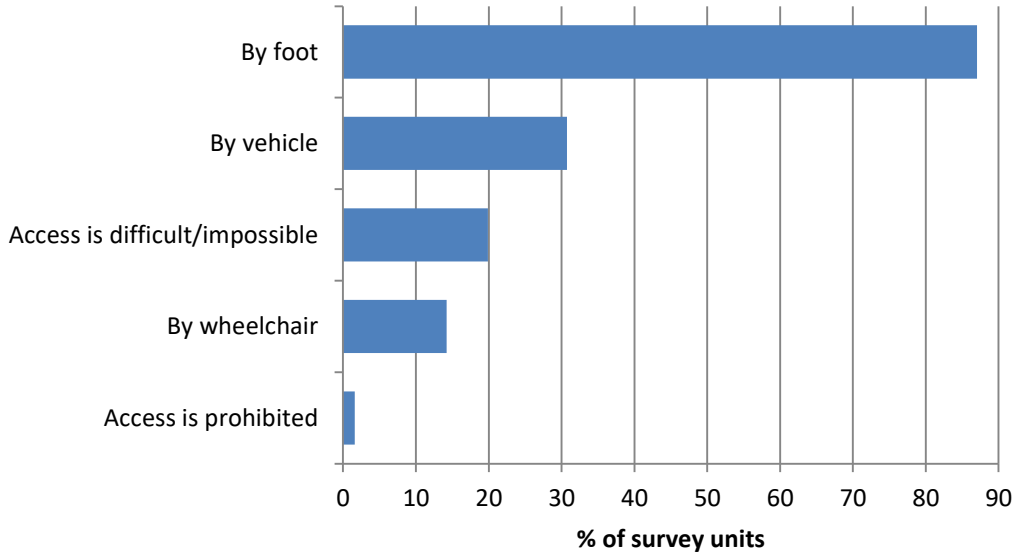
Over the last 3 autumn survey periods, Coastwatchers have surveyed 1267 individual survey sites, 115 of which were surveyed every year (2013, 2014 and 2015), 220 were covered in two of the three years and 932 only once.

Map XX – Left: 115 survey units covered every year since 2013. Right: 1267 survey units covered in any of the last three years.

Shore Access

Most shores surveyed were accessible by foot, for 30% there was also vehicle access. In 20% it was difficult to access the chosen survey unit directly from the hinterland of that survey unit and one had to approach via an adjacent survey unit. In 10 sites the access was impossible from land. These survey units were later excluded from the analyses for animals/plants, marine litter and inflows.

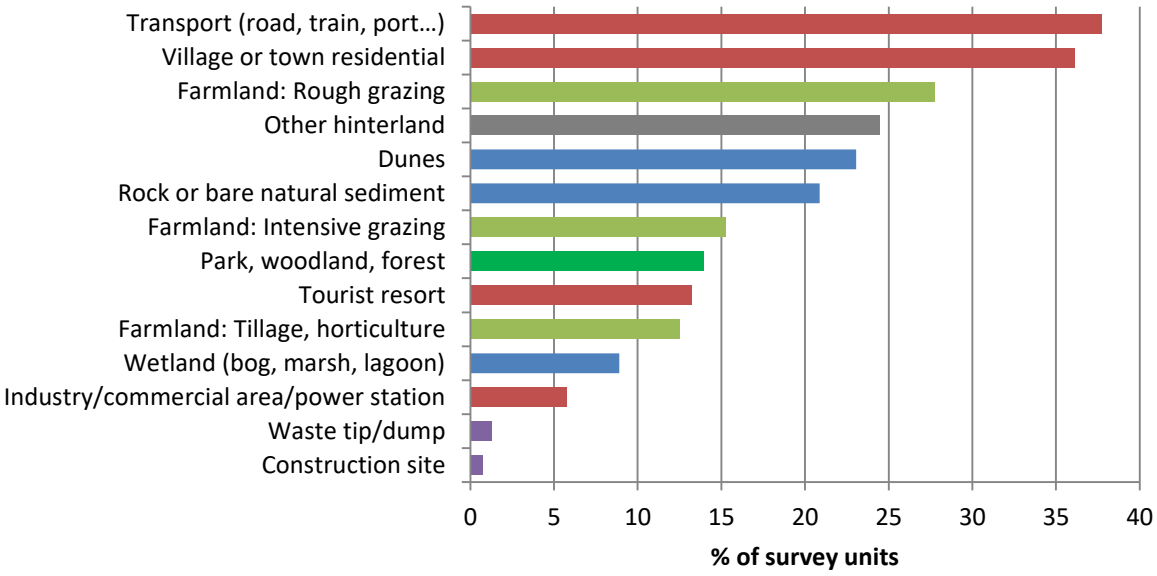
Wheelchair access right to high water mark was indicated as possible in 14%of sites. This may well be an over estimate according to wheelchair users as many wheelchairs do not have wheels suitable for traversing even hard sand splashzone entries. As we were also made aware that accurate wheelchair access information is missing for almost all of our coast, a rephrasing of this question and guidelines written by wheelchair users is being considered.



Surveyors were asked in question B1 to describe what the hinterland of their survey unit was mainly devoted to. They could tick up to 4 options in case of mixed use.

In the 2015 results transport and village or residential areas were part or all of most survey unit - see graph below.

Hinterland



RESULTS PART 2: BIODIVERSITY

Overall, biodiversity loss and the degradation of ecosystem services in the EU have continued since the EU 2010 biodiversity baseline, as confirmed by the 2015 *European environment - state and outlook report*

Reference: http://www.eea.europa.eu/soer

Oblivious to the shore's rich

There is lots of life on the shores and shallow waters around the island of Ireland. Some is obvious, like big brown seaweeds and the Chinese hat like limpets stuck tightly onto rocks, thousands of wintering seabirds crowding our bays looking for food and shelter. We also note a seal's head popping up and occasional sightings of cetaceans. Most of our sea life though – even life we walk across when the tide is out – goes unnoticed. If presence is not known, how can absence be missed? And if people do not know how fragile some shore life is, they will not take care with activities which may damage it given the acknowledged continued biodiversity loss in the world today (European Environment Report 2015 http://ec.europa.eu/environment/nature/biodiversity/comm2006/pdf/mid_term_review_summary.pdf) and the UN Biodiversity Convention's firm targets of halting the loss of biodiversity, this lack of awareness and knowledge needs to be addressed.

So **aim 1** of the Coastwatch biodiversity questions **is to raise awareness, open eyes and train people where to look for the riches, when and how to avoid damage and disturbance.**

Aim 2 is to contribute to scientific knowledge. With a marine area 10 times that of land and over 7000 km of All Ireland shore, the official marine scientist work just has to be selective. We still have far too little scientific information about the majority of our ocean wealth including the rich coastal rim. More than 500 shellfish aquaculture license applications in protected sites are pending - the majority as the marine information to assess impacts is incomplete. There are inshore areas of particular value as highly productively areas, nursery and spawning grounds which we know surprisingly little about:

- The strip exposed at spring low tide which is too shallow for most marine research vessel work and too deep for most intertidal surveys.
- Sheltered bay and estuary shore and splash zone retreats with little tidal channels, saltmarshes and reed beds which can be awkward to access.

These areas and the recording of fleeting finds anywhere - a beached sea turtle, mass death of organisms, or an algal bloom - are perhaps the most important citizen science marine biodiversity knowledge contributions which Coastwatchers can make. This aim is aided by training as we were able to give, supported ted by the Department of Environment Water Services grant and by new technology as developed in the EC funded FP7 'Citclops' project in which TCD/Coastwatch was the Irish partner and many Coastwatchers helped to test over the last 2 years, resulting in the **Eyeonwater app**. Once downloaded and tested on the phone, it should enable anyone to record red tides, dredge plumes or indeed occasions of beautiful water colour and transparency and have that information uploaded with location and time as evidence and as scientific data.

Aim 3 is to help active citizen engagement in informed decision making– a personal decision not to drive over an intertidal Seagrass bed once you know that it's there, a decision not to have your dog chasing wintering birds although he loves it and you love the sight. A second part of our aim is more challenging – help coastwatchers make an informed contribution to teaching or a planning application, or input into consultations like the Programme of Measures to bring our seas to Good Environmental Status (GES) under the Marine Strategy Directive. While the first example above just requires knowledge of something fragile and valuable to inform personal behaviour, the other examples also require an understanding of language, legal and planning context which our formal education from primary to tertiary is lacking.

Habitats & Select Plants

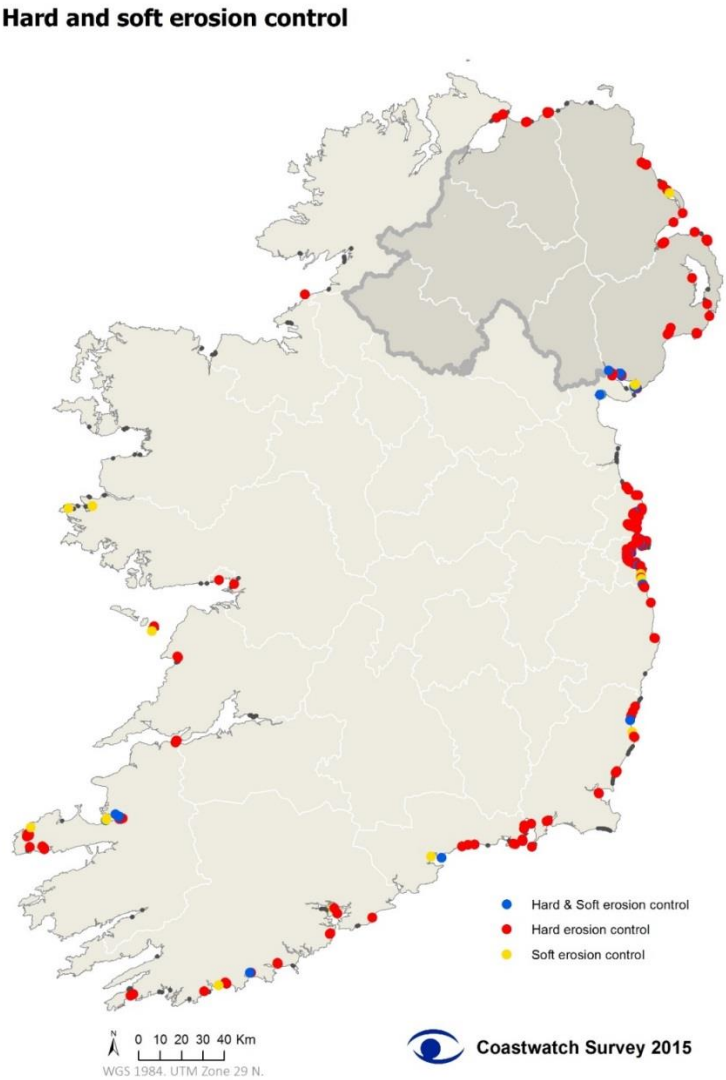
In Question D3 surveyors were asked to describe the splash zone habitats in their 500m s.u. As the survey is aimed at the general public the core international survey form only includes a selection of habitats, groups of algae, plants and animals (Section C and D of the survey form). Optional extra species and local harvesting knowledge is being sought on the back page of the Irish and UK survey form, with same questions now also adopted for N Spain and Portugal.

Most surveyors reported that there were several habitat types present, with sand/gravel/stone reported most frequently from the splashzone of 58% survey units.

Manmade coast

Hard erosion control was recorded in 39% of survey units – see map XX The occurrence is higher than in previous years due to the overrepresentation of the Dublin coast and due to the gradual increase in hard erosion control around our shores which was commented upon by several surveyors. Buildings and construction which had another function rather than erosion control - usually a pier, harbour or slipway were present in 10% of survey sites.

Soft erosion control like earth banks were noted in only 8% of surveyed sites. From training sessions we suspect that well grassed man made sea field embankments are often recorded as 'other' rather than manmade soft erosion control. 'Other' which was noted in 20% of survey sites and also includes the natural boulder clay sea banks of the SE coast which slip and slump when the base is undermined by the sea.



Map XX- Manmade hard and soft erosion control present over all or part of a survey unit: Hard – wall, rock armour, gabions and soft – usually earth banks**.**

Natural rock was the third most common coast type recorded and found in 36% of survey units. That includes rocky outcrops on sandy shores and full rock coasts with sea cliffs.

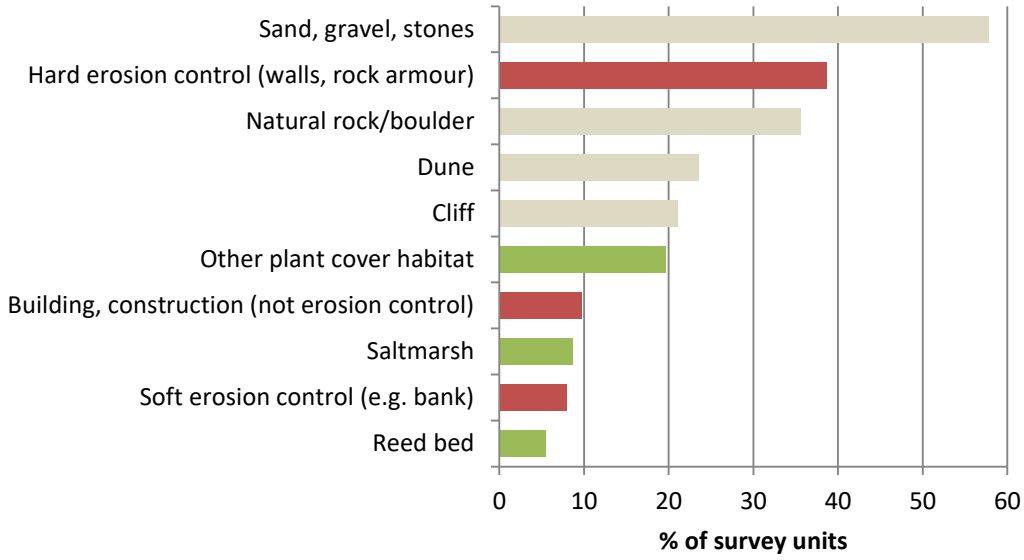


Figure XX: Spashzone habitats reported in the 2015 coastwatch survey.

Three soft coast types **Dune, Reed beds** and **Saltmarsh** were included in the survey and results will be looked at in more detail over the next few months as high value habitats under pressure and susceptible to climate change effects.

For this report December 2015 dune and seagrass survey results were picked as first habitats to investigate in relation to official monitoring and to explore how this type of citizen science work might be integrated and benefit coastal monitoring and protection.

Habitats

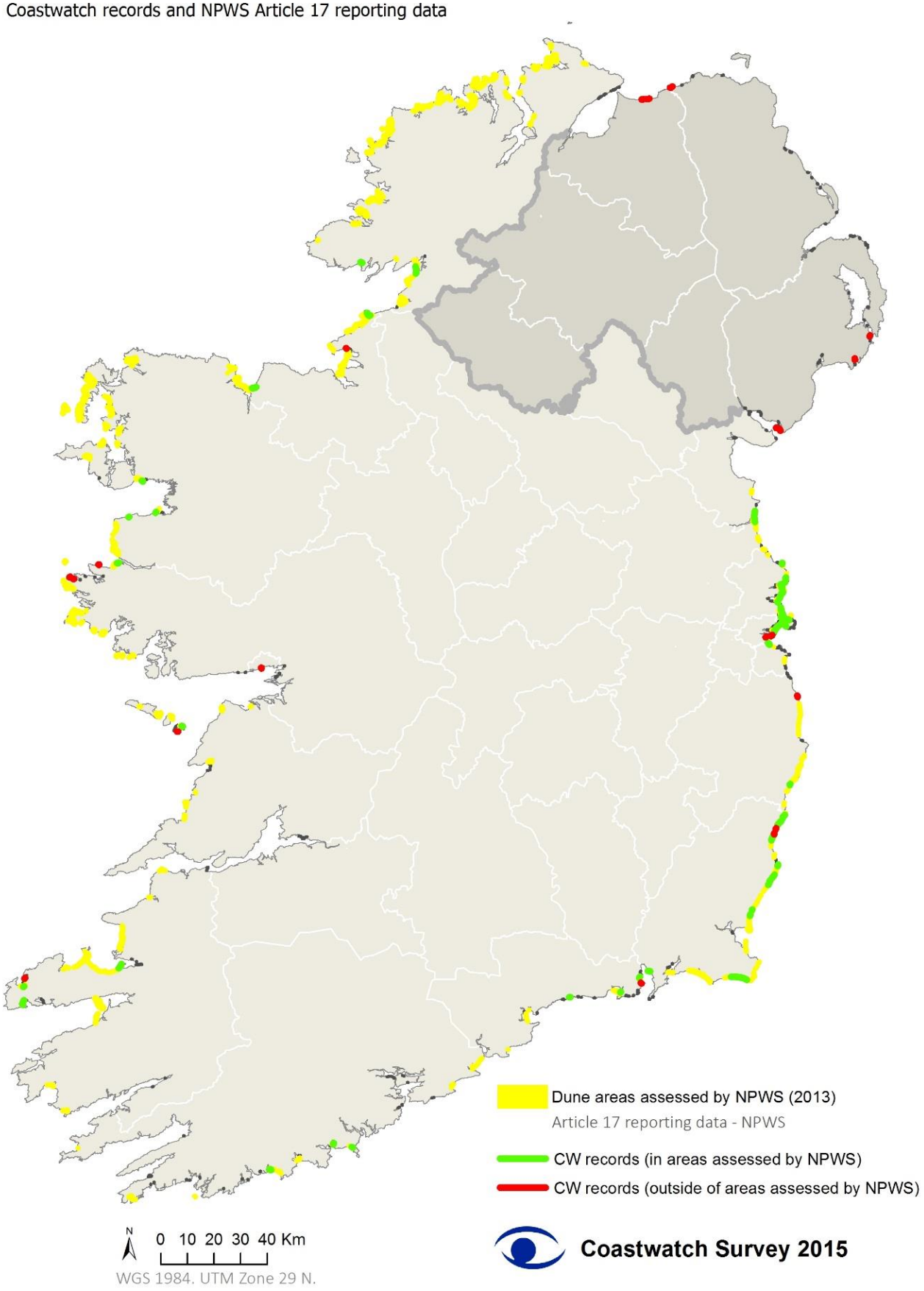
Dunes

Dune habitats were reported from 133 (24%) surveyed shore units. In 43 (32%) of these surveyors also indicated they saw an imminent risk or threat of erosion. In some known old dune sites, lichen rich sods of grey dune were seen strewn across the shore as in Kilmichael Co. Wexford. In Mullagmore Co Sligo a layer of peat bog was protruding underneath the dune and to underline how close bog and dune are, a duneslack in the centre of this large system sports a large patch of bog cotton *Eriophorum vaginatum* normally associated with blanket bog.

Even in an exceptionally mild calm autumn before any winter storms many old dune stocks are under erosion pressure.

Now focussing on dunes around the Republic of Ireland, we overlaid Coastwatch reports of dune in the immediate hinterland and/or splashzone on the latest NPWS dune habitat maps (Article 17 reporting data, 2013) map XX. This confirms that Coastwatch surveys which were carried out in areas officially recorded as dune, were generally reported as dune – although there were exceptions as in Dublin bay around Sutton dinghy club and south of Sutton cross where the dune fringe is now so small that it was discounted and at Ballyconniger Co. Wexford where the dune has now eroded and all that is left is a row of rock armour which was once put at the foot of the dune and a sand cliff with farm grassland and caravan park hinterland - see photos below/

More excitingly Coastwatchers also recorded dune vegetation outside the official sites. Before verification work was carried out on these reports outside the NPWS sites, we assumed they were recent embryonic dune pockets, but there were also sites which were considered established dunes among them.



Map XX: Dunes around the Republic of Ireland – Comparison between CW records and areas assessed by NPWS.

A narrow band of dune may build for a few years from drift line to white dune to vegetated dune and then get washed away in a winter storm. However that cycle tends to repeat itself in the same area. One may argue it's not worth including such transient sites in a dune inventory. However as so many of our old dunes have little or no embryonic dune front and open, mobile sand is an essential habitat requirement for some dune plants, like the now possibly extinct Sea Stock, it may be more prudent to record these when we come across them. Indeed one can see this policy was adopted for some sites. IN the 2004-6 coastal monitoring project carried out on behalf of NPWS www.**npws**.ie/sites/.../Ryle_et_al_2009_**Coastal**_Monitoring_Project.pdf Bull Island was marked in the data base as the only dune. In the 2013 NPWS survey, the embryonic dune at Sutton and at Merion gates/Booterstown was added (see figXX below) This year our surveyor group recorded a doubling of this white dune rim length around the 'baby lagoon with Salicornia band'. The extra interest here is that a rare *Salicornia* sub-type community – Sagino maritimae-Cochlearietum danicae, which is confined to a narrow band between the saltmarsh and sand dune communities appears to be developing.

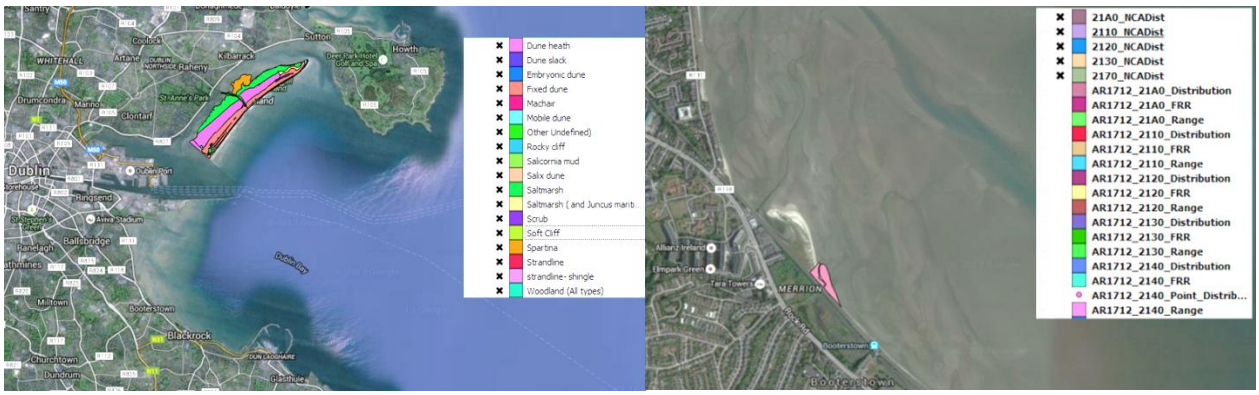
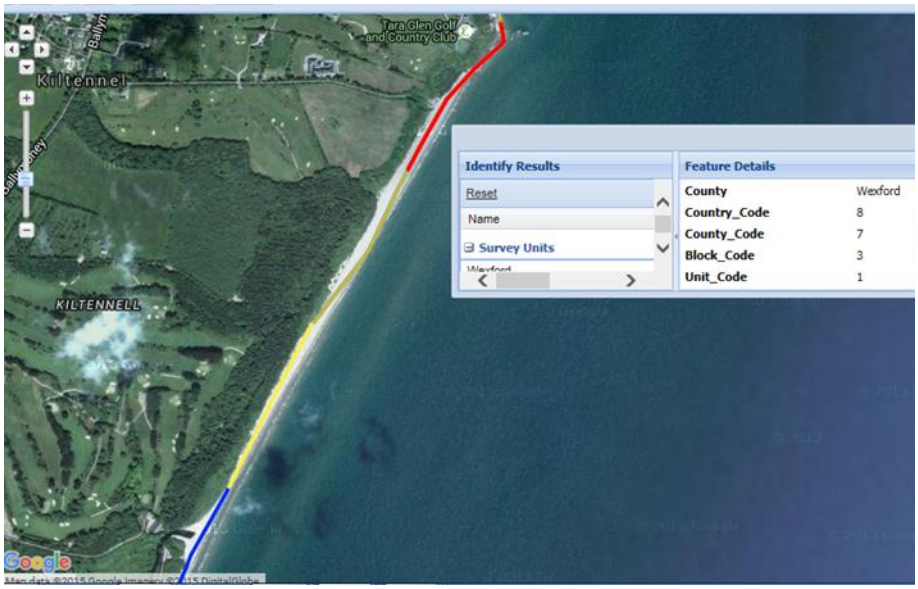


Figure XX Left: Dublin Bay dune habitat NPWS 2004-6 survey, Right: addition of dune at Merion strand NPWS 2013

The survey results also threw up oddities like the Courtown dunes, Co Wexford. Here both the first Art 17 assessment 2004-6 and the more recent 2013 NPWS survey report show the dune as a thin band between a stream and the start of rock armour. However Courtown Dunes and Glen pNHA is recorded as a much larger dune and the rock armour was officially put in to protect the dune. In the Courtown Bathing water profile Flora/Fauna, Riparian Zone; one can read:

'*The beach is backed by dunes which are generally well vegetated although species are more characteristic of woodland scrub than coastal dunes' and the description includes notes on dune slacks which are not included in the NPWS map –' the dune slack woodland has either a sycamore (Acer pseudoplatanus) or conifer canopy. The field layer has abundant Phyllitis scolopendrium in places. There are small areas of grey willow (Salix cinerea) scrub in wet patches . ..*

Locals see this as a dune and Coastwatch surveys have consistently entered this survey area from Courtown bathing water northwards to Dodd's (Duffvarrig) rocks as dune hinterland and splashzone. The unit marked red on Coastwatch map below (s.u. 8-7-3-1) ending in those rocks is characterised by flat dune plane with embryonic and vegetated dune. Plants include the Flora protection order 1999 Moor's Horsetail (*Equisetum* x *moorei*) and the dry heads of orchids seen earlier in the summer. This area is however experiencing severe scouring, especially where 'End' is marked on the NPWS map above – as is typical pattern observed adjacent to rock armour.

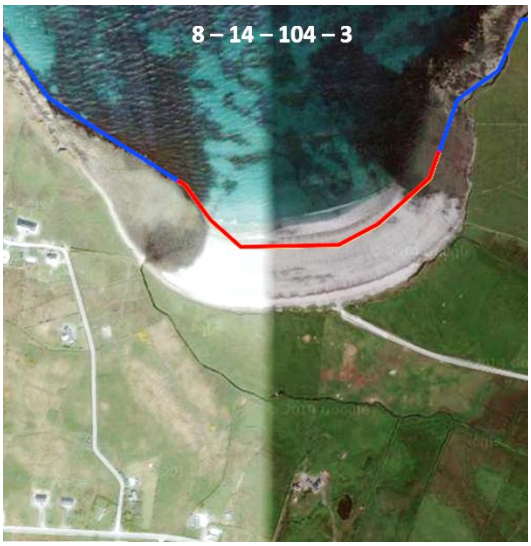


Moving around to the West coast, The pocket dune of Baile An Reannaigh 8 – 10 – 125 – 10 is more of machair character according to surveyors who noted that the flat dune gently slopes back to boggy land. The site is under pressure from sand removal which is taking place both on the beach and as is seen in satellite image in an area of vegetated older dune.

Figure XX Baile An Reannaigh Co Kerry 8 – 10 – 125 – 10 Co Kerry a small dune outside the NPWS dune data base.

In Galway Polly Dolan recorded dune vegetation outside the NPWS map list behind and sent transect photos from shore, over drift line, to dune to tightly grazed dune grassland vegetation which ends in a boggy wetland. – see below. There are Neolithic settlement remains on the site.

Figure XX Salena beach Co Galway with old dune hinterland and photos 1-3 from shore to downward sloping grazed field to wetland



8	4	11	1 and 2	Coastwatch group
8	4	11	7	Patrick Brady
8	6	3	3	Paul Dubsky
8	7	2	6	Coastwatch group
8	7	2	10	Paul and Karin Dubsky
8	8	2	7	Andrew Cox
8	10	125	6	Coastwatch group
8	13	35	1	Grattan Shore
8	14	103	9	Polly Dolan
8	14	104	3	Polly Dolan
8	14	116	4	Rory Keatinge
8	14	126	3	Cathleen Ní Chonghaile
8	16	31	9	Linda O'Dwyer

Follow up Action:

1. Coastwatchers Sea Stock is a biennial or short-lived perennial crucifer with pale lilac flowers with four petals, with a faint scent. Its leaves and stems are covered with a thick grey down and it is closely related to the common garden Stock (*Matthiola incana*). Look out for it on mobile sand dune. If you think you might have found it. Take a photo ideally with GPS location and contact the National Botanic Gardens for verification. If its Bingo let us know!

2. Recommendation to NPWS and local authorities: Include latest verified CW data in your data sets as citizen science data layer. This information should be useful in case of planning applications or dune inventory updates.

Similar detail mapping is possible for saltmarsh and other habitats, but not included at this stage.

Saltmarsh was reported from 9% of surveyed shores, is a listed as two different EU habitats in Annex 1 of the Habitats Directive but just recorded as saltmarsh by surveyors. It may refer to a large beautifully developed complex area with deep tidal channels and a range of specialised grasses and flowering plants. Among these sea asters were the last flowers seen in mass bloom during the survey. Apart from these larger saltmarsh habitats surveyors also noted fringe saltmarsh running like a belt around more exposed west coast shores. Saltmarsh is valuable as carbon and nutrient sink, as flood defence and as fish nurseries. In some saltmarshes Glasswort *Salicornia* spp is found in either patches or distributed throughout the saltmarsh grasses. In other areas the Glasswort grows seaward of the saltmarsh in sheltered hard mudflat areas. (see also glasswort in plant section below.

Reed bed is an area covered in large wetland grass, usually dominated by the common reed *Phragmites australis*. Surveyors found it in 5% of survey sites, usually sheltered estuarine areas, but also some pockets around streams, adding to habitat diversity between coastal fields, urban areas like Booterstown marsh in Dublin Bay and dunes as in Mullaghmore Co Sligo or Morriscastle Co Wexford. Although not listed as EU habitat, where it occurs naturally in a protected estuary, bay or other habitat complex, it is protected as 'typical feature'. Artificially constructed reed beds have become almost famous as tertiary sewage treatment as the *Phragmites* plants remove nutrients and other matter from already part treated sewage. The same nutrient retention and flood control function is carried out by the natural reed bed. Reed beds are also habitat for many animals from crabs, worms and juvenile fish who live in the reed bed channels to birds like warblers and kingfishers.

Threats and loss:

With climate change associated stronger storms and sea level rise the edges of our soft coast habitats are likely to be inundated and eroded. In many areas marginal wetlands are prevented from moving inland as we are building erosion control measures to prevent just that. In the case of farm land some inundation could be managed for growing edible coastal plants like Salicornia as now practised in France, in most areas a landward move of soft coast habitats and managed retreat would require coastal zone management which is now overdue.

Added to the direct weather and climate change losses we note two other issues:

The increase in hard erosion control which destroys natural dune functions when applied to these and the deflection of currents to unprotected soft coast and secondary erosion there.

Wetland infill and drainage pressures with one or two new or further progression of loss cases recorded per annual survey. We are concerned that even when such activity is established as unauthorised, a halt and restoration is the exception not the norm. This needs to change.

Case studies One pager if time allows

1 Lahinch Co Clare

One saltmarsh fresh water marsh complex in County Clare had been noted by surveyors in the 2014 survey to be disappearing under infill. This was followed up in a joint An Taisce and Coastwatch action. First alerting Clare county council and then when wetland status was disputed asking An Bord Pleanala to judge whether it was or wasn't a wetland. Their recent verdict LINK confirmed the wetland status and now the environmental groups are seeking restoration.

Tramore back strand, saltmarsh is due to be created by opening of old sea banks and allowing sea water to flood reclaimed land. This is to compensate for saltmarsh lost under the Tramore dump.

Intertidal

We take out intertidal for granted but anyone coming from the Mediterranean, Black sea or Baltic envies us for this huge area accessible to all by law and practise when the tide ebbs.

Figure XX below shows that 47% of shores were between 5-50m in, followed by 50-250m and 21% had a huge intertidal of more than 250m width characteristic of the Dublin biosphere reserve bay coast. Figure XX depicting sediments types in the intertidal shows that with exception of silt/mud which was reported from only 30% of survey sites, sediments occurred in grain size rank order from the most frequently reported sand (72%) over gravel, boulder, to rock.

The larger the area exposed at low tide, the more likely it is mudflat or sand bank habitat, but some intertidal rock platforms and boulder reefs were also observed especially on the west coast and northern Ireland.

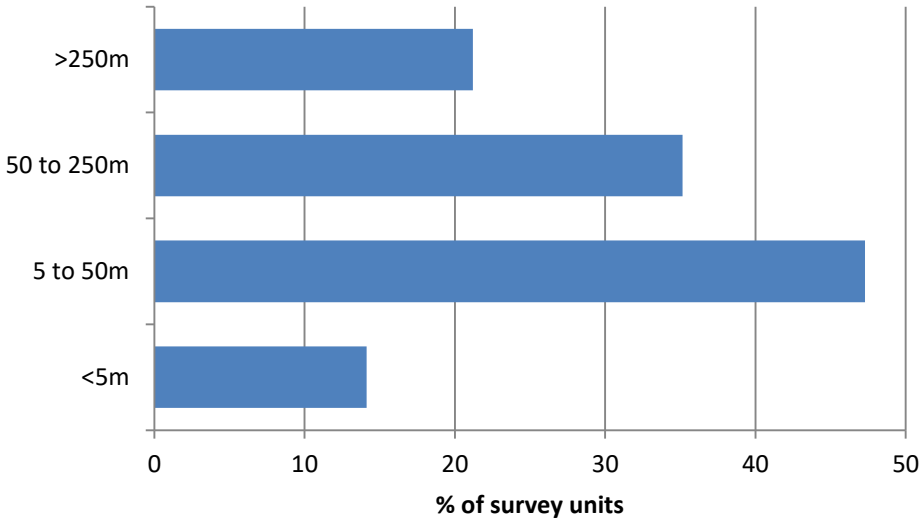


Figure XX Intertidal shore width All Ireland Coastwatch 2015 survey (N = 552)

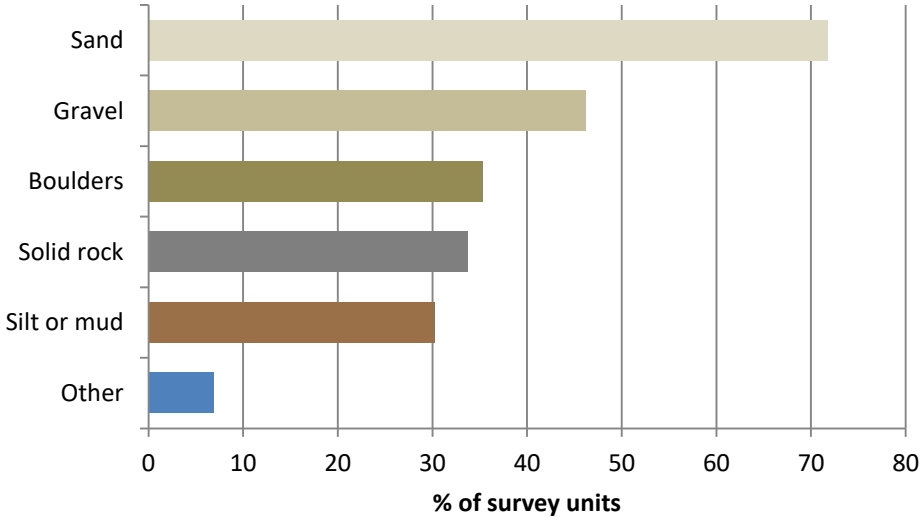


Figure XX Intertidal shore sediment recorded All Ireland Coastwatch 2015 survey (N = 552)

Seaweeds and Plants

Question D4 asks which of a short list of seaweeds and plants surveyors saw. Results are summarised in Fig XX below. The most common finds were brown and/or red sea weeds found on 68% of shores.

Figure 4 Brown seaweeds live and dislodged Co Waterford (Photo (L) XX and (R) Paddy Houlihan

Dislodged seaweeds were swept up on 63% of the shores surveyed and green seaweed patches, often associated with fresh water inflows or seepage, were found in 53 %.

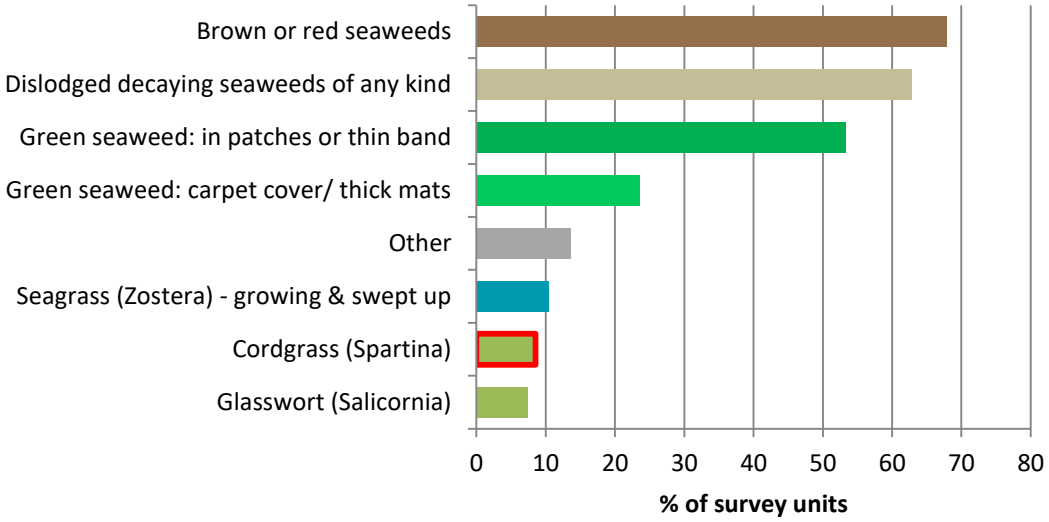


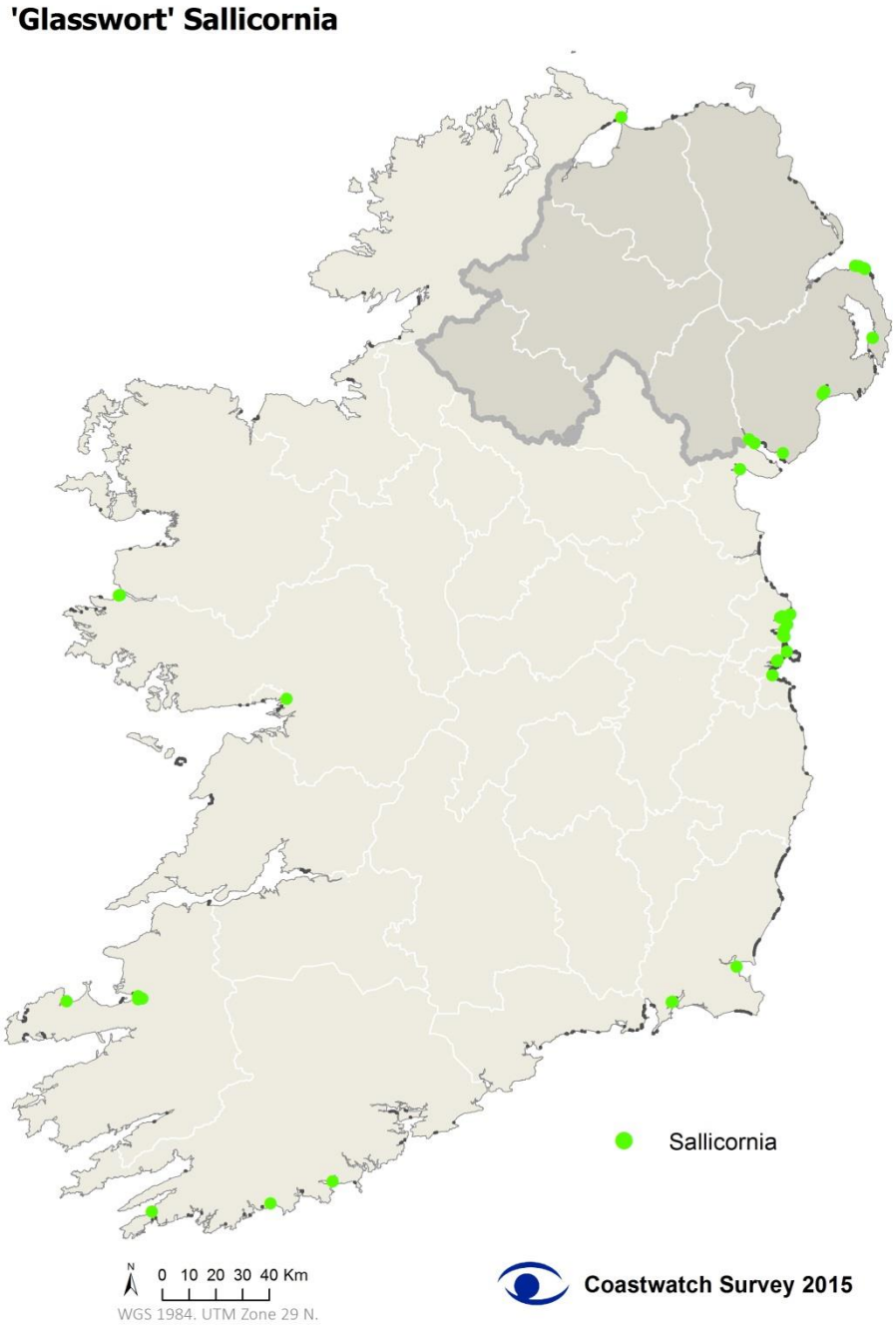
Figure XX Plants and seaweeds in the intertidal. (N=552; Source: Question D3). Plants/seaweeds found by surveyors in the autumn 2015 survey.

Thick green seaweed carpets, which are indicators of nutrient enrichment, were recorded on 24% of shores. While some 'carpets' may be small, there were acres covered in some estuaries and bays matching the EPA assessments of eutrophication. The picture below shows surveyors in Clonakilty bay where the inflow tests also flagged very high nitrate levels.

Three plants which are more challenging to find than the seaweeds were recorded: Glasswort (on 7% of shores), Cordgrass (9%) and Seagrass (11% provisional not all verified) While totally different, each can grow as dense stands and so form distinct habitats in sheltered areas.

Glasswort *(Salicornia*) is a hand high fleshy edible plant, which usually pops up from seeds on the upper mudflats and low saltmarsh in May. By the time the autumn survey is in progress the plants are turning the colour of autumn leaves.

There are 5 species of Salicornia in Ireland. In our survey we do not differentiate between these. Map XXX below shows the sites where Glasswort was observed in our last survey. Only in a few of these sites were sizable beds reported on mudflats or among saltmarsh grasses.



The rarest is the Perennial Glasswort restricted in Ireland to the Bannow Bay South Wexford area.

Gerard Woolly a long term Coastwatch surveyor found and minded several clumps in positions vulnerable to trampling, flooding and erosion on Bannow Island, as well as leading fieldwork sessions to locate more sites. Sadly he passed away this summer. To honour him this picture with the plant he cared for and a note which he helped to draft to make the scientific description fit for citizen science.

Plant description scientific

Sarcocornia perennis (Mill.) A. J. Scott Other names: Salicornia perennis, Salicornia radicans, Arthrocnemum perenne.

Perennial glasswort Sarcocornia perennis is a spreading, jointed-stemmed halophyte that differs from the closely related annual Salicornia in being a shrubby perennial and in having aspects of inflorescence structure. It is often found in open stands with: annual glasswort Salicornia spp, and annual seablite Suaeda maritima.

(Joint Nature Conservation Committee (JNCC). Habitat account - Marine, coastal and halophytic habitats. (web) http://www.jncc.gov.uk, date accessed 02/04/07.)

Plant description Ireland for find the Perennial Glasswort project

Perennial glasswort - Sarcocornia perennis in Latin – grows as a saltwater tolerant plant on some warm sheltered seashores from Asia to S. America. In Ireland it appears to be restricted to Bannow Bay in County Wexford. Here it grows as a delicate ground hugging bush (photo 1a and b). Green shoots grow straight up like thin green jointed candles from the thin woody branches. From above this resembles a dense patch of our more common annual Glassworts, which germinate from seeds in spring (photo 1 c). In late summer both annual and perennial Glassworts tend to be the same height, growing in the same area among other saltmarsh plants, but look out for a more greyish green and particularly dense shoots to find the rare species. A woolly dark moss-like seaweed is often found in the cool space around its branches. This becomes more visible in winter as the shoots die back.

For locations where surveyors noted it, see map XXX.

The **Cordgrass** (*Spartina* anglica is a species formed from the hybridization of S. alterniflora and S. maritima about 100 years ago and then introduced actively to stabilise shores. It can act as invasive alien species which has taken over large areas of open mudflat and saltmarsh.

Seagrass Zostera

Eelgrass, or seagrass locally known as 'sweet grass' in areas of Donegal is a true flowering plant which is living in the sea, rather like a seaweed but in contrast to seaweeds it has proper roots. It grows in some sheltered areas and favours mud and sand.

The high to midshore intertidal area is home to the short lawn like *Zostera noltii*, while in the sublittoral you can find *Zostera marina* with its > 1m long leaf blades growing up from the seafloor where its roots are anchored with long blades floating in the water. Finally there is an 'in-between' *Zostera* with wide strong grass blades like the Z marina, but typically located in intertidal pools. This is now classed as a phenotype of *Zostera marina* rather than a distinct species.

Seagrass beds are one of the most productive soft sediment habitats and important nursery habitat for many fish species. Marine invertebrates feed on eelgrass leaves and on the detritus around the bed. Larger fish and birds then come to feed on these and/or the grass. In Blacksod Bay Co Mayo the scallops are associated with seagrass beds and In Lough Swilly an earlier Coastwatch survey showed several species of pipefish associated with the 'Wee Lee' *Z marina* bed. In Tralee Bay surveyors noted that feeding Brent geese location is used as indicator of likely intertidal seagrass position. The longest *Z. marina* found in any Coastwatch survey was approx. 1.65 m long in Lough Foyle just north of the old Moville Harbour. These seagrass meadows in the sublittoral need good water transparency to photosynthesise and are thus vulnerable to spreading invasive Sargassum seaweed and water transparency loss from pollution, dredge or aquaculture activity.

Eelgrass used to be widespread in Ireland until in the 1930s a significant decline was noticed. We have no accurate figures of loss but almost every estuary where Coastwatch found old records – or where local people talk of large seagrass beds - as in Lough Swilly – it appears to have shrunk to a small fraction or even disappeared.

A major factor in the initial decline is thought to be seagrass wasting disease - a fungal infection attacking the leaves, causing blackened dead areas and die back. Other factors include destruction by coastal infill developments, dredging which blocks light, stopping the plants photosynthesising and smothering them, chemical, oil and organic pollution such as sewage; green opportunistic algae out competing the intertidal sea grass. Fishing boat bottom gear and pleasure craft anchoring and propellers can also damage beds. Alien species such as Japweed *Sargassum muticum*, can compete with the sublittoral Z marina for space.
In the last few years seagrass appears to be recovering in a few sites like Tramore Co Waterford and Dublin Bay where major pollution sources have been tackled. But in this year's survey there were a noticeable number of surveyors who reported dislodged sea grass even though the weather was calmer than in recent years and black blades were reported in standing crop and dislodged floating material. Follow up work is needed to check whether the disease may have returned.

Sea grass on all shore levels is very sensitive to disturbance (e.g. trawling, bait digging even trampling). *Zostera* is used as a 'good' and 'high' water quality indicator in EU law - in the water framework directive, the Marine Directive and Natura 2000 site monitoring.

Zostera was reported growing in 32 survey units. In ten of these it was seen to grow and there were plants swept up. In 26 sites no Zostera bed was found but only dislodged plants reported. In some sites – e.g. Fethard on Sea Co Wexford we have no recent record of *Zostera marina* but according to an experienced surveyor a lot of long seagrass was swept up over a week or more. Earlier in summer surveyors noted a lot of seagrass along the tide mark.

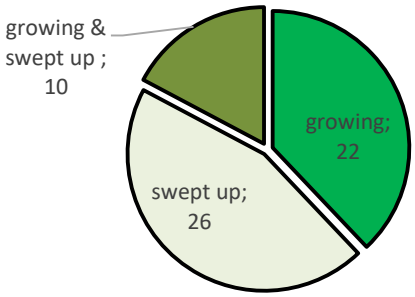
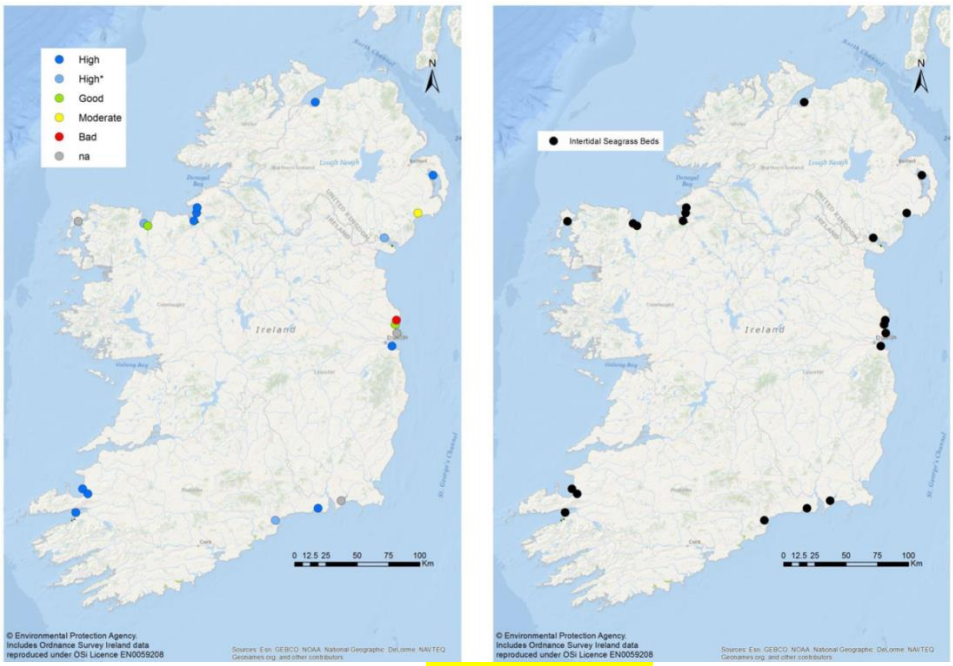
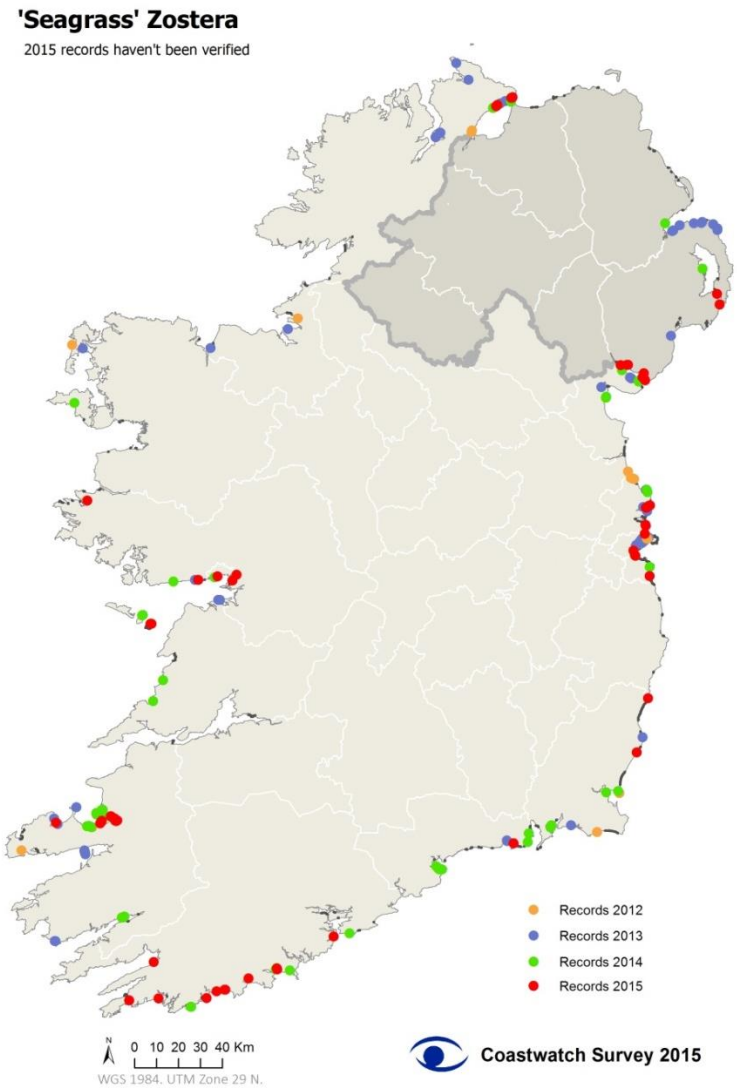


Figure XX Number of survey sites where seagrass Zostera was recorded growing, growing and swept up/dislodged and just swept up - Coastwatch 2015 survey. N=58



Map xx– Official Zostera records



Map XX – Seagrass Zostera records in 2012, 2013, 2014 and 2015. The 2015 records are still being checked.

In Blacksod bay and that was associated with boats coming into the protected site (SAC) for scallop dredging. The activity has since been brought under control with a scallop fisheries SI but there is concern that new dredging activity may affect other sites and if one waits in each case until seagrass damage is done there is little hope of restoring this important shallow water features.

Official records for Ireland as listed on the OSPAR website: Intertidal *Zostera* communities have been recorded on all Irish coasts and are updated by the EPA (Robert Silke). Subtidal, *Zostera* communities have only been recorded from the south, west and north coasts and their monitoring is confined to Natura 2000 sites in the south. Coastwatch L Foyle and Tramore Backmarsh records have added two inlets, however the Tramore Z marina sublittoral phenotype just around the closed dump has since disappeared again. The Fethard on Sea find this year suggests another Z marina bed is or was growing in this area. An exciting find of Z noltii 2014 in Cloghan co Kerry wos confirmed again this year and decribed as large healthy bed with Brent geese feeding on it.

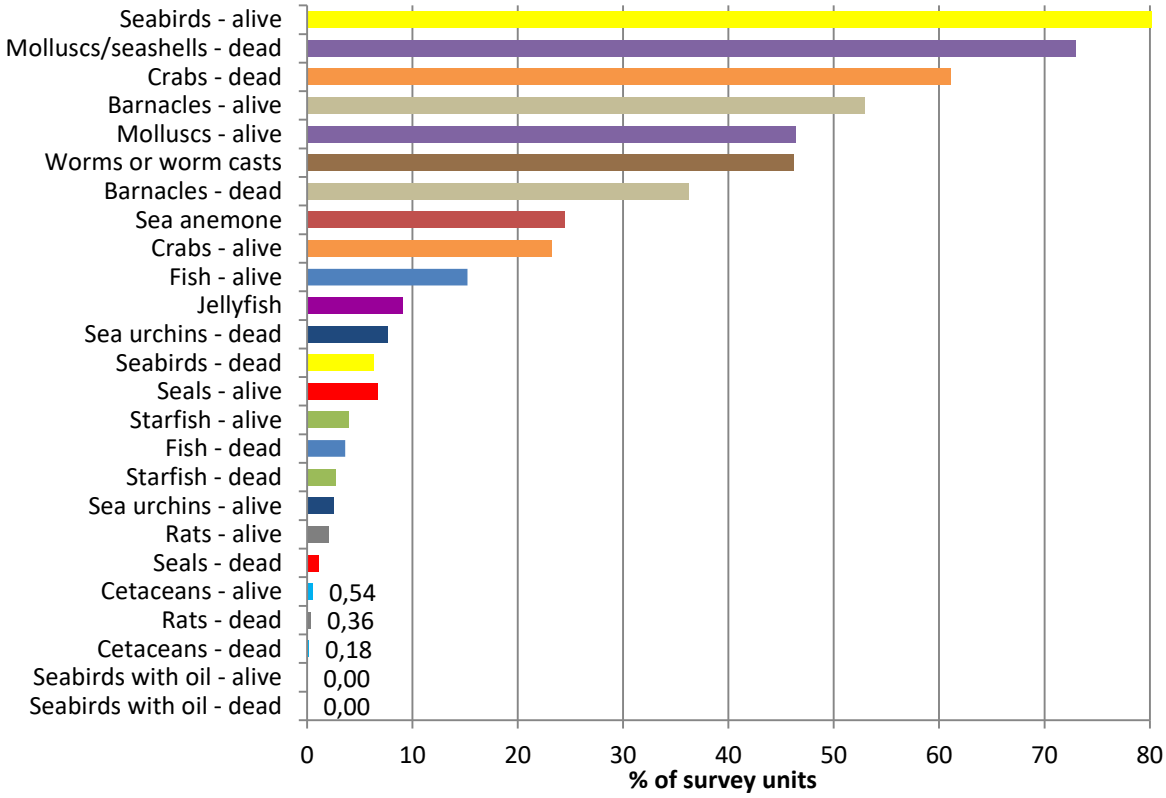
Subtidal Zostera		
1. Kinsale Harbour	8. Kilkieran Bay	14. Blacksod Bay
2. Roaringwater Bay	9. Greatman's Bay	15. Broadhaven Bay
3. Kenmare Bay	10. Inis Mor	16. Rutland Sound
4. Valentia Harbour	11. Mannin Bay	17. Mulroy Bay
5. Ventry Harbour	12. Kingstown Bay	18. Lough Swilly
6. Tralee Bay	13. Clew Bay	19. Donegal Bay
7. Galway Bay		

Table XX – **Subtidal Zostera records in Ireland.** Source: OSPAR Nov 2012
http://qsr2010.ospar.org/media/assessments/Species/P00426_Zostera_beds.pdf

ANIMALS

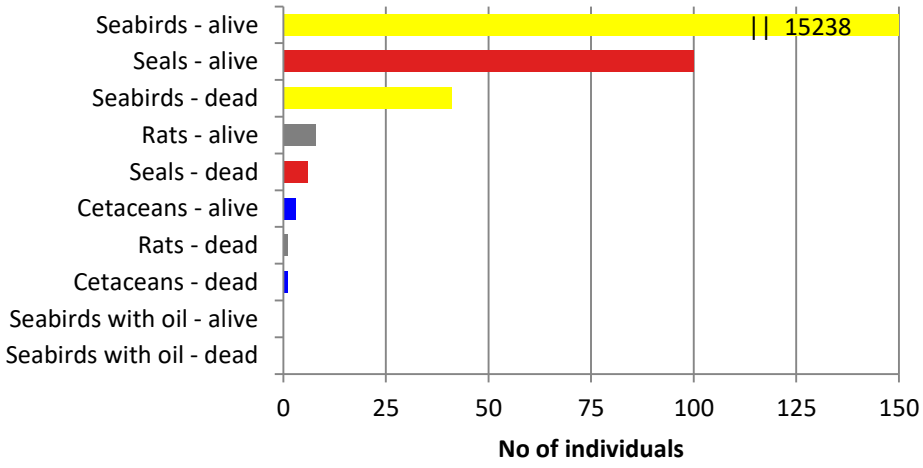
The most frequently observed animals or animal parts on our shores were live seabirds (81% of shores) followed by seashells (73%) and crab shells (61%) which can potentially be swept up on any shore. We are also delighted to report that once more no oiled birds or other oiled animals were found.

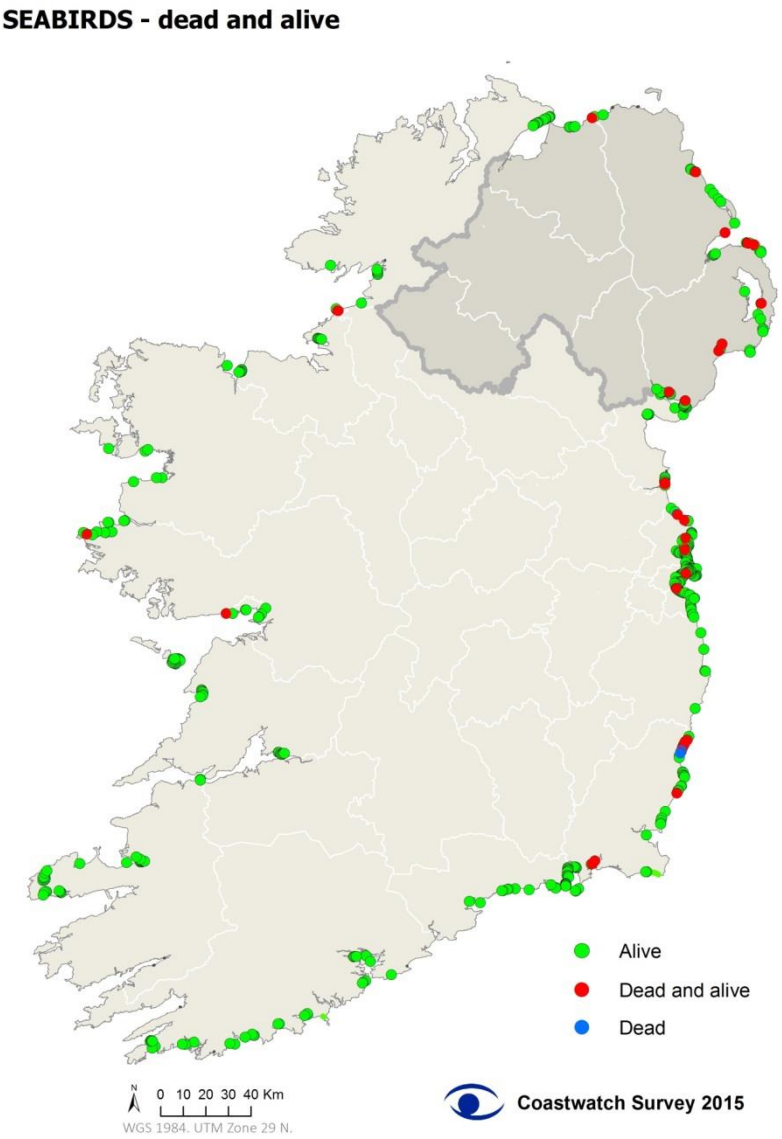
The sessile and low mobility animals associated with particular habitats which ranked highest were barnacles (53%) and next in shared 5th position with 46% were live molluscs (i.e. the inhabited seashell) and worms or casts which indicate their presence. The empty 'volcano' of dead barnacles stays in place between more fortunate live ones for some time so were spotted in a third of all sites, while sea anemones as well as live crabs were seen in 24% and 23% of all surveyed areas. Live fish were observed in 15% of sites.



Turning to animals recorded on <10% of surveyed shores, reports were Jellyfish (9%), Sea urchins (dead 8% and live 3%), Starfish (live 4%, dead 3%) and dead fish (4%) rats (live 2%, dead 0.4%) dead seals 1% and cetaceans only 3 sites with live and 1 with dead.

Higher animals were also counted or numbers estimated. Graph XXX below shows that 15238 live birds were recorded or estimated present in this autumn's survey.





As well as the species counted above two headless leatherback turtles found – one in Cork by Mary Looby's group and and one in North Wexford by local surveyors (names withheld) and verified as adult Leatherback sea turtles from flipper bones by Martin L. Zoology dept TCD when brought Coastwatch coordination.

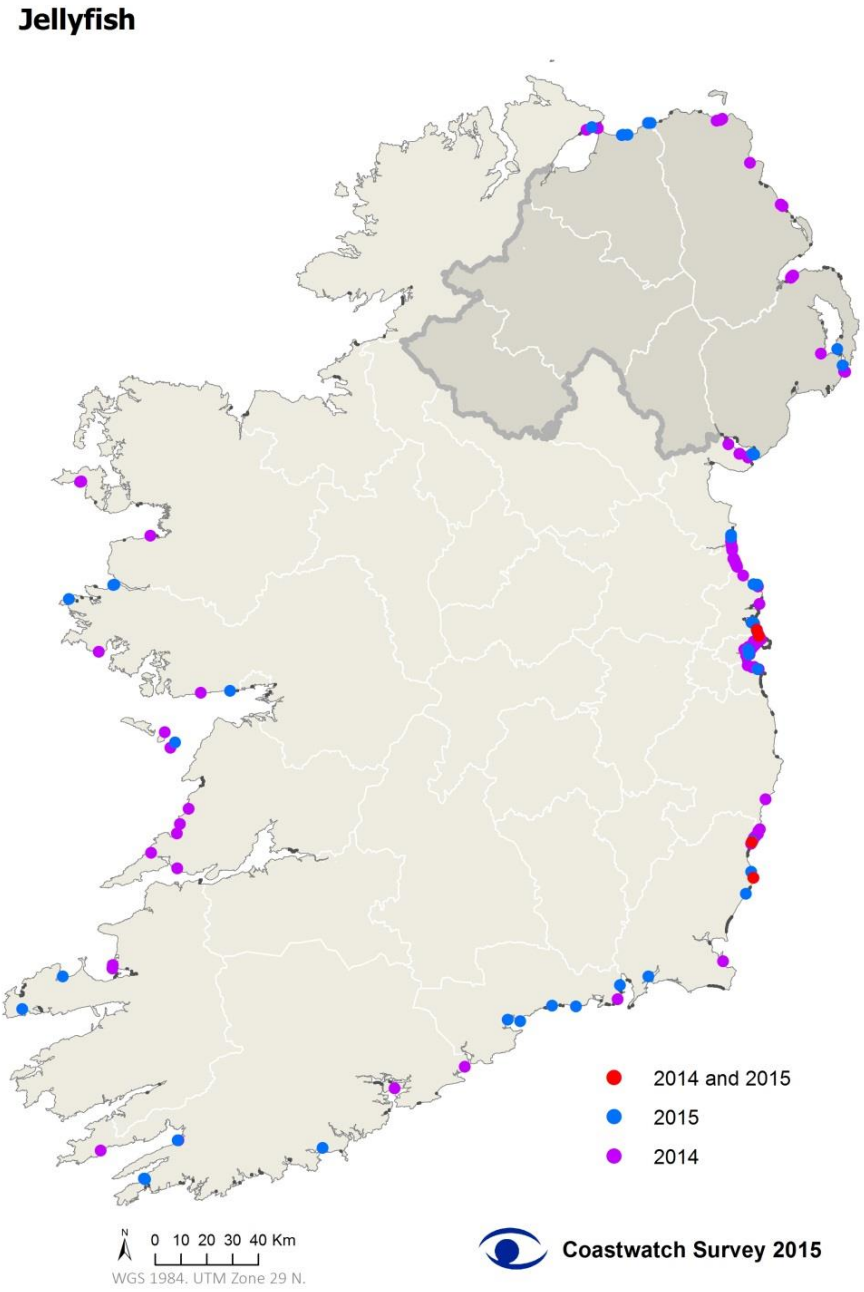
Figure 5 Remains of Leatherback Turtle found swept up in Cork by surveyors, reported by Mary Looby.

Jellyfish

This fascinating macro plankton which from Coastwatch attitude survey 2015 was the single most disliked factor when deciding where to swim was only reported from only 9% of shores and no mass stranding in contrast to the previous year two surveys. However there were more reports of the lion's mane jellyfish which has a very painful sting. The identification may have been aided by a new poster – see www.coastwatch.org produced for surveyors who had called for it after reporting high jellyfish numbers and wide distribution in 2013 and 2014.

It is likely that jellyfish numbers never built up in 2015 due to the abnormally cold water around our shores. Surveyors checking water temperature in a few sites on Irish Sea shores in a pilot harbour project saw water temperature remain around 15^{0}C until mid July in the North Irish sea with occasional warmer 17-18^{0}C water coming up the Irish sea as far as Arklow and then dropping down again.

The map below shows the jellyfish report distribution in 2014 and 2015.



Worms

In 56% of 552 survey units, surveyors reported seeing worms, worm casts or empty sand mason tubes which can get swept up in thousands. Some very special finds of peacock worm were photographed in Dingle and Carlingford lough.

Most surveyors also answered extra biodiversity questions introduced for All Ireland as final page of the survey form. In 2015 extra section reports from 486 survey sites were received. The questions cover three worms which occur in the intertidal and shallow water: The common and commercially important **lugworm**, identified by its worm like casts was recorded on 53% of shores. **Sand masons** identified by the little bushy tube tops protruding from hard muddy sand or shingle on the low shore and shallow pools were found on only 13% of shores. In training sessions most surveyors have never heard of them or noticed them. So this figure is likely to be an underestimate where surveyors who have not had training may have missed them. Less common again were **honeycomb worm reefs** observed extending from rock and boulder outcrops on 4% of shores. While this worm is widespread it only builds reefs in a few areas. In some of these Coastwatchers have found them every year, while in others the reefs appear and disappear.

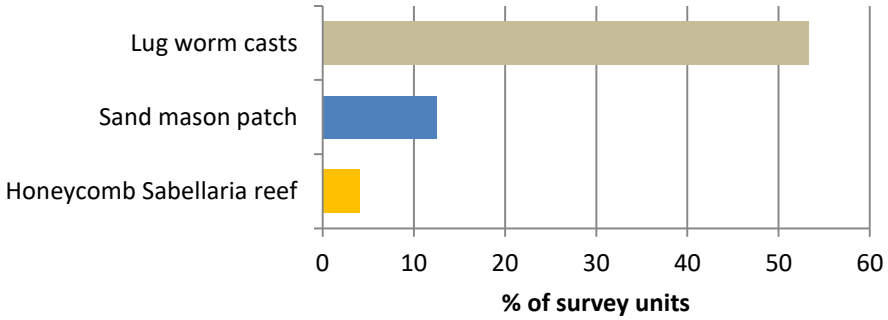
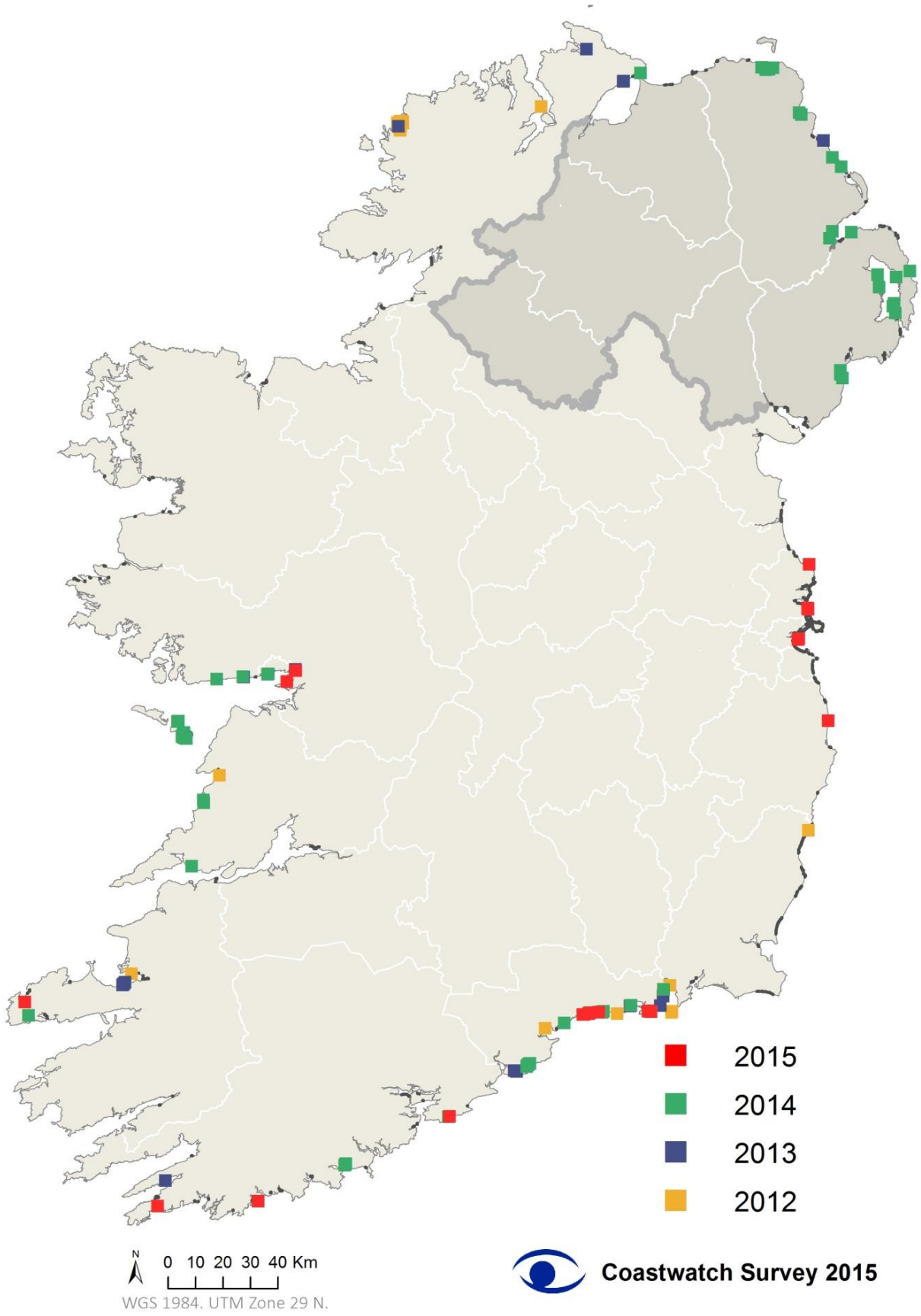


Photo XX Honeycomb worm frame building around bedrock. Photo Mary Looby survey unit 8 – 9 – 13 – 4.



Map XX – Honeycomb Sabellaria records over 4 years – verification in progress

The lugworm and bait digging

The way we manage the supply of this worm and his ragworm cousins to meet bait demands might seem a step too far removed from the MSFD, but we are putting it out as an example of human activity which impacts on at least 3 descriptors used in the MSFD to measure progress towards Good Environment Status of our seas.

Lugworm are like earthworms on land – an important component of the muddy sand shore. They are also food for fish like flounder and plaice who catch the tail as the worm pushes up its squiggly poo. They are valued bait for angling, sold in angling shops and dug by both commercial bait diggers and recreational sea anglers.

Poor digging practice without back filling, digging in highly sensitive areas like intertidal seagrass beds where lugworm can occur and digging an area too often can all effect lugworm populations, sea floor integrity and the status of habitats and species in the area.

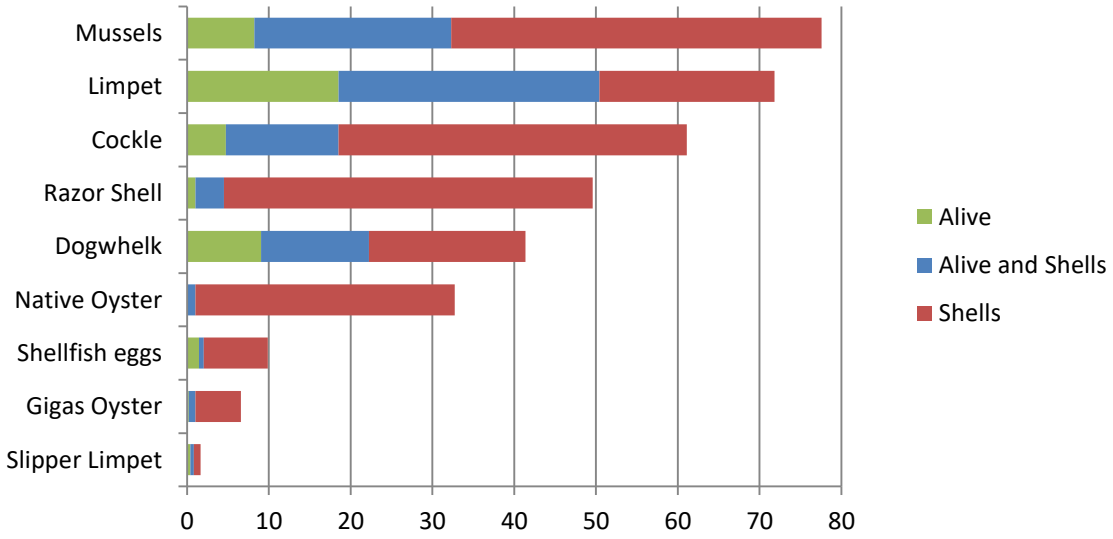
One area where the shore looks like a moon landscape is the Bull Island lagoon near the wooden bridge, another is Bannow bay, Co Wexford where the proximity of the shore road makes for easy access. At present bait digging is carried out without requiring any kind of permit of license. There is no closed season (when the lugworm is spawning) and no way to control how or where it is dug.

Our recommendation is to address this seafloor damage and lug population drop caused by too much digging and poor digging practice, digging in protected site

Measures proposed:

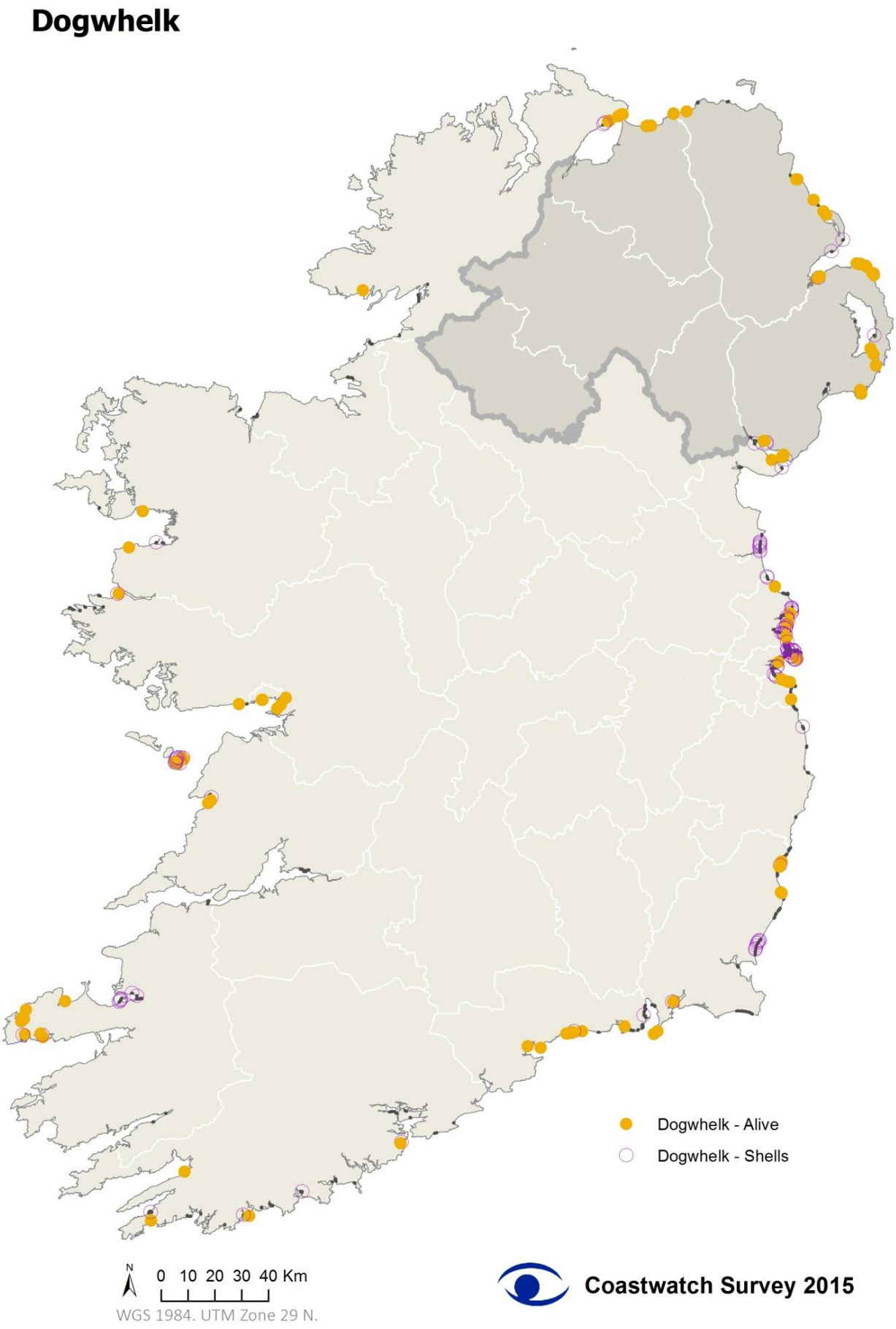
1. Introduce a well consulted and enforceable bait digging license requirement. The license should set out the closed season and back filling as condition. Bait diggers must carry the license with them.
2. Introduce closed areas with no digging, so we have control areas which can be studied for lugworm density and reproduction as well as hotspots for other species to feed in.
3. Explore supplementing the bait market with alternative worm and bait sources including worm aquaculture already successfully running in the UK. This should be open to EMFF co-funding.

Molluscs

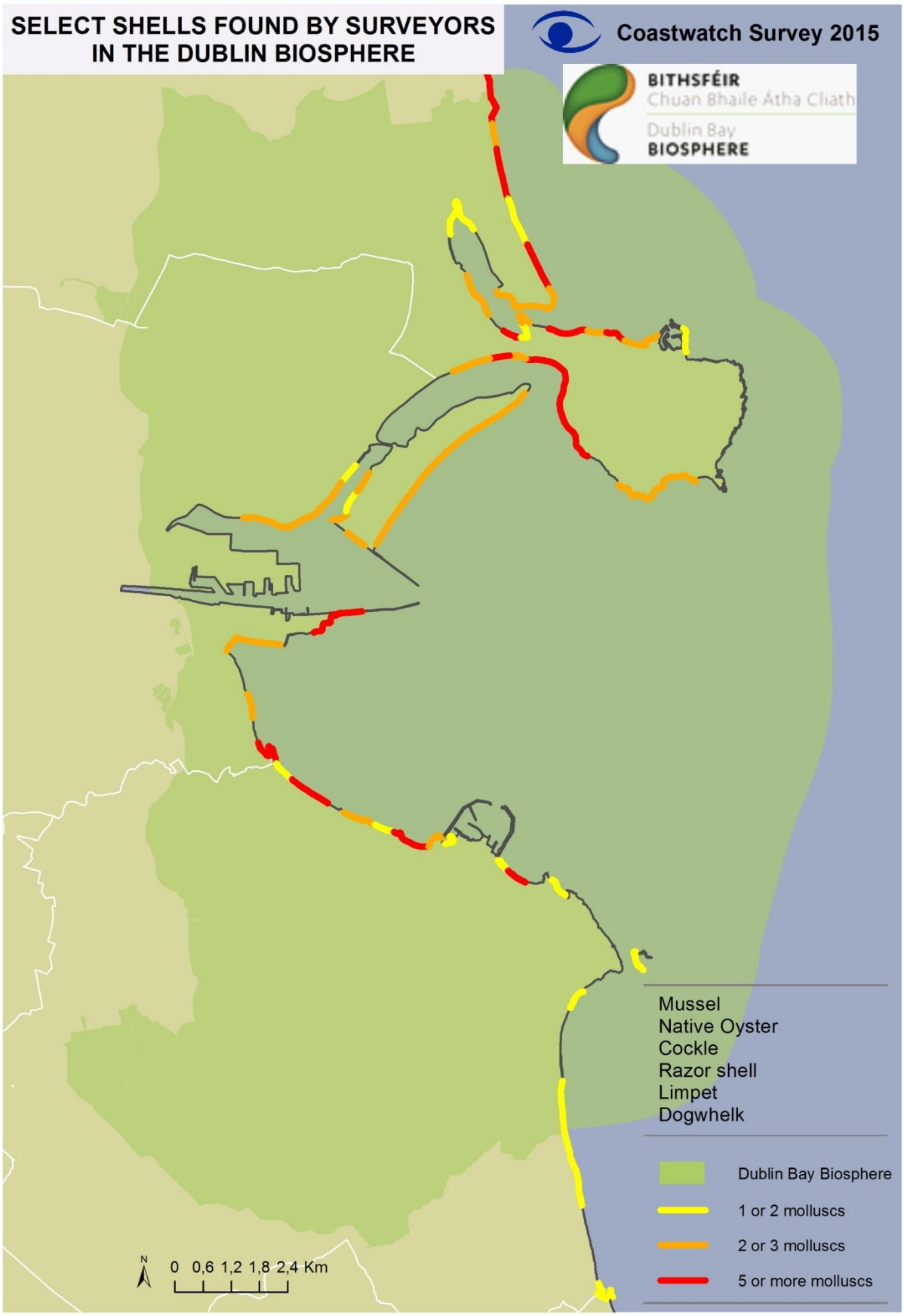


Live and dead molluscs (sea shells) were the next most frequently observed live on our shores – after sea birds.

The species then looked at in more detail are related to MSFD descriptors: The Dogwelk as contamination indicator



Seashells in Dublin Biosphere: map showing diversity of shells.



Invasive Alien Species

Invasive Alien Species (IAS) are animals or plants that are introduced intentionally or accidentally into a natural environment where they are not naturally found, and where they spread with serious negative consequences for their new environment.

On 1st January 2015 EU Regulation no 1143/2014 of the European Parliament and of the Council on "the prevention and management of the introduction and spread of invasive alien species" came into effect. The regulation "seeks to address the problem of alien invasive species in a comprehensive manner so as to protect native biodiversity and ecosystem services, as well as to minimize and mitigate the human health or economic impacts that these species can have".

Prior to the Invasive's Regulation tackling the problem of IAS had come under the scope of the Habitat's Directive. NPWS and the Northern Ireland Environment Agency set up "Invasive Species Ireland" as a joint venture to tackle the threat of IAS in 2007, which ran unti 2013? The Invasive Species Ireland project is still an important souce of information (for identification etc) and an important place for reporting sightings (see below).

One of the most difficult parts of adopting the EU Regulation is agreeing on the species that should be included. This task has fallen to the Scientific Forum on Alien Invasive Species, a European Commission Expert Group set-up to provide scentific advice for the application of the Regulation. A draft implementing act including the first list of IAS of Union concern is to be completed by January 2016. The Regulation on Alien Species in Aquaculture (Council Regulation No. 708/2007) unfortunately allows the spread of some species that are invasive due to their commercial importance.

IAS have become a well known issue in Ireland in recent years, with the problem of Rhododendron in Killarney National Park, Giant Rhubarb on Achill Island and Curly Waterweed & Zebra Mussel's in Lough Corrib grabbing the attention of the national media. Coastwatch started reporting IAS as a separate entry in the 201? survey as IAS had started to appear more regularly in previous years. IAS are seen as a threat to native biodiversity and warrant corrective action to prevent their further spread.

If you find IAS what do you do?

The first thing to do if you see something you suspect to be an IAS is to try to identify it correctly. Even if you are unsure of this you should then try to report it. The Invasive Species Ireland website (www.invasivespeciesireland.com) has a link on its homepate for Alien Watch, where new sightings are reported. Inland Fisheries Ireland (IFI) has an app for Apple and Android phone – IFI Invasives – where you can take a photo and give a gps co-ordinate if you spot an IAS whilst out and about. This is a great tool for correctly identifying specis and reporting them while on the go. Alternatively you can report sightings to the local Biodiversity Officer in your Local Authority, or directly to NPWS.

The key to combating invasives is early detection, as this gives the best and most cost-effective change of dealing sucessfully with the problem. Once an IAS becomes more established it is much more difficult to bring under control. Not to mention more expensive! Therefore it is vital that early detection is reported to give us a chance to combat the problem.

Many IAS can spread through water (from the rhizomes of Japanese Knotweed to the Slipper Limpet) so the coastal area is an important zone to be aware of IAS.

What Invasive Alien Species were found during the Survey 2015?

IAS could be recorded in the following seven areas of the Survey:

Inflows: Q.B2 - IAS for each of the 4 Inflow options
Intertidal: Q.D3 – Cord Grass (Spartina)
Q.D4 - Any new or recent species of animal, plant, or seaweed?
General Observations: Q.F4 - Evidence of Serious Risk – IAS

The Extra Questions on Biodiversity also had Gigas Oyster and Slipper Limpet options, but these figures are not considered for this draft. As these findings would be hugely significant we would like to verify these first. However it must be noted that the initial finding of 32 units with Gigas Oyster had 5 alive, and of 8 units with Slipper Limpet 4 were recorded alive. These figures if confirmed are very worrying. The Gigas Oyster is not supposed to reproduce in the wild. If it establishes in the wild it could threaten the existence of the native oyster (Ostrea edulis) and other native organisms with whom it would be competing. Like other IAS it would have a competitive advantage over many of the other native species.

In total 50 of the units surveyed mentioned IAS, with 36 respondants listing these as Serious Risk to the Survey Unit. 47 Units had Spartina recorded, although this was not necessarily identified as an IAS and many did not identify it specifically as an Invasive. 41 of these Spartina recordings did not mark it down as invasive anywhere else on the survey. Spartina has been here so long some consider it naturalised. The list of invasives found throughout the survey is below:

New Zealand Flax (Phormium tenax and P. colensoi), Cord grass (Spartina), Sea Buckthorn (Hippophae), Giant Rhubarb (Gunnera tinctoria), Japanese Knotweed (Fallopia japonica), and Wire weed (Sargassum muticum) were all recorded in more than one unit.

Slipper Limpit (Crepidula fornicata), the Carpet Sea Squirt (Didemnum vexillium), Nightshade (Solanum nigrum) and Duckweed (Lemna minuta?) were recorded in one SU each.

Invasive Alien Species in more deail:

Japanese Knotweed (Fallopia japonica) – an established Invasive and a detriment to both marine and terrestrial habitats. It can vigerously outcompete native plants, damage hard surfaces including foundations, and can block up rivers and outflows causing flooding and sedimentation impacts. Japanese knotweed can spread through even tiny fragments of its rhizome or small segments of stem, meaning it is often spread by mistake. Rhizome and stems that are washed downstream in water can also recolonize, meaning watercourses are a clear pathway for its spread.

Cord grass (Spartina anglica) – an established Invasive plant that is particularly destructive around coastal areas. It was originally planted in Ireland to help stabalise dunes, due to its deep root structures. Unfortunately it is often found in the same area as Salicornia mudflats, where it can be detrimental to the proliferation of the native sea grass beds. It is therefore designated a significant invasive on the Most Unwanted list (www.invasivespeciesireland.com/most-unwanted-species/) and all sightings should be reported on this website.

New Zealand Flax (Phormium tenax) – long established in Ireland, this was planted as a wind break along the coast at least as far back as the mid 19th century. It is found mainly on the south, south-west and west coasts, as well as in gardens throughout the country. Due to its size it is used in gardens for privacy and shelter. Unfortunately its high tolerence to exposed conditions and ability to grow in many soil types means once it excapes the garden it can thrive in the wild. Here it may outcompete other native plants not quite as robust. Not considered truly invasive it is a species to closely monitor due to these characteristics.

Giant Rhubarb (Gunnera tinctoria) – another extablished Invasive, Gunnera has escaped from gardens where it was planted for its architectural features. It is a large plant that can outcompete other natives, literally putting them in the shade! It grows vigerously through its rhizomes, which like Japanese knotweed can spread if even a tiny portion is disturbed. Both plants also can lie dormant in the rhizome for anything up to 20 years, before resurfacing as new growth. It has caused significant problems on the west coast where it seems to thrive in the harsh, salty environment of the Atlantic coast. Achill Island in particular has had a terrible time trying to eradicate Gunnera which has threatened to take over much of the landscape there.

RESULTS PART 3: WASTE, LITTER AND POLLUTION

LARGE WASTE

The Coastwatch 2015 survey section E1 focuses on large waste. In this section surveyors are asked to note any of the eight different categories of large waste given found anywhere on their 500m survey units from the beginning of the hinterland to the water. The amount of large waste discovered is not quantified in section E1 of the survey however extensive large waste discovered can be mentioned in section F6 (comments or observations) of the survey along with any pictures taken.

There have been some changes in the waste categories introduced in 2014, with tyres added as 'large waste'. The 'large metal objects' category was subdivided into 'abandoned vehicles, girders, machines' and 'large aquaculture gear' which is usually broken metal trestles.

The graph below shows the percentage of survey sites where large waste was discovered in each category.

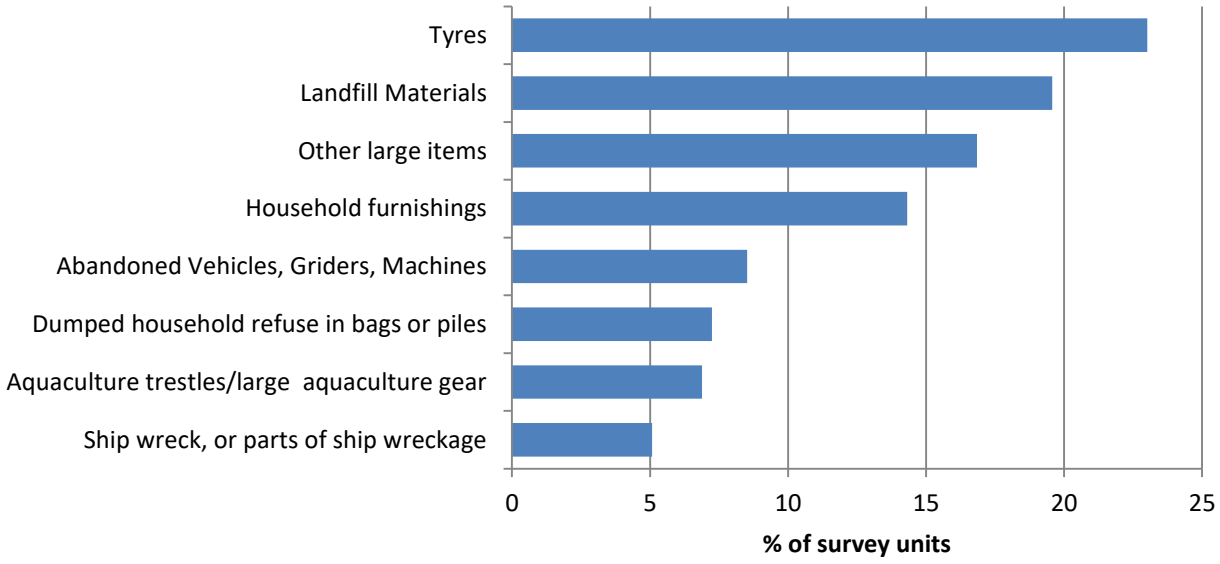


Fig XX- Percentage of survey units where large litter items were recorded by surveyors. (N=552 s.u. Question E1)

The graph shows that the highest percentage of large waste material discovered was tyres found in 23% of sites. This is a concern as tyres are a priority waste stream under the EU waste law. In 82 out of the 127 sites where tyres were present surveyors gave a count amounting to 377 tyres. Additionally one surveyor in Wexford commented that there were '150 approx. visible lines on Google Earth'. The second largest discovery of large waste made was landfill materials at 19.5%. Landfill materials have been raking in the 2 first positions in the large waste category for a number of years.

The two lowest recording findings of large waste items during the Coastwatch survey included ship wreckage/parts of wreckage at 5% and aquaculture trestles/large abandoned aquaculture gear at 6.8%.

The waste category of landfill materials, when discovered during the Coastwatch survey, sometimes need be followed up with a further examination of the site depending on the severity of materials discovered during the survey. With 19% of survey units showing evidence of landfill materials present it is clear that the presence of landfill materials along the coast is one of the biggest issues when it comes to large waste materials. Perhaps the survey unit containing the greatest extent of landfill materials present was at survey unit 8-4-11-4, a 500m stretch of coast adjacent to Irishtown Park in South Dublin Bay. Wave overtopping and/or storm tides appear to have moved rock armour and earth holding in the long closed Ringsend urban landfill site, exposing and removing underlying waste in three separate places.

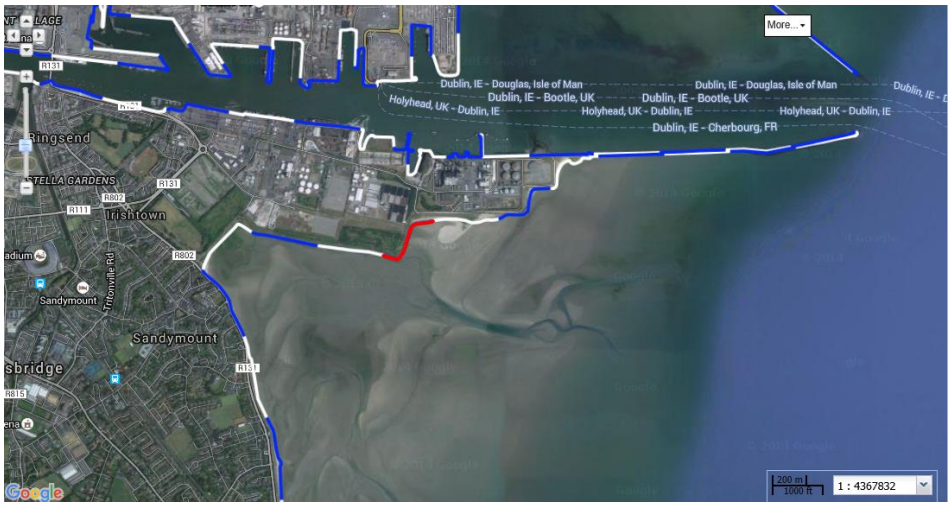


Image 1- Showing the survey units containing large areas of exposed landfill material at Ringsend, Co. Dublin.

As the result of a follow up report on the exposed landfill material at Ringsend it was discovered that the cause of the landfill material being exposed was because of the slumping of the rock armour currently in place along this survey unit.

Image 2A and 2B- Showing the extent of landfill materials being dragged out to become marine litter as a result of wave action.

2. LITTER COUNTS

Litter counts are well established in citizen science. Coastwatch has included litter counts since 1989. From a year on year comparability point of view one would keep the same count method and items. However our litter changes, mirroring new packaging, changes in land and sea use. Coastwatchers are therefore asked periodically would they prefer to keep established methods or propose/adopt any change. This is done both as All Ireland and wider European review.

In 2014 after such review, litter counts were changed in both items included and method.

Items: The drinks container group – plastic bottles, cans, tetra packs and glass bottles were maintained, but instead of six pack holders, bottle lids were included as another drinks container linked count item.

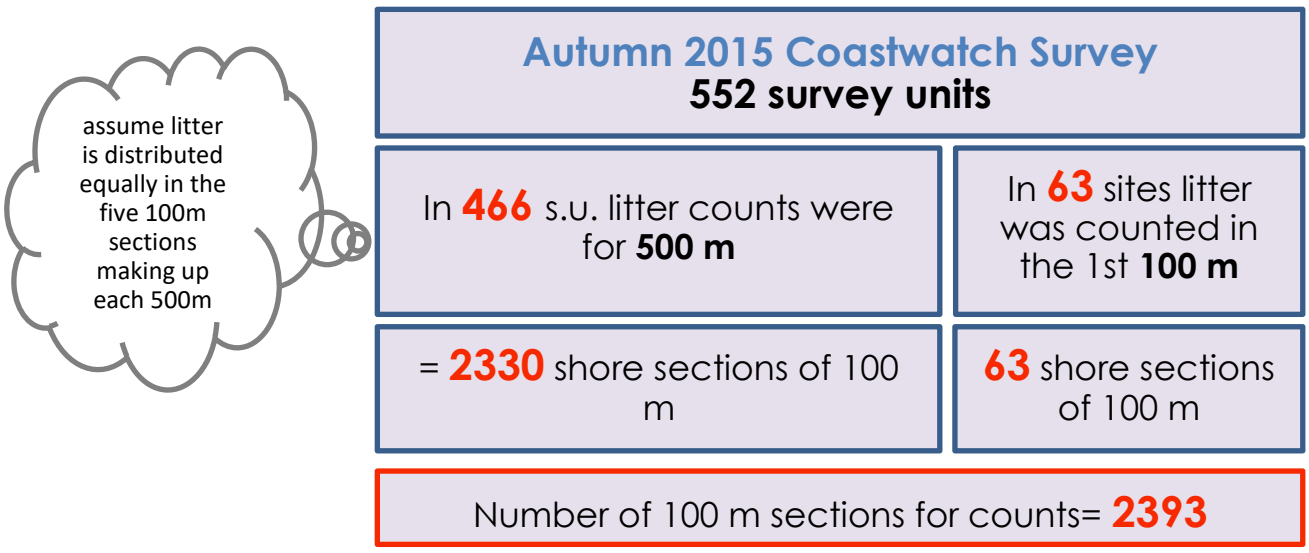
The plastic bag count was kept, but instead of counting tyres, a count for lighters was added. As before an open field count option was maintained to pick up litter types noticed by surveyors as on the rise or locally troublesome.

Length of shore: The standard Coastwatch survey and counts has been over 500 m of shore from hinterland to water's edge. However as the new standardized Marine law litter descriptor count is for only 100m shore stretches and as on littered shores a shorter count distance is welcomed by surveyors, we proposed a change to 100m section counts. The reaction was so strong and mixed that we decided to run with both and defer a decision until we saw the outcome of the 2014 results.

For anyone counting only 100m of their 500 m unit, the instruction and training highlighted that the first or last 100 m in a survey unit were to be marked out, to avoid a particularly clean or dirty areas.

All Ireland 2015 results

This year 84.4% of surveyors stayed with the old 500 m shore length for their counts, 11,4% counted litter was counted only in the first 100m and 4.2% indicated they hadn't been able to count the litter items. To use results from both shore lengths counts it was decided to break the 500m counts down into 5 sections of 100 m length and assume the litter was spread equally between them. Then add these to the survey units where only 100m counts were undertaken. This yielded **2393** survey sections of 100 m length with litter counts.



As explained earlier, surveyor were asked to count seven types of litter – that is 4 drinks packaging items described by material, bottle lids/caps as well as lighters and plastic bags. Additionally surveyors were invited to count other common litter found in their s.u. This can be used to monitor new types of litter that become more abundant which can lead to addition or substitution of a new item in a the litter count in subsequent years.

As in previous years the drink containers were the most abundant with a total of 20283 items counted: 9283 plastic bottles, 5762 cans, 2876 lids/caps, 1341 glass bottles and 1057 paper tetra-pack. Additionally there were 1240 plastic shopping bags and 212 lighters counted. Figure XX clearly shows the plastic bottle as the dominant litter.

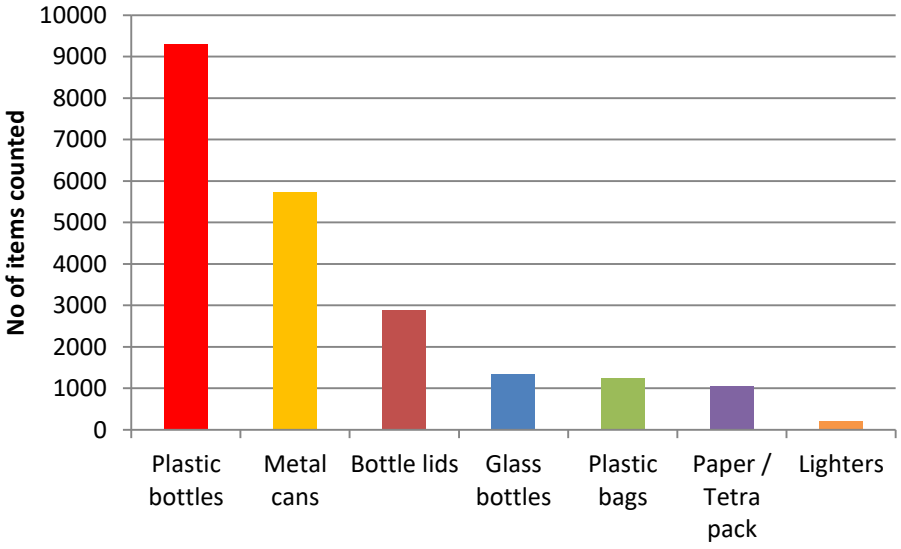
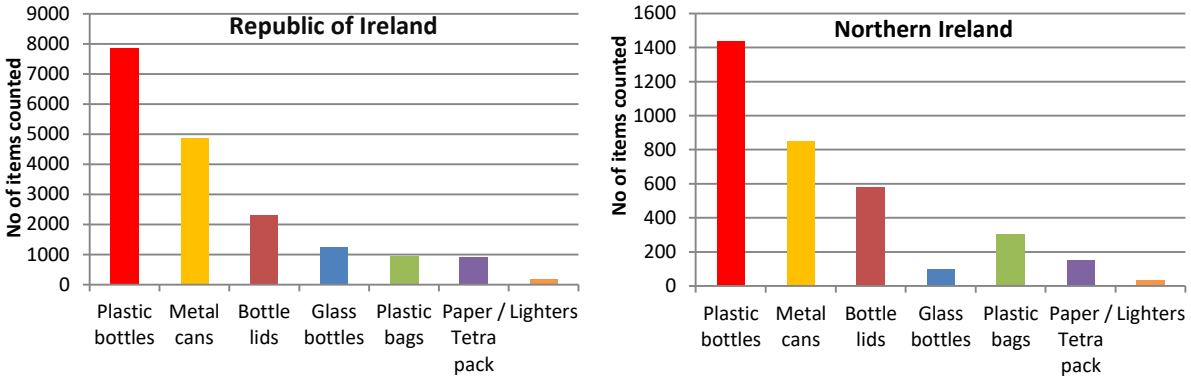


Fig XX All Ireland Litter counts on 2393 one hundred meter shore sections 2015 autumn survey



FigXX Litter counts separated for Republic of Ireland (2050 one hundred meter sections) and NI (343 one hundred meter sections)

Distribution

The figure XX below represents the presence/absence of these types of litter. Plastic bottles were found in 82% of the sites surveyed. Cans are also widely distributed all over the coast appearing in 68% of the s.u. And while the number of plastic bags and glass bottles is much lower they are fairly well spread around all Ireland being found in over 40% of the sites.

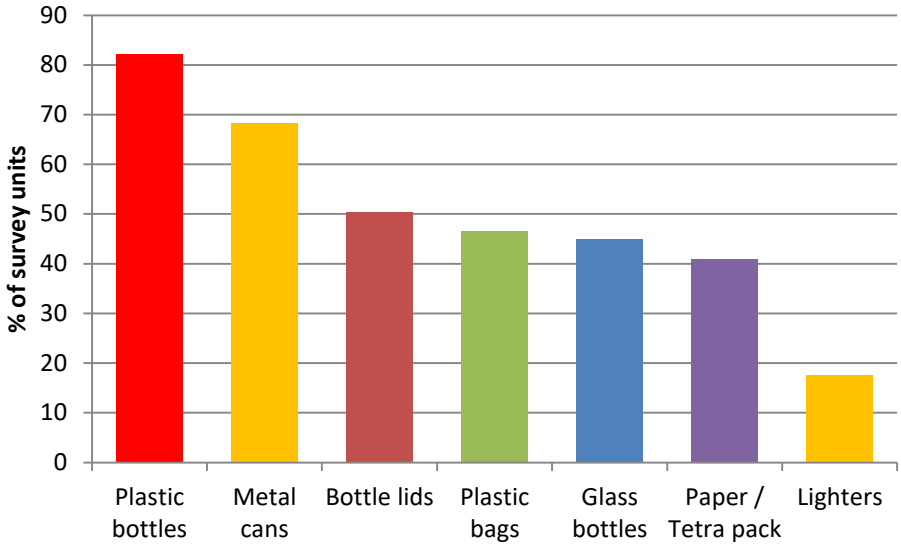
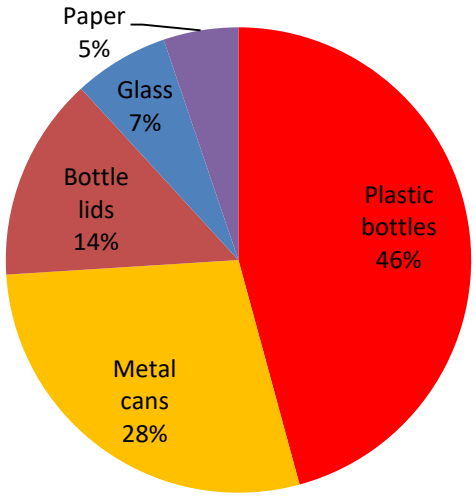


Fig XX – Percentage of survey units where each type of litter was present (N=552 s.u.)

Drinks containers

Separating the drinks container litter from the other 2 categories (lighters and plastic bags), figure XX below shows, plastic made up the majority of drinks container packaging (both in in north and south). Plastic made up 60% of the drinks container litter - plastic bottles (46%) + lids (14%) - followed by metal cans with a 28%.

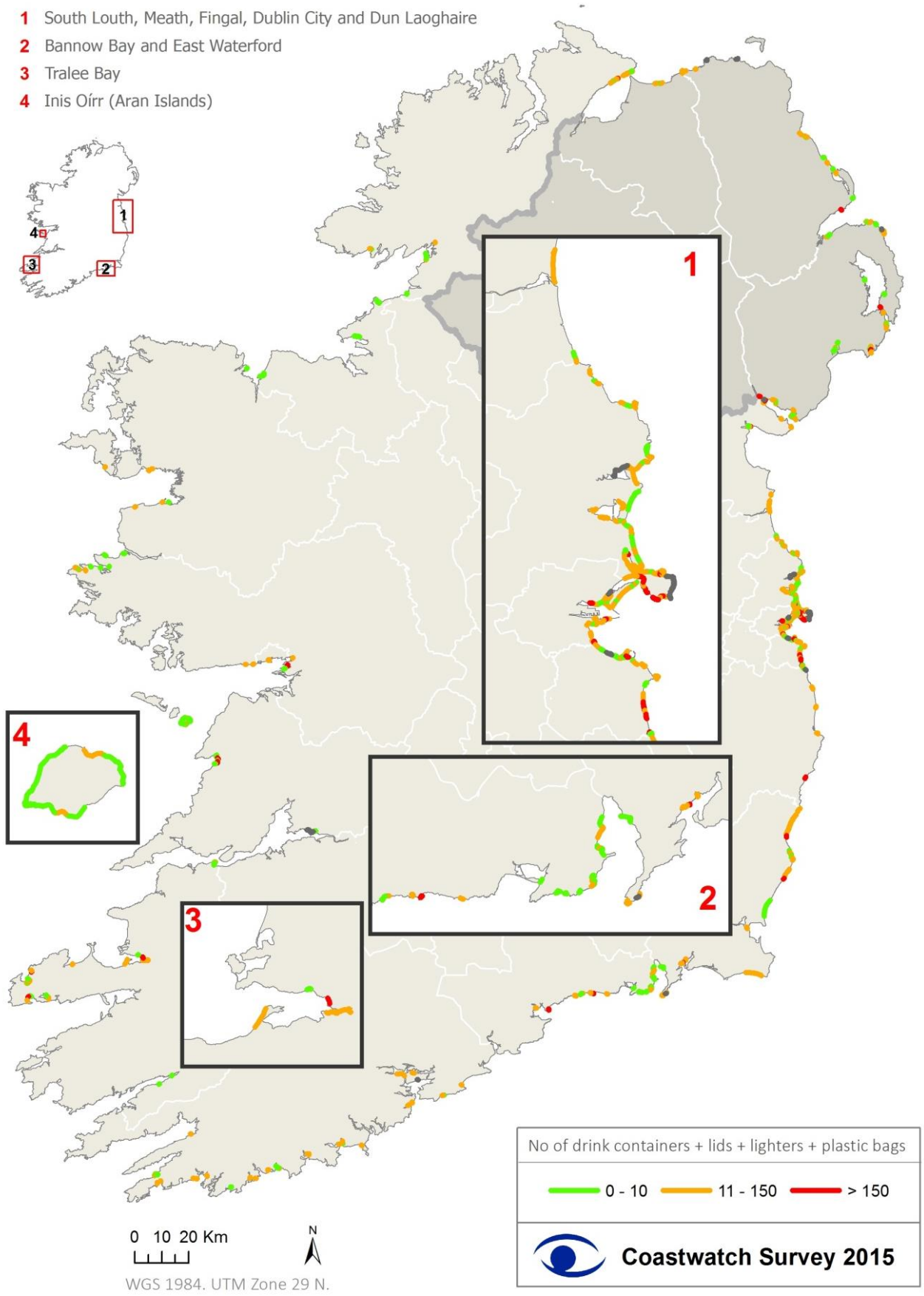


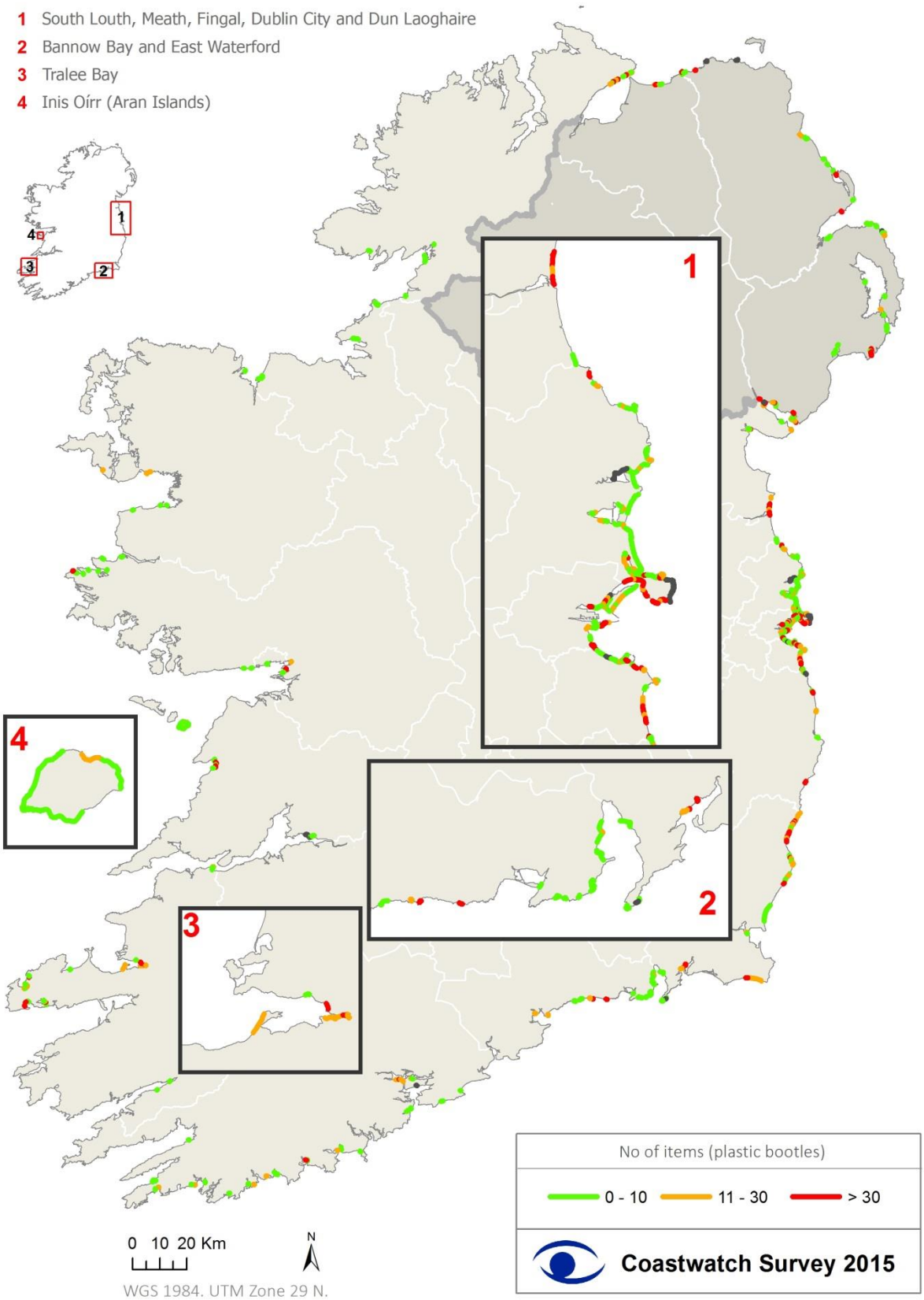
Litter mapping

In an effort to visualize the level or littering with the counted consumer waste survey units were divided into three cleanliness groups (using the number of items counted per 500m): 10 or less items counted, 11 to 150 items and more than 150 items.

Map XX shows that taking the basket of 7 counted litter items, the majority of surveyed shores are coloured orange (57%) with litter counts between 11 and 150 items per 500 m survey unit. The density increases around urban and estuarine areas as well as deposition shores where the sea can unload litter from a large sweep of the ocean. The higher consumer litter concentrations around urban centres is predictable. Additionally most town are on rivers and so here the riverine litter load mixes with that of the shore users and what winds may have funnelled from the sea into an estuary.

LITTER COUNTS Drinks containers, lids, lighters, and plastic bags





Map XX shows plastic bottles distribution in 500 m survey units presented in 3 densities: 0 to 10, 11 to 30 and more than 30.

Plastic Bottle counts over time: The plastic bottle count started in 1991 and if plotted over time shows a lot of variation in Ireland. However there is a general upward trend until 2005 with a decrease since then – see Figure XX. In 2015 the total number of plastic bottles was 9283 in 2393 hundred meter sections giving an average count of 3,88 plastic bottles/100 m, or to compare to previous years expressed as 19.39 bottles per 500 m s.u..

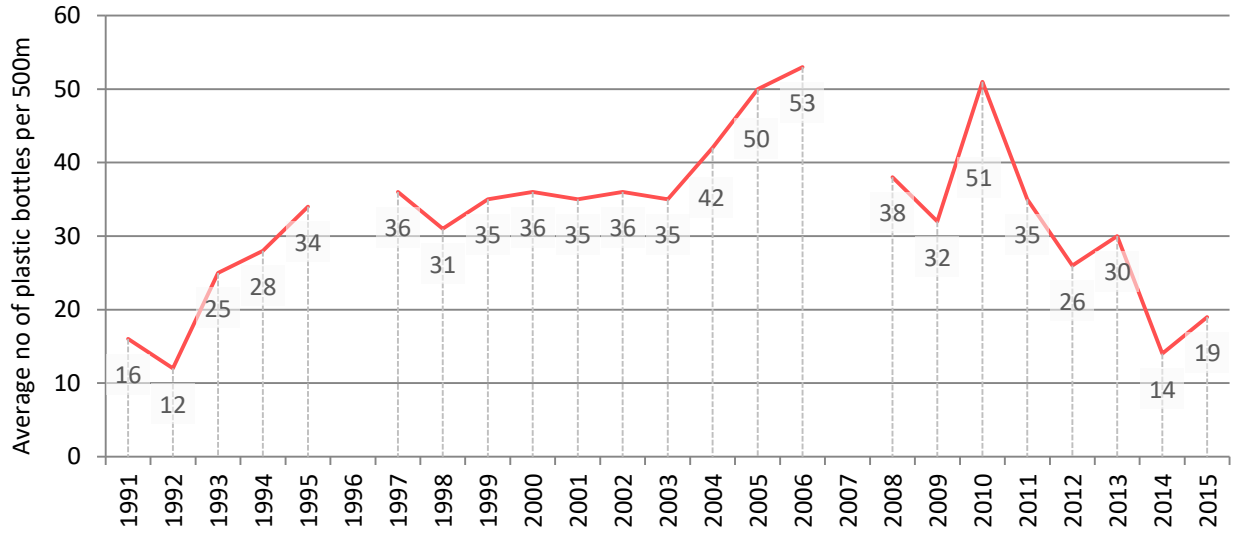


Figure XX Plastic bottle counts per 500 su over time – Coastwatch survey 1991 to 2015

When separating North (20.9 bottles/500m) bottles and South (19.15 bottles/500m

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.zerowasteeurope.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 carried for some distance.

2. One-way with deposit – bottles/cans are used only once, the producer can get back the materials or they will go directly to the recycling company which produces new bottles or cans which then need to be refilled and transported back to the customer. Still aiming for zero litter but a higher environmental impact than the first option where the remake of the container requires a high temperature.

3. One-way without deposit – bottles/cans are used by the customer, the producer may pay a fee to an organisation to handle the waste and most of the material is down cycled in mixed Green bin loads. Only a fraction of the material is recycled. The empties have 'no value' and thus there is neither an incentive to avoid littering nor to pick such containers up. This is the option we have now in place in Ireland,

introduced when speed, mechanisation and obsolescence stood for 'modern' and it was the cheapest option for producers.

When 25 years ago our Coastwatch surveys started, oil prices were low, carbon emission 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. 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. While Ireland has not gone that way yet, further research by Coastwatch on public acceptance of a deposit on return system carried out in 2013 suggests that there is a strong public backing for such a scheme, with 89% of those asked in favour (Dubsky et al 2013).

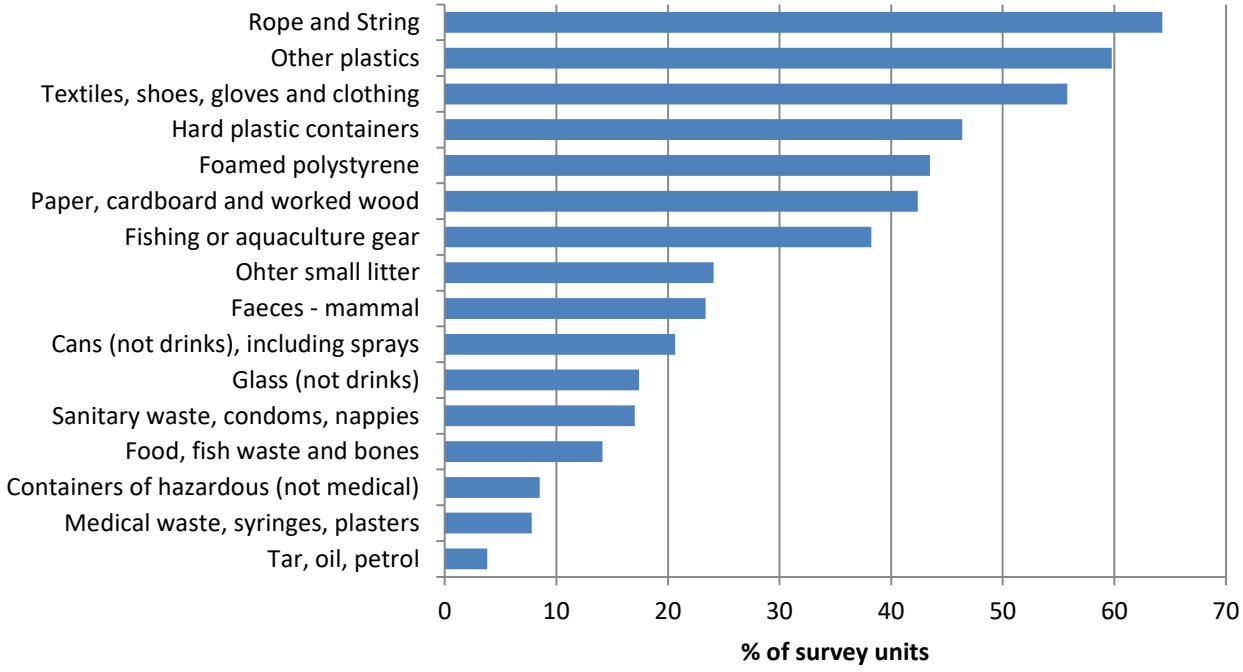
3. Small litter

General litter was a broad sweep across many types of litter, some of which surveyors would have recorded right from the start of the Coastwatch Europe survey in 1989. As part of the litter section review this year, one extra category was added: rope and string as noted by surveyors to be very common and hidden within other categories up to now.

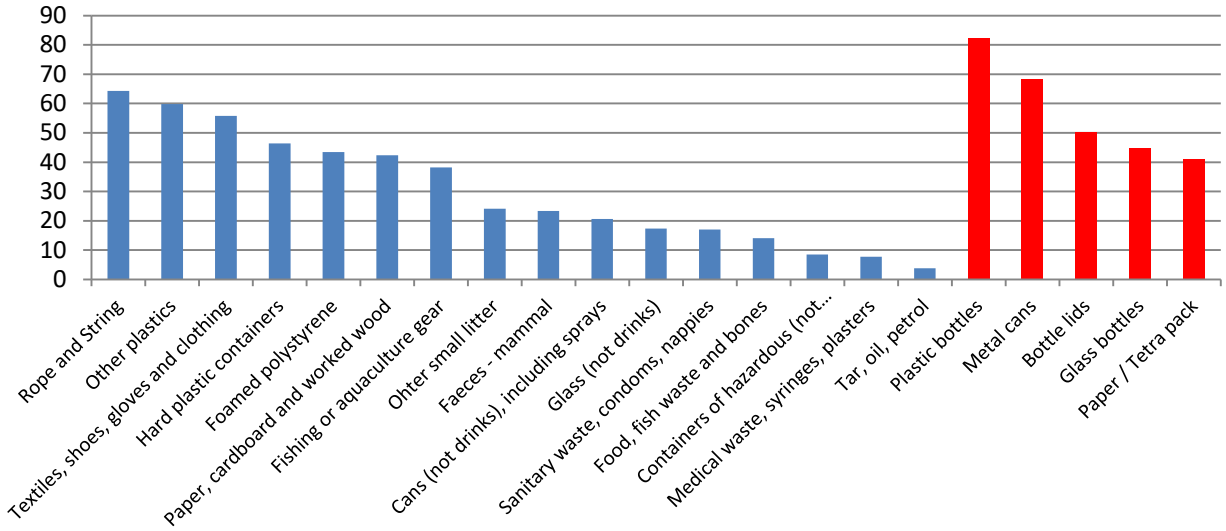
Surveyors were asked to walk their shore from splashzone down to the water's edge and note presence/absence of 15 categories of smaller litter items, as well as oil and tar pollution. Figure XX below shows results graphed as percentage of survey units in which a given litter category occurred.

The new rope and string category was the most common noted on 64% of the 552 survey units (this category was introduced in 2014 when it also ranked first with a 60%). Only plastic bottles and cans in drinks containers reported on above were more common.

Rope was followed by other plastics (60%), textiles (56%) and hard plastic containers (46%). With a presence in 43% of the site polystyrene seems to be increasing over the past few years. The fishing litter, which includes traps, nets, angling waste and aquaculture waste, has gone down in the raking. That is partly because in 2015 rope and string was made into a new category.

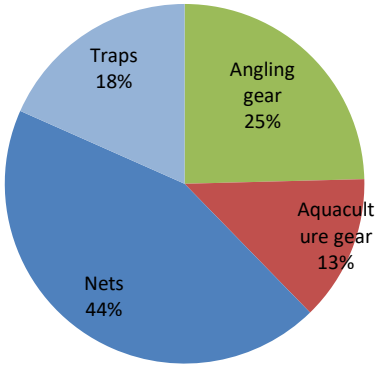


If we add in the drinks containers we can get a better idea of the distribution of all the types of litter on our shores with drink containers and plastic as the most predominant.

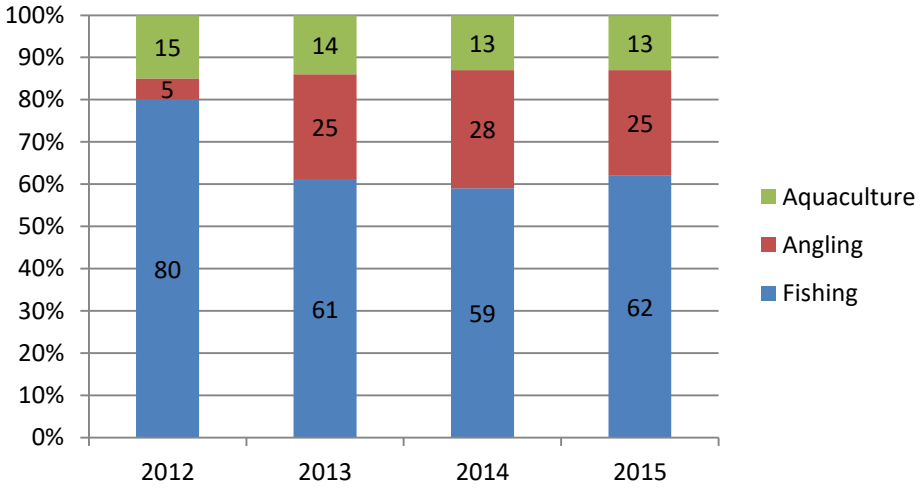


Fishing, angling and aquaculture litter

In 2015 there were 211 sites with some sort of fishing or aquaculture gear reported. Surveyors were invited to further identify the gear. The results show that the majority were general fishing waste (nets 44% and traps 18%), followed by angling (25%) and aquaculture gear (13%).



If we pool the traps and nets into one fishing category we can compare the relative contributions of the 3 different sources in the last four surveys (figure XX below). The distribution has been quite consistent, with fishing waste as the main contributor. The variation of the share of angling litter (much lower in 2012) might be caused by surveyors staying out of angling spots.



4. Micro litter

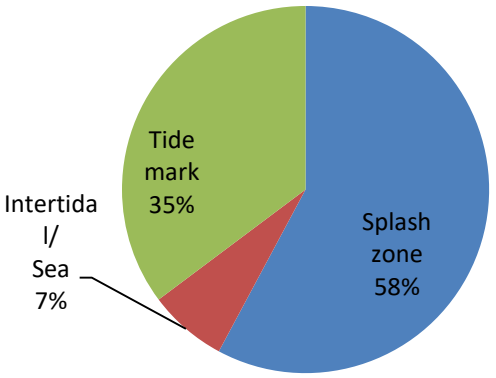
After large and general litter, surveyors are asked to look out for meso and micro litter (up to 1cm - small but well visible by naked eye) on their shore. This follows a two year period (2012 and 2013) when surveyors were asked to take micro litter samples if found and the analyses of these. In 2014 a number of micro litter university research projects had commenced and it was no longer considered useful to use scarce Coastwatch resources in this area. However it was important to alert surveyors to this litter and hence the question was included. Responses were entered for 420 of the 552 survey sites. Of these 73% didn't see any micro litter and 27% did. We cannot tell how accurate this, but can say with certainty that at least on 115 surveyed shores there was small litter present and in at least some cases there was lots. We did not provide surveyor with sampling containers nor did we hand out or suggest use of magnifying glasses. This means that no data regarding the characteristics of such types of litter can be presented. But from comments and team observations the identifiable small litter seen by naked eye was similar to that analysed on 2012 and 2013:

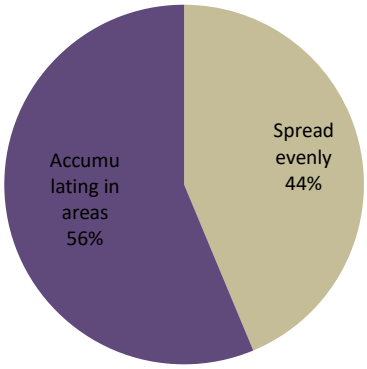
1. Fine plastic fibres from rope and nets, especially among seaweeds in deposition areas.
2. Polystyrene beads
3. Hard raw plastic pellets
4. Old paint flecks associated with harbours - e.g. Carlingford and Dun Laoghaire ice house pier

5. Looking back

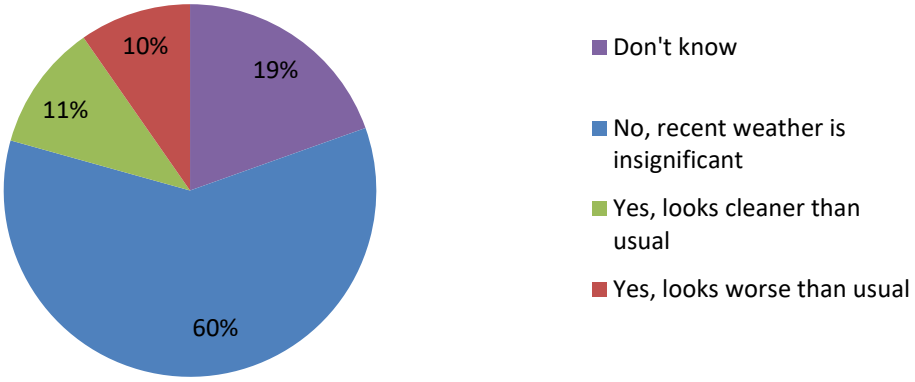
Asked which area of the shore was most littered, 58% had a most littered splash zone, followed by recent tidemarks which contain the most recent deposits. The intertidal and the sea were marked as the most littered mostly in harbours and urban estuaries.

In most cases the litter was accumulating in areas (56 %). The remaining 44% indicated that litter was spread more or less evenly throughout the survey unit.

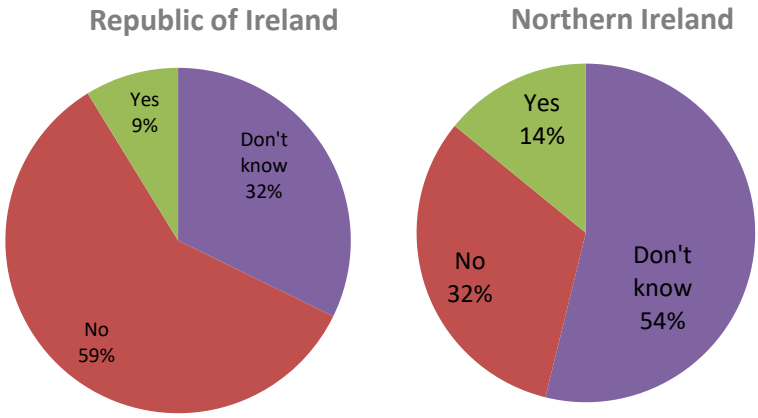




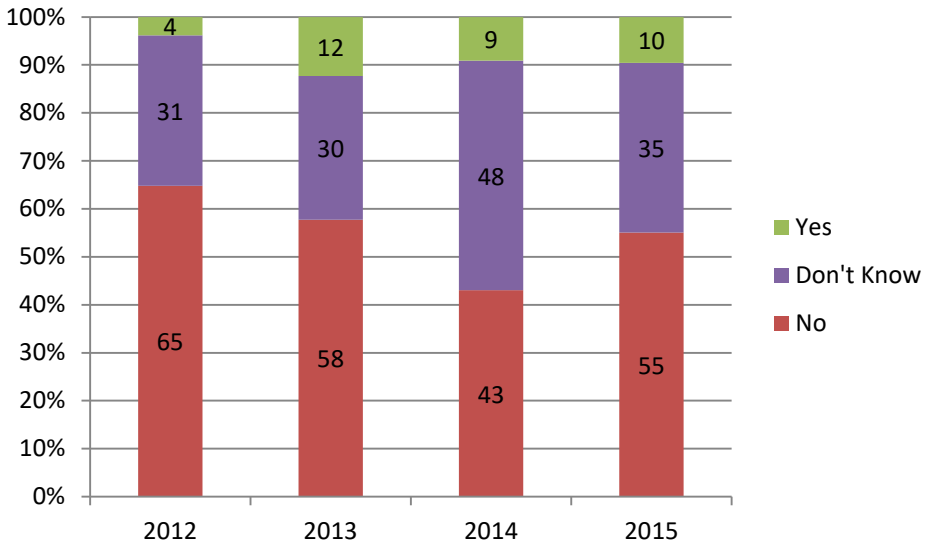
Volunteers were also asked if recent weather had made their shore look cleaner, more littered or if recent weather had had no effect. Around 21% considered that recent weather had changed the appearance of their costal unit in some cases making it more littered (10%) and in other making it look cleaner (11%). The rest either noted no recent weather role or didn't know the shore well enough to tell.



Shore cleaning: 10% of s.u. were known to have been cleaned in the week before the survey. In 2015 clean ups seem to be more frequent in Northern Ireland (14%) than in the Republic of Ireland (9%).



Over all, there has been a welcome increase in litter clean ups in all the Island of Ireland over the last years. Looking back at earlier surveys between 2-4% of shores were thought to have been cleaned in the week before the survey. After 2012 that figure has more than doubled.



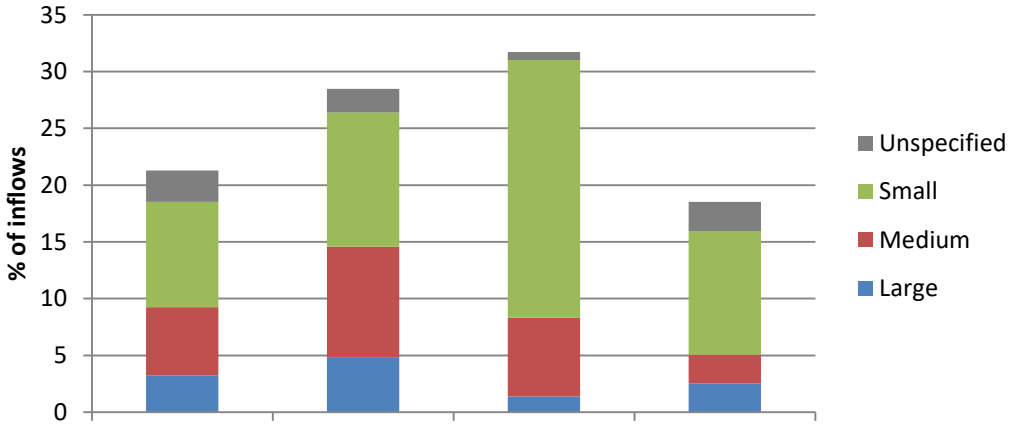
INFLOWS AND WATER QUALITY

The inflows section in the survey looked at four types, including 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.

The EU Water Framework Directive (which is also part of Irish law) 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 whatever action is needed. The condition of the inflows directly affects the state of the coastal waters as pollutants are carried downriver and into the sea.

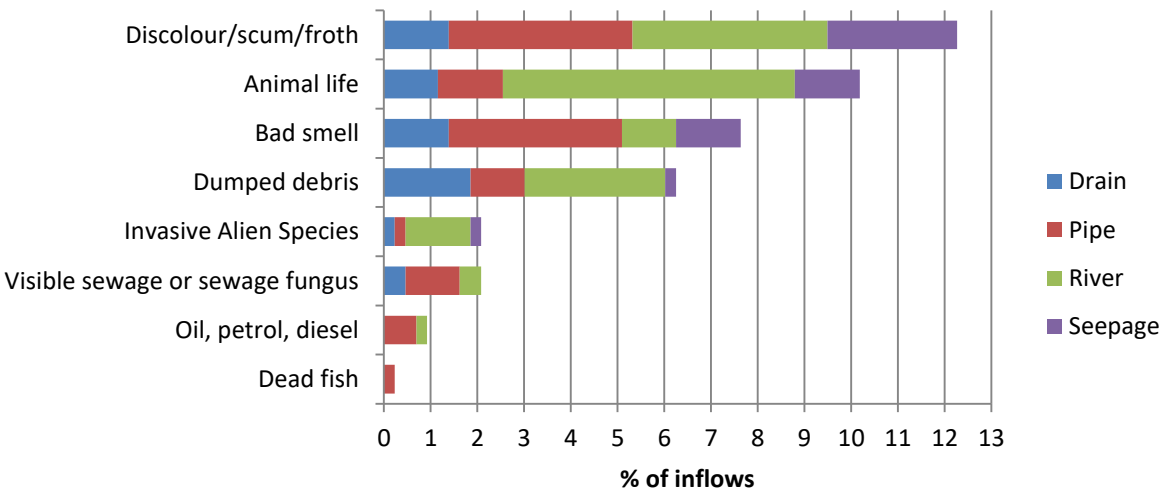
Characterization of Inflows

A total of 432 inflows were recorded this year in a total of 269 survey sites. The most common type of inflow recorded this year were rivers (32%). Most of them were small rivers. Piped inflows were the second most common making up 28%. 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. Drains and seepage made up the remaining 40% of inflows.



Water Quality Indicators

Surveyors were asked to examine any inflows and record potential and real signs of pollution listed - bad smell, discolour/scum, dead fish, dumped debris, sewage, oil and Invasive Alien Species. This list also included a box to tick if animal life was found in/on the inflow inviting surveyors to leave a comment in case they saw fish.



Discolour/scum/froth was the most common observation with 55 instances (12% of inflows) found. While discoloration can be a bad sign, it may also be an indication of recent heavy rain draining out to sea.

The next most common bad quality indicator noted was a bad smell with almost 8% of inflows affected. This is usually due to contamination from septic tanks, sewage treatment works or farm waste.

The worst inflows showed signs of 3 or 4 different types of pollution. There were 9 such cases. One single instance of dead fish was recorded near a pipe, which also had a bad smell, discoloration and sewage.

Nitrates

Nitrates and phosphates are the key nutrients which 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.

The EU Nitrates Directive (91/676/EEC) and national law N and S define waters 'polluted or liable to pollution' as: surface freshwaters with a nitrate concentration above 50 mg/l NO_3; all Ireland was designed as nitrate vulnerable area in 2001, requiring strict controls on the use of nitrate fertiliser. Since 1 March 2014 Ireland has been granted derogation for grassland farms, allowing higher amounts of nitrates application, but setting out additional nutrient management obligations.

The main consequence of this type of pollution is eutrophication, which means excessive algal growth – both opportunistic green algae and phytoplankton which is drifting as microscopic algal cells in the water column. This in turn decreasing water and oxygen levels in water. The response from a eutrophic ecosystem is a change in species. Our surveyors are reporting on presence of sea grass as sensate species which thrive on high nutrient levels.

Some surveyors had access to nitrite and nitrates test sticks and recorded water nutrient levels. Out of the 432 inflows record, 207 were tested. The results are shown in the graph below.

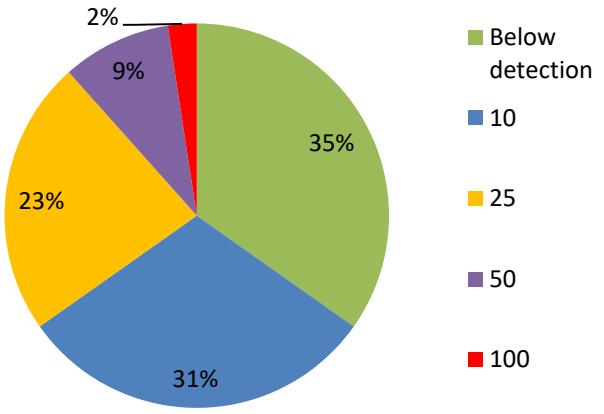
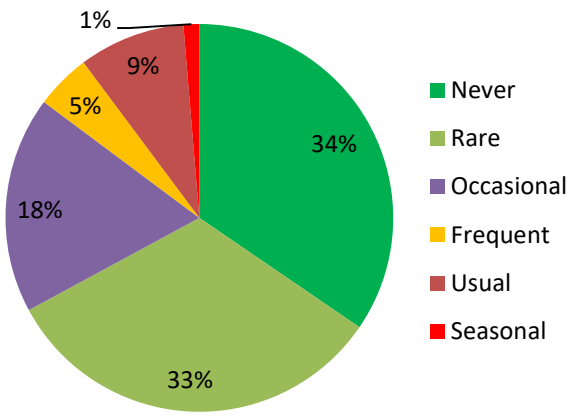


Fig XX – Inflows tested for nitrates. Nitrate concentration (mg/l NO_3).

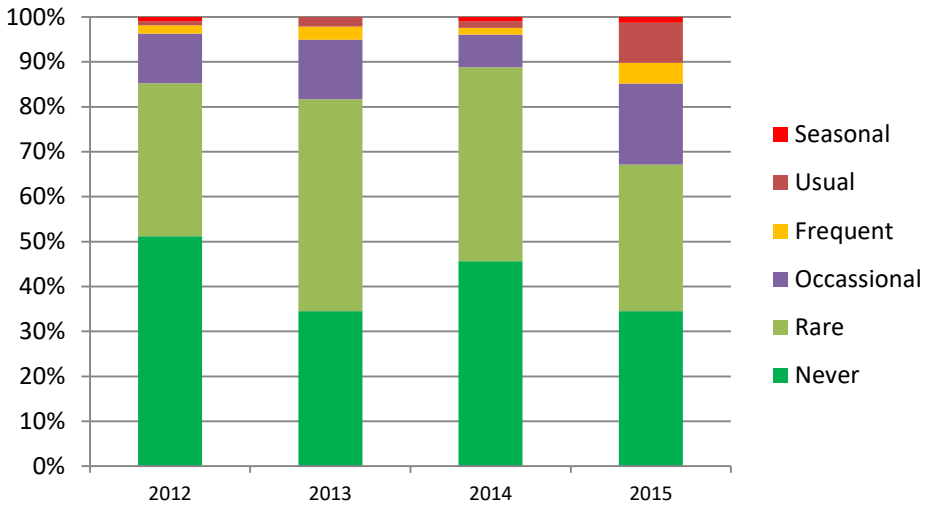
Most inflows had a level of nitrates either below detection (35%) or lower than 25 mg/l NO_3. While these are very good results we have to note that 23% were approaching the 50 mg/l NO_3 limit and 9% were in breach of this upper legal limit. Indeed 2% were so polluted with over 100 that they should be prioritized for source identification and clean up. These are almost identical to the results gathered in 2014.

Views on sewage pollution incidents

Surveyors who knew their area well were asked to respond to a question on frequency of sewage pollution incidents. We got 304 responses (more than half of the sites surveyed); the results are shown in the graph below.

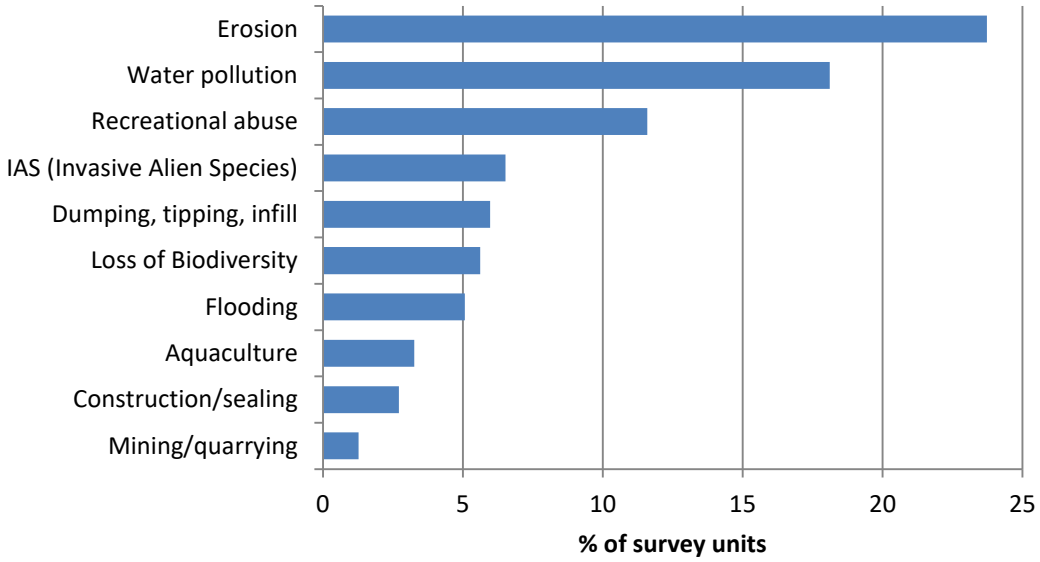


There seems to be an increase on the frequency of sewage pollution incidents perceived by surveyors. In the three previous years, in over 80% of the cases they said sewage pollution incidents were rare or never happened whereas this year the figure has gone down to 67% with a 15% indicating sewage incidents occurred frequently, usually or seasonally. This year there has been an over representation of the Dublin coast which might be causing this difference.



Threats

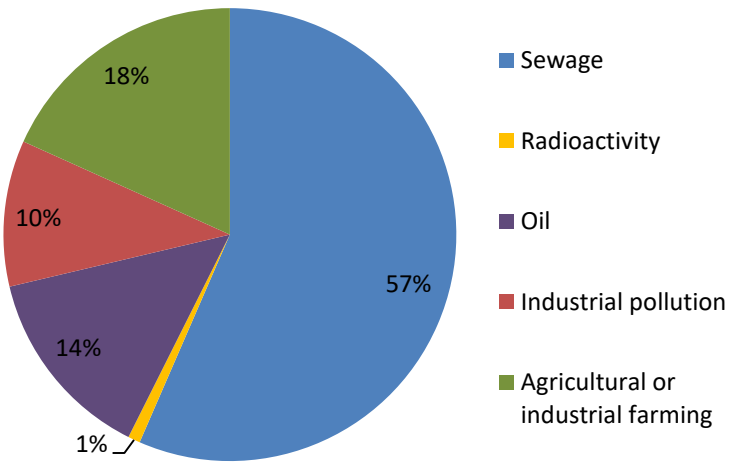
The survey question 'Tick if you have evidence of serious risk and/or imminent planned change for the worse from any of the threats/activities listed' consistently returns erosion as the highest threat. This year was no different. Erosion was cited as a serious risk in 24% of survey sites.



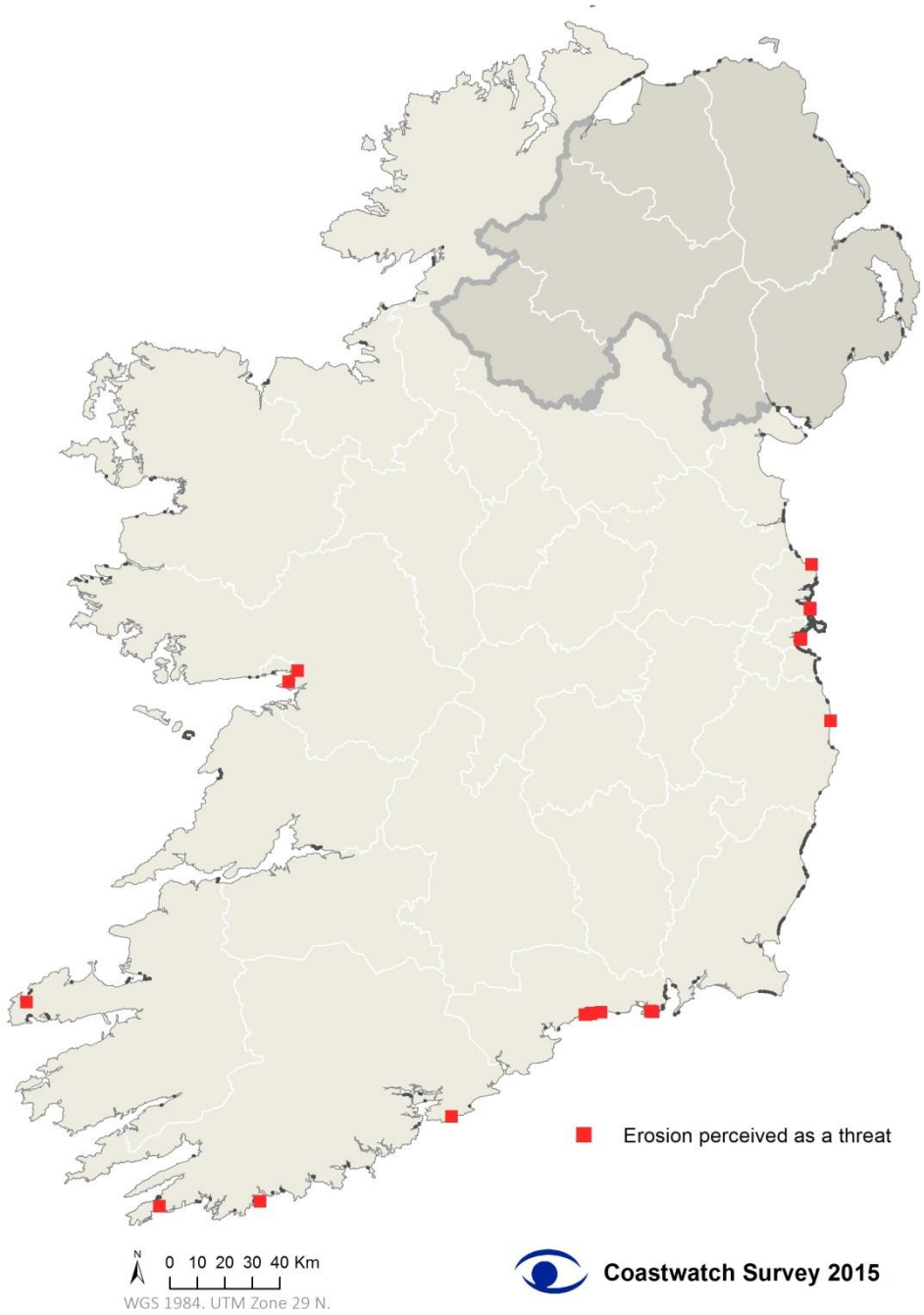
Erosion was perceived as a threat in 131 sites, of which 52 also were said to have some form of erosion control (walls, rock armour, banks…). Additionally there were 182 sites where a risk of erosion wasn't noted by our volunteers but that had some kind of erosion control (170 sites with hard erosion control).

Erosion threat	Hard erosion conrol	Soft erosion control	**Total no of s.u.**
X	X	X	13
X	X		35
X		X	4
X			79
	X	X	16
	X		154
		X	12

Water pollution was also a major concern in 18% of the sites. It was broken down into five categories, the most dominant being sewage followed by agricultural farming and industrial pollution.



Threat of erosion



Hard and soft erosion control