



# The environmental impacts and health hazards of abandoned boats in estuaries



Andrew Turner\*, Aldous Rees

School of Earth, Ocean and Environmental Sciences, Plymouth University, Drake Circus, Plymouth PL4 8AA, UK

## HIGHLIGHTS

- Boat abandonment is a growing problem on the estuarine foreshore.
- We surveyed two estuaries in eastern England where abandoned boats are abundant.
- Various items and materials were observed within and around boats.
- These included tyres, timber, plastics, electronic equipment, canisters and metal objects.
- Abandoned boats are a source of pollution and represent a hazard to humans and wildlife.
- Recommendations to address the problem are addressed.

## ARTICLE INFO

### Article history:

Received 10 October 2015  
 Received in revised form  
 14 March 2016  
 Accepted 18 March 2016  
 Available online 21 March 2016

### Keywords:

Abandoned boats  
 Coast  
 Shoreline  
 Hazards  
 Contamination  
 Litter

## ABSTRACT

Decaying boats are a common sight in the coastal zone and yet the practice of abandonment appears to be exempt from any clear or enforceable regulation. In the present study we surveyed two estuaries in eastern England hosting an abundance and variety of abandoned vessels. An inventory of items and materials associated with or adjacent to each boat was recorded in order to gain an insight into the hazards and pollution risks related to abandonment. Materials most commonly observed were paints, plastics, timber, expanded-extruded polystyrene and masonry, while items logged included ropes, tyres, canisters, electronic equipment and a variety of metal objects that were either fixed to or contained by the boats. As well as representing an eyesore and inhibiting access to the shore, decaying boats are a hazard to human health and safety and are a source of pollution (e.g. plastics, heavy metals, oil-related hydrocarbons) to local sediment and interstitial waters. Recommendations to deal with the problem of boat abandonment include compulsory boat registration, making boaters aware of (and providing incentives for) safe disposal, and providing authorities and landowners with clear information on existing or new agencies and legislation.

© 2016 Elsevier B.V. All rights reserved.

## 1. Introduction

Abandoned boats are a common sight and a growing problem on the foreshores, beaches, mudflats, harbours, marinas, reefs and mangroves of the coastal environment (National Association of State Boating Law Administrators, 2009; Eklund, 2014). Boats that have been damaged, are commercially obsolete, or are simply no longer wanted, affordable or repairable may have been deliberately grounded or sunk offshore or abandoned on the substrate in the inter-tidal zone. Boats range from small skiffs and dinghies to much larger commercial craft, and from recently discarded vessels in

a reasonable state of repair to derelict wrecks abandoned many decades ago.

In a recent study, Stevenson (undated) investigated the issue of boat abandonment in Southampton Water, southern England, and its adjacent estuaries, with particular attention paid to fibre-reinforced plastic hulls. Various boaters and authorities were interviewed and recycling and disposal options explored. The author highlighted the difficulties in identifying and quantifying the problem of boat abandonment and concluded that there was insufficient waste disposal legislation and a general unwillingness to deal with the issue. Additional, related problems identified at a Nordic workshop on end-of-life plastic leisure boats included a lack of knowledge on how to reuse and recycle materials, no defined senior authority, and no system for financing collection and disposal (Eklund, 2014). With similar issues recognised in the

\* Corresponding author. Tel.: +44 1752 584570; fax: +44 1752 584710.  
 E-mail address: [aturner@plymouth.ac.uk](mailto:aturner@plymouth.ac.uk) (A. Turner).

US, a number of states now have funding and expertise at hand for the recovery and disposal of boats that pose a navigational hazard if the owner cannot be traced (Aquatic Resources Program Policy Unit, 2007).

Despite the scale of the problem globally, and perhaps because of a lack of legislation, support or willingness to deal with the issue, little attention has been paid to the hazards to human health and safety and the threats to the local ecology, substrate and water column. The National Oceanic and Atmospheric Administration (NOAA) surveyed abandoned, derelict boats in sensitive habitats of various US territories in the Caribbean and Pacific and focussed on hazards relating to pollution and public safety (Lord-Boring et al., 2004). The magnitude of the impacts varied depending on the nature of the habitat, the degree of boat clustering and the extent to which boats were moved by wind and wave activity. Most of the impacts identified, however, were specific to boats and debris abandoned on hard-bottomed, benthic substrates of tropical regions that were characterised by frequent storms. In the Nordic countries, boats abandoned offshore or along the coastal zone have been recognised as a potential source of pollution arising from paints, electrical components, furnishings and mechanical parts (Eklund, 2014). However, the principal considerations in this respect related to the hazards incurred during boat dismantling rather than environmental issues arising at the point of abandonment.

In the present study, we address the hazards to human health and safety and the environmental impacts arising from the deliberate, in situ abandonment of boats along the inter-tidal zone of estuaries. Here, boats are subject to gradual, partial burial in the sediment but are otherwise relatively immobile. Unlike boats abandoned in the benthic environment, they are subject to decay through periodic saltwater inundation and exposure to the elements. We address the hazards and impacts resulting from the boats themselves, their contents, and debris on the foreshore that may or may not have been derived from decaying vessels. This was achieved through a qualitative analysis and characterisation of the types of materials and items associated with individual boats and clusters of boats on the mudflats and saltmarshes of two estuaries in eastern England. Legislation relating, directly or indirectly, to in situ abandonment along the foreshore is described and recommendations regarding best practice for boaters are addressed.

## 2. Study sites and boats

The Blackwater and Orwell estuaries are in the county of Essex, eastern England, and have been described in detail by Rees et al. (2014) as part of a previous study in which remnants of external and internal boat paints were sampled and analysed for heavy metals. In the present study, we targeted the Heybridge Creek, Tollesbury and Mersea regions of the Blackwater estuary, and the Pin Mill region of the Orwell estuary (Fig. 1) because of the density, variety and accessibility of abandoned boats on the respective foreshores. A total of 54 boats were inspected visually and with the aid of digital photography during April 2013. The boats are described in Table 1, along with their approximate dates of abandonment (and as ascertained from public records and use of the time slider facility in Google Earth), and a selection of photographs of boats and boat clusters are presented in Fig. 2. Boats were between about 5 and 20 m in length and, apart from a few small fibreglass craft and two metal vessels, were of timber construction. Abandoned vessels included yachts, trawlers, sailing barges and houseboats, and a cruiser, ferry and a tender for a lightship. We note that some of the barges appear to be part of 'hulk assemblages' that have been catalogued by English Heritage and identified as being of archaeological significance (Davies, 2011).

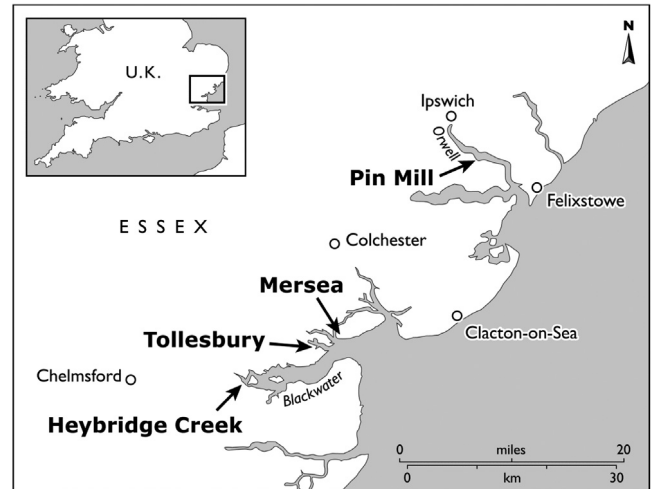


Fig. 1. The locations of the regions under study on the Blackwater and Orwell estuaries.

All boats were submerged within the intertidal mud to different extents and, while some lay on their sides, others were propped upright by their moorings and/or through substantial burial in the sediment. Many boats had been partially covered in tarpauling, perhaps for protection or as some signature of 'ownership'.

Items and materials associated with each vessel and that were visible from the outside and from safely accessible locations were recorded and described. While the interiors of some boats were viewable, boats were not boarded or disturbed for inspection. Some items were still attached to the boats with their original fixtures, but many appeared to have been dumped on the deck or were contained by the remains of the hull. In addition, we recorded items that were observed on or partly submerged within the intertidal sediment or saltmarsh vegetation in the vicinity of the boats.

## 3. Inventory results

The inventory of items and materials identified on or associated with each boat is shown in Table 1. For the first four categories of expanded-extruded polystyrene, rope, tyres (evidently used as fenders) and painted boat surfaces, presence or absence is noted; for the remaining categories, however, more specific information on the nature and abundance of the items is given. Among the latter categories, plastic, metallic and wooden items were most commonly observed. It is surmised that many of the plastic items were not part of the original boat or its contents on abandonment; for example, sheeting may have been used for some kind of protection during any restoration or salvage, while plastic bottles and other small items are likely to have been simply thrown into the hull as litter. In contrast, wooden items appeared to have been derived directly from the boat's construction, and usually the hull or deck. From discussions with a local boater and the charred remains of planks of wood it appeared that timber was often salvaged for firewood.

The variety of metallic items in the boats displayed different degrees of aging (rusting) and, in many cases, paint coverage, with several larger items, including winches, frames and tanks, fixed in their original positions. Electrical items and appliances recorded included various pumps, stoves and ovens, and a television, car battery and sewing machine, while canisters and cans appeared to contain (or at some stage contained) paint, oil and gas. Textiles observed included foam, a carpet and a cushion, while miscellaneous items not categorised above included adhesive taping, felt roofing, concrete blocks and a toilet.

Download English Version:

<https://daneshyari.com/en/article/6363287>

Download Persian Version:

<https://daneshyari.com/article/6363287>

[Daneshyari.com](https://daneshyari.com)