

End of Life Recreational Vessels

Work Package 1

Final Report

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Limitations

This report has been produced by Resource Futures on behalf of Defra. Whilst Resource Futures has taken all due care to interpret and collate the information presented within the report, any third party relying on the results of the analysis shall do so at their own risk and neither Resource Futures nor Defra shall be liable for any loss or damages arising there from.

Executive Summary

End-of-life recreational vessels, if abandoned, can lead to harmful materials such as hazardous chemicals, litter and microplastics spreading in the marine environment. This work looked to understand this problem, in line with the UK's commitment to lead action B.2.1 of the OSPAR Regional Action Plan on Marine Litter¹. The objectives of this work were to:

- Establish the volume, location and type of materials in this waste stream;
- Establish the current waste management options and barriers in the UK; and
- Identify potential policy options to prevent recreational vessel abandonment and improve waste management.

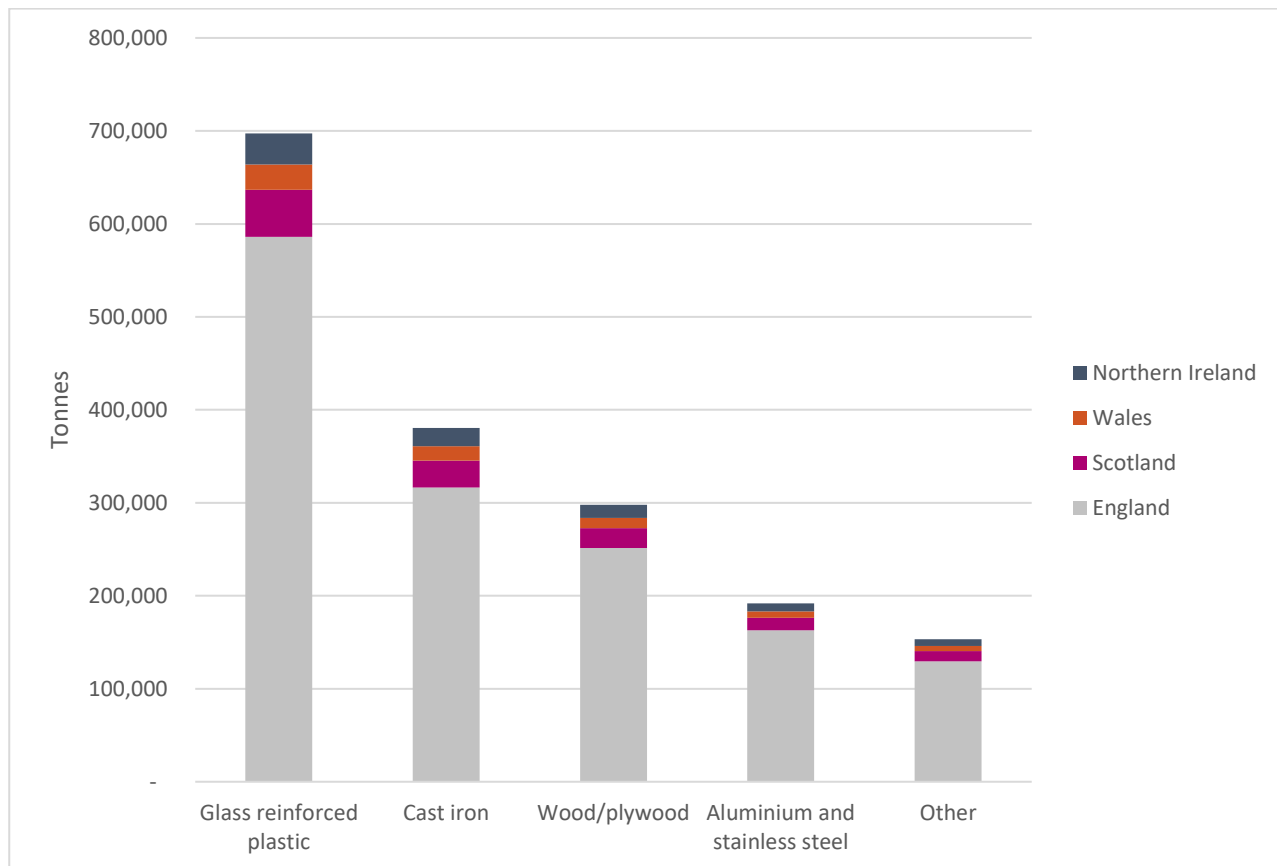
Desk-based research, stakeholder interviews and a workshop were conducted to inform the work. A full description of the methodology, data and assumptions used in the work is given in the body of this report. While the qualitative information gathered during the work was highly detailed, quantitative data on the topic are unreliable, and significant further primary data collection is required to verify all estimates.

It is estimated that there are almost 550,000 recreational vessels² currently owned in the UK, with over 450,000 in England. These estimates must be heavily caveated, as there is currently no mandatory registration of recreational vessels in the UK, and numerous assumptions had to be made to reach a sensible approximation given estimates of recreational vessels at an EU level, and reasonable assumptions on per capita ownership.

The estimated number of vessels per nation was multiplied by estimates of the weight of components in eight different recreational vessel types. Again, the vessel profiles must be heavily caveated, as few stakeholders were able to assist with the development of these profiles, and there is significant variation in size within each vessel category. Glass reinforced plastic (GRP) is the dominant material stream, with an estimated 700,000 tonnes currently in use in recreational vessels across the UK. For cast iron and wood/plywood, this figure is estimated at 400,000 tonnes and 300,000 tonnes, respectively (Figure ES 1). Estimates of vessels reaching end-of-life annually in Europe and France suggest that the proportion of material in use likely to appear as waste arisings annually is between 0.1% and 2.2%.

¹ [OSPAR \(2022\) OSPAR Regional Action Plan on Marine Litter \[accessed 2 February 2023\]](#)

² This includes small sailing boats, sailing yachts, power boats, day motor boats, other motor boats, rowing boats / sculls, and sports boats and RIBS. It excludes canal boats, canoes/kayaks, windsurfers and personal watercraft such as jet skis.

Figure ES 1: National scale up of materials in use in recreational vessels in the UK, by material type

There are very few companies in the UK that will handle a vessel at end-of-life. Transport to those available is often a significant part of the disposal cost. Vessels can be incinerated or landfilled, and while landfill is expensive it is currently the cheapest option. Recycling of GRP is currently limited, but it is a priority for the future. Wood, metal and fixtures and fittings can be recycled, but the materials are not of high value and recycling is rarely achieved in practice. Reuse of vessels is common, in terms of selling vessels on to second or third (etc.) owners. However, boats nearing their end-of-life are often sold for small amounts, much less than the costs of sound waste management when they are no longer fit for purpose.

There are several key barriers to legal waste management of vessels by owners. Firstly, waste management is costly, and the infrastructure to process recreational vessels is lacking. There is also uncertainty amongst owners in terms of how to dispose of a boat, and there can be a lack of knowledge upon purchasing a boat on the cost of maintenance, repair and disposal, particularly when the vessel has been bought for a low price. Finally, it can be hard to trace owners who have abandoned vessels, so there is little risk associated with this behaviour. Recreational vessel abandonment is a growing problem for landowners who then must take responsibility for the cost. While there was no consensus among stakeholders interviewed on the type of vessel most likely to be abandoned, a few stakeholders did suggest that some vessels are more likely to be abandoned than others. It was suggested that vessels with a length of less than 20ft are less desirable due to

the lack of internal and deck space, and are commonly abandoned. This is particularly true of low value (applies both to economic and sentimental value) or old vessels. It was also suggested that project boats are also often abandoned when the owner realises they cannot afford to restore the vessel. GRP vessels are more commonly abandoned than wooden vessels, as wooden vessels are easier to repair. Abandoned vessels are generally left in quiet, unmonitored areas, or they can be left in their moorings or on private land.

Five policy options were developed based on a review of policies and activities in other countries, and options put forward by stakeholders during interviews. These were:

1. Option 1: Extended Producer Responsibility
2. Option 2: Mandatory Registration of Vessels
3. Option 3: Public Funding for End-of-Life Vessels
4. Option 4: Establishing National Guidance on Waste Management of End-of-Life Vessels
5. Option 5: Circular Design

As the circular design policy concept lacked detail on approach and implementation it was not taken forward to full analysis. The other options were all assessed against key impact categories³ to analyse their potential efficacy and suitability, and were also voted on by stakeholders during a workshop to ground-truth this analysis, gauge support for the policies amongst the stakeholders present, and identify further barriers and opportunities. When considering the assessment against key impact categories, providing guidance was ranked highest and mandatory registration ranked lowest (but above a 'No Policy' option). This was predominantly because guidance is low cost and requires no legislative change. However, stakeholders ranked mandatory registration highest. Mandatory registration tackles a key issue around tracing those who abandoned vessels, and was seen as essential by the workshop participants. From all analysis, it is clear that no single policy option will solve the issue of recreational vessel abandonment, and consideration must be given to suitable combinations that work cohesively to affect change.

³ Impact on abandoned vessels, Legal feasibility, Technical/Logistical Feasibility, Economic impacts, Wider impacts, Geographical impacts, Environmental impacts

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Glossary

- Abandoned vessel** - Any vessel that has been left by an owner with no intention to return to or use it. This includes vessels that have been left in estuaries, on land, and in ports.
- Circular design** - Design that is made to maximise resource efficiency throughout the vessel life cycle from manufacturing to end-of-life, by eliminating waste and maximising reuse.
- End-of-life vessel** - A vessel which is at the end of its operational life and no longer seaworthy (excludes vessels which have been converted to other uses such as bars).
- Glass reinforced plastic (GRP)** - A composite material consisting of a polymer which is reinforced with glass fibres. It is also known as fibre reinforced plastic and Fibreglass.
- Project boats** - These are boats which are purchased, often for a low price, by an owner who intends to refurbish them.
- Recreational vessel** - For the purpose of this project, the definition of a pleasure vessel according to the Merchant Shipping (Vessels in Commercial Use for Sport or Pleasure) Regulations 1998 (SI1998/2771) is used:
- “(a) any vessel which at the time it is being used is:*
- (i)*
- (aa) in the case of a vessel wholly owned by an individual or individuals, used only for the sport or pleasure of the owner or the immediate family or friends of the owner; or*
- (bb) in the case of a vessel owned by a body corporate, used only for sport or pleasure and on which the persons on board are employees or officers of the body corporate, or their immediate family or friends; and*
- (ii) on a voyage or excursion which is one for which the owner does not receive money for or in connection with operating the vessel or carrying any person, other than as a*

contribution to the direct expenses of the operation of the vessel incurred during the voyage or excursion; or

(b) any vessel wholly owned by or on behalf of a members' club formed for the purpose of sport or pleasure which, at the time it is being used, is used only for the sport or pleasure of members of that club or their immediate family, and for the use of which any charges levied are paid into club funds and applied for the general use of the club; and

(c) in the case of any vessel referred to in paragraphs (a) or (b) above no other payments are made by or on behalf of users of the vessel, other than by the owner."⁴

List of abbreviations

EPR	-	Extended producer responsibility
GRP	-	Glass reinforced plastic (also known as fibre reinforced plastic and Fibreglass)
HIN	-	Hull identification number
ICOMIA		International Council of Marine Industry Associations

⁴ [RYA \(2019\) *Pleasure vessels and the UK Merchant Shipping Regulations* \[accessed 5 December 2022\]](#)

1. Introduction

This report is part of broader government research into end-of-life recreational vessels which, when abandoned, can lead to litter, contaminants and microplastics spreading in the marine environment. Abandonment of recreational vessels is an issue across the UK and beyond, but there is little understanding of the causes, scale, and impact.

This work will progress the UK's commitment to lead action B.2.1 of the OSPAR Regional Action Plan on Marine Litter⁵. The objectives of this work are to inform policy development to improve waste management for end-of-life recreational vessels by:

- Establishing the volume, location, and type of materials in this waste stream;
- Establishing the current waste management options and barriers in the UK; and
- Identifying potential policy options to address the problem.

This project is separated into two work packages, one focused on the UK, and one applying learnings to understand the wider context in the OSPAR area. This report presents the findings of the UK-focussed work.

This report outlines the approach, findings, and conclusions of this work. It provides a high-level estimate of materials in recreational vessels at a UK-wide level and broken down by nation. It outlines end-of-life vessel waste management options, barriers to waste management, and information on abandoned vessels and the reasons for abandonment. Finally, policy options are outlined and assessed in terms of their ability to tackle recreational vessel abandonment and improve end-of-life waste management.

While qualitative findings for this work are very rich, due to the high level of engagement of stakeholders, quantitative data are lacking. As such, all estimates of material tonnages and vessel numbers can only be taken as initial approximations based on numerous assumptions, that can be amended and verified in future work.

The focus of this work was on marine recreational vessels. However, it should be noted that multiple stakeholders stated that abandonment is also a large problem for recreational vessels inland, and so future work will be needed to expand the understanding of the problem.

2. Methodology

2.1. Desk-based research

Desk-based research used information in the public domain on vessel composition, end-of-life management options, overview of current waste management routes, barriers, and challenges to responsible management, and suitable policy options to address the problem. Sources included:

⁵ [OSPAR \(2022\) OSPAR Regional Action Plan on Marine Litter \[accessed 2 February 2023\]](#)

- Government websites and legislation in the UK and abroad to understand current regulatory frameworks and measures in place to address the issue;
- News articles, predominately in boating journals, to further understand issues with vessels at the end of their life;
- Trade Association documents including policy positions and guidance to members.
- Boat dismantlers and breakers websites; and
- Manufacturer, boat brokers and second-hand trading websites to collect data on vessel profiles.

This research was used to inform the stakeholder engagement activities to ensure they would address gaps and corroborate findings from the literature.

2.2. Stakeholder Interviews

Using existing knowledge, internal networks, and desk-based research, 120 stakeholders were identified and categorised into key industry groups as outlined in Table 1.

Table 1: Stakeholder groups

Groups	Example	Identified	Contacted	Engaged in interview
Government and Non-Departmental Public Bodies	Defra, MMO, etc.	6	5	1
Landowners	Crown Estate	1	1	0
Trade Association	British Marine, British Ports Association, etc.	23	14	7
Local Authority	Hampshire Council, Devon Council, etc.	9	3	1
Ports / Harbours	Cowes Harbour Commission, Cardiff Harbour Authority, etc.	13	11	2
Boat Salvage / Breakers	Boatbreakers, Gilpin Demolition, etc.	10	9	3
Boat Sales / Brokers	Berthon International, Solent Motor Yachts, etc	7	3	1
Shipyard / Boatbuilders	RS Boats, Spirit Yachts, etc.	14	12	1
Marine Protection	MCS, Devon Environment Foundation, etc.	5	3	0
Marina Groups	Boatfolk, Yacht Havens etc.	5	3	0
Researcher / Journalist	Portsmouth University etc.	2	2	1

Groups	Example	Identified	Contacted	Engaged in interview
Yacht Club/Sailing Club	Royal Lyminster Yacht Club, Hamble River Sailing Club, etc.	25	20	1
TOTAL		120	86	18

Within these groups, attempts were made to engage stakeholders from across the UK, and at least one stakeholder from each group. While every effort was put into obtaining an extensive and diverse sample across stakeholder groups and nations, this is limited by the willingness of interviewees to take part within the timeframe of the project, as well as the time available within the work to conduct interviews. Due to the high number of potential stakeholders within each group, key actors within the industries and/or actors with whom connections were already established were prioritised. Stakeholders operating in recreational boating hot spots in the UK such as the Solent in Hampshire and the South Coast of Devon were also prioritised.

Governing bodies and Trade associations were engaged first to alert them to the work, and to request their assistance in making introductions to key stakeholders in the recreational vessel and waste management industries. This was to reduce risk associated with lack of publicly available contact details for other stakeholders.

To achieve maximum stakeholder participation, we undertook the following method for engaging with stakeholders:

- Reach out via email, providing brief project background and attaching the support letter approved by DEFRA, requesting an interview and the most convenient time/date.
- If no response, follow up with a second email.
- If no response, final follow up via phone call.

All contact with stakeholders was recorded in a stakeholder engagement spreadsheet. Non-priority contacts or priority contacts who did not agree or were unable to participate in interviews were asked to fill out a short survey on vessel ownership of their members (e.g., number of boats in their marina) and approximate split of vessel type.

Interviews were conducted using an interview template approved by Defra designed to reflect the project brief as well as to target specific stakeholder groups (Appendix A). The interview template was split into three sections: the first included questions about the stakeholder, the second included questions on the recreational vessel industry and the third included questions on the end-of-life of recreational vessels and vessel abandonment. Priority questions for each stakeholder were established ahead of contact with the stakeholders. These questions were based on the nature of their business, their area of expertise within the recreational vessel industry and practices thought to be of interest to the project.

Steps were taken to ensure that all terminology was clear and consistent to facilitate conversations and accurate data collection. Details of individual organisations were researched before each

interview to gain a baseline understanding of the stakeholder, enabling us to target our interviews appropriately. After each interview, interview notes were written up ready for analysis and incorporation into the report.

Due to the substantial number of interviews booked during the period allocated for stakeholder engagement, a significant proportion of time was spent in direct stakeholder consultation. Furthermore, new stakeholders approached us requesting to participate having been referred by previous interviewees. Due to the length of this project, it was not possible to engage with all of the additional stakeholders that approached us. As a result, a prioritisation exercise was undertaken to ensure cross-industry representation.

In total, we contacted 86 stakeholders out of the list of 120. Those who we did not contact were either deemed less of a priority or we could not find contact information. Out of the 86 contacted, we conducted interviews with 18 stakeholders (Table 1). The group that responded best to our requests for interviews were the Trade Associations. Out of 17 contacted, we had seven responses all of whom took part in the interview process. Of the six Government Organisations contacted, three responded to our emails but declined to be interviewed.

Marina groups were the only group who did not respond to contact attempts. We were also unable to conduct an interview with the Landowner group and the Marine Protection group - representatives from these groups declined to take part in the interview process.

Out of all the stakeholders we engaged with, eight were UK-wide organisations and were able to comment on the UK recreational vessel industry as a whole. The remainder were based in England. No stakeholders based solely in Wales, Northern Ireland or Scotland undertook a formal interview. However, results from previous work in Scotland on the subject have informed this research, and there has been engagement with Natural Resources Wales throughout the work, due to their complementary work on mapping end-of-life recreational vessels. Representatives from all four nations participated in the policy workshop.

Some stakeholders did not respond to our invitation to take part in 1-2-1 interviews, however, they did sign up to the workshop. Stakeholders that took part in the workshop are detailed in section 2.4.

2.3. Quantitative modelling

One of the main objectives of this work was to quantify the volume, location and materials in waste arisings from recreational vessels in the UK. These data do not exist, and where data do exist they would be on individual waste transfer notes which are usually hand-written and not collated electronically. As such, it was necessary to apply a bottom-up methodology to estimate these figures, as outlined in the following sections.

2.3.1. Vessel composition

In order to estimate the total weight of materials in the fleet of recreational vessels in the UK, typical vessel weights were broken down into separate material compositions using profiles

developed in a previous project for Marine Scotland. In this previous project, attempts were made to collect granular information on material types, size/weight, number of components per vessel, manufacturer, and lifespan for sailing yachts, power/motorboats, rigid inflatable boats (RIB), and rowing boats from stakeholders. However, it became clear that this level of granularity was not available, and while stakeholders could provide average weights for vessel types, the weight of individual components was unknown. As such, the research methodology was changed to establish the percentages of different material types found in each specific vessel profile. Industry experts were asked to provide an estimated percentage of each material type within the total weight of a vessel. Responses from stakeholders were averaged to create a high-level percentage breakdown of material types per vessel, as shown in the example in Table 2.

Table 2: Vessel profile example (motor yacht)

Motor yacht: river or coastal boat with cooking facilities and a place suitable for sleeping. Estimated average weight: 5 tonnes. Estimated average length: 12 m.	
Material	Percentage of total vessel weight
Glass Reinforced Plastic	40%
Cast iron	15%
Wood/plywood	20%
Aluminium and stainless steel	15%
Other	10%

This methodology was limited by the small number of stakeholders able to provide and verify data. In the current project, the vessel profiles developed in previous research for Marine Scotland were circulated to key stakeholders in the categories Trade Association, Boat Salvage / Breakers, Boat Sales / Brokers, and Shipyard / Boatbuilders. These stakeholders were asked to verify the profiles and inform us of any suggested changes. While the previous project had combined small sailing boats and sailing yachts, and power boats, day motorboats and motor yachts, we separated these and asked for thoughts on how they would differ. Vessel categories and their meanings are outlined in Appendix B.

2.3.2. Number of vessels

All stakeholders interviewed were asked whether they had information on the number of recreational vessels within the UK, by nation and vessel type, and if they did not, whether they were aware of organisations who did.

A trade association was also directly approached specifically regarding their data, as this was used to quantify vessels in Scotland during previous research.

2.4. Workshop

One stakeholder workshop was held online, with the primary objective of exploring policy options to tackle the issue of recreational vessel abandonment and improve waste management.

Stakeholder groups to be prioritised for workshop attendance were agreed with Defra. These were Government and Non-Departmental Public Bodies, Trade Associations, Landowners, Boat Salvage / Breakers, Marine Protection, Marina Groups and Navigation Authorities. A workshop invitation was circulated to these groups at the same time as interviews were requested. This invitation was circulated wider than the original list of priority groups by the stakeholders.

There was very high demand to attend the workshop and efforts were made to support representation across stakeholder groups and nations. Workshop attendance is outlined in Table 3.

Table 3: Workshop participation by stakeholder group

Groups	Workshop attendees
Government and Non-Departmental Public Bodies	6
Landowners	0
Trade Association	5
Local Authority	3
Ports / Harbours	14
Boat Salvage / Breakers	2
Boat Sales / Brokers	0
Shipyard / Boatbuilders	0
Marine Protection	0
Marina Groups	0
Researcher / Journalist	1
Yacht Club/Sailing Club	0

With over 30 stakeholders attending, it would not have been possible for each participant to voice their views on each topic. As such, Miro⁶ was used alongside MS Teams as a facilitation tool. Miro is an interactive whiteboard tool, which enables participants to add their thoughts on each topic using sticky notes and comments, and vote for options using moveable dots.

The workshop was broken down into three main sections, in addition to introductions and close-down. These focused on:

- Defining the problem
 - Attendees added sticky notes to the Miro board with their thoughts on the motivators and barriers to recreational vessel abandonment and legal waste management. Attendees were split into three breakout rooms for this exercise to facilitate discussion.

⁶ <https://miro.com/>

- Overarching challenges were summarised by the workshop facilitators, and attendees voted to show which challenges they thought were most important in terms of both abandonment and legal waste management.
- Tackling the problem – what is already being done?
 - Attendees placed comments on maps of the UK, Europe, and the world to show where schemes are already in place and give information about these.
- Tackling the problem – future options
 - Attendees were presented with the list of impact categories that future options will be assessed by (see section 2.5).
 - Attendees were presented with a potential future option (those outlined in section 2.5), and after each option was presented were asked to comment on factors needed for success, potential impacts, potential risks, and feasibility of each option, by adding sticky notes to the Miro board.
 - Finally, attendees were asked to vote for their preferred future options, using dot voting.

2.5. Policy assessment

Desk-based research and interviews with stakeholders identified policy measures that could be taken to tackle the challenges associated with abandoned recreational vessels. This information was used to develop policies that could be used in the UK context. The following five policy options were presented to stakeholders in the workshop, the detail of which is outlined in section 2.4:

1. Option 1: Extended Producer Responsibility
2. Option 2: Mandatory Registration of Vessels
3. Option 3: Public Funding for End-of-Life Vessels
4. Option 4: Establishing National Guidance
5. Option 5: Circular Design

Information from the stakeholder workshop (section 2.4) was used to further develop the policy options that were identified in the literature review to put them into a UK context. Following the workshops, these policies were evaluated against the criteria outlined in Table 4. For each criterion, a score of 1 (low), 2 (medium) and 3 (high) was given, and then ranked accordingly. The score and ranking for each of these criteria can be seen in section 3.6.2.6. Circular design was not included in the policy assessment as it was not a fully developed policy option but was included in the workshop to help gather information that could be used for further policy development.

Table 4: Evaluation system for policy options identified in the literature review and stakeholder engagement.

Criteria	Scoring definition	Further description and rationale
Impact on abandoned vessels	<p>Low: Does not remove or only removes one of the challenges/barriers identified in step 1.</p> <p>Med: Removes approximately half of the challenges/barriers identified in step 1.</p> <p>High: Removes all or most of the challenges/barriers identified in step 1.</p>	<p>The challenges which were included in this evaluation are:</p> <ol style="list-style-type: none"> 1. The cost of disposing of end-of-life recreational vessels is high. 2. There is not sufficient infrastructure to support waste management of recreational vessels. 3. Vessel owners are not aware of how to dispose of vessels. 4. It is difficult to trace owners of recreational vessels that have been abandoned. <p>See section 3 for further information</p>
Legal feasibility	<p>Low: Can be implemented through primary legislation.</p> <p>Med: Can be implemented through secondary legislation.</p> <p>High: Can be implemented with no changes to current legislation.</p>	<p>Policy which requires primary or secondary legislation to be implemented would require a longer and more onerous process.</p>
Technical/Logistical Feasibility	<p>Low: Technology does not exist, or it is not feasible for logistical reasons</p> <p>Med: Moderate technological or logistical barriers</p> <p>High: No technological or logistical barriers</p>	-
Economic impacts	<p>Low: Costs incurred by Government and stakeholders (e.g., local authorities, boat owners, port authorities, small businesses etc.) are high.</p> <p>Med: Costs incurred are low for some stakeholders and high for others.</p> <p>High: Costs incurred by most stakeholders are low.</p>	<p>An economic impact assessment was not conducted as part of this research. Instead, desk-based research and stakeholder engagement were used to identify potential costs of these policies to different groups of stakeholders.</p>

Criteria	Scoring definition	Further description and rationale
Wider impacts (e.g. equality, businesses, social...etc)	<p>Low: One or more areas will be negatively impacted.</p> <p>Med: No other areas impacted</p> <p>High: One or more areas will be positively impacted.</p>	This includes any wider non-economic impacts to any stakeholder groups. This is an initial high-level evaluation using information from desk-based research and stakeholder interviews.
Geographical impacts	<p>Low: Many regions within the UK will be disproportionately affected.</p> <p>Med: One or two regions within the UK will be disproportionately affected.</p> <p>High: No region within the UK will be disproportionately affected.</p>	This includes an initial assessment as to whether there are any differences in impacts between the devolved administrations or any other region within the UK (for example, islands, rural areas, specific counties...etc).
Environmental impacts	<p>Low: Will negatively impact the environment</p> <p>Med: Will have no negative or positive impact on the environment</p> <p>High: Will positively impact the environment</p>	This includes wider marine or terrestrial environmental impacts.

3. Findings

3.1. Quantification and composition of recreational vessels

3.1.1. Vessel composition

Four stakeholders responded to our request for verification of our 'vessel profiles' that present typical weights of vessels in each category and the material composition. One had no amendments to make, while the three others suggested changes to the small sailing boat, sailing yacht, power boat and day motorboat categories. One other stakeholder declined to comment. Changes were made to the vessel profiles in line with these recommendations.

An overview of the typical vessel profiles is provided in Appendix C.

3.1.2. Number of Recreational Vessels

There were seven stakeholders who commented on the number of recreational vessels in the UK during stakeholder interviews. Of these, one was only able to comment on historic vessels⁷, one could provide the number of vessels on the Small Ships Register⁸ and two commented on number of vessels in specific locations⁹. Of those able to estimate vessels for the whole UK, one estimated that the number would be in the seven figures¹⁰, and another estimated 1 million vessels¹¹. These were high-level instinctual estimates, and could not be verified by available data. Another¹² was able to share figures that are submitted for the UK to the International Council of Marine Industry Associations (ICOMIA), based on surveys of water sports participation, marina occupancy, information on imports and exports and brokerage sales data, as well as the existing boat registration information from the Environment Agency and Navigation Authorities. These figures estimate 550,000 recreational vessels in the UK.

Data were also provided by one organisation¹³ on the number of vessels owned in each UK nation, broken down into seven vessel categories, as had been provided for our earlier research in Scotland. These data are for all recreational vessels, both coastal and inland, and cannot be separated to show only coastal vessels. These data are collected from a nationally representative sample of 12,000 people and then scaled up to the UK population. These data have been collected historically using face to face interviews, but during the pandemic moved to online data collection. At this point, the estimate of number of vessels owned increased dramatically. For example, the estimated total number of vessels presented in this source in 2019 for Scotland is on average 90% smaller than the results presented for Scotland in 2021. When comparing these figures to the UK population, they appeared unrealistic, suggesting that approximately 1 in every 13 people own a recreational vessel. The total number of vessels estimated for the UK was also very close to the 6 million estimated by the European Boating Association for the whole EU¹⁴.

As such, it was decided to scale down the estimates of vessels per UK nation to make them comparable to the figures submitted to ICOMIA. The previous figures for Scotland were also used to scale the data. These calculations resulted in the vessel figures shown in Table 5.

⁷ Interview with Trade Association, January 2023

⁸ Interview with Government Department, January 2023

⁹ Interview with Boat Sales / Broker and Yacht Club, January 2023

¹⁰ Interview with Trade Association, January 2023

¹¹ Interview with Trade Association, January 2023

¹² Interview with Trade Association, December 2022

¹³ Trade Association

¹⁴ European Boating Association, 2020. EBA Position Statement End of Lifeboats. <https://eba.eu.com/wp-content/uploads/site-documents/eba-position-statements/eba-position-elb.pdf>

Table 5: Estimated number of recreational vessels in the UK by nation and vessel type

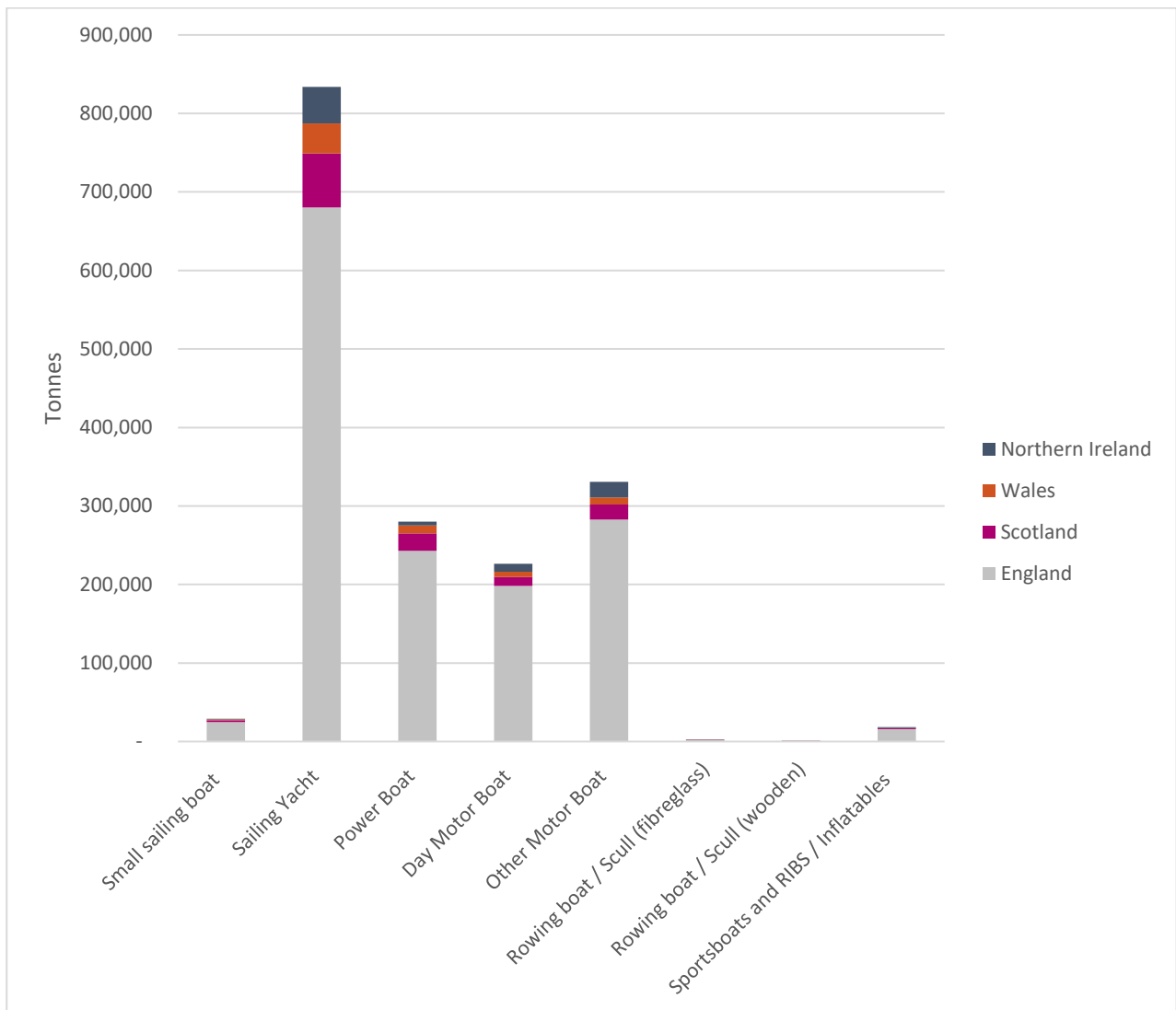
	England	Scotland	Wales	Northern Ireland	UK
Small sailing boat	98,530	9,129	4,573	2,570	114,802
Sailing Yacht	85,019	8,593	4,803	5,821	104,236
Power Boat	64,728	5,939	2,765	1,274	74,707
Day Motorboat	52,908	2,961	1,798	2,677	60,344
Other Motorboat	56,520	3,840	1,830	3,996	66,187
Rowing boat / Scull	47,092	3,481	3,377	1,804	55,754
Sports boats and RIBS / Inflatables	62,790	4,165	2,741	3,977	73,673
Total	467,587	38,109	21,887	22,120	549,703

These vessel numbers must come heavily caveated. As there is no universal registration process for recreational vessels in the UK, it is not possible to gather accurate data on this subject. It is crucial that moving forward efforts are made to tackle this, to adequately understand the scale of the issue.

3.1.3. Materials scale-up

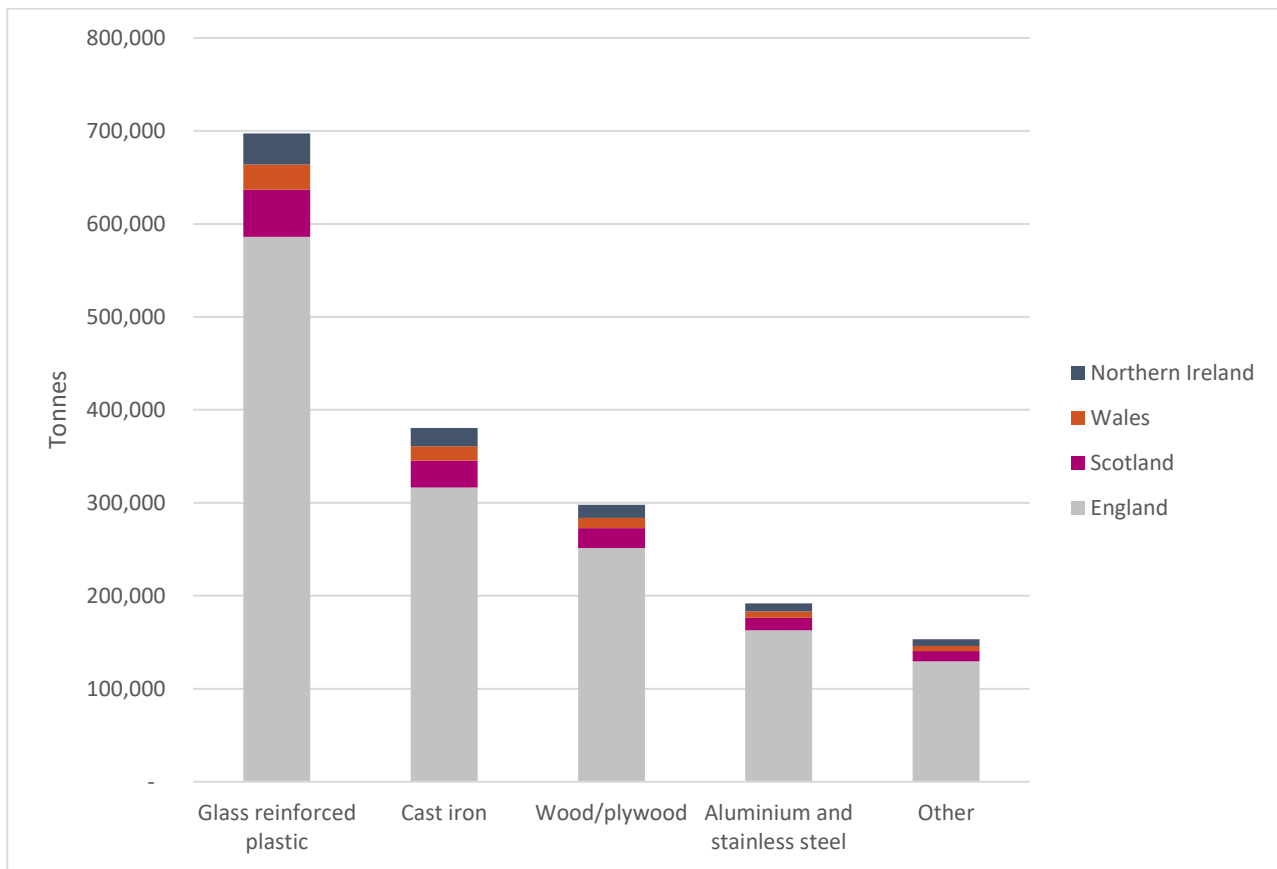
The weights calculated within the vessel profiles were multiplied by number of vessels in each nation to estimate the total weight of materials in the fleet of recreational vessels by UK nation. These results are outlined by vessel type (Figure 1) and material type (Figure 2) below.

Figure 1: National scale up of materials in use in recreational vessels in the UK, by vessel type



Sailing yachts are the heaviest boats according to our typical vessel profiles, and they are the second most common vessel type (Table 5). As such, they represent the bulk of material in the recreational vessel fleet.

Figure 2: National scale up of materials in use in recreational vessels in the UK, by material type



Glass reinforced plastic (GRP) is the most heavily used material within recreational vessels, as it is commonly used for hulls. Cast iron is the next most prevalent material, and is used for engines and keels. Wood/plywood is commonly used for furniture and decking, as well as hulls for some vessel types. Aluminium and stainless steel can be used for rig work, rigging wires, deck fittings and some hulls. Other materials include polyethylene, which is becoming more common as a material for the hulls of small sailing boats. It also includes upholstery, sails, rope rigging and Hypalon, which is only used in RIBS for inflatable tubing which increases the shock absorbing qualities of the vessel.

3.1.4. Waste arisings

In order to estimate waste arisings from recreational vessels in the UK, the number of vessels estimated for UK nations were scaled by estimates of vessels reaching end-of-life in Europe and dismantled in Europe and France. These figures are outlined in Table 6.

Table 6: Vessels reaching end-of-life and dismantled in Europe and France

	Total vessels	Vessels reaching end of life annually	Vessels dismantled annually
Europe	6,000,000 ¹⁵	130,000 ¹⁶	30,000 - 40,000 ¹⁷
France	1,000,000 ¹⁸	NA	1,200 ¹⁹

While the figures for Europe are estimations, the figure for dismantling in France is the result of the first year of the French EPR scheme, and is an accurate representation of the number of vessels dismantled. These figures suggest that between 0.1% and 2.2% of vessels are reaching their end of life each year. It is possible to use these figures to scale the estimates of in use material tonnages in the UK to estimate annual waste arisings. If this method is applied, estimated annual waste arisings of GRP range from 2,500 to 15,000 tonnes per year. The figures for cast iron are 1,500 to 8,000 tonnes and for wood/plywood are 1,000 to 6,500 tonnes per year. The full results of this exercise are outlined in the following figures.

¹⁵ European Boating Association, 2020. EBA Position Statement End of Lifeboats. <https://eba.eu.com/wp-content/uploads/site-documents/eba-position-statements/eba-position-elb.pdf>

¹⁶ European Commission, 2016. Assessment of the impact of business development improvements around nautical tourism. https://www.europeanboatingindustry.eu/images/Documents/For_publications/Business-development-around-nautical-tourism.pdf

¹⁷ Marine Industry News, 2021. Industry insight: End-of-life vessels – time for action? <https://marineindustrynews.co.uk/industry-insight-end-of-life-vessels-time-for-action/>

¹⁸ Boat Industry, 2018. The recreational fleet and new boaters in figures. <https://www.boatindustry.com/news/28920/the-recreational-fleet-and-new-boaters-in-figures>

¹⁹ European Boating Industry, 2020. Meeting of the stakeholders' working group for end-of-life recreational boats. <https://europeanboatingindustry.eu/newsroom/newsletter/item/404-meeting-of-the-stakeholders-working-group-for-end-of-life-recreational-boats>

Figure 3: National scale up of annual waste arisings from end-of-life recreational vessels in the UK, by material type (lower estimate)

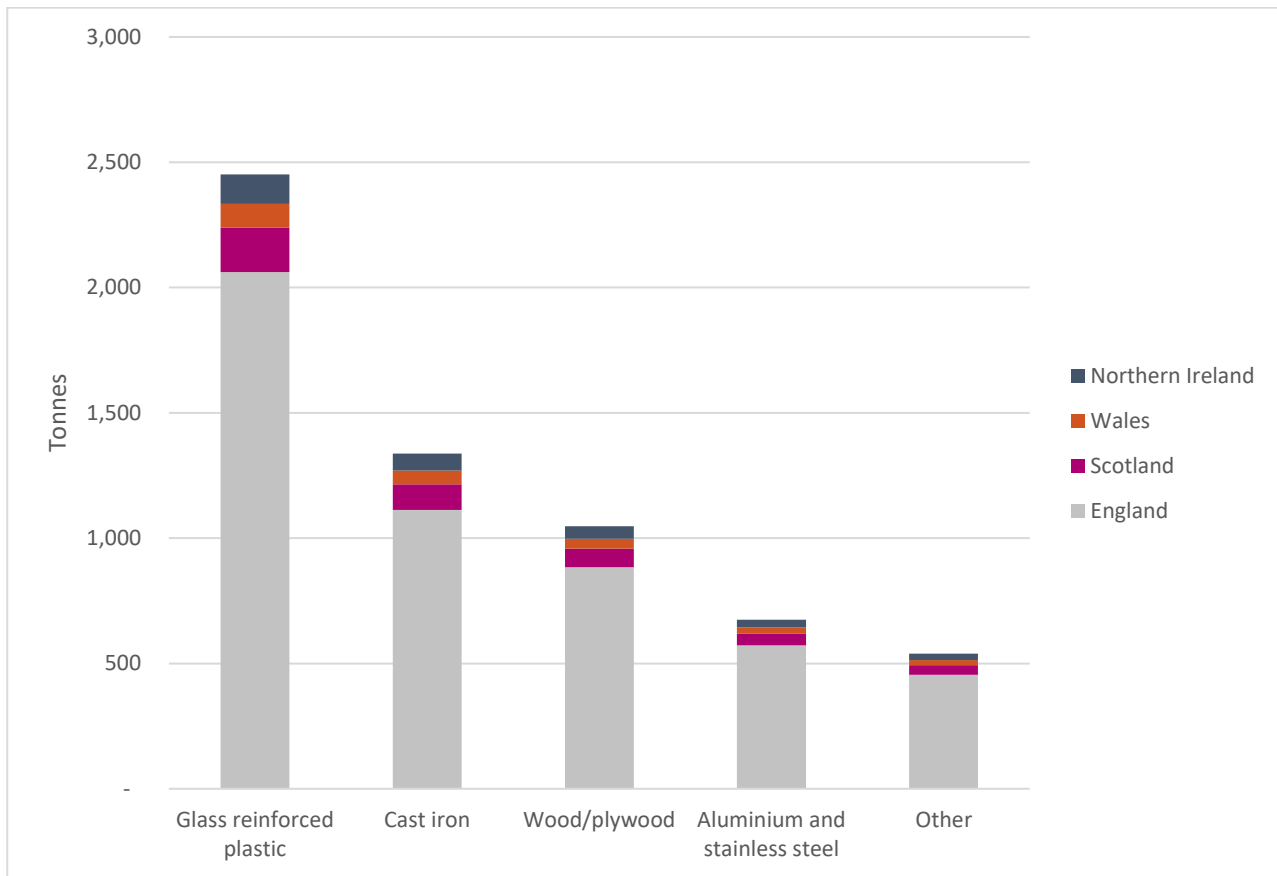
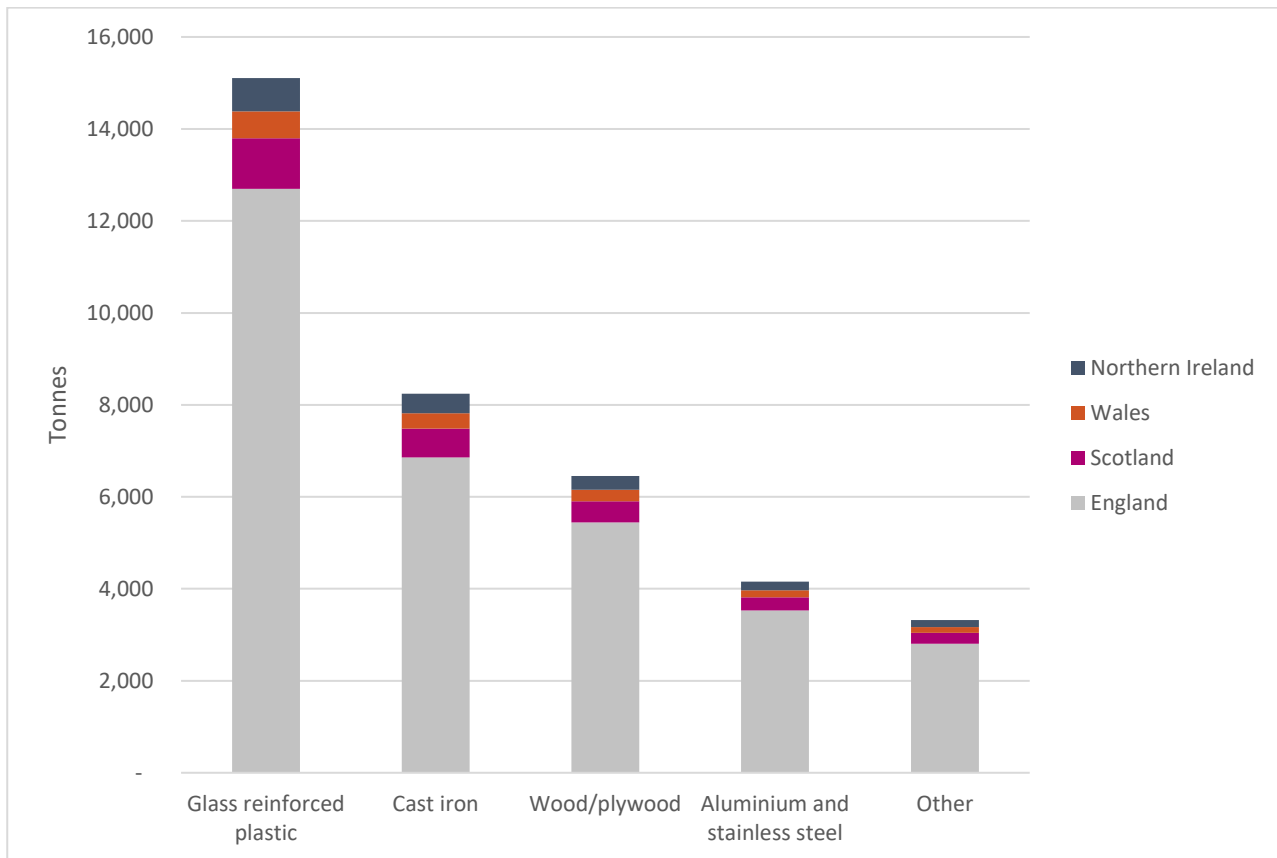


Figure 4: National scale up of annual waste arisings from end-of-life recreational vessels in the UK, by material type (upper estimate)



While this is a useful exercise to provide an indication of potential annual waste arisings, it must be noted that besides the limitations to the data already outlined above, it is unlikely that all vessel types and materials will reach end-of-life at an average rate. For example, one stakeholder²⁰ noted that large recreational vessels over 20m in length will rarely reach end-of-life, as they have enough value to make them worth refurbishing. Also, as outlined below in section 3.3, there have also been variations in the durability of GRP hulls overtime, which will affect the rate at which these vessels reach end-of-life.

3.2. Supply chain

Very little information was available on the recreational vessel supply chain. Only one stakeholder²¹ was able to share information on this subject, which is as follows. There are more than 300 boatbuilders in the UK, employing more than 8,000 people. The UK is a net exporter of recreational

²⁰ Interview with Trade Association, December 2022

²¹ Interview with Trade Association, December 2022

vessels, exporting over £600 million more than is imported, the bulk of which is in inboard/sterndrive motor boats.

3.3. End-of-life vessel waste management options

At the end of a vessel's life, the owner is responsible for managing its waste. Out of the 18 stakeholders interviewed, 14 stakeholders across the industry agreed that the last owner was responsible for a vessel's waste management. However, there were three stakeholders who recognised that the last owners were responsible, but were unsure of the waste management process once a vessel had been abandoned.²² This typically involves using a third party, known as boat breakers, who will strip the vessel of contaminants, remove all fittings and fixtures, and breakdown the vessel to its individual components.²³ Depending on the material of these components, they will be reused, recycled, incinerated, or sent to landfill. There are very few companies in the UK that will handle a vessel at the end of its life. The skills and expertise required to dismantle a vessel will vary depending on type.²⁴ As a result, transporting a vessel to one of these facilities is a large part of the total cost incurred at end-of-life.^{25,26,27,28}

There is uncertainty among stakeholders on how to dispose of vessels. For example, there was a perception among some stakeholders based in England that they would need to obtain a permit from the Environment Agency to break down their own vessel or one that was left in the harbour. However, another stakeholder²⁹, said that in their experience, a harbour authority would instead need to apply for an exemption from the waste management licensing. Three stakeholders out of the 18 interviewed did not know how they would go about disposing of a large recreational vessel³⁰.

In 2013, Boat DIGEST, a program to establish³¹ national guidance launched. Whilst this network was never established, the program published guidance for disposing of vessels at the end of their life. This guidance is referred to in online literature, however, the Boat DIGEST website no longer exists.

²² Interviews with one local authority, one government/non-departmental public body and one yacht/sailing club.

²³ [Above The Brine \(accessed November 2022\) Boat disposal and recycling services \[accessed 28 November 2022\]](#)

²⁴ [Rhode Island Marine Trade Association \(undated\) End-of-life vessel material management guide \[accessed 21 December 2022\]](#)

²⁵ [Responsible Boat Disposal \(Undated\) Re-homing, removal and disposal of old boats \[accessed 28 November 2022\]](#)

²⁶ [Marine Recycling FIBREGLASS \(Undated\) Boat Disposal and Recycling \[accessed 28 November 2022\]](#)

²⁷ [Boatbreakers \(undated\) Frequently asked questions \[accessed 28 November 2022\]](#)

²⁸ [Boat Breaking Scotland \(Undated\) About us \[accessed 22 November 2022\]](#)

²⁹ Stakeholder from a government/non-Departmental Public Body during workshop

³⁰ Interview with local authority, yacht/sailing Club, government/non-departmental public body, January 2023

³¹ [European Boating Association \(2015\) How to handle your end-of-life boat: Boat DIGEST guidelines released](#)

Whilst circular practices are being incorporated into the design of new vessels,^{32,33} there is little in place to incentivise innovation and circular concepts into the design of vessels.³⁴ Vessels made in the 70s and 80s are now coming to the end of their life.³⁵ Six stakeholders interviewed said boats built in the 60s, 70s and 80s were over-engineered and would last longer than more modern vessels. Modern boats are being built with thinner hulls and less materials as technology and material composition have advanced. They mentioned these boats may not have as long a life span as the older GRP boats³⁶, and as a result there could be a rise in the number of vessels coming to the end of their life in the coming years. Vessels coming to the end of their life are predominately made of GRP. A recent study estimated that approximately 95% of boats in Europe are made of GRP.³⁷

One stakeholder interviewed reflected that newer vessels are beginning to consider more sustainable materials, such as carbon fibre³⁸. Carbon fibre is a lighter material, meaning fuel consumption is better than other materials. There are many different types of carbon fibre, however, it is generally more energy intensive to produce than other materials.³⁹ Whilst these vessels are not coming to the end of their life now, the move to other materials should be considered.

The waste management options for vessels made from these materials are outlined below.

3.3.1. Reuse and repurposing

When a boat is dismantled, the fixtures and fittings that are still working can be sold and there is a second-hand market for them to be used.⁴⁰ Although there is a strong second-hand market for fixtures and fitting from end-of-life vessels, we understand from the stakeholders interviewed, these are small businesses and or individuals selling items on established online platforms⁴¹. There are also a small number of companies that restore and sell these items for use in homes or new boats.⁴² There is currently a very limited market for reusing or repurposing recreational vessels once these fixtures are stripped out. The initial landscape review identified companies in the UK which reuse or repurpose such recreational vessels for use in TV, films and events.⁴³ Vessels can

³² [Exotechnologies \(Undated\) *Danu* \[accessed 28 November 2022\]](#)

³³ [VAAN \(Undated\) *Circular* \[accessed 28 November 2022\]](#)

³⁴ [European Boating Association \(2020\) *EBA Position Statement, End of Lifeboats*](#).

³⁵ [RYA \(Undated\) *End of life boats* \[accessed 28 November 2022\]](#)

³⁶ Interview with two trade associations, boat salvage/breaker, journalist/researcher, yacht/sailing Club, January 2023

³⁷ [Premur V., Vucnic A. A., Melnjak I., Radetic L. \(2019\) *Challenges and possibilities for environmentally sound recycling of ships and composite boats in European Union. Holistic Approach to Environment*. 9\(2\): 35-43](#)

³⁸ Interview with Researcher /Journalist, January 2023

³⁹ [Composites construction UK \(2022\) *Is carbon fibre a sustainable material for strengthening buildings and structures?*](#)

⁴⁰ [Boatbreakers \(undated\) *Frequently asked questions* \[accessed 28 November 2022\]](#)

⁴¹ Interview with four trade associations, two boat salvage/breakers and a yacht/sailing club, January 2023

⁴² [Trinity Marine \(Undated\) *About Us* \[accessed 30 November 2022\]](#)

⁴³ [Boatbreakers \(undated\) *Boat Themed Props* \[accessed 28 November 2022\]](#)

also be placed in the marine and terrestrial environments to fulfil specific purposes such as creating a breakwater, to create artificial reefs or prevent coastal erosion.⁴⁴ In Gloucester, wooden hulled vessels were taken from Sharpness Docks and placed between the Canal and River Severn to prevent coastal erosion.⁴⁵

3.3.2. Recycling

3.3.2.1. Glass reinforced plastic and other composites

GRP is very difficult to recycle and there are very few commercially viable options. Currently it can be recycled and used as feedstock for cement clinkers⁴⁶ or ground and used as a filler and used to make rebar.^{47,48} The Rhode Island Fibreglass Vessel Recycling project in the United States established protocols for recycling GRP from vessels into cement in 2019 and they are piloting further recycling initiatives.⁴⁹ There are also small companies that are finding new ways to recycle GRP, such as a company in Norway which is using ground GRP to make flower pots and benches,⁵⁰ and a Finnish company which uses recycled GRP to make building materials.⁵¹

There is a lot of interest in developing protocols for recycling GRP as it has numerous uses outside of the boating industry. It is also used to make wind turbines, which are also posing challenges regarding waste management.⁵² One stakeholder, said GRP hulls of recreational vessels need to be classed as hazardous waste due to the contamination of the GRP with toxic coatings and for this reason waste management options which might apply to wind turbine blades cannot be applied to recreational vessels⁵³. A new UK consortium, Composites UK, has been established to increase facilities for the reuse and recycling of composite materials, including GRP.⁵⁴ As Austria, Finland, Germany and the Netherlands have banned the landfill of wind turbines, there is more focus on recycling fibreglass.⁵⁵ There have also been small-scale projects that have explored using GRP to make tiles for the façade of buildings.⁵⁶ A company in the Netherlands has also been using recycled GRP boats to create camp sheets to retain canal walls.⁵⁷

⁴⁴ Interview with a trade association, January 2023.

⁴⁵ [Gloucester Docks \(2006\) Purton Barge Graveyard](#)

⁴⁶ Key component of concrete.

⁴⁷ [Composites UK \(undated\) End-of-life options \[accessed 29 November 2022\]](#)

⁴⁸ [Engineered Composites \(Undated\) FIBREGLASS/FRP Rebar \[accessed 28 November 2022\]](#)

⁴⁹ [RIMTA \(Undated\) Environmental programs \[accessed 28 November 2022\]](#)

⁵⁰ [Compton N., \(2021\) What's the future for derelict FIBREGLASS boats? Yachting Monthly](#)

⁵¹ [Conenor \(undated\) Cleantech from Finland \[accessed 30 November 2022\]](#)

⁵² [Chen J., Wang J., Ni A. \(2019\) Recycling and reuse of composite materials for wind turbine blades: An overview. Journal of reinforced Plastics and Composites. 31\(12\)](#)

⁵³ Interview with Trade Association, January 2023

⁵⁴ [Composites UK \(undated\) End-of-life options \[accessed 29 November 2022\]](#)

⁵⁵ [Vella \(2022\) An industry in the making: diverting wind turbine blades from landfill](#)

⁵⁶ [Practical Boat Owner \(2020\) Plastic boats - how should we dispose of old boats when they reach the end of their lives?](#)

⁵⁷ [Busschen A. \(2017\) Revolutionary re-use of polyester boats](#)

Carbon fibre is more recyclable than GRP, however, the efficiency of this process is dependent on the type of carbon fibre.⁵⁸ Carbon fibre is also used in the manufacture of other vehicles such as airplanes and cars. Many carbon fibre airplanes are reaching the end of their life, and as a result, there has been research into recycling these materials.^{59,60} However, with the rise of carbon fibre waste, current global recycling infrastructure is insufficient. As a result, carbon fibre is often sent to landfill in practice.⁶¹

3.3.2.2. Wood

Vessels made from wood are recyclable. Wooden hulls need to be repaired more frequently than other materials (e.g. GRP and metal) as they are prone to rotting, however, more significant repair is possible than other materials.⁶² Due to increased maintenance cost over their lifetime, wood is a less popular material for hulls than GRP.⁶³ Small wooden boats (such as rowboats) could be cut up and recycled at a Household Waste and Recycling Centre.⁶⁴ Larger boats are more likely to need to be broken down by a specialist, however, the wooden components (e.g. masts, decks and hulls) can be recycled, often into chipboard.⁶⁵ There are examples of small companies which recycle wooden boats to make furniture and water sports equipment such as paddleboards and surfboards.⁶⁶ A stakeholder with experience in wooden boat building mentioned that small wooden boats are on occasion cut up and burnt within the boatyard. It was explained that this practice is now happening less⁶⁷. This anecdote was only shared by one stakeholder and therefore it is not possible to understand how widespread this practice is.

Not all wooden vessels are fully recyclable. Sometimes the wooden hulls are sheathed with GRP to strengthen them and seal leaks.⁶⁸ This poses challenges and decreases their recyclability.

⁵⁸ [Composites construction UK \(2022\) *Is carbon fibre a sustainable material for strengthening buildings and structures?*](#)

⁵⁹ [University of Warwick \(undated\) *Recycling waste carbon fibre* \[accessed 1 February 2023\]](#)

⁶⁰ [Zhang J., Chevali V. S., Wang, H., Wang. \(2020\) *Current status of carbon fibre and carbon fibre composites recycling Composites Part B.*](#)

⁶¹ [Zhang J., Chevali V. S., Wang, H., Wang. \(2020\) *Current status of carbon fibre and carbon fibre composites recycling Composites Part B.*](#)

⁶² [Woodenships \(undated\) *Recycling end of life yachts* \[accessed 29 November 2022\]](#)

⁶³ [Premur V., Vucnic A. A., Melnjak I., Radetic L. \(2019\) *Challenges and possibilities for environmentally sound recycling of ships and composite boats in European Union. Holistic Approach to Environment. 9\(2\): 35-43*](#)

⁶⁴ [Oxford City Council \(Undated\) *Waste Wizard* \[accessed 29 November 2022\]](#)

⁶⁵ [Boatbreakers \(undated\) *Frequently asked questions* \[accessed 30 November 2022\]](#)

⁶⁶ [Novoboats \(undated\) *Paddleboards* \[accessed 28 November 2022\]](#)

⁶⁷ Interview with a trade association, January 2023

⁶⁸ [East Coast Fibreglass Supplies \(undated\) *Sheathing boats with fibreglass* \[accessed 2 February 2023\]](#)

3.3.2.3. Metal

The metal components of boats, such as rails, tracks and eyeholes can easily be removed, cut up and sold for scrap.⁶⁹ However, the value of these items is often low and the cost to the owner to transport the boat may still be higher than money received from scrap.⁷⁰ Many large sailboats have large keels, which are made from metal, and must be separated from the GRP hull prior to recycling.⁷¹ This is heavy and requires specialised machinery to do so.

3.3.2.4. Fixtures and fittings

If separated, most of the fixtures and fittings of a boat can easily be recycled, as they are made of wood or metal.⁷² Sails, rope and other textiles can be recycled to make items such as reusable bags, deck chairs and awnings.⁷³ However, these are often polymer based fabrics which have limited recycling options.⁷⁴ Whilst waste electrical and electronic items can be recycled, this is not always achieved in practice. It's not always commercially viable for boat breakers to remove and clean fixtures and fittings due to the labour involved.⁷⁵ One small sailing yacht manufacturer interviewed, said they do take back aluminium masts for reuse and recycling into their own manufacturing process⁷⁶.

3.3.3. Incineration and Landfill

As GRP is difficult to recycle, it is typically sent to energy from waste plants, landfill or treated as hazardous waste.⁷⁷ Energy can be recovered from the polymer fraction, however, this is not an efficient process as this only accounts for 30-40% of the total GRP weight and the heat generated is therefore low.⁷⁸ The glass fibres have a low calorific value and therefore end up as ash when incinerated.⁷⁹ The bottom ash can be used in construction or may be sent to landfill.⁸⁰

The price of landfilling GRP in the UK is getting increasingly more expensive and currently costs approximate £98.60 per tonne to landfill. If a typical sailing yacht has a hull weighing approximately

⁶⁹ [GLE Scrap Metal \(undated\) *Aging ships offer plenty of valuable parts to the scrap metal recycling industry* \[accessed 29 November 2022\]](#)

⁷⁰ [Boatbreakers \(undated\) *Scrap a boat* \[accessed 29 November 2022\]](#)

⁷¹ [Rhode Island Marine Trade Association \(undated\) *End-of-life vessel material management guide* \[accessed 21 December 2022\]](#)

⁷² [Boatbreakers \(undated\) *Frequently asked questions* \[accessed 30 November 2022\]](#)

⁷³ [The Green Blue \(undated\) *Waste and Recycling* \[accessed 30 November 2022\]](#)

⁷⁴ [Rhode Island Marine Trade Association \(undated\) *End-of-life vessel material management guide* \[accessed 21 December 2022\]](#)

⁷⁵ Interview with a boat salvage/breaker, January 2023

⁷⁶ Interview with shipyard/boatbuilders, January 2023

⁷⁷ [Composites UK \(undated\) *End-of-life options* \[accessed 29 November 2022\]](#)

⁷⁸ [Ribeiro M. C. S et al. \(2016\) *Recycling Approach towards Sustainability Advance of Composite Materials' Industry*. *Recycling*. 1\(1\): 178-193](#)

⁷⁹ [Syc M. et al. \(2018\) *Material analysis of bottom ash from waste-to-energy plants* *Waste Management* 73:360-366](#)

⁸⁰ [Composites UK \(undated\) *End-of-life options* \[accessed 29 November 2022\]](#)

3.2 tonnes, then this would cost over £300 to landfill.⁸¹ However, it remains the cheapest option.⁸² Due to their size, end-of-life GRP boats could be taking up a large amount of landfill space from a very small subset of the population of the UK.⁸³

In reality, a lot of boats are treated as hazardous waste at the end of their life due the mix of materials and high contamination.

3.4. Barriers and challenges

3.4.1. To vessel owners

Desk-based research, interviews and workshops identified four main barriers that lead to owners abandoning vessels:

1. The cost of disposing of end-of-life recreational vessels is high.
2. There is not sufficient infrastructure to support waste management of recreational vessels.
3. Vessel owners are not aware of how to dispose of vessels.
4. It is difficult to trace owners of recreational vessels that have been abandoned.

As a result of these barriers, it is often cheaper for vessel owners to abandon their vessels in a quiet location or leave them in a marina than manage them responsibly through legal waste management processes.

Stakeholders engaged with at the workshops and through interviews, identified the cost of disposing of boats as the biggest barrier leading to abandonment. Out of the 18 stakeholders interviewed 15 mentioned that cost was the main barrier to responsible waste management⁸⁴. Using a boat breaker or other disposal organisation will cost the boat owner approximately £180⁸⁵ to £300⁸⁶ per metre of vessel length to do this. Due to the low number of boat breakers in the UK, transport is also a significant cost to the boat owner. Eight stakeholders interviewed, said that lack of facilities and infrastructure was a significant barrier to responsible waste management⁸⁷.

Establishing a boat breakers yard is an expensive and complex process, which may be why there are so few in the UK.⁸⁸ The same permits for breaking end-of-life vehicles are required to set up a

⁸¹ [HMRC \(2022\) Guidance: Landfill tax rates](#)

⁸² [International Maritime Organisation \(2019\) End-of-life management of fibre reinforced plastic vessels: alternatives to at sea disposal](#)

⁸³ Interview with journalist/research, January 2023

⁸⁴ Interviews with six trade associations, two boat salvage/breakers, two port/harbours, a Local Authority, researcher/journalist, yacht/sailing club, government/non-departmental public body and shipyard/boat builder, December 2022 and January 2023

⁸⁵ [Responsible Boat Disposal \(Undated\) Re-homing, removal and disposal of old boats \[accessed 28 November 2022\]](#)

⁸⁶ [Wood, C. \(2022\) Boats: Call for rules to stop old vessels being dumped, BBC](#)

⁸⁷ Interview with two Trade Associations, a Boat salvager/breaker, a Researcher/Journalist, a port/harbour, a Government Department/non-departmental public body, a boat sales/broker and a shipyard/boatbuilder, January 2023

⁸⁸ Interview with a boat salvage/breaker, January 2023

fully compliant boat breakers yard. A boat salver/breaker said that the process of obtaining the correct permits was prohibitive and the regulations around site safety and environmental damage of a breakers yard were a large barrier to new breakers yards opening.⁸⁹ They also said a lack of understanding of the correct rules and regulations means some breakers yards were dismantling vessels, while in good faith, illegally.

Boats may be purchased as “project boats,” meaning they have been bought, often cheaply, with the intention of restoring them.⁹⁰ One trade association interviewed said they often see project boats purchased by individuals who are not experienced boaters and may not realise the financial resources and experience needed to do this. Older vessels may also have additional challenges, such as the presence of asbestos.⁹¹ In cases where the owner has run out of money, the cost of appropriately disposing of these vessels is prohibitive and results in them being abandoned.

Lack of knowledge of boat owners around their responsibilities, options and costs are a barrier to managing vessels at the end of their life.⁹² Stakeholders interviewed said that in their experience, new boat owners don’t think about or understand the waste management costs and options when they buy a new or used vessel, so they are not prepared when they need to dispose of the vessels⁹³.

Some stakeholders saw the lack of a mandatory registration system in the UK as facilitating the abandonment of recreational vessels as it makes it difficult to identify the offender.⁹⁴ This lack of traceability means that there is little deterrent in place to prevent this behaviour.

3.4.2. To harbours, marinas, and other authorities wishing to clear abandoned vessels

A wreck is defined by section 255 of the Merchant Shipping Act 1995 as “jetsam, flotsam, lagan and derelict found in or on the shores of the sea or any tidal water.”⁹⁵ The owner is responsible for clearing their vessel if it is a wreck or deemed a hazard.⁹⁶ However, due to the lack of registration of vessels, it can be difficult to trace the owner⁹⁷. This passes the responsibility of disposing of the vessel to others. This responsibility depends on where the vessel has been abandoned. In water, the vessel becomes the property of the crown estate.⁹⁸ If the vessel is abandoned on land, in a marina

⁸⁹ Interview with a boat salvage/breaker , January 2023

⁹⁰ Interview with a trade Association, January 2023.

⁹¹ Interview with a trade Association, January 2023.

⁹² Interview with one boat sales/broker and two trade associations, January 2023

⁹³ Interview with a boat sales/broker and a shipyard/boatbuilder, January 2023

⁹⁴ Interview with a trade association, December 2022.

⁹⁵ [Merchant Shipping Act \(1995\) Section 55: Interpretation](#)

⁹⁶ [Merchant Shipping Act \(1995\) Section 225D: Removal by registered owner](#)

⁹⁷ Interview with a trade association, December 2022

⁹⁸ [UK Government \(2018\) Guidance: Wreck and salvage law](#)

or in water under control of a harbour, it is the responsibility of the landowner, harbour or local authority, depending on who owns the land.^{99,100,101}

The process of removing abandoned vessels or wrecks can be time consuming, challenging, and an expensive process. If the wreck occurs in a harbour or water under the control of a harbour authority, they have powers to remove the vessel and sell the vessel (or parts of it) to recover costs.¹⁰² Before the vessel is sold, the harbour must give at least seven days' notice in a local paper of this intention. Three stakeholders said easier powers of taking ownership of an abandoned vessel, would help with the process of removing abandoned boats¹⁰³. If there is no value or the vessel is beyond repair, then the boat can be dismantled and disposed of, the expense of which must be covered by one of the above groups.

Vessels may be abandoned in harbours or marinas, either as the result of the owner being unwilling to dispose of the vessel appropriately or because the owner has passed away.¹⁰⁴ They must follow a similar procedure and try to find the owner before they can try to remove the vessel, at their own cost. Participants in the workshop also highlighted that there is a lack of knowledge among some marinas on the procedures they need to follow and whether waste permits were required.

There are also physical challenges with removing vessels that have been abandoned. If they are left for a long time and they begin to sink, they can be more challenging to remove.¹⁰⁵ One boat salvage/breaker interviewed mentioned that if a vessel has sunk or is partially submerged, an exceptionally large amount of money is needed to dispose of the vessel, as commercial divers might be required to take part in the salvage operation. It was estimated that an extra £10,000 could be added onto the waste management cost.

It is also important to note that there is specific guidance around historic vessels (those over 50 years old and of cultural importance). This is provided by National Historic Ships and covers recording historic vessels¹⁰⁶ and deconstructing historic vessels¹⁰⁷.

⁹⁹ [British Ports Association \(2022\) *Guidance: dealing with abandoned vessels in harbours*](#)

¹⁰⁰ [Environmental Protection Act \(1990\)](#)

¹⁰¹ [Merchant Shipping Act \(1995\) *Section 252: Powers of harbour and conservancy authorities in relation to wrecks.*](#)

¹⁰² [Merchant Shipping Act \(1995\) *Section 252: Powers of harbour and conservancy authorities in relation to wrecks.*](#)

¹⁰³ Interview with two ports/harbours and a boat salvage/breaker, January 2023

¹⁰⁴ Information gained from ports/harbours that participated at the workshop, January 2023

¹⁰⁵ [Boatbreakers \(2016\) *Abandoned boats*](#)

¹⁰⁶ National Historic Ships, 2020. Recording Historic Vessels.

https://www.nationalhistoricships.org.uk/sites/default/files/uhv_recording_2nd_edition_2020_f.pdf

¹⁰⁷ National Historic Ships, 2020. Deconstructing Historic Vessels.

https://www.nationalhistoricships.org.uk/sites/default/files/uhv_deconstruction_2nd_edition_2020_f.pdf

3.5. Abandoned vessels

3.5.1. Types of vessels

There was no consensus among the stakeholders engaged in this project as to one type of vessel that is most likely to be abandoned. Some stakeholders were able to provide anecdotal evidence based on their experience of the types of vessels most likely to be abandoned. This includes:

- **Boats with a lower value** – this could include boats with a lower financial value or vessels that do not hold sentimental value.¹⁰⁸ There isn't a strong second-hand market for vessels under 7m, so they are therefore most likely to be abandoned.¹⁰⁹
- **Project vessels** – recreational vessels which are not seaworthy are sometimes purchased with the intention of restoring them. However, people may have underestimated the cost or work that would be required and are unable to make them seaworthy. One stakeholder said that project vessels are often purchased by older people who are then unable to finish them.¹¹⁰
- **GRP vessels** – As covered in section 3.3, there are difficulties associated with the waste management of GRP. Furthermore, there is a significant second-hand market for wooden boats as they can easily be repaired. People who purchase second-hand wooden vessels are generally interested in restoration and are less likely to abandon them.¹¹¹
- **Age groups** – generally, stakeholders spoke about owners of recreational vessels being older people that have more disposable income. In the workshop, some stakeholders from marinas spoke about challenges in removing vessels that belonged to owners who had passed away, although it is not clear whether these would be classed as abandoned. One stakeholder interviewed, suggested that younger people are more likely to abandon vessels, due to lack of disposable income to maintain a vessel or dispose of a vessel through legal disposal routes.¹¹²

3.5.2. Location

Stakeholders interviewed and who participated in the workshops highlighted that vessels are most likely to be abandoned in quiet locations, such as riverbanks and estuaries, where they will not be noticed. One stakeholder said that the river Hamble was considered one of the main hot spots for recreational vessels in the whole of the UK with around 3,500 boats located within the river. However, they did not have a problem with abandoned vessels as the high level of traffic and activity of the river meant discreetly abandoning a vessel was not possible. It was suggested by the

¹⁰⁸ Interview with two trade associations, December 2022 and January 2023.

¹⁰⁹ Interview with two trade association, December 2022

¹¹⁰ Interview with a trade association, January 2023.

¹¹¹ Interview with a trade association, January 2023.

¹¹² Interview with a trade association, January 2023

stakeholder that quieter, more out the way locations were more likely to receive vessel abandonment¹¹³.

There are also instances where vessels have been abandoned on private land. One stakeholder, with experience in the yacht and sailing club industry, said they have experienced an issue with club members abandoning small dinghies on land owned by sailing clubs¹¹⁴.

Vessel owners may also leave their vessels at moorings after their memberships have lapsed.¹¹⁵ Harbours and marinas are faced with challenges when trying to locate the owners, who may have passed away or who say they have sold the boat to others.¹¹⁶

Geographically, there are hotspots in the South of the UK, particularly near Southampton and Portsmouth, where vessels are abandoned, despite being close to a boat breaker. One stakeholder interviewed said that in their experience, sailboats were more commonly abandoned in the South-West and motorboats in the South-East.¹¹⁷ However, they did not have data to support this.

3.5.3. Efforts to clean up abandoned vessels

There are no national clean-up schemes in place. Due to the cost associated with this, it is done on a case-by-case basis.¹¹⁸ This may be carried out by public bodies, harbours or the third sector. Associated British Ports and their members have cleaned-up hotspots of abandoned vessels in the River Itchen near Southampton.¹¹⁹ This was met by some controversy as squatters were using these vessels to live in.¹²⁰ Other public bodies such as local authorities and the Crown Estate are involved in the removal of abandoned vessels.¹²¹ Wirral Council, for example, are in the process of procuring contractors to remove abandoned vessels from a hotspot on Haswell Foreshore on the Dee Estuary.¹²² These are just a few examples of the projects that have taken place to clear abandoned vessels in the UK.

3.5.4. Environmental impacts of abandoned vessels

Abandoned vessels have the potential to negatively impact the environment. Vessels often contain hazardous chemicals such as asbestos, oil, fuel and anti-fouling paint which may leach into the environment and pose a danger to wildlife.¹²³ Older vessels may still contain tributyltin, an anti-

¹¹³ Interview with a local authority, January 2023

¹¹⁴ Interview with a yacht/sailing club, January 2023

¹¹⁵ Interview with a trade association, January 2023.

¹¹⁶ Discussion in workshop among stakeholders from port/harbours, January 2023.

¹¹⁷ Interview with a boat salvager/breaker, January 2023

¹¹⁸ Interview with a boat salvager/breaker, January 2023.

¹¹⁹ [ABP \(2022\) Port of Southampton completes substantial wreck clearance project on River Itchen](#)

¹²⁰ [De Boltz H. \(2022\) Southampton's "boat graveyard" clean-up ongoing despite squatters living there, ABP says. Southern daily echo.](#)

¹²¹ Information from stakeholder workshop.

¹²² Information from stakeholder workshop

¹²³ Interview with two trade associations, January 2023

fouling paint which has been banned due to its environmental toxicity.¹²⁴ GRP may also breakdown to release microplastics into the environment, which have the potential to enter food chains and negatively impact organisms.¹²⁵ Depending on where they are abandoned, their presence may lead to habitat loss for plants and animals.¹²⁶

Abandoned vessels can also pose a danger to vessels and people as they are navigational hazards, either in the water or on land.¹²⁷ Abandoned vessels can also damage the land by scouring the ground on which they are abandoned, which could lead to increased coastal erosion.¹²⁸

3.6. Policy Options

3.6.1. Examples of policies in other regions

Some regions have taken steps, either through regulatory measures or support to stakeholders, to prevent abandoned vessels or remove them. This section outlines approaches that were identified through desk-based research and stakeholder interviews. This research was then used to help develop the policy measures that were explored in the stakeholder workshop.

3.6.1.1. Extended producer responsibility

Extended producer responsibility (EPR) is a policy based on the polluter pays principle, designed to decrease the total environmental impact of a product, by making the producers of the product responsible for the entire life-cycle of the product and especially for the take-back, recycling and final disposal. In many instances this makes producers financially responsible for managing their products at end-of-life. In the latest UK legislation, packaging producers will be required to pay a fee to cover costs for appropriate disposal of their products, preventing environmental harm, which is eco-modulated to incentivise design for recyclability through lower producer fees. France has established an EPR scheme for recreational vessels.¹²⁹ This is a mandatory compliance scheme for recreational vessels between 2.5 and 24 meters in length.¹³⁰ A tax is paid by companies when a boat is sold. Currently, the scheme finances a network of 26 dismantling centres, which break down and dispose of vessels at the end of their life.¹³¹ It also finances 80% of the transport cost of boats

¹²⁴ [BBC \(2021\) *Hundreds of abandoned boats dumped around Devon and Cornwall*](#)

¹²⁵ [Ciocan C. et al. \(2020\) *The fate and effect of GRP in the aquatic environment* Marine Pollution Bulletin. 160\(11\)](#)

¹²⁶ Interview with a local authority, January 2023

¹²⁷ Interview with a salvager/boat breaker, government department and non-departmental public body, port/harbour, and a trade association, January 2023

¹²⁸ Interview with government department and non-departmental public body, January 2023

¹²⁹ [APER \(undated\) *Network of dismantling recreation craft in France* \[accessed 23 December 2022\]](#)

¹³⁰ [Diaz I. M. \(2021\) *Pleasure boats at the end of their life: where is the dismantling sector?* Voiles et voiliers](#)

¹³¹ [APER \(undated\) *Network of dismantling recreation craft in France* \[accessed 23 December 2022\]](#)

under 6m in length.¹³² Between September 2019 and end of November 2020, 1,200 boats were dismantled.¹³³

New South Wales, Australia has recently consulted on exploring EPR which could incentivise eco-design (through targets mandating that circular concepts are incorporated into new builds) or fund the waste management of vessels.¹³⁴ The consultation responses have not yet been published.

3.6.1.2. Mandatory registration of recreational vessels

Mandatory registration of vessels could help to mitigate the challenges of locating the owner. The UK doesn't have mandatory registration of recreational vessels in place.¹³⁵ Boat owners can choose whether they want their boat registered. There aren't many incentives to registering a recreational vessel, but it does allow individuals to secure a marine mortgage or spend more than six months out of the UK. However, there are different elements within the vessels that are registered, such as safety equipment and very high frequency marine radios.¹³⁶ Boat registries exist in countries such as Denmark, France, Finland, Estonia, Latvia, Lithuania and Poland.¹³⁷ However, this system is not perfect as vessels are still abandoned in these areas and registration may not always be transferred on sale of a vessel.¹³⁸ France has required vessels to be registered since 2016¹³⁹, however, when these data were used to estimate the number of boats in France prior to EPR being introduced, it was found that approximately 20% of recreational boats were not registered.¹⁴⁰

3.6.1.3. Other initiatives

To prevent the abandonment of recreational vessels, some nations are funding schemes to incentivise and increase proper waste management and recycling. In Sweden, for example, the Swedish Agency for Marine and Water Management has funded a dismantling scheme, whereby recreational boat owners can recycle their boats for free.¹⁴¹ They are, however, responsible for payment of transport costs. Boats up to three tonnes can be sent to one of 25 recycling facilities in the country.¹⁴²

¹³² [Carbon Trust \(2022\) Roadmap for the decarbonisation of the European Recreational Marine Craft Sector.](#)

¹³³ [European Boating Industry \(2020\) Meeting of stakeholder working group for end-of-life recreational boats](#)

¹³⁴ [Transport for NSW \(2022\) End of life vesels: Public consultation on policy options](#)

¹³⁵ [UK Government \(undated\) The UK Ship Register \[accessed 5 January 2023\]](#)

¹³⁶ Interview with a trade association, January 2023

¹³⁷ [HELCOM \(undated\) Policy brief: end-of-life boats \[accessed 5 January 2023\]](#)

¹³⁸ [EBA \(2022\) EBA Position Statement: Boat Registration](#)

¹³⁹ [France Boat Registration \(undated\) Register boat in France. Register your yacht under French Flag \[accessed 5 January 2023\].](#)

¹⁴⁰ [EBA \(2022\) EBA Position Statement: Boat Registration](#)

¹⁴¹ [Baltic Marine Environment Protection Commission \(2019\) HELCOM RAP ML, RS1 Development of best practice on the disposal of old pleasure boats.](#)

¹⁴² [Båttretur \(undated\) Båttretur – Båtlivet's network for disposal of end-of-life leisure boats \[accessed 5 January 2023\]](#)

Similar schemes exist in other regions. Finland piloted an amnesty scheme in 2005, whereby boat owners could leave any vessel <10m at collection points free of charge.¹⁴³ This was in place in the Turku Archipelago where many Fins have summer homes and there is a high density of recreational vessels. A total of 180 vessels were dropped off, some of which were sold for reuse. This was not continued, but there is a network of dismantling centres for GRP boats at the end of their life.¹⁴⁴

The California Department of Parks and Recreation has established a surrender and abandoned vessel exchange (SAVE) program which provides funding to public agencies to operate vessel turn-in programs and efforts to clean-up abandoned vessels.¹⁴⁵ Canada operates a similar Abandoned Boats Program, funding clean-up and waste management of vessels. It also helps to educate boat owners on how to responsibly manage their boats, supports research on boat design and recycling.¹⁴⁶

Five stakeholders interviewed said a grant to assist with waste management costs would be a good initiative to prevent vessel abandonment¹⁴⁷. Other policy options mentioned by the stakeholders interviewed included increased official guidance on legal waste management options, more official breakers yards, mandatory insurance on recreational vessels, and increased circular manufacturing practices.

3.6.2. Policy options in the UK

Stakeholder interviews, workshops and desk-based research provided insight into the possible benefits and risks of the policy options which were explored. There is limited data in the public domain and therefore it is not possible to quantify the impact of the policy options on the number of abandoned recreational vessels. Instead, this analysis explores what considerations are needed for successful policy in this area and provide information that could help to determine whether there is merit in investigating any of these options further. It is worth noting that these policies are non-exclusive in that several could be implemented together if so desired. In the workshop, stakeholders identified that no one policy option would remove all the barriers that were identified, and that more than one complimentary policy measure will be required.

3.6.2.1. Option 1: Extended Producer Responsibility

EPR would place a levy on new recreational vessels that are built. This levy could be used to fund the breakdown and waste management of recreational vessels at the end of their life. This levy would secure funding and help to remove the cost barrier that leads to abandonment. In designing a new EPR scheme, consideration should be given to the following factors to maximise success:

¹⁴³ [Norden \(2013\) *Disposal of plastic end-of-life-boats*](#)

¹⁴⁴ [Renegade Sailing \(2018\) *Breaking Up is Hard to Do*](#)

¹⁴⁵ [San Mateo County Harbour District \(undated\) *Surrendered and Abandoned Vessel Exchange \(SAVE\) Grant Program \[accessed 23 December 2022\]*](#)

¹⁴⁶ [Government of Canada \(2019\) *Abandoned Boats Program*](#)

¹⁴⁷ Interview with two Trade Associations, two boat salvager/breakers and a port/harbour, January 2023

- **Materials in scope** – some stakeholders thought that an EPR scheme should be inclusive of all vessel types, whilst others thought that only vessels with GRP hulls should be included. One stakeholder that was interviewed, thought wooden boats should be exempt from the EPR because they are more sustainable than those made of GRP¹⁴⁸;
- **Vessels in scope** – one stakeholder thought consideration needed to be given to the profile of vessels included in the scheme and should not be restricted to vessels between 6 and 24 meters. There was also concern that owners of other vessels out of scope for this project (e.g., canal boats) would be disproportionately affected;
- **Fee modulation** – consideration needs to be given as to whether fees will be based on material composition of vessels (i.e., material of hull or weight of particular materials), on the overall size of vessels (i.e., length or weight), value of the vessel, or a combination of these; and
- **Effective communication** – feedback from stakeholders was that effective communication would be essential to maximise uptake of the scheme. There was also initial confusion among participants as to whether fees paid on new vessels would cover the cost of waste management of older vessels, which highlights that this needs to be communicated carefully.

The potential benefits of introducing a scheme were seen as alleviating the burden of cost to dispose of vessels at the end of their life. Stakeholders in the workshop and in interviews, highlighted that the wealthiest owners (and therefore most likely to be able to afford these costs) are those who purchase new vessels. It would also incentivise individuals to follow proper waste management routes. If a vessel is abandoned, then an EPR scheme may help to relieve some of the cost burdens to stakeholders (such as harbours) that are impacted when vessels are abandoned on their land.

Several challenges and risks were identified in the workshop, which will need to be mitigated to ensure a successful scheme. This includes:

- **Vessels manufactured or purchased abroad** – consideration should be given to how EPR is applied to new vessels that are imported into the UK for sale. Consideration would also need to be made for vessels which are originally purchased new abroad and then used in UK waters or sold second hand in the UK;
- **Premature disposal of vessels that are not at the end of their life** – one stakeholder said there is “a fine line between a project boat and an end-of-life vessel.” This came from concern that people may try to dispose of boats, even though they could be repaired;
- **Transport still a significant cost** – transporting of vessels is a significant cost for owners, and not covering this cost as part of EPR may mean that there is still a barrier in place for current owners. This could be mitigated through covering transport costs or establishing a wider network of dismantling centres to ensure they are more accessible;

¹⁴⁸ Interview with a trade association, January 2023

- **Potential to negatively impact the industry, particularly SMEs** – stakeholders from trade associations in the workshop and interviews voiced concerns that added cost has the potential to negatively impact the boating industry, particularly smaller manufacturers. One stakeholder interviewed, suggested that small sole traders should be exempt from any EPR scheme, regardless of vessel material¹⁴⁹. However, this needs to be balanced with the consideration that all producers are placing vessels, which will come to the end of their life, on the market.
- **Commercial vessels may be converted to recreational vessels** - one stakeholder interviewed¹⁵⁰ said that, except for larger commercial ships, a substantial proportion of vessels originally used for commercial purposes enter the recreational vessel market once their commercial life has ended. These vessels are often bought by private individuals and converted to recreational vessels, therefore becoming the responsibility of the owner.
- **Does not address challenge of identifying vessel owners** – whilst an EPR scheme may help address the financial challenges with waste management of vessels, it will not act as a deterrent to those who choose to abandon their vessels.

3.6.2.2. Option 2: Mandatory Registration of Vessels

This would require all vessels to be registered to enable identification of owners if a vessel is abandoned. Vessel owners would register the hull identification number (HIN) of their vessel. Mandatory registration would act as a deterrent to vessels being abandoned and help authorities to pursue enforcement action when it does occur. It could also help to deter impulse buyers. This could include a one-off registration fee that is paid on the purchase of a new or second-hand boat, or a regular registration payment (for example once a year or every five years). Workshop participants felt that a mandatory registration is a priority and that it should be easy to comply with and not cost-prohibitive. Establishing a mandatory registration system would also incur costs to the public purse to set up, maintain, promote and enforce. Depending on the role of marinas in this process (i.e., if there are responsibilities to check their members are compliant), they may also incur a small cost.

There is currently a small ships registry run by the Maritime and Coast Guard Agency, with around 58,000 vessels registered, which is not mandatory.¹⁵¹ There was a perception among stakeholders in the workshop¹⁵² that this could easily be rolled out and made mandatory.

Possible risks for introducing mandatory registration of vessels includes:

- **Compliance and enforcement** – to maximise success, enforcement provisions need to be made alongside mandating registration. There was a perception among stakeholders at the workshop that recreational vessel owners may be resistant to registering their vessels. The

¹⁴⁹ Interview with a trade association, January 2023

¹⁵⁰ Interview with government department and non-departmental public body, January 2023

¹⁵¹ Interview with Government Department, January 2023

¹⁵² The Maritime and Coast Guard Agency were not present at the workshop

role that harbours and marinas play in the monitoring of this policy also needs to be considered.

- **Vessels without a HIN** – Some vessels (particularly historic vessels, which are defined as vessels greater than 50 years old¹⁵³) do not have a HIN. There may also be cases where vessels have been imported and do not have a HIN.
- **Abandoned vessels still occur** – as outlined in section 3.6.1.2, countries which have mandatory registration still have issues with vessels being abandoned. The causes of this will need to be researched further, but it is possible that it still happens because mandatory registration will not remove the barriers associated with cost of waste management and the risk of enforcement action is not a sufficient deterrent for all vessel owners.

3.6.2.3. Option 3: Public Funding for Waste Management of End-of-Life Vessels

Public funding could be used to incentivise appropriate waste management of end-of-life recreational vessels. This could take many forms, including establishing turn-it-in programs or amnesty schemes such as those seen in the USA and Scandinavia, establishing a fund to support organisations involved in clearing of recreational vessels, establishing a network of waste management centres, or investing in projects related to increasing GRP recycling.

Whilst stakeholders in the workshop saw benefits in some of these options to alleviate immediate challenges, it would not remove the barriers leading to abandoned vessels and would not encourage responsible ownership. Furthermore, stakeholders did not think public funds should be used to fund a private problem, particularly when budgets are stretched, and funds would likely have to be reallocated from another area. There were also concerns surrounding the risk of misuse of funds and potential to fund waste crime.

3.6.2.4. Option 4: Establishing National Guidance on End-of-Life Vessels

Establishing national guidance on the waste management of end-of-life recreational vessels would ensure that those who must deal with end-of-life vessels or provide advice to members, such as vessel owners, trade associations and harbours or marinas, know what to do. Whilst some organisations provide guidance to their members, there is no nation-wide guidance available. In the workshops, stakeholders were asked to think about who needs to be targeted, how the guidance should be available and what needs to be included. Their responses can be summarised as follows:

- **Easily available** – guidance needs to be easily available online. One suggestion was to append guidance to the port marine safety code.
- **Content** – any guidance should include advice on how to dispose of vessels, including signposting to nearest boat breakers, facilities, and waste handlers. It should also make owners aware of their responsibility, maximum penalties for abandonment and raise awareness of the environmental impact of abandonment, so individuals understand the

¹⁵³ Feedback from stakeholders at the workshop

implications of their decisions. However, one stakeholder raised that abandonment is not about education and is instead about circumstance and therefore developing guidance won't address all barriers.

- **Target audience** – beyond vessel owners, standard guidance for ports and harbours would be useful.
- **Signposting to support** – guidance should include signposting to contacts that could provide additional guidance to further queries.

Establishing national guidance would not remove the barriers associated with cost, however, it can help to identify the lowest cost option and be used to support people who want to do the right thing. There is also an opportunity, that with effective communication, guidance could make potential buyers aware of their responsibilities and the costs that may occur to them. Stakeholders in the workshop also highlighted that effective communication would be essential to the success of the guidance, as there is currently guidance in the public domain and it's either not applicable to everyone, or people are not aware of it. For example, the Ports Authority publishes guidance on dealing with abandoned vessels in harbours.¹⁵⁴

Another challenge that was raised in the workshop is that there is currently no agreed definition on abandonment and that there is currently no nationally agreed guidance, which would need to be established in consultation with stakeholders.

3.6.2.5. Option 5: Circular Design

Desk-based research and interviews with stakeholders identified that there were some efforts to manufacture new vessels to incorporate circular design. This is where the design of the vessel is made to maximise resource efficiency through the vessel life cycle from manufacturing to end-of-life, by eliminating waste and maximising reuse. This could include designing vessels which are cost-effective to repair, therefore extending their life, or enabling their materials to be reused after the vessel comes to the end of its first life.

Whilst there are projects and companies that are incorporating circularity into their design, it is not widespread. In the workshop, stakeholders were asked to feedback about how this could be incentivised and any potential benefits. As this is not yet a fully developed policy, it was not evaluated as part of this work. Nonetheless, feedback from the workshop provides valuable insights that may need to be considered as part of other measures, or in the future.

Based on stakeholder feedback and desk-based research, there is no agreement on what circular design is, but it could include the following concepts found in circular design and eco-design of other products:

¹⁵⁴ [British Ports Association \(2022\) *Guidance: dealing with abandoned vessels in harbours*](#)

- **Consider materials at the end-of-life** - where possible materials should be reusable, or recyclable when they can't be. Incineration and landfill should be a last resort. There are examples of fully recyclable vessels, such as one used by Police Scotland.¹⁵⁵
- **Increase reuse** – whether this is reusing materials in new products or designing new materials and fixtures/fittings that can easily be reused.
- **Increase durability and repairability** – this will help to prolong the life of the vessel to ensure that waste management doesn't need to be considered.
- **Consider the full life-cycle of the vessel** – looking at the carbon emissions and other environmental impacts from production, throughout its use and at end-of-life.
- **Fuel efficiency** – the design of a vessel can impact the fuel efficiency. Newer vessels are being made from thinner hulls to increase fuel efficiency; however, this decreases durability and the overall impact should be considered.¹⁵⁶

Circular design could be incentivised through exemptions and reduced-fees under EPR, through stand alone policies such as targets or quotas, requiring all new build vessels to have an end-of-life plan, or a recognised accreditation standard. When exploring how this can be encouraged or incentivised, the following risks and challenges should be considered:

- **Commercial viability** – technology needs to be accessible at scale and at a cost that makes it commercially viable. One stakeholder in the workshop flagged that reuse of materials in new builds may not always be durable enough and could shorten the lifespan of a vessel.
- **Economic impact** – a regulatory approach could make it too expensive for ownership of new vessels. It could also make UK boat building less competitive in an international market, where the same restrictions aren't in place.
- **Circular design is not just waste** – the waste management of vessels should be considered in the full context of other environmental impacts throughout the vessel's lifecycle, particularly carbon emissions.

3.6.2.6. Policy Assessment

The findings of the assessment of policy options carried out by the authors can be seen in Table 7. Whilst stakeholder views were considered in this assessment, the assessment is not their views (see section 3.6.2.8 for workshop output). Option 5, circular design was not included in the assessment as it was not developed enough to appropriately assess the impact criteria against. When ranked (from highest to lowest scoring), the results are as follows:

1. Option 4: Establishing Guidance
2. Option 1: EPR and equally ranked Option 3: Public Funding
4. Option 2: Mandatory Registration
5. No Policy

¹⁵⁵ [Exotechnologies \(undated\) Danu™ \[Accessed 30 January 2023\]](#)

¹⁵⁶ Interview with a trade association and a boat salvage/breaker, December 2022 and January 2023.

No single policy option would be sufficient to remove all the barriers that were identified in this research project, and therefore policy measures may need to be looked at in conjunction with each other. Furthermore, it should be noted that the impact criteria were not weighted and are therefore viewed equally in this assessment. As a result, the broader context must be considered when determining next steps. For instance, EPR and public funding will remove the same barriers (high cost to vessel owners and insufficient infrastructure), and therefore would not be complimentary measures. EPR requires changes to primary legislation and would therefore take longer to introduce; public funding is unlikely to change behaviours, therefore impact may not be as long lasting.

The biggest difference between the policy options, which therefore had an influence on the ranking, is whether legislative changes needed to be introduced. Guidance and public funding would not require legislative measures. In theory, this could mean that they could be introduced more quickly. Whilst this may provide a solution in the short-term, the long-term impact needs to be balanced against the effort it will take to implement these policies.

All have associated economic costs to at least one stakeholder and where this cost should lie needs to be considered. For example, in the workshops, stakeholder feedback was that not all cost should be borne by the public purse.

Based on initial assessment, no unintended consequences on wider groups were identified for most of the policy options. Again, option 3 will require greatest public funding, which may result in the reallocation of resources from other areas. All policy options have the potential to remove abandoned vessels and have a positive impact on the environment.

Table 7: Assessment of policies against impact criteria.¹⁵⁷ Scores of 1 (Low), 2 (Med) and 3 (High) were given to help rank policy options.

Criteria	Option 1 EPR	Option 2 Registration	Option 3 Funding	Option 4 Guidance	No Policy
Impact on abandoned vessels Low: Removes 0-1 barriers Med: Removes approx. half of barriers High: Removes all or most barriers	Med	Low	Med	Low	Low
Legal Feasibility Low: Requires primary legislation Med: Requires secondary legislation High: Does not require legislation	Low	Low	High	High	High
Technical/Logistical Feasibility Low: Technology does not exist, or it is not feasible for logistical reasons Med: Moderate technological or logistical barriers High: No technological or logistical barriers	Med - There are challenges in apportioning costs due to lack of data on vessels and vessel profiles	Med - The small ships registry exists, but consideration into how this will be rolled out needs to be considered	High	Med – There will be challenges associated with agreed definitions and approach, including between devolved areas	High

¹⁵⁷ Option 5: Circular design was not included in the assessment.

Criteria	Option 1 EPR	Option 2 Registration	Option 3 Funding	Option 4 Guidance	No Policy
<p>Economic Impacts</p> <p>Low: High cost to stakeholders</p> <p>Med: High cost to some stakeholders, low to others</p> <p>High: Low costs to stakeholders</p>	<p>Med – There will be a cost associated with designing and implementing EPR. Additionally, there will be a change in who is incurring the cost for waste management.</p>	<p>Med – Costs will be incurred by most stakeholders; however, this will be low for vessel owners.</p>	<p>Med – There would be a high cost to government.</p>	<p>High – Costs of establishing guidance will be relatively low.</p>	<p>Low – There will be no change in costs to national government, but other stakeholders will still be incurring high costs to dispose and clear abandoned vessels.</p>
<p>Wider Impacts</p> <p>Low: One or more areas will be negatively impacted</p> <p>Med: No other areas impacted</p> <p>High: One or more areas will be positively impacted</p>	<p>High – This will shift the responsibility of waste management.</p>	<p>Med</p>	<p>Low – This will be unlikely to motivate people to take responsibility. In reality, public resources are stretched so allocation to recreational vessels maybe impact other areas.</p>	<p>High – Guidance will help people to understand their responsibility and change behaviours.</p>	<p>Low – There is unlikely to be significant changes in abandoned vessels. They will therefore continue to impact visual amenity.</p>
<p>Geographical Impacts</p> <p>Low: Many regions will be disproportionately affected</p> <p>Med: One or two regions will be disproportionately affected.</p> <p>High: No regions will be disproportionately affected</p>	<p>High – This assumes a UK-wide scheme, but waste is a devolved matter.</p>	<p>High</p>	<p>Med – Funding may not be proportional across all regions.</p>	<p>High</p>	<p>Low</p>

Criteria	Option 1 EPR	Option 2 Registration	Option 3 Funding	Option 4 Guidance	No Policy
<p>Environmental Impacts</p> <p>Low: Will negatively impact the environment</p> <p>Med: Will have no negative or positive impact on the environment</p> <p>High: Will positively impact the environment</p>	High	High	High	High	Med – There will be no changes.
Total	16	14	16	18	12

3.6.2.8. Stakeholder Views

Workshop participants were asked to vote on which policy option was their preference. Results are shown in Figure 5. Mandatory registration was the preferred option, followed by EPR and best practice guidance. Each participant was allowed two votes. This reflects the findings from the stakeholder interviews where 10 (out of 14) stakeholders thought EPR would be suitable for addressing abandoned vessels. A total of 10 stakeholders interviewed also said that they thought mandatory registration would also be suitable.

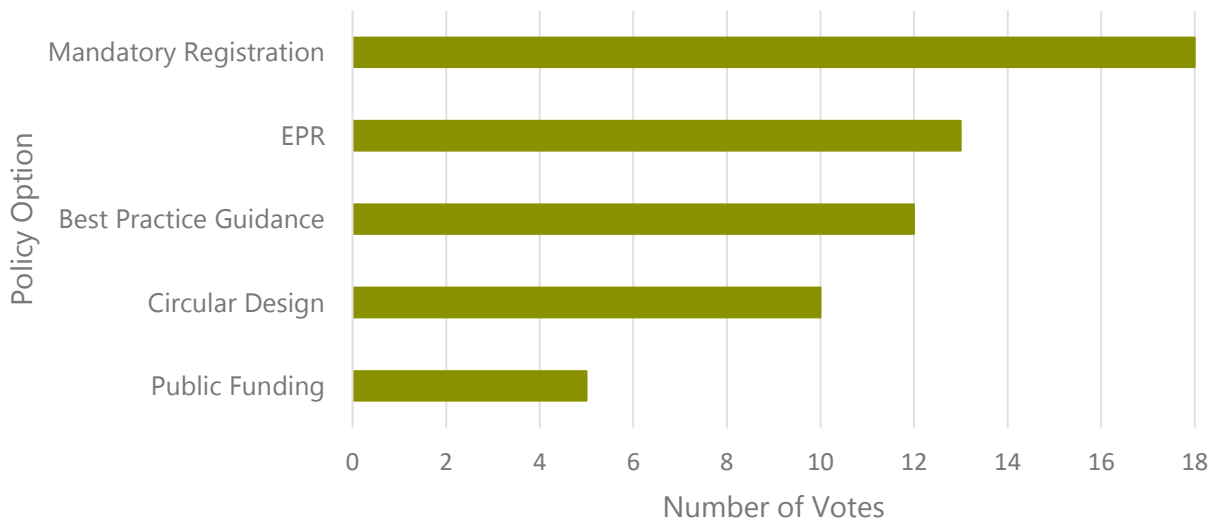


Figure 5 Results by participants of two preferred policy options (n=30 participants with two votes each)

When asked about other measures that could be taken to address recreational vessels at the end of their life, mandatory wreck recovery insurance was brought up. Currently, insurance is only required for recreational vessels on inland waterways.¹⁵⁸ Whilst this may prevent the abandonment of wrecked vessels, this would not address vessels that cannot be repaired.

4. Conclusion

Quantifying waste arisings is a crucial step in policy development processes of this nature both to inform the scale of the problem, and the scale of the potential benefits of investing in material recycling. While every effort was made to provide the best estimations possible in terms of material tonnages in the recreational vessel fleet, it must be recognised that there are currently vast data gaps which prevent the calculation of estimates with any reasonable accuracy. Mandatory vessel registration would assist with filling these data gaps, but before that point investment in primary data collection through site visits to harbours and boating clubs is required.

¹⁵⁸ [UK Gov \(undated\) *Owning a boat* \[accessed 30 January 2023\]](#)

While this work was commissioned to focus on marine recreational vessels, this is only part of the problem. Abandonment of vessels on inland rivers must also be recognised. While the estimates for material flows did include vessels which could be used both inland or on the coast, this excluded canal boats, and stakeholders able to reflect on the issue from an inland perspective were not engaged with. Broadening the scope of future work would assist with informed decision making on future policy development, to ensure opportunities are not missed.

There are several reasons why recreational vessels are abandoned by their owners. These can be summarised as insufficient understanding of disposal methods and the cost of disposal at point of purchase, insufficient waste management infrastructure, lack of accountability and prohibitive costs. When a vessel is abandoned the associated costs of dealing with the vessel fall to the landowner, or sometimes the third sector. While some landowners were very keen to engage with this research and were glad to see the issue being taken forward as a priority, others were disengaged. Stakeholders were certain this problem is likely to get worse very quickly and so it will be crucial to get all parties engaged.

The policy options outlined in this report are all initial outlines of how the options could work, and so require further scoping and analysis. There is a significant difference in the way the policy options were ranked against impact criteria, compared to how they were ranked by stakeholders. This is mainly due to considerations around cost and feasibility. It is clear that one policy option alone will not tackle the problem, so analysis of policies in combination is an important next step. There was wide consensus among stakeholders that vessel registration is an essential step. This would ensure those responsible for vessel abandonment could be located, thereby disincentivising this behaviour. The additional data provided by a registration scheme would enable more efficient set up of an EPR scheme, should that be the preferred policy response. EPR would enable long term change by funding the waste management infrastructure required and removing the cost barrier to responsible waste management. However, neither of these options will tackle the immediate problem, and so investing in the development and promotion of guidance will likely be needed, in order to encourage initial behaviour change.

In conclusion, recreational vessel abandonment is set to become an increasingly large problem. There are a number of options that could be used to tackle this problem, and enthusiasm from key stakeholders to progress these. However, limitations need to be overcome in terms of improving available data and engaging unengaged parties. Tackling this issue will have large environmental benefits, increase visual amenity in abandonment hotspots, and stimulate the limited waste management industry in this sector.

Appendix A Interview proforma

General information:

- Business Name
- Type of Stakeholder
- Contact Name
- Contact Details
- Position / Role

Overview

- Please provide an overview of your role in the management or use of pleasure/recreational vessels

General information on pleasure vessels

- What do you understand a "pleasure / recreational vessel" to be?
- Can you provide an overview of the current pleasure/recreational vessel market, e.g., the number of new boats entering the market, where boats are made, the prevalence of the second-hand market etc.?
- Do you know the number of pleasure/recreational vessels currently in the UK – by nation, by vessel type? If not, can you suggest organisations who might hold this information? (Note: request info on sizes where appropriate)
- Have there been any changes to the types of boats placed on markets over the last 30 years? E.g., types of vessels: motor / sailing or vessel size etc.
- Some boats built in the 1970s and 1980s will soon be coming to the end of their life. Have you noticed a shift in materials used since then compared to the current materials used now? E.g., more fibreglass, more plastics etc.
- Are new boats being built with circularity at end-of-life in mind?

End-of-life and disposal





- Who has responsibility for the management of end-of-life vessels?
- Do you know how recreational vessels are disposed of at end of life? / What are the current legal disposal options and what are the costs involved in legal disposal?
- What are the current barriers to the responsible disposal of an end-of-life vessel?
- What support (from industry, government, and communities) could help improve waste management and recycling of pleasure/recreational vessels?
- What proportion of vessels are abandoned compared to the number of vessels that are disposed of legally? Have you got an understanding of how this proportion may have changed over the last 5-10 years?
- Are you aware of any efforts to clean up abandoned vessels? E.g., any programmes or pilots that are taking place (UK or overseas)
- Are you aware of any recycling or reuse initiatives of pleasure/recreation vessels or their components currently taking place and if so, is there further potential for this?

- Where are pleasure/recreational vessels most likely to be abandoned/dumped? E.g., in marinas, in hard-to-reach areas, estuaries, a particular part of the UK etc.
- What is the most likely type of vessel to be abandoned? E.g., size, motor or sailing, etc.
- In your opinion what are the main issues caused by abandoned vessels?
- Are there any suitable policies that could be used to address the problem, both in terms of preventing abandonment and improving waste management options?
- Are you aware of valuable materials or items being removed from abandoned boats, not by the legal owners? Would this affect recycling as companies would not have valuable parts to sell to cover the costs of recycling?

Other information

- Is there any further information you can think of that would contribute to this project?
- Do you have any further data or images that would be useful for the project?
- Do you have any recommendations for other stakeholders we should speak to as part of this project?

Appendix B Vessel categories¹⁵⁹

Vessel type and description	Vessel illustration
<p>Small sailing boat (a dinghy, day boat or other small keelboat, usually taken out of the water at end of use)</p>	
<p>Sailing yacht (usually with cooking facilities and a place suitable for sleeping)</p>	
<p>Power boat (a craft that can plane over water but excluding RIBS/Sportsboats)</p>	
<p>Day Motor Boat (river or coastal boat without cooking facilities or a place suitable for sleeping)</p>	

¹⁵⁹ Personal comms, Trade Association, January 2023

<p>Other Motor Boat (river or coastal boat with cooking facilities and a place suitable for sleeping)</p>	
<p>Rowing boat/scull</p>	
<p>Sportsboats and RIBS/Inflatables (excluding power boats - usually with an engine and not including seaside inflatables)</p>	

Appendix C Typical vessel profiles

The profiles outlined below were developed during previous unpublished research for Marine Scotland. During this research, stakeholders were asked to provide their thoughts on the percentage composition of each vessel type. During the current project, stakeholders were asked to verify the profiles. One trade association, one boat salvage/breakers and one ship yard/boat builder suggested changes to the profiles during the current project.

Small sailing boat	<i>A dinghy, day boat or other small keelboat, usually taken out of the water at end of use. Average weight: 250kg. Average length: 5m.</i>	
Material	Proportion of total vessel weight (%)	
Fibreglass		50%
Cast iron		0%
Wood/plywood		10%
Aluminium and stainless steel		12%
Other		28%

Sailing Yacht	<i>Usually with cooking facilities and a place suitable for sleeping. Average weight: 8 tonnes. Average length: 11m.</i>	
Material	Proportion of total vessel weight (%)	
Fibreglass		40%
Cast iron		30%
Wood/plywood		15%
Aluminium and stainless steel		7.5%
Other		7.5%

Power boat	<i>A craft that can plane over water but excluding RIBS/Sportsboats. Average weight: 3.75 tonnes. Average length: 9m.</i>	
Material	Percentage of total vessel weight	
Fibreglass		40%
Cast iron		15%
Wood/plywood		20%
Aluminium and stainless steel		15%
Other		10%

Day Motor Boat	<i>River or coastal boat without cooking facilities or a place suitable for sleeping. Average weight: 3.75 tonnes. Average length: 9m.</i>	
Material	Percentage of total vessel weight	
Fibreglass		40%
Cast iron		15%
Wood/plywood		20%
Aluminium and stainless steel		15%
Other		10%

Motor Yacht	<i>River or coastal boat with cooking facilities and a place suitable for sleeping. Average weight: 5 tonnes. Average length: 12m.</i>	
Material	Percentage of total vessel weight	
Fibreglass		40%
Cast iron		15%
Wood/plywood		20%
Aluminium and stainless steel		15%
Other		10%

Row Boat A (Fibreglass = 90% of total)	<i>Average weight: 45kg. Average length: 4.25m.</i>	
Material	Percentage of total vessel weight	
Fibreglass		63%
Cast iron		0%
Wood/plywood		35%
Aluminium and stainless steel		2%
Other		0%

Row Boat B (Wooden = 10% of total)	<i>Average weight: 45kg. Average length: 4.25m.</i>	
Material	Percentage of total vessel weight	
Fibreglass		0%
Cast iron		0%
Wood/plywood		98%
Aluminium and stainless steel		2%
Other		0%

RIB/Inflatable/Sports boat	<i>Excluding power boats - usually with an engine. Average weight: 250kg. Average length: 7.5m.</i>	
Material	Percentage of total vessel weight	
Fibreglass		55%
Cast iron		25%
Wood/plywood		0%
Aluminium and stainless steel		5%
Other		15%