

CleanAtlantic

Tackling Marine Litter in the Atlantic Area

Identification of litter accumulation sites and clean-up
techniques on the Atlantic area coastline

Key findings of the online survey conducted in Ireland, Portugal, Spain and
United Kingdom



d-sidd



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SUMMARY

In 2020, Cedre launched at a French level an online survey on macro-litter on the coastline, as part of the Interreg Project CleanAtlantic. The survey, distributed to public establishment, local authorities and various other organisations such as non-governmental organisations of professional maritime associations, had a two-fold objective: (i) to map and characterise the main litter accumulation areas along the coastline and (ii) to review clean-up operations and good practices.

The results of this first survey focusing on France were reported in 2021 in a report entitled “Identification of litter accumulation sites and clean-up techniques on the French coastline” (Cedre, 2021). Following the publication of this first report, the study was extended in 2022 to the whole Atlantic area countries and the online survey was disseminated in Ireland, Portugal, Spain and United Kingdom.

This report presents the results of the survey conducted in Ireland, Portugal, Spain and United Kingdom, starting with a description of the respondents, mainly coastal municipalities and non-governmental organisations or “other” organisations, such as local groups, universities, aquarium, e.g. ; their sectors of activity and roles in beach clean-up activities. Overall, 51 usable responses were obtained on a total of 207 responses, with 15 responses for Ireland, 14 for Portugal, 12 for Spain and 8 for United Kingdom. The number of responses appears to be limited which can be explained by difficulties in accessing the targeted stakeholders.

The main stranded litter accumulation sites are identified along the Atlantic coastline and different initiatives and measures of protection equipment to reduce litter washing up on the shore are presented. The survey identified a total of 117 key litter accumulation sites along the entire Atlantic area coastline. It is estimated that 32 of these sites receive more than 10 m³/year and can be considered to be marine litter hotspots.

The identification of principal beach clean-up techniques is also a part of the report, presenting the environmental considerations of the respondents and the overall clean-up operations, the resources involved and their cost. The main operators involved in the clean-ups are the local councils, which contribute financially the most to the clean-up operations. They can deploy various mechanical devices, like rakes and beach cleaners, in contrast to the NGOs for which manual cleaning seems to be the most frequent.

Finally, in contrast to the first release of the survey, little information on the costs associated with cleaning is given. However, it was noted that many aspects are taken into account such as the nature of the site to be cleaned, ecological and economic considerations or the resources available.

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List of abbreviations

AA	Atlantic Area
Cedre	Centre of Documentation, Research and Experimentation on accidental waters (Centre de documentation, de recherche et d'expérimentation sur les pollutions accidentelles des eaux)
EPS	Expanded polystyrene
EU	European Union
MPA	Marine protected area
MSFD	Marine Strategy Framework Directive
NGO	Non-governmental organisation
OSPAR	Oslo-Paris convention
XPS	Extruded polystyrene

Overview and key findings

1. SURVEY BACKGROUND AND IMPLEMENTATION

In 2020, as part of the Interreg project CleanAtlantic, Cedre launched at a French level, an online survey on macro-litter on the coastline, with a two-fold objective:

- (i) to map and characterise the main litter accumulation areas along the coastline; and
- (ii) to review clean-up operations (techniques and resources, costs) and good clean-up practices.

The link to the online survey was emailed to over 400 stakeholders potentially involved in beach clean-up. The survey lasted for 1 month and 105 usable responses were collected that allowed the identification of 207 litter accumulation sites along the French coastline. Results obtained in France are detailed in Cedre (2021)¹.

In 2022, the same survey was translated in English, Spanish and Portuguese and disseminated in Ireland, Portugal, Spain and United Kingdom with the support of CleanAtlantic partners and the consultant D-SIDD (<https://d-sidd.github.io/>). The survey was launched in October-November 2022 and lasted for 1.5 month. The survey targeted stakeholders involved in implementing and financing clean-up, namely: local authorities, primarily municipalities (and groups thereof); marine protected areas (in the broadest sense); certain public institutions; and associations and cooperatives specialised in marine litter. The survey was therefore sent to:

- public establishments, national parks;
- government services;
- certain local authorities: regions, departmental councils and associations;
- Various other organisations: professional maritime associations (fisheries and aquaculture), environmental protection organisations (NGOs, associations, nature reserves, permanent initiative centres), social integration structures, research institutes and laboratories, etc.

Some of these contacts agreed to send the link to their own network of contacts, and it was also shared on social media.

The survey questionnaire circulated is presented in **Appendix 1**. The key information obtained from the survey responses is presented below.

Acknowledgements

We would like to express our sincere thanks to the organisations and individuals who agreed to share the link to the survey via their own network, and of course to those who took time to complete the survey.

¹ Cedre (2021). Report R.21.49.C .Identification of litter accumulation sites and clean-up techniques on the French coastline. Key findings of the online survey conducted in the framework of the CleanAtlantic project (WP7.4).

2. SURVEY RESULTS

2.1. Number of respondents who completed the survey

The link to the online survey was emailed by the partners to stakeholders potentially involved in beach clean-up. Certain recipients, who were asked to share the link within their own network, helped to broaden the survey's reach.

Overall, 207 responses were collected online. Of the 207 responses, 51 were considered usable (Figure 1), which represents around 25% of the responses collected (Figure 2).

Unusable questionnaires consisted mainly in:

- (i) Blanks;
- (ii) Partially completed questionnaires with only irrelevant answers and/or no key information;
- (iii) Duplicated.

Thus, questionnaires considered "incomplete" but giving information that could nevertheless be used in the data processing were also used.

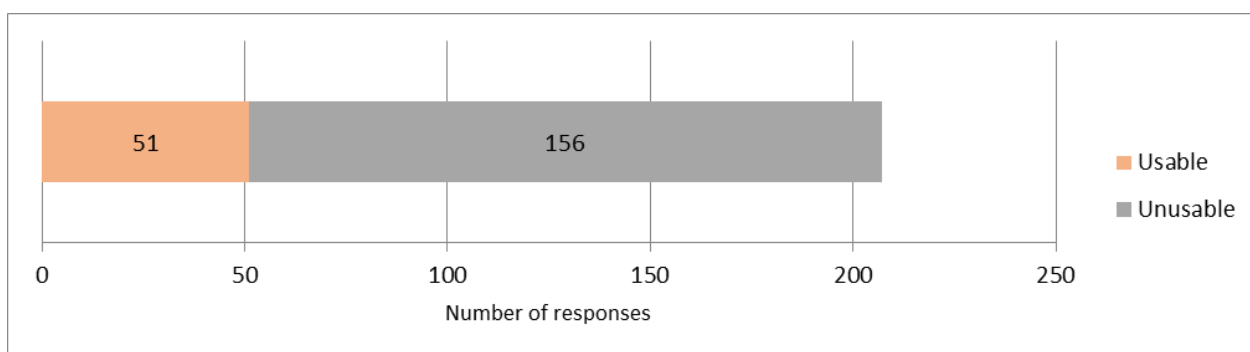


Figure 1: Number of usable responses (51 of 207)

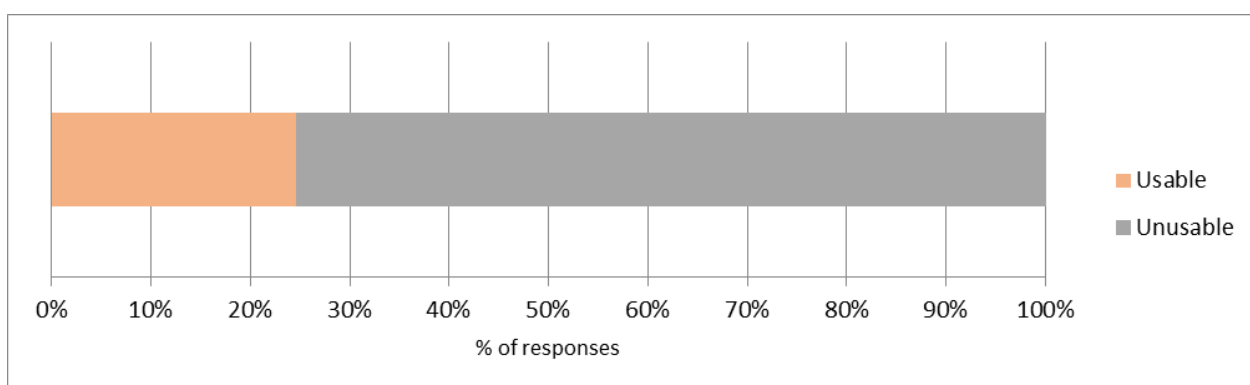


Figure 2: % of usable responses (around 25%)

2.2. Description of the respondents

The questionnaire was targeted local stakeholders liable to have very good field knowledge: (i) local authorities, (ii) marine protected areas and (iii) associations.

The survey obtained responses in the 4 countries targeted by the survey: 15 in Ireland, 14 in Portugal, 12 in Spain and 8 in United Kingdom. Two responses were also obtained in France, although the survey was not disseminated again in this country.

Despite their limited number, the responses show a relatively even spatial coverage of the Atlantic Area (AA) coastline (Figure 3). As indicated above, results obtained for France were collected in a previous study and are detailed in Cedre (2021).

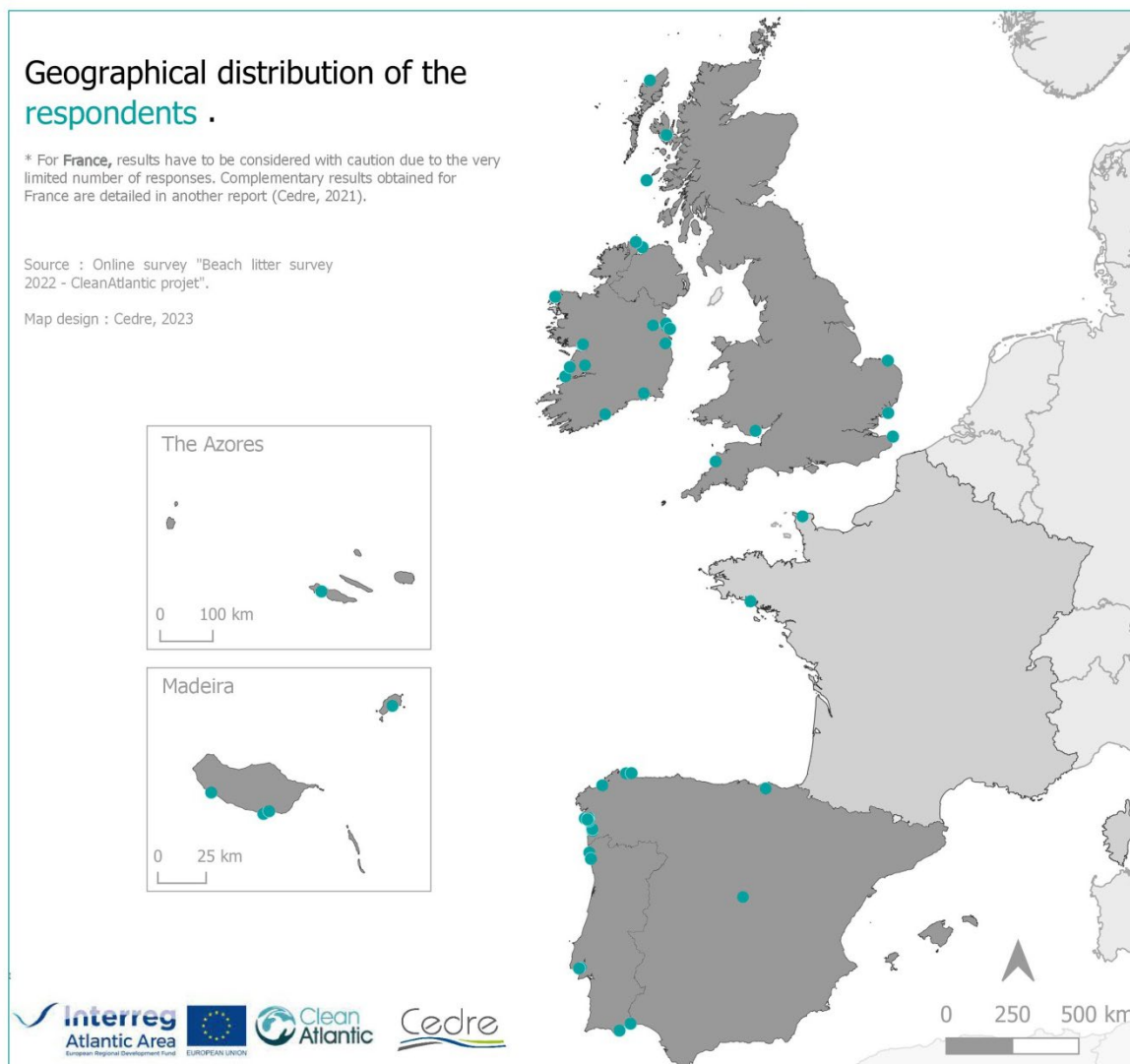


Figure 3 : Location of the respondents of Ireland, Portugal, Spain and United Kingdom (in dark grey on the map).

The organisation types with the highest response rate (Figure 4) were: (i) non governmental organisations (NGOs) and (ii) local authorities. 20 respondents classified their organisation as “others” which included organisations such as universities, local groups, aquarium, etc.

Due to the low participation rate, several categories, such as organisations in charge of a natural protected site and private clean-up operators, are not represented. Furthermore, it appears difficult to do comparison between countries as the response rate is low in each country.

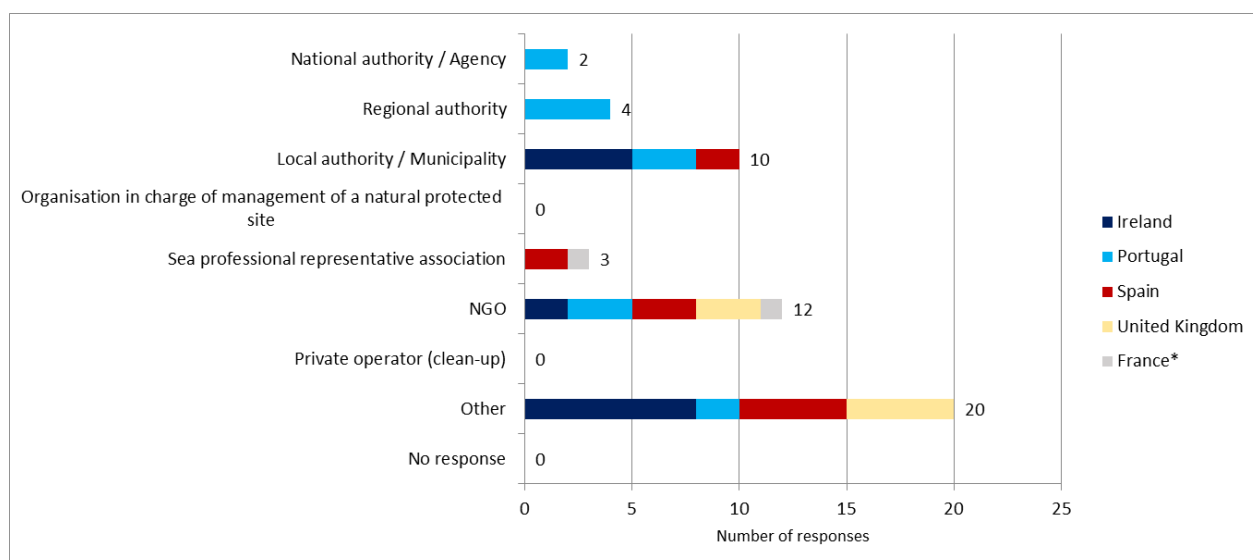


Figure 4: Status of the survey respondents (51 respondents), according to the countries

*For France, results have to be considered with caution due to the very limited number of responses. Complementary results obtained for France are detailed in another report (Cedre, 2021).

2.3. Role of the respondents in field of beach clean-up

The main roles played in the field of beach clean-up by the respondent organisations are, in more or less equal proportions, awareness-raising (influence of NGO) and conducting clean-ups (Figure 5).

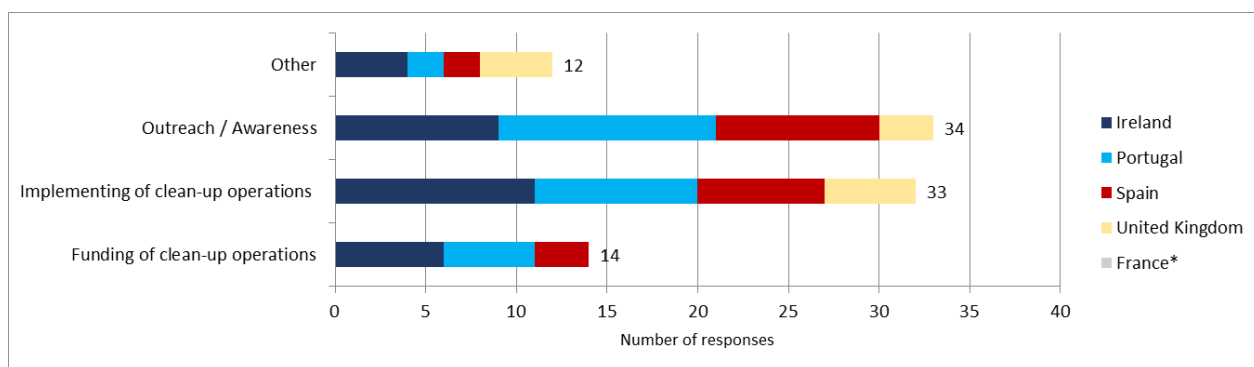


Figure 5 : Respondent organisations' roles in beach clean-up (several possible responses per respondent; 51 respondents)

*For France, results have to be considered with caution due to the very limited number of responses. Complementary results obtained for France are detailed in another report (Cedre, 2021).

2.4. Main sector of activity of the respondents

The main sector of activity (Figure 6) concerns environmental protection, followed by territorial management and fishing/fish-farming categories. The "other" category includes research/teaching, charity or trading.

The tourism and the protected areas are not represented by the respondents.

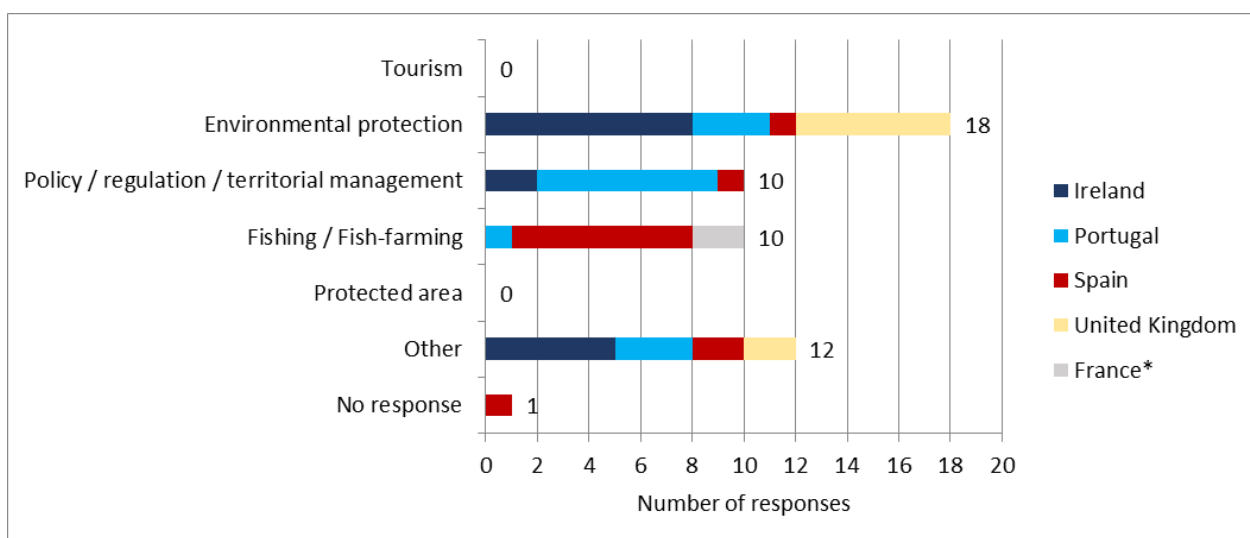


Figure 6 : Sector of activity of the respondents (51 respondents)

*For France, results have to be considered with caution due to the very limited number of responses. Complementary results obtained for France are detailed in another report (Cedre, 2021).

2.5. Geographical area considered by the respondents

The local areas (departments, groupes of communes, marine protected areas and counties) are well represented in the survey (Figure 7), suggesting a good understanding of the local beach litter situation on the section of coastline considered.

Some respondents checked the "other" category for their chosen geographic area of reference, i.e. an area that is not represented by an administrative division. Little detail was provided in the comments regarding these geographic areas. Some respondents, however, specified that the geographic area covered by their organization is a stretch of coastline, a beach or an island.

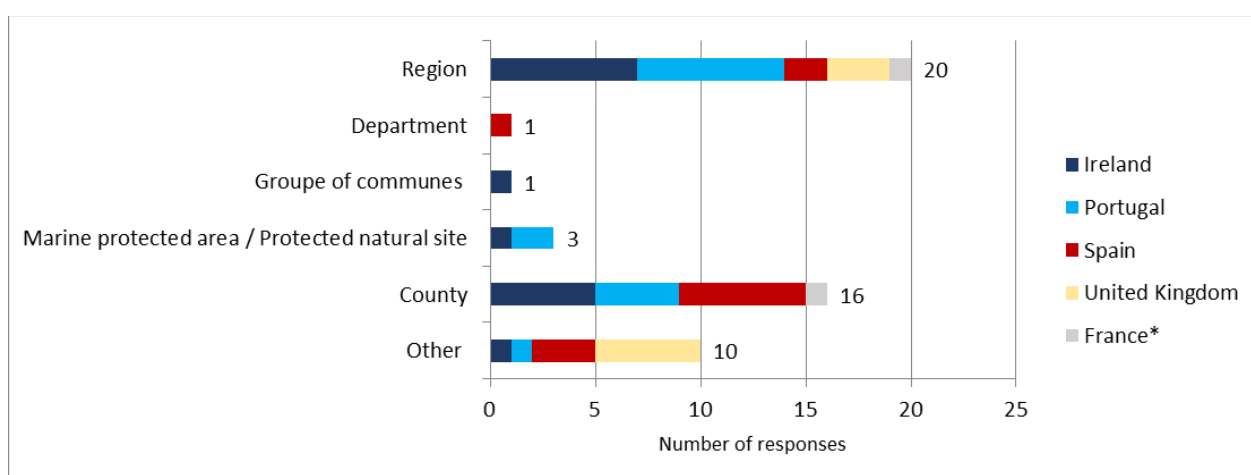


Figure 7: Geographical areas of the respondents (51 respondents)

*For France, results have to be considered with caution due to the very limited number of responses. Complementary results obtained for France are detailed in another report (Cedre, 2021).

3. DIAGNOSIS OF LITTER POLLUTION ON THE COASTLINE

3.1. Perception of the pollution

3.1.1. Litter pressure on the coastline

Half of respondents consider that litter pollution causes a moderate pressure on their coastal area and 22% consider that the pressure is strong (Figure 8).

20% of respondents consider the pressure to be weak or non-existent.

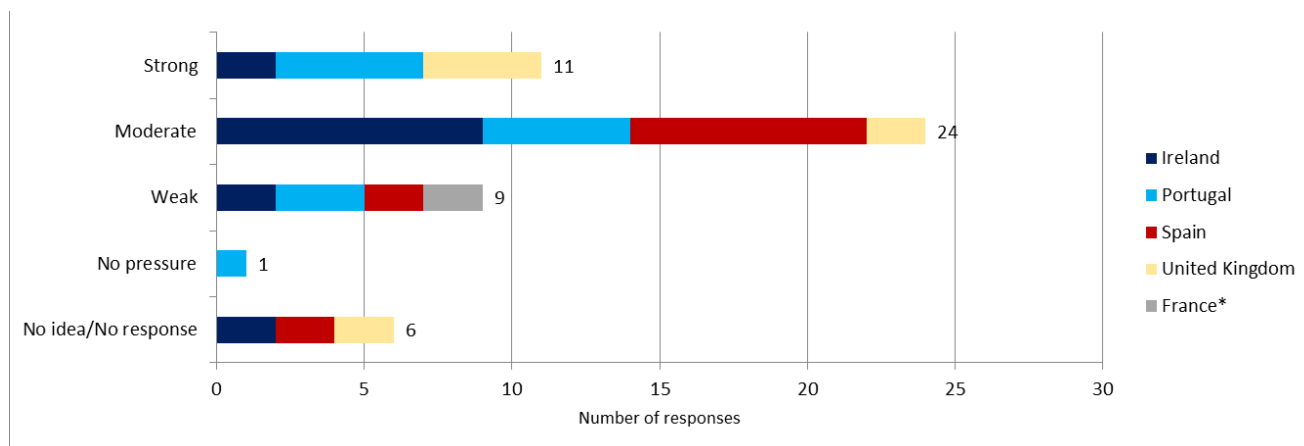


Figure 8: Intensity of the perceived marine litter pollution (only one answer possible; 51 respondents)

*For France, results have to be considered with caution due to the very limited number of responses. Complementary results obtained for France are detailed in another report (Cedre, 2021).

3.1.2. Perceived impact

The ecological impact (Figure 9) of litter pollution is the main harmful effect mentioned followed by the economic impacts due to damaged scenery. Economic impacts due to a loss of activity were almost unmentioned, probably due to a combination of the difficulty in assessing these financial impacts and the relative low participation of local authorities.

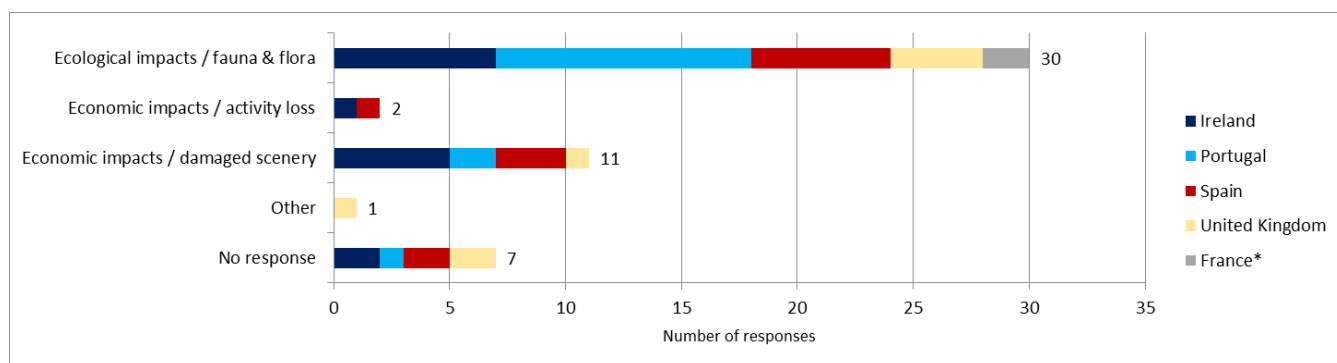


Figure 9: Perceived pressure of the pollution (only one answer possible; 51 respondents)

*For France, results have to be considered with caution due to the very limited number of responses. Complementary results obtained for France are detailed in another report (Cedre, 2021).

The comments provided regarding perceived impacts can be summarised as follows:

- Direct and indirect environmental impacts due in particular to:
 - Additional pressure on environments that are sometimes already considerably degraded;
 - Interactions with dune vegetation, as a result of the burial of litter and microparticles at high levels (embryonic dune and white dune) and plant cover;
 - Interactions with wildlife and especially seabirds;

- Direct and indirect economic impacts, in particular:
 - on tourist numbers (most frequently mentioned activity);
 - on the local image: tourism image (beaches), 'nature' image;
 - on local activities (One respondent mentioned that litter on beaches near livestock areas (in Ireland) could cause damage to livestock grazing near the coast).

3.1.3. Seasonal specificities of litter strandings

According to respondents, most litter strandings appear to occur in winter followed closely by summer (Figure 10).

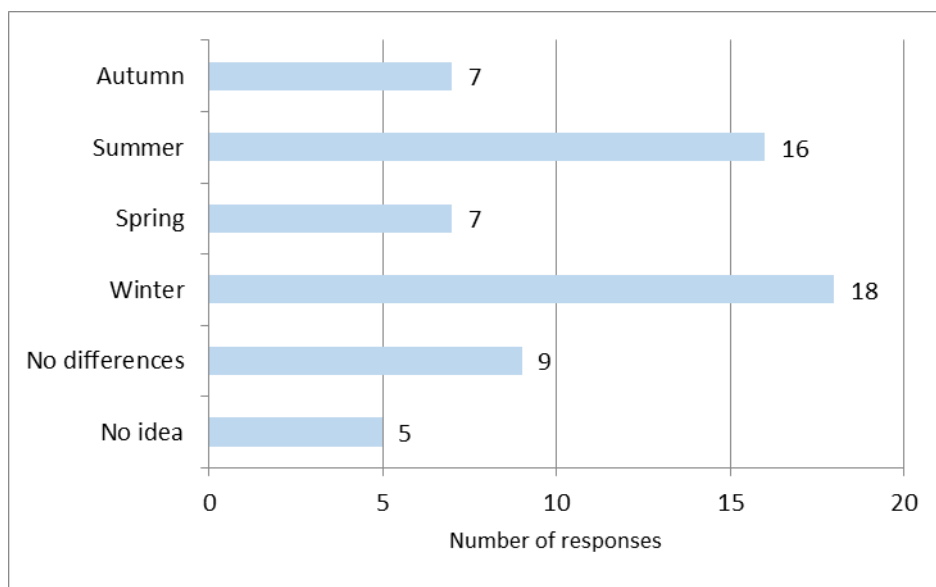


Figure 10: Seasonality of litter strandings (several possible responses per respondent; 51 respondents)

Winter storms and waves remobilise beach sediment and release the litter trapped within it; this litter is then scattered along the shoreline while litter previously lying in the shallows is washed up on the foreshore. This phenomenon is amplified during spring tides.

Strandings of litter in the autumn and spring are reported to be low.

Results for the summer could be related to the increase in beach users in areas with high tourist numbers (except for Portugal (Figure 11), which is unexpected). This can lead to a significant increase in litter left on the beach, where it is sometimes even deliberately buried.

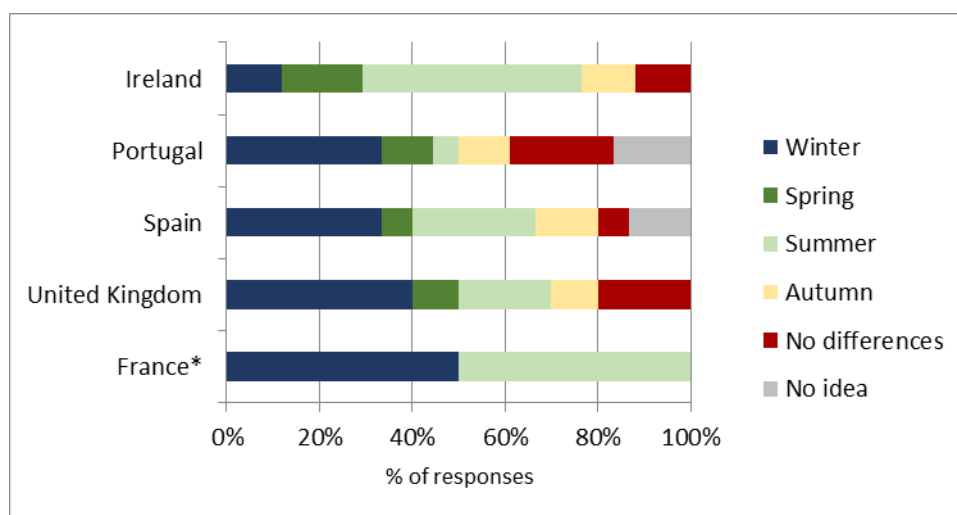


Figure 11: Seasonality of strandings in the countries (%).

*For France, results have to be considered with caution due to the very limited number of responses. Complementary results obtained for France are detailed in another report (Cedre, 2021).

3.1.4. Sources of litter pollution

According to the respondents, the main sectors of activity that generate coastal litter (Figure 12) are fishing (57%), followed by the food retail sector and tourism (respectively 37 and 39%). This is followed by shipping (22%) and waste water systems (22%), then by sectors with a similar rate of incidence (< 18%): port/harbour, industry, aquaculture, other leisure/sport.

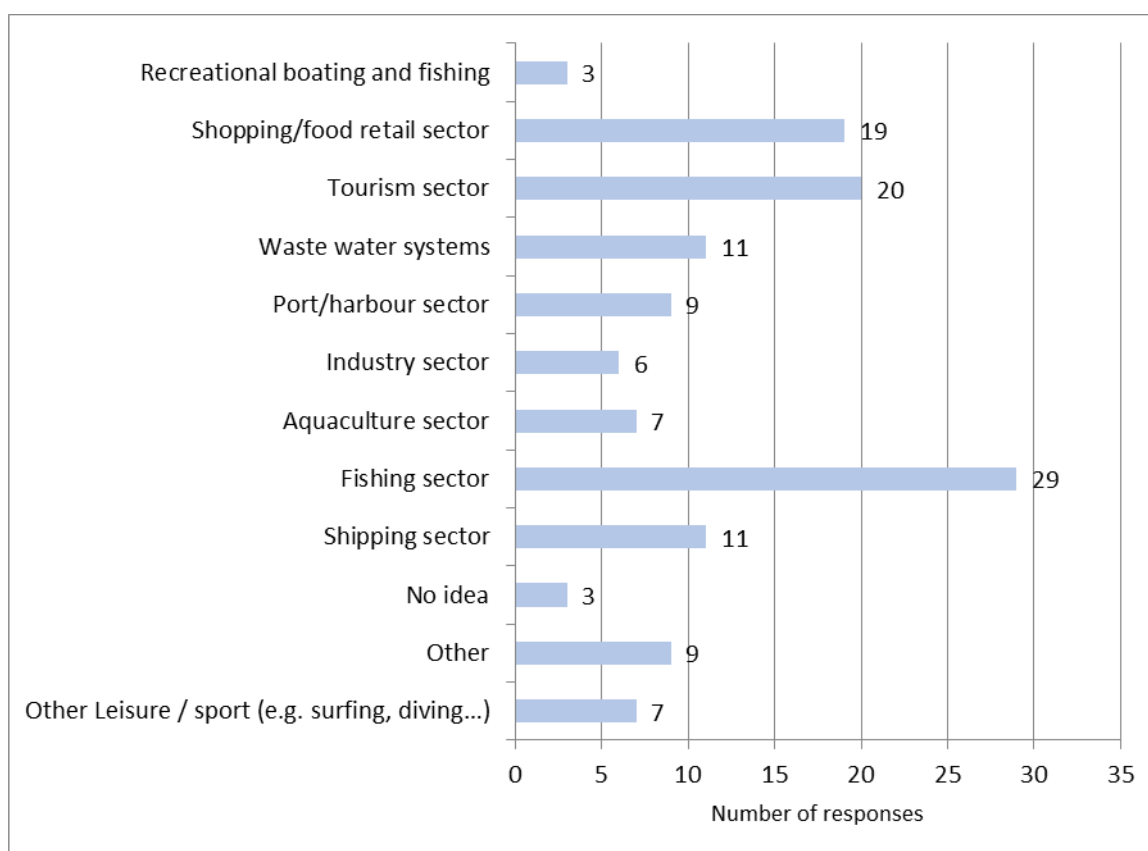


Figure 12: Principal sectors of activity that generate coastal litter (3 possible choices; 51 respondents)

The small number of respondents in France (two) makes comparison difficult. But in the other four countries, there are marked differences between countries among identified sources (Figure 13):

All four countries consider the fishing sector to be an important contributor to marine litter pollution, as well as the food sector, which is nevertheless cited much more by the Irish respondents.

The aquaculture sector is only cited in Spain and United Kingdom, in roughly equal proportions to the industry and port sectors (about 10%).

The recreational boating sector was only mentioned a few times in Ireland and Great Britain.

The tourism sector accounts for a large share of the potential sources of waste generation in all the respondent countries. The shipping sector is also found in all four countries, with a larger share in Portugal (15%).

Although some differences can be noted between countries, it can be observed that all the proposed sectors were cited by the respondents.

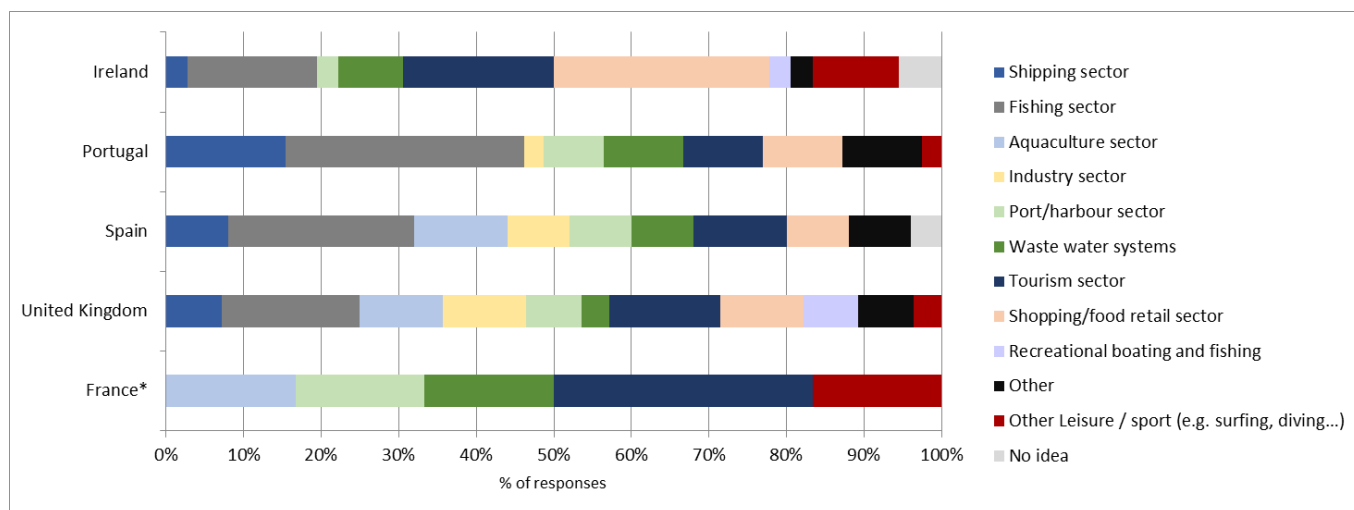


Figure 13: Principal sectors of activity that generate coastal litter by countries (%)

*For France, results have to be considered with caution due to the very limited number of responses. Complementary results obtained for France are detailed in another report (Cedre, 2021).

3.1.5. Most common types of litter found on the coastline

The most frequently cited types of litter are: “plastic packaging”, “litter from fisheries or aquaculture”, “can”, “plastic bags”, “plastic fragments/microplastics”.

3.1.6. Pathways of entry for litter

The main pathway for litter to wash up on the coast cited is “Abandoned on site” by beach users (Figure 14). The sea is then cited as the second most important pathway for litter.

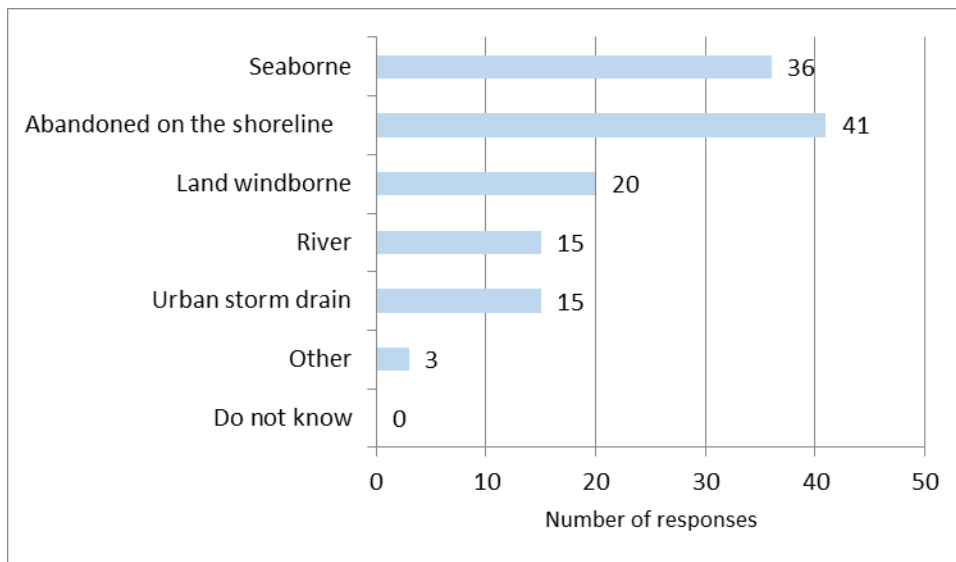


Figure 14: Main pathways of entry for litter into the respondents' sectors (3 possible answers per respondent; 51 respondents)

France stands out for its low response rate (two) and is therefore not comparable with the other four countries. For the latter, it can be noted that the responses are relatively similar: the main pathway of entry for litter on the coast is unanimously the abandonment on the shoreline (32% of total responses), not far from seaborne (28% of total responses).

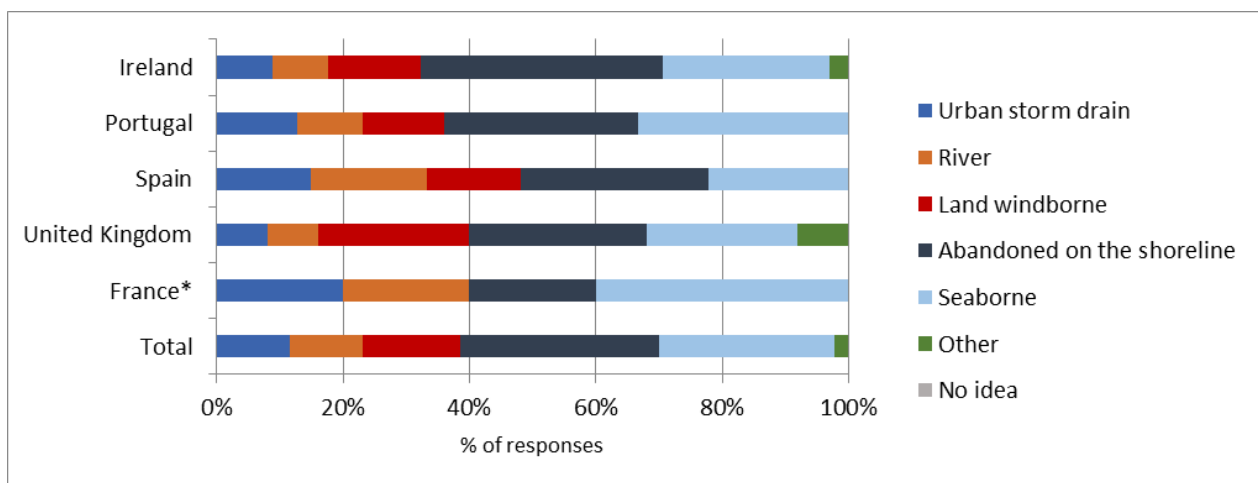


Figure 15: Main pathways of entry for litter into the respondents' sectors (% per country)

*For France, results have to be considered with caution due to the very limited number of responses. Complementary results obtained for France are detailed in another report (Cedre, 2021).

The majority of inputs therefore originate from land-based sources. The estimated average contributions of the different land-based pathways are as follows:

- dumping on site: 32%;
- land-based wind-driven inputs (15%);
- finally, almost on a par, rivers inputs (12%) and inputs from urban, rainwater and wastewater systems (12%).

3.2. Inventory of stranded litter accumulation sites

3.2.1. Number of litter accumulation sites inventoried

The survey identified a total of 117 litter accumulation sites (Figure 16) along the entire coastline.

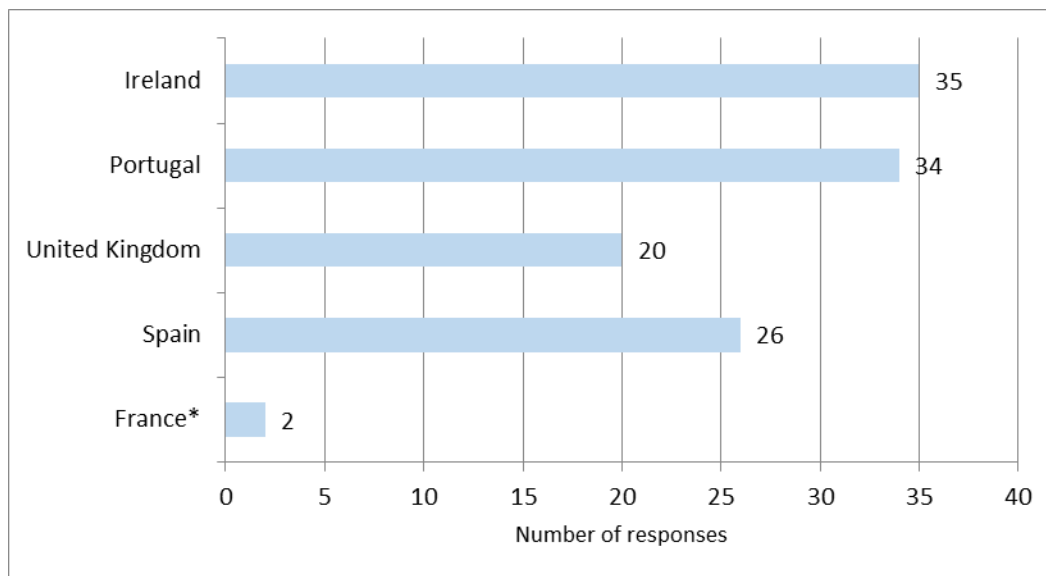


Figure 16 : Number of identified accumulation sites per respondent country (47 respondents)

*For France, results have to be considered with caution due to the very limited number of responses. Complementary results obtained for France are detailed in another report (Cedre, 2021).

These sites are distributed between the four countries as shown in Figure 18. Accumulation sites identified in France are shown in Cedre (2021). The information on the typologies of the identified sites can be found in **Appendix 2**.

It is estimated that about 48% of these sites receive less than 10 m³/year (68 sites over 117) (Figure 17) and 27% more than 10 m³/year (32 sites). These latter can be considered to be marine litter hotspots.

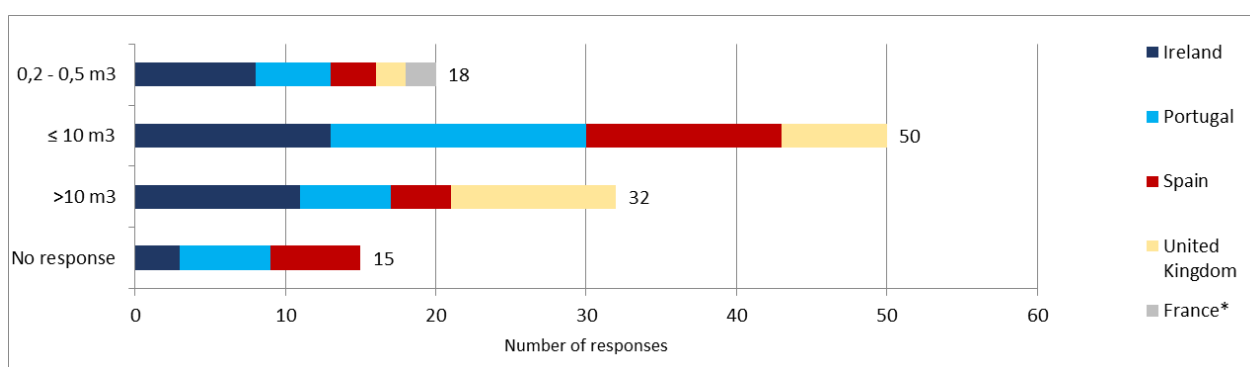


Figure 17 : Litter accumulation sites (number) per category of estimated annual volume (117 sites reported)

*For France, results have to be considered with caution due to the very limited number of responses. Complementary results obtained for France are detailed in another report (Cedre, 2021).

Geographical distribution of the accumulation sites identified in the online survey.

* For France, results have to be considered with caution due to the very limited number of responses. Complementary results obtained for France are detailed in another report (Cedre, 2021).

Source : Online survey "Beach litter survey 2022 - CleanAtlantic projet".

Map design : Cedre, 2023

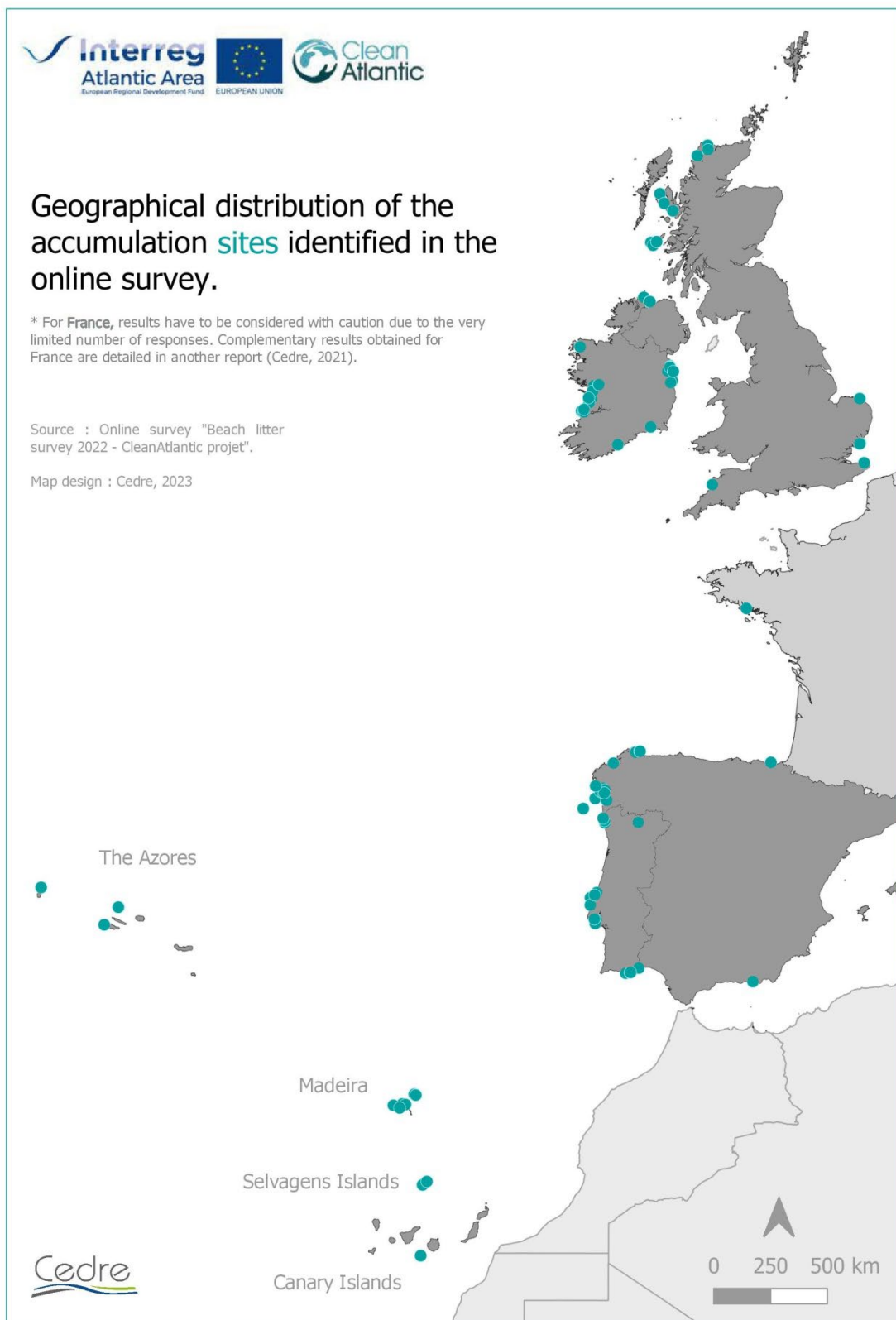


Figure 18: Location of the 117 accumulation sites identified by the respondents on the coastline of Ireland, Portugal, Spain and United Kingdom (in dark grey on the map)

- 35 in Ireland (Figure);

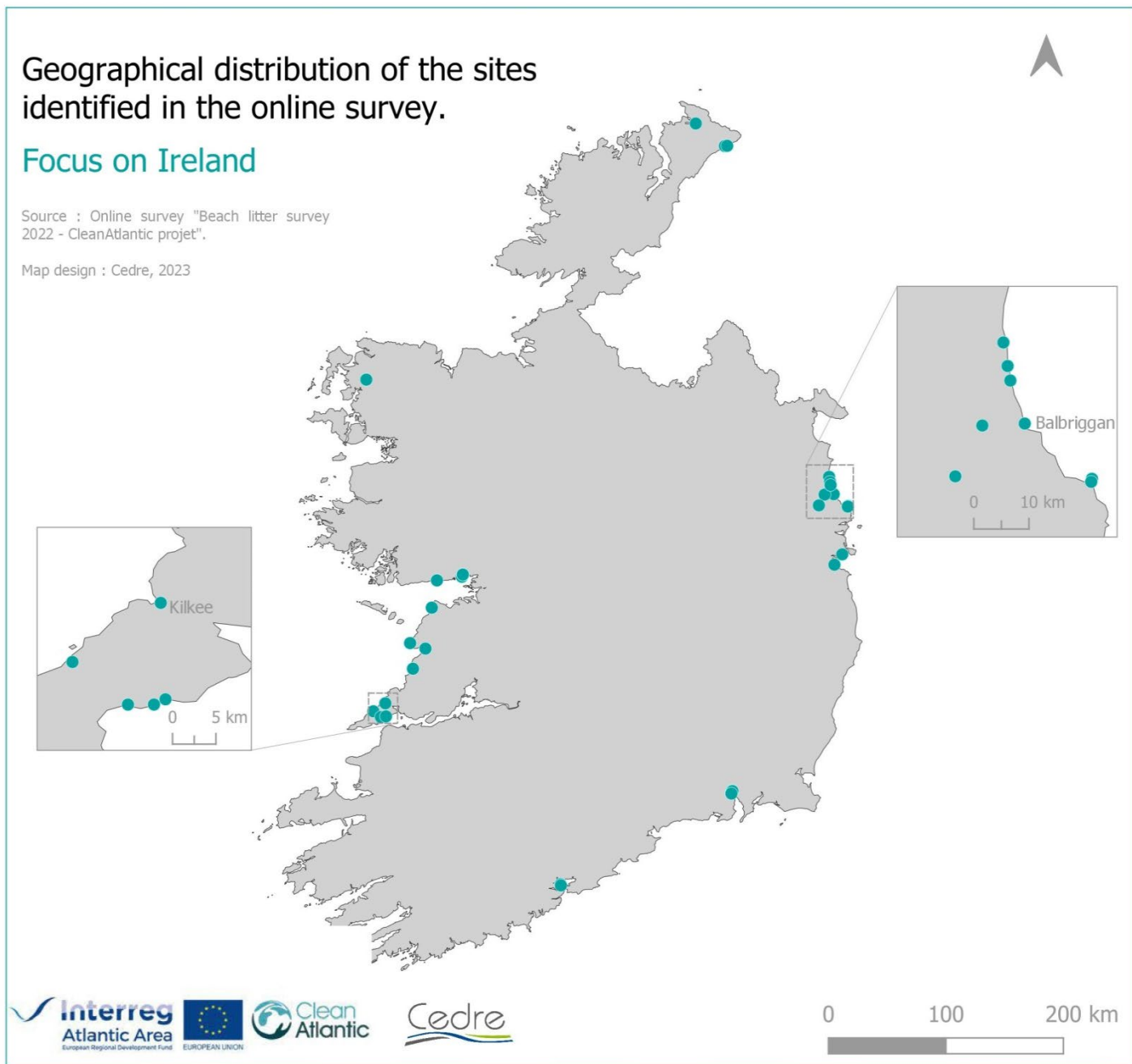


Figure 19: Location of the 35 accumulation sites identified by respondents on the Irish coastline

- 34 in Portugal (Figure 19);

Geographical distribution of the sites identified in the online survey.

Focus on Portugal

Source : Online survey "Beach litter survey 2022 - CleanAtlantic projet".

Map design : Cedre, 2023

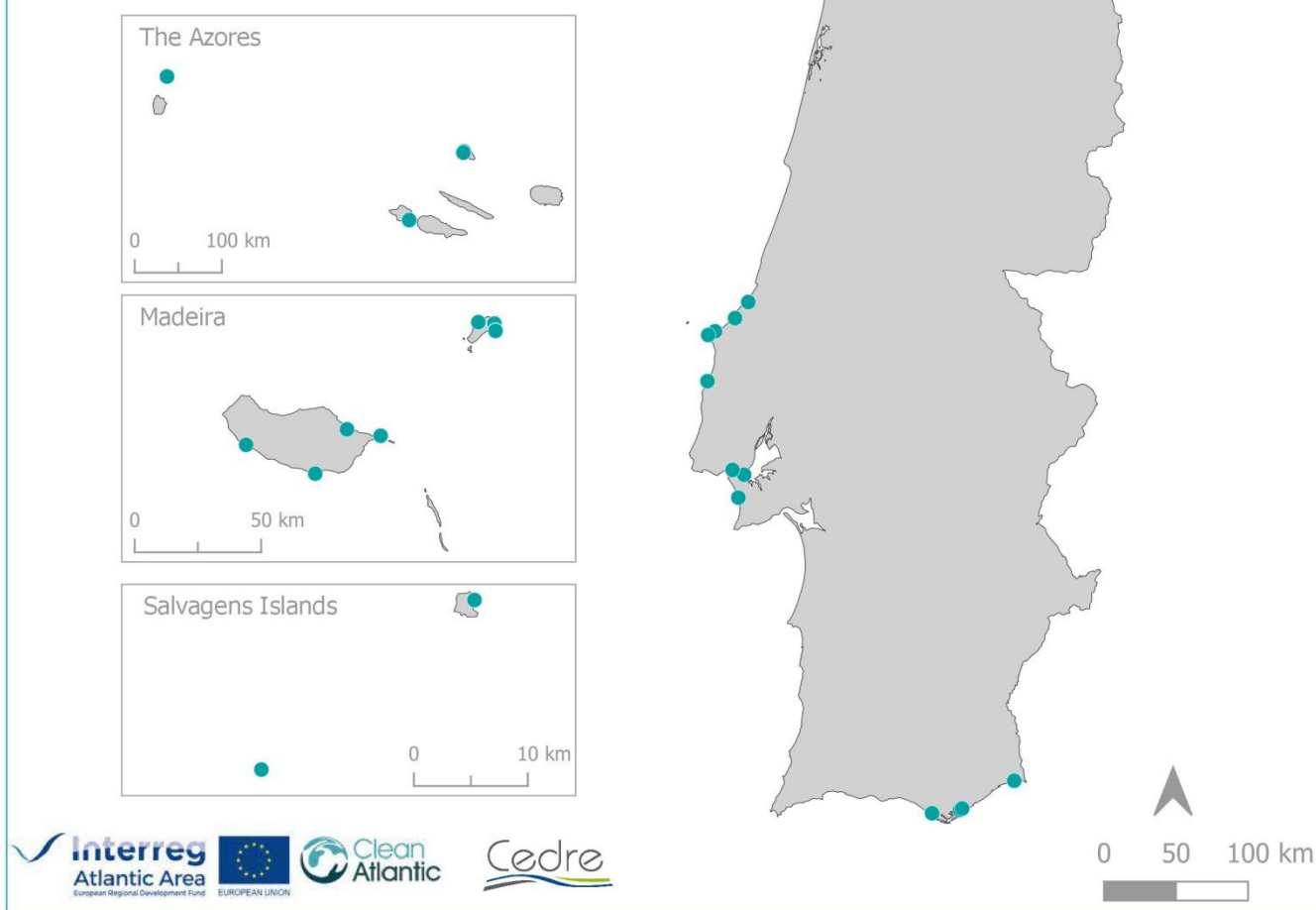


Figure 19 : Location of the 34 accumulation sites identified by respondents on the Portuguese coastline

- 26 in Spain (Figure 21) ;

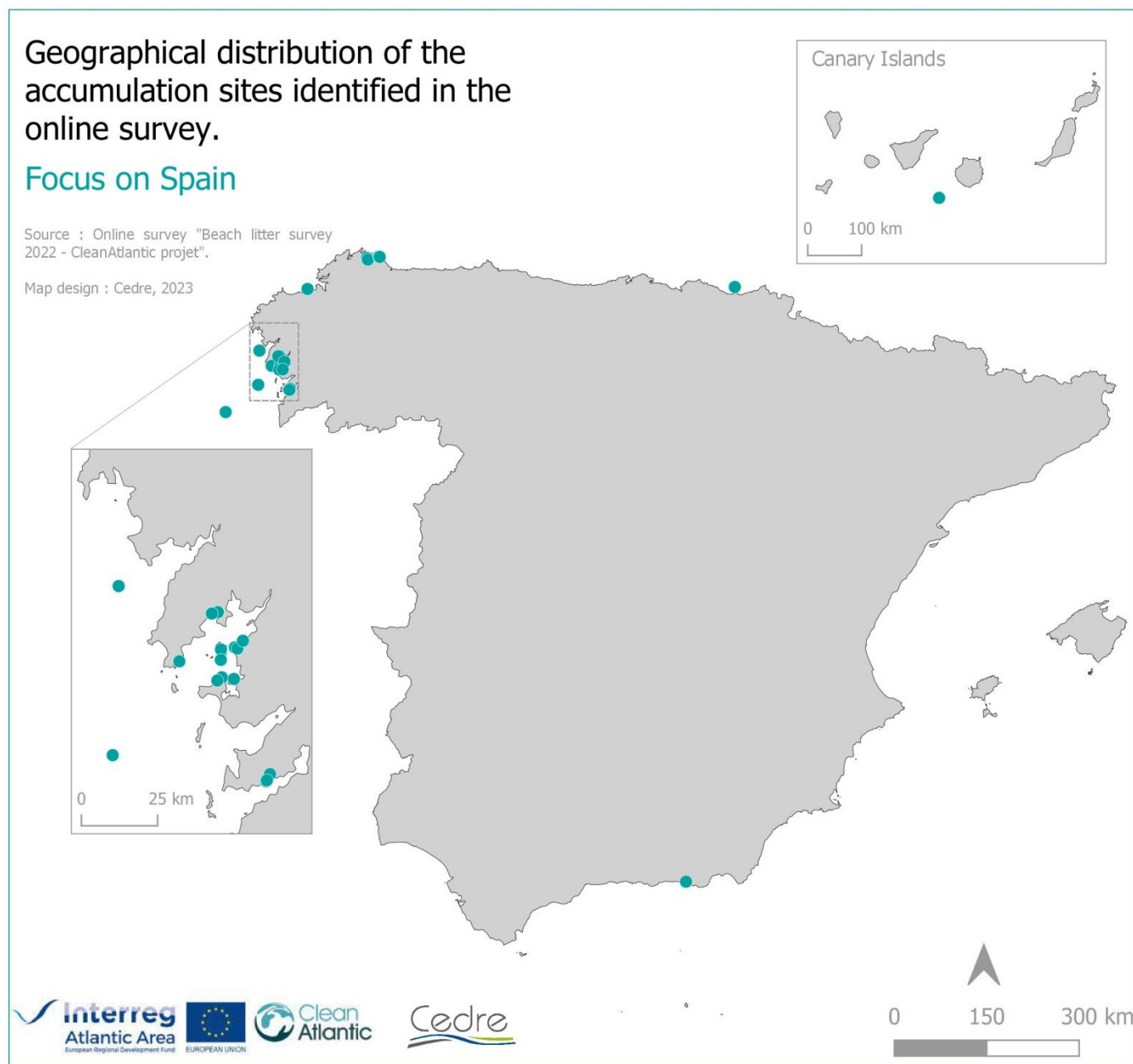


Figure 20: Location of the 26 accumulation sites identified by respondents on the Spanish coastline

- 20 in United Kingdom (Figure 21);

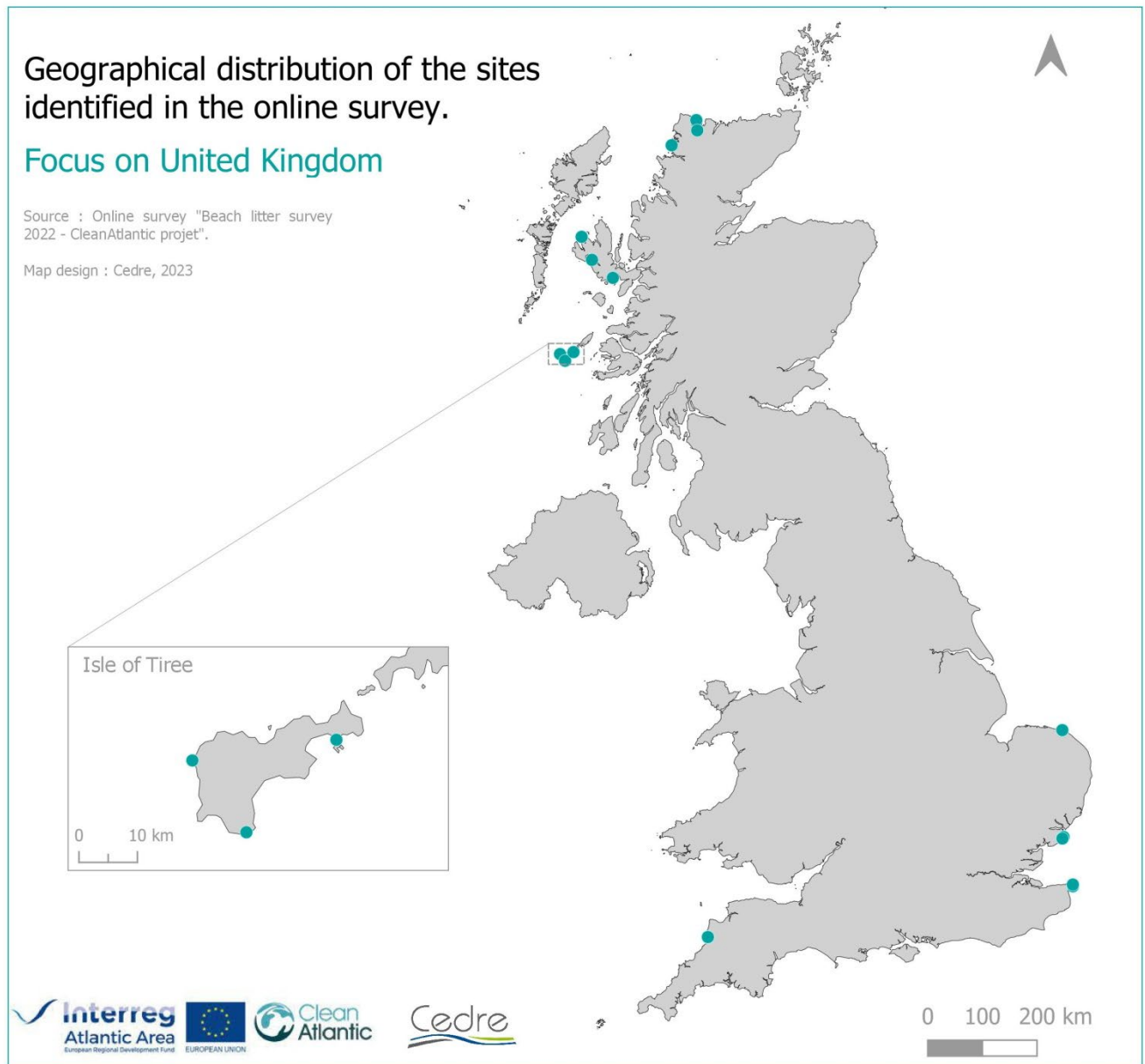


Figure 212: Location of the 20 accumulation sites identified by respondents on the United Kingdom coastline

3.2.2. Focus on hotspots

The sites receiving more than 10 m³ of litter per year are considered to be litter hotspots.

32 hotspots were identified.

These hotspots (Figure 22) represent around 55% of the sites identified in United Kingdom, around 31% in Ireland, 18% in Portugal and 15% in Spain.

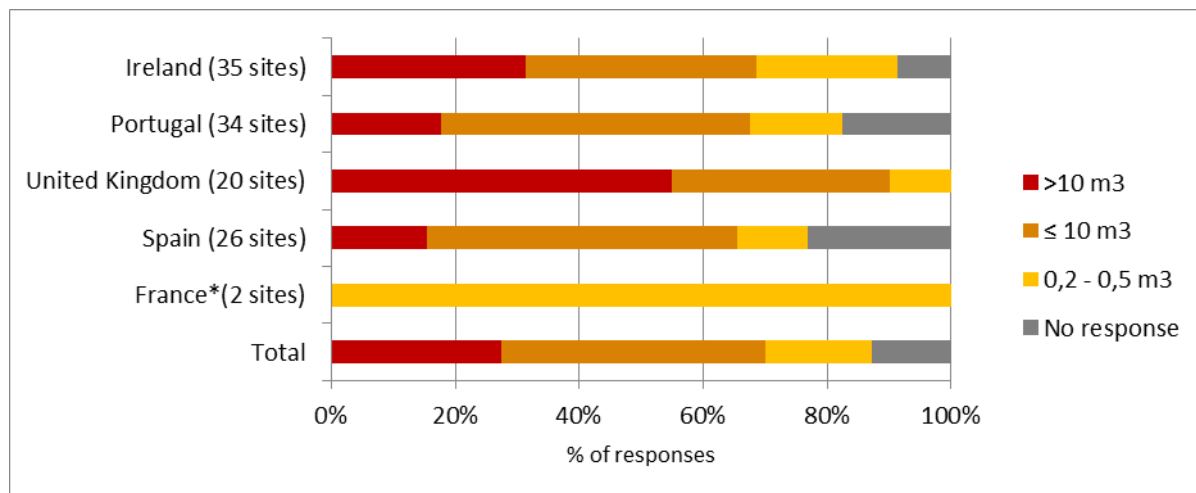


Figure 22 : Litter accumulation sites (%) per volume category and country

*For France, results have to be considered with caution due to the very limited number of responses. Complementary results obtained for France are detailed in another report (Cedre, 2021).

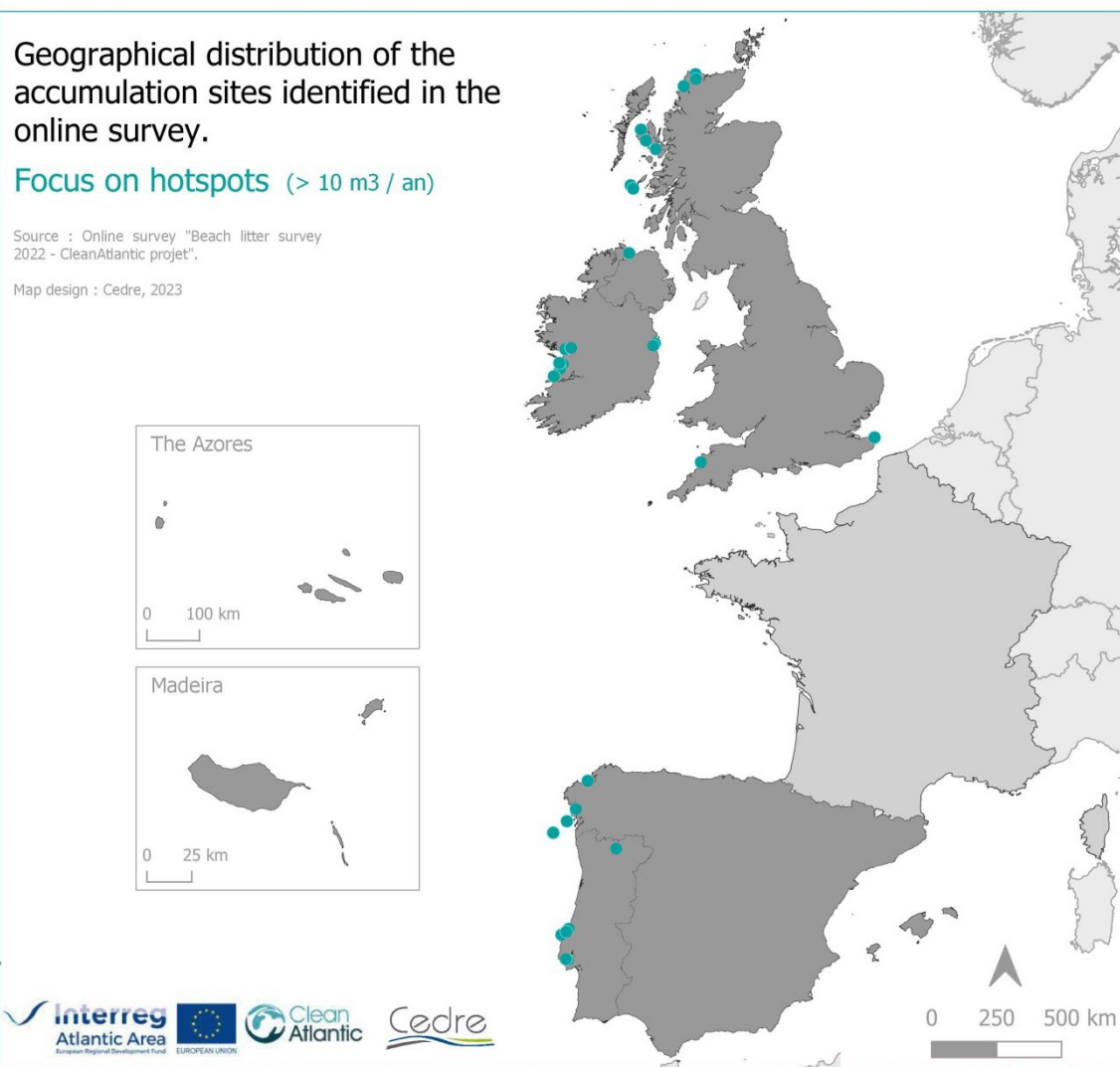


Figure 23 : Map of the 32 litter hotspots (> 10 m³) identified on the coastline of Ireland, Portugal, Spain and United Kingdom (in dark grey on the map).

**For France, results have to be considered with caution due to the very limited number of responses. Complementary results obtained for France are detailed in another report (Cedre, 2021).*

The inventory of these litter hotspots – and their geomorphological characteristics – is presented by country in **Appendix 3**.

3.3. Focus on foamed polystyrene

3.3.1. The foamed polystyrene issue

The vast majority of respondents confirmed the frequent presence of EPS (expanded polystyrene) / XPS (extruded polystyrene) in their area (Figure 24), mostly in the form of fragments or objects, particularly in Portugal.

We should of course avoid jumping to the conclusion that EPS/XPS is more abundant in this country, as the amplifying effect of the number of respondents must be taken into account.

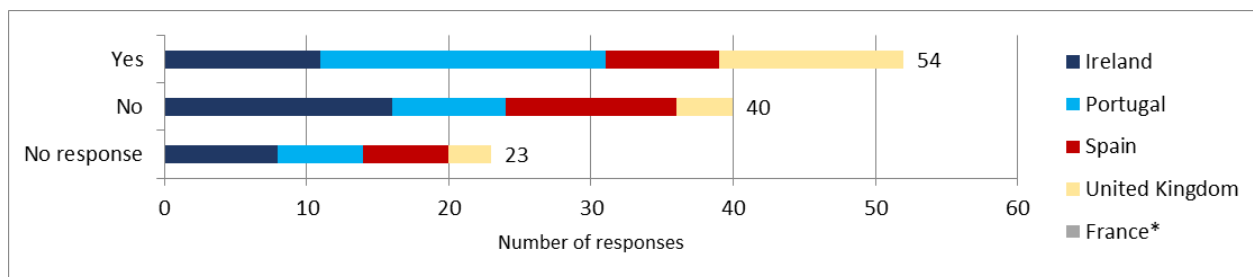


Figure 24 : Presence of foamed polystyrenes (EPS/XPS) according to the respondents.

*For France, results have to be considered with caution due to the very limited number of responses. Complementary results obtained for France are detailed in another report (Cedre, 2021).

3.3.2. Sites most affected by foamed polystyrenes

Based on the survey results, 54 accumulation sites with high proportions of EPS/XPS (Figure 25) were identified across the different countries.

Geographical distribution of the accumulation sites identified in the online survey.

Focus on polystyrene sites

* For **France**, results have to be considered with caution due to the very limited number of responses. Complementary results obtained for France are detailed in another report (Cedre, 2021).

Source : Online survey "Beach litter survey 2022 - CleanAtlantic projet".

Map design : Cedre, 2023

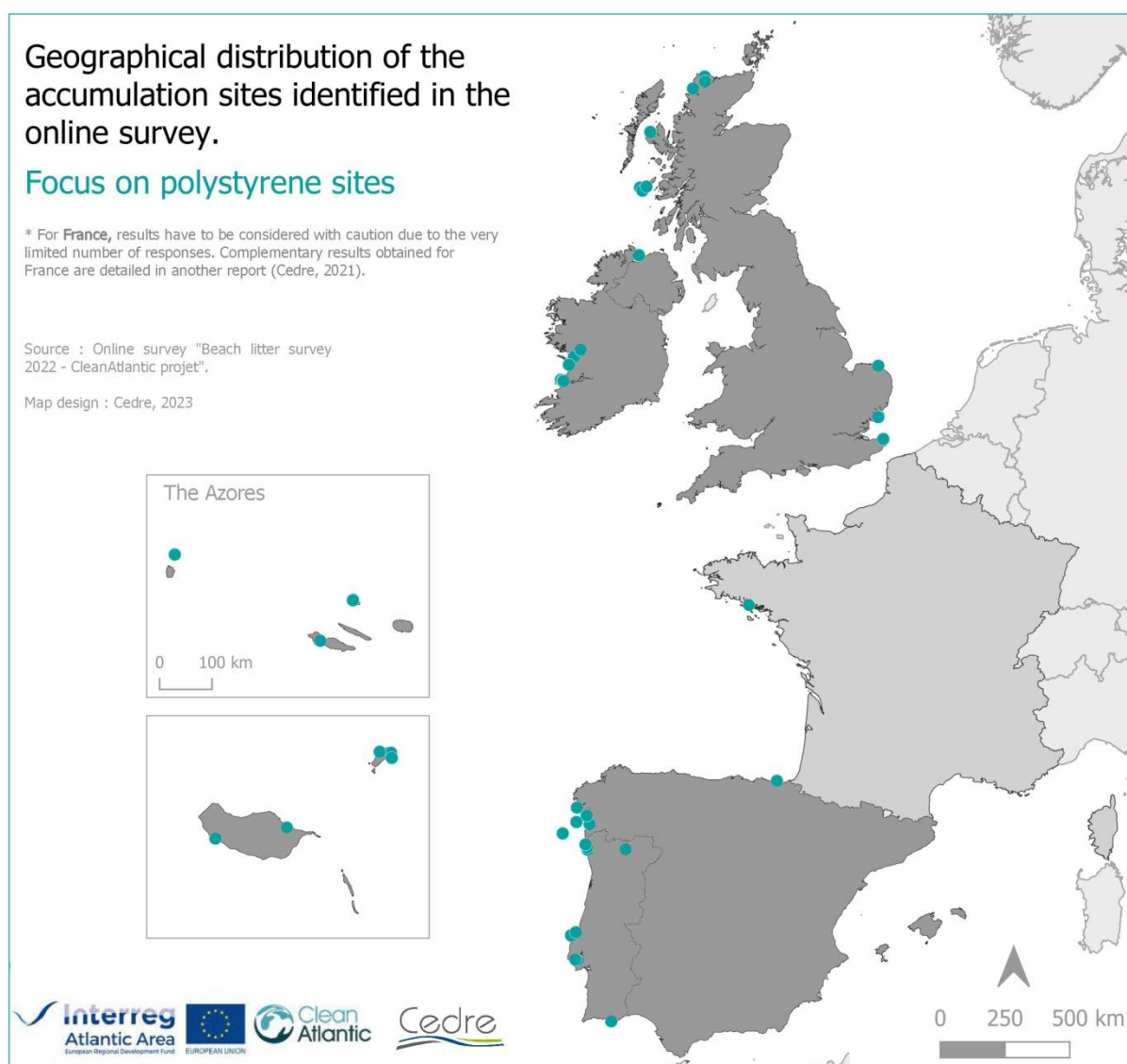


Figure 25 : Location of the sites most affected by foamed polystyrenes in Ireland, Portugal, Spain and United Kingdom (in dark grey on the map).

4. IDENTIFICATION OF MEASURES IN PLACE TO REDUCE STRANDED LITTER

4.1. Incentives implemented to reduce stranded litter

Incentive schemes to reduce the amount of litter washing up on the shoreline are increasingly common (Figure 26); they are usually implemented at the initiative of municipalities, on or near the shore.

Over and above awareness-raising, such schemes have two major objectives:

- Encouraging people not to dump litter or reduce inputs (urban, ports);
- Encouraging people to pick up beach litter.

In the first case, the most common system is a metal **plate** or stud, or even a simple tag (with chalk or a stencil), next to storm drains, bearing the message "*Here begins the sea*".

In the second case, dedicated litter bins, specifically for beached debris is provided on the backshore. These containers play an essential role both in beach clean-up, by encouraging ongoing collection.

Other incentive schemes were also mentioned:

- “ecological ashtrays”: reused bottles used as large ashtrays with an awareness message;
- Information boards with a clear slogan: "If the bin is full, take your rubbish home", “Don't leave rubbish, it will end up in the sea”, "1 cigarette butt pollutes 500 litres of water", “It's up to you to choose if the sea is to suffer” e.g.

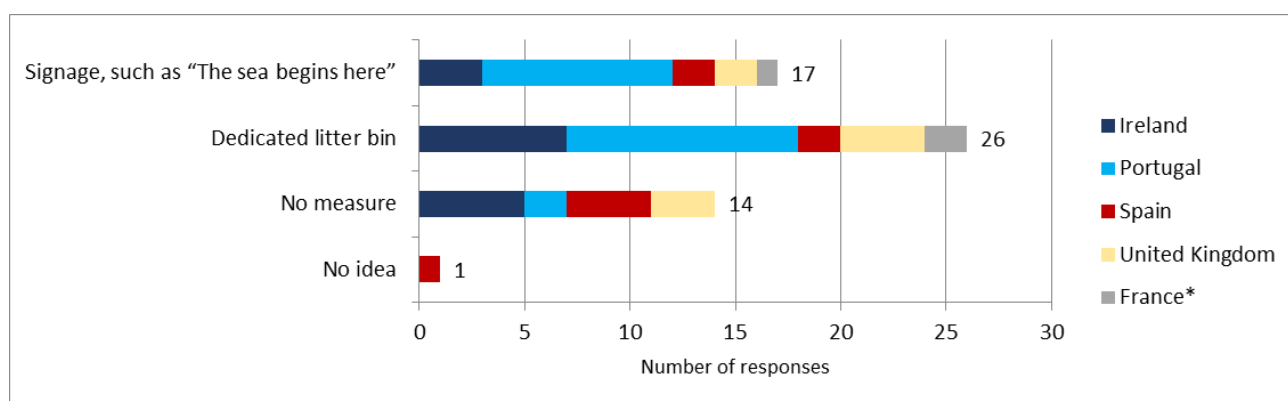


Figure 26 : Incentive measures implemented to reduce stranding litter (51 respondents).

*For France, results have to be considered with caution due to the very limited number of responses. Complementary results obtained for France are detailed in another report (Cedre, 2021).

4.2. Protective equipment in place to reduce litter washing up on the shore

Such systems are not often mentioned. So far, very few local authorities have set up such devices; however the trend seems to be on the rise.

Various such devices are in operation at sea, in rivers and in ports:

- a **recovery boat**, for instance a fishing boat or specialised barge, to collect litter inshore;
- a **floating boom** positioned inshore to provide a litter-free bathing area;
- a **floating boom** positioned immediately upstream of a river estuary, in order to capture some of the waste carried by the flow, particularly when the river is in spate;
- a **net positioned across stormwater outfalls** in ports, in order to intercept waste from the urban road network; such systems are increasingly favoured by the authorities.

In the present survey, most respondents (62%) indicated that there were no scheme or equipment in place and 10 mentioned the use of specific tools within urban water drainage system or of recovery vessel along the coast along with around 20% of the respondents (Figure 27).

Respondents who answered "other" did not specify what it was, except for one. This is tank that aims at collecting nets and net scraps directly from the ports so that they can be recycled, as a study showed that 30% of the litter found on their site was nets or net fragments. This measure aims at reducing the litter present on their beach.

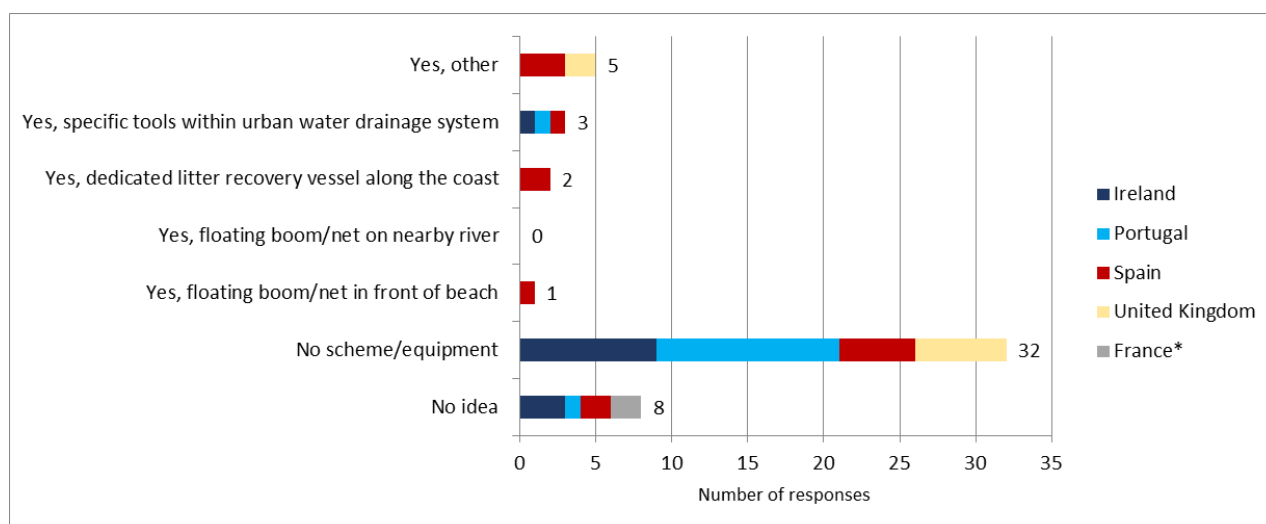


Figure 27 : Protective equipments implemented to reduce litter washing up on the shore (51 respondents).

*For France, results have to be considered with caution due to the very limited number of responses. Complementary results obtained for France are detailed in another report (Cedre, 2021).

4.3. Accreditation programmes promoting the reduction of stranded marine litter

Various accreditation initiatives (in the broadest sense) of varying scope (local, regional, national and international) (Figure 28), ranging from simple projects to more demanding certification programmes, have been identified across the different countries.

These initiatives consist in:

- **certification or accreditation** to guarantee users certain standards of health, comfort, access, etc., with certain cleanliness criteria taking into account marine litter, particularly plastics;
- **a charter, strategy or project**, which are less restrictive, aimed at reducing coastal litter, particularly plastics.

In the first release of the survey, in France in 2020, several programmes were mentioned, which is not the case in the present survey.

The different measures mentioned are:

- Greener Clare Programme (Ireland)
- Green Coast award (Ireland)
- Clean coast (Ireland)
- 2 minutes beach clean (Ireland)
- Skye Beach Clean (UK)
- Blue flag / Bandera azul
- Green business / green schools
- Tidy towns

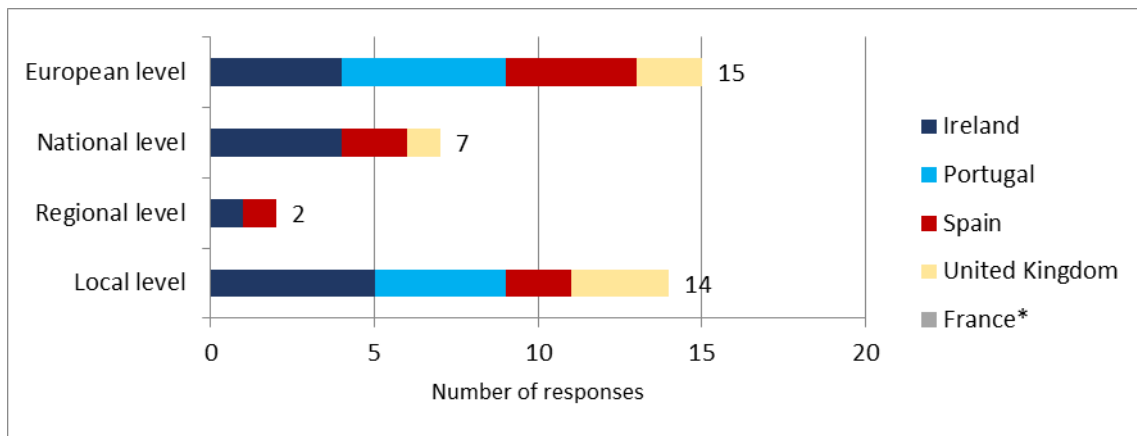


Figure 28: Accreditation programmes promoting the reduction of stranded marine litter (51 respondents). For France, results have to be considered with caution due to the very limited number of responses. Complementary results obtained for France are detailed in another report (Cedre, 2021).

5. IDENTIFICATION OF BEACH CLEAN-UP TECHNIQUES AND COSTS

This section only takes into account the responses of those who answered that they implemented or financed the clean-up operations (i.e. 35 respondents out of 51).

The survey results indicate that **environmental sensitivity** and **organization/management** are number one *ex aequo* key points in relation to clean-up (Figure 29). In third place come the **cost, the time availability and the logistics**, which are of course crucial for all structures, whether public or voluntary.

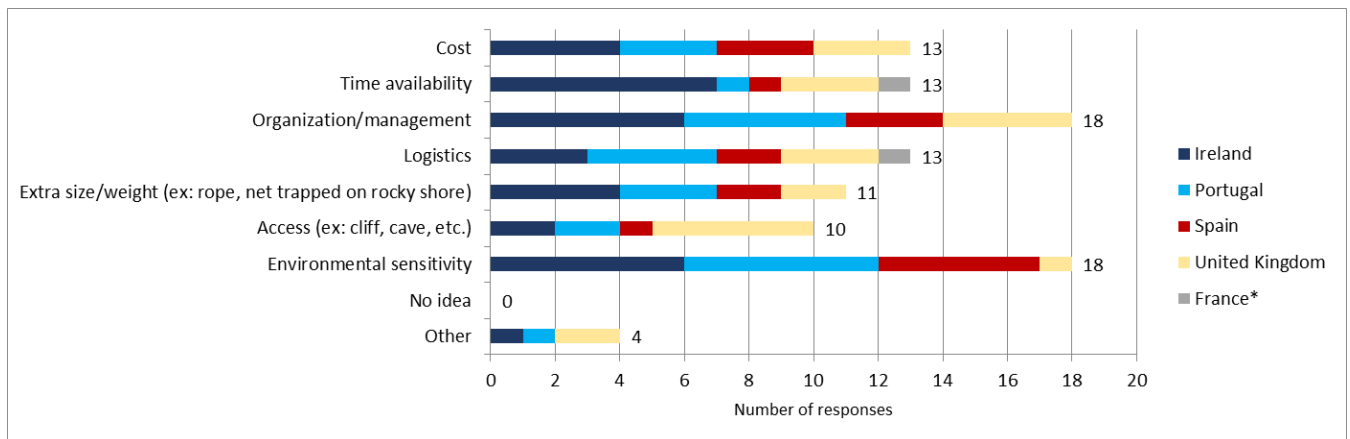


Figure 29 : Key factors to consider for coastline clean-up per country (35 respondents; several responses possible).

*For France, results have to be considered with caution due to the very limited number of responses. Complementary results obtained for France are detailed in another report (Cedre, 2021).

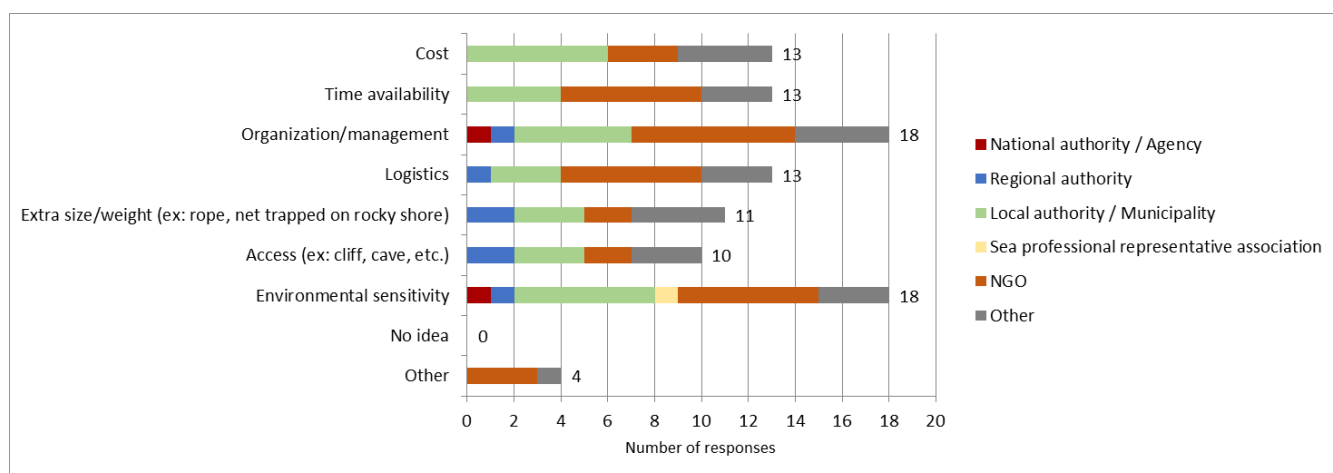


Figure 30 : Key factors to consider for coastline clean-up per type of organisation (35 respondents; several reponses possible)

The cost appears to be identified among the most determining factors (on a par with time availability and logistics) although respondents did not have a clear idea of the cost of a clean-up action.

Other limiting points also emerged from the comments left by the respondents like obtaining authorizations for the organization of clean-up actions or the disposal of collected litter.

5.1. Environmental considerations

To the question “are environmental issues taken into account”, the answer is almost unanimously yes (Figure 31). The issues listed first are the sensitivity of certain habitats (mainly dunes and strandlines), the presence of sensitive species – whether protected or not (in particular birds nesting on the foreshore) –and the sensitivity of certain substrates, mainly the risk of erosion caused by aggressive cleaning.

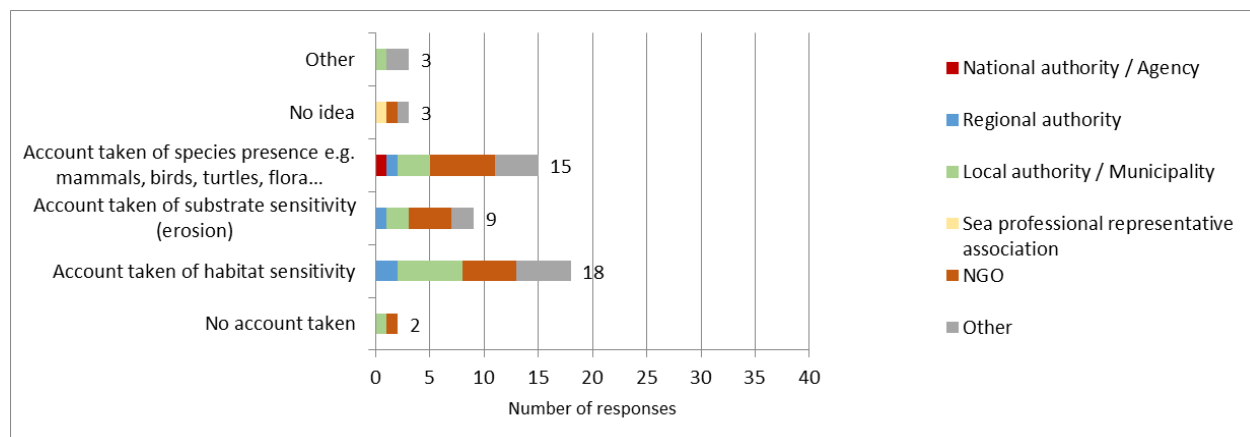


Figure 31: Environmental issues taken into account (35 respondents; several responses possible)

5.2. Type of cleaning

Manual collection is by far the preferred option (Figure 32) in the survey results. Mechanical collection, - much less implemented is generally associated with manual collection.

While almost all stakeholders involved in cleaning implement manual collection, this is not the case for mechanical cleaning, which is only organised by national and local authorities.

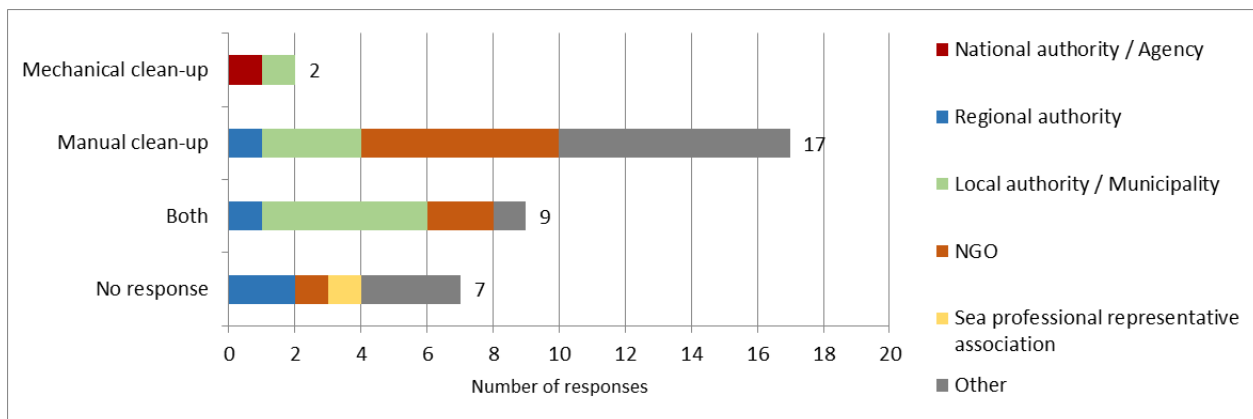


Figure 32: Types of cleaning per organisation type (35 respondents)

5.3. Resources involved

The workforce and equipment come from various sources (depending on who is organising the clean-up operations), but above all from NGOs and local councils (Figure 33).

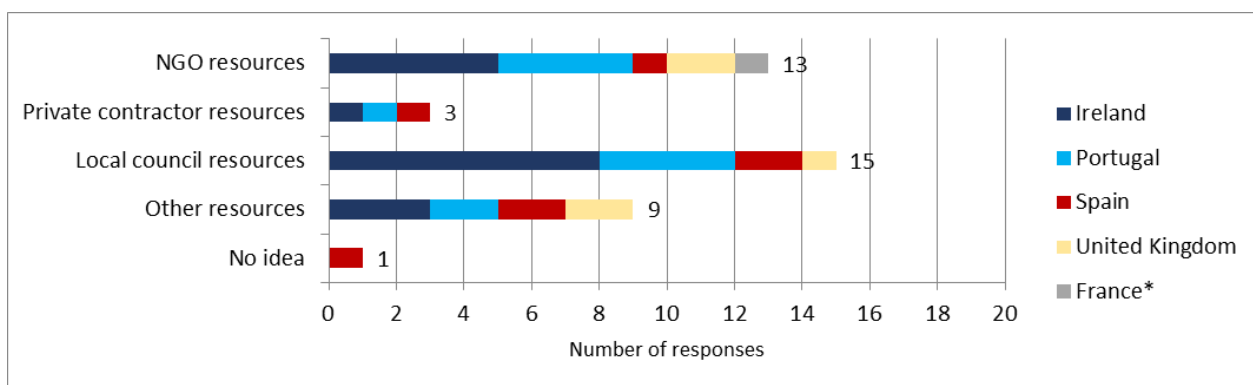


Figure 33: Origin of the resources used per country (35 respondents concerned; several responses possible).

*For France, results have to be considered with caution due to the very limited number of responses. Complementary results obtained for France are detailed in another report (Cedre, 2021).

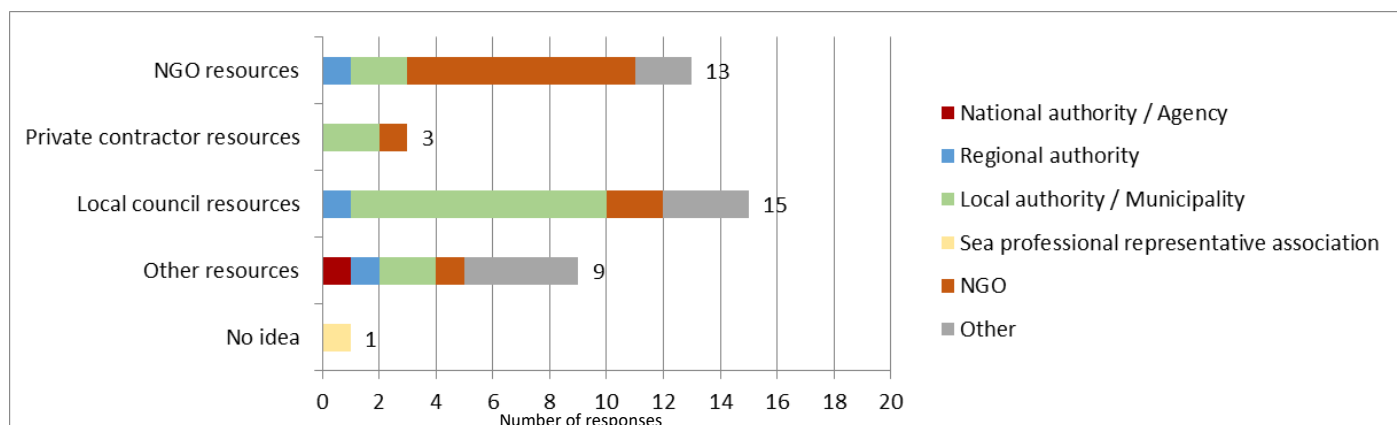


Figure 34 : Origin of the resources used per organisation type (35 respondents concerned; several responses possible)

With the help of volunteers, environmental associations organise opportunistic community beach clean-ups, and even national campaigns in the case of the largest associations. A large part of these operations are conducted on a voluntary basis (Figure 35).

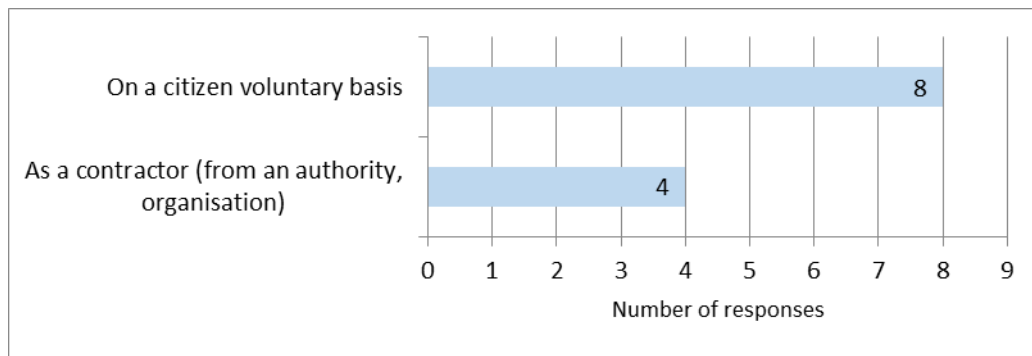


Figure 35: Nature of the associations' intervention (9 respondents)

Clean-up teams are often composed of more than 5 people, regardless of the operator or cleaning method.

The responses clearly highlight the high use of manual tools, regardless of the organizations that provide them. Other tools like sand-screening machines, rake machines or other mechanical equipments are less likely to be used, especially when NGOs provide the equipments (Figure 36).

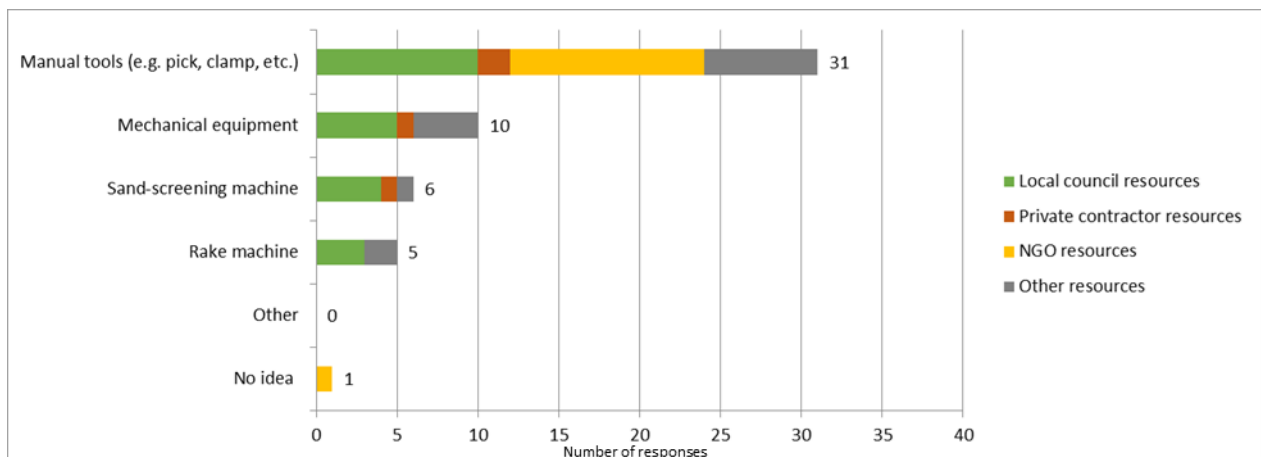


Figure 36: Cleaning equipments used (35 respondents; several responses possible)

5.4. Cleaning frequency

Unsurprisingly, the frequency of cleaning varies according to the season: monthly cleaning is the most common (for all types of cleaning), especially in winter (Figure 37). Cleaning efforts begin in the spring and continue through to the autumn, during which daily and weekly cleanings take priority over monthly cleaning, while in summer daily cleaning reaches its highest level.

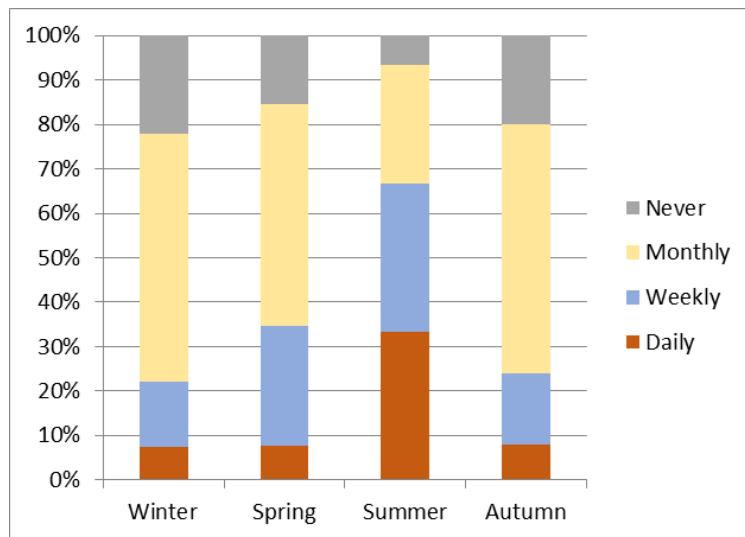


Figure 37: Frequency of coastal cleaning (%; 35 respondents)

5.5. Amount of litter collected annually

The majority of annual quantities reported by respondents are less than 100 m³ (Figure 38 and Figure 39). Only one respondent reported annual volumes greater than 100 m³.

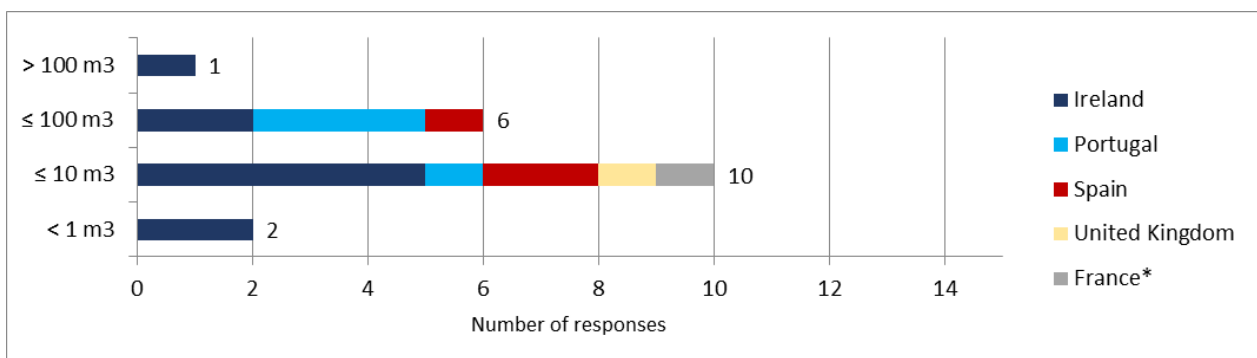


Figure 38: Volume (m³) of stranded litter collected annually by volume category and country (35 respondents).

*For France, results have to be considered with caution due to the very limited number of responses. Complementary results obtained for France are detailed in another report (Cedre, 2021).

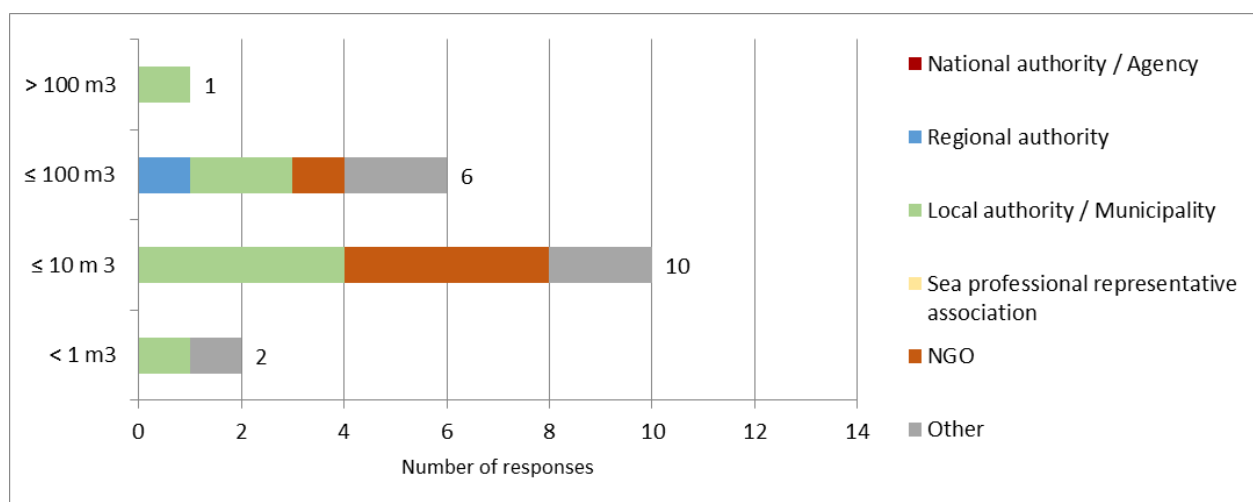


Figure 39 : Volume (m³) of stranded litter collected annually by volume category and organisation type (35 respondents).

5.6. Beach clean-up funding

Local councils are the structures that contribute financially the most to beach cleaning (Figure 40 and Figure 41).

The “others” funders of the cleaning actions are varied: aquarium participating financially, private funds of volunteers and associations, private entities or European and national funds (Federación Española de Municipios y Provincias (FEMP)). Most respondents who checked this category did not specify.

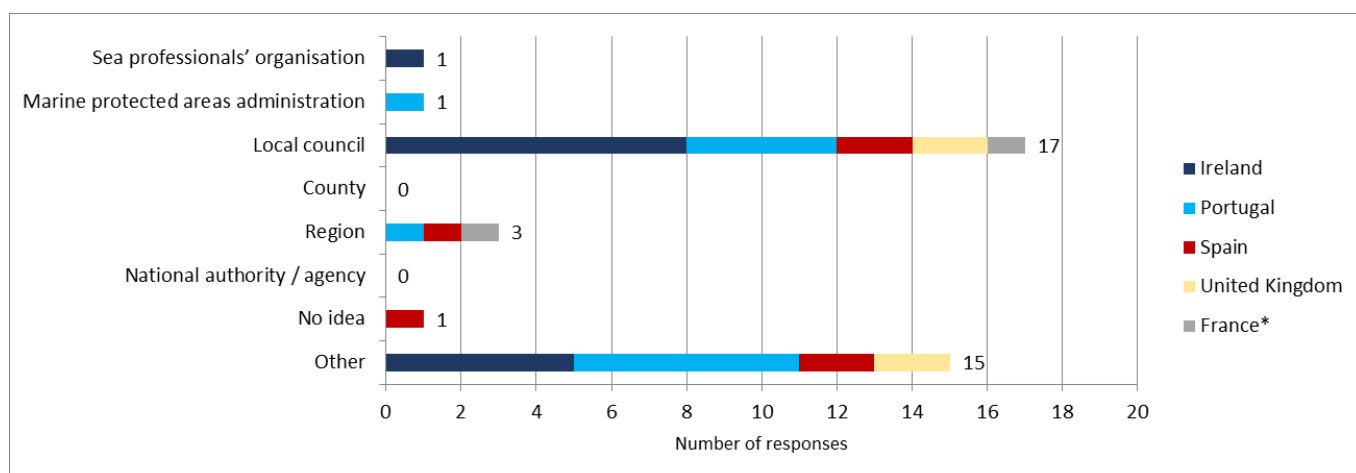


Figure 40: Types of organisation paying for cleaning operations per country (35 respondents).

*For France, results have to be considered with caution due to the very limited number of responses. Complementary results obtained for France are detailed in another report (Cedre, 2021).

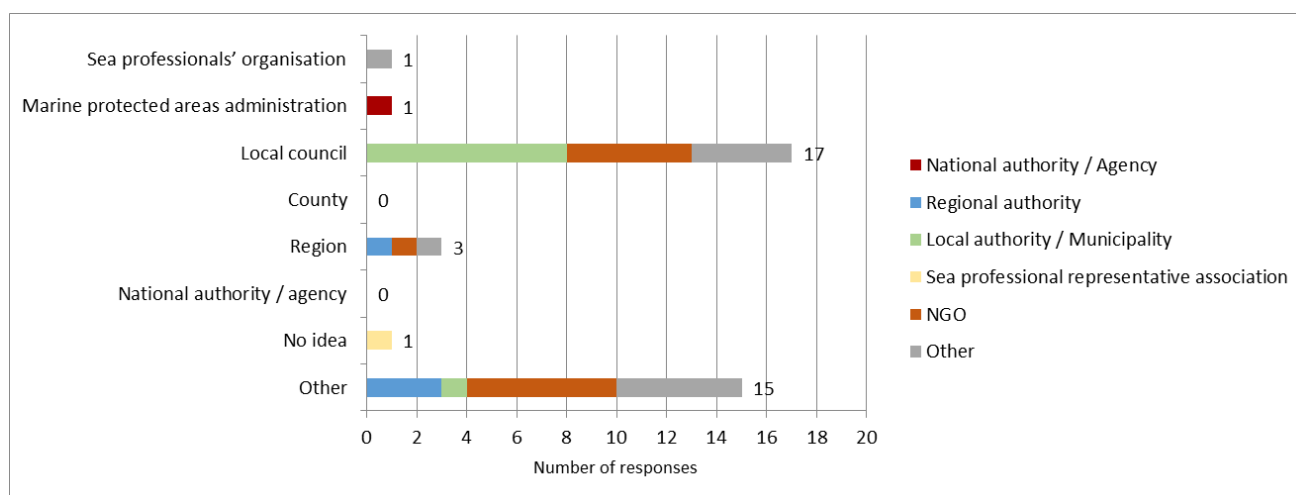


Figure 41 : Types of organisation paying for cleaning operations per organisation type (35 respondents)

5.7. Cost of clean-up operations

Overall, respondents (clean-up implementers or funders) either did not respond to this section or did not comment on the costs. There is therefore very little information on the costs associated with clean-up operations and litter removal/treatment. Clean-up operations vary considerably according to various parameters: volumes of stranded litter, local environmental characteristics (ecological and economic), coastal population density, site accessibility (in terms of remoteness, number of access points and hazardousness), and how many people are involved, e.g. Clean-up costs also vary according to the effort required.

Local councils were considered by respondents to be the major funders of clean-up operations. With regard to the costs of clean-up operations alone (without litter removal), one County Council Ireland estimated costs at €50k/year and the management of collected litter at €25k/year and €50k/year for the "other operations" category without specifying what these were. Regarding the total cost of the clean-up operations (collection and treatment of litter), another Irish county council specified paying €500 per skip for the deposit of litter at the landfill by volunteers. This council considers the global cost of these cleaning operations to be 200k€/year in relation to the annual council budget. These are the only two respondents who provided information on the costs associated with these operations funded by local councils.

Regarding "other" funders, the second most important category, only one respondent estimated the collection and management of operations at 2k€/year and 5k€/year when adding other ancillary costs (not mentioned in the comments).

No cost information was provided for other funders.

CONCLUSION

This report presents the results of the survey conducted in Ireland, Portugal, Spain and United Kingdom, starting with a description of the respondents, mainly coastal municipalities and non-governmental organisations or “other” organisations, such as local groups, universities, aquarium, e.g. ; their sectors of activity and roles in beach clean-up activities. Overall, 51 usable responses were obtained on a total of 207 responses, with 15 responses for Ireland, 14 for Portugal, 12 for Spain and 8 for United Kingdom. The number of responses appears to be limited which can be explained by difficulties in accessing the targeted stakeholders.

The main stranded litter accumulation sites are identified along the Atlantic coastline and different initiatives and measures of protection equipment to reduce litter washing up on the shore are presented. The survey identified a total of 117 key litter accumulation sites along the entire Atlantic area coastline. It is estimated that 32 of these sites receive more than 10 m³/year and can be considered to be marine litter hotspots.

The identification of principal beach clean-up techniques is also a part of the report, presenting the environmental considerations of the respondents and the overall clean-up operations, the resources involved and their cost. The main operators involved in the clean-ups are the local councils, which contribute financially the most to the clean-up operations. They can deploy various mechanical devices, like rakes and beach cleaners, in contrast to the NGOs for which manual cleaning seems to be the most frequent.

Finally, in contrast to the first release of the survey, little information on the costs associated with cleaning is given. However, it was noted that many aspects are taken into account such as the nature of the site to be cleaned, ecological and economic considerations or the resources available.

References

Cedre (2021): Report R.21.49.C .Identification of litter accumulation sites and clean-up techniques on the French coastline. Key findings of the online survey conducted in the framework of the CleanAtlantic project (WP7.4). http://www.cleanatlantic.eu/wp-content/uploads/2022/06/CA_WP7.4_Survey_report_final.pdf.

Appendices

Appendix 1: Beach litter online survey form

Appendix 2: Accumulation sites – Inventory, location and types of litter

Appendix 3: Hotspots (> 10 m³) - Inventory and types of site

Appendix 1: Beach litter online survey form

WELCOME TO THE BEACH LITTER SURVEY!

Thank you for taking the time to engage with this survey and assist with our research looking at best practices for dealing with marine litter on the shoreline.

What is marine litter?

Marine litter is defined as any solid material which has been deliberately discarded or unintentionally lost on beaches, on shores or at sea. The definition covers materials transported into the marine environment from land by rivers, draining or sewage systems or winds. It includes any persistent, manufactured or processed solid material. Originating from sources both on land and at sea, marine litter comprises a wide range of materials, including plastic, metal, wood, rubber, glass and paper (OSPAR).

What are beach litter accumulation sites and hot spots?

Under the effect of prevailing currents and winds, marine litter naturally tends to accumulate regularly in the same places along the coastline; it can also be trapped in natural (e.g. caves or rock faults) or anthropogenic (e.g. piers) structures. All these places where litter piles up constitute "accumulation sites", the most important of which are called "hot spots".

What is the purpose of this survey?

This survey is part of the European Interreg Atlantic Area CleanAtlantic project which aims "to address the problem of marine litter by improving data management, monitoring, modelling, mapping, and the collection of litter in the Northeast Atlantic". It is being disseminated simultaneously across the five countries involved in the project, namely: Ireland, United Kingdom, France, Spain and Portugal.

The objective of this survey is twofold: (i) to map the main points of waste accumulation on the coastline, and (ii) to draw up an inventory of the techniques and means used to clean up waste on the beaches in order to establish recommendations for good cleaning practices.

This survey should allow (i) a mapping of the main sites of arrival of waste on the coasts of the five Atlantic countries, and (ii) a better knowledge of the procedures of waste cleaning on the beaches of these countries. It will also contribute to meeting some of the objectives of the 'Regional Action Plan' of the OSPAR Convention (actions 54 and 56) and the 'Zero Plastic Waste at Sea' Roadmap of the Ministry of Ecological Transition (action 19).

This survey was disseminated in 2020, and in this year an update of the data obtained is carried out. The 2020 results are available on <http://www.cleanatlantic.eu/fr/marine-litter-in-the-atlantic-area/>

Accessing results of the survey?

A summary of the results (tables, graphs and maps) of the survey will be available in the next few months on the following page: <http://www.cleanatlantic.eu/results/>

Thank you!

This is an opportunity for you to make your beach litter experience known and share it within the European Atlantic Area. Do not hesitate to circulate this survey to those concerned with beach litter cleaning management (funding and/or implementation).

Thank you (in advance) for your time.

Questions?

If you have any questions, do not hesitate to send an e-mail to:

about the project (general contact): cleanatlantic@cetmar.org

about the survey: survey@cedre.fr and/or to the national partner (one per survey):

Ireland: Marine Institute

UK: Cefas

Spain: Cetmar

Portugal: DGRM

This survey is distributed with the technical and methodological support of D-SIDD.

General Data Protection Regulation (GDPR)

Here after are explained the reasons for the processing, the way we collect, handle and ensure protection of all personal data provided, how that information is used and what rights you may exercise in relation to your data (the right to access, rectify, block etc.).

Please note that:

- Data are collected in the framework of the EU-funded project CleanAtlantic;
- Contributions received from this survey will be used for research purposes. The purpose of the survey is mentioned above;
- Stakeholders contributions to the present survey are on a voluntary basis. The legal basis for processing is consent (Art. 6.1.a of the GDPR);
- Questions marked by an asterisk (*) are mandatory. Otherwise you will not be able to complete the questionnaire.
- Cedre (www.cedre.fr), as action leader of the CleanAtlantic project, is in charge of the survey;
- The survey will be carried out by Cedre with contribution from one national partner or NP (one NP per country – see after) aiming at (i) launching the questionnaire at national level towards national stakeholders, (ii) translating part of their answers and (iii) support partial analysis. NPs are as follows: Marine Institute (Ireland), Cefas (UK), Cedre (France), Cetmar (Spain,) and DGRM (Portugal)
- Each NP will provide a link for the questionnaire to ‘its’ national stakeholders. Each NP will respectively have access to data coming from ‘its’ national stakeholders;
- Data will be stored in the UK (on a dedicated LimeSurvey server) and will be managed from France by Cedre;
- All personal data (name, contacts) will be stored during the lifetime of the project;
- All personal data will be deleted one year after the last action in relation to the consultation;
- As a stakeholder, you are entitled to access your personal data and rectify, block or delete them in case the data is inaccurate or incomplete. You can exercise your rights by contacting Cedre (survey@cedre.fr).

SECTION 1: YOUR ORGANISATION AND YOUR BEACH LITTER 'AREA'

The purpose of the section 1 of the survey is to characterise your organisation, its geographic "area" (i.e. where you are involved in) and its connection with beach litter issue.

1.1. What is the name of your organisation?

1.2. What is the location of your organisation (Postal code)?

1.3. In terms of beach litter, which geographical area is covered by your organisation? *

(Important: this geographical entity corresponds to "your area" in the questionnaire)

- Region
 - Name of the Region :
 - Web site:
- Department
 - Name of the department :
 - web site:
- Group of communes
 - Name of the group of communes :
 - Web site
- Marine protected area / Protected natural site
 - Name of the MPA :
 - Postal code (for small area site)
 - Web site:
- County
 - Name :
 - Post/zip code :
- Other (specify):

1.4. What is the status of your organisation?*

- National authority / Agency
- Regional authority
- Local authority / Municipality
- Organisation in charge of the management of a Protected Natural Site
- Sea professional representative association
- NGO
- Private contractor (clean-up)
- Other

1.5. What is the main activity sector of your organisation?

- Policy / regulation / territorial management
- Protected area
- Fishing / Fish-farming
- Tourism
- Environmental protection
- Other

1.6. What is the responsibility of your organisation regarding beach litter clean-up? *

- Funding of clean-up operations

- Implementation of clean-up operations
- Outreach / Awareness
- Other

SECTION 2: BEACH LITTER ON YOUR SHORELINE AREA

The purpose of section 2 of the survey is to map in detail and characterise the main sites of litter accumulation on the shoreline.

2.1. Is beach litter an issue in your area?

- Yes, it is a major issue
- Yes, it is a medium issue
- Yes, it is a minor issue
- No issue

2.2. Where are the 3 most litter-affected sites in your area?

Please use the 3 maps below to separately pinpoint the locations of the 3 main areas of litter accumulation and describe the sites.

2.2.1. Site 1

What is the location of the site?

Please write your answer here:

Click to set the location or drag and drop the pin. You may also enter the name or the coordinates.
Use the "Zoom in" tool to see a more detailed view (for an accurate location of your site).

2.2.1. Site 1

What is the site name?

2.2.1. Site 1

What are the characteristics of the site?

- Mudflat /salt marsh
- Long sandy dune
- Sandy beach
- Pebble beach
- Rocky platform
- Rocky cove
- Cave
- Man-made structure
- Other:

2.2.1. Site 1

In your opinion, what is the approximate annual volume of litter at the site (order of magnitude)?

- 0.2-0.5m³
- ≤10 m³
- >10 m³

2.2.1. Site 1

In your opinion, what items/objects characterise the beach litter at this site?

(Example: plastic bottle, plastic food-packaging, rope, oyster bags, plastic debris, net, pallets etc.)

2.2.1. Site 1

Are pieces or objects of foamed EPS/XPS polystyrene (example: fish box, food containers...) a common issue at this site?

- No
- Yes
- Specify

2.3. Are pieces or objects made of foamed polystyrene (expanded or extruded - example: fish boxes, food containers, floats...) frequently observed in your area?

- No
- Yes
- Specify

SECTION 3: YOUR OPINION ABOUT BEACH LITTER ON YOUR SHORELINE AREA

Section 3 of the survey examines aspects related to the assumed main pathways, sources, and impacts of beach litter in your area.

3.1. In your opinion, which are the 3 major pathways of beach litter in your area?

- Don't know
- Seaborne
- Abandoned on the shoreline
- Land windborne
- River
- Urban storm drain
- Other

Feel free to give more details about pathways of beach litter in your area:

3.2. In your opinion, what are the 3 major sources of beach litter in your area?

- No idea / don't know
- Shipping sector
- Fishing sector
- Aquaculture sector
- Industry sector
- Port/harbour sector
- Urban drainage & waste water systems
- Tourism sector
- Shopping/food retail sector
- Recreational boating and fishing
- Other Leisure / sport (e.g. surfing, diving...)
- Other

Feel free to give more details about predicted sources of beach litter in your area:

3.3. During which season(s) does beach litter seem more abundant in your area?

- No idea / don't know
- No differences
- Winter
- Spring
- Summer
- Autumn

Feel free to give more details about the season(s) which beach litter seems more abundant in your area:

3.4. Do you think your area is particularly affected by beach litter?

- No idea / don't know
- No impact
- Minor impact
- Medium impact
- Major impact

3.5. In your opinion, what is the main beach litter impact in your area?

- Ecological impacts / fauna & flora
- Economic impacts / activity loss
- Economic impacts / damaged scenery
- Other

Feel free to give more details about the beach litter impacts in your area:

SECTION 4: EXISTING MEASURES TO REDUCE BEACH LITTER IN YOUR AREA

The purpose of this section is to describe incentive and/or protection measures, equipment or scheme that prevent or reduce litter from washing ashore.

4.1. Are there any incentive measures/schemes in your area to promote the reduction of litter?

- No idea / don't know
- No measure
- Yes: dedicated litter bin (photo 1)
- Yes: Signage, such as "The sea begins here" (photo 2)
- Yes: Other



Feel free to give more details about incentive measures in your area:

Do not hesitate to mention web site and send any relevant documents (leaflet, report, etc.) at the following addresses: survey@cedre.fr.

4.2. Are there any protection scheme/equipment that prevent/reduce litter from washing ashore present in your area?

- No idea / don't know
- No scheme/equipment
- Yes, Floating boom/net in front of beach
- Yes, Floating boom/net on nearby river
- Yes, Dedicated litter recovery vessel along the coast
- Yes, Specific tools within urban water drainage system
- Yes, Other

Feel free to give more details (types, location) about protection scheme/equipment in your area

4.3. Are there any eco-label programmes taking into account beach litter in your area?

Please use the "comments field" to specify the name of the eco-label programme.

- At local level :
- At regional level :
- At national level :
- At European level (example: Blue Flag):

Feel free to give more details about eco-label programme in your area:

SECTION 5: COST OF BEACH CLEANING

The purpose of section 5 of the survey is to collect information about the economic impact of beach litter in your area.

The total cost of beach litter cleaning operations includes: the litter recovery operations strictly speaking (incl. logistics) and possibly the management of the recovered beach litter (litter storage, transport and treatment - disposal, valorisation, etc.). Please be as precise as possible in your answers.

5.1. Who pays for the beach litter cleaning operations that you are involved in?

Please use the "comments field" to specify the name of the organisation.

- No idea / Don't know
- National authority / agency
- Region
- County
- Local council
- Marine protected areas administration
- Sea professionals' organisation
- Other

5.2. The National Authority / Agency pays for what and how much?

Please use the "comments field" to indicate the cost in k€/year.

- No idea / Don't know
- Only for litter cleaning operations
- Only for management of recovered litter
- For beach litter response in global (litter cleaning operations and management of recovered litter)
- For other operations

Feel free to give more details about the financial contribution of the Government / agency.

Please be as precise as possible in your answers.

Do not hesitate to mention links and send any relevant documents (leaflet, report, etc.) to the following addresses: survey@cedre.fr.

SECTION 6: IMPLEMENTATION OF BEACH CLEANING OPERATIONS IN YOUR AREA

The purpose of section 6 of the survey is to identify procedures and techniques used for beach cleaning operations that you are involved in in your area.

6.1. What are the main issues/key points that need to be considered for the beach cleaning operations in your area?

- No idea / don't know
- Environmental sensitivity
- Access (ex: cliff, cave, etc.)
- Extra Size/ weight (ex: rope, net trapped on rocky shore)
- Logistics
- Organization/management
- Time availability
- Cost
- Other:

6.2. Do the beach cleaning operations in your area take environmental issues into account?

Please feel free to use the "comments field" to specify how these environmental issues are taken into account.

- No idea / don't know
- No account taken
- Account taken of habitat sensitivity
- Account taken of substrate sensitivity (erosion)
- Account taken of species presence e.g. mammals, birds, turtles, flora...
- Other

6.3. Which type of clean-up are you using in your area?

- Mechanical clean-up
- Manual clean-up
- Both

6.4. What is the approximate annual volume of the total collected beach litter in your area?

Please specify, as accurately as you can in the comment field, the approximate total length of the shoreline cleaned (from which the litter is collected), as well as volume if >100 m³.

- <1 m³ (approx. length:)
- ≤10 m³ (approx. length:)
- <100 m³ (approx. length:)
- > 100 m³ (specify, if possible, approx. volume) (approx. length:)

6.5. Which resources are used for the beach cleaning operations that you are involved in?

- Local council resources
- Private contractor resources
- NGO resources
- Other resources
- No idea / don't know

6.5.1. How many people operate the beach cleaning operations (Local council resources)?

- <5
- ≥5

6.5.2. Which types of tool/equipment are used for the beach cleaning operations (Local council resources)?

- No idea / don't know
- Manual tools – please specify ((e.g. pick, clamp, etc.).
- Mechanical equipment - Please specify the mechanical equipment.
- Sand-screening machine
- Rake machine
- Other

Please use the "comments field" to specify the name brand & model / number of the mechanical equipment.

6.6. How often are the main beaches cleaned during the year (municipality resources)?

	Winter	Spring	Summer	Autumn
Daily				
Weekly				
Monthly				
Never				

6.7. If you have any other additional comment about improving beach cleaning operations and/or reducing ecological impact, please specify:

Question for NGOs only:

6.8. Are you involved in the beach cleaning operations:

- As a contractor (from an authority, organisation)?
- On a citizen voluntary basis?

6.9. How often are the main beaches cleaned-up in the beach cleaning operations that you are involved in?

	Winter	Spring	Summer	Autumn
Daily				
Weekly				
Monthly				
Never				

FINAL SECTION

The purpose of the final section of the survey is to mention relevant links and provide contact information.

Thank you very much for participating in our beach litter survey!

This was an opportunity for you to make your beach litter experience known and shared within the European Atlantic Area.

Do not hesitate to circulate this survey to those concerned with beach litter management.

**A summary of the results will be available in the next few months on the following page:
<http://www.cleanatlantic.eu/results/>**

If you have any questions about the project or the survey, do not hesitate to send an email to: survey@cedre.fr

If you accept to be further contacted about complementary questions and particular innovative measures/actions, please provide your contact details:

Thank you very much for participating in the beach litter survey!

Appendix 2: Accumulation sites – Inventory, location and types of litter

<i>Location of responding organisation</i>	<i>Name of litter accumulation site</i>	<i>Geographical coordinates of the site</i>	<i>Annual volume of litter (order of magnitude)</i>	<i>Items/objects that best characterise the litter found at this site</i>
Annual volume of stranded litter >10 m ³				
IRELAND				
Dublin, Ireland	Dollymount Strand	53.36504;-6.14925	>10 m ³	Plastic bottle, plastic food-packaging, rope, net food waste, cans, bottles
Lahinch, Ireland	Lahinch Blue Flag Beach	52.93268;-9.33666	>10 m ³	Majority of waste relates to public disposing of their waste inappropriately in the area, including plastic bottles, pizza boxes, coffee cups and plastic debris. This is a very popular and busy beach.
Galway, Ireland	Galway Bay	53.27245;-9.05095	>10 m ³	Plastic Debris, Fishing ropes & netting, Alcohol Glass Bottles & Aluminium Cans.
Dublin, Ireland	Sandymount Strand	53.31745;-6.20934	>10 m ³	Plastic bottle, plastic food-packaging, rope, plastic debris, net, animal excrement food waste, beer cans, glass bottles
Galway, Ireland	NA	53.245854;-9.248901	>10 m ³	Nets, Rope, Plastic Boxes, bottles
Moville, Ireland	Bredagh River Estuary	55.18765;-7.04639	>10 m ³	Mattress, Plastic Bottles, Cans, Rope, Tyres.
County Clare, Ireland	Spanish Point Blue Flag Beach	52.83979;-9.43211	>10 m ³	General plastic waste including plastic bottles from public use of beach area especially during busy summer period. Marine litter washed in from Ocean throughout year, especially following storms.
Galway, Ireland	Galway Bay	53.27245;-9.05095	>10 m ³	Plastic Debris, Fishing ropes & netting, Alcohol Glass Bottles & Aluminium Cans.
Mullaghroe North, County Clare, Ireland	Clarr coastal waters	52.95795;-9.45396	>10 m ³	Plastic bags, bottles fishing neys fishing cratrs, buoys
Clare, Ireland	Kilkee Blue Flag Beach	52.67976;-9.64344	>10 m ³	Plastic bottles, drinks cans, pizza boxes most common. Following storms more commonly plastic fish boxes and other types of boat waste marine litter.

Galway, Ireland	Galway Bay	53.27245;- 9.05095	>10 m ³	Plastic Debris, Fishing ropes & netting, Alcohol Glass Bottles & Aluminium Cans.
PORTUGAL				
Lisbon, Portugal	Costa da Caparica	38.67902;-9.1569	>10 m ³	Cigarette butts, microplastics, plastic bottles, plastic food packaging, cables, fishing nets, cotton buds and other sanitary items
Sao Martinho do Porto, Portugal	Sao Martinho do Porto	39.51444;- 9.13111	>10 m ³	Plastics, nets, cables, packaging
Matosinhos, Portugal	Matosinhos	41.62314;- 7.48877	>10 m ³	Cigarette butts, microplastics, plastic bottles, plastic food packaging, cables, plastic waste, fishing nets, cotton buds and other sanitary items
Peniche, Portugal	Baleal	39.3558;-9.38112	>10 m ³	Many plastic bottles, plastic food packaging, cables, oyster bags, many plastic waste, nets, pallets, many microplastics
Alges, Portugal	Alges	38.70245;- 9.22936	>10 m ³	Cigarette butts, microplastics, plastic bottles, plastic food packaging, cables, plastic waste, fishing nets, cotton buds and other sanitary items.
Foz do Arelho, Portugal	Foz do Arelho	39.43672;- 9.21374	>10 m ³	Plastic bottles, plastic food packaging, cables, oyster bags, plastic waste, nets
SPAIN				
Vigo, Spain	O Portino	43.35165;- 8.47389	>10 m ³	Plastic and garbage from municipal solid litter
Galicia, Spain	Litoral Gallego	42.03297;- 9.66797	>10 m ³	Plastics in general, garbage abandoned by people on the beaches, etc.
Boiro, Spain	Playa de Barraña	42.63865;- 8.88313	>10 m ³	Plastics in different formats, bottles, bags, plastic food containers, polystyrene boxes, plastic fragments of various sizes, wires of different compositions, honeycombs, compresses, masks, sticks, pallets, cans and bottles of various beverages, remains of fires that are dragged by rains and even trees, roots and some appliances

Galicia, Spain	Litoral Gallego	42.32769;- 9.19336	>10 m ³	Plastic debris in general, and garbage from containers and bags left by people on the beaches.
UNITED KINGDOM				
Argyll, Scotland (UK)	Craignish : West & NorthWest Coast.	56.50496;-6.9873	>10 m ³	ADIFG Ropes masses, trawl nets, Lines of tangled creels, single creels , creel sheaths, packaging straps, oil canisters/ bottles (5galon) Oil bottles (1L or 1/2L) gill nets, long lines, bale wrap, blue plastic, sheet plastic (reams) drink bottles- from many nations , food tubs, missile detector housing , plastic debris, sweet wrappers, fishing buoys, mussel bags, tubes, insulation, food containers ~ from many nations. Paint brush handles, buckets, even artificial turf, toothbrushes, combs, lighters, shot gun cartridges, short sections of ropes, knots from nets, short sections off gill net (8-10cm lengths), whole bundles of packaging straps ~ they disintegrate into microfibers/ dust. Parts of cars, flip flops, shoes, whole road bollards, traffic cones, etc. Predominately fishing.
Scouriemore, Scotland (UK)	Scouriemore	58.35181;- 5.15191	>10 m ³	When lost at sea, large buoys used in aquaculture that are filled with EPS break up on rocky shores and the EPS is dispersed along the shore.
Broadstairs, Great Britain	Viking Bay	51.36335;1.4454	>10 m ³	Fishing nets and ropes, fish boxes, fish farm pipes, fish boxes, oil drums, buoys, plastic associated with fishing and aquaculture
Isle of Skie, Scotland (UK)	Watnish	57.55342;- 6.63245	>10 m ³	Marine industry litter - rope, netting, fish boxes, buoys, plastic containers, black plastic piping and buoyancy tanks from fish farms, banding straps from bait boxes.
Flexbury, Great Britain	'Crap' Cove	50.84074;- 4.55598	>10 m ³	Fishing gear, rope, big plastic barrels, small plastics. All international.
Hynish, Scotland (UK)	Kilkenneth to Baugh	56.44402;- 6.90422	>10 m ³	With the increase of sweet wrappers nearing the hamlet of Crossopol, The long beaches, rocky outcrop shores and pebbly beaches all collect debris, continually, no coastline escapes apart from where smooth rocks goes into the sea.
Durness, Scotland (UK)	Balnakeil Bay, Kyle of Durness (beach and estuary system)	58.56829;- 4.74632	>10 m ³	Fishing nets and ropes, buoys, fish boxes, fish farm pipes, fish boxes, oil drums, plastic associated with fishing and aquaculture is blown by storms and accumulates behind the tide line. In this area we also see an accumulation of thick cotton webbing associated with flares and bombs from the local Ministry of Defence firing range on Cape Wrath. At the bottom of the

				estuary in the mudflats you see an accumulation of dense plastics, old buoys made of old brittle thermoset plastics, and this webbing. The webbing is also prevalent on Balnakeil Beach accounting for approx one third of pollution removed in the area.
Isle of Skye, Scotland (UK)	Ullinish	57.34969;- 6.46216	>10 m ³	Marine Industry litter - Rope, netting, fish boxes, buoys, plastic containers, black plastic piping and bouyancy tanks from fish farms, banding straps from bait boxes.
Laid, Scotland (UK)	Whiten Head	58.48022;- 4.73087	>10 m ³	When lost at sea, large buoys used in aquaculture which are filled with EPS breakdown on rocky shores and EPS get dispersed along the shore.
Broadstairs, Great Britain	Joss Bay	51.37984;1.44603	>10 m ³	Plastic bottles. Waste from fishing boats. Microplastics. Waste from people visiting the beach.
Isle of Skye, Scotland (UK)	Camasunary Bay	57.18987;- 6.11856	>10 m ³	Marine industry litter - rope, netting, fish boxes, buoys, plastic containers, black plastic piping and bouyancy tanks from fish farms, banding straps from bait boxes.
Annual volume of stranded litter ≤ 10 m ³				
IRELAND				
Claddagh, Ireland	Grattan Beach	53.26283;- 9.05789	≤10 m ³	Soiled Wipes (wet wipes) plastic bottles, assorted litter types
Goleen, Ireland	Goleen	52.64265;- 9.73487	≤10 m ³	Domestic and marine fisheries waste
Moville, Ireland	Moville Shore Front	55.18771;-7.0389	≤10 m ³	Plastic Bottles, Fishing Gear, Rope, Plastic Debris, Styrofoam, Cans
Muir Éireann, Ireland	Gormanston Beach	53.63857;- 6.21506	≤10 m ³	Plastic bottles, aluminium cans, dog poo bags, food waste, plastic packaging, disposable BBQ grills.
Ringaskiddy, Ireland	Loughbeg beach	51.83244;- 8.30343	≤10 m ³	Plastic bottles, Cans, Glass bottles, Nappies, General rubbish, Blankets, Tents

Irska, Ireland	Mornington beach	53.71678;- 6.24985	≤10 m ³	Plastic and aluminium can single use food and beverage items, nappies, dog fouling
Skerries, Ireland	Area between Skerries harbour wall and slipway for RNLI lifeboat station	53.58535;- 6.10607	≤10 m ³	All marine litter types. It seems to accumulate here due to tidal movements and the fact the site is tucked into a corner.
Fanore, Ireland	Fanore	53.12078;- 9.28798	≤10 m ³	Fishing industry waste and recreation users waste.
Bettystown, Ireland	Bettystown beach	53.69411;- 6.24298	≤10 m ³	Food and beverage related packaging, camping items - bbq, cans, bottles: items left behind by beach visitors.
Waterford, Ireland	Moran's Poles	52.27066;- 6.98897	≤10 m ³	Plastic bottles, food packaging, crisp bags, coffee cups, net, rope.
Skerries, Ireland	Skerries Harbour	53.58517;- 6.10567	≤10 m ³	All kinds of marine litter. Lots of plastic bottles some of which are thrown in; others are blown in and yet more are carried by tide. I think tidal movement plays a big part in pushing litter into this sheltered area. In addition, there are no bins or waste disposal facilities at the harbour or on the pier, so waste accumulates on pier and inevitably a portion of it blows or falls into the sea. There is a significant amount of fishing and boat waste in the area. I found a ship's cooker and 16 loose car tyres as well as fish crates at low tide.
Waterford, Ireland	Ryan's Shore	52.25937;- 6.99671	≤10 m ³	Plastic bottles, food packaging, crisp bags, coffee cups, net, rope.
Skerries, Ireland	Skerries North Beach	53.58232;- 6.10685	≤10 m ³	All marine litter types. Accumulates in seaweed at high water mark. Food and drink containers, fishing gear, random plastic fragments.
PORTUGAL				

Horta, Acores, Portugal	Praia do Porto Pim	38.52485;- 28.62757	≤10 m ³	Plastic bottles, ropes, plastic waste, microplastics
Selvagens island, Portugal	Selvagem Pequena	30.03353;- 16.02624	≤10 m ³	Plastic bottles, food packaging, cables, nets and other waste from fishing and cargo shipping activities
Peniche, Portugal	Baleal	39.37365;- 9.33872	≤10 m ³	Ropes, crab traps, creels, styrofoam and plastic fragments, fragments of surfing material including wax/paraffin, fragments of plastic bags and strips, capsules, plastic food packaging, cotton buds, biofilm filters, pellets
Castelo do Neiva, Portugal	Castelo do Neiva	41.61491;- 8.81101	≤10 m ³	Plastic bottles, octopus traps, styrofoam and plastic fishing boxes.
Porto da Cruz, Portugal	Maiata	32.76846;- 16.82271	≤10 m ³	Cables, fishing boxes, pieces of nets, octopus traps, buoys, etc.
Marchil, Portugal	Ludo	37.01247;- 7.98479	≤10 m ³	Plastic bottles, plastic and metal food packaging, nets, abandoned boats and fiber scraps, tires, styrofoam plates, household appliances, and construction debris.
Serra de Fora, Portugal	Calhau da Serra de Dentro	33.08351;- 16.29918	≤10 m ³	Fishing materials (nets, boxes, galoshes and starlight), plastic bottles, plastic fragments, wood, and styrofoam.
Corvo, Acores, Portugal	Praia da Areia	39.67245;- 31.12162	≤10 m ³	Plastic bottles, microplastics.
Selvagens island, Portugal	Selvagem Grande - Calhau de Ferro	30.14928;- 15.85808	≤10 m ³	Plastic bottles, food packaging, cables, nets and other waste from fishing and cargo shipping activities
Ribeira de Anha, Portugal	Foz da Ribeira de Anha	41.67301;- 8.82547	≤10 m ³	Plastic and glass bottles, medicine packaging, food packaging, nets, octopus traps, rope and string.

Ponta de Sao Lourenço, Portugal	Costa Norte da Ponta de Sao Lourenço	32.74922;- 16.70336	≤10 m ³	Cables, fishing boxes, pieces of nets, octopus traps, buoys, etc.
Fonte da Areia, Portugal	Calhau da Fonte da Areia	33.08776;- 16.35617	≤10 m ³	Fishing materials (nets, boxes, galoshes, starlight), plastic bottles, plastic fragments, wood, and styrofoam.
Santa Cruz, Portugal	Praia das Amoeiras	39.13286;- 9.38567	≤10 m ³	Styrofoam fragments, construction litter, capsules, plastic food packaging, tarmac.
Fornelos, Portugal	Praia de Fornelos (proximidades)	41.74798;- 8.87817	≤10 m ³	Ropes, string, fishing nets, bottles.
Serra de Fora, Portugal	Calhau da Serra de Dentro	33.06442;- 16.29555	≤10 m ³	Cables, fishing boxes, pieces of nets, octopus traps, buoys, etc.
Moncarapacho, Portugal	Zona intertidal circundante a praia dos Cavacos	37.03612;- 7.79697	≤10 m ³	Plastic bottles, tires, cables.
Serra de Fora, Portugal	Serra de Fora	33.06191;- 16.29526	≤10 m ³	Fishing materials (nets, boxes, galoshes and starlight), plastic bottles, plastic fragments, wood, and styrofoam.
SPAIN				
Pontevedra, Spain	Praia da Xunqueira	42.28646;- 8.72938	≤10 m ³	Waste plastics, polyethylene food packaging and nets
San Cibrao, Spain	Caosa	43.69487;- 7.44031	≤10 m ³	Plastic bottles, plastic food containers, ropes, plastic fragments, nets or netting, plastic crates, plastic bottles, plastic bottles, plastic bottles, plastic food containers, plastic food packaging, plastic ropes, plastic fragments, plastic nets or netting waste, plastic boxes

Vilanova de Arousa, Spain	Arino	42.56201;-8.833	≤10 m ³	Wheels, plastics bottles.
Pontevedra, Spain	Semoino	42.55756;-8.87395	≤10 m ³	Plastic bottles, ropes, tires, nets.
Eistero, Spain	Lordelo	42.49714;-8.8714	≤10 m ³	Ropes, remains of wood, plastics, abandoned boats, anchors, remains of nets...
Pontevedra, Spain	Praia do Con	42.27092;-8.74056	≤10 m ³	Plastic stick, plastic ropes of the mytilliculture activity, various plastic wastes.
Lugo, Spain	Portelo	43.69254;-7.43346	≤10 m ³	Plastic bottles, plastic food containers, ropes, plastic fragments, nets or net scraps, plastic crates, buoys, fish boxes, fish boxes.
Esteiro, Spain	Esteiro	42.55959;-8.82567	≤10 m ³	Plastics, tires, remain of fishing gear, bricks and cigarette butts.
Pontevedra, Spain	As Acenas	42.53507;-8.87446	≤10 m ³	Plastic bottles, ropes, nets, tires.
Pontevedra, Spain	Porto Meloxo	42.49015;-8.88465	≤10 m ³	Ropes, tires, nets, wood, glass, microplastics, microplastics.
Pontevedra, Spain	Enseada do Con	42.27298;-8.73859	≤10 m ³	Plastic bottles, leftovers from the port activity, cables, plastic fragments.
San Cibrao, Spain	Ensenada de Coido	43.69094;-7.42143	≤10 m ³	Plastic bottles, plastic food containers, ropes, plastic fragments, nets or net scraps, wooden pallets, pieces of boats, wood, pots, buoys.

Pontevedra, Spain	Casa da Toxa	42.49353;- 8.83574	≤10 m ³	Plastics, oyster baskets, polystyrene waste, nets, etc.
UNITED KINGDOM				
Walton-on-the-Naze, Great Britain	Northern Naze foreshore (approx 1 mile of beach)	51.8661;1.29295	≤10 m ³	Washed up plastic bottles, debris from boats eg fenders and ropes, polystyrene, and thousands of plastic cotton bud stems being washed down the Stour from Brantham where a previous industrial operation discarded them in large volumes.
Walton-on-the-Naze, Great Britain	Corner of Walton Mere adjacent to the Backwaters	51.85058;1.27085	≤10 m ³	Plastic bottles, polystyrene, plastic debris.
Broadstairs, Great Britain	Stone bay	51.36293;1.44702	≤10 m ³	SITE 1 – 2022-256
Bude, Great Britain	Crooklets	50.83593;- 4.55396	≤10 m ³	Microplastics predominantly, fishing litter.
Isle of Tiree, Scotland (UK)	Gott Bay to the furthest point of Coaslus South/West Coast.	56.5225;-6.76586	≤10 m ³	Packaging, tonnes sacks, reams of sheet plastics, agricultural sacks, coal sacks.
Walton on the Naze, Great Britain	Esplanade Beach	51.85018;1.2747	≤10 m ³	Anything dropped by tourists - glass bottles, cans, wet wipes, plastic food packaging and drink cups, sweet/ice cream/picnic wrappers, plastic bottles and drinks containers, plastic beach toys, cigarette butts by the thousand. This is nearly all dropped on the beach by people rather than being washed up, although when the tide comes in, it enters the sea and is washed along the beach.
Flexbury, Great Britain	Mear	50.83845;- 4.55557	≤10 m ³	Fishing waste, plastic debris.
Annual volume of stranded litter: 0.2-0.5m ³				
IRELAND				

Doonaha, Ireland	Doonaha Beach - Glaisin Beach	52.6159;-9.65046	0.2-0.5m ³	Fishing tackle, nets, line, plastic bottles, sweet wrappers, glass bottles, drink cans, old shoes, bits of wood, oil canisters and gas containers, soda bottles, random items, kids plastic toy debris, plastic food packaging.
Waterford, Ireland	Cheekpoint	52.27216;-6.99364	0.2-0.5m ³	Plastic bottles, food packaging, crisp bags, coffee cups, net, rope.
Preston Hill, County Meath, Ireland	Bettystown Beach	53.6367;-6.28418	0.2-0.5m ³	Sweet related litter, packaging items, food related litter, plastic bottles.
Lisheencrona, County Clare, Ireland	Haugh's Beach	52.61587;-9.67741	0.2-0.5m ³	Old wellingtons, fishing gear, rope, plastic debris - bottles, food packaging etc, golf balls, tennis balls, beach toys.
Ringaskiddy, Co. Cork, Ireland	Gobby beach	51.82721;-8.30063	0.2-0.5m ³	Plastic bottles, dog food bags, glass bottles
Doonaha, County Clare, Ireland	Barnalough	52.6192;-9.63853	0.2-0.5m ³	Plastics of all types, fishing net debris, rope, pallets, oyster bags, food packaging.
Moville, County Donegal, Ireland	Moville Front Shore	55.18862;-7.02919	0.2-0.5m ³	Plastic Bottles, Fishing Gear, Rope, Plastic Debris, Styrofoam, Cans.
Laytown, County Meath, Ireland	Laytown	53.68008;-6.23852	0.2-0.5m ³	Small amount of single use food and beverage packaging, debris from fishing boats, etc.
PORTUGAL				
Monte Gordo, Portugal	Zonas de praia nao vigiadas, nao concessionadas	37.17414;-7.47228	0.2-0.5m ³	Plastic bottles and packaging, cigarette butts.
Estreito da Calheta, Portugal	Praia da Gale	32.72218;-17.18118	0.2-0.5m ³	Cigarette butts; Polystyrene (styrofoam) fragments; Plastic fragments; Covers and closures; Napkins, paper handkerchiefs, toilet paper; Sanitary articles, of which wet wipes.
Costa da Caparica, Portugal	Fonte da Telha	38.56743;-9.19272	0.2-0.5m ³	Cigarette butts and filters, cotton buds, caps and lids, pellets, plastic food packaging.
Quelfes, Portugal	Parque Natural da Ria Formosa	37.02921;-7.81026	0.2-0.5m ³	Plastic bottles, plastic and metal food packaging and fishing lines.
Funchal, Portugal	Praia do Gorgulho - Cais do Carvao	32.63605;-16.93542	0.2-0.5m ³	Plastic bags, cigarette filters and other small plastic litter.
SPAIN				
Castiñeiras, Spain	Castineiras	42.5318;-8.99678	0.2-0.5m ³	The debris carried by the tides, which bring different types of garbage and remain on the sand when the tide goes out.
Peralto, Spain	Muelle Escarabote	42.63559;-8.90097	0.2-0.5m ³	Area frequented by teenagers in summer and adults who are engaged in fishing all year, there are usually among the stones bottles, cans, plastic of all kinds remains of various things, butts, honeycombs, compresses, remains of

				yogurts and bottles of different sweet or salty, remains of boxes, branches, sticks of rafts
Aduana de Corón, Spain	Corón	42.57648;-8.80932	0.2-0.5m³	Plastic bottles, plastic food containers, ropes, nets, wood from rafts...
UNITED KINGDOM				
Cromer, Great Britain	East Runton beach	52.93723;1.27377	0.2-0.5m³	Plastic crab pot coatings, plastic string/rope, polystyrene/Styrofoam (used on crab pot marker flags), plastic nurdles, misc. plastic, dog poo bags, wet wipes.
		52.93738;1.27253		
FRANCE*				
*For France, results have to be considered with caution due to the very limited number of responses. Complementary results obtained for France are detailed in another report (Cedre, 2021).				
Audierne, France	Baie d'Audierne	47.63833;-3.21597	0.2-0.5m³	NA
Plouharnel, France	Plouharnel	47.6431;-3.2113	0.2-0.5m³	Plastic bottles and mesh nets.
Annual volume of stranded litter: unspecified				
IRELAND				
Magherard, County Donegal, Ireland	NA	55.28576;-7.26952	NA	NA
Munhin, County Mayo, Ireland	NA	54.15459;-9.78882	NA	NA
Richmond Grange, County Meath, Ireland	NA	53.58761;-6.32812	NA	NA
PORTUGAL				
Horta, Portugal	Praia de Porto Pim	38.52447;-28.62578	NA	Microplastics
		38.52472;-28.62565		
Corvo, Portugal	Praia da Araia	39.67241;-31.1216	NA	NA
		39.67233;-31.12166		
Vitoria, Portugal	Porto Afonso na ilha Graciosa	39.07583;-28.06306	NA	Plastic debris.

Vitoria, Portugal	Porto Afonso	39.06614;- 28.06717	NA	NA
SPAIN				
Celeiro, Spain	Ria De Viveiro	43.67979;- 7.60529	NA	Bottles, containers, bags.
Gipuzkoa, Spain	Golfo de Bizkaia	43.37311;- 2.24121	NA	Fragments or small plastic containers mainly from litter generated on land.
Islas Canarias, Spain	Islas Canarias	27.58035;- 16.10156	NA	Fragments of plastic, net debris.
Viveiro, Lugo, Spain	NA	43.66228;- 7.59344	NA	NA
NA, Spain	Mar de Alboran	36.25756;- 2.95313	NA	Plastic fragments, plastic bottles and containers.
Louro, Spain	Demarcación noratlántica	42.69515;- 9.17578	NA	Net debris, ropes and plastic fragments.

Appendix 3: Hotspots (> 10 m³) - Inventory and types of sites

HOTSPOTS (>10 m ³)			
<i>Location</i>	<i>Name</i>	<i>Geographical coordinates of the site</i>	<i>Geographical characteristics of the site</i>
IRELAND			
Dublin, Ireland	Dollymount Strand	53.36504;-6.14925	Sandy beach, long sandy dune
Lahinch, Ireland	Lahinch Blue Flag Beach	52.93268;-9.33666	Sandy beach
Galway, Ireland	Galway Bay	53.27245;-9.05095	Mudflat/salt marsh, sandy beach, pebble beach
Dublin, Ireland	Sandymount Strand	53.31745;-6.20934	Sandy beach, man-made structure
Galway, Ireland	NA	53.245854;-9.248901	Pebble beach, rocky platform
Moville, Ireland	Bredagh River Estuary	55.18765;-7.04639	River mouth
County Clare, Ireland	Spanish Point Blue Flag Beach	52.83979;-9.43211	Sandy beach
Galway, Ireland	Galway Bay	53.27245;-9.05095	Mudflat/salt marsh, sandy beach, pebble beach
Mullaghroe North, County Clare, Ireland	Clarr coastal waters	52.95795;-9.45396	NA
Clare, Ireland	Kilkee Blue Flag Beach	52.67976;-9.64344	Sandy beach
Galway, Ireland	Galway Bay	53.27245;-9.05095	Mudflat/salt marsh, sandy beach, pebble beach
PORTUGAL			
Lisbon, Portugal	Costa da Caparica	38.67902;-9.1569	Sandy beach

Sao Martinho do Porto, Portugal	Sao Martinho do Porto	39.51444;-9.13111	Sandy beach
Matosinhos, Portugal	Matosinhos	41.62314;-7.48877	Sandy beach
Peniche, Portugal	Baleal	39.3558;-9.38112	Sandy beach
Alges, Portugal	Alges	38.70245;-9.22936	Sandy beach
Foz do Arelho, Portugal	Foz do Arelho	39.43672;-9.21374	Sandy beach
UNITED KINGDOM			
Argyll, Scotland (UK)	Craignish : West & NorthWest Coast.	56.50496;-6.9873	Long sandy dune, sandy beach, pebble beach, rocky platform, rocky cove
Scouriemore, Scotland (UK)	Scouriemore	58.35181;-5.15191	Rocky cove
Broadstairs, Great Britain	Viking Bay	51.36335;1.4454	Sandy beach
Isle of Skie, Scotland (UK)	Waternish	57.55342;-6.63245	Pebble beach, rocky cove
Flexbury, Great Britain	Crap' Cove	50.84074;-4.55598	Pebble beach
Hynish, Scotland (UK)	Kilkenneth to Baugh	56.44402;-6.90422	Sandy beach, pebble beach, rocky platform, rocky cove
Durness, Scotland (UK)	Balnakeil Bay, Kyle of Durness (beach and estuary system)	58.56829;-4.74632	Long sandy dune
Isle of Skye, Scotland (UK)	Ullinish	57.34969;-6.46216	Pebble beach, rocky cove
Laid, Scotland (UK)	Whiten Head	58.48022;-4.73087	Pebble beach

Broadstairs, Great Britain	Joss Bay	51.37984;1.44603	Sandy beach,
Isle of Skye, Scotland (UK)	Camasunary Bay	57.18987;-6.11856	Pebble beach
SPAIN			
Vigo, Spain	O Portino	43.35165;-8.47389	Rocky cove, man-made structure
Galicia, Spain	Litoral Gallego	42.03297;-9.66797	Long sandy dune, sandy beach, pebble beach, rocky platform
Boiro, Spain	Playa de Barraña	42.63865;-8.88313	Sandy beach
Galicia, Spain	Litoral Gallego	42.32769;-9.19336	Mudflat/salt marsh, long sandy dune, sandy beach, rocky platform,