



Alum Bay Marine Archaeological Investigations

Management Report



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Management Report



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The Maritime Archaeology Trust
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IV. SUMMARY

Alum Bay is located on the north-west coast of the Isle of Wight between the Needles and Hurst Narrows. This report addresses the future management of three archaeological sites, comprised of two shipwrecks and a collapsed Victorian pier, located within Alum Bay that have been the subject to archaeological work since the early 1990s. The archive of material derived from this work has recently been subject to a formal process of assessment and analysis and that project has resulted in the production of this management report as well as a wider ranging academic monograph on the maritime archaeology of the area.

The shipwreck site of Alum Bay 1 was discovered in 1991 has been identified as a large section of the upper port bow section of HMS *Pomone*, a 38-gun 5th-rate frigate that was lost on the Needles in October 1811 while homeward bound from service in the Mediterranean. The site of loss at the Needles is a designated historic wreck site under the Protection of Wrecks Act 1973. The Alum Bay 2 shipwreck was discovered in 2001 and is the upturned bottom and lower hull of a small coastal trading vessel that has been dated to the late 18th/early 19th century. Finally, the site of Alum Bay pier is the collapsed and tangled remains of the Victorian pier that was built in 1887 to serve the growing seaside tourist industry in the area and which fell into eventual disuse in the mid-20th century.

None of the archaeological remains of any of these three sites are currently afforded any form of statutory protection. Accordingly, this report addresses the identifiable threats to the future integrity of the archaeological sites within Alum Bay and concludes that Alum Bay 1 is at a medium level of risk, specifically from anchoring vessels in conjunction with ongoing rates of sediment reduction and related exposure and degradation of wooden material. This has the potential to trend towards a high level of risk in the future. In contrast, Alum Bay 2 and Alum Bay pier are currently at a low level of risk, although the former is reliant on a thin sediment layer to protect it against damage from marine organisms.

The archaeological significance of the three sites is also formally set out and discussed in full. This concludes that the sites of Alum Bay 1 and Alum Bay 2 are both of high archaeological significance, while the site of Alum Bay pier is of low archaeological significance. As a result of this, it is proposed that monitoring of all three sites should continue and that statutory protection should be put in place to begin to formally protect the sites of Alum Bay 1 and Alum Bay 2. It is recommended that the best mechanism for this would be scheduling under the Ancient Monuments and Archaeological Areas Act (1979) because of the continued provision for public access without the need for a formal licensing system.

1. Introduction

Alum Bay lies on the north-west coast of the Isle of Wight and forms part of the exposed coastline between the Needles and Hurst narrows (Figure 1). In 1991 local maritime archaeologists were alerted to the presence of a large section of wooden shipwreck on the seabed within Alum Bay, subsequent investigations in 1992 and 1993 indicated that the vessel probably dated to the early 19th century and might represent a section from HMS *Pomone*, a 38-gun frigate wrecked on the Needles in 1811. The area at the Needles is protected through designation under the Protection of Wrecks Act (1973). The Alum Bay shipwreck became the focus of several seasons of archaeological fieldwork in the late 1990s and early 2000s by various combinations of professional archaeologists and diving volunteers. During the latter period of work a second shipwreck, known as Alum Bay 2, was located a short distance to the west. Work on both sites continued in the 2000s, this included the installation of a dive trail to aid the interpretation of the seabed remains for visiting divers and further excavation of Alum Bay 1 in 2010.

The substantial archive of material that had accrued from two decades of field investigation within Alum Bay and the potential significance of the two shipwrecks was recognised by English Heritage with the commissioning of a project to assess, analyse and disseminate the archaeological work that had taken place. In addition to the publication of a dedicated monograph into the maritime archaeology of Alum Bay (Whitewright and Satchell, forthcoming), the project was also tasked with addressing the future management options for the archaeological resource contained within Alum Bay and this report represents that element of the wider Alum Bay project.

In order to be able to consider the possible management options for the archaeological sites in Alum Bay, some understanding of the archaeology itself as well as the physical setting in which it is located is required. This first of these is presented in Section 2, which offers a brief overview and a summary of the archaeological remains. The reader is reminded that an extended account of these remains, in addition to interpretation and analysis is contained within the Alum Bay monograph cited in the previous paragraph. Section 3 addresses the natural environment of Alum Bay and outlines the current state of the seabed remains before assessing the identifiable threats to these remains. This is followed by a formal risk assessment for each of the three main archaeological sites; Alum Bay 1, Alum Bay 2 and the remains of Alum Bay Pier. Section 4 then builds on the analysis phase of the wider project by presenting an assessment of archaeological significance on the same site by site basis just outlined. It is then possible in Section 5 to discuss the future management of these archaeological sites from a more informed position, understanding both their significance and the threats that they face. That chapter discusses and sets out how these three sites can be monitored in the future and what, if any, requirements there are for statutory protection through existing heritage legislation.

2. The Maritime Archaeology of Alum Bay

2.1 HISTORY OF ARCHAEOLOGICAL INVESTIGATION

The earliest discovery of the archaeological sites in Alum Bay is unclear, although it seems likely that they have been known about by local divers for a considerable period of time before the first archaeological work (Firth, 1993: 1). Alum Bay 1 was brought to the attention of archaeologists in 1991, following its 'rediscovery' by Sports Divers. The following year the site was inspected by the Archaeological Diving Unit who recommended that the site be designated as an interim measure (Firth, 1993: 2) while further work was undertaken to provide a date and identification of the vessel. The ADU noted that designation could then be confirmed, or revoked based on that information (ADU, 1992). This recommendation was not accepted by the then Department of National Heritage. The site was visited in late summer 1992 by sports divers from the Isle of Wight, who removed a copper bolt. The bolt was subsequently deposited at the Isle of Wight County Archaeology Centre. In 1993 sustained archaeological work on Alum Bay 1 commenced under the aegis of the HWTMA (Allen, 1994: 151). This work undertook the tagging and recording of timbers alongside the establishment of the site extent and basic relationship of structural components (Figure 2).

The next concerted archaeological work within Alum Bay took place in the late 1990s and was again led by the HWTMA. Non-intrusive survey work in 1998 (Momber in Flatman and Blue, 1999: 187) and 1999 had the aim of producing an overall site-plan of Alum Bay 1 and this was duly completed in the summer of 1999. Further work, again directed by the HWTMA, was undertaken during 2000 and included trial archaeological excavation at the northern and southern end of Alum Bay 1. Annual work, directed by the HWTMA, on Alum Bay 1 continued in 2001 with limited diving on the site. Additionally, in 2001 the site of Alum Bay 2 was discovered, located and investigated for the first time with the subsequent survey resulting in the creation of an initial site-plan of the wreck for the first time. In 2002, more substantial work was conducted on Alum Bay 1 which included the excavation of an area in the centre of the structural remains allowing the site plan to be further updated to incorporate the 2000-2002 seasons of work. In the same year, Alum Bay 2 was revisited and an updated site-plan was created. 2003 witnessed further work (directed by the HWTMA) on both shipwreck sites and the first stages of establishing a diver trail around Alum Bay. Diver searches of the bay were also conducted for the first time to try to begin to establish the overall extent of the maritime archaeological remains located within Alum Bay. Work on the dive trail and searches of the bay continued in 2004. Between 2005 and 2009 work in Alum Bay was limited to activity related to the diver trail and general monitoring of the two shipwreck sites of Alum Bay 1 and Alum Bay 2.

Further work, directed by the HWTMA, was undertaken in 2010 (HWTMA, 2010: 13). This included excavation at the northern end of Alum Bay 1, between the 2002 excavation and the area of structure adjacent to the hawse holes. This allowed a considerable area of structural remains to be recorded (Figure 3) that had not previously been addressed and for the overall site plan to be updated further. In addition to this, searches of Alum Bay were undertaken assisted by a volunteer survey using side-scan sonar to identify anomalies that were then ground-truthed by divers. Finally, monitoring dives were undertaken in 2012 and 2013 during which limited non-intrusive survey was undertaken on both Alum Bay 1 and 2 (Figure 4) in order to provide specific information for the on-going analysis of both sites.

The work briefly summarised has spanned twenty years and has involved a large number of professional archaeologists, volunteers and students who have all contributed to understanding the archaeological resource present in Alum Bay. At the same time, these participants have all gained valuable experience of underwater survey techniques across a period in which the discipline of maritime archaeology in England has undergone large changes.

2.2 ARCHAEOLOGICAL REMAINS

2.2.1 Alum Bay 1

The site of Alum Bay 1 is located at 50°39.996'N 1°34.362'W (Datum: WGS84) and comprises a large structural section from a wooden ship lying in 7-8m of water on a generally sandy seabed. Archaeological survey and excavation has been conducted on the site since the early 1990's (Section 2.1) while anecdotal accounts suggest that the site has been visited by recreational divers for a slightly longer period of time. From the outset, the vessel was strongly associated with the loss of the Royal Navy frigate HMS *Pomone* on the Needles in October 1811 and the archaeological work carried out on the site has served to confirm this.

At their maximum extent the seabed remains of Alum Bay 1 measure c. 18.5m in length, have a total width of 8m and lie in a generally north/south alignment (Figure 5) The majority of the structural remains are wooden elements that formerly comprised the framing and planking of the vessel, while iron reinforcement elements are also present across the structure in two discernible rows. Meanwhile, two types of identifiable fastening

material survive; wooden treenails and copper bolts. Several examples of the latter carry the broad arrow marking that is synonymous with production for the Royal Navy. Outer hull sheathing in the form of fragmentary sheets of copper has also been recorded and recovered from the northern end of the site. Evidence for the provision of gun-ports on the vessel have been observed via a series of voids in the recorded hull structure and the survival of a gun-port sill in one example. Finally, at the northern end of the site the remains of a pair of lead anchor hawse-pipes are preserved.

The structural features indicate that the inside of the vessel is directly visible, with the outer-planking the lowest level of material, lying upon the seafloor. The preserved section of hull represents a significant portion of the upper side of the vessel, rather than the lower sections; keel, keelson and the like, that are often preserved on shipwreck sites. When considering the vessel in its original orientation, the two lines of iron reinforcement indicate that the upper-works of the vessel lie towards the western side of the site and that the lower elements, if present, would lie to the east. This, along with the location of the hawse-holes allows the section of remains to be identified as the port side of the vessel with the bow of the vessel towards the north. The seabed remains of HMS *Pomone* located at the site of Alum Bay 1 therefore represent a relatively unusual form of shipwreck; comprising as it does the upper elements of a Royal Navy warship, rather than the lower works, and of a frigate, rather than a larger line of battle vessel. These remains, and the interpretation of them are described in full in the monograph publication (Whitewright and Satchell, forthcoming: Chapter 3) that is part of the wider Alum Bay Project

2.2.2 Alum Bay 2

The site of Alum Bay 2 is located at 50°39.983N 1°34.416W (Datum: WGS84). The remains of the wreck lie to the south of a rocky reef on a bed of fine, sandy sediment, which trends to gravel to the south of the wreck itself. Diver observations since 2001 indicate that the wreck is usually covered by a thin layer of sandy sediment, which sometimes obscures many of the features and has certainly afforded the remains a level of protection from biological decay. Work in recent years has established that further, possibly significant, elements of the vessel are still to be uncovered in the sediment to the east and west of the currently extant remains. The curvature of the exposed hull indicates that such remains may be buried at a greater depth and so may be afforded a better state of preservation and protection than the remains recorded thus far.

The surveyed remains of Alum Bay 2 measure c.9m in length by c.3m wide and are oriented NW-SE (Figure 6). The wreck is deposited upside down on the seabed and accordingly the outer planking is uppermost, with surviving frames beneath. The wreck is characterised in its southern half by a substantial area of surviving external planking and a section of timber which has been identified as the keel. There are some very limited areas of incoherent iron concretion in the southern half of the wreck, mostly in the vicinity of the keel. The northern half of the wreck is characterised by a predominance of surviving frame elements, with only limited hull planking. The remains of limber holes can be seen cut into four of the surviving floor timbers. The vessel is fastened throughout with treenails that are cross-cut in order to tighten them.

A full description and analysis of the Alum Bay 2 shipwreck is given in the Alum Bay monograph (Whitewright and Satchell, forthcoming: Chapter 4). Analysis of the construction has identified that the vessel was built using a disconnected framing system that can itself be placed within a wider English carvel shipbuilding approach. Construction features and dendrochronological results strongly suggest that the vessel was built in the south of England. Based on the surveyed, visible remains, it seems likely that the remains represent a significant proportion of the lower elements of a wooden sailing vessel, albeit one of relatively small size with a projected length of c. 11.4m-13.8m (37'-45'), an extreme breadth of c. 3.8m-4.6m (12'-15') and a corresponding tonnage of 28-54 tons under the 'old measure' in use at the time. This vessel was probably used as a coastal trading vessel, with a relatively flat-bottomed hull designed for taking the ground in the tidal waters of the south coast of England.

2.2.3 Alum Bay Pier

A highly contrasting archaeological site to the shipwreck remains just described is contained on the eastern side of Alum Bay and comprises the ironwork from the Victorian era pier, located at 50°40.115N 1°34.250W (Datum: WGS84). The disjointed structural remains of Alum Bay pier were located during geophysical survey and subsequent diver searches of Alum Bay during 2010. The majority of the pier wreckage is incoherent and jumbled with only a limited number of elements retaining any kind of structural integrity. The observed remains comprise a mixture of round pilings interspersed with iron bars of 'H' and 'T' cross-sections. All the iron elements are concreted and encrusted with marine growth making the recording of their dimensions difficult; the lengths of individual elements vary from 0.4m to 4m in length. No measurements for the other elements ('H' and 'T' bars) were recorded during the brief time on site in 2010. Some of the circular pilings were recorded and were made from concentric layers of ironwork with a total external diameter of c. 220mm. Historic photographs of the pier indicate that the circular pilings probably relate to the main pier walkway, while the H and T bar elements were used in the platform at the head of the pier. A number of wooden planks, c. 140mm

in width, are also interspersed with the iron elements and these probably represent the remains of the original walkway planking of the pier.

2.2.4 Isolated Finds

In addition to the three coherent sites just outlined, a number of isolated find-spots have been identified during the course of the archaeological work that has taken place within Alum Bay. These have included stray finds discovered by sports divers, as well as material located during organised searches by diving archaeologists. This material has been analysed as part of the wider Alum Bay project and is included in the monograph publication discussed previously.

Thus far, such material is entirely related to maritime activity from the post-medieval period and does not provide any evidence for earlier human activity. Chronologically, the earliest artefacts are two stone cannon balls found during archaeological searches that are likely to date from the 16th century and which are now on display at Fort Victoria. Broader in date is a truck (wheel) from a cannon carriage that can only be assigned to the 17th-19th centuries, but which is made from a tropical hardwood from Malaysia that is therefore very unusual in that regard. The truck was recovered by a sports diver, declared to the Receiver of Wreck and is also now on display at Fort Victoria. Finally, a section of planking carrying copper sheathing was found during archaeological searches and provides a link to many of the wrecks lost in the area since the late 18th century, when such material became commonplace.

Desk-based research conducted as part of the wider project has indicated records of over sixty losses in the immediate vicinity of Alum Bay and the Needles that do not have a confirmed location. The potential for material from these losses to be distributed across this area is well-illustrated by the break-up of HMS *Pomone*, including the deposition of a large piece of that vessel in Alum Bay, over a kilometre from the original wrecking point. As diving in the area continues, either for archaeological purposes or as general sports diving, it is likely that the number of such finds will increase.

The nature of the in-situ archaeological material represented by the finds just described is obviously unknown and therefore dictates that they cannot be assessed for archaeological significance or risk because their overall extent is unknown. However, they do serve to indicate the wider archaeological potential of the area that exists, in addition to the well documented shipwreck sites in Alum Bay and at the nearby Needles.

2.3 GAPS IN EXISTING KNOWLEDGE

Although the sites described above have been investigated for a relatively long period of time, for the most part it has only been as part of the present project that extended research and analysis has been conducted into the archaeological remains. As a result of this it has been possible to identify some gaps in our existing knowledge of the sites, or areas of fruitful future research. These are discussed in full when considering the Potential of each site in the Significance Assessment process presented in Section 4, however they are summarised below;

- **Alum Bay 1.** Expansion of Dendrochronological sampling to take advantage of the status of HMS *Pomone* as a vessel that had not had a formal refit prior to sinking. The original nature of the timber therefore has the potential to provide a useful insight into timber resources and management within the Royal Navy during a period when such resources are acknowledged as being under pressure.
- **Alum Bay 2.** The visible remains of the vessel are now well-documented, but it is clear that there is potentially substantial additional structure that is buried around the existing site extent. Some consideration must therefore be given to the desirability of excavation or other methods to establish the extent of these remains, set against the benefits of a policy of minimum disturbance.
- **Alum Bay Pier.** The work undertaken on the remains of Alum Bay pier is relatively limited. It would therefore be useful to conduct a more detailed survey to establish the full extent of the site and in turn to allow the implementation of a monitoring program on the remains.

2.4 OWNERSHIP, CURRENT USE AND MANAGEMENT

As with many marine sites, the ownership, management and current use that relates to the maritime archaeology that is contained within Alum Bay is complex and encompasses a range of organisations. These issues are now considered in turn.

2.4.1 Ownership

Firstly and most simply, the seabed in the area is owned by The Crown Estate, from whom permission has been granted whenever archaeological excavation has taken place on the remains of Alum Bay 1. The ownership of the shipwreck remains has generally been unknown due to the unconfirmed identity of the two vessels. This remains the case with Alum Bay 2, which is still not positively identified. Ownership of the remains of the vessel may then revert to The Crown. The site of Alum Bay 1 is now more clear-cut because the remains have been positively identified as part of HMS *Pomone*, the seabed remains and any artefacts raised from the

site are therefore the property of the MOD because of the status of the vessel as a Royal Navy warship. The Receiver of Wreck should therefore contact the MOD in the event of any artefacts being raised in the future order to make them aware of the recent work that has led to the site being positively identified. The ownership of Alum Bay Pier is currently unknown, but it is possible that this could be established as a result of future research. Finally, the archive, including raised artefacts, held by the MAT in relation to the archaeological work conducted in Alum Bay will be passed to the Isle of Wight Museums service.

2.4.2 Current Use

Alum Bay as an area is currently used by a wide range of stakeholders representing a number of different activities (Figure 7). Most pertinent to the archaeological sites is diving, which is conducted from an archaeological perspective by the MAT, additionally, the area is also popular with sports divers because of the normally sheltered nature of the bay. In addition, pleasure boats are a major user of the bay as both an anchorage, for angling, or simply as a location in its own right. The shoreline of the bay is also a popular tourist spot, with access provided from the Needles Pleasure Park. Finally, Alum Bay is a known fishing area, particularly for crab and lobster potting which often targets the reef located to the north of Alum Bay 1 and 2. The breadth of use for Alum Bay has obvious implications for the management of the archaeological material located there and this is considered further in Sections 3.2 and 3.3 in relation to the specific threats with the potential to impact on the maritime archaeological record

2.4.3 Management

General management of the marine zone in England is undertaken by the Marine Management Organisation (MMO) as a result of the Marine and Coastal Access Act (2009). Alum Bay falls within the South Inshore Marine Plan Area for which an overall management is currently at a consultation stage, via the MMO, at the time of writing. The MMO is also responsible for administering license applications relating to activities that have the potential to disturb or damage the seabed, including archaeological sites, such as machine assisted salvage.

The archaeological material within Alum Bay is not currently managed from a heritage perspective via any form of statutory instrument. Discussion and recommendations in relation to specific heritage management procedures are included in Section 5 and 6 of this report. More widely, Alum Bay falls within defined areas that are considered worthy of designation on grounds that are non-heritage in nature. Firstly, the area is within a European Special Area of Conservation (SAC) defined as the 'South Wight Maritime' area. Secondly it falls within the 'Needles' recommended Marine Conservation Zone (rMCZ) (see Section 3.1.4), which was not included in the initial round of designated MCZs.

3. Risk Assessment

3.1 PHYSICAL SETTING¹ AND PHYSICAL CONDITION

Alum Bay itself is located on the north-west coast of the Isle of Wight (Figure 1). Needles Point and its famous surrounding rocks are the most westerly point of the island and are located at the extreme western end of Alum Bay. Meanwhile, the eastern end of Alum Bay is defined by Hatherwood Point, 1.6km to the northeast. In between, the coastline delineates a steady curve to the southeast, bounded by high chalk cliffs prone to rock-falls and landslips along the southern edge with bands of coloured rock along the eastern side. Alum Bay is bordered to the north-west by the Needles Channel, beyond this, the edge of the 'Shingles' gravel bank lies c.1.4km to the northwest of Alum Bay.

The general depth of Alum Bay reaches c.10m below Chart Datum (CD). Running the length of Alum Bay is a rocky reef, the height and extent of the rock outcrops vary along its length, but two major rocky outcrops have been noted as hazards to shipping (Bruce 1997: 35). The most westerly of these is known as Long Rock and hardly ever shows at low water while the other rock, some 200m to the east is visible at an ordinary low water spring tide (Bruce, 1997: 35). Both the Alum Bay 1 and 2 wreck sites lie to the south of this reef.

3.1.1 Geology and Seabed

Considering the wider area, Alum Bay lies within the Greater Poole and Christchurch Bay region as defined by the South Coast Regional Environment Characterisation (SCREC). Christchurch Bay can be considered as a relatively shallow embayment, defined by Hengistbury Head in the west and Hurst Spit and The Needles in the East. The underlying geology of the area is of Wealdon Beds to the south of a line running between The Needles and Purbeck, a thin strip of Lower Greensand/Gault and Upper Greensand lies to the north of this. The remainder of the area to the north is comprised of Bracklesham Beds, Barton Group and Solent Group (cf. Velegrakis, 2000: 23-25 & fig. 2). Alum Bay lies just at the intersection of these and the chalk outcrop that traverses the centre of the Isle of Wight (Figure 8). This has resulted in the famous coloured rocks along the eastern cliff of Alum Bay and the notable contrast between those and the chalk cliffs and stacks of the southern edge of the Bay and the Needles proper (Figure 9).

In the south of Alum Bay, the Reading Beds and London Clay dip steeply (SCOPAC: Western Solent, E5&6) and all strata in Alum Bay are soft and easily eroded, comprising clays, sandstones and occasional grit and pebble horizons (SCOPAC: Western Solent, E5&6). The high chalk cliffs that line Alum Bay were noted above and on-going erosion of these cliffs has been observed, although little quantitative work has been undertaken on the scale and pace of change (SCOPAC: Western Solent, E5&6). Erosion occurs as the cliffs are undercut and destabilised through marine erosion, leading to infrequent, localised rock falls, depositing debris on the cliff base and beach (Figure 10), which is then gradually removed by marine processes before the cycle is repeated (SCOPAC: Western Solent, photo 5). The erosion of these cliffs has been cited as being an important source of gravel and coarse sands for local beaches while finer sands, silts and clays derived from the cliffs are thought to be susceptible to rapid suspended transport offshore (SCOPAC: Western Solent, E5&6). The seabed in the area is a thin layer of sandy-gravel, overlaying bedrock. Within the SCREC, the seabed at Alum Bay is described as 40-50% gravel and 50-60% sand, this comprises poorly-sorted granules with a mean diameter of 2-4mm.

Observation during fieldwork within Alum Bay indicates that the seabed around the two wreck sites consists of sandy silt which overlies the bedrock. A seabed sample was taken from the area of Trench 3 during the 2010 fieldwork, prior to the excavation and removal of sediment from this area. The sample extended between two of the vessel's frames to the depth of the outer hull planking. As such, the sample encompasses the sediment overlying the wreckage following its deposition.

Assessment of the sediment has identified four distinct layers all comprised of sand. Each of these layers is c.25mm thick and very distinct in nature. From top to bottom these layers are described as follows:

1. Upper mobile yellow sand
2. Beige sand.
3. Very dark-grey sand.
4. Mid-grey sand.

It has been possible to correlate the assessment of the recovered seabed sample from AB1 with existing diver observation of the sediment composition made during survey and excavation of AB1 and survey of AB2. This indicates that sediment disposition, prior to any excavation or disturbance has been broadly similar across

¹ A full and detailed description of the marine environment in the wider region is provided by the Standing Conference on Problems Associated with the Coast (SCOPAC) and is available at www.scopac.org.uk. Further information is available through the South Coast Regional Environment Characterisation (SCREC), meanwhile the Geology of the area is covered in full by West (2011).

both sites, resulting in a thin layer of sediment covering both sites. The processes relating to this sediment coverage are now discussed further.

3.1.2 Tidal and Sediment Regime

Alum Bay is exposed to tidal currents and modified open sea, including swell and waves. Maximum significant wave heights of up to 2.3m might occur at a 1 in 50 or 1 in 100 frequency. The general tidal patterns in the Solent are complex (see Bruce, 2008) and the relationship between the tidal streams in Alum Bay and those in the Western Solent and Needles Channel no less so; direction and speeds are summarised in Table 1. In the Needles Channel, north-easterly tidal flow peaks at 3.7 knots, 5 hours prior to high water (Portsmouth) springs (Bruce, 2008: 10) and the south-westerly tidal flow at 3.3 knots, 3 hours after high water (Bruce, 2008: 26).

Time (relative to HW Portsmouth)	Alum Bay		Needles Channel		Needles Light	
	Direction	Rate	Direction	Rate	Direction	Rate
-6	NE	1.8	NE	2.3-2.8	N	1.9
-5	NE	1.0	NE	3.3-3.7	N	2.9
-4	Slack	Slack	NE	3	N	2.6
-3	S/SW	1.0	NE	2.2-3.0	N	2.0
-2	Slack	Slack	NE	2.7-3.0	N	2.1
<i>Tide off the Needles is slack 1hr 30mins before HW Portsmouth at springs and 45mins at neaps</i>						
-1	SW	1.5	NE	0.8-0.4	S	1.5
HW Portsmouth	Slack	Slack	SW	1.7	S	2
+1	Slack	Slack	SW	3.0	-	-
+2	Slack inshore SW offshore	Slack 2.0	SW	3.0	S	1.5
+3	Slack inshore SW offshore	Slack 2.5	SW	3.3	SW	2.0
+4	NE	0.3-0.5	SW	2.2-2.5	-	-
+5	E/NE	0.2-0.4	SW	0.8	N	0.8
+6	N	0-1.0	NE	1.7-2.0	N	1.5
<i>Rates shown are for spring tides, neap rates are half, all data from Bruce 2008</i>						

Table 1. General tidal regime for Alum Bay, the Needles Channel and Needles Light.

The sediment regime in the surroundings of Alum Bay is twofold. Offshore, the over-riding regime is one of the south-westerly transport of sediment from the western Solent and Hurst Spit along Hurst Channel and the Needles Channel (SCOPAC: Hurst spit to Calshot spit, EO1; Christchurch Bay, EO2). This is partly related to the tidal regime in the area. Tidal flow is broadly asymmetric, with a concentration of the ebb tide into a shorter time period than the flood tide, with a correspondingly higher potential for sediment transport in a seaward direction (SCOPAC: Western Solent, F1). The potential for sediment transport against this general regime has also been noted and in the case of coarse sediment transport this is seemingly the result of high wave energy coupled with a storm surge (SCOPAC: Western Solent, F1). Meanwhile, fine sediment may be transported in a north-easterly direction during the longer flood tide. Inshore, within Alum Bay, there is a net littoral drift from southwest to northeast leading to the transport of flints, sand and gravel from Alum Bay towards Totland (SCOPAC: Western Solent, LT4) and net offshore loss of fine sand in Alum Bay has been suggested (Brampton *et al.*, 1998).

In comparison to the rest of the Isle of Wight, Alum Bay has received far less study and is correspondingly less well understood. Survey, monitoring and reporting of beach profiles to advise on sediment erosion/accretion has taken place around the Isle of Wight as part of the Southeast Strategic Regional Coastal Monitoring Programme (see Crocombe, 2008; Case, 2009a; 2009b). However, the Totland 1 cell (containing the western half of Alum Bay) has either not been included in the topographic survey so far undertaken through this programme (Crocombe, 2008: 12) or the survey has been delayed (Case, 2009a: 21; 2009b: 18). Some data is available for the Totland 2 cell (containing the eastern half of Alum Bay). Where monitoring of beach material has taken place, it has revealed an overall loss of material between 1996 and 2002 (Bradbury *et al.*, 2003). Analysis of the northern half of Alum Bay between 2003 and 2004 illustrates an accretion in the cross-sectional area of the beach caused by a steepening of the profile (Crowcombe, 2008: 19, 150-2). The northern half of Alum Bay has been classified as being in 'retreat' at the mean high and low water marks with a classified *foreshore change parameter* of -6 (Crowcombe, 2008: 19). It has been suggested within the context of the work of SCOPAC that future increases in rates of sea-level rise and winter rainfall would have the potential to accelerate the landslides on the cliffs within Alum Bay, with an increase in the supply of sediments to the sediment transport system just outlined, as a result (SCOPAC: North west Isle of Wight, 5).

On-site Sediment Levels

In the context of the present report, it is clearly of use to consider the diver observations of sediment levels in the vicinity of the two areas of historic shipwreck (Alum Bay 1 and Alum Bay 2). Observation since 1993 on Alum Bay 1 and 2001 on Alum Bay 2 suggests that the level of sediment has changed at either site, in different ways and that any observed changes tend to be quite localised in nature. In general, it may be stated that the levels of sediment at both sites have remained relatively stable over the last decade or so, although there has been an observed reduction in sediment, and associated exposure of wooden structure, at the site of Alum Bay 1. However, there has been no dramatic annual exposure of 'fresh' structure or significant accumulations of sediment in the manner documented on sites such as the *Hazardous* in the eastern Solent (van Rensburg and Satchell, 2006: 16).

At the site of Alum Bay 1, there has been a slight reduction in sediment cover of the archaeological remains, this is more pronounced around the hawse-hole structure that protrudes from the seabed at the northern end of the site (Figure 11). There, the hawse pipes have become far more visible than in previous decades and wooden material has become exposed and degraded away. Meanwhile, the photographic archive from Alum Bay 2, located slightly further towards the Needles Channel, suggests that sediment has accumulated on the site since 2001, obscuring the exposed framing timbers at the northern end of the site (Figure 12). It may also be noted that the low laying nature of Alum Bay 2 means that it has been particularly prone to changes in sediment levels, with small increases greatly obscuring the site.

This general observation seems at odds with the overall sediment regime model for Alum Bay and the surrounding areas (above), which indicates that there should be net sediment loss within Alum Bay, rather than the relatively stable levels of sediment that seem to be present over the last decade or so. A possible explanation might be that while fine sediment is being transported in a generally north-east direction from Alum Bay towards Totland, similar sediment is accumulating around some areas of the two wreck structures as a result of sediment movement from the south-western end of Alum Bay within the overall north-easterly trend. The reef that lies to the north of both sites may be having an impact within this process by reducing sediment transport to the north. It should also be noted here, that the period of archaeological diver observation on the two sites has taken place over a much longer time frame than the limited investigation into sediment movement within Alum Bay itself. Broadly speaking, Alum Bay 2 appears to be better protected, at the time of writing, than Alum Bay 1; the former being subjected to slowly increasing levels of sediment, while the latter is seemingly subject to slow reductions in sediment levels.

3.1.3 Water Temperature & Salinity

In order to fully understand the ecological environment present within Alum Bay it is necessary to give a brief overview of the water temperature and salinity in the area. This has a direct impact on the biological species that may be present within the bay, either as permanent residents or occasional visitors. In particular, this is of importance to the presence or absence of marine organisms that actively decay wooden remains, for example Shipworm (*Teredo navalis*). Recently completed work in the Baltic has highlighted the importance of these two factors (Björdal and Gregory, 2011) in the presence or absence of shipworm and resultant threat to submerged wooden material.

The nearest data on water temperature is that for sea surface temperature (SST) recorded at a wave monitoring buoy off Milford-on-Sea, in eastern Christchurch Bay. This provides a detailed record of SST, taken every 30 minutes from 2006-2011, the dataset is available via the Channel Coastal Observatory (www.channelcoast.org). The shallow waters of Alum Bay mean that water temperature is unlikely to be dramatically different to those recorded for the nearby surface; data collected from the western English Channel indicates only a minor difference in temperature in the upper 10m of the water column (see Smyth *et al.*, 2012). Although only available for a relatively short time period, this data clearly illustrates a consistent seasonal fluctuation in SST, following a broadly cyclical pattern. This pattern, as might be expected illustrates that summer temperatures are on average between 10°C (2008) and 13°C (2006) warmer than winter temperatures (Figure 13). SST generally peaks in July or August within an average range of 17.9°C (2008) to 19.4°C (2006). These temperatures drop gradually through the autumn and early winter, before a minimum temperature is reached in January or more usually February within an average range of 5.5°C (2010) to 8.6°C (2007) range. This general trend is mirrored by shore-based monitoring stations located at Bournemouth and Fawley, to the west and east of Alum Bay respectively.²

Similar datasets for seawater salinity in the region around Alum Bay are harder to come by. As a result, a general measure is provided from data collected in the western English Channel (see Smyth *et al.*, 2012) which records salinity at a level of 35 psu (practical salinity unit), typical for the English Channel as a whole.

² For presentation of this data see <http://www.cefas.defra.gov.uk/our-science/observing-and-modelling/monitoring-programmes/sea-temperature-and-salinity-trends/station-positions-and-data-index.aspx>

Measurements taken at Calshot indicate salinity of 32 psu, the lower salinity measurement being the result of a freshwater influence from Southampton Water (see Levasseur, 2008: 49-52). The Solent as a whole has been noted as having salinity levels similar to the open ocean, at approximately 35 psu (Townend, 2008: Salinity). On these grounds and accounting for the tidal flow outward from the Solent, it should be expected that the salinity within Alum Bay should generally be the same as for the open ocean, in this case 35 psu.

3.1.4 Ecological Context

A *SeaSearch* programme has been operated around the coasts of Hampshire and the Isle of Wight by the Hampshire and Isle of Wight Wildlife Trust (HIWWT) since 2006. In 2009, Alum Bay was included in the programme of investigation and ecological data is therefore available from that year (Dale, 2010). Within the *SeaSearch* criteria, Alum Bay is categorised as a 'Mixed Sediment Site' with a general depth of 8m (Dale, 2010: 1) comprising boulders, rocky reef and areas of finer sediment (Dale, 2010: 4). Species noted at the site are listed in Table 2, with fish and crustaceans being the most abundant groups.

In addition to the formal surveys undertaken by the HIWWT, the photographic and video archive resulting from archaeological work in Alum Bay has served to confirm the longer term presence of many of the species observed during the shorter window of the *SeaSearch* survey. During the setting up of the diver trail, staff from the HIWWT recorded a range of other species such as sea slugs, hydroids, bryozoans, sponges, fan worms and oysters. Taken as a larger dataset, the information from the HIWWT visits as part of the diver trail work and the wider *SeaSearch* surveys illustrate the potential interest of such historic wrecks as reefs for marine life. It is also worth noting at this point that the presence of macro fauna, such as Common Lobster, in Alum Bay has significance for the archaeological sites contained there, particularly in relation to assessing their stability. The burrowing action of such crustaceans can undermine sites and have a detrimental effect on the stability of specific areas within sites.

Class	Common Name	Scientific Name
Fish	Topot Blenny	<i>Parablennius gattorugine</i>
	Goldsinny	<i>Ctenolabrus rupestris</i>
	Bib	<i>Trisopterus luscus</i>
	Pollock	<i>Pollachius pollachius</i>
	Ballan Wrasse	<i>Labrus bergylta</i>
	Corkwing Wrasse	<i>Crenilabrus melops</i>
	Leopard-spotted Gobies	<i>Thorogobius ephippiatus</i>
	Two-spotted Gobies	<i>Gobiusculus flavescens</i>
	Grey Mullet	<i>Chelon labrosus</i>
Crustaceans	Common Lobster	<i>Homarus gammarus</i>
	Spiny Squat Lobster	<i>Galathea strigosa</i>

Table 2. Species observed by HIWWT during *SeaSearch* surveys of Alum Bay in 2009. Data provided on sponges, worms, molluscs, tunicates and algae was not detailed enough to list, no bryozoans or cnidarians were noted at Alum Bay (data is taken from Dale, 2010: 4).

Additionally, as noted in Section 2.4.3, Alum Bay falls within the 'Needles' recommended Marine Conservation Zone (rMCZ). This rMCZ was delineated because of the recorded presence on a single occasion in 1999 of stalked jellyfish (*Lucernariopsis campanulata*). The continuing uncertainty of the presence of the stalked jellyfish in the area has meant that the recommendation as an MCZ has not been taken further. The preferred habit of the stalked jellyfish, which has a UK wide distribution is the lower shore and on sub-littoral seagrasses³; it is not considered likely to be spatially coincident on the archaeological remains within Alum Bay.

Shipworm and Gribble

In addition to the species noted above, two in particular are worthy of further comment because of the destructive impact that they can have on submerged wooden remains. The first of these is shipworm (*Teredo navalis*), actually a bivalve mollusc rather than a worm, which bores into and consumes submerged wooden objects depositing a calcareous layer on the walls of its burrows (Appelqvist, 2012: 58). The surface of the wood can appear unaffected, apart from the shipworm's entrance holes, but the internal structure can become completely destroyed.

The water temperature and salinity ranges that can be ascribed to Alum Bay indicate that it is a suitable environment for shipworm with normal levels of salinity and an average water temperature range between May and November (Figure 14) that is suitable for spawning (Appelqvist, 2011: 60-62). This has been confirmed during archaeological work on the site of Alum Bay 1 where the calcareous tubes left by shipworm activity have been noted. The presence of shipworm on Alum Bay 1 is clearly of significance for the longer term stability

³ <http://www.marlin.ac.uk/speciesinformation.php?speciesID=3733>

of the site due to the highly destructive nature of shipworm (for recorded example see Appelqvist, 2011: 62). Furthermore, existing research (Björdal and Nilsson, 2008: 864-5) has identified a clear link between the exposure of wooden timbers, infestation by shipworm and the resulting rapid destruction of wooden material. Likewise, the burial of wooden timbers in even a shallow layer of sediment greatly reduces the likelihood of shipworm infestation with a corresponding reduction in the subsequent destruction of wooden remains (see also Gregory, 1999; Björdal and Gregory, 2011: 118-120).

The second extremely destructive species is a wood-boring crustacean known as gribble (*Limnoria*). This mainly gnaws and burrows at the surface of the wood, rather than penetrating the internal structure of the wooden remains (Appelqvist, 2011: 58). The presence of gribble has also been recorded on Alum Bay 1 during the dendrochronological sampling of the wooden remains and through diver observation during survey and excavation. One of the most notable effects of gribble activity, apart from obvious damage to the surface of wooden remains, was the difficulty that resulted in extracting fully useful samples for dendrochronology, because of the degraded nature of the outer elements of the timbers. The mechanisms relating to the damage of wooden material from gribble is not fully understood, in part because during experimental research the effects of shipworm have obscured the impact of gribble (Björdal and Nilsson, 2008: 5). However, other sites in the eastern Solent, for example the *Flower of Ugie*, have demonstrated that exposed timbers can rapidly lose much of their original surface as a result of the impact of gribble (Whitewright and Satchell, 2011: 86). Work on such sites has also observed that even a thin layer of sediment cover can protect wooden remains from the effects of gribble.

It is therefore clear that the ecological context of Alum Bay is supportive of the potential presence of both shipworm and gribble. This potential has been realised on the site of Alum Bay 1 where the presence of both species have been observed and recorded. With this in mind, the gradual exposure of wooden elements on Alum Bay 1 means they will come under increasing threat from shipworm. Meanwhile the shallow layer of sediment that is often present on Alum Bay 2 is likely to be affording the site some protection, although the site could rapidly become vulnerable following a large-scale depletion of sediment. The threats to the two sites from the destructive effects of shipworm and gribble are therefore likely to be correspondingly different; the cycle of exposure, infestation and destruction is clearly active on Alum Bay 1, meanwhile the remains of Alum Bay 2 appear to be relatively well protected for the moment. This overall situation is taken into account when considering the vulnerability of either site as part of a wider assessment of their respective archaeological significance (Section 4).

3.1.5 Summary of Site Condition

In summary, the physical condition of the archaeological remains within Alum Bay can be considered as highly variable. This variability primarily relates to the extent to which material has become exposed in the past through the natural forces described above and has remained exposed allowing biological forces to impact upon them. Elements of Alum Bay 1 are still in good condition where they have remained buried, however it is clear that exposed timbers and ironwork are heavily degraded and concreted respectively. In the case of timber elements, both shipworm and gribble are clearly having a detrimental effect on the legibility of the exposed archaeological remains when compared to their as-found condition in the early 1990s.

In contrast, Alum Bay 2 has remained in a largely similar condition since its discovery. Although there has been some localised loss of material the overall features of the site remain intact and sediment seems to have accumulated gradually at the site, offering further protection. Potentially vulnerable detail of features such as treenail caulking-cuts are still well-preserved offering the best illustration of this. A caveat to this is that where timbers have become exposed, as in the two associated timbers to the south of the site, biological degradation has begun to act rapidly. Finally, the tangled remains of Alum Bay pier seem to be in a relatively stable overall condition, although the limited amount of work that has been done on the site dictates that this is much harder to assess. A more detailed condition survey of these remains is an obvious area for future work.

3.2 ASSESSMENT OF IDENTIFIED THREAT

A number of threats, both natural and cultural in origin, can be identified as having a potential impact on the maritime archaeological sites within Alum Bay (Table 3) and these are now discussed. The identified threats are derived from those listed by Dunkley (2008: list 12) in relation to the management of protected wreck sites. Accordingly, they are also listed in the appropriate section of the risk management form that has been completed for each discreet archaeological site (Alum Bay 1, Alum Bay 2 and Alum Bay Pier) and which are included below.

Assessment of possible threat is based on existing observations of the sites that have taken place since their discovery and initial archaeological investigation, in addition to the likely activities and resulting threats that have been identified in compiling this report. This assessment then attempts to consider both the potential long-term and short-term threat to each site and the overall result is assessed on a scale of Low, Medium or

High. In doing this, consideration has also been given to the present condition of the seabed remains, for example the remains of Alum Bay 2 are notable for the well-preserved outer-planking and good structural integrity of framing timbers. The relative impact on this site may therefore be considered much higher than on the remains of Alum Bay 1, where exposed timbers are often quite degraded and structural remains are less coherent.

The archaeological sites under consideration lie in relatively close proximity within a well-defined geographical area. Because of this, identified threats are considered across the whole of Alum Bay, with specific site-by-site mention made where applicable. This is considered preferable to repeating the same set of risks for each site, with very little overall change from site to site. Each site is then afforded an individual site risk assessment in accordance with the guidance set out by Dunkley (2008).

Threat Group	Threat	Code	Description
Inshore Fisheries	Recreational Angling	ANGLE	Fishing with rods or hand lines, sometimes from an anchored vessel. The fishing gear has a small potential to cause damage, further potential threat comes from the vessel, if anchored – see Anchorage below.
	Potting	POT	A selective fishing method, undertaken with crab or lobster pots. These have the potential to be dragged through or across a site during recovery causing destructive damage by snagging or disrupting archaeological remains.
Natural Processes	Biological Decay	BIO	Biological degradation caused by marine organisms, most notably shipworm and gribble in the context of wooden remains that have become exposed from the seabed sediment.
	Coastal Erosion	C_ERO	Large-scale sediment movement caused by coastal processes such as the net sediment loss taking place from within Alum Bay in a general northerly direction.
	Seabed Erosion	S_ERO	Localised erosion of the seabed, often as a result of Coastal Erosion, that can lead to remains becoming exposed and as a result being subjected to other threats, such as Biological Decay
Socio-Economic Activity	Anchorage	ANCH	In an area used for an anchorage the anchors have a well-documented potential to cause considerable damage, often accidental, to seabed remains. Impact is likely to be greater where surviving archaeological features are exposed and upstanding from the seabed.
	Diving	DIVE	Interference from sports divers, either through casual disturbance and exposure of the buried remains, or through the deliberate removal of artefacts.

Table 3. Summary of threats identified as impacting upon the maritime archaeology of Alum Bay. The description is based on the impact of these threats within the context of Alum Bay and should not be taken as a generalisation for other sites. Further information can be found in (Dunkley 2008: list 12).

3.2.1 Inshore Fisheries

Evidence on the extent of fishing activity in Alum Bay has been drawn primarily from the Marine Management Organisation (MMO) via the MMO's marine planning portal.⁴ This indicates a wide range of fishing activity taking place within the wider Alum Bay area that has a variety of potential impacts upon the seabed archaeological remains. Data used by the MMO and contained in the *MCZ Fishermap* records that the highest incidence of activity recorded in the general area around the Needles is the use of bottom-gear (trawls and the like) in a variety of forms, although not with the intensity that it is used in other areas. In the area of Alum Bay itself, the use of bottom towed fishing gear became prohibited under a byelaw introduced by the Southern Inshore Fisheries and Conservation Authority from January 2014.⁵ Such potentially destructive activity should not be considered a threat to the archaeological material within Alum Bay. Other forms of fishing include line fishing, netting and potting. Meanwhile, the Centre for Environment, Fisheries and Aquaculture Science (CEFAS) provides further observational data that records very low levels of inshore fishing with static gear and no sighting of fishing with mobile gear.

Anecdotal evidence and observations made during archaeological visits suggests that potting, both for crabs or lobsters, is the most likely form of gear-based fishing and does occur in the area, with gear sometimes left across the site of Alum Bay 1. Similar sources also confirm that vessels anchor in Alum Bay for the purpose of boat-based angling. While the angling is unlikely to impact on archaeological remains, the anchoring poses a clear threat and is discussed below (Section 3.2.3) Overall, the impact of fishing activity on the archaeological remains in Alum Bay is hard to predict and there appear to be very few, if any, recorded instances of damage resulting from contact with fishing gear. However, the potential for damage from potting must be considered as similar to the threat posed from anchoring pleasure craft.

⁴<http://planningportal.marinemangement.org.uk/#>

⁵ <http://www.southern-ifca.gov.uk/>

From a site-level perspective, Alum Bay 1 appears to be at greatest risk from the threat posed by inshore fishing activity because of the fragile nature of its extant, upstanding archaeological remains. Coupled with this, those same remains make the site attractive for marine life that may be the target of fishing activity. In contrast, Alum Bay 2 is extremely low-lying and has benefitted from the slow accretion of seabed sediments on the site during the past decade, meaning that there is little in the way of upstanding structure to snag gear on and little to attract marine life to the site in the first place. Finally, while the remains of Alum Bay pier represent an attractive environment for marine life, the structure appears to be robust enough to withstand accidental snagging from fishing gear.

Identified Threats from Inshore Fishing: ANGL; POT

3.2.2 Natural Processes

As will be clear from reference to Section 3.1, the environmental context of the archaeological sites within Alum Bay is complex. The current understanding of the over-riding sediment regime within which Alum Bay is sited concludes that there is net sediment loss; mainly in a northerly direction. However, cliff erosion is also ongoing and may in part serve to replenish some of this lost sediment. It can therefore be expected, at a broad level, that such coastal erosion will subsequently result in seabed erosion at the level of individual archaeological sites.

In addition to this, the salinity and water temperature of Alum Bay make it a suitable environment for marine life such as shipworm and gribble. Both of these destructive organisms have been recorded on exposed wooden remains at Alum Bay 1. In contrast, neither species has been observed at the main area of Alum Bay 2, primarily because of the thin layer of sediment that is usually covering the site and which has increased since the initial discovery of the site. Some evidence of gribble activity has been noted on the exposed face of one of the large timbers associated with Alum Bay 2 and located several metres to the south-west of the main structure.

In the context of Alum Bay, these two sets of natural processes are inter-linked. Reduction in the levels of seabed sediment across a site leads to the ongoing, or fresh exposure of wooden remains. These may then be rapidly infested by marine organisms which can then quickly destroy any extant wooden remains. Conversely, any increase in the sediment across a site can prevent such organisms from becoming established and can act to preserve the site.

Despite the model of net sediment loss from within Alum Bay, overall seabed sediment levels appear to be relatively stable in the context of the two main archaeological sites. Instead, the picture that the archaeological material paints is one of far more localised, site specific change. Alum Bay 1 appears to have been subject to gradual sediment loss since its original discovery in the early 1990s. The best evidence for this comes from comparing archive photos of structure and seabed levels at the northern end of the site, in the vicinity of the vessel's hawse holes (Figure 11). In contrast, observation based on archive material and recent site monitoring visits indicates that Alum Bay 2 has experienced gradual sediment accretion since 2001 (Figure 12).

Identified Threats: BIO; C_ERO; S_ERO

3.2.3 Socio-Economic Activity

Two main threats can be identified that arise directly from socio-economic themes, namely intentional interference from divers (DIVE) and unintentional damage caused by anchoring vessels (ANCH). Diving, both for sport and archaeological purposes is one of the most significant modern marine activities that takes place within Alum Bay from the perspective of cultural heritage management. The area is listed in popular diving publications (e.g. Pritchard and McDonald, 2001: 27-28) and the resulting activity has the potential to discover new archaeological sites (e.g. Alum Bay 2) or individual artefacts (e.g. the cannon truck). Set against this must be the unwanted impact that sports diving can have on maritime archaeological sites, notably in the removal of artefacts from sites and the associated destruction of archaeological information. Within Alum Bay this has happened on a number of occasions, with a particularly popular target being the exposed copper fastenings that are easily visible on Alum Bay 1. In some cases these artefacts are traceable via their declaration to the Receiver of Wreck, including during the finds amnesty, but it is possible that many artefacts are raised and not declared. Sports Diving therefore represents an on-going means to enhance our knowledge of the archaeological resource within Alum Bay, but it also represents a clear threat to the integrity of those archaeological remains. The impact of this threat, both real and potential, appears to be greatest on Alum Bay 1 where a large number of portable artefacts are present in the form of copper fastenings. By contrast Alum Bay 2 lacks such artefactual attractions and so is under much lower threat with no identified instances of diver interference taking place. Similarly, there is no evidence thus far of any deliberate removal of submerged elements from the old Alum Bay pier.

Broadly related to the sports diving just discussed is socio-economic activity involving general boating in Alum Bay; some for the transport of divers, others simply from sailing or pleasure cruising. The vessels themselves,

particularly in the latter example, have little direct bearing upon the archaeological remains except in cases when they anchor within Alum Bay. In this regard, the Royal Yachting Association (RYA) notes that Alum Bay is;

“an essential anchorage for recreational vessels making passage across the English Channel and is considered to be the last and first safe haven for mariners travelling to or returning from France or the Channel Islands in the event of inclement weather. Protecting boats from south westerly winds, local stakeholders have confirmed that the Bay provides safe anchorage for larger boats some distance from shore.”⁶

Alum Bay is therefore a very popular area for boating activity of all types and this is witnessed by the high numbers of craft that can be present in the bay at any one time, especially during the summer months (Figure 7). In many scenarios, anchoring vessels, either yachts or motor vessels, do not pose any threat to the archaeological remains simply because they do not anchor upon them. However, during the period that maritime archaeological investigation has taken place in Alum Bay (Section 2.1) there have been repeated instances when anchors have been dragged across sites, causing damage to the archaeological remains and indicating the potential for further damage to occur in the future. The most recent such incident was recorded during a monitoring dive on Alum Bay 1 in June 2013 when it was observed that an anchor had been left imbedded in the archaeological remains since the site had last been visited for monitoring the year before (Figure 15). Both of the historic Alum Bay shipwrecks discussed in this volume are marked as wrecks on the Admiralty chart that shows Alum Bay, however neither of the two shipwreck sites are currently buoyed or any indication given as to their historic status. The recently observed incident of anchoring on the site demonstrates that there is clear potential for further damage to be unwittingly caused by anchoring vessels in the future.

Identified Threats from Socio-Economic Activity: ANCH; DIVE

3.3 OVERALL ASSESSMENT OF THREATS AND RESULTING RISK

The obvious threat posed to the archaeological remains of AB1 from diving, anchoring and fishing were noted by Firth (1993: 8) in the first interim report on work at the site. The same threats had also been noted by the Archaeological Diving Unit in their 1992 assessment of the site (ADU 92/07). Recent work that has been undertaken in addressing archive material, in conjunction with the consideration of current marine activity within Alum Bay indicates that the overall nature of threats to the archaeological remains is the same. However, the severity of these threats varies on a site by site basis and an indication of this is provided in Table 4 which sets out the identified threats and their likely impact on each site.

A formal Risk Assessment for each coherent archaeological site has been conducted as part of this stage of the project in accordance with the methodology set out by English Heritage (Dunkley, 2008). These are included in Appendix 8.1 and the overall result of each assessment is included below in Table 4 alongside the identified threat.

Site \ Threat	Inshore Fisheries		Natural Processes			Socio-Economic		Risk	Future Trend
	ANGL	POT	BIO	C_ERO	S_ERO	ANCH	DIVE		
Alum Bay 1	LOW	MED	HIGH	HIGH	HIGH	HIGH	MED	MED	HIGH
Alum Bay 2	LOW	LOW	MED	MED	LOW	MED	LOW	LOW	LOW
Alum Bay Pier	LOW	LOW	LOW	LOW	LOW	MED	LOW	LOW	LOW

Table 4. Summary of threat assessment faced by maritime archaeological site within Alum Bay and a rating of the severity of each threat faced. An assessment of overall risk is also included and the full site risk assessments can be found in Appendix 8.1.

Like the type and severity of identified threats, the overall risk to the sites under discussion is also varied. The ongoing exposure and resultant degradation of Alum Bay 1, coupled with its vulnerability to anchoring vessels and interference from sports divers means that the site can be considered as being at Medium risk at present. The site has a potential future trend towards High risk in the future if destructive interference from anchoring or diving is combined with, or augments the exposure of large sections of the buried remains.

In contrast to this, the site of Alum Bay 2 is currently in a relatively well-preserved state and in a seemingly stable condition, with only very limited overall loss of material in the past decade. The slowly increasing sediment on the site and lack of upstanding remains means that the risk of damage from anchoring and diving is greatly reduced, while not being totally absent. The preserved features of this rare vessel-type seem likely to remain in their current state unless there is a dramatic intervention in the form of sustained anchor damage

⁶<http://www.rya.org.uk/infoadvice/planningenvironment/marineconservation/mcz/Pages/TheNeedlesrMCZandAlumBayrRA.aspx>

or unwarranted human interference. Risk to the site is therefore considered to be Low, although its rarity dictates that it would still benefit from statutory protection. While the shallow or partial burial of the remains means that the risk to Alum Bay 2 could increase in the future, at present the most likely trend is for the risk to the site to remain Low.

Finally, the highly contrasting site of Alum Bay Pier represents a relatively unknown set of archaeological remains where there is clear potential for additional work. In the first instance this can take the form of a survey to establish the full extent and disposition of the seabed remains. In concert with this, a condition survey of specific iron elements would be useful to establish a baseline for future monitoring work. It is difficult at present to fully assess the risk posed to the remains of the pier from the threats identified above. Of these, the most likely cause of damage would seem to come from anchoring pleasure vessels. As noted, until further monitoring of the site occurs it is difficult to establish the full rate of physical or biological decay. What can perhaps be stated with reasonable confidence is that the class of material used (iron) dictates that the remains of Alum Bay pier will degrade over time as a result of natural processes and it is likely that the rate of degradation will increase as time goes on.

4. Assessment of Archaeological Significance

The following section sets out an assessment of the archaeological significance of the discreet sites of Alum Bay 1 and Alum Bay 2 against the non-statutory criteria set out by the Department for Culture Media and Sport (DCMS, 2010) and the specific guidance offered by English Heritage (2012) for assessing the importance of shipwrecks or the sites of shipwrecks. The full definition of each criteria is contained in Appendix 8.2 and an assessment against each criteria is made on a rating of Low, Medium or High significance.

4.1 ALUM BAY 1: STATEMENT OF ARCHAEOLOGICAL SIGNIFICANCE

Overview

The archaeological remains of Alum Bay 1 have been positively identified as part of HMS *Pomone*, a 38-gun 5th-rate frigate, built in 1805 and wrecked on the Needles in 1811. It should be noted here that the Needles site itself was deemed of sufficient archaeological significance to be designated in 1974 under the *Protection of Wrecks Act* (1973) as the site of HMS *Assurance* (1753) as well as HMS *Pomone*. The area around the Needles has remained a designated site ever since. In summary, Alum Bay 1 is considered to be of High significance when assessed against the criteria of *Period, Rarity, Documentation, Group Value, Fragility/Vulnerability Diversity* and *Potential*. Meanwhile the site can be considered to be of Medium significance when assessed against the criteria of, *Survival/Condition*. Taken as an overall assessment, the site of Alum Bay 1 must be assessed as having a High level of archaeological significance.

Period

On the basis of the archaeological analysis of the Alum Bay 1 site that has been undertaken, including dendrochronological dating, metallurgical analysis and archaeological analysis the remains represent part of the 38-gun, 5th-rate, *Leda*-class frigate HMS *Pomone*, that was launched at Frinsbury in Kent in 1805 and was wrecked on the Needles in October 1811. As such, the remains fall into a period classed as 'Hanoverian (1714-1837)' by English Heritage (Dunkley, 2012: 11) and as 'Early Modern and Industrial (1650-1850)' by the *Maritime Archaeological Research Framework for England* (MRF) (Ransley and Sturt, 2013). This latter period, broader in nature than the dynastically defined 'Hanoverian' period is noted (Dellino-Musgrave and Ransley, 2013: 164) as being one of great significance, both from a maritime and non-maritime perspective because of the changes that took place during its span. Britain and England in particular became more outward-looking in nature as the mercantile and naval fleets of the country established and consolidated an overseas empire (see also Dunkley, 2012: 11-14). Some of the processes of capitalism and consumerism, in harness with increasing globalisation can be seen to emerge during this period.

More specifically, the refined date that can be assigned to the site on the basis of its identification dictates that it should also be classified as falling within the period of conflict termed the Napoleonic Wars (1803-1815), themselves part of a longer Anglo-French conflict stretching from 1793 until 1815 that included the French Revolutionary Wars (1793-1802). This conflict between Britain, France and a myriad of other continental nations can be seen as extremely significant for the formation of nationhood within many of the participants, including Britain. From a British perspective, the emphasis placed on the maintenance of naval power for much of the Napoleonic wars established the basis for Britain's maritime domination of the 19th century, following the defeat of Napoleon in 1815. As an extension of this, it is important to note that the naval activities of the Napoleonic War were very much an extension of the policies and practices that were developed by Britain during a range of conflicts in the 18th century. As a result of this, it is possible to situate HMS *Pomone* within the specific concerns and technological developments of the first decade of the 19th century, at the height of the conflict, as well as contextualising the vessel against the maritime developments of the preceding 50 years or so.

Historical studies of naval shipbuilding during this period have increasingly emphasised the important role that merchant shipyards played in meeting the overall demand from ships by the Royal Navy; especially smaller rated vessels such as frigates (see Knight, 2003). The construction of HMS *Pomone* at the private yard of Josiah Brindley, at Frinsbury in Kent means that the vessel provides an excellent opportunity to study the interplay between state and private shipbuilding at the height of the maritime conflict that was such a crucial element of the Napoleonic War. This includes the extent to which such private builders followed the edicts of the Admiralty and Navy board and encompasses the oft debated topics of the quality and efficiency of private shipyards. The analysis of HMS *Pomone* presented in the accompanying monograph demonstrates that the vessel is well suited to exploring these themes from an archaeological perspective, in addition to the more usual historical accounts; a relatively unique approach for the study of such vessels.

As well as some of the broader context highlighted above, the period in which HMS *Pomone* was built and operated is extremely significant from the perspective of maritime technology, including naval shipbuilding and operations. Copper was increasingly adopted in mercantile and naval shipbuilding from the 1780s, initially for sheathing the exterior underwater hull and subsequently for fastening bolts to accompany the sheathing

process. Both of these components have been archaeologically documented on the remains of HMS *Pomone* and both copper sheathing fragments and bolts have been subjected to metallurgical investigation and analysis allowing this aspect of the vessel to be fully contextualised against contemporary archaeological remains and traditional historical narratives. This period also witnessed a rapid increase and eventual standardisation in the application of iron as a shipbuilding material, initially as a means of reinforcement for wooden hulls before eventually becoming a building material in its own right. The building period of HMS *Pomone* falls relatively early in this process, at a time when the application of iron for wooden shipbuilding was by no means standardised and when there were still many doubts about the suitability of such a material for use in Naval vessels. Method and techniques for the application of ironwork were eventually standardised under Robert Seppings during the second decade of the 19th century. In this regard the vessel is of particular significance as an example of individual experimentation on the part of the vessel's builder, Josiah Brindley, and efforts that were being made by private and merchant builders alike to successfully incorporate iron into the building programme. Brindley's adoption of a unique approach to connecting the beams and frames of HMS *Pomone* and HMS *Shannon* provide an excellent example of the technological experimentation that was undertaken in the context of wooden shipbuilding at this time.

In terms of period, the remains of HMS *Pomone* located at the site of Alum Bay 1 are highly representative of a very important period of British history that has been acknowledged as helping to shape national identity and to lay some of the foundations for the subsequent maritime dominance and Empire of the 19th century. On a smaller scale, the vessel provides a window through which to view the interplay between private shipbuilding for state requirements at the height of the global maritime conflict that characterised the Napoleonic War. Finally, HMS *Pomone* provides us with a means to access the archaeological remains of new, industrially based shipbuilding materials at a time when the successful application of such materials was not guaranteed. *Overall Period significance: High*

Rarity

English Heritage note (2012: 7) that currently only ninety-three sites have been firmly located and dated by the NRHE for the period 1500-1815 into which the construction and use of HMS *Pomone* falls. Put another way, wreck sites that pre-date 1840 comprise just 4% of all known and dated sites (Dunkley, 2012: 2). Accordingly, the site of Alum Bay 1 can immediately be considered as relatively rare, when set against the wider corpus of shipwreck remains located within English waters. The importance of the period, specifically the Napoleonic Wars in which HMS *Pomone* was built, utilised and lost was highlighted above and it is notable that the designated site of HMS *Pomone* at the Needles represents the only Naval vessel from the Napoleonic conflict currently protected within English waters (Dunkley, 2012: 12). Recently, the corpus of such vessels has been increased through the location of the site of loss and subsequent salvage break-up of the 36-gun HMS *Amethyst* (1799-1811) in Plymouth Sound.⁷ In this regard, it is extremely significant that while archaeological work at the Needles designated site identified a significant artefactual assemblage, no remains of the vessel's hull were located. The remains of HMS *Pomone* located at the site of Alum Bay 1 therefore represent one of only two known sites comprising structural remains of a Naval vessel dating from this period.

From the first decade of the 19th century the Royal Navy largely focused its frigate building program on repeat orders for three existing designs of vessel (Gardiner, 2000: 87, 95; Winfield, 2005: 165) of which the *Leda* class was the most numerous eventually produced. It is worth clarifying this fact a little further however. Between 1803 and 1815, eight *Leda* class frigates were ordered (before April 1809), built and launched (Gardiner, 2000: 26; Winfield, 2005); vessels that can be considered to have been built under fully wartime conditions. A further seven vessels were ordered between 1812 and the end of the war, but none were launched in time to see wartime service. An additional twenty-nine vessels were ordered in 1816-17, although the last six of these were never completed. HMS *Pomone* and its direct sister ship HMS *Shannon* were the second and third vessels of the class to be built after the construction of the class vessel HMS *Leda*. A third *Leda* class vessel (HMS *Leonidas*) was also built on the River Medway and launched in 1807. Of the *Leda* class vessels built after 1815, two survive in an extant form; HMS *Trincomalee* (launched 1817) and HMS *Unicorn* (launched 1824). The latter of these was never commissioned and survives in its 'in ordinary' state. By the time that both of these vessels were built, the original *Leda* class design had been modified to incorporate the design philosophy of Seppings, including standardised iron fittings and fixtures. This along with the peacetime context of the building of these two vessels means that they are not directly comparable with the early *Leda* class frigates built prior to 1815 and especially the earliest examples dating from before 1810 to the height of the naval conflict of the Napoleonic Wars. As a consequence of this the remains of HMS *Pomone* can be considered as a unique record, archaeological or otherwise, of this important vessel type. Furthermore, the site of Alum Bay 1 offers a direct complement to the designated site at the Needles by providing evidence for the structural remains of HMS *Pomone*.

Overall Rarity significance: High

⁷ http://www.promare.co.uk/ships/Wrecks/Wk_Amethyst.html

Documentation

As a Royal Naval vessel, the remains of HMS *Pomone* located at the site of Alum Bay 1 can be associated with a wealth of historical documentation. The plans of the class vessel (HMS *Leda*) that were supplied to Brindley for the construction of the vessel are held by the National Maritime Museum. Meanwhile, extensive documentation is held by the National Record Office at Kew and the National Maritime Museum that relate to the commissioning and subsequent use of the vessel. These include letters between Brindley and the Admiralty and official documents such as muster books, logs books, pay books, etc. In addition to this, the private papers of the vessel's captain (Robert Barrie) for the ship's service in the Mediterranean and subsequent loss at the Needles also survive. Finally, the ship appears in more public documents such as newspaper reports into naval actions that were characteristic of the way news of such events was communicated to the public at the time. The historical documentation associated with HMS *Pomone* is therefore extensive and publically accessible for future historical researchers.

As well as this wealth of contemporary documentation, research and analysis of the remains of HMS *Pomone* presented in the accompanying monograph offer an interesting counterbalance to the historical sources on ship construction that have tended to form the basis for our knowledge of English and British shipbuilding traditions, including naval ones, of the period. The importance of using archaeological evidence to further develop and enhance our historically derived knowledge base has been noted in the key research questions for the theme of seafaring set out in the MRF for the Early Modern and Industrial Period (Dellino-Musgrave and Ransley, 2013: 175-6). The analysis of the archaeological record of HMS *Pomone* in Alum Bay, alongside the relevant historical documents provides an excellent example of the validity of such statements and also of the potential for such archaeological material to be addressed in the context of broader, historical commentaries or treatises. Finally, the importance of the wreck has undoubtedly been increased by the preservation of fieldwork records dating back to 1993 which have been utilised in the writing of the accompanying monograph and which continue to be available to inform and contextualise future work. In addition to this is the archive of material that is derived from the work undertaken at the Needles designated site that also contains elements of HMS *Pomone*.

Overall Documentation significance: High

Group Value

HMS *Pomone* was part of the largest single class of frigates constructed by the Royal Navy during the era of wooden sailing warships. As noted above in regard to *Rarity*, such *Leda*-class vessels can be sub-categorised into those built during wartime and prior to the constructional standardisation of Seppings and those built after 1815 which also followed Seppings' edicts. The latter sub-group are well represented by the extant vessel remains of HMS *Trincomalee* and HMS *Unicorn*. Meanwhile, HMS *Pomone* is a representative example of the first phase of the *Leda*-class frigate building program undertaken in the first decade of the 19th century at the height of the naval war from which a distinct group of early *Leda*-class vessels can be identified.

Further Group Value can be assigned to HMS *Pomone* when it is considered as an example of an important phase in the development of the frigate class itself within the Royal Navy. Notably as one of only two surviving archaeological examples of the 18lb heavy frigates that were widely utilised from the 1780s onwards (see Gardiner, 1994; 2000). When viewed as part of the wider trajectory of frigate building within the Royal Navy, the remains of HMS *Pomone* can be assigned significance in terms of Group Value alongside other documented archaeological examples of the same type of vessel, such as HMS *Association* (lost 1753), HMS *Dartmouth* (lost 1690) and HMS *Amethyst* (lost 1811). This can help to provide an archaeological narrative to British frigate development over the longer term to set alongside the more common historical one. In particular, the building of HMS *Pomone* in a private yard and the construction of the contemporary HMS *Amethyst* in a Royal Yard has clear potential to enhance our understanding of comparative building practices on the basis of archaeological, rather than historical source material. Additionally, as has been noted above, HMS *Pomone* represents a very rare example of the known archaeological remains of a Royal Navy vessel from the Napoleonic Wars located in English waters. As such, the vessel can be associated with other naval vessels of the period, including those which have not yet been discovered and can be seen as partially representative of this large group of vessels and their associated activities.

Finally, the location of HMS *Pomone* a short distance from the contemporary remains of the unidentified coastal trading vessel of Alum Bay 2 also enhances the Group Value of both vessels. Taken together, the two vessels provide an excellent example of the divergent approaches to ship construction that can be identified taking place across Naval and merchant shipyards across the course of the 18th century. Likewise, HMS *Pomone* serves to highlight the specialised nature of the design, construction and use of such vessels when compared to the ordinary vehicles of late 18th century English seafaring epitomised by Alum Bay 2.

On a slightly wider scale, the site has clear and significant association with the designated wreck site at the Needles that contains further remains for HMS *Pomone*. Taking that site into consideration, the wider area

around the Needles and Alum Bay contains a shipwreck resource of demonstrably high potential, partly illustrated by the number of stray finds that have been located as part of the wider Alum Bay project. The sites of Alum Bay 1 and Alum Bay 2 should be considered as part of this wider group of vessels, linked by their geographic location. Consideration of this large group of vessel as a whole, raises some interesting future questions for the management of large bodies of closely located shipwrecks, either known sites or unknown sites.

Overall Group Value significance: High

Survival/Condition

The wrecking process of HMS *Pomone* on the Needles in 1811 resulted in the breaking up and eventual disintegration of the vessel in the days following its stranding and initial salvage. This process was recorded by contemporary accounts and confirmed by the archaeological work done at the site (see Tomalin *et al.*, 2000), which included analysis of the possible site formation processes based on the distribution of artefacts on the seabed. As part of this process, a large section of the vessel from the port, bow, upper-sides became deposited in Alum Bay and was subsequently investigated as the site of Alum Bay 1. On this basis it is immediately clear that HMS *Pomone* has only survived in limited, discreet elements; artefacts at the Needles and a specific element of the hull in Alum Bay. On these grounds, the survival of the overall entire vessel can perhaps be considered to be limited, although a caveat is of course that a single large section of the hull does survive in Alum Bay and that there is always the potential for further sections to be located in the vicinity, in the future. The discovery of a variety of archaeological material during previous fieldwork illustrates the potential for further remains to be located in the future.

In terms of condition, the section of hull located in Alum Bay can be assessed in two ways. The extant, above seabed remains can be considered to be in moderate condition, although they are increasingly heavily degraded in some areas, compared to their state at the time of initial work in the early 1990s. In contrast, the most recent season of excavation (2010) has indicated that wooden elements covered by sediment are still relatively well preserved. The iron elements that are one of the characteristic features of the site are generally quite heavily concreted which has greatly hindered their interpretation during recent fieldwork and they may be considered to be in a similar overall condition to the extant wooden remains. Other material features of the site, such as copper or lead are less susceptible to biological and physical processes of degradation and remain in a good state of preservation

Overall Survival/Condition significance: Medium

Fragility/Vulnerability

From the perspective of Fragility, the physical remains of HMS *Pomone* can be considered to be in a fragile, yet relatively stable condition. Wooden structural elements on the site have become more fragile during the time that the site has been subject to archaeological work, witnessed by the reduced amount of wooden material in the vicinity of the non-fragile lead hawse-holes at the northern end of the site. This rate of degradation may be considered to be relatively normal for exposed wooden remains in temperate waters inhabited by organisms such as shipworm and gribble, both of which have been documented on the site.

As the fragility of the seabed remains increases over time, they are becoming ever more vulnerable to natural and human threats. A reduction in the sediment levels at the site has the potential to expose wooden material, which has thus far been protected by a layer of sediment, to the effects of biological and physical decay. Indications are that the protective sediment that covers the site is being slowly reduced by the natural patterns of net sediment loss from Alum Bay. Less predictable is the rate of human impacts to the site, in particular, the impact of anchoring vessels, fishing and non-archaeological diving. Accidental damage from anchoring vessels, or from fishing gear such as lobster pots, has been documented throughout the archaeological investigation of the site. The most recent of these occurred in 2013 when an anchor (still *in-situ*) was found to have broken one of the surviving iron elements. Such damage is likely to continue at a random and unpredictable rate, but with entirely predictable results, in the future. Further identifiable human threats come from visiting sports divers who may be tempted to remove structural elements as 'souvenirs'. Under particular threat are the still numerous copper bolts that are both easily mobile and potentially of financial value. The identification of such copper artefacts that have been raised by sports divers and subsequently declared to the Receiver of Wreck, has continued since the earliest work on the site. Because of this threat, loose copper material that is identified during monitoring of the site is usually recovered. While this policy inevitably destroys a small piece of the archaeological site, it does so in an archaeological controlled manner.

Overall, the remains of HMS *Pomone* located in Alum Bay must be considered as highly fragile because of the potential of wooden elements to rapidly degrade once they become exposed; much as the currently exposed remains have done since the site has been archaeologically investigated. In conjunction with this, the vulnerability of the site is increasing as the seabed remains become more physically fragile. In addition to

natural threats, a number of human threats from anchoring, fishing and diving can be identified as being active and highly detrimental to the on-going integrity of the site.

Overall Fragility/Vulnerability significance: High

Diversity

As noted above, the temporal period in which the remains of HMS *Pomone* are situated is one that witnessed the application of naval power as a central element of British foreign policy and national defence during the Napoleonic War. HMS *Pomone* is documented as being the only known example of a Naval vessel from this period within English waters, as such, the vessel adds a great deal of diversity to the existing corpus of vessels that are formally protected. The vessel is also notable because of the novel approach to solving problems of timber resourcing in the Royal Navy through the application of Brindley's patented bolt and carling system of fastening. This represents the willingness of the Royal Navy to accept innovation and experimentation as part of the overall effort to reduce the problems of a growing timber shortage in the first decade of the 19th century. This fact is recognised by the designation of the site of the Needles, where the vessel was wrecked in 1811. In this regard, the elements of the ship that have become deposited in Alum Bay must be considered to hold the same high degree of diversity as the site at the Needles.

Overall Diversity significance: High

Potential

The seabed remains of HMS *Pomone* that are located in Alum Bay have been the subject of archaeological investigation since the early 1990s. During this time the site has been surveyed, excavated and sampled, all of which have allowed the development of the archaeological interpretation of the vessel that is presented in the accompanying monograph. It is clear from this, and the preceding assessment of the fragility of the vessel, that further intrusive archaeological investigation is probably undesirable, unnecessary and likely to be relatively unproductive in terms of informing us further about the vessel. An exception to this would be the targeted exposure of timbers in order to undertake an extended and extensive program of dendrochronological sampling and analysis. HMS *Pomone* was never subject to a refit or rebuild during its period of service, consequently its structural elements can be assumed to be original, with the exception of any minor repairs undertaken at sea. The vessel therefore has the potential to provide useful information about the types, origins and management of timbers and related forestry used for the construction of naval vessels in private yards at the time. This is significant on a much wider scale than an individual vessel because it is a period when timber shortages are widely acknowledged as being one of the drivers behind the development of alternative technology, such as iron, or Seppings' new approach to rationalising the way in which wooden elements were utilised in the construction of Naval vessels. As the only identified archaeological remains in England of a Royal Navy vessel from this period, the wooden structural remains of HMS *Pomone* represent the only way of achieving this via the direct investigation of an un-refitted vessel from this period.

The site of Alum Bay 1 has also been the subject of ongoing, regular on-site archaeological investigation and monitoring since its discovery. As a result of this, the site archive documents a twenty year period in the site formation processes of a wooden shipwreck exposed in a relatively shallow environment. Because of this, ongoing monitoring of the site has clear potential to inform us regarding the likely trajectories of stabilisation or degradation that other vessels in similar environments are likely to undergo, following their discovery. Additionally, there is some potential to address wider scale site formation processes across the area between the Needles and Alum Bay, if further elements of the vessel are found in the future.

As a result of the publication in the accompanying monograph of an extended archaeological discussion of HMS *Pomone*, the site still has considerable archaeological potential. Firstly, as a means of informing us about some of the wider trends in late 18th/early 19th century naval shipbuilding and related timber management, via an extended programme of dendrochronological sampling. Secondly as a means to continue to build on our understanding of how maritime archaeological remains of a range of material types are likely to degrade/stabilise over time. The first of these potential research pathways requires the development of a highly coherent project design, securing of adequate funding and the allocation of time for the resulting assessment and analysis. The second pathway can be achieved through the continuation of the existing monitoring visits that have been undertaken on the site since 1993, in conjunction with on-going diver observations in the wider area. As the ability to rapidly record underwater cultural heritage via a range of technology continues to increase, the archive associated with such monitoring visits is likely to become increasingly informative for the study of site formation processes in future years.

Overall Potential significance: High.

4.2 ALUM BAY 2: STATEMENT OF ARCHAEOLOGICAL SIGNIFICANCE

Overview

The archaeological remains of Alum Bay 2 have been dated to the very late 18th century, with a likely use in the early years of the 19th century. The identification of the original vessel is still unknown, but it has been possible to narrow it down to a handful of vessels of a similar type. The most likely of these is the *Ann and Susannah*, a 51 ton trading sloop built in Cowes in 1799 and lost on the coast at the Needles in 1821. Another high potential historic loss is that of the *Commerce*, recorded as being lost in Alum Bay in 1820, while bound for Southampton from Cork, but for which there is no other information at this time. On this basis, the vessel has been interpreted as a relatively small coastal trading vessel constructed within a southern English carvel building tradition. In summary, Alum Bay 2 is considered to be of High significance when assessed against the criteria of *Period*, *Rarity*, *Diversity* and *Potential*. Meanwhile the site can be considered to be of Medium significance when assessed against the criteria of *Documentation*, *Group Value*, *Survival/Condition* and *Fragility/Vulnerability*. Taken as an overall assessment, Alum Bay 2 can be assessed as having a High level of archaeological significance because of the *Period*, *Rarity* and *Potential* of the site.

Period

On the basis of the evidence outlined above the Alum Bay 2 shipwreck was built or refitted in the final years of the 18th century and almost certainly used during the early years of the 19th century. As such, it falls into a period classed as 'Hanoverian (1714-1837)' by English Heritage (Dunkley, 2012: 11) and as 'Early Modern and Industrial (1650-1850)' by the *Maritime Archaeological Research Framework for England* (MRF) (Ransley and Sturt, 2013). This latter period, broader in nature than the dynastically defined 'Hanoverian' period is noted (Dellino-Musgrave and Ransley, 2013: 164) as being one of great significance, both from a maritime and non-maritime perspective because of the changes that took place during its span. Britain and England in particular became more outward-looking in nature as the mercantile and naval fleets of the country established and consolidated an overseas empire (see also Dunkley, 2012: 11-14). Some of the processes of capitalism and consumerism, in harness with increasing globalisation can be seen to emerge during this period.

Likewise, the process of industrialisation, first undertaken in Britain, created an irreversible change in the way that many people lived and worked during their lives. These processes extended to shipbuilding practices and witnessed the development and widespread adoption of iron, copper and copper-alloys for construction and steam-power as an alternative form of propulsion. Alum Bay 2 lies firmly within this broad period and represents an example of the well-established tradition of shipbuilding within southern England, potentially traceable back to the 17th century, rather than one of the developing approaches based on industrial materials. Little is known about the actual construction details of vessels built by such regional shipbuilders during this period from an archaeological perspective and so Alum Bay 2 has clear significance in being able to contribute a physical set of remains to the historically based narrative.

Alum Bay 2 also represents a very different type of vessel to the longer-distance, regional and global trading, naval and colonial vessels that are often the focus of archaeological and historical investigation. The remains of Alum Bay 2 serve as a remainder of the small-scale ordinary ships that formed the basis of coastal commerce and whose operation underpinned the larger-scale voyages that stemmed from them. This activity and its importance for facilitating longer distance trade has been highlighted from a historical perspective within existing academic research (Doe, 2006: 430; Robinson, 2006: 270; Skidmore, 2013: 153). The remains of Alum Bay 2 offer a rare opportunity for this important and often overlooked facet of maritime activity to be addressed from an archaeological perspective that provides a clear complement to the historical material.

Overall Period significance: High

Rarity

English Heritage note (2012: 7) only 93 sites as firmly located and dated by the NRHE for the period 1500-1815 into which the construction and initial use of Alum Bay 2 falls. It has also been observed (Dunkley, 2012: 13) that the British merchant fleet expanded from 3,281 vessels in 1700 to over 20,000 vessels in 1800 and included 'a diversity of vessel types not accurately captured through known archaeological remains' (Dunkley, 2012: 13). Currently, the only protected site representative of a coastal trading vessel potentially dating from the Hanoverian period is the site of Seaton Carew; probably a two-masted collier dating to the mid-19th century (Dunkley, 2012: 14) and a very different vessel to Alum Bay 2. Against this context, Alum Bay 2 represents an almost unique archaeological example of the remains of a small coastal trading vessel from the late 18th and early 19th century. Although the remains of the vessel date from the last 250 years, it represents a building tradition not well-preserved in other vessels lost in English waters and one whose application potentially dates to as early as the 17th century. On this basis, the site of Alum Bay 2 should be considered to be an extremely rare example of its type within the maritime archaeological record of England and the UK.

Overall Rarity significance: High

Documentation

The shipwreck of Alum Bay 2 cannot be associated with any specific historical documentation such as builder's plans or reference in historical events. It does however offer an interesting counterbalance to the historical sources on ship construction that have tended to form the basis for our knowledge of English and British shipbuilding traditions of the period. The importance of using archaeological evidence to further develop and enhance our historically derived knowledge base has been noted in the key research questions for the theme of seafaring set out in the MRF for the Early Modern and Industrial Period (Dellino-Musgrave and Ransley, 2013: 175-6). The analysis of the archaeological record of Alum Bay 2 provides an excellent example of the validity of such statements and also of the potential for such archaeological material to be addressed in the context of broader, historical commentaries or treatises. Finally, the importance of the wreck has undoubtedly been increased by the preservation of fieldwork records dating back to 2001 which have been utilised in the writing of the present volume and which continue to be available to inform and contextualise future work.

Overall Documentation significance: Medium

Group Value

As noted above in relation to Rarity, Alum Bay 2 cannot be associated with any other vessels of the same, or similar type, from an archaeological perspective. However, its location a short distance from the contemporary remains of HMS *Pomone* and scattered remains across Alum Bay does enhance the Group Value of Alum Bay 2. Taken together, the two vessels provide an excellent example of the divergent approaches to ship construction that can be identified taking place between Naval and merchant shipyards across the course of the 18th century. Likewise, Alum Bay 2 serves to highlight the specialised nature of the design, construction and use of vessels such as HMS *Pomone* when compared to the ordinary vehicles of late 18th century English seafaring epitomised by Alum Bay 2. As noted above in relation to Alum Bay 1, the remains of Alum Bay 2 also form part of a much larger group of vessels that are located in the close vicinity of the Needles.

Overall Group Value significance: Medium

Survival/Condition

Based on the extant, surveyed seabed remains of Alum Bay 2 it can be stated that the vessel exhibits a reasonable degree of survival in relatively good condition. A large area of the lower hull of the vessel has been surveyed without recourse to excavation and observation of the site suggests that further remains are likely to exist in a buried state around the currently exposed remains. The pattern of the vessel's framing is exhibited in the northern half of the site and further framing timbers as well as other internal timbers and potentially artefacts are likely to be preserved under the outer-planking that characterises the southern half of the vessel. The remains are in demonstrably good condition, with detailed features such as caulking cuts and limber holes well-preserved despite exposure when sediment levels on the site are reduced.

Overall Survival/Condition significance: Medium

Fragility/Vulnerability

Archaeological visits and survey over a twelve year period between 2001 and 2013 have indicated that some elements of Alum Bay 2 have degraded during this time. This includes elements of the outer-planking and part of the surviving keel. The vessel remains are therefore subject to a natural rate of degradation that might reasonably be expected of the exposed elements of a wooden vessel of this date. Sediment levels at the site appear to be relatively stable and may even have accumulated sediment over the past decade, affording the wooden material some protection from shipworm and gribble which are recorded as present within Alum Bay.

The site is unlikely to be specifically vulnerable to divers seeking objects for salvage as there are no artefacts visible on the site and the construction of the vessel does not include any of the material components, such as copper/copper-alloy fastenings that are regularly removed from sites. The greatest threat to the site probably comes from potential damage from fishing equipment being dragged through the site, or from the anchors of the pleasure craft that are known to frequent Alum Bay on a regular basis. At present therefore, the site appears to be relatively stable but remains vulnerable to one-off incidents of fishing or anchoring that do have the potential to inflict a large amount of irreversible damage to the site.

Overall Fragility/Vulnerability significance: Medium

Diversity

As noted above, the temporal period in which the remains of Alum Bay 2 may be located is one that witnesses the growing importance of mercantile seafaring activity. It was also noted above that Alum Bay 2 represents a relatively unique vessel type, both in terms of its size, building tradition and function. Vessels such as Alum Bay 2 are currently not well-represented in the published archaeological investigations that have taken place in the UK, nor in the range of vessel types afforded legal protection. As such, it has clear significance in its ability to greatly increase the diversity of the vessel types and maritime archaeological sites that are studied, published and protected within the territorial waters of England and the wider UK.

Overall Diversity significance: High

Potential

Thus far, the archaeological survey of Alum Bay 2 has been restricted to recording and sampling of the extant seabed remains. As a result of this, the vessel has been documented and characterised, allowing its date, building tradition, general size and probable vessel type to be suggested and for subsequent analytical interpretation to take place on the basis of this. In doing this, the archaeological remains of Alum Bay 2 have demonstrated the clear potential of such remains to shed light on the shipbuilding practices prevalent within relatively small trading vessels operating in the late 18th and early 19th century. Thus far, comparative examples of vessels of this date and general type have not been studied and published from other areas of the UK. In such a scenario there would be clear potential for the direct comparison between such vessels and the possibility of further investigation of regional shipbuilding traditions that analysis of Alum Bay 2, in conjunction with the contemporary historical sources, suggests. The need for such investigation and interpretation of archaeological remains from this period as a means to refine and further inform our historically based understanding has been mentioned previously and represents a well-established research 'need' within future maritime archaeological planning within England and the UK. Clearly, Alum Bay 2 has further potential to begin to answer some of these questions within the context of the late 18th century and in relation to smaller regional trading vessels being built and operated around the south coast of England. In this regard, the existing archaeological potential of Alum Bay 2 to must be considered as high.

Overall Potential significance: High.

4.3 ALUM BAY PIER: STATEMENT OF ARCHAEOLOGICAL SIGNIFICANCE

Overview

The archaeological remains of Alum Bay pier date to the late 19th century and were deposited in their current state when the pier was finally destroyed by the military during the Second World War. The pier is representative of the growth of seaside tourism in Britain and Alum Bay in particular during the late 19th century. In summary, Alum Bay pier is considered to be of Medium significance when assessed against the criteria of *Period*, *Group Value* and *Potential*. Meanwhile the site can be considered to be of Low significance when assessed against the criteria of *Rarity*, *Documentation*, *Survival/Condition*, *Fragility/Vulnerability*, and *Diversity*. Taken as an overall assessment, Alum Bay Pier can be assessed as having a Low level of archaeological significance.

Period

The history of Alum Bay, including its pier is relatively well documented from a local perspective through work such as Medland's *Alum Bay and the Needles* (1995). Consequently, there is an established chronology for the iron pier that the present archaeological remains derive from. This was built in 1887 and served primarily as a means to allow tourists to disembark from visiting steamers, it was also used by tourists already on the Isle of Wight who were visiting the increasingly popular area of Alum Bay. The pier was declared unsafe in 1925, was damaged by a storm in 1927 and was eventually broken up during the Second World War.

The use of the pier straddles a number of periods as classified by English Heritage, starting with the Victorian (1837-1901) and subsequently pre-WW1 (1901-1914), WW1 (1914-1918), inter-war (1918-1939) and finally WW2 (1939-1945). Additionally, the remains fall into the Modern Period (1850-2000) as defined by the *Maritime Archaeological Research Framework for England* (MRF) (Ransley and Sturt, 2013). Of these, the earlier periods that include the rationale for the initial construction and use of the pier before it was severely damaged in 1927 are the most relevant. The latter periods, when it has largely fallen into disuse are considered less relevant. A wide range of maritime related themes have been identified as characterising the Modern period within the MRF (see Parham and Maddocks, 2013), that are outside the scope of this assessment when considering the significance of the Alum Bay pier. However, it is clear that Alum Bay pier is part of a wider trend in the early-modern period and late 19th century in particular, that witnessed the development of coastal tourism and seaside resorts. This is mentioned fleetingly in the MRF but is discussed in more detail by Murphy (2009: 160-166) who notes the role that pier construction played in facilitating this developing industry by providing landing stages and platforms for promenading, entertainment and refreshment. Alum Bay pier is part of this under-studied element of England's coastal archaeology and can be considered as representative of smaller-scale local pier building rather than the more famous examples associated with urban coastal resorts.

Overall Period significance: Medium

Rarity

The expansion in pier building to service the growing Victorian tourist industry in the late 19th century is noted by Murphy (2009: 162-3) who considers the building boom to extend to the beginning of the First World War. In total, the register of British piers held by the National Piers Society lists fifty-eight surviving piers and forty-one piers that are now lost, including Alum Bay pier. The surviving piers include the slightly larger, but broadly similar, contemporary pier at Totland, located a short distance to the east of Alum Bay and opened in 1880.

The Alum Bay pier is therefore not especially rare, either as part of the national corpus of piers, or as an example of the smaller class of piers built in the late 19th century.

Overall Rarity significance: Low

Documentation

Known documentation that can be associated with Alum Bay pier is limited to historic photographs. It does however seem likely, that given the recent historic period that the pier is from, further historical research might locate plans and correspondence relating to the construction and use of the pier. There is also a limited archive of material deriving from the archaeological survey of the site.

Overall Documentation significance: Low

Group Value

Some local Group Value can be assigned to Alum Bay pier through its broad association with contemporary piers built at Totland and Yarmouth. Likewise, further Group Value on a national scale can be assigned through the association of the remains with the wider corpus of piers built across Britain and England during the 19th century and early 20th century.

Overall Group Value significance: Medium

Survival/Condition

In comparison to extant, maintained piers of the same date and general construction type, the remains of Alum Bay pier must be considered to be in a poor condition overall. Meanwhile, the exact extent of the surviving remains as a proportion of the original structure is unknown, although it seems unlikely to be particularly high. On a smaller scale, archaeological investigation undertaken thus far has indicated that specific features and types of material do survive on the site in a legible form, which has the potential to inform future work and interpretation.

Overall Survival/Condition significance: Low

Fragility/Vulnerability

Ideally, the remains of Alum Bay pier require a full condition survey in order for their fragility and vulnerability to be fully assessed. Visits to the site undertaken thus far suggest that at the present time the structural remains of ironwork located on the seabed are relatively robust in relation to the identified threats to their ongoing coherence. However, as just noted, this represents a clear area for future work in the management of the site in order to improve our understanding of the site. It is likely that in the longer term, the construction material will undergo natural degradation and become increasingly fragile.

Overall Fragility/Vulnerability significance: Low

Diversity

Alum Bay pier is one of a number of piers that were built during the late 19th century and early 20th century to facilitate the increase in seaside tourism. Fifty-eight of these structures survive of which twenty-four are protected through Listed Building status, including the Grade 1 listed Clevedon pier. Although ineligible for listed building status due to its location below the mean low-water, it does not seem that application of comparable statutory protection to Alum Bay pier would increase the diversity of the existing corpus of protected piers. There is no indication at present that Alum Bay pier exhibits any particularly remarkable features or construction practices that would alter that assessment.

Overall Diversity significance: Low

Potential

Discussion in the preceding sections illustrated the fact that the remains of Alum Bay pier are of generally low significance when considering factors such as their uniqueness as an archaeological artefact, condition or associated documentation. There is however, some potential at the site as a means to study and document the on-going site formation processes acting upon submerged ironwork of late 19th century date. The history of the site means that dates of construction, destruction and deposition of material are easily established. An extended condition survey of the site would serve to provide a benchmark against which future observation of any deterioration in the ironwork could be measured. This has the potential for providing a useful case-study of such material which can then be used to inform the management of other sites of similar material properties and add to the existing knowledge of such processes and preventative measures (e.g. MacLeod, 2013).

Overall Potential significance: Medium

5. Monitoring and Protection

5.1 FUTURE MONITORING

Since the inception of work within Alum Bay in the early 1990s there have been a number of periods when fieldwork has been undertaken in addition to visits between fieldwork seasons for the purposes of monitoring, or for activity such as work on the dive trail. This has ensured that the archaeological remains have been informally monitored on at least an annual or biennial basis across the period in question. Latterly, this process has become more formalised with recording of specific features that have become newly uncovered, or recording where material has been lost from existing site plans. This process of visual observation has been augmented by a photographic record and more recently through a video record.

The current regime of regular visits appears to be working effectively. This is allowing the record of the site through photographs, video and drawn record, where required, to be developed. Over the last few years the most effective of these has proved to be high definition video and this is recommended to be continued on all future dives at the sites in Alum Bay. Monitoring dives also have the potential to record any new material that has become uncovered since the previous visit. Finally, as research objectives and methods of analysis evolve and change, regular monitoring allows specific questions to be answered as they arise. In terms of the frequency of monitoring, it seems reasonable to suggest a target of visiting sites on an annual basis with biennial visits as a minimum requirement.

5.2 PROTECTION REQUIREMENTS AND OPTIONS

It is clear from the historic investigation and recent monitoring that both sites of Alum Bay 1 and 2 are at risk from a range of natural and cultural threats (Section 3). Some of these can be classified as natural degradation, such as erosion or biological decay and these are affecting the site of Alum Bay 1 more than the other sites. Meanwhile, more destructive threats include human interference the removal of artefacts by divers or via anchoring vessels. The latter of these in particular has caused significant damage to the remains of Alum Bay 1 on several occasions during the archaeological monitoring of the site, most recently in 2013.

Overall, there is little that can be done to slow or halt the natural threats to the site without significant investment to encourage sediment accretion at Alum Bay 1. Such options might include the installation of sandbags or geotextiles to trap sediment and act as a barrier to marine organisms (for discussion of different methods see Gregory and Manders, 2011). This approach has the potential to increase the protection afforded to the site but would decrease the visibility of the remains to visiting divers. In contrast, Alum Bay 2 appears to be relatively stable in this regard, however, the site could easily become rapidly degraded if the thin layer of sand that covers it is lost. The most effective management option at this time would seem to be preservation by record, facilitated by ongoing monitoring dives.

Prevention of further damage to the sites from human interference is seemingly much easier to achieve. Damage from anchoring can be easily prevented through the establishment of a no-anchor area around the two sites. Other cultural threats that can be observed is the removal over the years of material such as copper bolts from Alum Bay 1. This is also possible to prevent in the future through the protection of the sites through a statutory mechanism such as designation via the PWA (1973) or scheduling via the AMAAA (1979), both of which make it illegal to tamper with the archaeological remains that comprise the site.

Such recommendation is not however new, as long ago as 1992, the ADU observed (1992) that;

'the structure of the vessel [Alum Bay 1] may be of considerable significance in the evolution of Royal Navy vessels... it seems appropriate to afford the site protection under the 1973 Act [the PWA] ...It may be appropriate to place a small warning buoy securely on the site to reduce the threat from anchoring or potting.'

At the time, this proposal was intended to be a temporary measure until the date, identity and significance of Alum Bay 1 could be established. Although the site was never designated, the date, identity and significance have now all been established and can be considered as being worthy of protection. The threats to the site remain the same and the simplest form of protection is the same as in 1992; designation under the PWA 1973.

Set against this, must be a strong desire to maintain and potentially encourage public access to the sites of what, after all, is their archaeological heritage. Although this can be done through the licensing system that is part of the PWA, the open nature of sites that are scheduled under the AMAAA would seem to be less bureaucratic and more inclusive. Currently, no shipwreck sites in England have been afforded statutory protection under the AMAAA. However, the suitability and viability of the AMAAA for application to the marine zone and to shipwreck sites in particular was established through an EH funded pilot study in 2011 (Whitewright, 2011). That report concluded that there was no reason why the AMAAA could not be used to

protect maritime archaeological sites. Furthermore, the report noted that the combination of protection while allowing public access was desirable from a heritage management perspective.

From the perspective of efficiency and simplicity it therefore seems desirable to schedule a single area within Alum Bay on the grounds of the combined archaeological significance (Section 4) of Alum Bay 1 and Alum Bay 2 as being collectively representative of two very different sections of England's maritime activity at the end of the 18th century and beginning of the 19th century. An area with a radius of 100m would encompass both sites (Figure 16) and allow for any additional material that might be found in the immediate vicinity. The size of the scheduled area should allow sufficient space around the edge of it for any anchoring vessels that misjudge the distance from the centre-point. Given the use of Alum Bay as an area of anchoring vessels it seems desirable to mark the centre-point of the protected area with a buoy. Siting the centre-point of this area mid-way between the two sites has the additional advantage of keeping mooring footings away from any archaeological sensitive areas. The low archaeological significance of the remains of Alum Bay pier dictate that there is no desire to extend protection to encompass those remains, or to afford them individual protection at this time.

6. Conclusion: Management Recommendations

The area of Alum Bay contains a range of maritime archaeological material, encompassing stray finds, through coherent shipwreck remains that describe an important phase in England's shipbuilding past, to a physical record of the growth of seaside tourism in the late 19th century. The assessment of archaeological significance provided in Section 4 of this report, coupled with the extended analysis and interpretation offered in the Alum Bay monograph has highlighted the high level of archaeological significance of the two shipwreck sites contained in Alum Bay. These comprise a section of HMS *Pomone*, a 38-gun 5th-rate frigate lost in 1811 in addition to a well-preserved section of hull of a small coastal trading vessel dating to the late 18th and early 19th century. The collective archaeological potential of Alum Bay is illustrated by the remains of these vessels being set alongside the remains of Alum Bay pier and the possibility of future individual finds or other shipwreck remains. Taken as a whole, the maritime archaeology of Alum Bay provides a unique insight into a variety of elements of England's maritime past, particularly those from more recent periods.

While the significance of the Alum Bay 1 and 2 shipwreck sites is clear, equally demonstrable is the wide range of threats that these sites face when considering their future management and protection. In particular, the threat posed by anchoring boats has led to regular instances of damage to the fragile remains of Alum Bay 1 and could also impact upon the currently stable condition of Alum Bay 2. A lesser threat is posed from fishing activity and uncontrolled interference from visiting sports divers, including the removal or disturbance of artefacts. To these threats can be added the ongoing processes of natural degradation that inevitably impact upon archaeological remains located in the marine zone.

Providing recommendations to address this situation takes two approaches. Firstly, the continuation of a regular monitoring program at Alum Bay 1 and 2 in order to ensure that material lost through natural processes is subject to preservation by record. This process could usefully be extended to the Alum Bay pier site in order to begin the process of monitoring that site and to understand the rate of degradation that is ongoing.

Secondly, attention must be given to the clear and often destructive threat posed by anchoring vessels that has been impacting upon the archaeology of Alum Bay since it was first subject to archaeological investigation in the early 1990s. The clearest option is to extend the legal protection currently afforded the remains of HMS *Pomone* located at the Needles, to the section of the ship located in Alum Bay. The same protection could be given to the remains of Alum Bay 2 under the same statutory instrument. Designation under the Protection of Wrecks Act (1973) of an area within Alum Bay that encompasses Alum Bay 1 and 2 is therefore one recommendation of this management report.

A more nuanced option is to schedule both sites under the Ancient Monuments and Archaeological Areas Act (1979). This would prohibit interference with the sites, accidental or otherwise, and so prevent vessels from anchoring. Critically, the sites would remain open to wider public access without the need for the administration of a licensing system for casual visitors. Future archaeological work on the sites could be conducted according to the same system that covers terrestrial monuments. Such a publically inclusive mechanism for the provision of statutory protection is therefore the alternative recommendation of this report.

Overall, Alum Bay contains a valuable record of a specific, important period in England's maritime past. This unique archaeological record is under clear threat from human activity that can have potentially destructive consequences. A program of on-going monitoring will be carried out by the Maritime Archaeological Trust that will continue to develop and inform our understanding of these sites. There is a clear need to augment this process of preservation by record through the implementation of statutory protection, ideally through scheduling in order to protect the demonstrably significant archaeological remains, while maintaining public access.

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8. Appendices

8.1 SITE RISK ASSESSMENT: SITE BY SITE

Alum Bay 1

Wreck/Site Name		SI Number														
Alum Bay 1																
NRHE / UKHO No.	EH Region	Restricted Area							Principal Land Use							
NRHE 767332; UKHO19555	South East								Coastland 1							
Latitude (WGS84)		50°39.996'N														
Longitude		01°34.362'W														
Class Listing					Period					Status						
5 th -rate ship (frigate)					Post-Medieval (Hanover)					Non-Designated Wreck Site						
Licensee					Nominated Archaeologist					Principal Ownership Category						
N/A					N/A					C: Crown/MOD						
Seabed Owner							Navigational Administrative Responsibility									
The Crown Estate							Nil									
Environmental Designations																
SAC (South Wight Maritime); rMCZ (The Needles)																
Seabed Sediment										Energy						
General: Sandy Gravel. Local: Sandy Silt										Low						
Survival																
Overall Vessel: Poor. Site Specific: Good																
Overall Condition					Condition Trend					Principal Vulnerability						
C: Generally satisfactory but with significant localised problems.					B: Declining. The condition of the monument is deteriorating as a result of ongoing damage, causing gradual loss of fabric.					ANGL, POT, BIO, C_ERO, S_ERO, NAT, ANCH, DIVE,						
Amenity Value: visibility																
B: Limited above bed structural remains and finds scatter with limited visibility and only legible with further interpretative information.																
Amenity Value: physical accessibility								Amenity Value: intellectual accessibility								
A: Full								C: No Interpretation								
Management Action					D: Legal protection should be sought to preserve integrity of site and mitigate threats											
Management Prescription		A	B	C	D	E	F	G	H	I	J	K	L	M	N	
															X	
Notes																
<p>The site lies in sheltered waters and is easily accessible by divers. The sediment regime at the site indicates an ongoing, but relatively slow reduction in sediment levels across the site. Subsequently exposed wooden remains are then subject to biological degradation while metal fastenings may become loose and easily removed by divers. The fragile nature of the remains dictates that they are very vulnerable to damage from anchoring vessels that use Alum Bay and potentially also from fishing equipment.</p> <p>The vessel has been identified as a section of HMS <i>Pomone</i> that was wrecked on the Needles in 1811. The site at the Needles is now designated under the Protection of Wrecks Act (1973). On the grounds of consistency and to mitigate the threat from anchoring and diving it is desirable to extend the same level of protection to the remains in Alum Bay. However, in the interest of public access to the site, scheduling under the Ancient Monuments and Archaeological Areas act (1979) is seen as a more suitable option.</p> <p>Monitoring of the site is on-going and takes place on an annual/biennial basis.</p> <p>Overall Risk Assessment: MEDIUM (Potential to trend to HIGH in the future)</p>																

Alum Bay 2

Wreck/Site Name		SI Number													
Alum Bay 2															
NRHE / UKHO No.	EH Region	Restricted Area						Principal Land Use							
UKHO 64660	South East							Coastland 1							
Latitude (WGS84)		50°39.983N													
Longitude		01°34.416W													
Class Listing				Period				Status							
Sailing Vessel (Hoy)				Post-Medieval (Hanover)				Non-Designated Wreck Site							
Licensee				Nominated Archaeologist				Principal Ownership Category							
N/A				N/A				E: Unknown							
Seabed Owner						Navigational Administrative Responsibility									
The Crown Estate						Nil									
Environmental Designations															
SAC (South Wight Maritime); rMCZ (The Needles)															
Seabed Sediment						Energy									
General: Sandy Gravel. Local: Sandy Silt						Low									
Survival															
Medium															
Overall Condition				Condition Trend				Principal Vulnerability							
B: Generally satisfactory but with minor localised problems.				C: Stable (slow natural decline)				ANGL, POT, BIO, C_ERO, S_ERO, NAT, ANCH, DIVE,							
Amenity Value: visibility															
B: Limited above bed structural remains and finds scatter with limited visibility and only legible with further interpretative information.															
Amenity Value: physical accessibility						Amenity Value: intellectual accessibility									
A: Full						C: No Interpretation									
Management Action		D: Legal protection should be sought to preserve integrity of site and mitigate threats													
Management Prescription		A	B	C	D	E	F	G	H	I	J	K	L	M	N
															X
Notes															
<p>The site lies in sheltered waters and is easily accessible by divers. The sediment regime at the site indicates that sediment has accumulated since the discovery of the site and this has increased the level of protection afforded against biological decay. The wreck is mostly buried and low lying, however, partially exposed frame elements at the northern end of the site maybe an area that is potentially vulnerable to damage from anchoring vessels. No objects that are likely to be removed by sports divers have been identified on the site, although exposure of timber by curious divers could result in subsequent biological decay.</p> <p>Despite extended investigation the vessel is still unidentified, however, it probably represents the remains of a small coastal trading vessel. The orientation of the vessel upside down means that the outer planking is easily accessible and exhibits a number of interesting features. Well preserved internal structure may lie underneath the external planking in the southern half of the site. The rarity of the vessel type means that some form of legal protection is desirable as mitigation against the identified threats, in the interest of public access to the site, scheduling under the Ancient Monuments and Archaeological Areas act (1979) is seen as the most suitable option.</p> <p>Monitoring of the site is on-going and takes place on an annual/biennial basis.</p> <p>Overall Risk Assessment: LOW</p>															

Alum Bay Pier

Wreck/Site Name		SI Number													
Alum Bay Pier															
NRHE / UKHO No.	EH Region	Restricted Area						Principal Land Use							
	South East							Coastland 1							
Latitude (WGS84)		50°40.115N													
Longitude		1°34.250W													
Class Listing				Period				Status							
Pier				Victorian/Modern				Non-Designated							
Licensee				Nominated Archaeologist				Principal Ownership Category							
N/A				N/A				E: Unknown							
Seabed Owner						Navigational Administrative Responsibility									
The Crown Estate						Nil									
Environmental Designations															
SAC (South Wight Maritime); rMCZ (The Needles)															
Seabed Sediment						Energy									
General: Sandy Gravel. Local: Sandy Silt						Low									
Survival															
Poor															
Overall Condition				Condition Trend				Principal Vulnerability							
B: Generally satisfactory but with minor localised problems.				C: Stable				ANGL, POT, BIO, C_ERO, S_ERO, NAT, ANCH, DIVE,							
Amenity Value: visibility															
B: Limited above bed structural remains and finds scatter with limited visibility and only legible with further interpretative information.															
Amenity Value: physical accessibility						Amenity Value: intellectual accessibility									
A: Full						C: No Interpretation									
Management Action		D: Legal protection should be sought to preserve integrity of site and mitigate threats													
Management Prescription		A	B	C	D	E	F	G	H	I	J	K	L	M	N
												X	X		
Notes															
<p>The site lies in sheltered waters and is easily accessible by divers. The remains comprise the tangled iron remains of the Victorian pier that was damaged by storm in 1927 and dispersed during the Second World War. The remains stand clear of the seabed and limited survey indicates that a variety of different structural elements are present. These are concreted and have a covering of weed. It seems likely that other elements are buried in the sediment underneath the extant remains.</p> <p>Although the remains appear relatively robust at present, survey undertaken thus far has not included a full condition survey or the establishment of a full plan of the site. Achieving this can therefore be seen as a first step to the effective future management of the site and would allow a baseline against which future monitoring can take place. A range of potential threats can be identified but it is not yet clear which of these has the potential to really impact upon the site.</p> <p>Overall Risk Assessment: LOW</p>															

8.2 CRITERIA FOR ASSESSING ARCHAEOLOGICAL SIGNIFICANCE

Period

The historic interest of all types of wreck which characterise a category or period should be considered, and the selection of sites for protection should include wrecks which illustrate important aspects of social, political, economic, cultural, military, maritime, and technological history. In identifying sites to be protected, regard will be had to the currency of any particular wreck type (the length of time over which any particular vessel type was constructed and used or any cargo type transported) and its representativeness (whether the vessel or cargo type was one of few or many types representative of that period).

Rarity

There are some wreck categories which, in certain periods, are so scarce that all surviving examples that still retain some archaeological potential should be preserved. The age of a vessel is often closely linked to its rarity. The older a vessel is, for example, the fewer comparable vessels are likely to survive either in use or as wrecks, and the more likely it is to have historic interest. The loss of one example of a rare type of site is more significant than the loss of one example of a very numerous class of site. In general, however, a selection for protection must be made which portrays the typical and commonplace, as well as the rare. This process should take account of all aspects of the situation and distribution of a particular type of wreck in a regional, national or international context.

Documentation

The significance of a wreck may be enhanced by close historic association with documented important historical events or people, or by the supporting evidence of contemporary records or representations. Historical records are generally only relevant to monuments of recent date, although it is important to recognise that some types of recent vessel may not be served by any historical records. The range of contemporary records that might be expected for a particular type of vessel needs to be considered so that the value of any known records which relate to it can be assessed. The importance of a wreck may also be enhanced by the existence of records of previous archaeological recording or survey work.

Group Value

The value of a single wreck may be greatly enhanced by its co-location with other similar vessels (for example at the site of a battle) or by its association with other contemporary features such as port facilities or defensive sites. Association with vessels of other periods (for example on long-standing navigation hazards) may also enhance the value of a site. In some cases it is preferable to protect the complete group of archaeological remains, rather than to protect isolated features within the group.

Survival/Condition

The degree of survival of a wreck is a particularly important consideration. In general, early wrecks are less likely to survive well than later examples, and in assessing the survival of any site, it is important to consider the likely normal degree of survival of vessels of that date or type. Assessments of survival should consider the degree of intactness of a wreck, the likelihood of the preservation of constructional and technological detail and the current condition of the remains.

Fragility/Vulnerability

Highly important archaeological evidence from some wrecks can be destroyed by the selective or uncontrolled removal of material, by unsympathetic treatment, by works or development or by natural processes. Some vessel types are likely to be more fragile than others and the presence of commercially valuable objects within a wreck may make it particularly vulnerable. Vulnerable sites of this type would particularly benefit from protective designation.

Diversity

The importance of wrecked vessels can reflect the interest in their architectural design, decoration and craftsmanship, or their technological innovation or virtuosity, as well as their representativeness. Consideration should be given both to the diversity of forms in which a particular vessel type may survive and to the diversity of surviving features. Some vessels types may be represented in the surviving record by a wide variety of building types and techniques which may be chronologically, regionally, or culturally conditioned. The sample of protected sites should reflect this wide variety of forms. In addition, some wrecks may be identified as being of importance because they possess a combination of high quality surviving features or, occasionally, because they preserve a single important attribute.

Potential

On occasion, the nature of archaeological remains cannot be specified precisely but it still may be possible to document reasons anticipating their existence and importance and so to demonstrate the justification for identifying a site for protection. For example, each type of site may provide a slightly different range of contexts for the preservation of archaeological and palaeoenvironmental evidence, and the environment of a site may provide strong indications of its likely level of survival. Sites may also be significant in terms of their potential to provide information on site formation and decay processes and the examination of physical, chemical and biological processes on cultural remains or through its potential for public education.

9. Figures

FIGURE LIST

Figure 1. *Location of Alum Bay and the Needles*

Figure 2. *Archaeologist recording datums and structural remains at Alum Bay 1 in 1993.*

Figure 3. *Archaeologist undertaking structural on Alum Bay 1 recording following excavation in 2010.*

Figure 4. *Diver inspecting the outer hull planking on the western edge of Alum Bay 2 in June 2013.*

Figure 5. *Interpretative plan of the seabed remains surveyed, excavated and recorded from Alum Bay 1.*

Figure 6. *Archaeological plan of the seabed remains of Alum Bay 2.*

Figure 7. *A view looking across Alum Bay taken from the chair lift providing visitor access to the beach.*

Figure 8. *The geological context of Alum Bay.*

Figure 9. *The Needles, Needles Point and Alum Bay looking east from the Needles Channel.*

Figure 10. *High chalk cliffs characterise the shoreline along the southern site of Alum Bay.*

Figure 11. *Changes to sediment levels at the site of Alum Bay 1*

Figure 12. *Changes to sediment levels at the site of Alum Bay 2.*

Figure 13. *Monthly sea-surface temperature in Christchurch Bay, 2006-2011.*

Figure 14. *Combined average monthly sea surface temperature in Christchurch Bay, 2006-2011.*

Figure 15. *Anchor damage to Alum Bay 1 observed in 2013.*

Figure 16. *Illustration of the projected extent of a proposed protected area around the Alum Bay 1 and 2 shipwrecks.*

For convenience, the captions above are abridged. All images are copyright of the Maritime Archaeological Trust unless otherwise specified in the full figure caption.

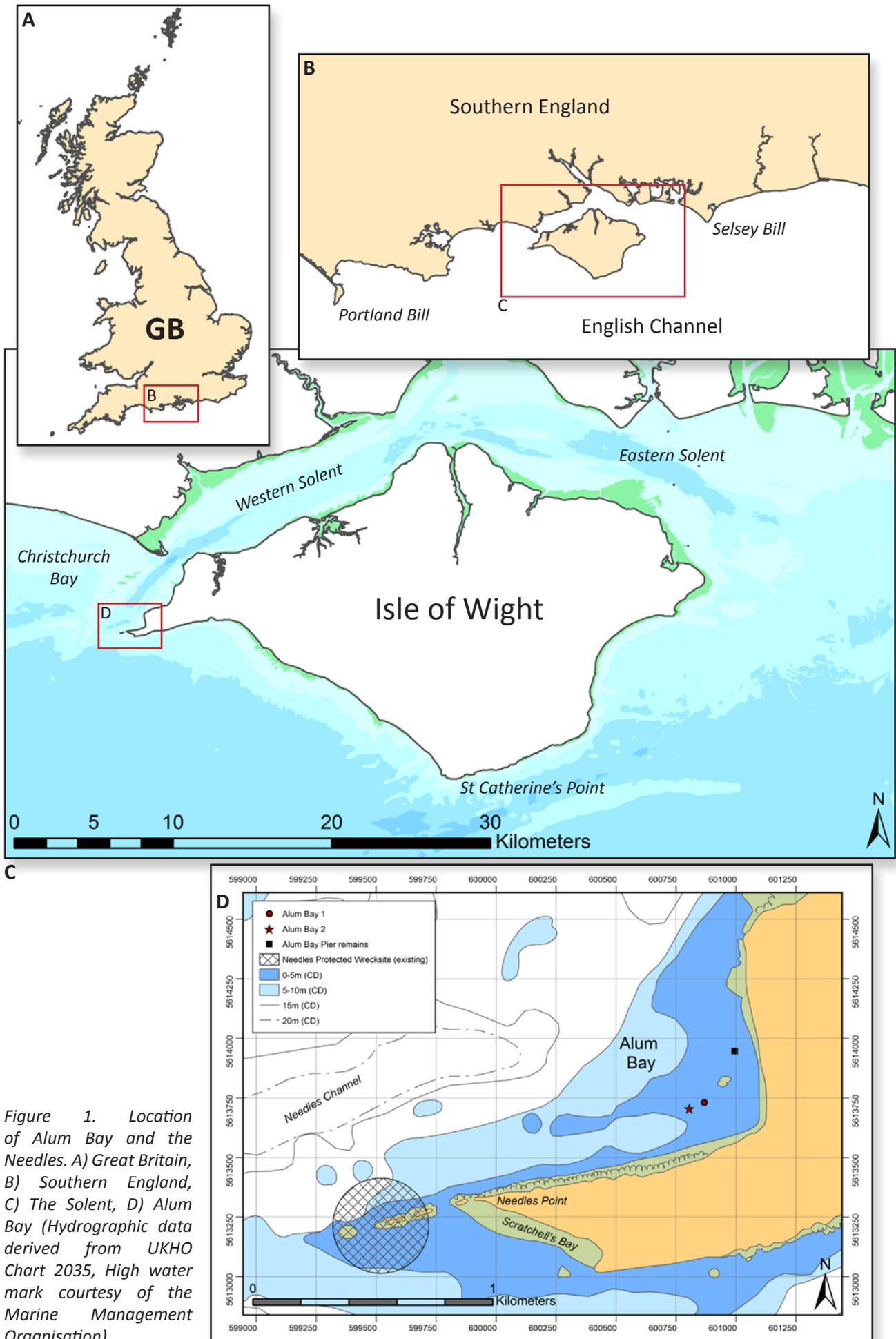


Figure 1. Location of Alum Bay and the Needles. A) Great Britain, B) Southern England, C) The Solent, D) Alum Bay (Hydrographic data derived from UKHO Chart 2035, High water mark courtesy of the Marine Management Organisation).



Figure 2. Archaeologist recording datums and structural remains at Alum Bay 1 in 1993.

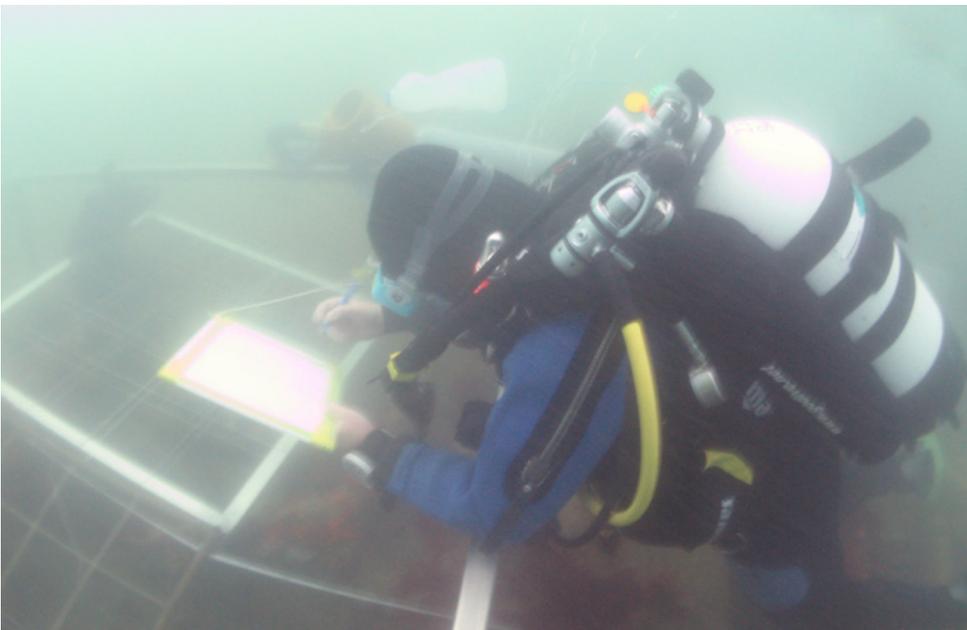
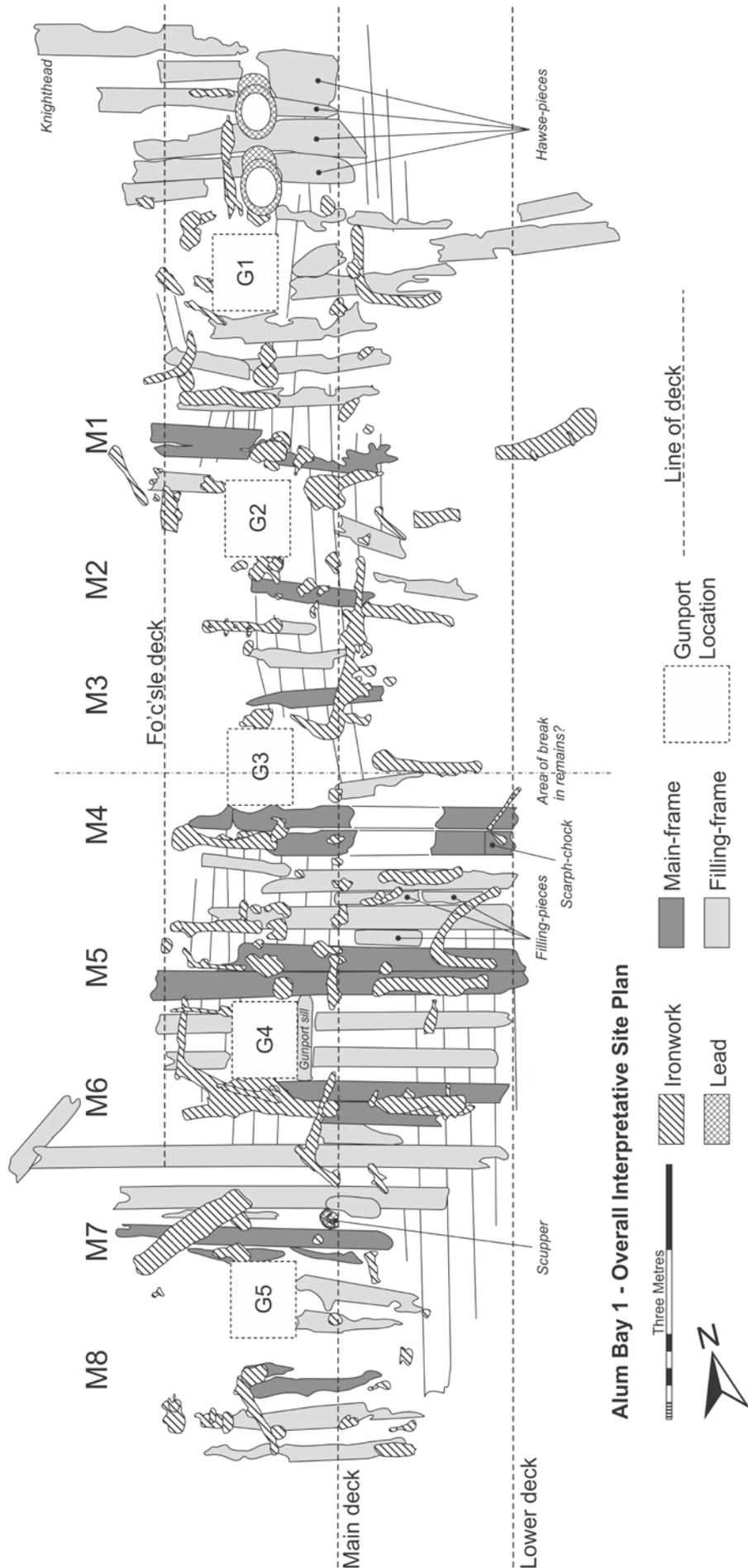


Figure 3. Archaeologist undertaking structural recording on Alum Bay 1 following excavation in 2010.



Figure 4. Archaeologist inspecting the outer hull planking on the western edge of Alum Bay 2 in June 2013 (Image courtesy of Roland Brooks).

Figure 5. Interpretative plan combining all of the seabed remains surveyed, excavated and recorded from Alum Bay 1 between 1991 and 2013. It should be noted that some elements recorded in earlier seasons are no longer present on the site.



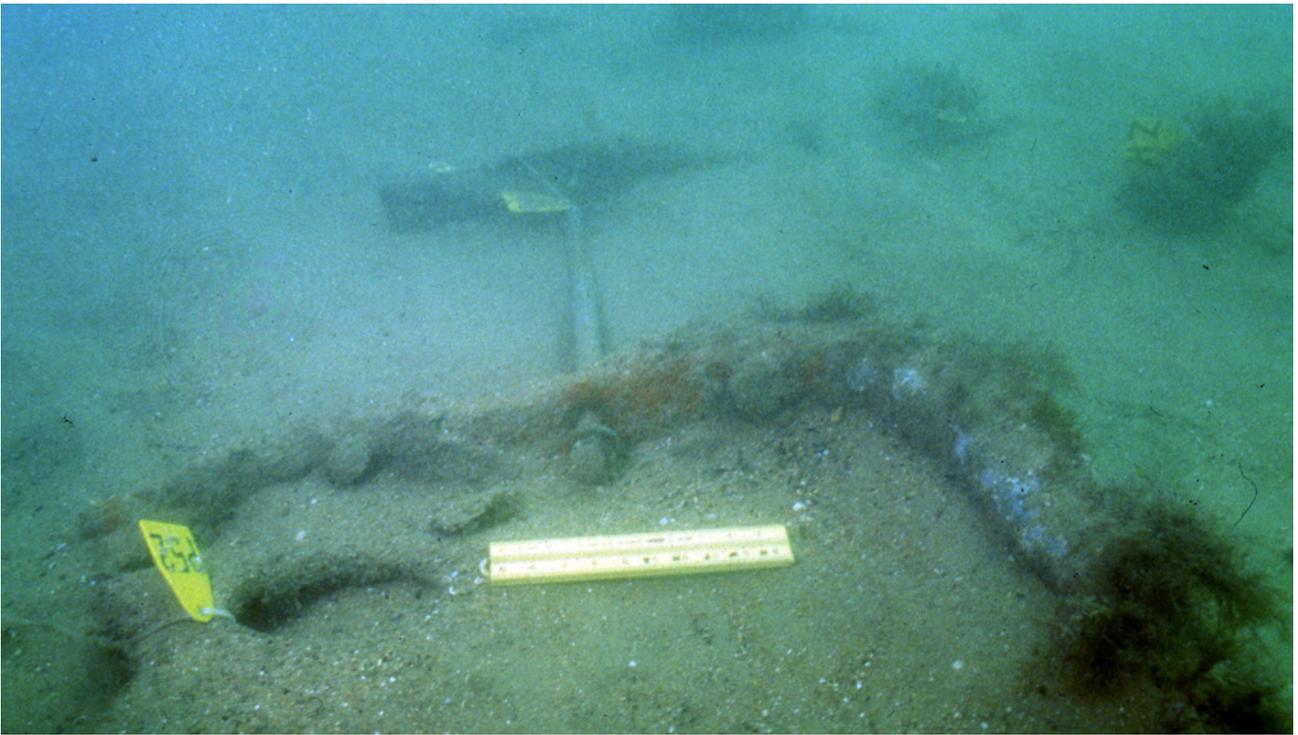


Figure 6. Ironwork element, probably a 'standard', photographed on site in 1993. The upper end of the vertical arm lies towards the left of the picture (scale = 25cm)

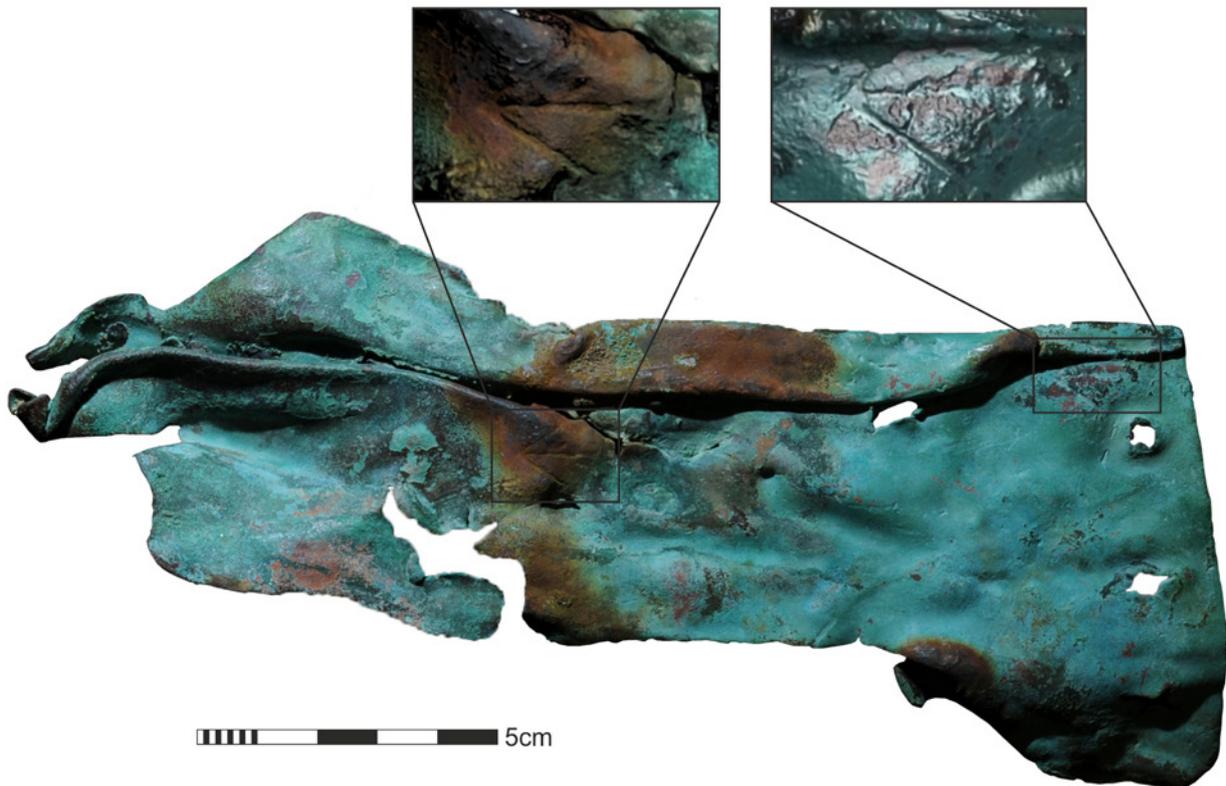


Figure 7. Copper sheathing fragment recovered from the northern end of AB1. Broad arrow stamps are clearly visible in the enlarged sections which have been created using Reflective Transformation Imaging (RTI) techniques (RTI courtesy of Dave Selmo).

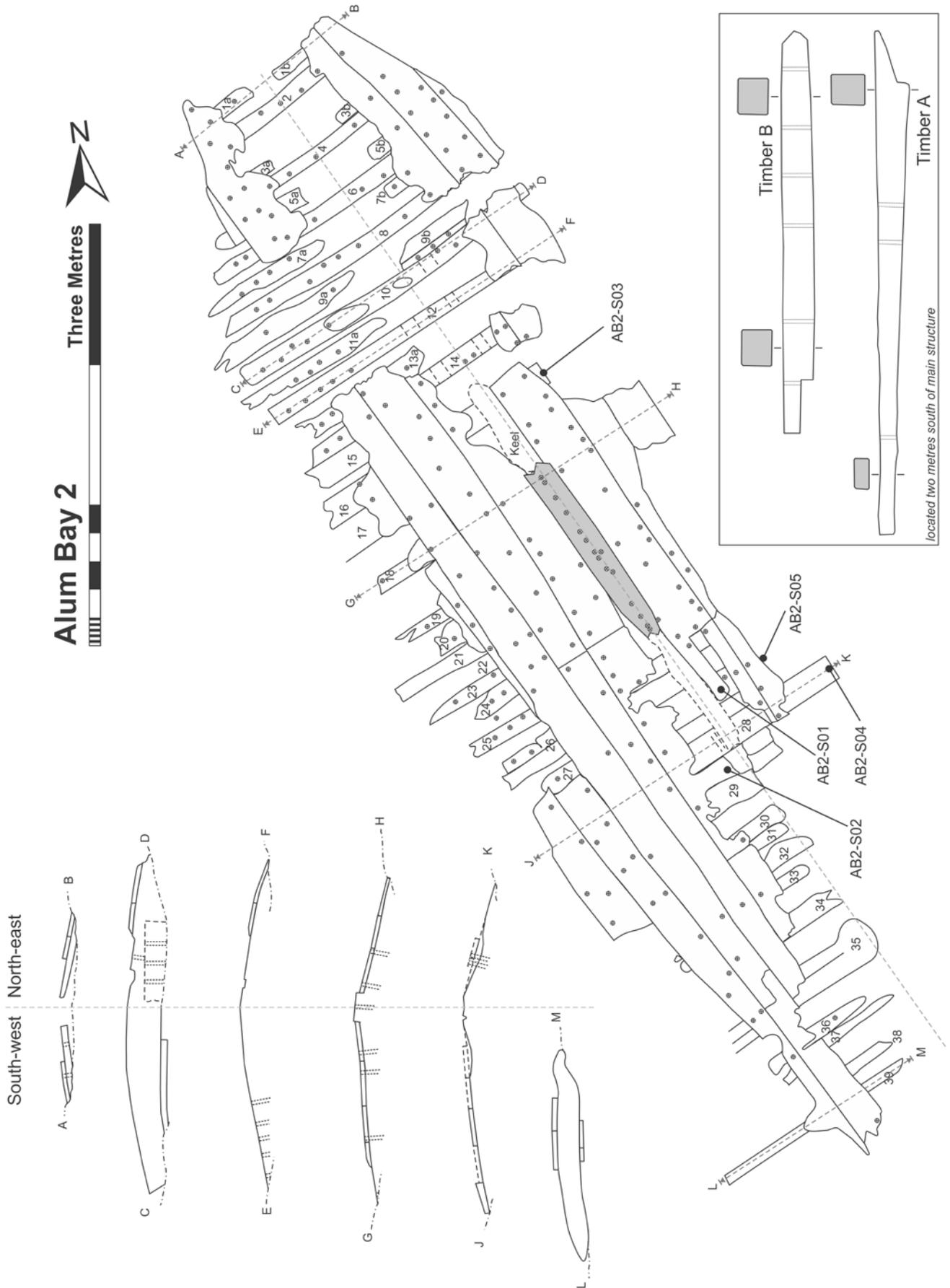


Figure 8. Archaeological plan of the seabed remains of Alum Bay 2, combining the initial site plan from 2001/2, with additional survey work undertaken in 2012. All sections and additional timbers A and B were recorded in 2012.

Figure 9. A view looking across Alum Bay taken from the chair lift providing visitor access to the beach. A large number of vessels, both motor boats and yachts are visible within Alum Bay and include many anchored vessels (Image courtesy of Angus Kirk).



Figure 10. The geological context of Alum Bay (after Velagrakis, 2000: fig. 2).

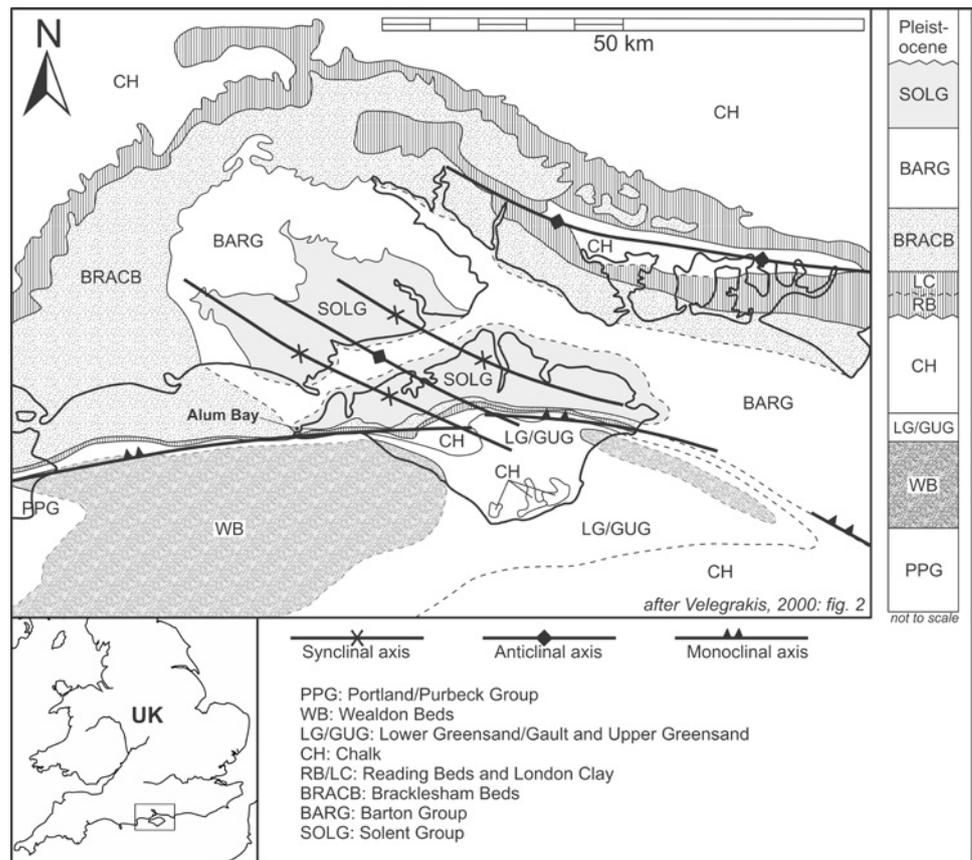




Figure 11. The Needles, Needles Point and Alum Bay looking east from the Needles Channel. The Needles lighthouse marks the end of the Needles themselves and the building high on the cliff indicates the Needles Point. The inner reaches of Alum Bay can be seen where the cliff geology changes from white chalk to coloured sands.



Figure 12. High chalk cliffs characterise the shoreline along the southern side of Alum Bay and are subject to on-going erosion resulting in significant landslips (Photo: Ine Demerre).

Figure 13. Changes to sediment levels at the site of Alum Bay 1 in the area of the hawse holes. Top: 1993. Middle: 2001. Bottom: 2013 (Photo: Rowland Brooks).

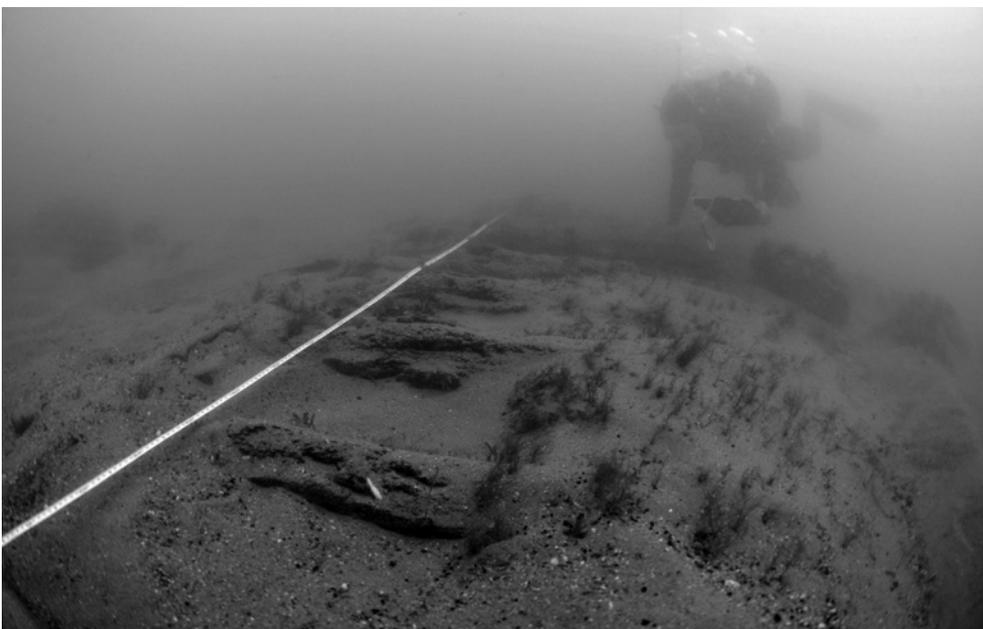
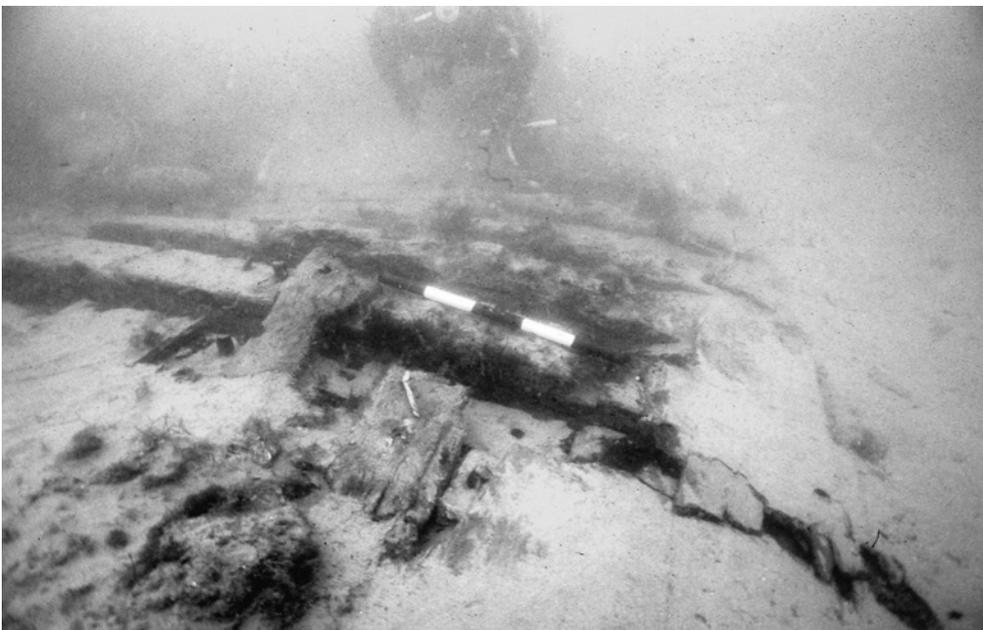
Overall sediment levels seem to be gradually falling in this area of the site, leading to the exposure and subsequent destruction of wooden structural material.





Figure 14. Changes to sediment levels at the site of Alum Bay 2 in the northern area of the site where framing timbers are most exposed. Top: 2003. Middle: 2003. Bottom: 2013. (Photo: Roland Brooks)

Overall sediment levels seem to be gradually increasing in this area of the site, affording the wooden remains protection from marine organisms and erosion.



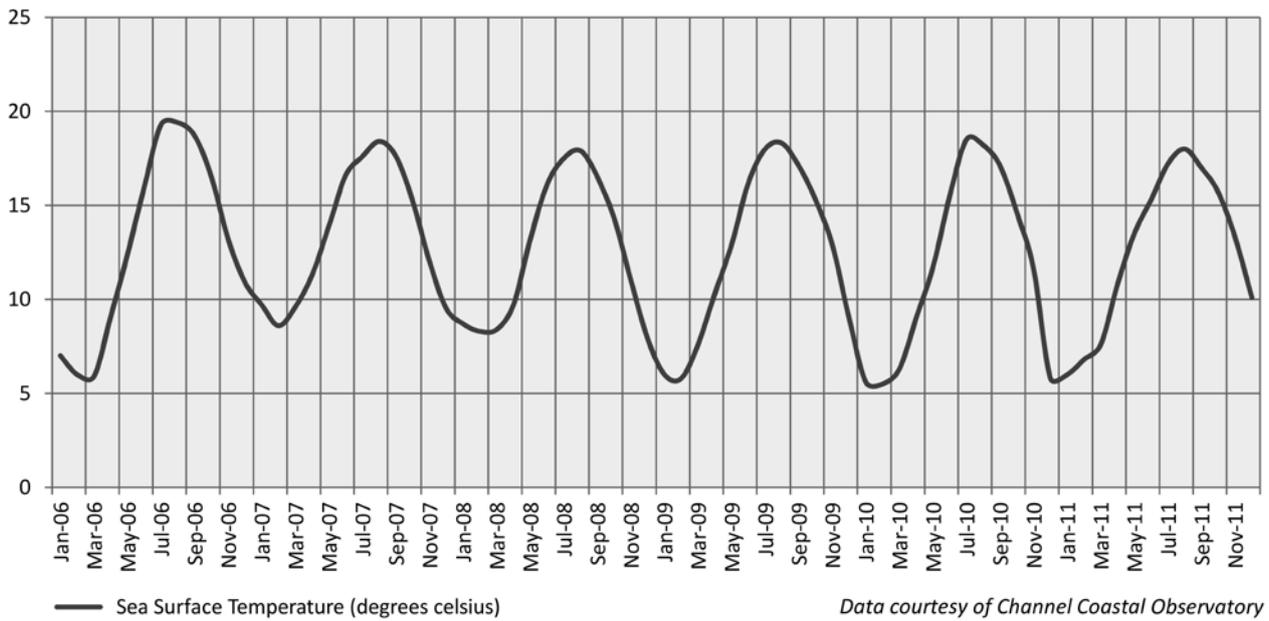


Figure 15. Monthly sea-surface temperature in Christchurch Bay, 2006-2011.

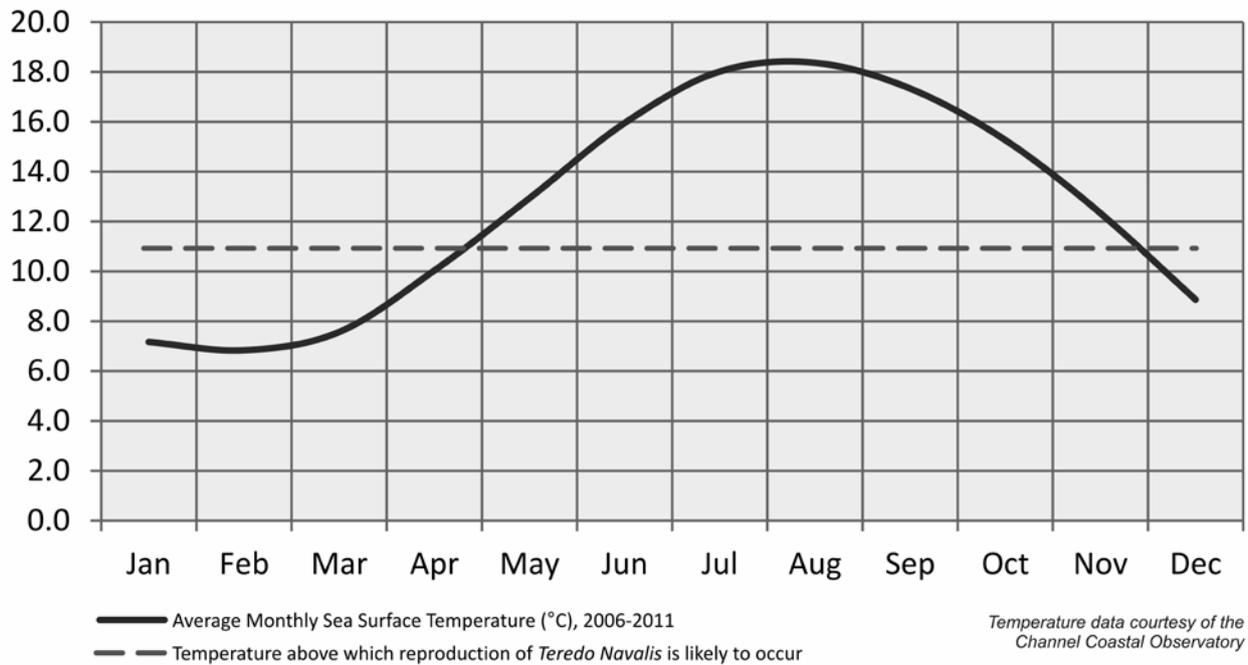


Figure 16. Combined average monthly sea surface temperature in Christchurch Bay, 2006-2011. The dotted line indicates the temperature above which spawning of shipworm is likely.



Figure 17. Anchor damage to Alum Bay 1 observed in 2013. Left: The anchor still in-situ on the site. Right: Damage where a concreted iron structure elements has been smashed by the anchor being dragged through the site (Photos: Roland Brooks).

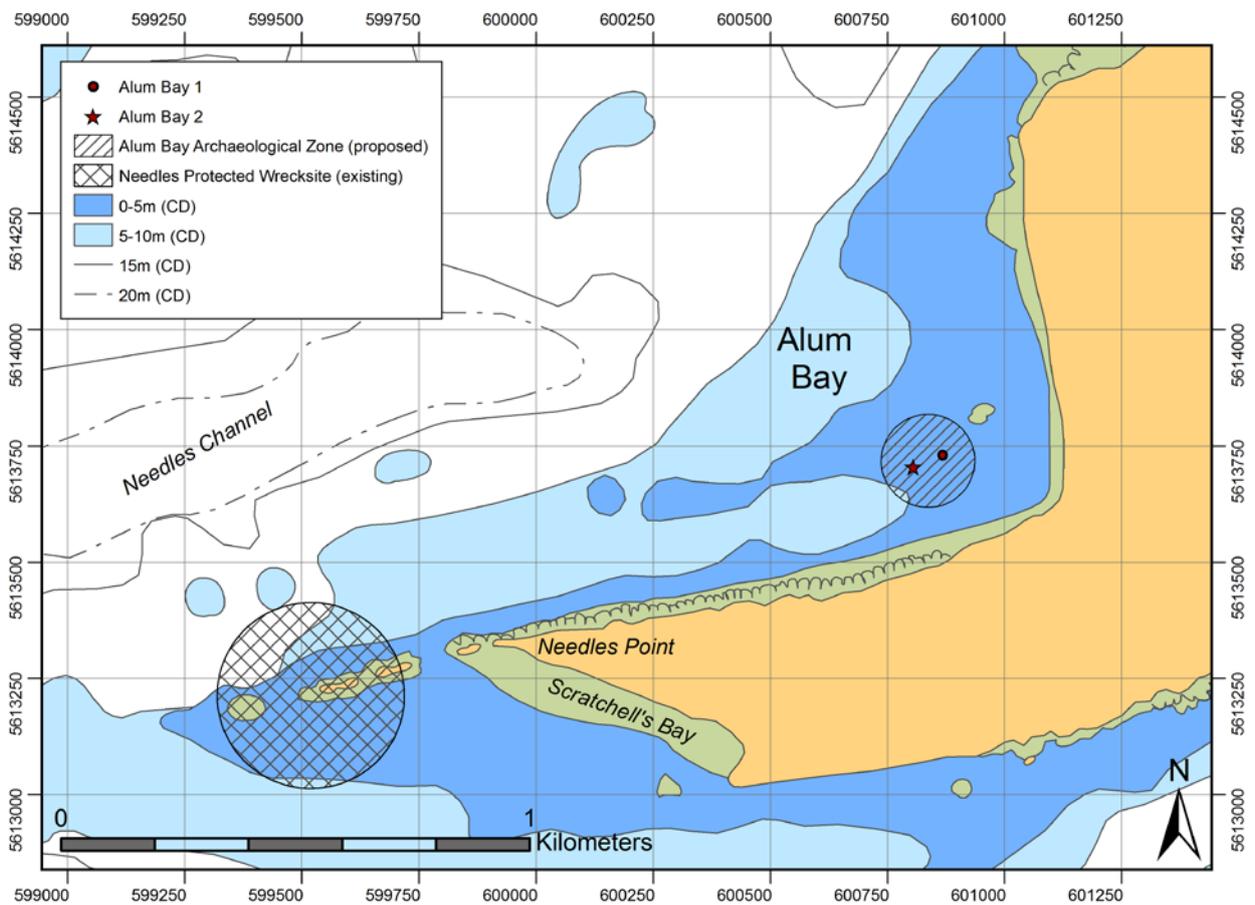


Figure 18. Illustration of the projected extent of a proposed protected area around the Alum Bay 1 and 2 shipwrecks (Hydrographic data derived from UKHO Chart 2035, high water mark courtesy of the Marine Management Organisation).

Maritime Archaeology Trust

The Maritime Archaeology Trust will promote interest, research and knowledge of maritime archaeology and heritage.

The Maritime Archaeology Trust Policy Statement:

- Carry out maritime archaeological surveys, investigations and research in accordance with professional and museum codes of conduct and practice, the Institute for Archaeologists and the UNESCO Convention on the Protection of Underwater Cultural Heritage.
- Promote archaeological awareness and competence.
- Promote public awareness, enjoyment, education and participation in the maritime archaeological heritage.
- Support the publication of the results of maritime archaeological investigations, surveys and research.
- Liaise with other regional, national and international organisations involved in maritime archaeology and related disciplines.
- Provide maritime archaeological services to heritage agencies, local authorities and a wide range of marine operators.
- Support regional, national and international initiatives for improvements to the legislation regarding the preservation and management of the maritime archaeological heritage.
- Ensure that maritime archaeology plays an important role in coastal planning, management and policies.

The Maritime Archaeology Trust

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Charity Registration Number 900025

Images (top to bottom): Inspecting a gun on the stern section of the SS Serrana, disseminating maritime archaeology to the next generation, augering to recover samples of Bronze Age palaeochannels in Langstone harbour, representing the Trust at the INTERREG annual event in Rotterdam.

