



# ROTTNEST ISLAND: MARITIME CULTURAL HERITAGE ANALYSIS AND MANAGEMENT PLAN-2002

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Grant Luckman, on the *Mira Flores* site

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## **Introduction**

This report is the result of fieldwork undertaken during the Western Australian Maritime Museums (WAMM) 2002 maritime archaeology practicum. Fieldwork conducted was on Rottnest Island from 28 October to 8 November 2002.

For the duration of the fieldwork, a series of aims was established. Most notably: the inspection and assessment of the islands historic shipwreck trail, the interpretive materials and associated artefacts located in the terrestrial environment around the island relating to this maritime heritage. The expected result from this endeavour was to produce a management plan for the islands' maritime heritage; including recommendations to the Rottnest Island Authority on the future protection, conservation and interpretation of this cultural resource. Planned as part of this process were: site inspections, conservation reports, excavations and artefact assessments. Included in this assessment were shipwreck materials, housed in the local historical museum on Rottnest Island.

In addition, planned for Salmon Bay was a remote sensing survey and possible site inspection. The purpose; was to locate the remains of an historic shipwreck, which had been previously reported to the Department of Maritime Archaeology, Western Australian Maritime Museum. A final aim was to provide a shipwreck poster display and web site to aid in public interpretation of the islands underwater cultural heritage.

## Section 1. Area covered by this report

### 1.1. Definition of report area

Rottneest Island is located off the south-west coast of Western Australia (see Figure 1). Its approximate latitude of 32°00' south, and longitude 115°30' east, is ca. 18 kilometres west of the town of Fremantle and is ca. 11 kilometres long by 5 kilometres wide. From Perth the island can be reached by boat from Fremantle or by light plane—the island has a sealed airstrip—. The historical shipwrecks and non-historical wrecks dealt with in this report are located in waters within the zone controlled by the Rottneest Island Authority (see Figure 2).



Figure 1. Rottneest Island

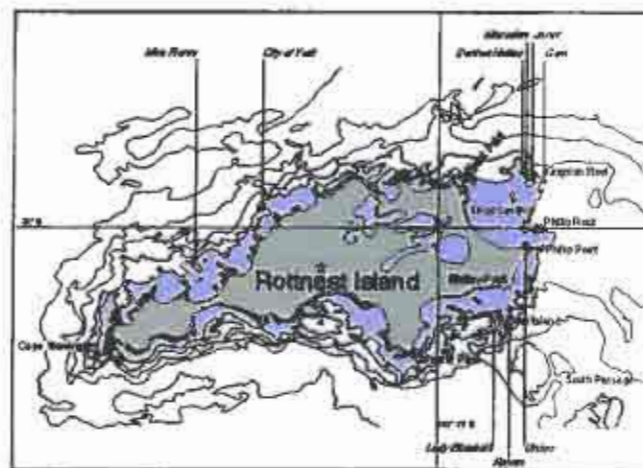


Figure 2. Plan of Rottneest Island

### 1.2. Climate, wind and sea conditions

The climate of Rottneest Island is very similar to Perth. There is a distinct seasonal variation with cool, wet winters followed by hot, dry summers. Mean temperature ranges from 19–31°C in January (summer), to 8–19°C in July (winter).

The islands' coast is subject to extensive wave action during storms. Swell from the Indian Ocean is greatest on the southern coast and western end of the island, but severe storms refract swell into most areas except the bays at the eastern end of the island.

## Section 2. Wreck inspection, survey and excavation

### 2.1. Aims and methodology

Many of the vessels that comprise the Rottneest Island wreck trail have received only cursory inspections. Vessels that have received work that is more detailed need to be re-surveyed to determine their current level of deterioration. For the purposes of this report, each site will be investigated to obtain a current report of their physical states. Divers conducted fieldwork on Self Contained Breathing Apparatus (SCUBA), from the Department of Maritime Archaeologies vessel *Seaspray*; or from the shore of the island where possible. All diving operations were completed in accordance with Museum dive regulations and safety procedures.

Site measurements were taken using either metric tape measures, or tape measures with a combination of metric and imperial gradations. The site surveys were mainly conducted using a baseline-offset survey technique, with some remote artefacts—from the main site—plotted by trilateration. Scaled sketches of wreck features and photogrammetry were utilised on some sites where difficult diving conditions existed. Remote sensing equipment was also utilised as part of the survey process. The magnetometer used was a marine proton precession type; Elsec model 7706 unit manufactured by Littlemore Scientific Engineering of Oxford in the United Kingdom. The side scan sonar unit was manufactured in Gloucester by Marine Sonic Limited and operates through frequencies 150–600 kHz (kHz=thousand Hertz).

Pre-disturbance salinity, temperature and dissolved oxygen measurements were taken using a 90DC, Q1016 model instrument manufactured by TPS Pty. Ltd. The method was to suspend the measuring probes in the water column at various depths to establish readings from surface to sediment. Corrosion potentials were measured using a 'Finest' brand multimeter, and pH measurements with a Cyberscan 100 unit; both of which were contained within a waterproof perspex housing designated as either box 1 or 2 by the Museums Department of Conservation. For measuring corrosion potentials and pH readings the students utilised pneumatic drills connected to SCUBA tanks to bore test holes through the hulls concretion layer. Sediment cores were used to determine seabed composition at the various sites visited or surveyed. To obtain these samples clear perspex tubes were driven into the seabed then withdrawn, capped and sealed with rubber bungs.

Almost all sites were photographed using digital stills, video, conventional film and cassette video cameras. The following sections represent the results of all the investigations undertaken.

### 2.2. *Mira Flores*

#### 2.2.1. Site location and description

The site of the *Mira Flores* is located on Horseshoe Reef, approximately one kilometre north of Rocky Bay, Rottneest Island. Exposed to the prevailing westerly Indian Ocean swells, and to all winds from the south-west around to the north-east, and thus is an extremely difficult site to dive.

The most prominent feature of the site is the bow section, which is located in a 'hole' past the reef top, about 15 metres east of the stern, at a depth of 13.2 metres. This section of the wreck has a far higher integrity than the section of wreckage on the reef top, due to far lower levels of exposure. In addition to this, several sections of mast, winch, a cargo of heavy corrugated iron and a grindstone have been located away from the main structure of the site.

Sarah Kenderdines' site plan (see Figure 3) clearly delineates the sites' area. In light of the conditions experienced on this survey, the plan produced in Kenderdines' book remains the most informative. The *Mira Flores*' stern faces the shoreline, with the majority of the wreckage located on a kelp-covered reef top varying in depth from five to seven metres. Overall, the site measures 100 metres by 25 metres, with hull plating and frames spread throughout the wreckage. The wreckage located on the reef top is low relief and relatively hard to distinguish

from the large amounts of marine growth. The bow has collapsed back though itself; but much of the plating is still evident. A square-shaped hollow structure about three metres long protrudes from supporting frames; this runs at an angle upwards to the tip of the bow and could be a bowsprit housing. Kenderdine (1995) also describes the remains of the donkey engine winch being observable on the site, though not identified or located during this inspection. A feature that might be a donkey boiler was seen but it was the opinion of the inspection team that it was not a boiler; however, its actual function is unidentified. Also located along this section of the reef top were numerous circular objects (see Figure 4). The function of these objects is unknown, though Kenderdine has suggested that they are the solidified contents of wooden barrels.

### 2.2.2. Wreck history

In 1886 whilst *en route* to Australia, the *Mira Flores* approached Rottnest Island after the ship's captain, a Mr Witt, decided to anchor the vessel there overnight before continuing on to Fremantle the following day. Early next morning the vessel weighed anchor and soon struck Horseshoe Reef. The captain realised the vessel was sinking and attempted to steer it towards shore hoping to beach it. It ran aground again, unfortunately stranding itself on the reef.

The ship's cargo included alcohol, medicines, books, earthenware, drapery, furniture, machinery, rope, hardware, building materials and ammunition. Some salvage took place, but the majority of the cargo remained on board when the vessel broke up on the reef.

The *Mira Flores* was an iron barque constructed in Liverpool, England in 1867 by Bowdler, Chaffer and Company, built for a German buyer—W. Moach—who purchased the vessel for use in international trade. Registered in Rockstod, Germany the *Mira Flores*' tonnage was 499.5 tons with dimensions of: length 49.2 metres (161.5 feet), beam 8.3 metres (27.1 feet) and draft 5.25 metres (17.1 feet).

E.H. Roberts and the Underwater Explorers Club discovered the site in 1956. In 1973, there were reports to the Fremantle police of looting from the site. During 1975, further reports received by the WAMM alerted them that divers were still illegally removing ammunition from the site. With the aid of the Army—Australian Army Explosive Ordnance Disposal Unit—they removed 80 cases—or about 1500 rounds—of ammunition from the site in 1975. The army subsequently disarmed and rendered harmless the recovered ammunition. The WAMM received all the harmless ammunition they required for research purposes; and the Army disposed of the remaining ordnance in 1976.

Due to consistently difficult conditions, little has occurred in the form of an official survey of the site. Extensive photographic documentation has occurred over the years by Mike McCarthy, Pat Baker, and other staff in the Department of Maritime Archaeology. Efforts to produce an accurate and scaled site plan have been hindered considerably due to the high exposure of the site. This exposure led to difficult conditions whilst trying to map the site during recent fieldwork.

### 2.2.3. Site inspection and survey

Site name: *Mira Flores*

Date of inspection: 30 October 2002

#### Personnel:

Jeremy Green (WAMM Staff)

Corioli Souter (WAMM Staff)

Mark Ingram

Susan Kennedy

Grant Luckman

Approximate location:

*Mira Flores* is located approximately one kilometre off Narrowneck at the western end of Rottneest Island on Horseshoe Reef. It lies between nine and eleven metres of water.

GPS location: Not taken.

Chart/map no.: DMH001      latitude: 32° 00.4100' south      longitude: 115° 28.1500' east

Access to the site:

Departing from Thomsons Bay, the site is accessible sailing north around the top of the island to the western side of the island. When approaching the narrows at a distance of approximately one kilometre the visual transits become evident.

Compass bearing: Not taken.

Sextant angles: Not taken

Visual transits: See Below



Figure 3. Transit photographs for the *Mira Flores* (Kenderdine, 1995)

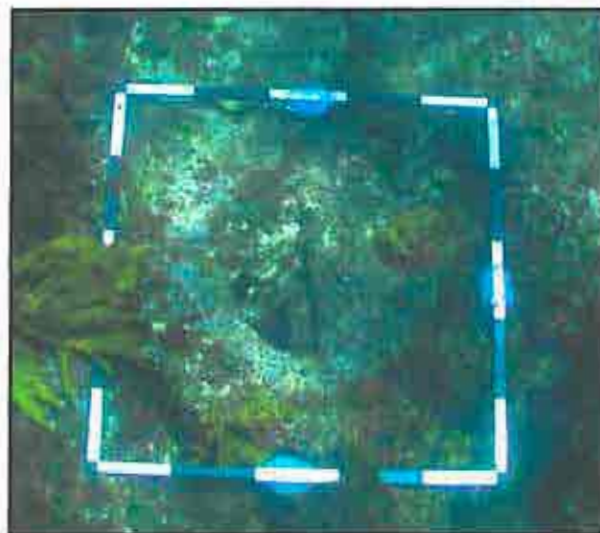


Figure 4. Unidentified circular objects on the *Mira Flores*

Site conditions during inspection

Condition	30/10/02
Sea & Swell	1.0 & 1.5m
Surge	3m
Visibility	10m
Current	1 Knot

Table 1. *Mira Flores* site conditions

During the initial inspection, dive conditions were fine with little swell. During the second dive however there was enough water movement on the site to make conditions difficult for accurate measurements. Visibility was excellent at approximately 10–12 meters. The water temperature was 22°C and the ambient temperature was approximately 26°C. Significant amounts of kelp on the site made some identification difficult, especially during photomosaic work.

#### Site condition and integrity:

As outlined earlier, the stern section has maintained a high level of integrity being sheltered from the high energy forces evident at the reef top. The bow section, however, is less preserved and has flattened out and scattered across the reef. The site is still in a suitable state of preservation to be identifiable.

#### Management considerations:

##### Natural forces:

The *Mira Flores* is especially vulnerable to effects of the weather. Although located at a considerable depth of—max—13.2 metres, the site is very exposed to swell and surge. Shallower areas along the reef top—ca. 5 metres—are indicative of the degree of site exposure in this area. Though the vessels dimensions were only 49.2 metres by 8.3 metres, the site expands over 100 metres length and 40 metres width. This indicates how severe the prevalent wave energy at the site is. During the first day of survey students experienced considerable swell, and on the second day of fieldwork, survey was impossible. The site is very exposed to the open ocean throughout the year with heavier swells present during winter. The *Mira Flores* site is subject to considerable wave action between June and November. Even in the summer months, the site is still significantly exposed.

##### Present and future human forces:

The site is readily accessible to divers with small vessels. With accurate transits the site is easy to locate, particularly the stern section. Whilst the *Mira Flores* does not have the same problems of shallower sites from diver salvage and interference, there have been considerable problems in the past with the salvage of ammunition from the wreck. This is still a consideration in the site management today. In spite of official efforts to remove ordnance, the Western Australian Maritime Museum website warns that; “If you dive on this site do not touch munitions if you see any, they could be extremely dangerous”. However, dive stores on Rottnest Island informed the inspection team that this site compared to others is not frequently visited by dive tours. This low visitation could be a direct consequence of the adverse weather conditions experienced at the site. During this period of fieldwork, conditions were very trying. Inexperienced divers should not dive this site.

##### Significance:

The *Mira Flores* is of considerable historical significance, as it was associated with attempts to reduce monopolies on trade by British shipowners through to the late 19<sup>th</sup> century. At this time, the majority of shipping agents in Fremantle were members of the Western Australian Shipping Association (WASA). The net result was a freight war that, in turn, allowed the sale of cheaper goods in addition to the normal supply of colonial products. However, it was expensive for the WASA members to load British-owned vessels. This prompted the use of the German-owned *Mira Flores*. The loss of *Mira Flores* dealt a devastating blow to the WASA and the local economy. By 1887, Fremantle merchants and London broking firms had agreed to work together. The inquiry into the loss of the vessel also prompted an attempt to regulate overseas shipping to and from the colony. Today the wreck performs an important role in the colonial shipwreck trail for this very reason. However, though it is not dived frequently by tourists, markers and plinths on land direct tourists to its location and significance.

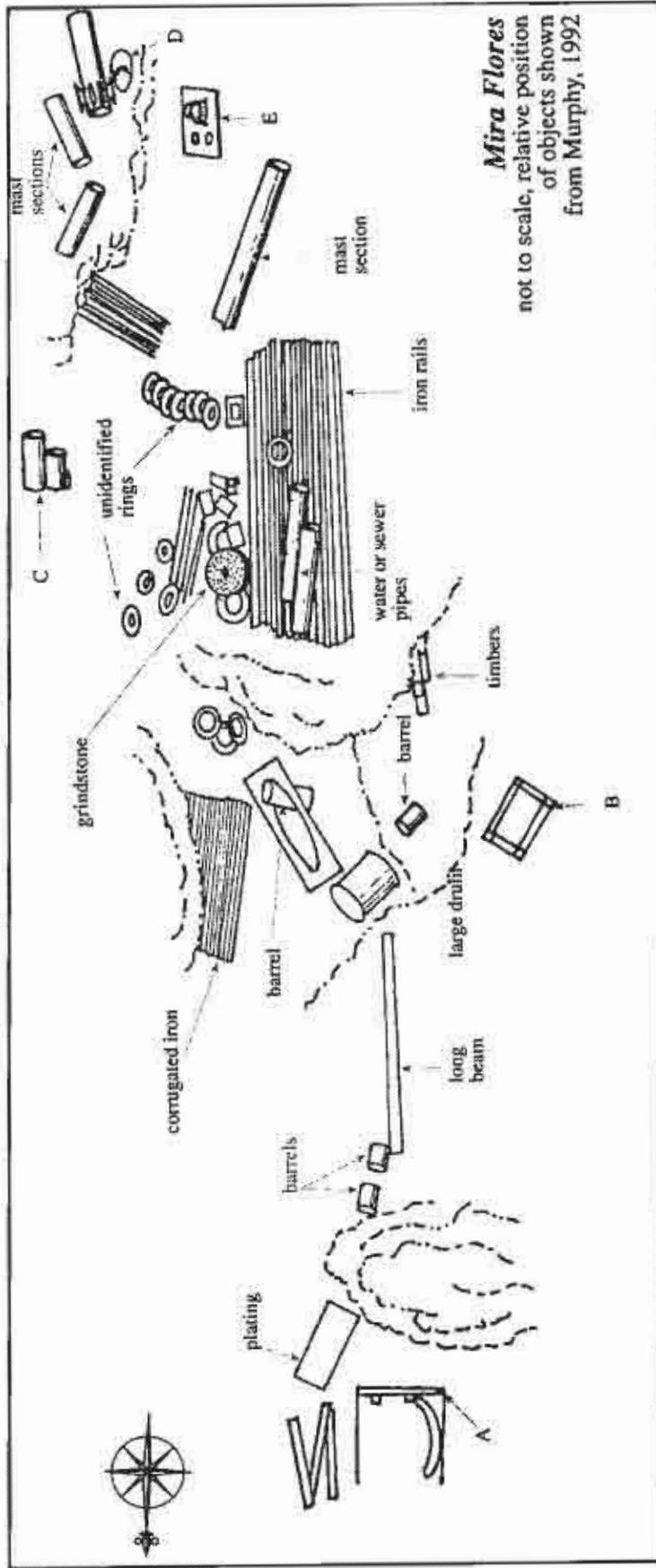


Figure 5. Plan of the *Mira Flores*

## 2.3. Denton Holme

### 2.3.1. Site location and description

The *Denton Holme* is located on Transit Reef, approximately 1.75 kilometres north-east from the main jetty in Thomsons Bay, Rottneest Island. It lies in approximately two to seven metres of water. Composition of the seabed is a combination of rock and sand, interspersed by small areas of reef. The site is well offshore, and is protected from southerly, south-westerly and to a degree protected from westerly weather. However, this site would be difficult to dive if winds tended to a northerly direction.

The wreck covers area approximately 30 metres by 15 metres (450m<sup>2</sup>). The bow is the most prominent feature of the site standing 3.5 metres tall (see Figure 7). The windlass is visible also and lies slightly aft of the bow; further aft the keelson is easily visible. The frame spaces are two feet and the knees in the bow are eight by eight inches. From the bow area, it is apparent that there is a lower, middle and upper deck. The deck beams in the bow section are spaced four feet apart. The rivets in the hull are approximately two inches in diameter and 18 inches—vertically—apart. Glass shards were located around the bow section and other cargo remnants—for example pipes—were scattered across the site.

Two plinths have been placed on the *Denton Holme*, one has text that is unreadable due to marine growth; the other has text and a site plan, but is placed unnoticeably and appears to have been dislodged from its original location.

### 2.3.2. Wreck history

In June 1890 the iron barque *Denton Holme* (998 tons), sailed from Glasgow to Fremantle with a cargo that consisted of iron pipes, cement, alcohol and other general cargoes. On 24 September, the vessel approached Rottneest Island and signalled for a pilot. But by the time the signal was answered, the vessel had run aground on Transit Reef. The vessel became a total loss, and although some cargo was salvaged or washed up on shore, much of it remained on board as the ship broke up. The *Denton Holme* built in Belfast, Northern Ireland in 1863, was owned by J.P. Corry and Company.

### 2.3.3. Site inspection and survey

Site name: *Denton Holme*

Date of inspection: 2 November 2002

Personnel: Julie Ford, Matthew Gainsford & Colleen Greenwell.

GPS: Datum: WGS84      Bow:    latitude 31.98657° south    longitude 115.55678° east  
   Stern:    latitude 31.98588° south    longitude 115.556730° east

#### Access to the site:

From the main jetty in Thompsons Bay, head in a NNE direction safely around the inshore reef then head on a course of NE/ENE for approximately 1km. Approaching the area, look westwards towards Bathurst Lighthouse and then refer to the transit picture below (see Figure 6.).

#### Compass bearings:

Lighthouse Bathurst Point: 265°

Main light: 250°

North end of Phillip Rock: 170° (From 1980 Report of Wreck Inspection, WAMM)

#### Sextant angles:

Light to light: 14°22'

Mid hotel to Bathurst Point light: 32°48'

Army Jetty to north end: 68°05' (From 1980 Report of Wreck Inspection, WAMM)



Visual transits:

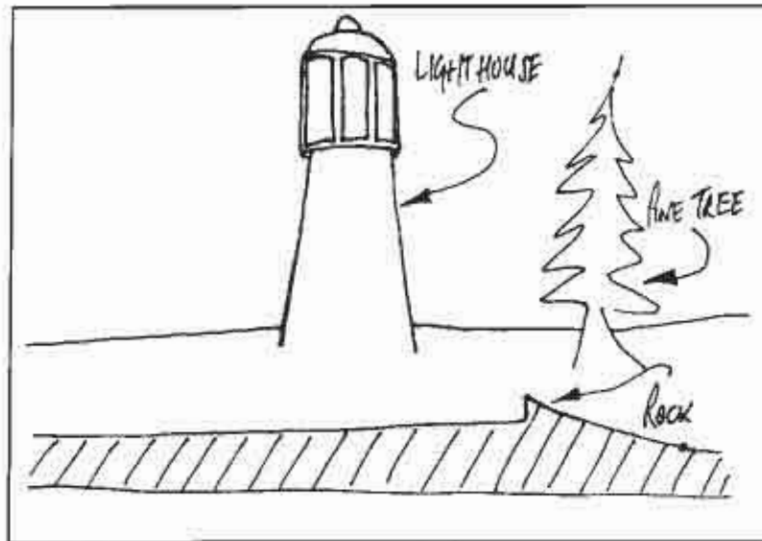


Figure 6. Looking towards Bathurst Lighthouse, to the right there is a pine tree that lines up with the jutting rock below (Geoff Kimpton)

Site conditions on inspection:

Condition	02/11/02
Sea & Swell	1.0 & 1.7m
Surge	5m
Visibility	5m
Current	0.5 Knots

Table 2. Denton Holme site conditions

General weather: Overcast, west-south-west winds at 8 knots.  
Seabed coverage: Limestone reef sitting on sediment.

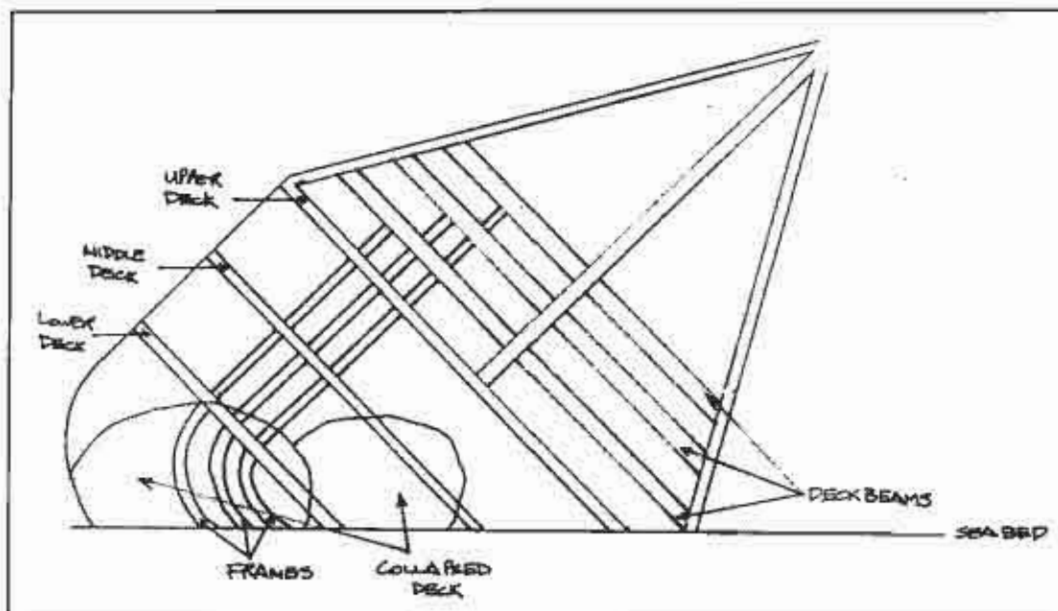


Figure 7. Sketch of the collapsed bow of the Denton Holme (not to scale)

Biological data:

Abundantly covered with *Ecklonia radiata*—kelp—that is approximately 1 to 1.5 metres tall: encrusted with coralline algae and covered with sponges, sea squirts, filamentous algae and sedentary filter feeders. Examples of the fauna that reside on the wreck include baitfish, Buffalo Bream and Wrasse.

Site condition and integrity:

It lies in an east–west direction with the bow tipped towards the starboard side. The stern appears to have collapsed inwards, while the starboard and port sides have fallen outward—this common with iron shipwrecks where the sides separate at the turn of the bilge—from the centre of the vessel.

Management considerations:

Natural forces:

Exposed to both swell and current due to its shallow water depth. The position that the wreck is lying in is a key factor in its deterioration. *Macedon*, which is situated metres from the *Denton Holme*, has suffered less deterioration and collapse. This may be due to *Macedon* lying parallel to the swell/current thus enduring less water pressure against its hull, which has remained well intact. The level of degradation of the *Denton Holme* is a result of the angle it lays on, being more susceptible to maximum pressure from currents and swell.

Present and future human forces:

The *Denton Holme* does not suffer from significant human impact. Although not being a regularly dived site the public are exposed to it via the glass bottomed boat tours. Salvage of the wreck has occurred in the past and any future salvage would require damaging the reef. This site would not be greatly conducive to treasure hunters seeking financial gain.

Projected general site stability:

A significant part of the site is scattered with low relief close to and on top of the reef, with the exception of the bow. The majority of the site is concreted to the reef and is indistinguishable from it. The bow is the most susceptible to deterioration from its relief, influenced by the currents and swell. The other sections of the wreck—for example the strakes—would theoretically corrode at a slower rate than the bow due to their decreased exposure to turbulent moving water.

Assessment of site significance:

*Denton Holme* is significant because of its unrealised contribution to the Perth waterworks and the highlighting of a need for better warnings from Rottnest Island. It prompted improvements in navigation facilities for the approaches to Fremantle (Kenderdine, 1995).

Management proposals and recommendations:

Measurement of corrosion levels of the upper and lower bow and strakes—port and starboard at more than one location—would provide a reliable indication to the rate of deterioration. It would be possible to attach an anode(s) to the bow to restrict corrosion, if indeed. This should be the fastest corroding area of the vessel. Move the plaque—with site plan—to a more suitable area; and clean the second plaque, with the text only. Examine the site and the plaques every few years to determine whether a different management plan needs to be enforced. During this periodical examination of the site, the cleaning of the plaques would help it function properly as an information tool for the public: conducted in conjunction with the annual Maritime Archaeological Association of Western Australia's (MAAWA) plaque cleaning fieldtrip.

## 2.4. *Uribes*

### 2.4.1. Site location and description

The wreck is located in two to three metres of water, within ten metres of the shore at Kingstown, near Phillip Rock. It runs parallel to the beach just below a sandstone rock platform that fronts the shoreline. The wreck lies on a sand bottom and is partially buried. This burial varies from season to season: it was more uncovered than seen previously during this period of fieldwork. The site is reasonably protected unless north-westerly swells are deflected into Thomsons Bay that create strong beach breaks over the shallow site.

### 2.4.2. Wreck history

In 1942, the *Uribes* was transporting military stores from Fremantle to Thomsons Bay, Rottneest Island when engine failure caused it to drift onto a reef close to shore off Kingstown. Among other cargoes, the salvaging included military vehicles transported by the vessel. An account stating that the *Uribes* was still loaded with 150 six-inch artillery shells when it sank seems doubtful, as there has been no trace of the shells to date.

The *Uribes* was originally built as a 118 ton iron barque in 1868 at Stockton-on-tees, Scotland, but was subjected to several structural changes during its life; the last in 1934 when it was converted to a three masted auxiliary schooner with a kerosene-petrol engine. Its dimensions were length 37 metres (104.3 feet), beam 7.3 metres (24.1 feet) and draft 2 metres (6.6 feet).



Figure 8. The *Uribes* (WAMM slide collection)

### 2.4.3. Site inspection and survey

Site Name: *Uribes*

Dates of inspection: 30/10/02, 31/10/02

Personnel:

Julie Ford

Colleen Greenwell

Matthew Gainsford

Geoff Kimpton (WAMM Staff)

Mike McCarthy (WAMM Staff)

Vicki Richards (WAMM Staff)

Approximate location: 400 metres west of the Natural Jetty, Thomsons Bay, Rottneest Island.

GPS: Datum: WGS 84

latitude 32°0'13" south

longitude 115°33'00" east

Chart no.: AUS 112

Compass bearing:

A: Phillip Rock beacon 45°  
B: Bathurst Point light 315°

Visual transits:

Transits are unnecessary due to its location. It lies in front of the third rock formation west of the Natural Jetty hard against the reef.

Site photographs:

Colour: Pat Baker WAMM

Video: Pat Baker WAMM

Site conditions on inspection:

Condition	30/10/02	31/10/02
Sea & Swell	1.0-1.5m	1.5-2.5m
Surge	0.5m	0.5m
Visibility	4-5m	0-2m
Current	Nil	1-2m

Table 3. *Uribes* site conditions

Conditions on the first day—30 October 2002—were ideal with moderate ESE winds in the morning changing to south-south-west in the afternoon, increasing from 9–12 knots to 10–14 knots. On the second day of the survey, a change occurred overnight with a strong wind warning forecast for the area. The winds on the 31 October 2002, in the morning were 10–14 knots, west-south-west changing in the afternoon and evening to north-west 26–36 knots.

On site conditions for the first day were fine. The sites visible remains were more exposed than ever before, which allowed a thorough examination of the wreck. Visibility on the first day allowed a methodical inspection, with little to no seaweed present. A change in the weather led to a dramatic change in site conditions. A large amount of seaweed swept onto the site, reducing visibility from the day before and causing problems in undertaking work on the site. All attempts to continue work were abandoned with the change in weather on the night of the 31 October. A severe weather alert was forecast for the evenings of the 31 October and 1 November with wind gusts up to 45 knots expected. Due to these circumstances, the team postponed work until better weather developed.

Site conditions on the 2 November did not allow further work to continue due to zero visibility caused by suspended sediment and seagrass in the water column.

Chemical measurements:

See on-site conservation pre-disturbance survey report.

Site condition and integrity:

The site covers area 7.2 metres by 32.6 metres. The Bow is still standing at a height of 3.8 metres, whilst the stern has collapsed onto its port side lying approximately less than one metre above the seabed. The starboard side of the site is lying against the reef in approximately two metres of water. Parts of the hull are concreted to the reef making it difficult to discern where the wreck ends and the reef begins.

The bow section of the site remains relatively intact, with approximately eleven metres on the port side and six metres on the starboard side remaining. Most of the hull has collapsed outwards from the wreck amidships, collapsing to the level of the seabed.

Management considerations:

Natural forces:

The site covered by a layer of sand. This sand acts as a protective layer, approximately one to two metres deep across the entire site. Another factor affecting the wreck is the location of the reef. Embedded in the reef is the starboard side of the vessel, with sand building up on this side. This will aid its preservation in the future creating a more oxygen deficient environment.

Present and future human forces:

While the site is known as a dive site, there seems to be very little diver or snorkel activity on it. The accessibility of the site for both diving and snorkelling evidences that it has the potential of being a well-used site. Because of this, it has the potential of humans to affect it, but because of its long history in the area and the minimal affect on the site thus far, it seems unlikely that it will become a major concern for the future. The site still requires regular inspection to investigate the human interaction and site stability.

Projected general site stability:

Reveals signs of regular sand deposition and excavation due to natural forces. While the majority of the site is under approximately one to two metres of sand, the upper structure of the bow and stern still enable the site to be viewed. With this periodic burial and excavation, the consideration of increased deterioration needs addressing. This is especially pertinent to the bow section that in the future will collapse. The on-site conservation data from the site especially of the bow and stern sections will enable a predictive model of the sites stability and corrosion rate.

2.4.4. Conservation pre-disturbance report

<u>Site name:</u>	<i>Uribes</i>
<u>Date of survey:</u>	31 October 2002
<u>Time of survey:</u>	11:00 a.m.
<u>Aim of survey:</u>	To determine the extent of corrosion levels on the <i>Uribes</i> .

Personnel:

Colleen Greenwell  
Matt Gainsford  
Julie Ford  
Mike McCarthy (WAMM Staff)  
Vicki Richards (WAMM Staff)  
Geoff Kimpton (WAMM Staff)

Distance from land/reef:

one metre off reef face

Site classification:

Not undertaken

Site dimensions:

32.6 metres long

7.2 metres wide

Site orientation:

North-east

Seabed topography:

Sand with very little seagrass.

Marine macrofauna and flora: Filamentous heterokontophytes  
Little crustose corraline algae  
Chlorophytes  
Sedentary filter feeders  
Sea squirts  
Very sparse *Posidonia sp.* (seagrass)

Wreck specific types of marine life (photograph):  
Not taken due to bad visibility.

Composition of dominant wreck material:  
Wrought iron.

Exposed artefacts:  
Bottles and brass fittings are scattered across the site. With the site so exposed at present, a great deal of material is evident for the first time. In the middle of the site, lies another vessel, and the remains of this are visible on top of the *Uribes*. These include a wooden rudder and stern-post that are yellow metal—brass—fitted. The rudder lies almost perfectly in the middle of the site and the stern post lies across the port side jutting out approximately two metres.

Degree of site exposure:  
The site covers a large area of seabed. Its profile ranges from zero metres to 3.8 metres above the seabed. The area closest to the reef is buried by sediment but the bow is 3.8 metres proud and the stern is only one metre proud. The amidships section—port side—is also well covered by sediment.

Evidence of seasonal exposure:  
Regularly affected by seasonal exposure: evidenced more this inspection than ever before. The bow had been scoured out exposing a section that was black—iron corrosion products formed in an anoxic environment—compared to the rest of the bow. The top section of the bow that is normally exposed is approximately 3.2 metres and the new 'black' layer is 0.6 metres. Concluding the bottom section of the bow—0.6 metres—was recently exposed. There is also evidence of scouring around the stern section with the same distinguishing black line.

Evidence or potential for storm, cyclone influence:  
Currents and swells affected the site during the course of the inspection. Water movement at the bow and stern due to the sea conditions caused strong currents to sweep around both areas scouring out the seabed near the wreck.

Evidence of human disturbance:  
There is evidence of human disturbance—in the form of salvage—on the reef top at the stern of the *Uribes* in the form of two cemented 44 gallon drums. The drum on the reef top is easily located, standing upright with very little of the metal remaining. Only the contents are visible and this presents a marker to the location of the site. The 44 gallon drum in the water lies on its side and is only partially visible, covered with sand. The corrugation of the drum is distinguishable and it has dimensions of 0.30 metres by 0.50 metres.

Weather Conditions: Wind 15-20 knots westerly

Sea Conditions: 9-14 feet

Swell: 1.7 metres

Current: None

Tidal information: Not ascertained

Freshwater/saltwater influence: None

Water temperature: Surface: 20°C  
Depth: 20°C at two metres below the surface

Salinity/conductivity water (surface, at depth), dissolved Oxygen content water (surface, at depth)

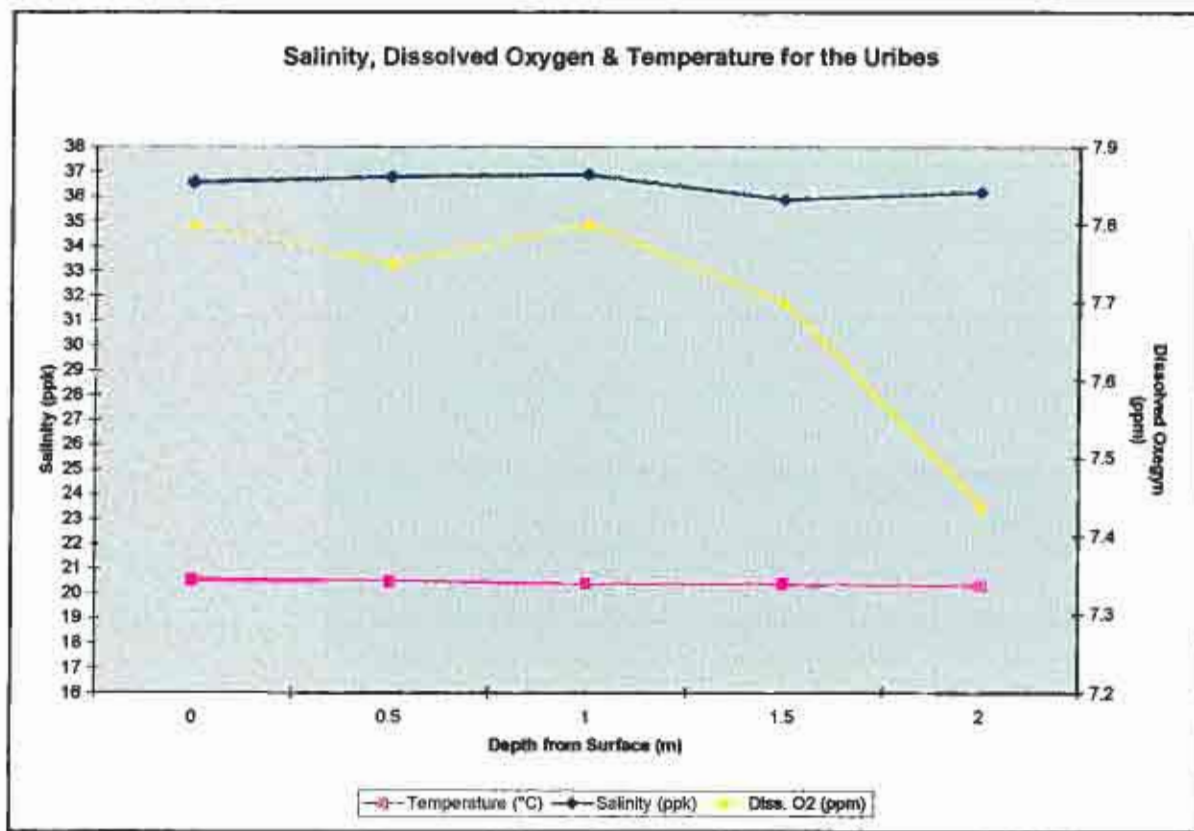


Table 1. Salinity, dissolved Oxygen and temperature for the *Uribes*

Water pH: Surface 8.3  
Depth 8.3

Redox potential water: Surface 0.126 V  
Depth 0.245 V

Water depth: Maximum 3.8 metres, Bow  
Minimum 2 metres, Stern

Visibility:  
0-4 metres visibility: depending on the floating debris in the water column.

General sediment composition:  
Coarse-grained sands highly mobile.

Mobility of sediment surface:  
Sand at the site is highly mobile with no rippling effect evident across the site.

Sediment slope:

The sediment slopes upwards on the starboard side towards the reef face, and around the hull on the port side. The scour effect at the bow has formed a slope on either side of it, with the same effect noted at the stern of the wreck. The slope starts ca. 2–3 metres from either side of the bow—less at the stern—on a sharp angle downwards until contacting the wreck.

Probe depth to wreck material:

Not Conducted.

Depth to stable seabed:

Undetermined on the outside of the structure: internally approximately 20 centimetres.

Sediment gradation:

Very little colour change throughout the sediment samples. Samples were light brown to a yellow colour.

Sediment photography:

Not taken due to adverse sea conditions.

Sediment sample and analysis:

Sediment samples acquired were at various locations across the site. The samples were uniform fine to coarse-grained sands, yellow-orange in colour. The colour was uniform throughout the site with only one representation of an anaerobic environment. This was located in the middle of the wreck, where at 20–25 centimetres below the seabed level, fine to coarse-grained sediment was evident grey-black in colour.

Sediment pH:

Depth: 30 millimetres

pH: 8.3

Sediment redox potential:

Depth: 30 millimetres

Potential: 0.079 V

Timber infestation by marine borers:

Evidence of *teredo navalis*—shipworm—attack was apparent on the ceiling timbers across the site. Some timbers had suffered less attack than others.

Probe depths of timbers:

Timber probes were undertaken on ceiling timbers at the site because a wooden wreck lies across the site.

- 1 ceiling planking, portside midships collapsed hull  
Depth 0.5 centimetres. Heavy teredo attack.
- 2 timber portside under bow.  
Depth 0.5 centimetres. No teredo noticed.
- 3 ceiling planking, portside, inside hull near break midships  
Depth 1.5 centimetres. Mild teredo
- 4 ceiling planking, portside, inside hull near break midships  
Depth 4.0 centimetres. Heavy teredo attack.
- 5 ceiling planking, portside, inside hull near break midships, next to sample 4.  
Depth 0.25 centimetres. No teredo attack noticed
- 6 ceiling planking, starboard side, near reef face  
Depth 4.0 centimetres. Heavy infestation of teredo.

pH profiles of timbers:

Not undertaken



Timber samples:  
Non undertaken

Depth of concretion and graphitisation, surface pH metals

Area	Description	Top				Middle				Bottom			
		pH	Eh	Adj Eh	hole depth (mm)	pH	Eh	Adj Eh	hole depth (mm)	pH	Eh	Adj Eh	hole depth (mm)
1	Stern towards shore	7.26	-0.54	-0.294	26					8.25	-0.53	-0.27	8
2	Stern towards sea	7.19	-0.53	-0.28	20					too rough			
3	Bow towards sea	6.35	-0.52	-0.27	18					6.1	-0.48	-0.23	15
4	Bow towards shore	6.78	-0.4	-0.15	25					6	-0.52	-0.27	5
5	midships towards shore					6.05	0.519	-0.269	14				
6	midships towards sea					7.38	0.512	-0.262	6				
	Water Surface	8.3	-0.12	0.126									
	At depth	8.3	-0.01	0.135									
	Sediment 30mm deep	8.3	-0.17	0.079									
Notes	Area 1, top was taken 100mm from the top												
	Area 1 bottom was taken 80mm from the base												
	Area 2, top was taken from 90mm from the top												
	Area 3, top was taken from 60mm from the top												
	Area 3, bottom was taken from 200mm from the bottom												
	Area 4, top was taken from 100mm from the top												
	Area 5, middle was taken from 60 mm from the top												
	Area 6, middle was taken from 50mm from the top												
	From the top' refers to the top edge of the wreck												
	From the bottom' refers to the bottom edge of the wreck where it meets the sediment												
	Readings were taken from either 3 levels, near the top of the wreck, middle or bottom.												

Table 5. Pre-disturbance conservation data: *Uribes*

Depth of drill holes from surface.

Stern (shore)	Bottom	2.4m
	Top	1.7m
Stern (sea)	Top	1.8m
Bow (shore)	Bottom	3.0
Bow (sea)	Bottom	3.7m
	Top	1.5m
Amidships (shore)	Middle	2.0m
Amidships (seas)	Middle	2.1m

Table 6. Depth of drilled holes

Depth of concretion:  
2–20 millimetres

Depth of graphitisation:  
3–6 millimetres

Sample concretion:  
Not undertaken

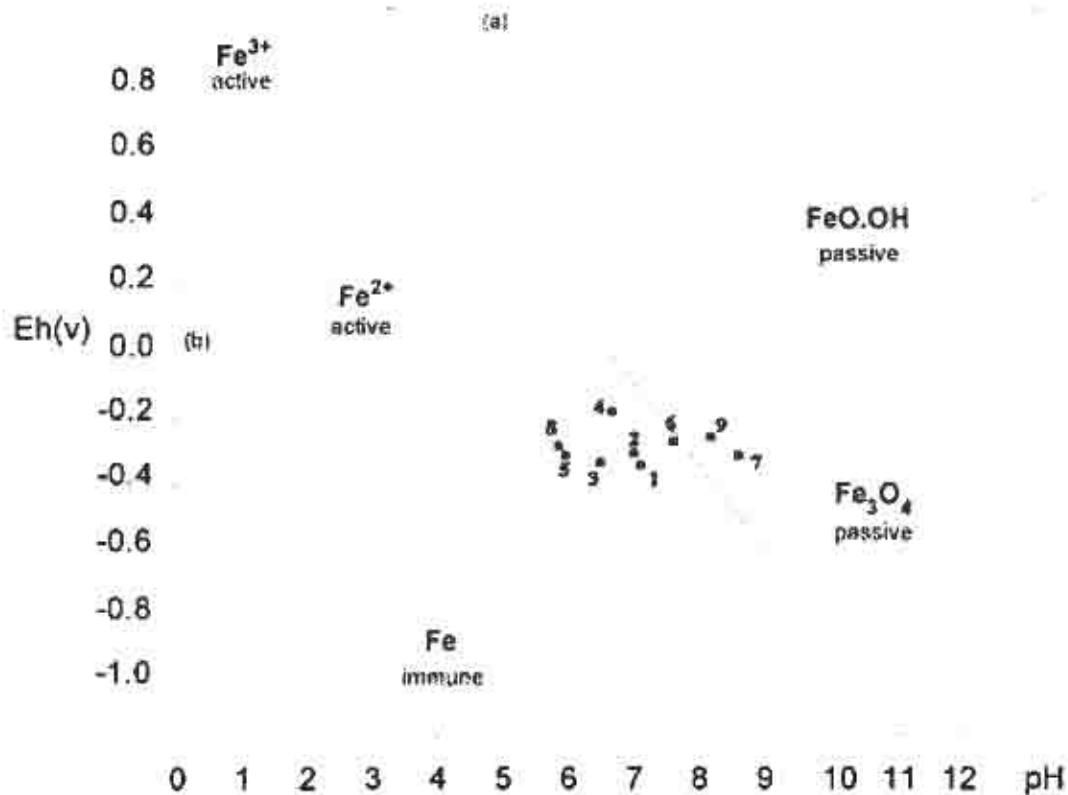


Figure 9. Pourbaix diagram for iron corrosion on the *Uribes*

Sample metals:  
Not undertaken.

#### 2.4.5. Wreck excavation

The best opportunity for an excavation was at the *Uribes* site: due to conditions on the island and the significant proportion of the *Uribes* uncovered during the fieldwork timeframe. The concept was to locate features of the wreck—from previous dives—deemed to be of significance and then to excavate them archaeologically. Since excavation is essentially a destructive process surveying the areas took precedence before the excavation occurred. Furthermore, it was necessary to deliberate on areas for excavation and to come to a consensus on the best features to excavate. There were a number of areas deemed of importance: the engine, the winch, and the sternpost of the wooden vessel and finally, sternwards of the forehead bulkhead to expose the keelson. Areas agreed upon as being significant had a strategy formulated for their excavation. Both an airlift and water dredge would be utilised whilst working in distinct teams. This allowed almost all of the personnel to excavate at the same time but in different areas.

#### 2.4.5.1. Methodology

Team A: Julie, Colleen & Matt

Team B: Susie, Mark & Grant

Team A would take team B for a reconnaissance dive on the site to locate the areas to be excavated. This would allow Team B to orientate around the site therefore lessening the occurrence of team members becoming disorientated.

Team A and B would determine where they would excavate before entering the water, as well as determining which area would have the dredge in operation and what area would have the airlift in operation. After this was established then either team—two groups of two—would descend and begin the excavation around their subsequent areas.

If there material was to be raised—if found, though it appears unlikely—it would be left where discovered until a diver surfaces and asks for the recording equipment and bags. From the nature of the site, it appears unlikely that there will be any material uncovered.

Team members will interchange at regular intervals with the remaining persons, so that the entire team can participate in the excavation. After the initial excavation then it might be possible—if time allowed—to excavate another area, but from the conditions of the preceding days, this is unlikely.

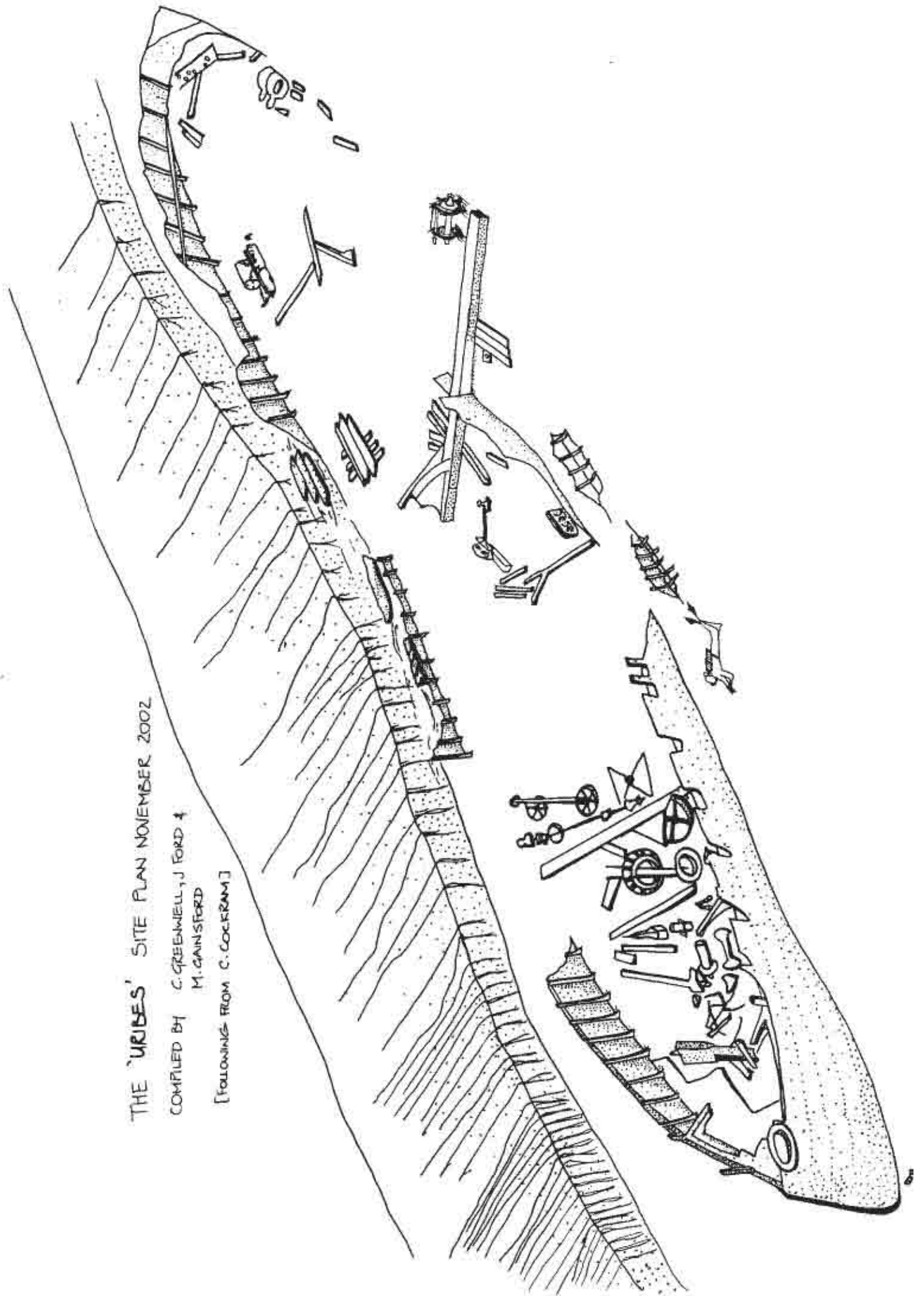
#### 2.4.5.2. Excavation results

The staging point for the excavation was the beach adjacent to the site. All members were to establish their SCUBA and excavation gear at this point. After observing the conditions there seemed to be large amounts of seaweed surrounding the site that was obscuring visibility. Team A—Colleen and Matt—and Team B—Mark and Grant—were the first to explore the site. Team A would be utilising the water dredge on the engine and team B would be excavating behind the forehead bulkhead using the airlift. Due to the amount of seaweed, visibility varied from *ca.* 0.5 metres to zero metres, making excavation—and setting up the equipment—difficult. Team A after liaising with Mike McCarthy decided to abandon the first site and start excavating the winch. This also proved too difficult, as visibility was zero metres most of the time. Team B concentrated on the bulkhead and observed similar problems. The excavation was cancelled due to poor conditions.

THE 'URIBES' SITE PLAN NOVEMBER 2002

COMPILED BY C. GREENWELL, J FORD &  
M. GAINSFORD

[FOLLOWING FROM C. COCKERAM]



## 2.5. *Macedon*

### 2.5.1. Site location and description

The *Macedon* is located on Transit Reef, Thompsons Bay, Rottnest Island, Western Australia.

### 2.5.2. Wreck history

The *Macedon* was an iron steamship of 826 tonnes gross, built in 1870 by W. H. Potter in Liverpool for W. M. Howard, Smith and Partners of Melbourne. The main purpose for its construction was the Sydney–Melbourne service. It was the third vessel owned by this company. New owners chartered the vessel with the option of purchase, which they eventually did. She was carrying 50 passengers and a full cargo including government stores a considerable amount of bullion for the Union Banks branches, mail and 50 horses. The evening of 21 March 1883 was fine though a little hazy with calm seas. Despite these rather favourable conditions, the *Macedon* wrecked on Transit Reef. Apart from the wrecking no loss of life resulted from the event. The *Macedon* was a part of the new companies endeavour to establish a Fremantle based inter-colonial steamship service. The wrecking also removed a vital link between the other ports of Australia and Fremantle. Therefore, the loss of the *Macedon* opened the door for other companies to exploit this niche of inter-colonial trade.

### 2.5.3. Site inspection and survey

Site name: *Macedon*

Date of inspection: 30/10/02

Personnel:

J. Ford  
C. Greenwell  
M. Gainsford  
M. McCarthy  
V. Richards (WAMM Staff)

GPS location: Datum Used: WGS 84

Chart/map no: DMH 412 Bow: latitude 31°59'17" south, longitude 115°33'21" east  
Stern: latitude 31°59'15" south, longitude 115°33'19" east

Access to the site:

When exiting Thompsons Bay, travel past Inner Kingston Reef, continue from this point in a north-east direction towards Transit Reef. On the site there is a blue marker buoy marking the wreck of the *Denton Holme*. The *Macedon* lies to the south and slightly to the east of this wreck.

Visual transits:

Same transits as for the *Denton Holme*.

Site conditions on inspection:

Condition	30/10/02
Sea & Swell	0.5m
Surge	4m
Visibility	15m
Current	None

Table 7. *Macedon* site conditions

Seabed coverage:

Kelp, deposits of coarse sands, some rocks and reef cover the majority of the wreck; apart from this, the site is relatively uncovered. Some concreted sections of the site can be mistaken as reef.

Biological data:

Fauna: Buffalo Bream; Leather Jackets; goatfish and other unidentified species.

Flora: *Ecklonia radiata*, crustose coralline algae and filamentous algae.

Site condition and integrity:

The sides of the wreck still stand vertically up to the upper deck level. This is assumed to be a resultant factor of the direction the hull lies compared to the predominant swell and current. Various sections of the wreck are easily distinguishable; for example the boiler and the steering gear. The site appears in good condition; following from this the sites integrity should also be good, especially as the usual swell runs parallel to the wreck rather than perpendicular to it.

Management considerations:

Natural forces:

The natural forces that affect the wreck are probably less significant to the *Macedon* than to other wreck sites—for example the *Denton Holme* that lays metres from the site but on a different orientation—. Natural forces at the site do not affect it to the point of significant deterioration. The wreck lies in the direction of sea and swell and therefore it has less destructive forces acting on it than other wrecks. If this sea and swell were to come from another direction, it would affect the site more significantly because the wreck lies very proud of the seabed. *Macedon* appears to be in a location that will preserve its integrity for a long time.

Present and future human forces:

Human forces influencing the wreck of the *Macedon* could have the potential to be quite catastrophic. However, measures appointed ensure that some care is taken for the area. Since access to the site is relatively simple, it could therefore be subject to large numbers of divers and the initiative of placing a mooring buoy on the site to stop anchor drag, undertaken by the Rottneest Authority, seems to be a success. The dive shop when questioned divulged that the wrecks were not the key focus for diver pressure on the island. Artefactual remains are assumed to litter the site, but on inspection there appeared only to be scattered bottle shards and some coal. This in our opinion does not seem to be attractive in any way other than if a diver would pick up a shard as a souvenir. This seems unlikely, as none of the artefacts seen were very attractive. There is little or no evidence of interference on the site and it appears in good condition.

Projected general site stability:

The stability of the site in view of the above is good. The natural forces that run through the site do limited damage and do not pose a serious threat. Diver pressure seems to be less than previously thought and the covering of coarse sand will ensure the site remains intact into the future.

## 2.6. *Shark*

### 2.6.1. Site location and description

*Shark* is located approximately 25 metres from the shore adjacent to a sandstone reef platform off Henrietta Rocks in Porpoise Bay, Rottnest Island. The vessel is resting in about 2.5 metres of water on a thin layer of sand that covers the bedrock, surrounded by sand flats and sea-grass beds that extend seaward. The sites exposure is to direct southerly swells and wind waves, but protected from most other sea conditions.

The site consists of both marine and non-marine sections, with the majority of the hull structure submerged at a maximum depth of 2.5 metres. The whole vessel tilts to the port side. From the surface, most of the stern is evident, particularly at low tide. The crane frame and its mechanism protrude above the surface: with these structures being the most pronounced of the site. The vessel, due to the archaeological evidence available, was possibly a bucket dredge. The bow is submerged, although two stanchions are seen protruding a few centimetres above the surface at low tide. The bow structure is still in excellent condition, though parts of the surrounding hull have corroded and collapsed.

Though the hull structure is completely submerged some sections remain intact, despite the considerable corrosion evident. At midships on the starboard side, most of the hull is complete. The stern lies at the surface, and there is notable wave action over it. Like the bow, this has maintained a high level of integrity, with the surrounding hull structure still relatively stable. There is minimal burial of the wreck: with sediment coverage in the midships area only a few centimetres deep, probably resulting from wave action.

### 2.6.2. Wreck history

Little is known about the history of the *Shark*. It was a hopper barge wrecked in 1939 when it broke its moorings at Fremantle and drifted to its present location.

Arthur Bishop—a local boat builder—apparently dived on the vessel after its wrecking in 1939, retrieving a pair of spectacles and returning them to their owner. On this dive, he noted that the vessel was laden with wheat, indicating this was most likely the main cargo. MAAWA undertook an inspection in 1989, recording the site both photographically and pictorially. Col Cockram (1993) has produced a detailed site plan (see Figure 11). There does not appear to have been significant archaeological investigation beyond this, and no file is present in the Department of Maritime Archaeology, WAMM.

### 2.6.3. Site inspection and survey

Site name: *Shark*

Date of inspection: 30 October 2002

Personnel:

Corioli Souter (WAMM Staff)

Mark Ingram

Susan Kennedy

Grant Luckman

Approximate location:

The *Shark* is located at Henrietta Rocks in Porpoise Bay. It is approximately 25 meters offshore, immediately underneath Lookout Point.

Chart/map no.: DMH001      latitude 32°00.4100' south longitude 115°28.1500' east

GPS location: Datum: WGS84    latitude 32.0167° south      longitude 115.54137° east

Access to site:

Due to the *Shark's* close proximity to the reef; conditions are treacherous for boats and therefore the site is only accessible by land. However, due to its location this is not a problem. Cycling south along the main road from the Thompsons Bay settlement, the site is easily reached on foot from the road to Henrietta Rocks (see Figure 10).



Figure 10. The *Shark* viewed from the road

Site conditions on inspection day:

Fine weather prevailed during the two days of fieldwork. The site is located immediately adjacent to reef, so whilst it is sheltered from swell, wave energy is frequently experienced. During fieldwork, conditions were typical, and waves were as mild as could be expected at around one metre. Water temperature was 21°C and visibility was two metres. The weather was overcast but clearing with light easterly offshore winds. The ambient temperature was *ca.* 23°C.

Visual transits:

No visual transits were taken of the site, as it is visible above the water line.



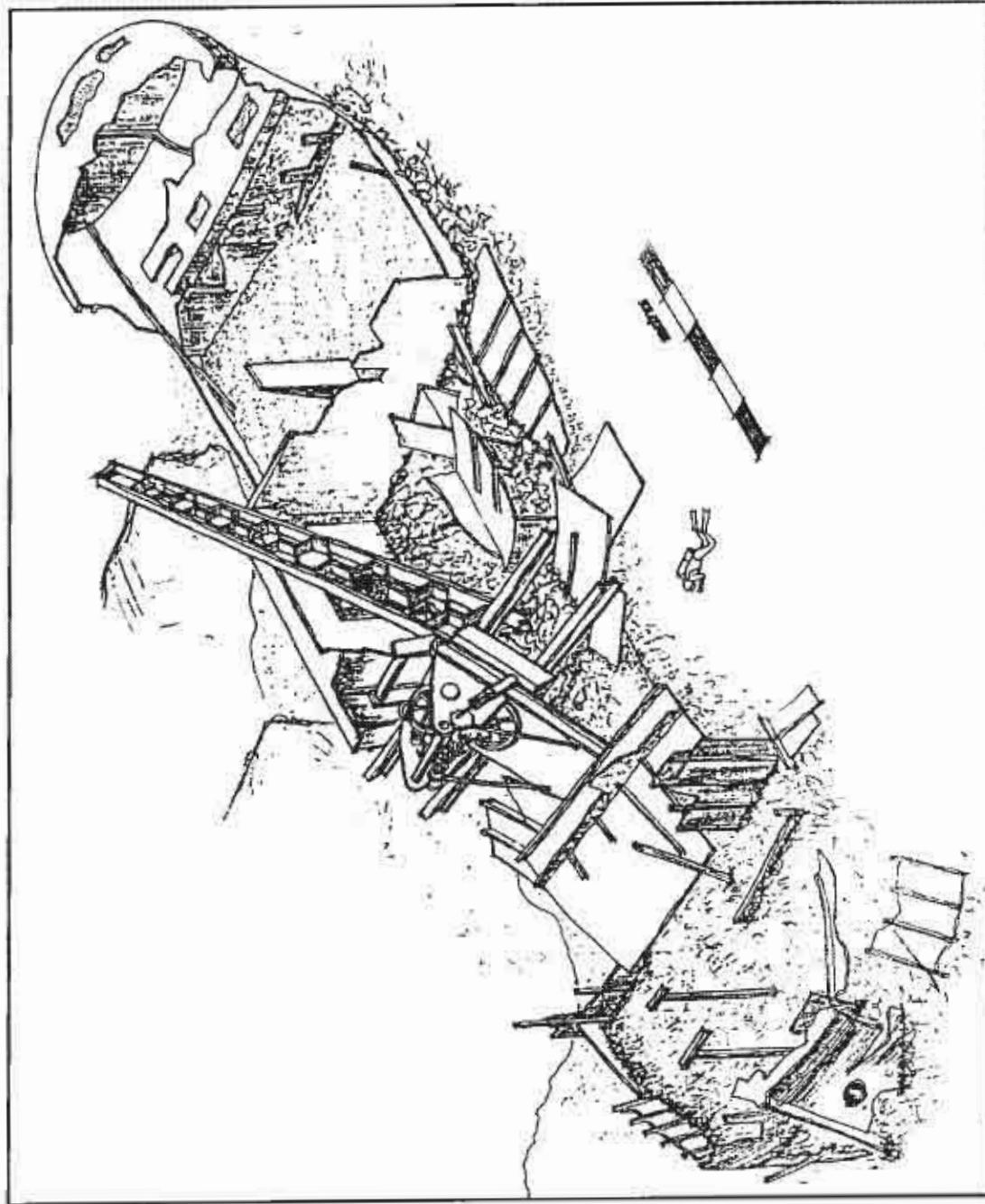


Figure 11. Site plan of the *Shark* (C. Cockram, 1993).

#### Site photographs:

The full collection is available on the Department of Maritime Archaeology image server.

#### Site condition and integrity:

As previously discussed, the site has remained relatively intact, and the structural components have remained easily identifiable. However, although it is a recent wreck it will continue to corrode rapidly. The site is corroding in the same pattern as that outlined by Riley in his model of iron ship disintegration (see Figure 12). The bow and stern will remain relatively intact, whilst the hull will collapse—evidenced on the port side—where not supported by the reef. The midship fittings have remained in a good state of preservation—not submerged—, and they are also vertical—not subject to problems caused by their weight—: in time, it is likely that these will collapse and become submerged.

#### Management considerations:

##### Natural forces:

Reef structure further out to sea helps protect the wreck from onshore swells: though there is still considerable energy at the site. Even in calm conditions the site is affected heavily by swells from the east. As hypothesised, core samples revealed that the site is reasonably sheltered on the starboard side, which runs adjacent to the reef. A dark silt layer was visible within the first ten centimetres of the core taken midships portside, indicating an anoxic—oxygen deficient—environment. Cores taken of the port side did not show this anaerobic layer. This is not surprising because the wreck is exposed to prevailing easterly winds, wave energy and swell.

##### Present and future human forces:

The *Shark* is one of the frequently snorkelled sites on the Rottnest Island wreck trail due to its shallow depth. Early historical accounts describe divers on the site salvaging personal effects. There is little in the way of artefacts left on the site. This could be subject to diver salvage: snorkellers appear to have had a minimal impact on the site. There is no boat activity in the area due to the shallowness of the wreck and the proximity to the reef.

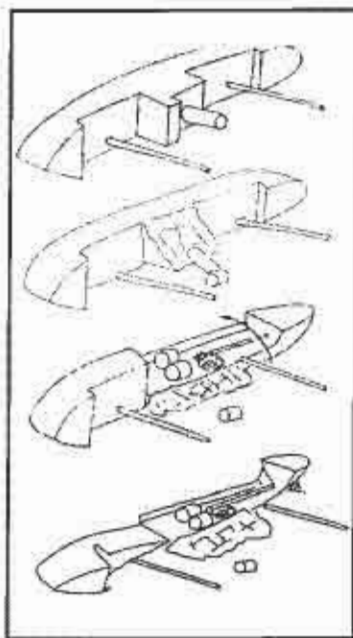


Figure 12. Riley's model of iron shipwreck disintegration

#### Assessment of site significance:

##### Historical and social:

The *Shark* is another vessel demonstrating the dangers of shipping in Western Australia. In this case, it illustrates the problems of inadequate moorings. Research has also been undertaken on

the *Shark* in relation to local farming identities. Ken Cleaver from the Rottneest Guides investigated the site, and Arthur Bishop who was the diver salvaging the wreck.

Technological:

Whilst vessels of this kind were common, there are few examples of hopper barge wrecks, especially in such accessible waters. The crane and associated mechanisms are also quite interesting and for the time being, have remained in an excellent state of preservation. There is little opportunity to investigate a vessel of this kind in such an accessible area, and consequently the parties concerned should preserve it for this reason.

Tourism and economics:

Aside from the *Uribes* in Thomsons Bay, the *Shark* is the only other wreck that can be easily snorkelled. It is also the only site clearly visible from land. Tourists can walk, cycle or take tour buses from the Thompsoms Bay settlement to the lookout. Consequently, the *Shark* plays an important role in tourism as it provides information about shipwrecks to people with minimal intervention.

2.6.4. Conservation pre-disturbance report

Site name: *Shark*

Date of survey: 2 November 2002

Time of survey: 11:35 a.m.

Aim of survey:

To determine the extent of corrosion levels and other site formation processes.

Personnel:

Ian Godfrey (WAMM Staff)  
Mark Ingram  
Susan Kennedy  
Grant Luckman

Distance from land/reef:

Approximately 25 metres from the shore.

Site classification:

Not undertaken

Site dimensions:

27.6 metres long by 7.0 metres wide

Site orientation:

East–West

Seabed topography:

Sand with patches of seagrass.

Marine macrofauna and flora:

Description of the flora:

Sedentary filter feeders

Sea squirts

Seagrass

Mussels

Limpets

Wreck specific types of marine life:

Photo file.

Composition of dominant wreck material:

Iron

Exposed artefacts:

There were no surface artefacts visible, except for the remains of the iron structure.

Degree of site exposure:

The vessel's port side is directly exposed to the prevailing south-easterly weather, whilst the starboard side that rests against the reef platform is relatively protected. It appears that the wreck is sitting on limestone rock with a shallow covering of sand; therefore the majority of the site exposed is above the sand level.

Evidence of seasonal exposure:

The deteriorated condition of the port side of this vessel is evidence that prevailing onshore waves affect it. Heavy scouring of the stern area was occurring at the time of the inspection.

Evidence or Potential for Storm, Cyclone Influence:

This vessel would be exposed to the influences of both seasonal storms and cyclones.

Evidence of Human Disturbance:

There was no evidence of human disturbance visible.

Weather conditions:

Wind 5–10 knots south westerly

Sea conditions:

0.5 metres

Swell:

Negligible

Current:

None

Tidal information:

Mid-tide (slack water)

Freshwater/saltwater influence:

None

Water temperature:

Surface: 18.7° C

Depth: 18.7° C at two metres

Water salinity/conductivity:

37.5 ppt (parts per thousand)

Water dissolved oxygen content:

11.12 ppm (parts per million) average

Water pH:

Surface: 8.24

Depth: 8.25

Redox potential water:

Surface: 0.126 V

Depth: 0.245 V

Water depth:  
2.5 metres

Visibility:  
five metres

General sediment composition:  
Coarse-grained highly mobile sands.

Mobility of sediment surface:  
Highly mobile sand with no rippling effect evident across the site.

Sediment slope:  
The site appears to be almost entirely level.

Probe depth to wreck material:  
Undetermined.

Depth to stable seabed:  
Limestone rock was evident in a scour hole at the stern, approximately 0.3 metres below the sand horizon.

Sediment gradation:  
Very little colour change through the sediment samples.

Sediment sample and analysis:  
Sediment samples were taken across the site. The results were of uniform fine to coarse yellow-orange colour sediments. The colour was uniform throughout the site with no representation of an anaerobic environment except in the centre of the wreck where at 20–25 centimetres below the sand horizon, fine to coarse grained grey-black sediment was evident.

Sediment pH:  
8.20

Sediment redox potential:  
-0.076 V

Depth of concretion and graphitisation, surface pH metals:

Hole #	Location	Position		Concretion depth	Graphite Depth	PH Box 2	Ecore Box 2
1	Stern (shore)	Top	0.9m	3.5mm	3mm	7.20	-0.586
2		Bottom	2.1m	12mm	11mm	7.32	-0.586
3	Stern (sea)	Top	0.77m	3mm	2mm	7.96	-0.555
4		Bottom	2.2m	27mm	22mm	7.62	-0.582
5	Amidships (sea)	Top	0.75m	14mm	9mm	7.09	-0.590
6		Bottom	2.05m	38mm	33mm	5.79	-0.590
7	Amidships (sea)	Top	0.67m	8mm	6mm	8.12	-0.582
8		Bottom	2.34m	5mm	3mm	8.05	-0.581
9	Bow (sea)	Top	1.17m	4mm	3mm	8.22	-0.585
10		Bottom	2.5m	43mm	38mm	7.94	-0.580
11	Amidships (shore)	Top	0.67m	11mm	9mm	8.21	-0.597
12		Bottom	1.9m	4mm	3mm	8.95	-0.602

Table 8. Pre-disturbance conservation data: *Shark*

Depth of concretion:  
3–43 millimetres.

Depth of graphitisation:  
3–38 millimetres.

Sample concretion:  
Not taken.

Sample metals:  
Not taken.

## 2.7 Remote sensing search for Salmon Bay wreck

### 2.7.1. Aims and methodology

To locate the remnants of a wreck reported to be in Salmon Bay, Rottneest Island, a remote sensing search was conducted. This search utilised both side scan sonar and magnetometer remote sensing equipment. After identifying the search area—based on the report that it lay in 26 metres of water—remote sensing commenced on 7 November 2002. However due to poor conditions the side scan sonar proved to be redundant—wave and swell action precluded its use—and therefore the magnetometer was used primarily.

### 2.7.2. Results

Due to the poor conditions, the corresponding side scan sonar readings did not give a clear indication of the anomaly detected by the magnetometer. After sensing an anomaly, the area around it was probed to develop a more defined search area. The anomaly on the east–west run revealed a monopole plot on the magnetometer scan at  $32^{\circ}01.785\text{S}$ ,  $115^{\circ}30.181\text{E}$  (see Figure 13). The anomaly on the north–south run revealed a dipole plot at  $32^{\circ}01.771\text{S}$ ,  $115^{\circ}30.180\text{E}$  (see Figure 14). The final location of the boiler was  $32.029567^{\circ}\text{S}$  and  $115.502900^{\circ}\text{E}$  (see Figure 15). Land transits were photographed so that the site can be relocated easier (see Figure 16).

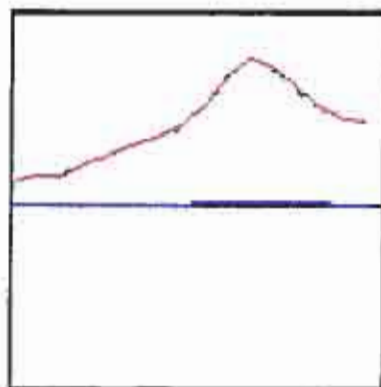


Figure 13. The anomaly recorded by the magnetometer as a monopole, from the west to the east

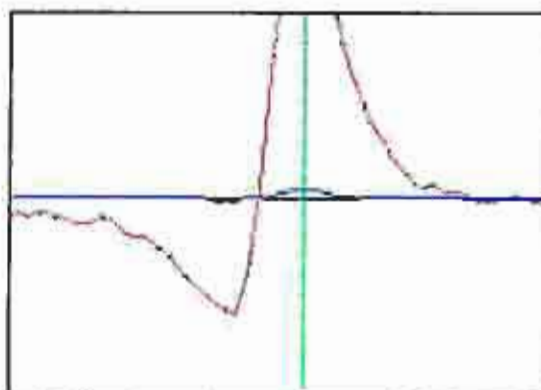


Figure 14. The anomaly recorded by the magnetometer as a dipole, from the north to the south

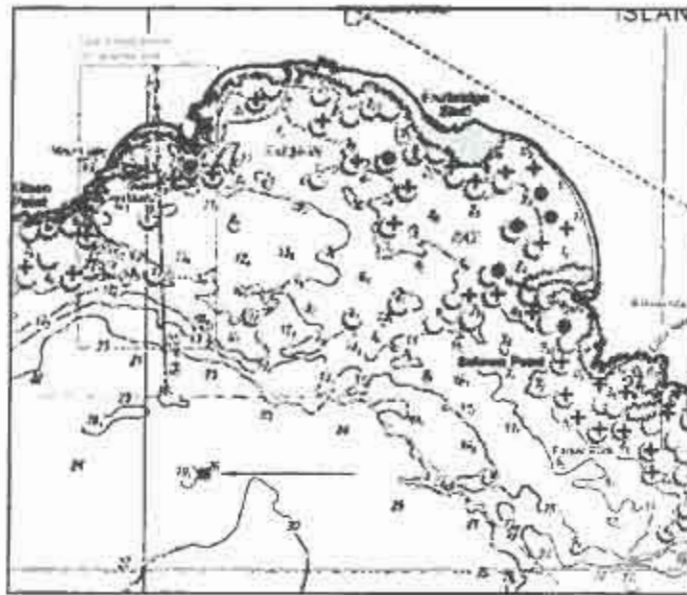


Figure 15. Chart excerpt of Salmon Bay, the square is the approximate location of the wreckage



Figure 16. Transit photos (Pat Baker)

Once an area had been located via the remote sensing equipment, staff and students conducted a series of diver searches to accurately locate and map the remains. Pairs of divers would search the area by conducting circular searches. Dive one: Jeremy Green and Matthew Gainsford. They failed to locate the wreck in their fifteen minutes allotted bottom time. The second dive of the morning, Pat Baker and Mark Ingram searched to the west of the area searched on the first dive and located the boiler lying in *ca.* 24–26 metres. A third dive was organised for the remaining staff and students. Recording the site was the aim of this dive via both still photography and video (see Figures 17, 18 & 19). The wreckage consisted of a boiler, propeller and shaft. There was also another conspicuous large structure, which remains unidentified. The remnants of the wreck lay on a rock and sandy bottom, close by to surrounding reef, encrusted with marine growth, including algae, sponges and tunicates.

### 2.7.3. Future research

A future expedition to the site is required, in order to create site plans and accurately record the remains, take measurements of the boiler and propeller and conduct another circular search of the surrounding area, to ascertain if any other remnants of the wreck are remaining. Archival research may help provide an identification of the origin of the remnants.





Figure 17. Side view of the boiler

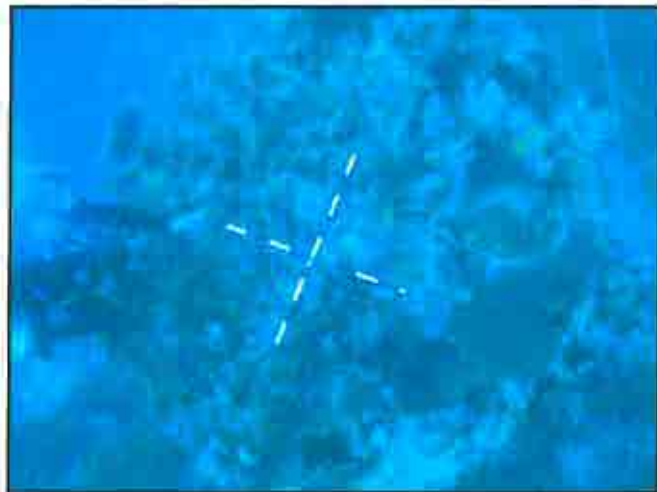


Figure 18. Plan view of the boiler



Figure 19. The propeller

## 2.8. Sites visited but not inspected

### 2.8.1. *Transit*

The *Transit* site does not look like the classical 'shipwreck site', but there is a plinth on Transit Reef that approximates where the *Transit* was wrecked. It is important that the plinth on the site is easily readable: this partially solves the issue of its management. Student Mark Ingram snorkelled the site and confirmed the above—that you could read and understand it—about the plinth. Since there is no wreckage or artefactual remains on the site, the site is best left in its current condition. However there should be effort given to increase the awareness of its location.

### 2.8.2. *City of York*

"The *City of York* is located ca. 200 metres offshore, west of City of York Bay" (Kenderdine, 1995:66). The vessel lies in seven metres of water, bow facing towards the shore. It lies upon a reef in which seas can strongly transgress the site. The wreck is easily distinguishable and lies along the edge of the reef adjacent to the sand. The stern post is the most prominent feature of the site and distinguishes its orientation; therefore the remainder of the wreck is put into context. A significant proportion of wreckage is still proud of the seabed. Of this, frames and stringers are the most easily identifiable.

The plinth was unobserved during the snorkel on the site. From the snorkel, the team was able to develop an overview of its layout; formation processes and therefore how it might further degrade. It is worth noting that there may be a need for the site to have another site inspection, to ascertain exactly how the site is degrading, with a précis detailing the impacts on the site and how they affect it. From the inspection, the site seems to be in a reasonable condition and no suggestions made at this point regard its management.

### 2.8.3. *Gem*

The *Gem* was lost in 1876 *en route* to Fremantle carrying a cargo of wheat. The vessel was a 52 ton cutter built in 1835. The exact circumstances of the wrecking are unknown, but generally attributed to the vessel being holed in bad weather.

Today the site lays approximately 300 metres south-east of Kingston Reef, one kilometre north-east of Phillip Rock, in ca. ten metres of water. The wrecking event had a significant social impact because all crew members perished with controversy over the process of its wrecking and the testimony of the harbour master. Due to time constraints and bad weather conditions, this site was not inspected. However, remote sensing carried out on the site utilised the side scan sonar. Conditions were quite rough, which resulted in considerable noise and did not allow a clear image. Ideally, this site would be included in a survey of the Rottnest shipwreck trail owing to its social significance to the Fremantle area.

### 2.8.4. *Lady Elizabeth*

The *Lady Elizabeth* is located in the "sheltered waters of Porpoise Bay, south of Bickley Point on the shoreward side of Dyer Island" (Kenderdine, 1995:78). The vessel is a composite of iron and wood construction around 160 feet in length. It was decided to investigate this wreck after the excavation had been aborted on the *Uribes*.

The wreck lies in five to seven metres of water with the bow towards the shore. It has a list to starboard with the port side material fallen in on the wreck, whilst the starboard material has spilled out on to the seabed. There is a significant proportion of the vessel lying proud of the seabed and as such presents a good opportunity to study a composite wreck.

Once we had investigated the site, Pat Baker cleaned the plaque, and Geoff Kimpton derived new GPS positions of both the bow and the stern. The plaque is in good condition: there seems to be no need to replace it, as it is both informative and easy to read. The site appears to be in good condition and there is no evidence of tampering by divers. There is little in the way of attractive material for divers to salvage.

### Section 3. Wreck trail interpretation and use

#### 3.1. Assessment of wreck trail plinths

The plinths on Rottneest Island are of two types, those that are underwater and those that are on the land, identifying wreck sites to the public. The basis for this assessment is to decide whether plinths around the island are serving their intrinsic purpose, that is, to inform the greater public of the shipwreck resource around Rottneest Island.

The inspection of plinths concentrated on the sites visited by the Maritime Archaeology Department and students over the two weeks, from 28 October 2002 to the 08 November 2002. Plinths were photographed and ideas were raised concerning their location, condition, content and other relevant issues associated with the trail that is designed to be informative, interesting and well presented.

Plinths investigated were: all plinths associated with the wrecks on the land. The wreck plinths and Parker Point plinths—associated with the nature trail—were investigated by the Department and students whilst diving. Results would form an assessment on how environmental conditions, and public pressure was affecting them. Once completed an analysis conducted of the content and layout of the plinths, would determine whether the content of the plinth(s) is still relevant, and if this content should be altered to enhance the resource for the public.

#### 3.1.1. Land plinths

##### 3.1.1.1. *Antira II*

The plinth for the *Antira II* is constructed of concrete with a brass plaque attached to its face with the vessels' description etched into its surface. However, the land has eroded away from the plinth and now the steps are visible. This erosion combined with its construction, have resulted in it becoming too tall for a significant selection of readers, especially children. Erosion around the plinth has also caused it to become unstable, with it wobbling side to side.



Figure 20. Shows the plaque is too high



Figure 21. Close up of the *Antira II* plinth

### 3.1.1.2 *MIRA FLORES*

Again, this is an example where the base of a plinth is eroding away and the condition of the plinth could be better. There are stairs so that the public can see the plaque but these are undesirable and need improving. Aside from this, the plinth is in a reasonable condition.

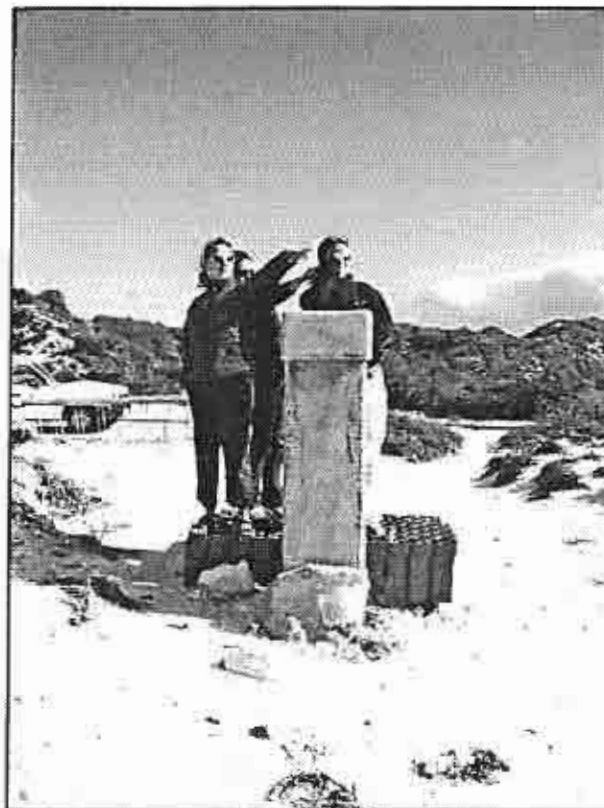


Figure 22. Erosion around the base



Figure 23. Plaque condition

### 3.1.1.3 Kiryo Maru

This plinth is hard to see from the roadside. It is in a position that would make it difficult for the public to interpret in a reasonable fashion and there is a lack of association of the plaque to the site. The position of the plinth does not correspond to where the wreck lies and therefore there should be a better link between these so the public can actually witness the sites exact location.



Figure 24. The Kiryo Maru plaque

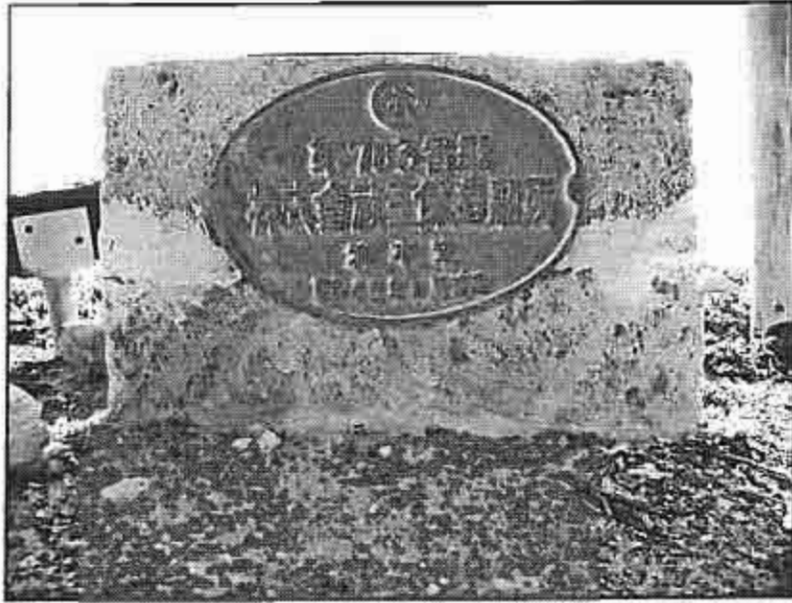


Figure 25. Translation into Japanese

#### 3.1.1.4. *City of York*

This plinth is at an easier height to reach, read and presents itself to the public in a form that is easier to interpret. The plinth and plaque are also in a better condition and are more aesthetic for the public.

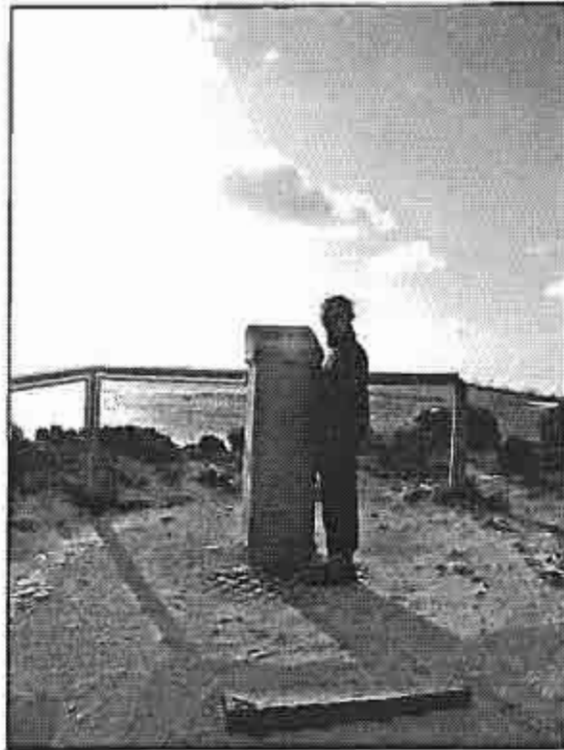


Figure 26. Plinth is a better height



Figure 27. City of York plaque

#### 3.1.1.5. Transit Reef wrecks

The Transit Reef wrecks—*Macedon*, *Denton Holme*, *Janet*, *Gem* and the *Transit*—are described on the same plinth. The plinth's location makes it difficult for anyone to find easily. To locate it you have to walk across an area covered by trees that obscure it and then contend with a fence that obstructs it. This could be rectified by more adequate signage; a path to the plinth; or removal of the plinth to another area that is easier to locate. The plinth itself however, apart from its location, is at a good reading height. The condition of the plaque and plinth is adequate with some flaking and crumbling. There is also graffiti on its surface. The plinth should be moved to a better location that dissuades people from abusing it.

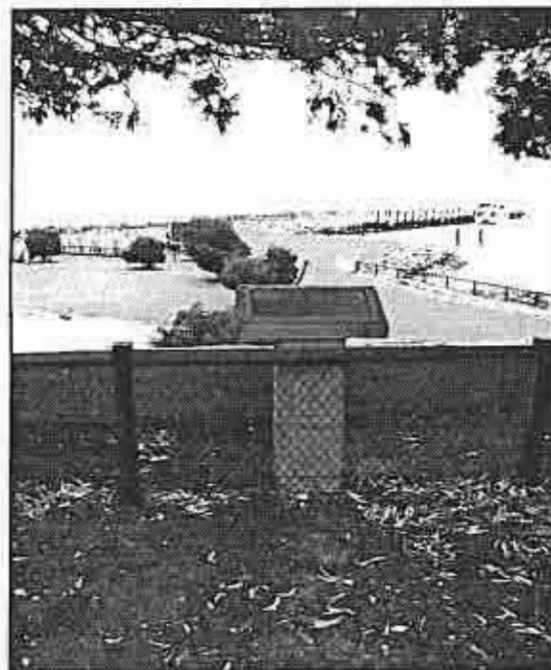


Figure 28. The plinth is in a difficult location



Figure 29. The plinth is also degrading

#### 3.1.1.6. *Lady Elizabeth, Raven and Shark*

There is one plinth for these wrecks that all lie within the same area. The plinth is in a reasonable condition but it is degrading, evidenced from concrete crumbling away from it. The information plaque—like the other plinths—is in a good location, its content read easily and frequently visited by tourists to the island. The height of this plinth is ideal and most of the public should be able to read it easily.



Figure 30. The plinth for the *Lady Elizabeth, Raven and Shark*

#### 3.1.1.7. *Uribes*

The *Uribes* wreck site has a plaque but no plinth associated with it. The plaque is hard to locate and once located it was small with little information about the site. There are a number of enforceable alterations to make this site more user friendly. A larger plaque on the site is needed; or even some description of plinth so that the public are aware of the wreck site. In addition, the plaque or plinth needs to be in an easily seen location.





Figure 31. The plaque is hard to locate



Figure 32. The plaque for the *Uribes*

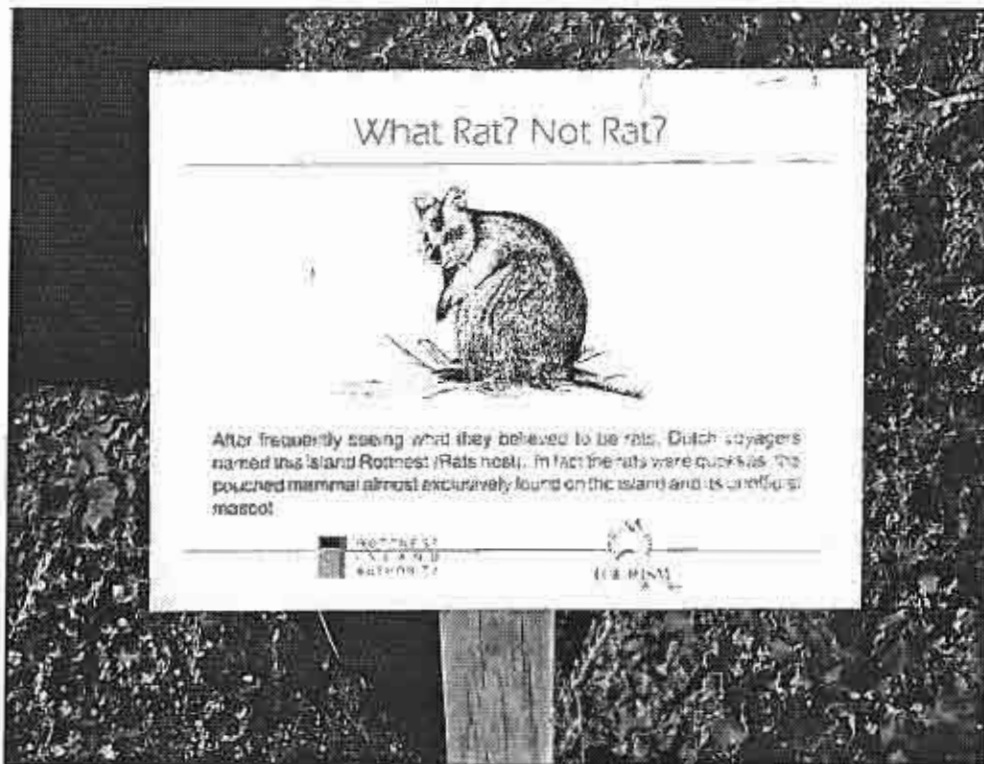


Figure 33. An example of an informative plaque with a good picture and logos of the associated parties

### 3.1.2. Underwater plinths

#### 3.1.2.1. *Mira Flores*

It is in good condition, unobscured and easy to read. Located in the deep hole of the site it is often sand scoured clean.

#### 3.1.2.2. *Denton Holme*

There are two plinths associated with the site. One lays just behind the bow that is a small plinth with a plan of the site. The second is located on the starboard side of the bow away from the majority of wreckage. Both seem to be in a reasonable to good condition but the smaller one amongst the wreckage is easily missed.



Figure 34. The small plinth on the *Denton Holme* site

### 3.1.2.3. *Lady Elizabeth*

The plinth on the *Lady Elizabeth* is located towards the bow, about two thirds of the way up the vessel on the starboard side. The plinth is easily spotted and readable. The fact that it lies on the sand to the side of the wreck is its greatest attribute to its location. There is no need for a change in its location or content.



Figure 35. The *Lady Elizabeth* plinth

### 3.1.3. Recommendations

There is various signage around Rottneest Island which is informative, easy to read and presented well. When presented in a fashion such as this, the public read it, enjoy it and view it as a picturesque presentation of a public resource.

The wreck trail plinths on land vary from location to location. If the public were to be involved with such a resource, the Rottneest Authority should provide information at sites that is both accessible and easy to interpret. The signage and plinths should follow a format that allows the public to visit the island and view the wreck trail in a coherent fashion. Presentation of such plinths is essential for the public; to arouse interest in the wreck trail and ensure that they have pride in its maintenance. Two examples of what the underwater plinths at Rottneest Island look like are shown above.

There is also a nature trail investigated at Parker Point, to assess how plinths are presented to the public. The underwater plinths at Parker Point resemble the smaller plaque at the *Denton Holme* site. There are many underwater plaques for the public to examine, and it is this number of plaques and their conditions that has been assessed. There is at least one plaque per wreck and therefore each has information underwater and on land. The presentation of this information is most important to the Department of Maritime Archaeology, who wants to provide a précis of the available information to the diver and the public.

Some of these plinths submerged for twenty years or so, have some minor issues. For the majority they have lasted well and the WAMM should use a similar design if replacing these plinths becomes an issue. The shape and composition of the plinths is good, but the plaques need to be more resilient, evidenced at the *Denton Holme* site where the plaque is covered with perspex so that the marine biota cannot adhere well to the surface. Previously the plinths had no covering and this allowed marine flora to grow on its surface: MAAWA cleans the plaques yearly and this would help them also, and increase the life of the plaque. There should be mention also that only the plaque should be cleaned not the whole plinth.

The plinths should also be located in a position that is easily recognisable to divers and the public. Currently some plinths do not actually lie outside the wreck but inside the wreckage zone—evidenced at the *Denton Holme* wreck—. The positioning should be outside the wreckage, in a position that divers can readily identify. A good example of this is the *Lady Elizabeth*, where the plinth lies on the starboard side of the wreck amidships on sand and is easily recognisable.

### 3.2. Diver accessibility and use of wreck sites

Most of the sites on Rottneest Island are easily accessible to divers. They lie within a nautical mile of the coast and often in water five to ten metres in depth. This leads to the assumption that: 'the wrecks are often visited and divers are constantly diving on them, especially in summer when the daily population rises significantly on the island'.

After liaising with the dive shop in Thompsons Bay, it was discovered the diver pressure on the wrecks as a percentage of total dives was not significant. The shop assistant expressed 'divers preferred diving in other locations compared to the wreck sites'. However, this does not indicate that there is no diving on the wrecks. If the dive shop conducted at least one dive on each wreck, this would assure some divers were visiting the sites. If the dive shop did not organise trips to the wrecks then there would be people aboard private vessels diving the sites. These would be unsupervised dives, with the type of diver that could cause damage to the wrecks, as they may not have been briefed on the significance of the resource.

To enable all divers to participate in maintaining the shipwreck resource; there should be some system in place to help them accomplish this. The best method would be would be a waterproof book that divers could take with them to the sites. This would include a historical précis, site plan and information pertaining to the *Historic Shipwrecks Act 1976* and *Maritime Archaeology Act 1973*, to allow the reader to understand the penalties of destroying and/or looting the wrecks. If such measures were implemented with co-operation from the dive shop, divers would know about how to dive a wreck. Therefore, the shipwreck resource should be available to the public for many years to come.

## Section 4. Wreck trail management plan

### 4.1. Introduction

Rottneest Island is one of the most popular recreation and holiday destinations for Western Australians, interstate and international visitors with approximately 500 000 people visiting the island each year. Rottneest is located on the south west coast of Western Australia at latitude 32° south and longitude 115°30' east, 18 kilometres west of Fremantle. It is eleven kilometres long by nearly five kilometres wide, and has an approximate east–west orientation. Declared under the *Land Act*, Rottneest Island is an area for the purpose of public recreation.

The *Rottneest Island Authority Act 1987* directs the authority, with control and management of the island in accordance with a management plan. It is currently in draft form with the document displayed for public consultation. The life of these management plans is *circa* five years before a review. Under the *Historic Shipwrecks Act 1976* protection is provided for wrecks over 75 years of age in Commonwealth waters. The *Maritime Archaeology Act 1973* is the relevant act for protection of wrecks in Western Australian state waters. The Western Australian Maritime Museum endeavours under these acts to protect and conserve maritime archaeological sites in Western Australia.

As part of this mandate, the Western Australian Maritime Museum requires that a management plan be created to assist in the control of the Rottneest Island maritime heritage trail and other aspects of significance to maritime archaeology on the island. The Rottneest Island maritime heritage trail was established in 1981 by the Western Australian Maritime Museum with assistance from the Maritime Archaeological Association of Western Australia (MAAWA) and the Rottneest Island Authority. Funding derived from the Commonwealth Historic Shipwrecks fund, and a local shipping company helped make this possible (McCarthy, 1998).

This management plan aims to complement the effort currently conducted by Graduate Diploma students in 2002 and the Department of Maritime Archaeology. A major section of the management plan is the continuing research into aspects of vessels that comprise the wreck trail. If research into these vessels continues it will signify that the information provided to the community is relevant and interesting. It could be the same information gathered previously but presented in different format. More in depth site plans need completing as part of this continuing research. Research needs to be undertaken in conjunction with the Department of Maritime Archaeology's ongoing commitment with the National Accreditation Scheme (NAS); ensuring quality work is conducted. The natural continuation of this research is to guarantee that work commenced is adequately recorded, is made available to the public and where possible submitted for publication. Efforts should be made to provide current avenues to the public so they can access information where possible.

### 4.2. Establishment of the wreck trail

The shore and reefs of Rottneest Island form a natural hazard that has claimed at least twelve vessels since 1842 when the schooner *Transit* was lost: many of these wrecks were extensively salvaged soon after their loss and forgotten. In the mid 1950s' many of these wrecks were rediscovered, and with the aid of relatively innovative equipment such as SCUBA, the wrecks were again salvaged to a greater degree than previously possible.

Many of the artefacts recovered from the Rottneest wrecks remain on the island. Places such as bars, clubrooms, dens or rubbish tips hold a significant amount of this material (McCarthy, 1981). As SCUBA became more popular—and relatively cheaper—the reach of divers to the underwater environment extended and many of the sites experienced high visitation. Evidence suggests that the *Macedon* is the second most visited wreck in Australia. Despite the interest generated in the wrecks, divers still had no encompassing guide to the resource, on or around the island. Information sought after included the location of the wrecks, the best way to get there and general information on the vessels. The Western Australian Maritime Museum was the organisation responsible for fielding many of these requests for information. Dr Mike McCarthy at the time recognised the need for an information outlet concerning the wrecks and devised a plan make this information available. Jeremy Green and Graeme Henderson—then

curator with the Department of Maritime Archaeology—expressed interest, as did the Maritime Archaeology Advisory Committee. This group represents academics, divers and other interested parties providing a nexus between the public and academics.

A trial program completed to present to the public—including divers—better access to the wrecks around the island; in the form of underwater display cases and associated information. Up until this point, there had been a situation of mistrust between many divers and the WAMM, who many thought to be elitist.

So in 1981, the Rottneest Island wreck trail was launched this being the first wreck access project in Australia (McCarthy); developing a bond formed between the Rottneest Island Board and the Rottneest Island Museum. The Aims of the project as stated by McCarthy were:

1. Establishing an underwater display area,
2. The acquainting of the wreck itself with the public,
3. Fostering a greater awareness of the wreck as an educational and recreational resource.

These trails include:

1. Land trails,
2. Snorkel dives,
3. Boat trails and dives.

#### 4.3. Assessment of the shipwreck trail

The facilities provided during the establishing of the wreck trail included, concrete plinths with interpretive information etched onto the glass. These were placed underwater near each of the sites and land based plinths were located within the vicinity of the wrecks. Information pamphlets were provided and the wreck sites were marked on Admiralty, marine and harbour charts. In addition, the wreck trail links to, the shipwreck exhibition based at the Rottneest Island Museum (McCarthy, 1998). Furthermore, there was a semi-submersible tour, which accessed a number of the wreck sites for those individuals unable to either dive or snorkel the sites: this service was discontinued in 2001.

Since 1980, the program has evolved not only with respect to the Rottneest Island wreck trail but also to other trails within the state and Australia. Western Australia, especially the Western Australian Maritime Museum has been a leader in this field. This initiative allows the wrecks to become widely available to a greater cross section of the public, presenting the information in innovative ways. Though not specifically stated as an aim, one of Mike McCarthy's hopes has always been that the public would through this program, accept a stewardship role providing greater protection for the wrecks, than may otherwise have been the case. This is especially true of the diving public and even more acutely so with the commercial dive operators whose livelihoods linked inextricably with the rich sites available to divers around the island.

The last twenty years has seen constant re-assessment of the program; and the Rottneest Island wreck trail is now part of what is now termed the, 'Wreck access and outreach program' within a much broader access facility. Wreck access is reasonably self-explanatory, whilst the outreach program provides access to previously unobtainable—or difficult to obtain—research notes, databases and collections. The program is both dynamic and fluid with the ability to respond to community expectations and the direction that Maritime Archaeology is heading. The program now provides access to the largest demographic since its inception.

McCarthy in his 1998 article includes an impressive list of results to date, including aspects of the Rottneest Island wreck trail. In this article McCarthy and Garret outline possible future directions of the program. There have been two formal assessments of the program to date: both of which provided effective feedback on the program, allowing those managing it to scrutinise its effectiveness and react accordingly. Funding issues have necessitated a minimalist approach for much of the programs life (McCarthy, personal communication 2002).

#### 4.4. Recommendations

As part of the overall program, it would be ideal to see a position created solely to oversee its implementation across the state. This would ensure a consistent approach and greater continuity given that at present, work on the program is sporadic and without co-ordinated effort. This position would ideally be able to lobby for external funding as part of their job description: ensuring that the program not only attracted ongoing recurrent funding, but funding for capital works programs, which need to be identified in a working document such as an operational plan for the wreck trail.

Community access to sites needs expanding; and secondary access via avenues such as the Maritime Museum, websites and brochures increased. Access to the sites is currently ungoverned and not expressly dealt with in the draft plan of management. Ideally there needs to be a description of visitor monitoring enabling managers of this resource to make informed decisions based on empirical information. Ideally, this visitor-monitoring program would augment the subjective opinions of visitors gained through questionnaires. Far too often, it is the managers of a resource—including a cultural resource—who feel they know the best method for presenting a site to the public, only to realise that it does not meet community expectations. Practical measures to be undertaken on wreck sites as part of this management plan should include; the investigation of the need and practicality of permanent moorings on the most visited areas; and those most likely to suffer long term anchor damage from vessels anchoring close to sites.

Regular maintenance, including preventative measures, of the wreck sites should be undertaken. Upgrades or alternatives of these measures should be part of a well-planned cyclical program. Any attempt to reinstate the glass bottom boat tours should be encouraged since this method of interpretation bridges the gap between those willing and able to dive and land based visitors. A good working relationship with the various stakeholders involved in the wreck trails program should continue to be an important aspect. This is particularly true of the Rottnest Island Authority and commercial dive operators: both of who facilitate most visitations to the trail. Management style is an important aspect of this, and personality or interaction plays a significant factor.

Access to new technology needs integrating into the program, allowing the public to interact with new and innovative methods relevant to the development of the wreck trail. Mike McCarthy has already investigated aspects of this in his 1998 article, which touches on the idea of virtual shipwrecks. Visitors could electronically view a dive(s) through each site; this combined with voiceovers would illustrate the display. In addition to interpreting the wrecks, the public needs information of the processes that are detrimental to the wrecks. Displaying stories such as the incident with the boiler from the *Macedon* should prove an effective way to reduce ignorance and perhaps will reduce the need for regulatory operations.

Those times of the year experiencing high visitation on the island—for example school holidays—is when it would be most appropriate to run seasonal programs. Employing a guide for a *ca.* two week period, to run a tour twice daily by bike to all the land based sites may prove an effective way to increase the wreck trails profile. They may also be able to run snorkel tours off the shallow land based wrecks in a way that does not interfere with commercial tour operator's interests.

Corporate sponsorship; should also be investigated. Archival research conducted on the wrecks—all included in the wreck trail—may uncover a specific link to companies or individuals that may feel a special bond to a particular vessel or wrecking event. For instance, a CEO of a large company may have had an ancestor who survived a wrecking event or was part of the rescuing of passengers. This link could develop results through sponsorship of a particular site or of the overall trail.

## Section 5. Artefact conservation

### 5.1. Anchor monuments

#### 5.1.1. Aims and methodology

The survey and assessment of anchor monuments at Rottneest Island performed part of the overall inspection of the islands wreck trail. The anchors are of significant importance to the public in terms of their historical importance and value in the interpretation Rottneest Islands' maritime cultural heritage.

The anchors were: measured, drawn and photographed as part of the assessment process, measured using metric measuring tapes. A profile of the arms of each anchor were procured by laying a two metre aluminium graduated photographic scale from palm to palm at 90° to the shank and then measuring down from the bar to the inner and outer edges of the arms. Photographs taken used a digital colour stills camera.

The criteria used to assess the cultural significance of this site is derived from the: Guidelines in Managing Australian Shipwrecks, based on the Australian International Council on Monuments and Sites (ICOMOS) Burra Charter for the conservation of places of cultural significance. The measurable degree of significance is by two levels of significance. A site can be either: rare—uncommon or exceptional—in possessing rare, endangered or uncommon aspects of history, or important in demonstrating a distinctive way of life which is no longer practised and is in danger of being lost. A site can also be representative—typical or characteristic—in demonstrating the characteristics of a class of cultural item, or important in demonstrating the principal characteristics of the range of human activities.

#### 5.1.2. Historical overview

##### 5.1.2.1. History of the anchor monuments

The *City of York* anchor was raised by the, Blue Water Wanderers and Western Command Skin-diving Club in 1959. The anchor from the *Mira Flores*; was removed from the wreck site in 1963 by the Royal Australian Navy. These anchors were displayed in the early 1970's after consultation between the Western Australian Maritime Museum and the Rottneest Island Authority: the *Kiryō Maru I* anchor was installed in about 1994 after Mr. John Clarke of Two Rocks donated it.

##### 5.1.2.2. Historical origins of the anchors

The anchor monuments of Rottneest Island present an interesting cross section of maritime history; representing shipwrecks from different historical eras, with the anchors themselves portraying evolutionary history of anchor design and development.

The wrought iron anchor from the *Mira Flores* (1867–1886) wrecked in 1886, appears to be a Rodgers, small palm, stream anchor, as only Rodgers stream and kedge anchors have a round stock which is rove through the shank. It appears to be too large for a kedge.

The *City of York* (1861–1899) anchor, also made from wrought iron, is similar in design to an old wooden stock, admiralty pattern anchor. It has straight rather than curved arms, but it has a shorter shank than is common on old pattern admiralty longshank anchors. It also has features that are more common to anchors of the latter 19th century such as a shackle and pin instead of an iron ring to connect the anchor cable that confirms the vessels wrecking in 1899. Visually, the wrought iron and associated stamp welds are of higher quality than usually observed on earlier admiralty anchors. This mix of features does not appear in any of the available literature on anchors and may be rare example, not previously recorded.

The other anchor on display at Rottneest Island is from the wreck of *Kiryō Maru I*, wrecked in 1984. This modern cast iron anchor is not of any great historical interest and is an example of a close stowing, Dreadnought stockless anchor, and weighs approximately 370 kilograms.



### 5.1.3. City of York anchor

#### 5.1.3.1. Site location and description

The site is located at the northern end of the grassed area, in front of the eastern side of the Rottneest Accommodation Centre, adjacent to the main jetty in Thomsons Bay. The anchor rests on three concrete pads that are level with the grass surface; the corners of the anchor palms rest on the two front pads, whilst one end of the wooden stock rests on the third pad. The stock is a replica and is not part of the original design material. There is an interpretive plaque located in front of the anchor, which details some history of the wreck.

#### 5.1.3.2. Anchor condition

The rate of metal deterioration to the *City of York* anchor appears to be minimal at the present time, with only some small patches of surface corrosion, sulphur precipitate and exfoliation of iron. There appears to have originally been a protective coating applied to the anchor's surface: but this has now flaked off and needs to be re-applied; after the surface corrosion is again neutralised.

#### 5.1.3.3. Significance assessment

SIGNIFICANCE ASSESSMENT CRITERIA	RESULT	DEGREE
<b>Significant in the evolution and pattern of history, or important in relation to a figure, event, phase or activity of historic influence.</b>	YES	REPRESENTATIVE
<b>Reason;</b> The anchor is significant because of its connection to an historical shipwreck event, and representative of an important physical characteristic of 19th century maritime trade.		
<b>Significant in possessing or contributing to technical or creative accomplishment, or important in demonstrating a high degree of technical or creative achievement for the period in question.</b>	YES	REPRESENTATIVE
<b>Reason;</b> The anchor was a 'state of the art' piece of maritime equipment at the time of its manufacture and exhibits a high degree of technical achievement in 19th century metallurgy, metalworking, and design.		
<b>Significant through association with a community or communities in Australia today for social, cultural, or spiritual reasons or important as cultural items.</b>	NO	
<b>Significant for the potential to yield information contributing to an understanding of history, technological accomplishments and social developments, or important for its potential to yield information.</b>	YES	RARE
<b>Reason;</b> Because of the rarity of the anchor its analysis will yield important information in the techniques of 19th century metallurgy, metalworking and the evolution of anchor design.		
<b>Significant in the potential to yield information about the composition and history of cultural remains and associated natural phenomena, particularly the biota, through examination of physical, chemical and biological processes.</b>	NO	

Significant for its potential to contribute towards public education, or important for its potential for public education through on-site (or other) interpretation.	YES	REPRESENTATIVE
Reason; Anchors offer the potential for on-site interpretation by visitors to Rottneest Island, for maritime researchers and the general public through documentation.		

#### 5.1.4. *Mira Flores* anchor

##### 5.1.4.1. Site location and description

The site is located at the southern end of the grassed area in front of the eastern side of the Rottneest Accommodation Centre, adjacent to the main jetty in Thomsons Bay. The anchor is supported by, a galvanised metal bracket, which holds the anchor stock above the grass. The crown rests directly on to a large concrete pad partly supported by two blocks of timber under the arms of the anchor. There is an interpretive plaque located in front of the anchor, which details some of the wrecks history.

##### 5.1.4.2. Anchor condition

The rate of metal deterioration to the *Mira Flores* anchor appears to be greater than that on the *City of York* anchor. There are extensive patches of surface corrosion, sulphur precipitate and exfoliation of iron. The rust staining the concrete beneath the anchor crown evidences this rate of deterioration. There appears to have originally been a protective coating applied to the anchor's surface, but this has now flaked off and needs to be reapplied, after the surface corrosion has been neutralised.

##### 5.1.4.3. Significance assessment

SIGNIFICANCE ASSESSMENT CRITERIA	RESULT	DEGREE
Significant in the evolution and pattern of history, or important in relation to a figure, event, phase or activity of historic influence.	YES	REPRESENTATIVE
Reason; The anchor is significant because of its connection to an historical shipwreck event, and representative of an important physical characteristic of 19th century maritime trade.		
Significant in possessing or contributing to technical or creative accomplishment, or important in demonstrating a high degree of technical or creative achievement for the period in question.	YES	REPRESENTATIVE
Reason; The anchor was a 'state of the art' piece of maritime equipment at the time of its manufacture and exhibits a high degree of technical achievement in 19th century metallurgy, metalworking, and design.		
Significant through association with a community or communities in Australia today for social, cultural, or spiritual reasons or important as cultural items.	NO	
Significant for the potential to yield information	YES	REPRESENTATIVE

<b>contributing to an understanding of history, technological accomplishments and social developments, or important for its potential to yield information.</b>		
<b>Reason;</b> The analysis of the anchor has the potential to yield important information about the techniques of 19th century metallurgy, metalworking and the evolution of anchor design.		
<b>Significant in the potential to yield information about the composition and history of cultural remains and associated natural phenomena, particularly the biota, through examination of physical, chemical and biological processes.</b>	NO	
<b>Significant for its potential to contribute towards public education, or important for its potential for public education through on-site (or other) interpretation.</b>	YES	<b>REPRESENTATIVE</b>
<b>Reason;</b> The anchor offers the potential for on-site interpretation by visitors to Rottneest Island, for maritime researchers and the general public through its documentation.		

#### 5.1.5. *Kiryō Maru* I anchor

##### 5.1.5.1. Site location and description

The *Kiryō Maru* I anchor site overlooks the west end, Rottneest Island and is located beside the road, which leads to Cape Vlamingh. However, it does not lie opposite the wreck, which is located further north towards Cathedral Rocks, about 150 metres from the shore. Roughly mounted the anchor shank sits on a galvanised metal bracket, whilst the crown of the anchor rests directly on the ground. A covering of low profile flora is starting to overgrow the monument, and there are no restraints to stop vandals damaging or removing the anchor. An interpretive cairn is located to the right of the anchor, with two bronze information plaques affixed to it, but these also are not ideal and should be located in a position whereby their interpretation is easier.

##### 5.1.5.2. Anchor condition

The anchor is in excellent condition, mainly due to its recent vintage, but there are some minor patches of surface corrosion evident. In the long term, it will require some surface preparation and coating with a suitable protective substance.

##### 5.1.5.3. Significance assessment

SIGNIFICANCE ASSESSMENT CRITERIA	RESULT	DEGREE
<b>Significant in the evolution and pattern of history, or important in relation to a figure, event, phase or activity of historic influence.</b>	NO	
<b>Significant in possessing or contributing to technical or creative accomplishment, or important in demonstrating a high degree of technical or creative achievement for the period in question.</b>	NO	

Significant through association with a community or communities in Australia today for social, cultural, or spiritual reasons or important as cultural items.	NO	
Significant for the potential to yield information contributing to an understanding of history, technological accomplishments and social developments, or important for its potential to yield information.	NO	
Significant in the potential to yield information about the composition and history of cultural remains and associated natural phenomena, particularly the biota, through examination of physical, chemical and biological processes.	NO	
Significant for its potential to contribute towards public education, or important for its potential for public education through on-site (or other) interpretation.	YES	REPRESENTATIVE
<b>Reason;</b> The anchor offers the potential for on-site interpretation by visitors to Rottneest Island, for maritime researchers and the general public through its documentation.		

#### 5.1.6. Recommendations

##### 5.1.6.1. Conservation policy

Since the anchors from the *Mira Flores* and *City of York* have been removed from historic shipwreck sites, it is appropriate that they be nominated for protection under the provisions of the *Historic Shipwrecks Act 1976*. Allowances made under this Federal act protects shipwrecks in State waters and their associated relics. In the case of these anchors the following sections of the Act would apply:

##### *Historic Shipwrecks Act 1976.*

Part II - Protection of historic shipwrecks and relics:

Section 4A Shipwrecks and relics associated with a State or Territory may be declared to be historic.

##### Section 4A, Subsection 1.

If a Minister of a State informs the Minister, in writing, that the Government of the State recommends that a declaration be made under this subsection in relation to the State, the Minister may, by notice in writing published in the Gazette, declare all remains of ships (whether or not the existence and location of the remains are known) that are; (a) situated in Australian waters, or waters above the continental shelf of Australia, adjacent to the coast of the State; and (b) at least 75 years old; to be historic shipwrecks, and, where such a declaration is made, the declaration extends to remains (including remains that come into existence, because of a shipwreck or otherwise, after the making of the declaration) that, after the making of the declaration, become remains to which paragraphs (a) and (b) apply.

##### Section 4A, Subsection 4.

Subject to subsection (10), where; (a) part of the remains of a ship has been removed from waters: and (b) a declaration made under subsection (1) or (2) applies in relation to the part of the remains remaining in those waters: the declaration applies also in relation to the part of the remains that has been removed from those waters.

Section 4A, Subsection 8.

Subject to subsection (10), where; (a) an article has been removed from waters; and (b) if the article had not been so removed, a declaration under subsection (4) or (5) would have applied in relation to that article;

Section 4A, Subsection 10.

Where a declaration under this section applies in relation to the remains of a ship or to an article, the Minister may, by notice in writing, published in gazette, revoke that declaration to the extent that it applies in relation to those remains, to a specified part of those remains or to that article, as the case requires.

This action would cause the anchors to be recorded at a national level, which would permanently link their existence to that of the shipwrecks from which they came, thus ensuring that they will never be lost in obscurity. Although the remaining fabric appears to be reasonably stable, there is evidence of ongoing spot corrosion and some exfoliation of surface metal. Recommended: that an urgent assessment of the anchors conditions and a policy of periodic condition assessment to be carried out by a professional conservator, in consultation with the Rottnest Island Authority.

The anchor from the vessel *Kiryō Maru I* does not fall within the jurisdiction of any of the relevant heritage acts because it was wrecked as recently as 1984. However, because of its educational, cultural and interpretive value it is recommended that the Rottnest Island Authority should preserve it.

5.1.6.2. Conservation strategy

Although the anchor monuments are not complex cultural sites, this simplicity reinforces the need for the remaining anchor fabric to be protected from major deterioration in the future. There does not appear to be any existing record of the type of conservation treatment given to the anchors prior to display, but they appear to be reasonably free from surface chlorides but subject to spot corrosion.

For a conservation strategy the Rottnest Island Authority should consult with the Western Australian Maritime Museum (WAMM) conservators regarding initial, and thereafter periodic, testing of the anchors. This includes the monitoring of corrosion or other deterioration, and to suggest recommendations for any remedial conservation treatment or processes that may be required subsequent to those inspections. The conservator's advice on the frequency required for those inspections should also be obtained. Nominating the anchor for protection by the *Historic Shipwrecks Act 1976* would also help in this process: as the Western Australian Maritime Museum is the delegated state authority under the act. It would be advantageous for the shipwreck anchor monuments on Rottnest Island to be linked to the islands wrecks through an interpretive publication that includes both aspects of the islands maritime cultural heritage.

should be less than 150 Lux and less than 20mW/M<sup>2</sup> as a benchmark. While these levels are the maximum for a museum setting, fragile objects require less intense light.

The light levels for the maritime heritage exhibit were tested in a number of different areas. During testing of the light, it was unsure whether the blinds in the room were opened. Two windows located opposite each other were experimented with in four different scenarios: no blinds open, first blind open, second blind open and all blinds open. It came to our attention that the blinds in the room are never opened, but the comparison is useful for future reference. The levels in the room with no blinds open were varied, not many of which were within the limits required for a museum.

Cabinet	Lux	UVmW/M <sup>2</sup>
Mira Flores Wall	174	7.9
Mira Flores Cabinet	76.8	1.6
Macedon Wall	455	20.0
Macedon Cabinet	196	11.5
Middle Room	94.1	2.5

Table 9. Light levels in the museum

Some of the most fragile objects for example coated wood, paper, and textiles are sensitive to light and levels should be lower than 50 Lux. While these cabinets do not have any textiles in them, there is wood in both of the cabinets. The observable levels should be less. In the historical room, there are materials that are more sensitive including: books, material, leather, paper and fur. The levels for this room are even higher than that of the maritime exhibit.

Cabinet	Objects	Lux	UVmW/M <sup>2</sup>
Quokka	Fur	388	21.7
Convicts	Material	800	39.6
Shingles	Wood	568	40.6
Early Settlers	Leather, wood, book	398	21.0
Island Prison	Wood, books	229 and 177*	11.0 and 3.2*

\*Measurements taken on top of both books in cabinet, left to right.

Table 10. Light levels in the museum

The light levels in this room exceed the maximum and minimum levels for sensitive material by as much as 650 Lux—convict cabinet—; with such high levels of light beaming into these cabinets the objects that are on show are vulnerable to increased deterioration, depending upon the material.



Figure 40. Convicts cabinet, material located in bottom. Light sources both, internal—top right hand corner—and external, reflection in the glass of five lights

#### 5.2.2.4. Relative humidity and temperature

Relative humidity and temperature were measured over a two and a half hour period on the day of survey. This illustrates that the temperature and humidity levels in the room are within the required limits. However, this does not show the true conditions of the room. To obtain a true reading of the conditions in the room a progressive test needs to be undertaken through all the seasons, day and night over an extended period.

#### 5.2.3. Artefacts

Of the objects catalogued 27 were listed as being in the collection of the Rottneest Island Museum, one seems to have been registered incorrectly, the last was unknown if catalogued previously and another has been catalogued incorrectly. The objects reflect a wide variety of different types and conditions. The evaluation of the objects was to determine what artefacts were on display and their condition.

The collection contains 29 registered objects; but the total number of objects is higher due to some objects containing multiple items. In one case—MF1087—there are 30 artefacts incorporated in the registered number; composed of different parts to bullets, from the copper casings to the lead projectiles.

Object	Number
Lead	3
Wood	3
Coal	1
Glass	6
Ceramic	3
Bone	1
Copper alloys	5
Composite	7

Table 11. Collection of artefact types

Improperly supported in its cabinet is the diving helmet—MC1572—; being secured by two wires that are anchored via two screws diagonally opposite each other. While the helmet is heavy and is reasonably stable by this system of support, the cabinet in which it is housed needs maintenance to ensure that the screws hold the perspex in place over the helmet. Possible deterioration is evidenced on the breastplate and top of the helmet. It appears as rust forming on the breastplate and white residue forming on the top of the helmet.



Figure 41. Diving helmet (MC1572)

The bullets from the *Mira Flores*—MF1087—as previously stated contain lead. Being in contact or association with chipboard, an increase in the deterioration of these objects can occur, also this can affect other materials in the same cabinet through the release of vapours—from the wood—. White residue is evident on the casings and lead projectiles in the collection, due to possible deterioration from the release of gas from the chipboard.



Figure 42. Bullets from the *Mira Flores* (MF1087)

The glass and ceramics in the cabinets both seem in reasonable condition. If they have been conserved properly and are not placed in direct sunlight, the display of these objects should be guaranteed with minor conservation treatment.

Objects in the historical room of the museum contain the most fragile artefacts, which may require future care or conservation. As previously stated the artefact materials consist of fur, books, leather and other similar materials. All of these objects are light sensitive and a high Lux and/or ultra violet light reading can cause increased deterioration of these objects. The location of the objects around the room combined with the light levels—around 750 Lux—should increase the deterioration of the artefacts. The presentation of these objects, books and materials can increase the deterioration of surfaces, or the breakdown of fibres in the materials. Books in the museum are showing signs of possible deterioration on their covers. These are the surfaces in direct contact with the brightest lights.

#### 5.2.4. Conclusion

The condition of the objects relates directly to their storage environment and previous conservation. While the objects in the Rottneest Island Museum seem to be satisfactory, the conditions in which they are stored could increase deterioration in the long term. Fragile artefacts for example leather and paper are dramatically affected by light and attack by contaminants—dust and biological pests—in the cases. Cleaning the cases frequently will help to diminish, if not halt the infestation of biological pests and build up of detritus.

Lighting levels in the museum are extremely high in areas. Reducing light levels by using lower wattage globes and redirection of light will aid in the safekeeping of the objects in the collection. Instead of using direct light, reflecting light off walls so that it filters down into the cabinets will still allow for visitor viewing needs, but will also protect the more fragile and light sensitive objects. Another method of protecting these objects is to move them so they are the furthest away from the light source.

Relative humidity and temperature in the museum ranges between 21–23°C and 53–56% relative humidity. The survey established that the environmental conditions in the museum were good. Future surveys of the conditions in the museum would be helpful to gain an understanding and



perspective of the environmental conditions and to ascertain whether they alter from season to season.

### **Conclusion**

Although conducted during a period of less than ideal weather conditions, the 2002 Rottneest Island fieldwork project was a successful operation. The majority of aims proposed were completed with the exception of the underwater excavations, which were constrained by weather conditions.

The assessment of the historic shipwreck trail around the island revealed that it has been a great pioneering success, with the underwater interpretive plinths in remarkable condition, having been in place for approximately 21 years. However identified as of major importance was, a need for more interpretive material in the form of brochures and underwater slates, so that both land tourists and SCUBA divers can obtain full the full interpretive benefit from the trail.

An inspection of the shipwreck artefacts on display, both around the island and in the Rottneest Island Museum, revealed that more work is required concerning the conservation of these materials combined with periodic long term monitoring. The environmental conditions in the museum itself are good but not ideal, with the display facilities being average. The upgrade of these issues should be a long-term goal of both the Western Australian Maritime Museum and the Rottneest Island Authority.

Even though a substantial corpus of material has been compiled as part of this project, there is still a great deal of work that needs to be completed around the island for example shipwreck site surveys, analysis and interpretation. Exposed by this report, environmental conditions on many of the sites can be difficult to work in and require a long-term commitment in order to achieve meaningful results.

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*West Australian*, 26 September, 7 October 1890.

## Appendices

### Appendix 1. Museum artefacts condition reports


IND. NO.	
REG. NO.	CH75.24(b)

VENUE	Rottneest Island Museum	DATE IN	
TITLE/TYPE OF OBJECT	Metal pole		
DIMENSIONS			
OWNER			
<b>Description of Object</b> Metal flat based pole with two holes. Painted green and white. Metal hook screwed in the top. Length is 96cm. Base square is 14cm Diameter of holes 2.5cm Radius of pole near base 2.5cm Radius of pole near top 1.5cm Under surface of base is not painted and it is corroding. The remaining paint is starting to chip away. Hook attached with washer and nut. Made of cast iron.		<b>PHOTOGRAPH</b> 	
Condition			
Comment			
EXAMINER		DATE	
LOCATION			

No change in condition [ ]

Change in condition [ ]

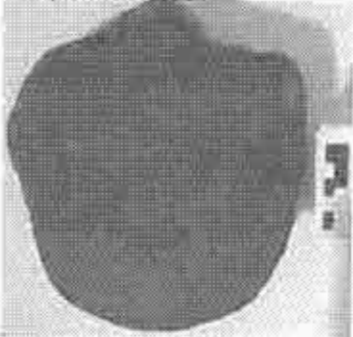
IND. NO.	
REG. NO.	CH75108 MC 75/108 (Museum Records)

VENUE	Rottnest Island Museum	DATE IN	
TITLE/TYPE OF OBJECT	Chunk of red lead oxide		
DIMENSIONS	12.7cm wide and 8 cm tall		
OWNER			
<b>Description of Object</b> Can see the pink oxide on the edges and it is heavily concreted.		<b>PHOTOGRAPH</b> 	
<b>Condition</b>    			
<b>Comment</b>    			
EXAMINER		DATE	
LOCATION			

No change in condition [ ]

Change in condition [ ]


IND. NO.	
REG. NO.	CH75 109 MC 75/109 (Museum records)

VENUE	Rottnest Island Museum	DATE IN	
TITLE/TYPE OF OBJECT	Coal		
DIMENSIONS	210x180mm		
OWNER			
<b>Description of Object</b> Lump of coal, crumbling.		<b>PHOTOGRAPH</b> 	
<b>Condition</b>			
<b>Comment</b>			
EXAMINER		DATE	
LOCATION			

No change in condition [ ]

Change in condition [ ]

IND. NO.	
REG. NO.	CY762

VENUE	Rottnest Island Museum	DATE IN	
TITLE/TYPE OF OBJECT	Clapper from bell-brass		
DIMENSIONS	16.1x3.1cm		
OWNER			
<b>Description of Object</b> Long circular metal rod with hook on top, hole at bottom and additional metal circular blob at bottom. Top of rod diameter (near hook) 1.1cm Bottom of rod diameter 1cm		<b>PHOTOGRAPH</b> 	
<b>Condition</b> Good condition			
<b>Comment</b>			
EXAMINER		DATE	
LOCATION			

No change in condition [ ]

Change in condition [ ]


IND. NO.	
REG. NO.	CY1075

VENUE	Rottneest Island Museum	DATE IN	
TITLE/TYPE OF OBJECT	Pulley sheave wood/iron coak		
DIMENSIONS	Diameter 21cm (concretions 7x11cm)		
OWNER			
Description of Object	<p>Pulley sheave, wood and iron coak, iron fragments with concretion in MAC. Thickness approx 35mm average.</p>		
	<p><b>PHOTOGRAPH</b></p> 		
Condition	<p>Concretion on underside cracking. Salt crystals appearing on surface. Does not appear to be conserved. Some concretion has fallen off. Large crack running from outside rim to centre. Salt crystallisation is extensive. Appears to be copper by products present as well. Not much material appears to have fallen off. Crack appears to have been caused by concretion.</p>		
Comment	<p>Hard to tell whether this artefact has deteriorated extensively. Appears that there has been limited attack by borers or marine life. There appears to be iron corrosion products embedded in the wood. Crack in centre width: 17.8mm Crack on outer part of object width: 31mm.</p>		
EXAMINER		DATE	
LOCATION			

No change in condition [ ]

Change in condition [ ]

IND. NO.	
REG. NO.	CY2579


VENUE	Rottnest Island Museum	DATE IN	
TITLE/TYPE OF OBJECT	Wood decorative, carved, gilded		
DIMENSIONS	33.5x4x3cm		
OWNER			
<b>Description of Object</b> Piece of carved timber with a regular diagonal pattern up the length. Carved lettering on the back 'SXV111' Gilding has worn off in many places.	<b>PHOTOGRAPH</b> 		
<b>Condition</b> Overall, wood condition is good. Appears to have dried uniformly, no cracking. Top layer of gilt appears to have flaked off rather than worn off, mainly on exposed areas.			
<b>Comment</b> Incorrect reference number on artefact (CY 1083) should be CY2579.			
EXAMINER		DATE	
LOCATION			

No change in condition [ ]

Change in condition [ ]



IND. NO.	
REG. NO.	CY3278

VENUE	Rottnest Island Museum	DATE IN	
TITLE/TYPE OF OBJECT	Porthole with glass		
DIMENSIONS			
OWNER			
<b>Description of Object</b> Brass porthole with glass. Glass cracked but still intact.		<b>PHOTOGRAPH</b> 	
<b>Condition</b>			
<b>Comment</b>			
EXAMINER		DATE	
LOCATION			

No change in condition [ ]

Change in condition [ ]

IND. NO.	
REG. NO.	LE16

VENUE	Rottnest Island Museum	DATE IN	
TITLE/TYPE OF OBJECT	Bolts and wood		
DIMENSIONS	170x250mm		
OWNER			
<b>Description of Object</b> Worn timber with metal bolt? Coming out of the top? And metal base.		<b>PHOTOGRAPH</b> 	
<b>Condition</b> Timber well worn and metal corroded. Rust forming on metal.			
<b>Comment</b>			
EXAMINER		DATE	
LOCATION			

No change in condition [ ]

Change in condition [ ]


IND. NO.	
REG. NO.	LE1105

VENUE	Rottnest Island Museum	DATE IN	
TITLE/TYPE OF OBJECT	Brass sheathing marked with 'SMS Williams & Co. Llanelly. Patent.'		
DIMENSIONS	20cm x 21cm		
OWNER			
<b>Description of Object</b> Concreted metal sheathing with green stains all over it.		<b>PHOTOGRAPH</b>	
<b>Condition</b>			
<b>Comment</b>			
EXAMINER		DATE	
LOCATION			

No change in condition [ ]

Change in condition [ ]

IND. NO.	
REG. NO.	LE1110

VENUE	Rottnest Island Museum	DATE IN	
TITLE/TYPE OF OBJECT	Sandalwood pieces		
DIMENSIONS	Approximately 1m long and 110x150mm wide		
OWNER			
<b>Description of Object</b> Sandalwood pieces, unmilled branches of wood. 2 large pieces and 1 small piece		<b>PHOTOGRAPH</b> 	
<b>Condition</b> Covered in white powder and crumbling. Timber falling apart.			
<b>Comment</b> 			
EXAMINER		DATE	
LOCATION			

No change in condition [ ]

Change in condition [ ]



IND. NO.	
REG. NO.	MC1112

VENUE	Rottnest Island Museum	DATE IN	
TITLE/TYPE OF OBJECT	Bottle fragments		
DIMENSIONS			
OWNER			
<b>Description of Object</b> Base is indented and has 'N & Co' 'X1' written on it		<b>PHOTOGRAPH</b> 	
Condition			
Comment			
EXAMINER		DATE	
LOCATION			

No change in condition [ ]

Change in condition [ ]


IND. NO.	
REG. NO.	MC1572

VENUE	Rottnest Island Museum	DATE IN	
TITLE/TYPE OF OBJECT	Brass diving helmet		
DIMENSIONS	Approx 40x50cm		
OWNER			
<b>Description of Object</b> Copper alloy helmet covered incrustation. Cracked on top right hand side 		<b>PHOTOGRAPH</b> 	
<b>Condition</b> Helmet twisted and cracked,			
<b>Comment</b> Tested for surface chloride concentration (1) 21.1ppm front left side of skirt (2) 5ppm right shoulder of skirt (3) 6ppm exposed metal front left side of skirt			
EXAMINER		DATE	
LOCATION			

No change in condition [  ]

Change in condition [  ]

<b>IND. NO.</b>	
<b>REG. NO.</b>	MC2577

<b>VENUE</b>	Rottnest Island Museum	<b>DATE IN</b>	
<b>TITLE/TYPE OF OBJECT</b>	Stoneware sherds		
<b>DIMENSIONS</b>	Base was 13cm diameter		
<b>OWNER</b>			
<b>Description of Object</b> Had brown stenciling, and little brown cracks in the glaze. White concretion and salt coming out.		<b>PHOTOGRAPH</b> 	
<b>Condition</b>			
<b>Comment</b>			
<b>EXAMINER</b>		<b>DATE</b>	
<b>LOCATION</b>			

No change in condition [ ]

Change in condition [ ]

<b>IND. NO.</b>	
<b>REG. NO.</b>	MC2578

<b>VENUE</b>	Rottnest Island Museum	<b>DATE IN</b>	
<b>TITLE/TYPE OF OBJECT</b>	Bottle Fragment – brown neck		
<b>DIMENSIONS</b>	24x27mm		
<b>OWNER</b>			
<b>Description of Object</b> Glass fragment of brown bottle, neck and lip. Inside diameter of opening 17.2mm. Broken below neck.		<b>PHOTOGRAPH</b> 	
<b>Condition</b> Bubbles in glass. In relative good condition.			
<b>Comment</b>			
<b>EXAMINER</b>		<b>DATE</b>	
<b>LOCATION</b>			

No change in condition [ ]

Change in condition [ ]




IND. NO.	
REG. NO.	MF1086

VENUE	Rottnest Island Museum	DATE IN	
TITLE/TYPE OF OBJECT	Porthole rim brass		
DIMENSIONS	Outside diameter 20cm, inside diameter 15cm		
OWNER			
<b>Description of Object</b> Brass porthole with fittings ie. Catch and hinge type fastening. No glass. Inside sections still have thread over _ of the circumference.		<b>PHOTOGRAPH</b> 	
<b>Condition</b> General good condition. Copper oxide is apparent in places (corrosion products). Etching on outside surfaces. A dark dusty product also apparent on the outside. Nothing appears to have fallen off the artefact in the case.			
<b>Comment</b> The number of the back is apparent			
EXAMINER		DATE	
LOCATION			

No change in condition [ ]

Change in condition [ ]


IND. NO.	
REG. NO.	MF1087

VENUE	Rottnest Island Museum	DATE IN	
TITLE/TYPE OF OBJECT	Lead bullets		
DIMENSIONS	Diameter is 1.12cm, length is 3.14 cm		
OWNER			
<b>Description of Object</b> Has concretion on some and white residue on the surface.		<b>PHOTOGRAPH</b> 	
<b>Condition</b>  			
<b>Comment</b>  			
EXAMINER		DATE	
LOCATION			

No change in condition [ ]

Change in condition [ ]


IND. NO.	
REG. NO.	MF1348

VENUE	Rottnest Island Museum	DATE IN	
TITLE/TYPE OF OBJECT	Glass bottle: twirly salad oil		
DIMENSIONS	12x5cm		
OWNER			
<b>Description of Object</b> Bottle appears very light green. Moulded number on bottom 186. Longitudinal crease, which appears as trenches. Diamond patterning around shoulder then goes into swirl pattern on neck. Bottle appears to be filled with dried sand products.	<b>PHOTOGRAPH</b> 		
<b>Condition</b> Good overall condition. Top of the bottle has been broken off. Shiny patina (rainbow hue) is apparent so glass products may be coming out. No cracks.			
<b>Comment</b> This artefact does not appear to be deteriorating extensively. Reg no is clear.			
EXAMINER		DATE	
LOCATION			

No change in condition [ ]

Change in condition [ ]


IND. NO.	
REG. NO.	R622

VENUE	Rottnest Island Museum	DATE IN	
TITLE/TYPE OF OBJECT	Copper bolt with clinch ring		
DIMENSIONS			
OWNER			
<b>Description of Object</b> Copper bolt with clinch ring. Clinch ring surrounded by wood remnants. Bolt is possibly brass not copper.		<b>PHOTOGRAPH</b> 	
<b>Condition</b> Copper oxide and copper hydroxy, copper sulphide in evidence (copper corrosion products). Bolt has extensive pitting along its length. Not much wood left around the bolt but what is left appears in reasonable condition the wood will be full of copper corrosion products.			
<b>Comment</b> Reasonable example			
EXAMINER		DATE	
LOCATION			

No change in condition [ ]

Change in condition [ ]

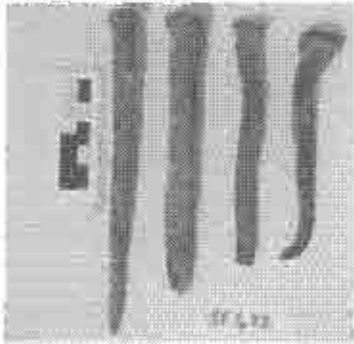
IND. NO.	
REG. NO.	ST470

VENUE	Rottnest Island Museum	DATE IN	
TITLE/TYPE OF OBJECT	Bottle base with concretion		
DIMENSIONS			
OWNER			
<b>Description of Object</b> Bottle base heavily concreted. Green bottle with high indent. Appears to be moulded in an early style.		<b>PHOTOGRAPH</b> 	
<b>Condition</b> Heavily concreted appears to show remnants of marine borers. Does not appear to have been treated. This may be in danger of laminating.			
<b>Comment</b> May not necessarily need treatment.			
EXAMINER		DATE	
LOCATION			

No change in condition [ ]

Change in condition [ ]


IND. NO.	
REG. NO.	ST472

VENUE	Rottnest Island Museum	DATE IN	
TITLE/TYPE OF OBJECT	Copper nails		
DIMENSIONS			
OWNER			
<b>Description of Object</b> 4 copper nails 110-115mm long, shortest bent at end, all with tapered points. All 15x20mm wide at top to point.		<b>PHOTOGRAPH</b> 	
<b>Condition</b> Iron corrosion evident on surfaces.			
<b>Comment</b>			
EXAMINER		DATE	
LOCATION			

No change in condition [  ]

Change in condition [  ]



IND. NO.	
REG. NO.	ST473

VENUE	Rottnest Island Museum	DATE IN	
TITLE/TYPE OF OBJECT	Ceramic fragment, blue pattern		
DIMENSIONS	50x50mm		
OWNER			
<b>Description of Object</b> Small fragment of ceramic circular blue pattern.		<b>PHOTOGRAPH</b> 	
<b>Condition</b> Fine brown lines through glaze, chipping of surfaces.			
<b>Comment</b>  			
EXAMINER		DATE	
LOCATION			

No change in condition [ ]

Change in condition [ ]

IND. NO.	
REG. NO.	ST501


VENUE	Rottnest Island Museum	DATE IN	
TITLE/TYPE OF OBJECT	Porcelain fragment, blue and white pattern		
DIMENSIONS	132.2x139.8x58mm		
OWNER			
<b>Description of Object</b> Top Blue and white pattern around rim and on inside base.  Bottom Blue line around top and bottom, and around base of fragment.		<b>PHOTOGRAPH</b> 	
<b>Condition</b>   Fine brown cracks forming through glaze. Broken area glued back on.			
<b>Comment</b>			
EXAMINER		DATE	
LOCATION			

No change in condition [ ]

Change in condition [ ]




IND. NO.	
REG. NO.	ST503

VENUE	Rottnest Island Museum	DATE IN	
TITLE/TYPE OF OBJECT	Wood/ Bone base of comb/ Toothbrush		
DIMENSIONS	80x30mm		
OWNER			
Description of Object	PHOTOGRAPH		
Base of toothbrush/ comb with holes for bristles. Handle broken.			
Condition			
Comment			
EXAMINER		DATE	
LOCATION			

No change in condition [ ]

Change in condition [ ]

IND. NO.	
REG. NO.	ST751

VENUE	Rottnest Island Museum	DATE IN	
TITLE/TYPE OF OBJECT	Lead bottle Seal		
DIMENSIONS	50x50mm		
OWNER			
<b>Description of Object</b> Lead seal with concretion.		<b>PHOTOGRAPH</b> 	
<b>Condition</b> Covered in white powder, forming on edges.			
<b>Comment</b>			
EXAMINER		DATE	
LOCATION			

No change in condition [ ]

Change in condition [ ]


IND. NO.	
REG. NO.	ST813

VENUE	Rottnest Island Museum	DATE IN	
TITLE/TYPE OF OBJECT	Glass bottle base		
DIMENSIONS	40x40mm		
OWNER			
Description of Object Green bottle base fragment	PHOTOGRAPH		
Condition			
Comment			
EXAMINER		DATE	
LOCATION			


No change in condition [ ]

Change in condition [ ]

IND. NO.	
REG. NO.	ST827

VENUE	Rottnest Island Museum	DATE IN	
TITLE/TYPE OF OBJECT	Copper sheathing		
DIMENSIONS			
OWNER			
<b>Description of Object</b> Copper sheathing nailed to a fur/felt (hair) mat. Appears to be used in sheathing a hull to deter marine borers.		<b>PHOTOGRAPH</b> 	
<b>Condition</b> Corrosion products (copper) along the copper and around the nails. Bits of the matting quite brittle but does not appear to be breaking off.			
<b>Comment</b> 			
EXAMINER		DATE	
LOCATION			

IND. NO.	
REG. NO.	NOT REGISTERED

VENUE	Rottnest Island Museum	DATE IN	
TITLE/TYPE OF OBJECT	Timber door		
DIMENSIONS			
OWNER			
<b>Description of Object</b> Timber door, from locker. Timber inlay with handle still attached.		<b>PHOTOGRAPH</b> 	
<b>Condition</b>  			
<b>Comment</b>  			
EXAMINER		DATE	
LOCATION			

No change in condition [ ]

Change in condition [ ]