First port in the Northwest
A maritime archaeological survey of Cossack
25-30 June 2012

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Cover image: 'Stone jetty, Cossack III, 18 Dec 1963'. Artist: Frank Norton, Stateships Collection, Western Australian Museum

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Abbreviations

BOM	Bureau of Meteorology
BP	Before Present
cm	centimetres
DGPS	Differential Global Positioning System
ft	feet
GPS	Global Positioning System
HCWA	Heritage Council of Western Australia
HP	Horse Power
HWM	High Water Mark
In	inches
LWM	Low Water Mark
L x B x D	Length x Breadth x Depth
m	metres
mm	millimetres
MV	Motor Vessel
NHP	Nominal Horse Power
O.N.	Official Number
PWD	Public Works Department
SLWA	State Library of Western Australia
SRO	State Records Office
SS	Screw Steamer
TSS	Twin Screw Steamer

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Introduction

Cossack was the first port in Western Australia's Northwest, and operated from 1862 to around the 1920s before being abandoned as a commercial port. Today it is one of the State's most significant historical archaeological precincts and an historic port town. While previous archaeological work has investigated the historical town site precinct and Indigenous sites, a comprehensive study to establish the extent and nature of Cossack's maritime archaeological resources had not yet been undertaken.

As well as its archaeological significance and research potential, Cossack has recently been subject to development pressure. With the Pilbara going through a recent mining boom, plans have been slated for development and sale of privately-owned town site blocks within the historic precinct, and there has been discussion of improved maritime facilities including a marina. A maritime archaeological study was considered to be necessary from a cultural resource management perspective, to inform any future plans for development of the area.

Between 25 and 30 June 2012 the Western Australian Museum's Department of Maritime Archaeology visited Cossack to survey for archaeological remains of shipwrecks, port and maritime infrastructure, and sites related to maritime industries and maritime exploration.

The study area (Figure 1) was to include the Nickol Bay area, offshore islands and inland to Roebourne, although not all locations were able to be visited within the timeframe.

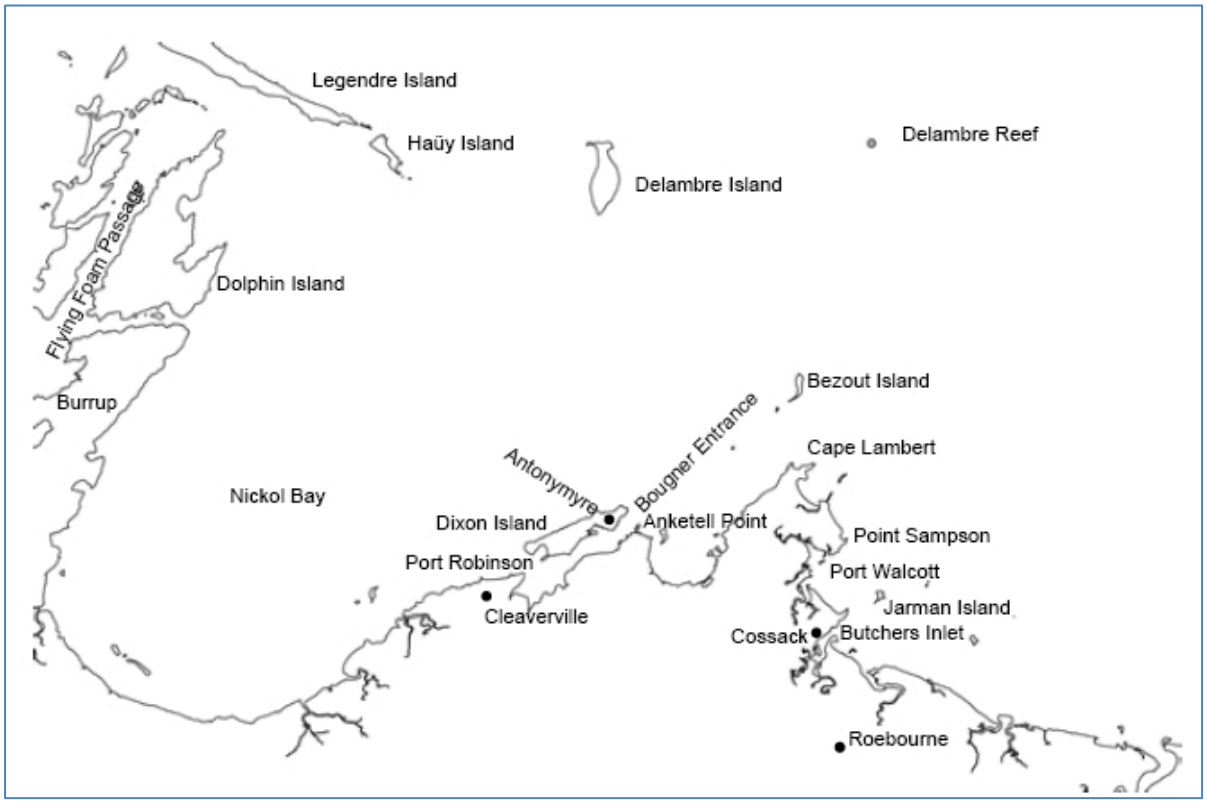

Figure 1. Map of study area showing key names and places mentioned in text.

Legislation

The Chief Executive Officer ('The Director') of the Western Museum is responsible for the state *Maritime Archaeology Act 1973*, and is the delegate for the Commonwealth Minister responsible for the Commonwealth *Historic Shipwrecks Act 1976*.

Commonwealth *Historic Shipwrecks Act 1976*

The Commonwealth Act declares 'all remains of ships (whether or not the existence and location of the remains are known) that are situated in Australian waters, or waters above the continental shelf of Australia, adjacent to the coast of the State; and at least 75 years old, to be historic shipwrecks…' (Part II, 4A. (1)).

The Act applies from the Continental Shelf, including the Exclusive Economic Zone (EEZ) to the Low Water Mark (LWM), except in the cases of enclosed bays, rivers and other State Waters (see below). It protects all shipwrecks and artefacts associated with shipwrecks (such as anchors) that are over 75 years of age, or subject to declaration by the Minister (for example World War II shipwrecks such as HMAS *Sydney* (1942) and HSK *Kormoran* (1942)). Section 17(1) relates to the discovery of shipwrecks and relics:

> A person who finds, in a fixed position in Australian waters or waters above the continental shelf of Australia, the remains of a ship or of a part of a ship, or an article associated with a ship, shall, as soon as practicable, give to the Minister a notice setting out a description of the remains or of the article and a description of the place where the remains are, or the article is, situated, being a description of that place that is sufficient to enable the remains or article to be located.

Hence it is a requirement under the Act to report potential wreck sites, and it is an offence to fail to do so.

State *Maritime Archaeology Act 1973*

This Act protects sites in State waters such as inland waters and enclosed bays. The Act protects shipwrecks and other types of maritime archaeological sites including shipwreck survivor camps, whaling stations, pearling camps, jetties and port infrastructure and maritime exploration sites. Maritime archaeological sites can be underwater, above water, or in the inter-tidal zone.

Section 4.(1) of the Act defines maritime archaeological sites as:

> a. any area in which the remains of a ship, which in the opinion of the Director may have been a historic ship, are known to be located;
>
> b. any area in which any relic is known to be located, or where in the opinion of the Director unrecovered relics associated with a ship which may have been a historic ship are likely to be located; and
>
> c. any structure, campsite, fortification or other location of historic interest that, in the opinion of the Director, is associated with, and was occupied or used by, persons presumed to have been in a historic ship, shall be a maritime archaeological site.

(2) A maritime archaeological site may be situated below low water mark, on or between the tidemarks, or on land, or partly in one place and partly in another.

The Act also requires new discoveries to be reported:

New finds

17.(1) A person who finds a ship that was, or appears likely to have been, lost before the year nineteen hundred and fails to give notice of the finding to the Director in writing as soon as practicable after the finding commits an offence.

Since the Commonwealth *Historic Shipwrecks Act 1973* takes precedence over the State Act, the State Act only applies above the LWM for all maritime archaeological sites including shipwrecks and below the LWM to the 3 nautical mile limit for all underwater cultural heritage, including maritime archaeological sites, but excluding shipwrecks.

All the Cossack wrecks in Butcher Inlet (State Waters) that were wrecked pre-1900 are automatically protected by the State *Maritime Archaeology Act 1973*, while all wrecks and relics such as anchors over 75 years old below the LWM outside Butcher Inlet are automatically protected by the Commonwealth *Historic Shipwrecks Act 1976*.

Archaeological surveys

Cossack contains a rich archaeological assemblage of structures and material, for a period for which there is little historical documentation on the day-to-day lives of its residents. The unique character of Cossack as a frontier port town, and lack of modern development make it one of Western Australia's most intact and important historical archaeological sites. Cossack encapsulates a number of historical and archaeological research themes relevant to development of Western Australia, and the Indian Ocean world. Such themes include colonisation processes, trading networks between Australia and Southeast Asian/ Indian Ocean rim countries, port development, human-environment interactions, adaptation, society and ethnicity, labour, domination and resistance and maritime industries.

Past archaeological surveys have documented the town's layout including its Asian Quarter and cemetery, historic buildings, ruins and archaeological features, Chinese market gardens and Indigenous and Malay fringe camps (McIlroy 1990, Paterson & Wilson 2004, Yates 2002, Wilson 2005, Nayton 1992, 2011).

The Departmentof Maritime Archaeology had previously undertaken brief inspections of the SS *Silver Star* (1936) shipwreck (Sledge 1978: 16-18), and of ship wreckage at Point Samson, subsequently identified as remains of the Norwegian barque *Solveig* (1902) (Sledge 1978:17; McCarthy 1998).

The main aims of this maritime archaeological survey were to:

1) Undertake background historical research to gather information on known and potential maritime archaeological sites;
2) Conduct fieldwork to locate maritime archaeological sites, and assess their condition and research potential;
3) Compile a report with all results to be made publicly available.

Survey personnel

The survey team consisted of Department of Maritime Archaeology staff Ross Anderson (OIC), Patrick Baker, Nicolas Bigourdan, Jeremy Green, Maddy McAllister, Ben McKinnon (volunteer), Alistair Paterson (University of WA).

Coastal environment

This low-lying area of the Pilbara Region between the tablelands and the coast is known as the Abydos Plain. Butcher Inlet lies on the eastern side of a large Proterozoic basalt outcrop terminating at Cape Lambert and Point Samson, creating the coastal outlet for the Harding River (Short 2005: 372-73). Butcher Inlet is completely surrounded by salt marshes, sand beaches such as Mount Beach (also Settlers Beach), mud flats and mangroves. Rocky granophyre outcrops include 34 metre high Reader Head and Nanny Goat Hill (also known as Red Hill). The Cossack foreshore consists of intertidal Pleistocene calcarenite beach rock overlain by a shallow covering of sand in the vicinity of the wharf. A rocky boulder shoreline extends from just north of the Cossack townsite and cemetery to Reader Head interspersed with sandy beaches, mangroves and intertidal sand flats, while mud and mangroves characterise the foreshore south of the wharf. Butcher Inlet has been silting up since the turn of the 20th century, and almost completely dries at low tide except for the deeper channels.

Tides

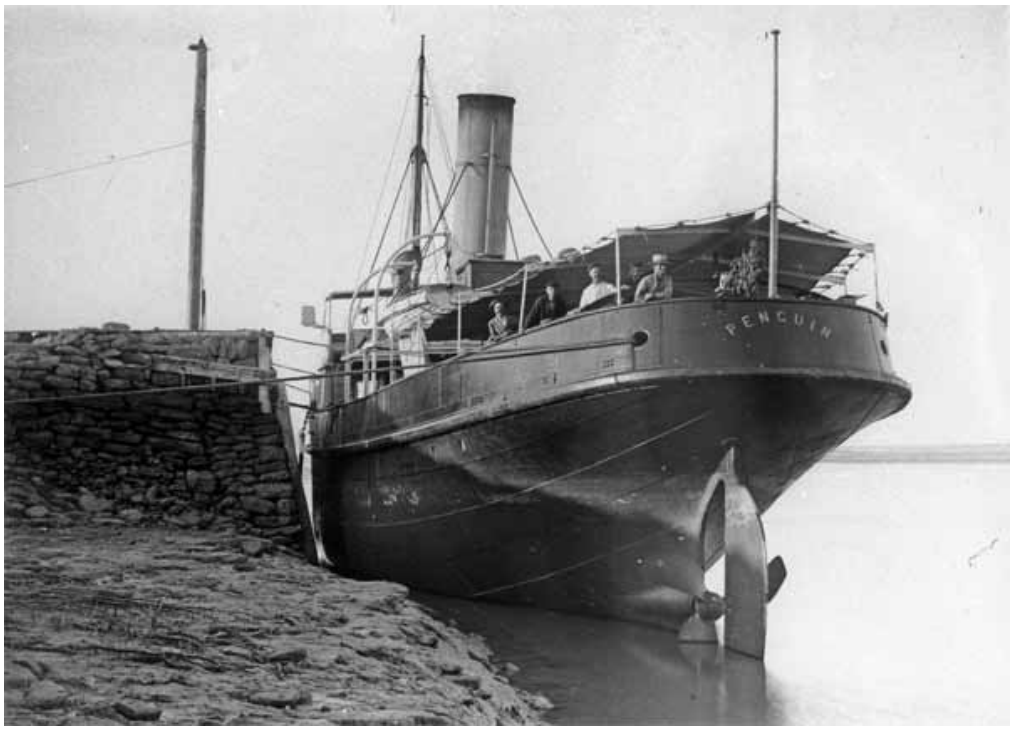

Figure 2. SS Penguin sitting on the bottom at Cossack wharf at low tide ca. 1920 (WA Museum).

The Northwest's five-metre tidal range (Figure 2) and the shallows of Butcher Inlet (also known as Butcher Inlet, Butcher Creek or simply 'the Creek') meant cargo had to be lightered to and from larger ships that anchored in the roads of Port Walcott. Lightering was time consuming and expensive as it meant double handling of cargo. The twisting channel in Butcher Inlet made navigation difficult, with its ever-changing sandbanks and tidal flows. However the tides could also be used to advantage to assist vessel movements and for maintenance, for example repairing vessels and purposely sinking vessels to clean them of vermin such as rats and cockroaches.

Cyclones

Cyclones are intense low pressure tropical storms with gale force winds or higher, that regularly form in waters off the northern coast of Australia between November and April. The cyclone season in the Pilbara is between mid-December and April, peaking in February and March The Pilbara coast experiences more tropical cyclones with damaging winds in excess of 90km/h than any other area in Australia, averaging about one every two years. The Pilbara region also experiences the highest incidence of coastal crossings by Category Three cyclones, the highest rating with winds in excess of 150km/h (BOM 2013).

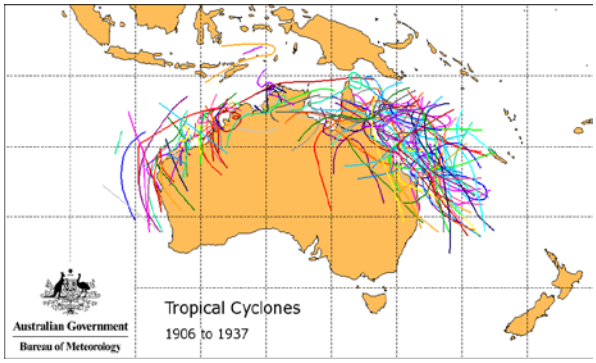

Figure 3. Tracks of cyclones crossing northern Australia's coast (Bureau of Meteorology)

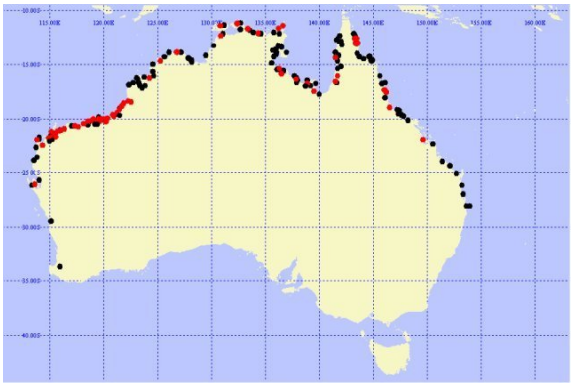

Figure 4. Cyclone crossings of coast, red dots indicate Category 3 severe cyclones (Bureau of Meteorology)

When cyclones cross the coast with their associated storm surges and flooding they bring attendant destruction to shipping, infrastructure and settlements, and loss of life. Over 100 cyclones occurred off Western Australia's northwest coast between 1870 and 1935, costing thousands of pounds of damage and hundreds of lives lost (*WA* 29/3/1935: 22). Major storms and cyclone events that have caused significant damage to shipping and maritime infrastructure between Exmouth and Broome occurred in 1882, 1886, 1887, 1893, 1898, 1903, 1908, 1911, 1912, 1925 and 1932. In the late 19th and early 20th century cyclones were known as 'willy willys', 'cock eyed Bobs' or simply 'cock eyes'.

For much of Cossack's life the predominant structures were timber and iron, with their rooves held down by anchor chains or steel wire cable. Cossack has in effect been rebuilt three times over, with the only buildings still standing today being solid stone buildings and the quay, all constructed during the 1890s. Cyclones continue to impact the archaeological remains at Cossack, most recently in 2010 with Cyclone Glenda described as a '100 year cyclonic event' causing high winds, storm surges and flooding. The effects of Cyclone Glenda were not uniform across the landscape, though in severely affected areas storm surges and flooding completely washed away archaeological material and removed sand overburden, leaving exposed areas vulnerable to further damage (Nayton 2010: 6).

Cyclones caused the wrecking of the wooden barque *Solveig* (1903) at Point Samson and disappearance without trace of the steel barque *Glenbank* (1911) with 23 lives off Delambre Island. One of the Northwest's most enduring maritime mysteries remains the disappearance without trace of the cargo/ passenger steamship *Koombana* (1912) with all 140 lives when it foundered during a cyclone *en route* from Port Hedland to Broome.

Entire Northwest pearling fleets made up of small wooden cutters and luggers were devastated by cyclones, with the heaviest losses of vessels and life occurring in 1875 (numerous vessels and 59 lives lost), 1887 (18 luggers and 140 lives lost) and 1910 (26 luggers and 40 lives lost) (*WA* 29/3/1935: 22).

Historical Background

The coast and hinterland of the Abydos Plain, including the Cossack and Roebourne areas as well as sea country and offshore islands, are the traditional lands of the Ngarluma (pronounced 'Nar-Luma') people.

Coastal Aboriginal archaeological sites in the Pilbara include artefact scatters, ceremonial and 'increase' sites, *bugaridlajgu (*Ngarluma) or *gabugari* (Yindjibarndi) Dreaming sites, campsites, rock art, rock shelters, standing stones and stone arrangements, grinding patches, shell middens, shell mounds and earth mounds (Bradshaw 1994:3-12; Berndt 1964:64-67). The Nationally Heritage Listed Murujuga /Burrup Peninsula and Dampier Archipelago 30 km west of Cossack contains the world's most ancient and extensive concentration of rock art (McDonald & Veth 2009:49-69), while Womala/ Womalantha/ Depuch Island 70 km to the east also has a highly significant and extensive corpus of rock art (Crawford 1964:67). The rock art includes motifs of human-like figures (anthropomorphs), marine animals such as turtles, fish, crab, whales, sharks, dolphin and both living and extinct animals (Mulvaney 2009:40-48; McDonald and Veth 2009:49-69; Crawford 1964:23-63). The Ngarluma people were involved in a vast cultural exchange and ceremonial network, trading marine products such as pearls and pearl shell (*Pinctada maximus*), northern baler shell (Melo amphora), stingray barbs and sawfish teeth for stone artefacts and ceremonial goods with inland Aboriginal groups as far afield as the Hamersley Plateau and Western Desert (Hook 2009:27-28).

Following the European 'settler invasion' of the Northwest it appears that new materials rapidly entered this exchange network, with an iron axe found at the Hamersley Plateau in 1875 (Hook 2009:29). Contact rock art also occurred with depictions of sailing and steam ships, human figures on horses, with guns, hats and pipes and a horse and human figure in a wheeled buggy recorded at Inthanoona Station, 70km southeast of Cossack (Paterson & Wilson 2009:99-111; Paterson & Van Duivenvoorde 2013:30-54).

Between 10 May and 23 October 1861 explorer and government surveyor Francis Gregory led an expedition to explore the coastline and hinterland in the Nickol Bay area of northwest Western Australia. Gregory's favourable report of an estimated three million acres of good grazing land and 200,000 acres of agricultural land encouraged great interest among pastoral and investment interests in the prospects of colonising 'the Northwest' (Withnell Taylor 2002: 14-23).

Perth-based pastoralist and merchant Walter Padbury was an investor in Gregory's expedition. On 4th April 1863 Padbury sent Captain Peter Hedlund from Fremantle in charge of his small wooden cutter *Mystery* to seek a suitable landing place in the Northwest for a private pastoral venture. Hedlund was to sail ahead of Captain Jarman in the chartered 254 ton barque *Tien Tsin*, that sailed from Fremantle on 24th April with passengers and a cargo of livestock for Padbury's pastoral station, subsequently established at the De Grey River.

Hedlund discovered a small inlet east of Cape Lambert with a sloping, sandy beach suitable to land stock and access the hinterland, and named it Tien Tsin harbour. He then left a pre-arranged message on Delambre Island advising where Captain Jarman could meet him. Upon the *Tien Tsin*'s arrival government surveyor J.R. Ridley and the *Mystery*'s navigator C.C. Hunt surveyed the anchorage and explored the navigable extent of the inlet east of Cape Lambert (Figure 5). They

travelled as far as the Upper Landing at the mouth of the Harding River naming Jarman Island and Butcher Inlet after the *Tien Tsin*'s Captain and First Officer (Withnell Taylor 2002: 25-29).

From this point on settlers with their livestock and cargo were landed at Butcher Inlet, from where they tramped across the salt marsh to reach fresh water at the Harding River rock pools. On C.C. Hunt's 1863 map of Tien Tsin Harbour (Port Walcott) there is a pencilled notation 'Landing for stock' on Settlers Beach west of Reader Head (SRO 3423/6).

Despite its disadvantages of being situated on the bank of shallow, mangrove-lined Butcher Inlet with no source of permanent fresh water, between 1863 and the 1890s Tien Tsin Harbour, and the township later named Cossack, was transformed from a muddy backwater to the maritime hub for European colonisation of the Northwest frontier, and port for the Northwest's historic administrative centre of Roebourne. Its development was driven initially by pastoralism, and subsequently the pearling and mining industries. Today the Cossack Town Site Precinct is listed on the State Heritage Register (Place Number 03239) and lies 35 kilometres east of Karratha, the modern administrative centre of the Pilbara region.

Situated 1600 kilometres north of Perth, Cossack was remote and sailing voyages could sometimes take up to a month. Cossack soon became an international port that traded directly with Southeast Asian ports such as Singapore, Jakarta, Bali, Macassar and Solor as well as Australian and European ports, in time sending wool directly to London instead of via Fremantle (De La Rue 1979: 67).

The pastoral industry was the major factor in the development of Cossack. Though pastoralism is predominantly viewed as an inland activity, the pastoral and maritime industries were co-dependent, as wool and stock had to be shipped in and out with suitable ports and maritime infrastructure constructed.

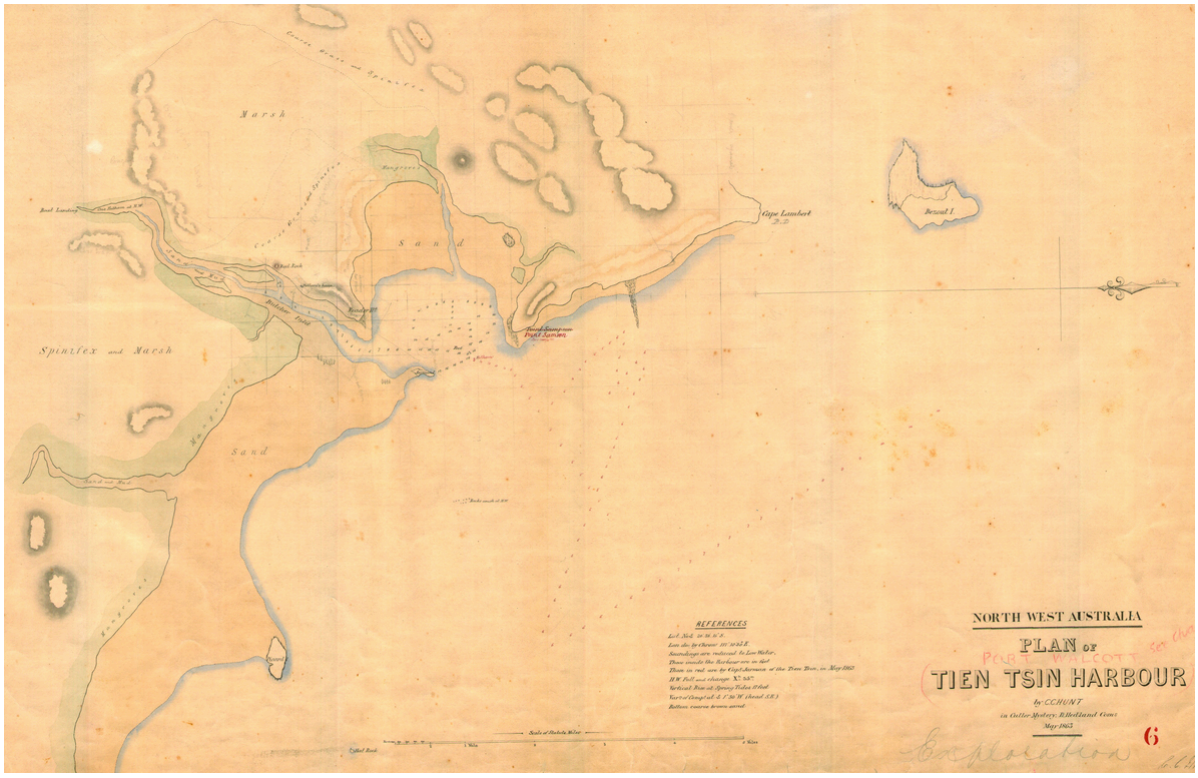

Figure 5. The first chart made of Tien Tsin Harbour (later known as Port Walcott) 'Plan of Tien Tsin Harbour by C.C. Hunt in cutter *Mystery*, Peter Hedlund Comr, May 1863', State Records Office (SRO 3423/6).

Cossack was also the centre for the Northwest pearling industry until technological, economic and environmental factors saw the pearling industry shift to Broome in the 1890s. Cossack was ethnically diverse, and the Indigenous and Asian population always outnumbered its small European population. The Asian population was made up mainly of Indo-Malays, Chinese, Japanese and Filipinos to meet the labour demands of the pearling industry. The afore-mentioned changes in the pearling industry, Cossack's natural environmental limitations as a port, and the development of other Northwest ports such as Port Hedland and Broome contributed to Cossack's decline.

By the 1940s Cossack had been largely abandoned, with just a handful of permanent residents. The remaining intact stone buildings were constructed during the town's heyday in the 1890s (Figure 6) while the footprint of the rest of the town is an historic archaeological site providing less visible evidence of the early development of Cossack and its Indigenous, European and Asian residents and seasonal workers (Figure 7, Figure 8) .

Figure 6. View of Cossack historical precinct in 2012 looking northeast with Butcher Inlet in the background.

Figure 7. Worked glass artefacts indicate the presence of Indigenous people living in and around Cossack post-colonial settlement.

Figure 8. Japanese cemetery reflecting the strong Asian presence in Cossack.

Pastoralism and pearling

The main industries that spurred the development of Western Australia's Northwest were pastoralism and pearling. In 1861 F.T. Gregory reported on the 'immediate commercial importance' of pearling and pearl shelling in the region (Withnell Taylor, 2002:21). As pastoral settlers entered the Ngarluma peoples' traditional lands they found Indigenous people had been conducting a ritualistic and extensive trade in *Pinctada maximus* pearl shell for millennia, a tradition that continues to this day. As the first location in Australia to establish the commercial *Pinctada maximus* pearl-shell industry, Cossack was the birthplace of a fishery of global significance during the 19th and early 20th centuries.

Pearling season conveniently coincided with the off-season on pastoral stations after lambing and shearing. The pastoralists' need for cheap labour soon saw Indigenous people working in the pastoral industry in exchange for clothing, food and tobacco. Pastoralists used their Indigenous pastoral workers to collect pearl shell from the shoreline during the off-season, initially as beach collecting at low tide, which led to wading, then naked diving (i.e. with no surface air-supplied diving equipment) (McCarthy 1994).

In 1867 William Tays entered into an agreement with H. Hicks to set up a pearling venture with Aboriginal divers, acquiring a whaleboat from a whale ship he was supplying with beef, and based his camp in Butcher Inlet. Tays and Hicks soon had 9 tons of pearl shell worth over £1000 and a seven-carat pearl worth £10 (Withnell Taylor 2002:114).

After the shallower beds were worked out, pearlers required larger boats to work further away from Cossack. Divers worked out of small dinghies, with three to six dinghies supported by a larger mother boat anywhere between 6 and 80 tons.

From 1875 to the 1890s the pearling boom saw an influx of population from Fremantle, Eastern Australian colonies, Batavia, Singapore, China, Macassar and Sulawesi. The demand for divers led to coercion, brutality, forced labour, kidnapping and slavery of Indigenous people as far afield as the Kimberley, Gascoyne and Northern Territory. While some Aborigines were initially willing to dive they soon became less willing, no doubt as a result of the brutal and inhumane labour recruitment strategies adopted by many, though not all, pearlers. Indigenous divers were provided with food, clothing and tobacco, while Malay and European crews were paid wages.

The government was often complicit in the use, and abuse, of Indigenous people in the industry, though it also enacted a series of Pearling Acts to protect Indigenous men, women and children from inhumane treatment.

Once the easily accessible shallow areas had been depleted of pearl shell, naked divers were used to dive to depths of up to 10-15 metres to recover shell. The introduction of helmet diving technology and the discovery of vast shell beds along the 80 Mile Beach led to Broome becoming the capital of pearl diving in Western Australia.

Labour, slavery and ethnicity

> *Next time you gaze in wonder at the beauty of a Western Australian pearl, spare a thought for the Aboriginal people who suffered so appallingly during the industry's darkest days* ('Warlu Way' interpretation board, Cossack)

Both pastoralism and pearling depended heavily on Aboriginal labour, while the rapid development of pearling, rapacious demand for labour and resulting shortage of Aboriginal workers (whether willing or not) saw labour imported from Southeast Asian countries such as Macassar, Timor, Ceylon (Sri Lanka), the Philippines and Malay Archipelago. South Sea Islanders and other nationalities were also involved.

Local Ngarluma men, women and children from the Nickol Bay, Roebourne and Cossack areas were initially used for pearl shell gathering and shallow water diving, and were paid with rations of flour, sugar, tea and tobacco (*Inquirer and Commercial News* 15/7/1868: 3). However demand for workers soon outstripped supply due to the decline of the Indigenous population from introduced diseases such as smallpox, and the increasing numbers of boats seeking divers (McCarthy 1989:197). Indigenous divers were in demand for their acute underwater eyesight, swimming and diving skills and their ability to collect pearl shell. As the accessible pearl shell beds in the inter-tidal zone and shallower depths were stripped, naked divers were forced to dive to ever increasing depths to gather shell. Being integral to the economic development of the Northwest, the labour system was more or less officially sanctioned, with police and the Resident Magistrate complicit in the system of acquiring and selling labour, and overlooking cases of maltreatment, slavery, murder and massacres (Allbrook & Jebb 2014). One observer of pearling in Nickol Bay wrote that: 'The thirst for shells, for pearls for success, brutalises…the pearling speculator or diver…no day is respected, no dark man's life is valued…but the utmost of diving must be sucked out of them, killing them or not' (*Inquirer* 28/4/1875).

To meet the demand for divers, pearlers undertook expeditions as far afield as the Gascoyne and Kimberley regions to procure Indigenous people for labour, often by brutal force (*The West Australian* 24/12/1909 p.10).

Within Western Australia Ngarluma, Jaburrara, Kariyara, Yindjibarndi and Martuthunira people actively resisted being forcibly employed in the pearling industry, with the first episodes of murder and retaliation between Aborigines and European pearlers occurring on the Burrup Peninsula in the first pearling season of 1868 (Withnell Taylor 1987: 118).

Although there was a prohibition on the use of white convict labour in the 'North District', in 1870 pearler and entrepreneur Charles Broadhurst received colonial government permission to engage Aboriginal convicts from Rottnest Island as 'volunteer' divers on the *Adur* for the 1870-71 season (McCarthy 1989:197-201). Despite public controversy, twenty Aboriginal convicts were shipped, though five escaped by jumping overboard as soon as the *Adur* reached their country in Champion Bay, Geraldton (McCarthy 1989: 198). It was an unsuccessful season for Broadhurst, marked by bad weather, lack of shell and escape attempts by his Aboriginal convicts, although other vessels did well on the same grounds (McCarthy 1989:202).

In the 1869-70 season Sydney-based boats the *Coquette*, *Melanie* and *Kate Kearney* used South Sea Islanders as divers, and in 1870-71 pearlers Howlett and Cadell began using indentured Malay and Macassan divers. As a result of these successful examples of using imported labour there was an exponential increase in the use of Asian labour in the pearling industry. By 1872 Cadell had 44 Malays at his camp at Condon, and Broadhurst had 140 Malays in camps at Port Hedland and Bannangarra (McCarthy 1994).

Pearlers also imported Australian Aboriginal divers from Makassar, who had been kidnapped from the Northern Territory in Makassan proas, and sold in the Makassar slave market. One pearler Mr. F. McRae, entered into an agreement with Makassan authorities to engage eighteen 'Port Essington' (probably Iwaidja language group from Cobourg Peninsula, Port Essington area being by then an abandoned British colony on the Cobourg Peninsula) Aborigines to work as pearl divers, to be returned to Makassar at the expiration of their agreement:

> The Creek now begins to show some signs of life, and presents quite a lively appearance, several vessels having arrived with their divers. From Singapore, there is the *Montiara* and *Victoria*, and I also hear that the *Flower of the Yarrow*, with her four cutters, had left Singapore for this port, intending to work with the Nor'-westers this year. From Macassar, there have arrived, the *Dawn*, *Azelia*, *Governor Weld*, *Lily of the Lake*, and *Mary*; the *Pearl* is hourly expected. The whole of these vessels have Macassar divers on board. The *Azelia* has also some eighteen Port Essington divers, whom Mr. F. McRae engaged at Macassar. These natives, I understand, were kidnapped by the Macassar proas and taken to Macassar. Mr. McRae has been compelled by the authorities at Macassar to enter into an agreement to return them at the expiration of their term of agreement. From Solor, there have arrived the *Marten*, *lone*, and *Twilight*, to arrive from Solor—the *Onward*, *Challenge*, *Gift*, *Amy*, *Dolphin*, *Kate*, and *Masopppa*,; from Endeh—the *Gypsy*, *Ethel*, and *Argo* ; from Singapore—*Good Luck* (Tuckey,) and a vessel purchased by Mr. W. E. Marmion (*The Inquirer & Commercial News* 6/10/1875 p.2).

By 1875-76 the use of Malay labour in the industry reached a peak with 22 vessels, mainly from Macassar and Kupang, crewed by some 770 Malays, an 'unspecified number' of Port Essington Aboriginals, 17 'Chinamen', 24 women and a few children. Though reports of brutality and maltreatment of Indigenous and Malay divers in the North-west pearlshell industry were known to the Western Australian colonial government, it was the Dutch East Indies Governor General who was concerned for their well-being, and enacted prohibitive legislation that effectively ended the system of importing Malay divers for a number of years (McCarthy 1989:209-214).

The presence of Chinese, Japanese, Malay and Filipino divers, storekeepers, merchants and prostitutes contributed to Cossack's multi-ethnic diversity. The colonial government could not keep track of the numbers of Asians involved in the pearlshell industry as it was impossible to collect reliable statistics with such a moveable and seasonal workforce. The importance of Asian labour to the northern Australian pearlshell industry can be gauged from the fact that in 1925 pearling was the only industry exempted from the White Australia Policy (Nayton 2012: 81).

Other maritime work such as crewing vessels and lightering also depended on Indigenous and Asian labour. Some vessels were entirely operated by both Indigenous and Asian crews and there is at least one reference to an Aboriginal 'Captain J—n' in command of one lighter (*The Inquirer & Commercial News* 13/2/1884 p. 5). When the lugger *Flora* was wrecked on the Perseverance Rocks

bank returning with firewood from Antoni's Myia at Dixon Island, its master was a man named only as 'Wolla', along with three Chinese crew Ah You, Ah Hong and Ah Kie. Ah Kie was unfortunately drowned in the event (SRO 1902/ 2694 Cons 430). When the composite lighter *Myra* sank at Reader Head on a voyage from Balla Balla to Cossack it had a crew of 'seven coloured men', who may have been Aboriginal, Malay, Chinese or other nationalities (*Western Mail* 4/2/1898:14).

Prisoners from Roebourne jail were engaged as forced labourers in the construction of maritime infrastructure such as Jarman Island lighthouse, the Roebourne to Cossack tramway and Cossack wharf, the prisoners typically being Indigenous and/ or Asian men (Owen 1936:33-35).

When maritime archaeological sites such as shipwrecks and port facilities are viewed through the lens of labour and ethnicity, the sites can be used to understand the scale and impact of colonisation processes, and its human dimensions. Colonising settlers and the Western Australian government were only able to develop and accrue wealth through controlling and directing labour, whether it be forced as slaves or prisoners, paid, indentured or voluntary. In the case of Indigenous people in the pearling industry it was commonly the former, as kidnapping, slavery, brutality, forced labour and overwork causing death in the pearling industry have been well documented. However some pastoralists and pearling masters were more enlightened than others, and these men cared for their workers' health and well-being.

A number of police reports document the deaths of Indigenous naked pearl divers due to 'inflammation of the lungs' or simply of cold, most likely due to overwork/ exertion and spending too many hours in the water (SRO 28/451, SRO 28/557, SRO 28/451, SRO 28/555, SRO 28/732). Though the police would inspect the bodies if they were brought back to Cossack, if there were no signs of violence, charges were not laid on pearling vessel masters or owners for maltreatment. In some cases where there were obvious signs of violence or forced restraint (rope marks, cuts and lash marks) the police were occasionally able to successfully bring charges to bear and secure convictions, including fines and jail terms (SRO 32/121).

Overall Indigenous and Asian people were highly valued for their maritime skills, endurance, underwater vision and ability to undertake sustained physical effort in the harsh climate of the Northwest (*ICN* 15/7/1868 p. 3), though their efforts met with little reward. Payment was often made in the form of provisions (food, clothing, tobacco) to meet their basic needs and ensure their dependence, and came at great cost to their health, traditional lifeways and in some cases, their lives.

Lighters and lightering

Where ports were of inadequate depth or lacked maritime infrastructure such as deep-water wharfs and jetties, smaller (generally) flat-bottomed vessels called 'lighters' were used to tranship freight to and from larger trading vessels.

As Butcher Inlet was too shallow for large vessels, international and coastal shipping used to anchor in the roadstead off Jarman Island, and lighters transhipped the freight to and from the Cossack wharf. Lighters were also used as coastal traders to tranship passengers and freight to nearby ports and pastoral stations such as Condon, Balla Balla, and as far as Fremantle. Noblet (1968:12) describes shipping in Cossack around the 1920s as involving 'lightering on a large scale', with lighter-

men making up the majority of Cossack's workforce. Lighters ranged from small wooden sailing ketches and luggers between 12 and 60 tons, to auxiliary-engined schooners up to 300 tons. The first steam lighters in Cossack were the SS *Beagle* and SS *Croydon* that arrived in the 1890s (Thompson n.d.: 7). Table 1 lists some of Cossack's better known lighters. The *Beagle* was operated by an agency for the Blue Funnel Line and 'another company which ran a combined service to and from Singapore and Fremantle', owned by Mr George Tee and later Mr Harding, while the operations of the Adelaide Steamship Company's lighter *Croydon* was run by Mr Aubrey Hall (Thompson n.d.: 34-35).

The transfer of freight from lighters to ships involved cranes and slings, or baskets. The slings were also used for passengers, and on at least one 'novel occasion' on 6 August 1929, in the absence of a priest at Roebourne, Mr N. Clarke and Miss Susan Cain were lightered out to the SS *Koolinda* and hoisted aboard in a basket to be married by Father Raible of the Beagle Bay mission, then hoisted back down to the waiting lighter again—the total time elapsed was seven minutes (*Daily News* 13/8/1929 p.1). A rounded iron cage-like structure with a lifting ring and lug just south of the Cossack wharf is identified as a stock harness for transferring stock in lightering operations.

The labour force of lightermen was made up of Aboriginals, Europeans, Malays and Arabs. Lightering work was spasmodic, and dependent on shipping arrivals. One report described the mistreatment of 'a native named Captain J—n, who works a lighter at Cossack efficiently for a settler there' (*Inquirer and Commercial News* 13/2/1884 p.5) indicating that this man had the requisite maritime skills and experience to be in charge of a lighter, and was accordingly given the title of 'Captain'. When a man described only as 'Assam, an Arab' refused duty aboard a lighter at Roebourne, the Cossack Police Court sentenced him to three months imprisonment (*Western Mail* 14/8/1886 p.40).

Table 1. Cossack lighters

Name	Description
Eva (1936)	Sank at Reader Head in easterly gale and high seas when anchors dragged (*West Australian* 5/5/1936 p.11). Possibly refloated.
May (1886)	Sank while lightering wool (*Western Mail* 13/11/1886: 17)
Amy (1923)	Described as a lighter wreck in mangroves opposite Nanny Goat Hill (Thompson n.d.: 35).
Derby (1894)	Adelaide Steamship Company lighter stationed at Derby, later sold to Captain England and Miller and used as a lighter at Cossack. Badly damaged in 1887 at Derby, damaged when blown against jetty at Cossack in 1889 and lost in a cyclone at Cossack Beach in 1894 (Cairns & Henderson 1995: 135, 225).
SS Beagle	Steam lighter operated by agency for Blue Funnel Line in 1890s. Blown ashore and damaged in 1894 cyclone with stern almost on train station platform. Later refloated.
SS Croydon	Steam lighter operated by Adelaide Steamship Company in 1890s. Blown ashore above HWM in 1898 cyclone and refloated.

Cossack (1894)	Blown over road above HWM and stranded at Cossack during cyclone (*South Australian Register* 23/1/1894 p.5), but was refloated.
Myra (1894)	Sank off Jarman Island with 60 tons of cargo for SS *Albany*, later refloated (*Western Australian* 29/11/1894 p.5)
Maggie Gollan (1898)	58 ton wooden ketch. Sank in Butcher Inlet and carried out to sea during cyclone with full load of cargo for Condon (Cairns & Henderson 1995: 290).
SS *Silver Star (1936)*	Composite-built single screw steamer built 1905 at Coffee Point, Perth from prefabricated sections built in England. Ex-Swan River ferry, Albany excursion ferry, south coast fishing vessel and floating smoke-house. Sold to Cossack Lightering and Trading Co. in 1935 and used as a wool lighter. In 1936 rammed Cossack wharf and split its stempost. It was abandoned at Cossack in unseaworthy condition and subsequently burnt (De L. Marshall 2001: 220-240).
Roselle/ Rouzelle	Lighter owned by Cossack Lightering and Trading Company in 1930s (De L. Marshall 2001: 230)
MV *Nickol Bay*	Owned by Cossack Lightering and Trading Company, less than 118 tons (*Western Australian* 24/2/1937 p.17). Was the only lighter operating in Cossack in 1938 (Thompson n.d.: 45)
SS *Uribes*	Auxiliary iron schooner, 118 tons 104 x 24 x 6.5 feet owned by Cossack Lightering and Trading Company (*Western Australian* 24/2/1937 p.17). Later sank off Rottnest Island.
MV *King Bay*	Wooden auxiliary schooner, constructed by E. Howson, Fremantle for Cossack Lightering and Trading Company, dimensions 110 x 26 x 9.5 ft, jarrah frames and planks, oregon deck planks and masts, 200 HP auxiliary engine (*Western Australian* 24/2/1937 p.17; *Western Australian* 19/7/1939 p.23))

In 1937 it was reported that a 200 ton vessel (later named MV *King Bay*) was being constructed on the Swan River by E. Howson for the Cossack Lightering and Trading Company. The same report described this lighter as being intended to operate in the same way as the company's auxiliary schooner *Uribes* 'for lightering at coastal ports and trading between Fremantle and the North-west' (*Western Australian* 24/2/1937 p.17).

When the federal government enacted a World War II export embargo on Yampi Sound ore to Japan, a deputation of pastoralists, shipping company representatives, the manager of the Cossack Lightering Company and politicians sought a federal subsidy of £500 to allow essential shipping services to continue, that would otherwise be jeopardised by the loss of valuable contracts. A report

of the deputation provides insights into the vital service provided by northwest coastal shipping activities, and the close association between shipping companies and pastoralists:

> 'Speakers stated that for the past 13 years the Cossack Lightering Company had been performing an essential service on the North-West coast lightering wool, livestock and station supplies between the shore and the ships at places where no facilities existed for ships to load from jetties. There were at least 20 landing places along the coast between Geraldton and Wyndham, and of these 10 were serviced by lighters. Apart from the shipment of wool and station supplies, the export of live sheep to Singapore was an important trade in which the lightering service played a big part. Last year at various outports 5,000 sheep were lightered from the shore to ships bound for Singapore. This trade would be largely increased when seasonal conditions improved and sheep numbers in the North West returned to their former level.
>
> Assistance to Ships
>
> It was pointed out that from a shipping point of view it was vital that small craft such as lighters should be available at intervals along the coast. Many of the North-West ports offered difficulties for shipping, and should a vessel run aground it was essential to have a lighter into which cargo and passengers could be transshipped. In this respect lighters had rendered valuable service in the past. The service was also valuable for defence purposes, as it represented the only form of patrol over a long stretch of coastline which ships never approached' (*Western Australian* 19/7/1939 p.23).

Boat building and repairing

A Mr C. Harper built the first pearling boat 'for his own use in Cossack' (Thompson n.d.), while in 1867 a twelve metre lugger was built at Andover Station and wheeled to Port Walcott for pearling (Nayton 1990a).

In 1872 Mr Wrighton built a 10 or 12 ton vessel at the port (Nayton 1990a), that would have been most likely used for pearling. In 1875 there was a reference to a Mr S. Isbester building a cutter or schooner:

> On the Swan I believe you make nothing of the launch of cutters and schooners, but we have had a launch here by S. Isbester, of a boat of his own building; certainly she was rather a long time on the stocks, but it is no less the fact that we have had a launch at Port Walcott (*Western Australian Times* 21/12/1875 p.3).

There is historical, photographic and archaeological evidence for a boat 'lay up' area south of the wharf, roughly corresponding with the end of the seawall and where a small tidal flat ran off west of Butcher Inlet (Figure 9). The lay up season coincided with the cyclone season, when the pearling fleet took the opportunity for maintenance and to make repairs. Mr W.A. Thompson described the lay up procedure in his memoirs:

> 'The mother ships would control possibly five to ten luggers each. The luggers would start dribbling in towards the end of September and the last would probably have arrived by end of November and the mother ships following. The luggers needing repairs to under water copper sheathings, deck caulking, or any other work, would lay up at the Western end of the town ship on a beautiful wide sandy beach, which was a feature of Cossack's foreshore up to the

year 1900; but seems to have deteriorated since then, by the extensive collection of mud and mangrove growth at both western and eastern ends of the old port. The remainder of the luggers would anchor securely in the protected waters, in the lee of the mangrove island, lying one third the length of Cossack creek at the western end. At low water many old rusted anchors and chains were still visible as evidence of breakaways during a 'willy willy or, as they are now known a 'cyclone' (Thompson n.d.)

Archaeological evidence of the layup area includes cut fragments of copper sheathing, keels and wrecks of small vessels, ballast mounds and corroded remains of mooring chains.

Figure 9. Layup and mooring area south of Cossack wharf of unknown date, possibly late 1880s or early 1890s. Photographer unknown. (WA Museum, Department of Maritime History).

Maritime infrastructure

Maritime infrastructure can be broadly defined as infrastructure built to aid the safe navigation of vessels and service the conduct of maritime industries and trade. Maritime infrastructure includes such things as ports, harbours, jetties, piers, wharves, navigation aids, cargo lading and storage facilities, lighthouses, moorings, pilotage, customs and quarantine facilities. They can be official or unofficial (vernacular) structures.

Cossack's main function was to serve as the port for Roebourne ten kilometres inland—the administrative centre of the Pilbara—and surrounding pastoral stations and mines. Passengers, goods and mails were also transhipped from Cossack to smaller ports and stations on the Northwest coast such as Condon and Balla Balla. Cossack's efficacy as a port depended on being able to land imports of stock and cargo, and export produce such as pearl shell, stock and wool.

This function was impeded by Cossack's natural disadvantages of a being situated in a tidal inlet with shallow shifting channels, being regularly subjected to destructive cyclones between December and April, a lack of fresh water and primitive infrastructure facilities in such a remote area. It was also cut

off from Roebourne by swampy marshland that caused numerous problems for the carriage of people and goods. Even with the later construction of a road and tramway, these were often damaged, cut off or washed away by the flooding and storm surges that accompanied cyclones.

Though vessels of up to 400 tons did occasionally berth at Cossack jetty and wharf, most coastal and international vessels anchored in the roads off Jarman Island where they were attended by lighters to load and unload cargo. As this involved double handling of cargo, lightering was expensive, labour intensive and time consuming. There were also problems with coastal steamship service timetables not corresponding with the high tides necessary to transport cargo up Butcher Inlet to Cossack, with steamers bypassing Cossack as a result.

The maritime archaeological survey recorded most of Cossack's major maritime infrastructure features including the Upper Landing, Cossack Quay and seawall, Explosives Jetty and ship repair and layup area (Figure 10). Although the Cossack to Roebourne road, causeway and Cossack to Roebourne tramway can be considered as maritime infrastructure, they are not included within the scope of this report.

Dig Down/ Dig Rock postal site

In terms of maritime communication one of the earliest sites was a 'post office' described as 'six miles [9.5 kilometres] from the Upper Landing' near the mouth of the Harding River, which was informally known as either 'Dig Down' or 'Dig Rock'. Mails were left in bottles or nailed to a nearby tree for settlers and ships heading south. The site was known informally to local settlers and ships' masters, though its position was never marked on any early surveyors' maps or charts (Withnell Taylor 2002: 38-39). The described location 'six miles from the Upper Landing' with fresh water places Dig Down/ Dig Rock in the proximity of Roebourne. This site was not searched for on this survey.

Lower and Upper Landing

From 1863 cargo and stock were loaded directly onto a mangrove-free area of sand-covered Pleistocene rock beach on the west side of Butcher Inlet known as the 'Lower Landing'. Goods were then reloaded onto smaller flat-bottomed vessels to be transported to the maximum navigable extent of a narrow, mangrove-lined tidal channel to the 'Upper Landing'. The Upper Landing avoided the marsh lying between Cossack and Roebourne requiring just a 200 metre tramp across a mudflat, and was the closest point to Roebourne that cargo could be transported by watercraft.

The Upper Landing was used from the earliest times as indicated by the notation 'Boat Landing' on C.C. Hunt's chart of Tien Tsin Harbour dated 1863 (Figure 11). Later charts name the location as the 'Upper Landing'. Withnell constructed a warehouse, earth road and a stone causeway across the remaining 300 metres of tidal marsh to dry ground (Nayton 2012: 92). Archaeological evidence includes the roadway with its 200 metre long stone causeway (Figure 12), a rock-lined area of levelled and stepped ground next to the tidal channel, and the disintegrated and corroding remains of a large ship's windlass (Figure 14). Given the large dimensions of the windlass and the early use of the Upper Landing, it is possible that it was salvaged from the wreck of the *New Perseverance* (1867) to use for loading and unloading of cargo.

Figure 10. Map of Cossack and Butcher Inlet showing maritime infrastructure sites and areas of activity described in text.

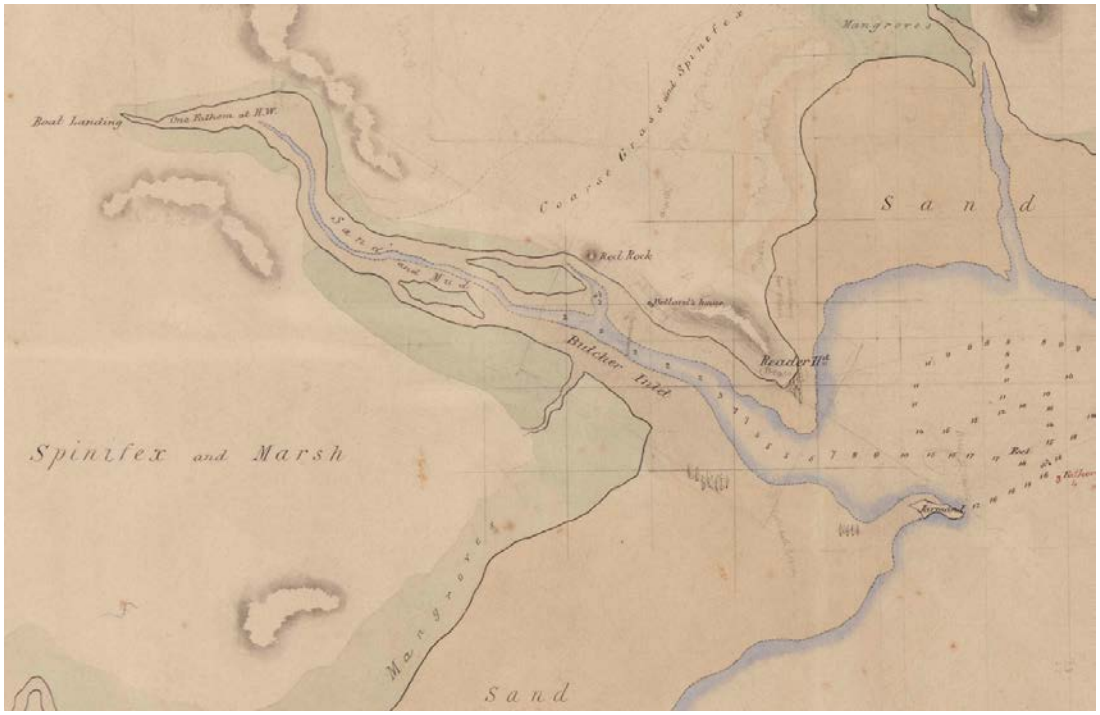

Figure 11. Detail of Butcher Inlet, note 'Boat Landing' at upper left which is the site of the Upper Landing (Plan of Tien Tsin Harbour by C.C. Hunt in cutter *Mystery*, Peter Hedlund Comr, May 1863, State Records Office).

Figure 12. Upper Landing stone causeway, view looking north.

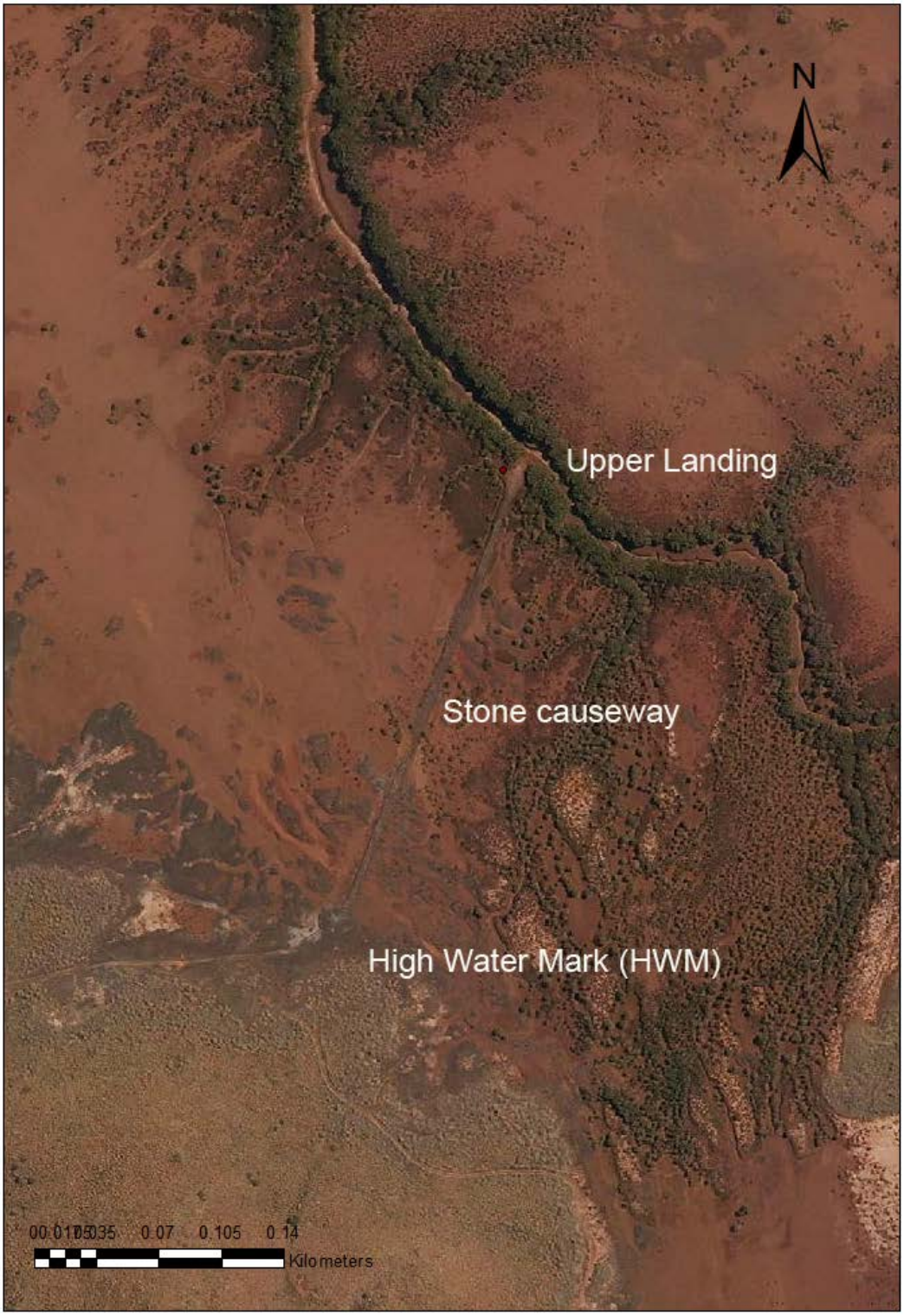

Figure 13. Aerial GIS image of Upper Landing showing main features

Figure 14. Corroded remains of windlass (Feature CK45) at Upper Landing.

First jetty

There is some confusion over the construction of Cossack's first jetty. The Heritage Council of Western Australia records that in February 1868 Messrs. Harper and Grant built Cossack's first jetty, with a derrick that was used to load wool and pearl shell (HCWA Cossack Townsite Assessment 2006: 4). Nayton records that pearlers built the first jetty and Knight and Shenton's store during 1869-70 season (Nayton 2012: 119)

Second jetty

In 1875 it was reported that:

> Improvements are gradually and surely taking place here, for I find the stonework of a new jetty has been completed, and the contractor (Mr. Clarkson) is only waiting for the arrival of the timber (which is expected by every vessel) to complete it (*The Western Australian Times* 5/10/1875 p.3).
>
> The jetty is in course of construction, and, when completed, will be a great boon to the masters of trading craft, there being at present only one lighter, which, to say the least, is both tedious and expensive. The contractor is at a standstill for timber (*The Inquirer & Commercial News*, 6/10/1875 p.2).

These reports indicate that the second jetty probably consisted of a stone foundation with timber piles supporting timber decking, probably jarrah (Figure 15). Tenders for construction of a road were also being called for in 1875 (*The Western Australian Times* 21/12/1875 p.3) indicating the increase in trade and shipping to Cossack and requirement for better transport infrastructure between Cossack and Roebourne.

Figure 15. Photograph of what is believed to be Cossack's second jetty, date unknown (WA Museum, Department of Maritime History).

This basic early infrastructure was soon overwhelmed by the growth of the shipping trade and rapid development of the Northwest. On 3 August 1885 a public meeting in Roebourne brought to the notice of the government a litany of maritime infrastructure woes that were not only inhibiting trade, but endangering shipping. These included the inadequacy of the 'wretched kerosene lamp' that served as a lighthouse on Reader Head, the 'already inadequate' jetty extension project

underway, the lack of a goods shed or cranes, the channel was 'imperfectly buoyed' and a lack of reliable moorings for ships of reasonable tonnage (*The West Australian* 21/8/1885 p.3).

By 1891 Cossack was handling over 6000 tons of cargo annually, and there was still no improvement to the basic facilities. One resident provided a vivid description of the jetty and chaotic conditions at the port when complaining that:

> The structure that we dignify with the name of a jetty would perhaps be better described as a landing stage; it measures 25 feet [7.62m] in length by 20 feet [6m] in breadth, and is entirely innocent of any appliances either for mooring the boats, or facilitating the discharge of cargo; there is no crane, and cargo has all to be hoisted by the very primitive arrangement of a block and tackle, which is worked by a horse. With the Adelaide Steamship Company's boats trading coastwise, and the *Australind* and the *Saladin* running to Singapore, we have steamers calling at the rate of fully one a week, nearly all of which carry heavy cargoes for Cossack... the inward trade at the port can be put at 6000 tons per annum, to which has to be added the export of wool, shell, sheep, horses, cattle, &c. Taking the import trade alone, this gives an average of 500 tons per month, which, being taken from the steamers in the Roads, is heaped (literally heaped) on the wretched jetty, whence it is carted or trammed to Roebourne, or re-shipped in small boats for delivery at the minor ports along the coast. The jetty is in such a chronic state of block that it is always difficult, and often impossible, to obtain the cargo that is lying on it for the various destinations, and it frequently happens that settlers' teams are sent down to the port, and have to return empty for the simple reason that the teamsters are unable to get at or find the goods that they have sent to cart, until the owners of the goods that happen to be on top have had them removed (*The West Australian* 29/6/1891 p.4).

The same report also stated that there was no wharf manager at Cossack, and pilfering of cargo was rife. This jetty was later buried and built over by the Cossack quay.

Stone quay/ Cossack wharf

After much representation from the community the government acted to improve facilities, and in February 1895 a new land-backed stone quay was opened (Figure 16). The structure was built of worked local granophyre stone filled with earth (Figure 17), and was built over the site of the earlier jetties. A steam crane and winch, and goods shed were also provided, and the substantial stone buildings of the Customs House, Bond Store and seawall were built at around the same time. A Public Works Department Plan dated 1892 (Figure 19) shows the new quay wall being planned as part of proposed improvements for Cossack. The quay and seawall were built at the same time around 1894.

Figure 16. Cossack quay at low tide with Customs Bond Store in background and more recent concrete boat ramp. The turtle pen and swimming baths were in this area north of the quay, in front of the Customs Bond Store.

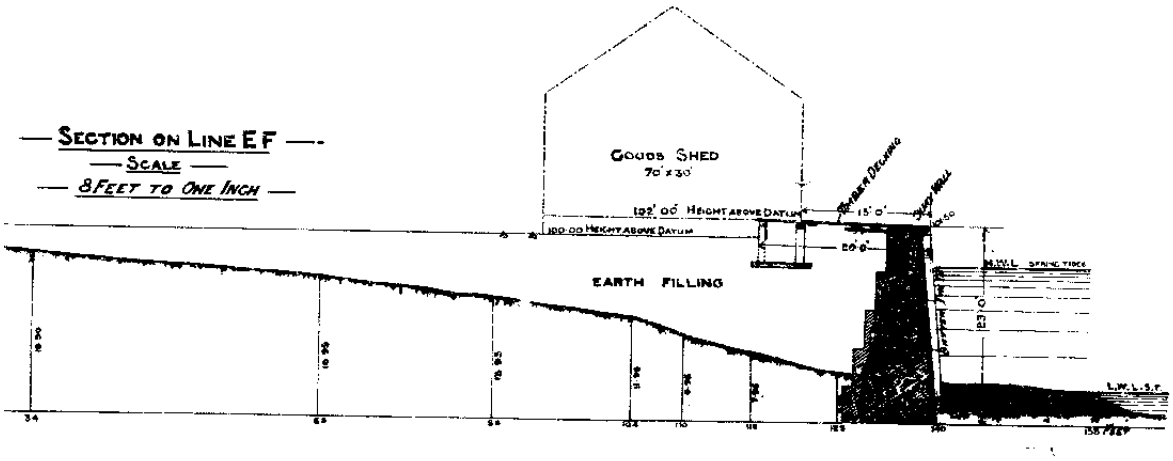

Figure 17. Section through quay and goods shed showing stone quay wall and extent of land reclamation and earth fill (SRO 1983 PWD 1501).

Figure 18. Steps on northern side of Cossack quay at low tide in 2012.

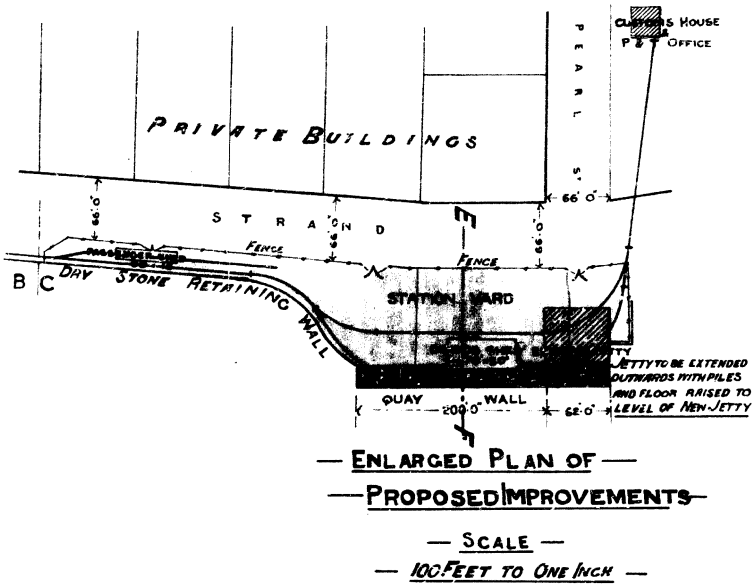

Figure 19. Plan of proposed Cossack wharf. Note old jetty incorporated into new structure (SRO 1983 PWD 1501).

The timbered deck of the quay was level with the 'highest known water level' during cyclones (PWD plan 1983). Today the iron goods shed has been removed though the concrete foundations are visible. There is a set of stone steps running down the face of the north wall of the quay of which

parts are eroded, and a large structural crack is evident (Figure 18). A modern metal pontoon jetty has been added to the south wall of the quay for use by small boats. An iron stock harness most likely dating to the late 19th/ early 20th century is found abandoned in the mangroves on the southern side of the quay. A boat-based photographic survey to record the condition of the stone quay wall was undertaken.

Seawall

A Public Works Department Plan dated 1892 (SRO 1983 PWD 1501) shows a 'dry stone retaining wall' in conjunction with quay (Figure 19). The seawall extends south from the end of the wharf, and was designed to stop the Strand from flooding at high tides, and to increase the useable size of the port station yard. The seawall has since been much affected by cyclones and storm surges with some sections consisting entirely of collapsed rubble, though remaining structure observed in 2012 includes mortared flat slabs of stone laid in up to seven courses, with a maximum height of 1.5 metres.

Figure 20. Mortar repair on Cossack dry stone retaining wall/ seawall.

A drain or culvert was placed just south of the wharf. A detailed survey of the seawall was undertaken to document its current state, and provide a baseline for future surveys to assess cyclone and/ or storm surge damage (Anderson & Bigourdan 2013). Given that the Public Works Department plan describes a 'dry stone wall', mortared sections of seawall observed (Figure 20) may be evidence of areas that were repaired following cyclones, such as in 1894 when part of the seawall

was ‘carried away’ (*Argus* 29/1/1894). Nayton (2010) provides a plan showing two breaches in the sea wall that were archaeologically surveyed in the 1990s.

Explosives magazine, tramway and jetty

The explosives jetty (Feature CK67) is situated north of the Cossack town site on the western shore of Butcher Inlet. The construction date of the explosives jetty and magazine is unknown, but appears to have been constructed around the 1890s, being associated with the development of gold and copper mining in the Pilbara. The explosives magazine (Feature CK65) is a roughly made, thick-walled stone structure incorporating natural bedrock of the hill on its southwest corner (Figure 21). The remnant jetty structure consists of loose boulders that appear to have been collected from the beach immediately south, and piled up to form a stone groyne/ jetty (Figure 22, Figure 23). This has left a cleared area of sandy beach to the south of the jetty suitable for pulling up small boats at high tide. There is a concrete footing and three iron bolts in the intertidal zone just south of the jetty. The alignment for the a horse-drawn tramway cuts uphill through the foredune with a rock wall embankment, and further concrete and bolts indicating the track route are situated inland along the tramway route to the magazine. A modern vehicle track makes use of the tramway cutting alignment to access the area.

Figure 21. Explosives magazine structure (Feature CK65).

Figure 22. View of explosives jetty (Feature CK67) at low tide looking northeast.

Figure 23. View of explosives jetty (Feature CK67) at low tide looking southeast.

Stock Jetty

The Stock Jetty was constructed on the eastern side of Butcher Inlet opposite Cossack town site (Figure 24) along with a cattle race and stockyard. The jetty was sited to take advantage of the 'Deep Pool' that allowed vessels to float at anchor at low tide, though the 'tortuous channel' was difficult for the larger steam lighters to navigate. The Stock Jetty was extended around 1897, though shortly afterwards most of the older part of the jetty was destroyed during the 1898 cyclone (*West Australian* 10/5/1898 p.2). A Public Works Department plan relating to 'Cossack Harbour Works – Stock shipping movements contract' (PWD 4209) shows a platform extending into the water for the cattle yard, an area delineated for dredging and a nearby wreck in the channel with the annotation 'Old Wreck to be removed' to improve vessel access to the Stock Jetty (PWD 4208).

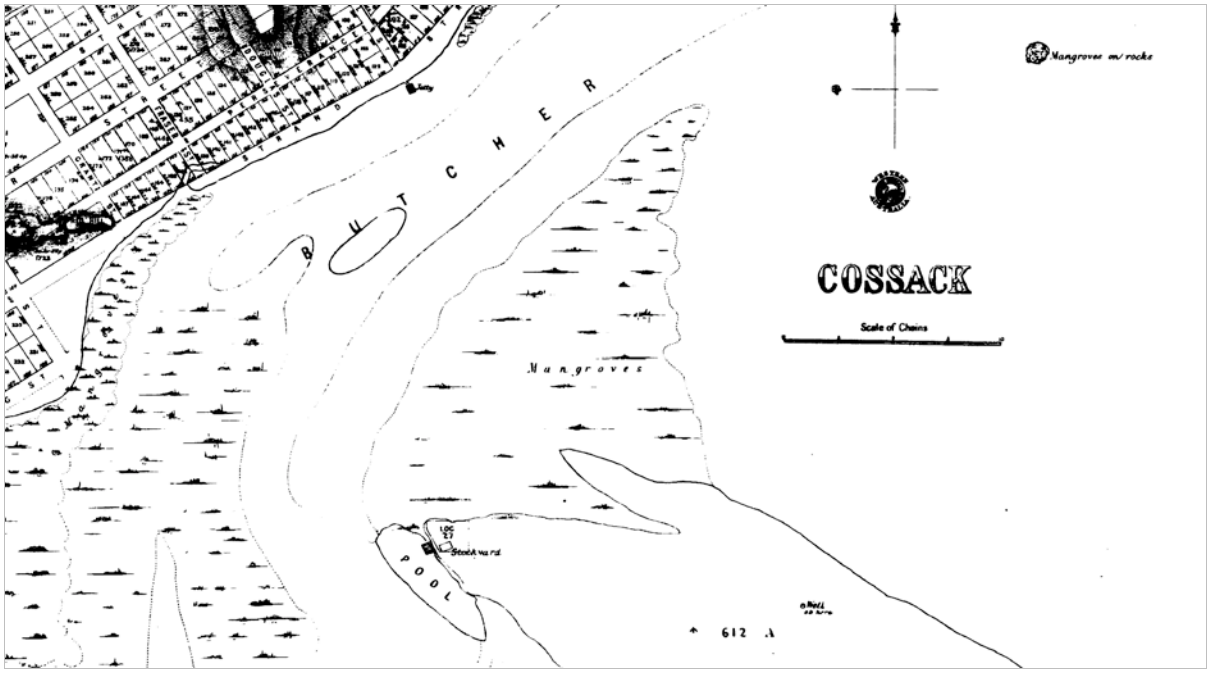

Figure 24. Location of Stockyard Jetty in Butcher Inlet on peninsula opposite Cossack. Note 'Deep Pool' (SRO 0448 Cossack Townsite 1896).

A heavy mooring was placed in the Deep Pool (also marked on charts as 'The Pool') at the Stockyard Jetty for the use of ships loading and unloading cattle. This landing on the eastern bank of Butcher Inlet was also used as the access point for the Cossack lazarette situated north of the cattle yards. No evidence of the Stock Jetty was seen though a close investigation was not possible. The land in the stockyard area is clear of vegetation and mangroves.

Point Samson Jetty

Due to the existing limitations of Cossack and the increasing siltation of Butcher Inlet, an alternative to cope with the increasing demands of coastal shipping was required. In 1903 the government constructed a jetty 2137 feet (651 metres) long at Point Samson (Figure 25), providing sufficient depth to allow large vessels to berth at all tides, although this location was still exposed to prevailing easterly winds and the full force of cyclones. The Norwegian timber carrying barque *Solveig* was wrecked in 1903 while carrying piles for the construction of the Point Samson jetty, and the jetty

was severely damaged in 1912 by a storm carrying away part of the T-head and sixty fender piles, causing shipping to be diverted through Cossack for a period of three months while repairs were undertaken (*Western Mail* 30/3/1912 p.16). When the tramway connecting Port Samson directly to Roebourne was constructed in 1910 the bypassing of Cossack was complete (Nayton 2012: 60, 143). The crew of a lugger saved the Point Samson jetty from being destroyed by a fire in 1911, though the goods shed and nine piles were destroyed (*Northern Times* 11/11/1911 p.3). When the Point Samson jetty was destroyed beyond repair by a cyclone in 1925 (*Argus* 26/1/1925 p.5) Cossack enjoyed a temporary resurgence as a lightering port for the Northwest, but it was never a major port again, eventually becoming all but abandoned in the 1940s (Nayton 2012: 143). Goods exported from Point Samson jetty included stock, and asbestos from Wittenoom that was transported by locomotive to be heaped in loose piles next to the jetty, and then manually shovelled into bags.

Figure 25. Point Samson jetty ca. 1910 (WA Museum).

Figure 26. Point Samson jetty piles in inter-tidal zone, June 2012.

Ex-Public Works Department (PWD) diver Tim Eastwood described his role in the demolition of Point Samson jetty around the 1984-85 summer season. The PWD divers were requested to assist with demolition as the jetty was in dilapidated condition and there were concerns over it breaking up and becoming a navigation hazard. The divers conducted an underwater survey of the jetty and found some piles of 500mm diameter that were affected by teredo worms. The method of demolition involved pouring kerosene over the jetty and adding explosives, then lighting it, thinking the heavy timbers would sink to the seafloor. Although the explosives had the desired destructive effect the divers were then forced to spend the next several weeks in a boat picking up loose floating timbers all the way to Cape Lambert, having created the problem they were trying to avoid! (T. Eastwood, pers. comm. July 2012).

A low tide inspection of the Point Samson jetty remains in the inter-tidal zone showed remains of timber piles, iron bolts and concrete jackets (Figure 26). An unusual feature of the timber piles is that they had been copper sheathed. While copper sheathing would have been expensive, this is

interpreted as being a necessity for the Northwest where maintenance would be limited, therefore the jetty was constructed to the highest possible standard (and expense) to reduce maintenance and promote longevity for the structure. A large landward section of the jetty with intact timber piles, decking and railway lines has collapsed but remains *in situ*, where at the time of this survey it was fenced off as a hazard.

Lighthouses, buoys and beacons

Wooden navigation beacons were erected on Lookout Hill (Reader Head) and Jarman Island in 1866 (Nayton 2012: 58). In 1872 the SS *Xantho* landed the first lit beacon at Port Walcott/ Cossack, which was replaced in 1881 by a wooden lighthouse at Reader Head. This lighthouse burnt down in 1884, and the Jarman Island lighthouse was subsequently constructed in 1888. A possible foundation for the Reader Head lighthouse in the form of a built-up platform of granophyre boulders is found at the top of Reader Head, now the site of a visitor lookout pergola.

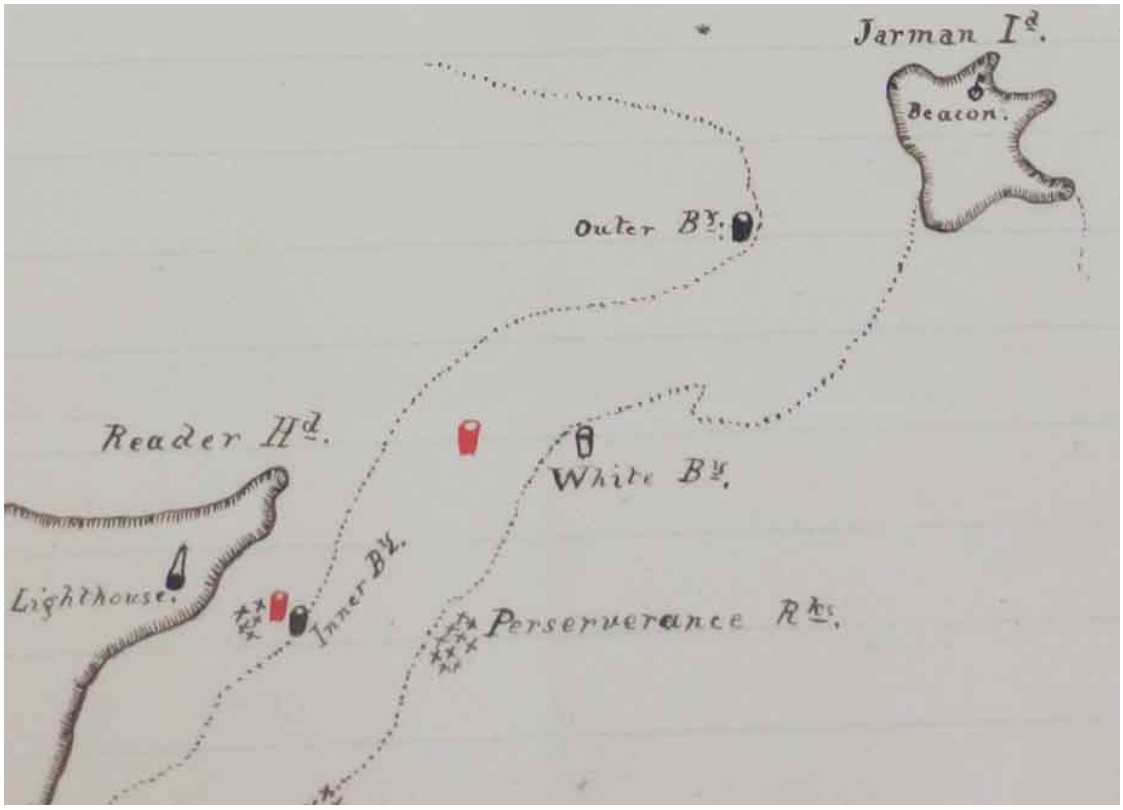

Figure 27. Sketch plan by Capt. Blair Mayne showing positions of Reader Head lighthouse, Jarman Island beacon and the three Butcher Inlet entrance navigation buoys in November 1884. (SRO 1884/ 5986)

The brigantine *Sea Ripple* owned by A. Clark of Ashburton was being used as a hulk and lightship at Cossack, when it was blown ashore by a cyclone and wrecked in 1893. The *Sea Ripple* had previously been converted to a lightship by the Adelaide Steamship Company, and operated as a storage hulk and lightship at Carnarvon between 1886 and 1892 (Cairns & Henderson 1995:210).

Jarman Island lighthouse was constructed from a kit of prefabricated cast-iron panels imported from England. Both the iron lighthouse and stone keepers quarters on Jarman Island were built by prison labour under the supervision of Resident Engineer Warden Owen using Indigenous, Malay and Filipino prisoners for labour. Owen found it was necessary to keep the Islamic Malay and Catholic Filipino workers camps separate during the construction works to avoid conflict between the workers (Cumming et al: 37; Owen 1934).

Jarman Island had previously had a tub beacon constructed out of a wooden cask mounted on a pole held in place by a rock cairn and wire stays (Figure 36). Related maritime infrastructure on Jarman Island includes the lighthouse keepers' quarters (built in two stages from 1887), boat shed foundations and launching ways. In 1911 the Jarman Island lighthouse was converted from oil to kerosene, and operated until 1985 when it was replaced by the Cape Lambert lighthouse (Cumming et al: 37).A plan dated September 1878 contains an inset plan named 'Butcher Inlet Port Walcott/ Surveyed by H. Stuart Carey'. The inset plan shows the position of two beacons on rocks marking the north-western entrance of Butcher Inlet (Cossack Tally 504081, State Library Map Collection).

By 1884 the entrance channel to Butcher Inlet/ Cossack Creek was marked by three buoys:

1) An outer black buoy on the east end of the spit off Reader Head, to be kept on the starboard by vessels entering port;

2) A white buoy on the end of the spit of Perseverance Rocks, to be kept on the port side by vessels entering port;

3) An inner black buoy on the inside of some unnamed rocks to be kept on the starboard side by vessels entering.

A map by Captain Mayne shows the location of entrance buoys, with buoys marked in red being the middle entrance white buoy and inner black buoy, that were relocated to their correct positions after having drifted and/or the channel shifted (Figure 27) (Capt. Blair Mayne, Inspector of Pearl Shell Fisheries aboard Revenue Schooner *Eloise* at Cossack to Colonial Secretary 6/11/1884, SRO 1884/ 5986).

Other correspondence describes how the former Perseverance Rocks beacon was 'stepped into a fissure in the rocks and wedged up by blocks or lumps of stone', and recommended that a future strong iron staff beacon on Perseverance Rocks should be four inches square, sunk into the rock to depth of four feet using 'jumpers' and 'wedged up' (George Forsyth, Fremantle and Northwest Harbour master to Colonial Secretary 22/7/1885, SRO 1884/ 5986). Following complaints that the previous mooring stones were 'eaten away' and chains corroded, new materials for navigation buoys and markers sent to Cossack on 24 August 1885 included 'requisite anchors, chains, two buoys, small cask and iron cage beacon' (George Forsyth, Fremantle and Northwest Harbour master, note on file 24/8/1885, SRO 1885/ 2604). The buoys were moored with seven and a half fathoms of chain connected to swivels and two small anchors, in the absence of suitable mooring stones with rings (SRO 1885/2604).

Archaeological remains of navigation buoys and markers may include chain moorings, anchors, mooring stones, rock cairns and any evidence of markers installed on rocks such as remnants of corroded iron work, anchoring points for cable stays and drilled/ worked foundations.

Moorings

Around 1871 Mr Howlett put in the first moorings and navigational beacons for Butcher Inlet (Nayton 2012: 119). A Public Works Department chart from 1888 shows moorings on the eastern side of Butcher Inlet marked as 'A.S.S.Co. Moorings', that would have been used by Adelaide Steam Ship Company lighters servicing their regular coastal steamships (PWD Plan 1788). A heavy mooring was placed in the Deep Pool (also marked on charts as 'The Pool') at the Stockyard Jetty for the use of ships loading and unloading cattle.

Figure 28. Mangrove tree with chain used as a mooring point in Butcher Inlet (Feature CK22).

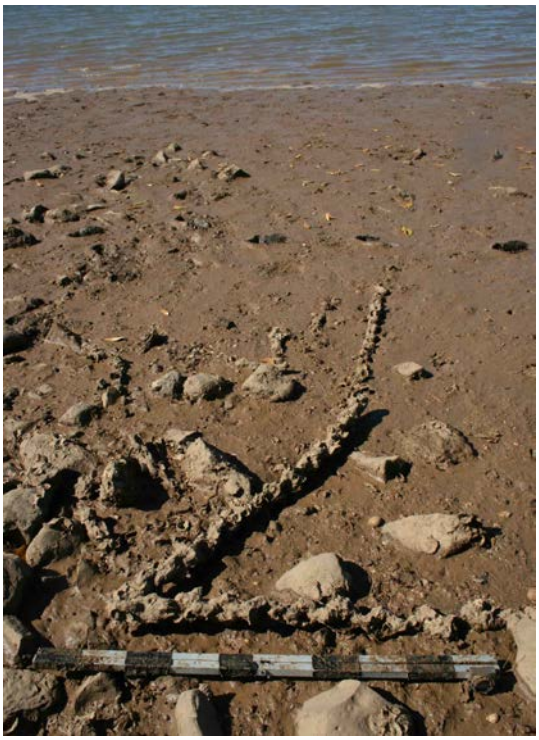

Figure 29. Corroded mooring chains are evident along the length of Butcher Inlet foreshore.

Small cutters and luggers used anchor and chain moorings in Butcher Inlet, with multi-point moorings being used during cyclones. Foreshore surveys recorded numerous lengths and segments of corroded chain and two examples of large mooring chains secured to mangrove trees (Figure 28, Figure 29). The magnetometer survey recorded numerous anomalies on the south side of Vampire Island, which are interpreted as being evidence of chain and anchor moorings used by small craft that are known to have used this sheltered area.

A number of moorings are known to be of more recent origin, usually consisting of tram wheels (Russ Heaton, pers. comm., 27/6/12).

Slipways and grids

In May 1926 Captain Courthope, part-owner of the schooner/ lighter *Nicol Bay* applied for permission to build a 'grid' to be used for the purposes of cleaning the hull of the *Nicol Bay*. The grid was also described in correspondence (SRO 475/26) as a 'slipway', which in nautical terminology usually refers to a sloping surface leading down to the water on which ships are built or repaired, requiring them to be winched up. In this case the grid was constructed as a flat platform-type structure to utilise the tidal range of Butcher Inlet (Figure 30). Vessels could be floated onto the grid at high tide, leaving them well supported above the mud and allowing access to the lower hull as the tide dropped.

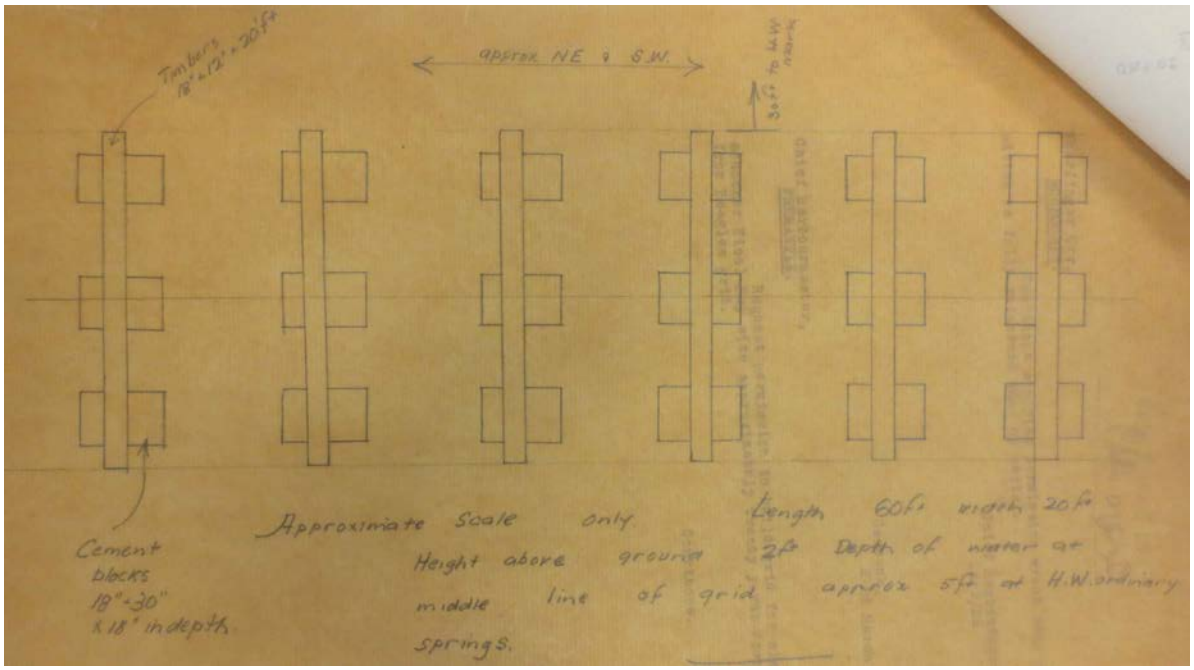

Figure 30. Captain Courthope's proposed grid (SRO 475/26).

The Commissioner for the Northwest approved the construction of Captain Courthope's grid as the Cossack wharfinger recommended it would be an asset to the port of Cossack, and would not interfere with the working of the harbour. The location of the grid was described as being approximately 250 yards (228.6m) from the wharf and well clear of the place usually used by luggers for lay up purposes. It was also described as being 'approximately 20 yards downstream from the *Beagle*'s grid' (SRO 475/ 26). It is not known whether Courthope did in fact construct the grid, though a drawing and description of its proposed layout exists in the archives.

The proposed grid was to have a length of 60 feet (18.3m) and width of 20 feet (6.1m), being 2 feet (61cm) above ground level with a depth of water over the middle line of the grid approximately 5 feet (1.5m) at high water ordinary springs. It was to be constructed of six parallel rows of timber bearers 18" x 12" x 20 feet (46 x 30.5 cm x 6.1m) with each bearer supported by three cement blocks 18" x 30" x 18" in depth (46 x 76 x 46cm) as foundations. The grid was to be oriented approximately northeast by southwest and lying 30 feet (9.1m) from the ordinary high water mark (SRO 475/ 26). An image of the iron lighter SS *Beagle* at Cossack (Figure 31) shows the *Beagle* resting on a grid of six

or seven large timbers or concrete sleepers at low tide, with the remains of a wooden wreck in the foreground.

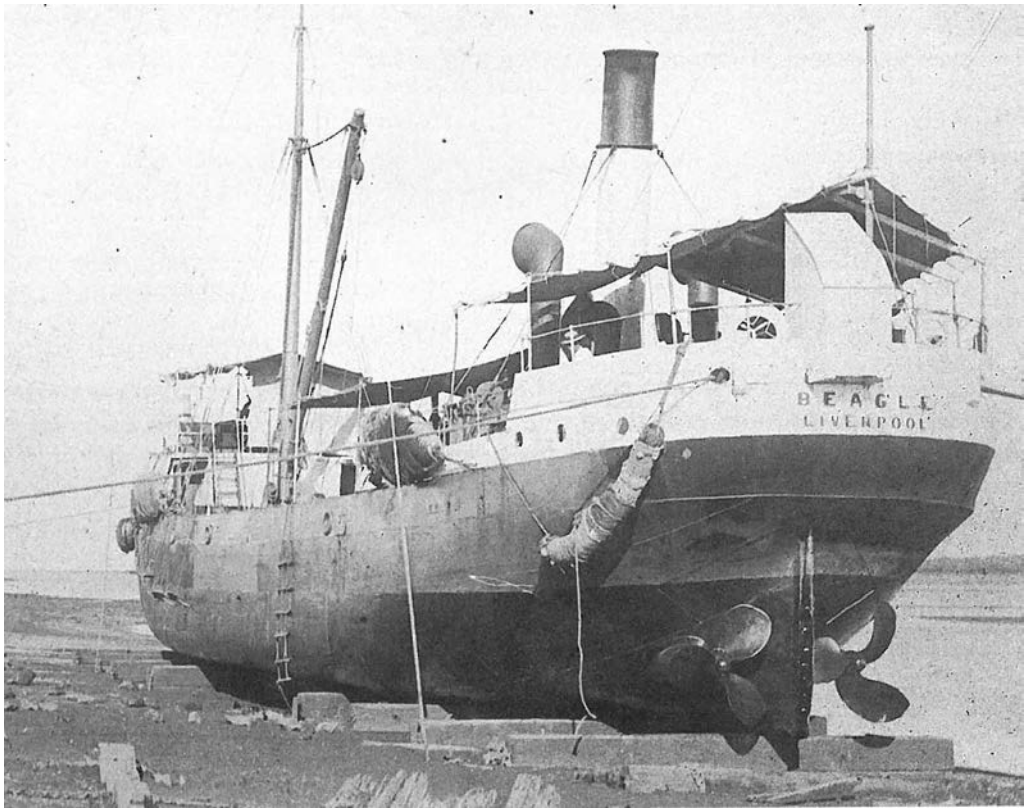

Figure 31. The steam lighter *Beagle* resting on its grid at Cossack around the 1890s. Note remains of a wooden wreck in the foreground (Battye Library 21613P).

Two cement foundation footings measuring 50 x 80cm and 190cm apart associated with iron or steel rollers were located on the Butcher Inlet foreshore that may be related to Courthope's, or another slipway, or a boat house. One of the footings had copper alloy and iron ship's fastenings embedded in it indicating it would have supported a timber, now missing. Another concrete and rock foundation feature of unknown function measuring 150 x 55 cm lies six metres south.

Another feature consisting of three parallel timbers partially buried in mud further south is interpreted to be remains of a grid. One of the timbers had the remains of copper alloy fastenings and appears to be the keel or false keel timber recycled from a broken up vessel. The largest visible timber measured 6.2 metres in length and 34cm width, the three timbers lying 5 metres apart.

Turtle pen

Commercial turtle fishing was conducted in the Northwest from the late 19th century, with the main target being green turtles (*Chelonia mydas*). Turtle fishing followed traditional Indigenous fishing methods, although with the technological advantage of using small cutters or motor launches. When

a turtle was sighted a turtle catcher would leap over the side of the vessel and wrestle the turtle onto its back underwater rendering it helpless, the boat crew retrieving both catcher and turtle when they came to the surface. Adult turtles weighed between 200-250 pounds (90-113 kilograms). During the 1920s and 1930s with the development of canning preservation technology, the Roebourne Produce Company, Chelonia Company, Monte Bello Sea Products Ltd and Australian Canning Company used Cossack as a base to intensively exploit this marine resource. Turtle products included pure extract of turtle, soup, jelly, oil (used in skin creams and cosmetics), meat, and blood and bone fertiliser (*Northern Times* 3/10/1931 p.6). The London-based Chelonia Company was formed in 1922 of mainly Scottish investors with capital of £25,000, and held government concessions for the collection of turtles from the Dampier Archipelago and Monte Bello Islands. The operation involved live turtles being transported by schooners to Rockingham south of Fremantle, where holding pens and canning and preserving works were constructed (*Argus* 26/10/1922 p.10).

In 1932 it was reported that the Monte Bello Sea Products Co. was in the final stages of negotiations with the Commonwealth Government to purchase the Bond Store for use as a turtle and fish processing factory (*Western Mail* 29/9/1932 p.50) and by 1933 had 'undertaken valuable experimental work in the canning of turtle soup at Cossack' (*West Australian* 3/5/1933 p.12). In 1933 the Australian Canning Company formed in London with capital of £25,000, and like its predecessor the Chelonia Company held an exclusive turtle fishing lease from the Western Australian government. The same year the company took over Monte Bello Sea Products with the aim of expanding the canning operation and importing turtle soup and other products to Europe (*West Australian* 3/5/1933 p.12). The securing of the exclusive marine lease was essential to the Australian Canning Company's operation in order to ensure supplies, and avoid price rises if demand were to outstrip supply. It appears that the company relied to some extent on non-waged turtle fishers with their own boats to provide turtles, who would be paid a set price by the company..

In 1934 it was reported that the Australian Canning Company was installing additional plant capable of trebling its output (*West Australian* 22/2/1934 p.13), however by 1938 the company had gone (somewhat aptly) into liquidation (*Northern Times* 26/2/1938).

An article in the *Western Mail* of 4 June 1925 shows photographs of the Roebourne Produce Company's operation in the Cossack Bond Store including workers, a view of the interior of the factory with cooking boilers and the turtle pen situated on the foreshore. The turtle pen was situated in the inter-tidal zone on the foreshore opposite the Bond Store, and appears to have been constructed of timber or iron posts with wire netting approximately three metres high. No evidence of the turtle pen was seen during this survey.

Trepang fishing

There is historical evidence for late 19th and early 20th century Chinese commercial fishing for trepang (also known beché-de-mer or 'sea cucumber') (*WA* 14/9/1946:5), with the extensive drying inter-tidal reef flats surrounding Bezout Island and other offshore islands providing the required habitat and harvesting grounds.

In 1888 it was reported that 'Messr's Millar Bros. *Water Lily* has been sold to some Chinese merchants here for £140. The celestials intend using her for fishing purposes' (*Inquirer and Commercial News* 19/12/1888:4). In 1889 a vessel named *Lily* owned by Chinaman Ah Wee went

missing in a cyclone west of Cossack, with Ah Wee and three other Chinese aboard (Western Mail 16/3/1889:25). It is uncertain whether this *Water Lily* and *Lily* are the same vessel.

In January 1893 the cutter *Beatrice* owned by Wah Shing was wrecked in the Dampier Archipelago with five Chinese fishers Ah Chik Ah You, Ah On, Hing Long and Ah Hong who 'were stationed beach de mer [sic] fishing for Wah Shing Chinaman storekeeper Cossack' (SRO 1893/0213, 18/1/1893).

Mr Savile Kent, Commissioner of Fisheries reported in 1894 that:

> Concerning the species of beché-de-mer indigenous to the Nor'-West district and the prospects of developing a more extensive trade in the marine product, I have already made a brief reference in my last year's report…Up to the time of my visit the first-named species [*Actinopyga mauritania*] only was collected for the Chinese market, the second form [*Holothuria sanguinolenta*] being passed over as apparently identical with a common non-commercial species with which it is frequently associated. By indicating the essential points of distinction that subsist between these two external corresponding species, I was enabled to put the local collectors in the way of adding materially to their customary harvest….As remarked, when referring to the possibilities for pearl-shell culture possessed by [King George Sound region], but little substantial progress can be expected until the adjacent coast line becomes more settled or a more friendly relationship is established with the natives. It is of interest, however, in this association, to place on record that during my brief stay in King Sound last October, natives from the north side of the entrance to the Sound came in for the first time to volunteer their aid in company with the Cygnet Bay and other south-side natives in the collection of beché -de-mer (*West Australian* 12/5/1894:9-11).

As late as 1934 Cossack was described as 'the haunt of a few Chinese trepangers' (*West Australian* 28/3/1934:4) while in 1946 Edward H. Angelo reported two Chinese beachcombers camping on Bezout Island, with two baskets on poles recovering trepang from the reef at low tide, who subsequently went missing (*Western Australian* 14/9/1946: 5).

As yet no archaeological evidence has emerged of any associated processing sites or camps used to smoke the product to make it palatable for consumption.

Overall the above references indicate that a trepang trade operated from Cossack exporting to the Southeast Asian/ Chinese market from at least 1893 to 1946 (and probably earlier); that from 1894 Mr Kent's advice may have contributed materially to the development of the trade; that at least one or two vessels were owned by Chinese merchants involved in the trade; and that in 1894 Aboriginal people from the King Sound and Cygnet Bay areas were collecting trepang in the King Sound area, possibly by Chinese or Macassan trepangers.

Recreation

The Cossack foreshore and Butcher Inlet were venues for recreation and aquatic watersports. The annual New Years Regatta and sports day was held with running, sack, dinghy and rowing races, and a sailing race around Jarman and Hat Islands. There was a separate race for Indigenous crews reflecting the segregation of the time. Recreational fishing has long been a popular pastime at Cossack.

A swimming enclosure made of posts and netting (*NT* 5/11/1926 p.6) and dressing sheds were installed some time before 1926. In 1926 the baths were damaged by a vessel carrying away one of the posts and netting (*NT* 5/11/1926 p.6) and the following year the Roebourne Road, Water and Health Board allocated £10 to repairing the baths (*NT* 10/12/1927 p.4). It was also reported that the dressing sheds were being misused, 'people using them for storage purposes and making it very inconvenient for ladies who take their children for a swim and use the sheds for dressing' (*NT* 5/11/1926 p.6).

In 1939 it was reported that materials for new swimming baths had been ordered and the dressing sheds had been renovated (*NT* 22/12/1939 p.4). The exact location of the baths and dressing sheds has not been ascertained, though they were probably sited on the foreshore in front of the Bond Store, or just northwards. No evidence of the swimming baths or sheds was seen during this survey.

Ballast dumps

A possible ballast dumping area is located in Port Walcott anchorage 400m west of the sloping rocky point of Jarman Island in about three metres depth. It is visible on aerial photographs as a dark patch (Wayne Young, pers. comm. 28/6/12). Ships arriving in ballast for wool cargoes would have dumped their ballast before taking on cargo.

Lazarettes

Leprosy was first detected in Western Australia at Northam, near Perth, in 1889, and is believed to have been introduced to northern Australia by Asian workers in the mining and pearling industries (Friends of Peel Island Flyer, December 2008: 1). The first three leprosy cases confirmed in the North-West were Aboriginal workers from Mardie Station, diagnosed by Dr. Moloney at Roebourne in 1909, all of whom subsequently died from the disease (*Western Mail* 30/12/1911:10-11). Between 1908 and 1914 lazarettes were established at Derby, Cossack, Port Hedland, Onslow and Beagle Bay to isolate lepers—usually Indigenous and Asian people—from the general community (Friends of Peel Island Flyer, December 2008: 1). A sketch map by C. Thompson of Cossack between 1890-95 shows an arrow with notation 'Depuch Island lazaret' which lies 55km east of Cossack.

In 1909 a quarantine area and lazarette was established opposite Cossack on the mangrove-lined east bank of Butcher Inlet, north of the Stock Jetty. However people could easily access the opposite bank at low tide, and fears of contagion led to the establishment of Bezout Island lazarette that same year. The Bezout Island lazarette operated for four years until 1913 when the last remaining leper on island escaped, and the Cossack lazarette site was reopened. A small iron shed was constructed on 'the Peninsula' opposite Cossack where the lepers had been previously segregated. This structure was described as a ten by twelve foot iron 'sleeping shed' with ten-foot high walls, a 'granolithic floor', and an outdoor area with the roof crossed by barbed wire (Telegram from Roebourne District Medical Officer to Commissioner of Public Health 8/12/1913, SRO 1924/ 2973). This structure was later condemned as being 'cruel' and 'inhumane' for its ant-infested and poorly–laid cement floor, lack of ventilation and inadequate shelter from sun and rain (Chairman of Roads Board to Chief Protector of Aborigines telegram 7/4/1914, SRO 1924/ 2973). A married couples quarters was constructed to house a couple that was overseeing the welfare of the lepers. From 1925 a number of patients were transferred to Cossack from the Kimberley lazarettes (HCWA

Assessment Woodmans Point P0499, 2006: 13; *Friends of Peel Island Newsletter*, December 2008: 1-3), and the Cossack lazarette was closed in 1931.

Plans for the Cossack lazarette (Figure 32, Figure 33) show a number of prefabricated weatherboard buildings mounted on concrete stumps, including married couple's quarters, nurse quarters, white patients quarters and ward attachment. See also entry for 'Bezout Island' below.

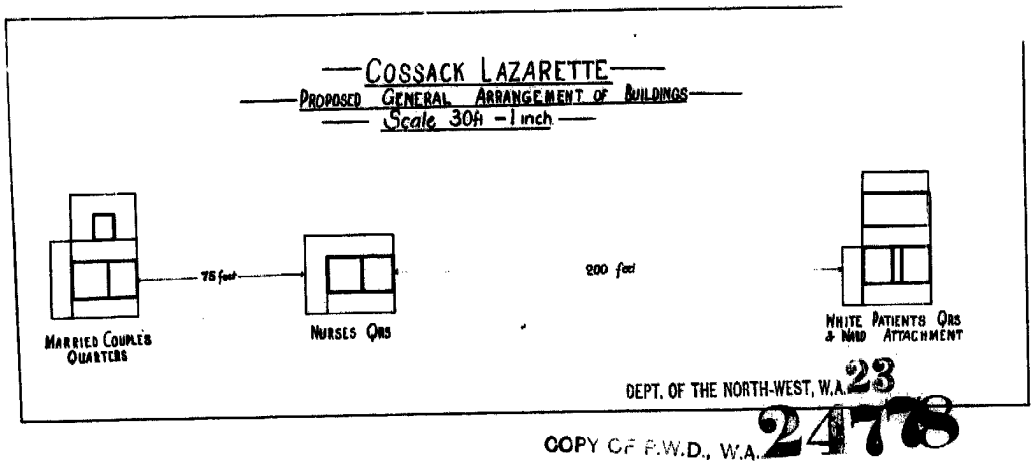

Figure 32. Cossack lazarette general arrangement of buildings (SRO Item 24778 Cons 1647).

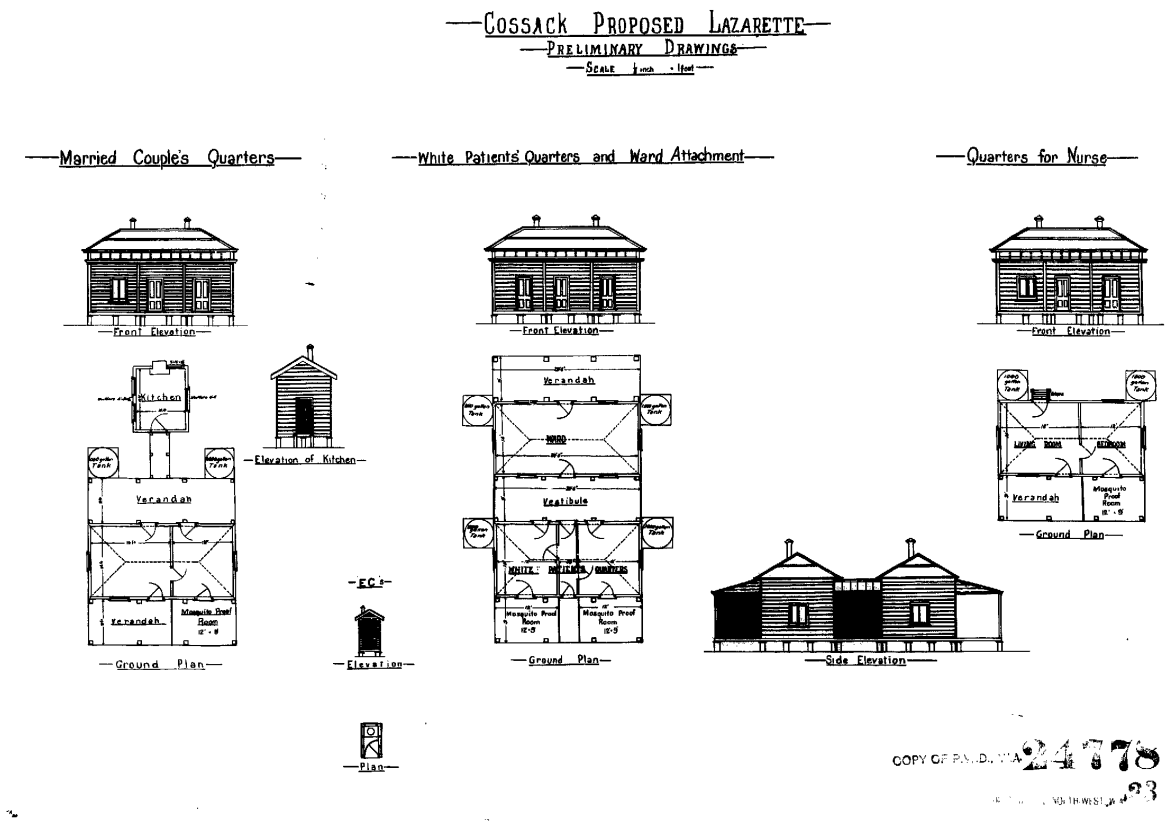

Figure 33. Cossack proposed lazarette showing married couple's quarters, white patient's quarters and Nurse quarters (SRO Item 24778 Cons 1647).

Heritage Council of Western Australia documentation states that there are 'no remains' of the Bezout Island lazarette existing, and that there are no buildings extant at the site of the Cossack lazarette (HCWA 2006:13). However concrete footings and other features have been reported as being visible at the site in the 1980s (T. Eastwood, pers. comm. July 2012). Recyclable building materials such as timber, roofing iron, rainwater tanks and fittings were most likely salvaged for reuse elsewhere in Cossack and Roebourne leaving just the building footings and any associated archaeological remains such as refuse dumps.

Islands

Offshore islands in the Cossack/ Port Walcott study area include Bezout Island, Dixon Island, Legendre Island, Jarman Island, and Delambre Island. All of the islands have archaeological sites and attendant cultural heritage values.

Figure 34. Jarman Island seen from Cossack across Butcher Inlet, view northeast.

Bezout Island

Bezout Island lies 14km northwest of Cossack. It was used as a lazarette (leprosarium) between 1909 and 1913 in order to quarantine and treat leprosy sufferers.

Both male and female cases were isolated on Bezout Island, where they were 'under the observation of the district medical superintendent, who has been supplied with 'Nastin' for treatment' (*West Australian* 17/7/1911: 8). Bezout Island was described in newspaper articles as a 'leper camp', and facilities appear to have been non-existent. Wood, rations and water were ferried out to the island under contract, while the police boat was responsible for carriage of passengers. After use the police boat was 'disinfected' by being washed in seawater or partially sunk (*Sunday Times* 28/7/1912: 14). Bezout Island is an exposed, barren island with no wood or water, and conditions would have been cruelly inhumane and isolated. During cyclones and adverse weather conditions, residents were further isolated as small supply boats were unable to visit the island, forcing them to resort to collect shellfish and rainwater to survive. Aboriginal people often had no communication with their family members once health officials or the police had removed them to the island, and families feared the worst for their safety (SRO ITEM 1926/ 618).

Fear of contagion of the disease, and racism, led to complaints about the lack of security to prevent infection of the general populace, with incidents of lepers escaping from Bezout Island by swimming or being assisted by boats, and dried fish and shellfish collected by lepers being sold in Cossack to purchase necessities. One article headlined 'Two black lepers escape from Bezout' condemned the 'disgraceful state of affairs in respect to the aboriginal lazarette at Bezout Island', stating that a woman had been removed from the society of two male Aboriginal lepers, who reportedly swam to the mainland and were later arrested by police. The police stated that they believed the men had been taken off with the assistance of pearling boats. The article concluded that 'The authorities do not consider that there is any need for alarm at the fact that there are lepers at Cossack, as the disease is not as infectious as is widely supposed. Still no time should be lost in shifting them from Cossack. They certainly shouldn't be allowed to live and have their being in a white settlement'

(*Sunday Times* 30/11/1913: 9). The Bezout Island lazarette was closed for good when the last remaining leper escaped.

Edward H. Angelo visited Bezout Island in 1946 and reported finding two Chinese beachcombers camping there, with two baskets on poles recovering *beche de mer* from the reef at low tide. They went missing soon afterwards, one of them later found to have died as his leg was trapped in a clam shell as the tide rose, the other man presumed to have been swept away by the tide while attempting to extricate his friend (*Western Australian* 14/9/1946: 5).

Bezout Island was not visited during this fieldwork.

Delambre Island

Delambre Island is the eastern-most island of the Dampier Archipelago, situated approximately half way between Flying Foam Passage and Port Walcott/ Cossack. It is almost completely surrounded by extensive drying tidal reef flats, except for its northern side which drops off steeply to eleven metres depth, allowing access from the sea at all tides (AUS55, Approaches to Port Walcott, RAN Hydrographic Service 1985).

Delambre Island's position and accessibility made it an ideal maritime landmark and 'post office' site for passing coastal shipping to drop mail or leave messages. In April 1863, Captain Peter Hedlund in the *Mystery* had left a message for Captain Jarman of the *Tien Tsin* at Delambre Island, to arrange a rendezvous along the western side of Nichol Bay (Withnell Taylor 2002: 26). Their meeting and subsequent explorations led to their decision to land stock and supplies at Butcher Inlet at the mouth of the Harding River, and the beginning of European colonisation of the Northwest. Edward H. Angelo visited Delambre Island in 1946 and described high rocks on the northern side with a letter 'L' and an arrow pointing downwards chiselled into them (*Western Australian* 14/9/1946: 5), which likely indicates this post office site.

Delambre Island was later used as a 'barracoon' by pearlers – a place of isolation where Indigenous or Asian divers used as slaves or indentured labour in the pearling industry could be held captive until required. In his account of the wreck of the *Anne* (1894) at Flying Foam Passage, Captain Parkes wrote that five of the Malay crew had survived, and 'from their account we learned that the Cossack passenger boat had come out the previous afternoon and made fast astern of the schooner, Joe Green going aboard. She had been to Delambre for men' (*Western Australian* 9/2/1894: 6).

Another eyewitness reporting the slavery and maltreatment of Indigenous people in the pearling industry described seeing at Flying Foam Passage 'no less than 24 natives handcuffed together, and then conveyed to Delambre Island, and there detained until they were required for pearl diving, their only food being a little flour' (*Daily News* 23/2/1905: 12).

Edward H. Angelo described Chinese trepangers, beachcombers and turtle catchers using Delambre Island in the 1940s, including one man who had lost his dinghy in a storm and survived for six weeks by drinking turtles' blood before being rescued. Angelo described 'a small compound made of rocks' constructed by turtle catchers on the north-east or eastern side in which live turtles could be stored while awaiting shipment (*Western Australian* 14/9/1946: 5).

Delambre Island was not visited during this fieldwork.

Dixon Island, Port Robinson, Cleaverville, Antonio's Myia (Antonimyra)

Dixon Island protects Port Robinson on the western side of Cape Lambert (Figure 35), and was used early on as an anchorage and camp by pearlers. Port Robinson is described as 'a snug little harbour available for small vessels with local knowledge, of 8 or 9 feet [2.4 m or 2.7 m draught]' and is marked on nautical charts as an anchorage (Australia Pilot 1959: 304; Admiralty Chart AUS 327, 1967).

One reference to its historical use is that 'on 18 January 1869…one of Broadhurst's sailors, a Mr. Ashwick left their camp on Dixon Island near Cape Lambert and was reported missing en route for Roebourne' (McCarthy 1989:193-194). Captain Cadell—who was to become notorious for his brutality towards Indigenous and Asian divers—was also reportedly using Dixon Island/ Port Robinson as a base with his vessel *Water Lily* in 1871 (*Inquirer and Commercial News* 24/5/1871:2). Port Robinson was in fact a superior port to Cossack/ Butcher Inlet, and offered the advantage of being removed from scrutiny of officials and rival pearlers based at Cossack and Roebourne while being based nearby.

The historic town site of Cleaverville was located on the mainland adjacent to Port Robinson, and fresh water wells were sunk in this area, though without success (*The Inquirer and Commercial News*, 11/7/1877: 3).

Police records relating to the wreck of the lugger *Flora* describe a place named 'Antonio's Myia', which is sometimes marked on modern maps as 'Antonimyra' on the northern end of Dixon Island. The *Flora* had left Cossack under the command of a man named Wolla to gather a load of firewood from Popes Nose Creek and Antonio's Myia (Statement of Wolla 12/5/1903, SRO Item 1902/ 2694 Cons 430). This is likely to have been another pearling base camp.

Dixon Island, Port Robinson, Cleaverville and Antonio's Myia were not inspected during this fieldwork.

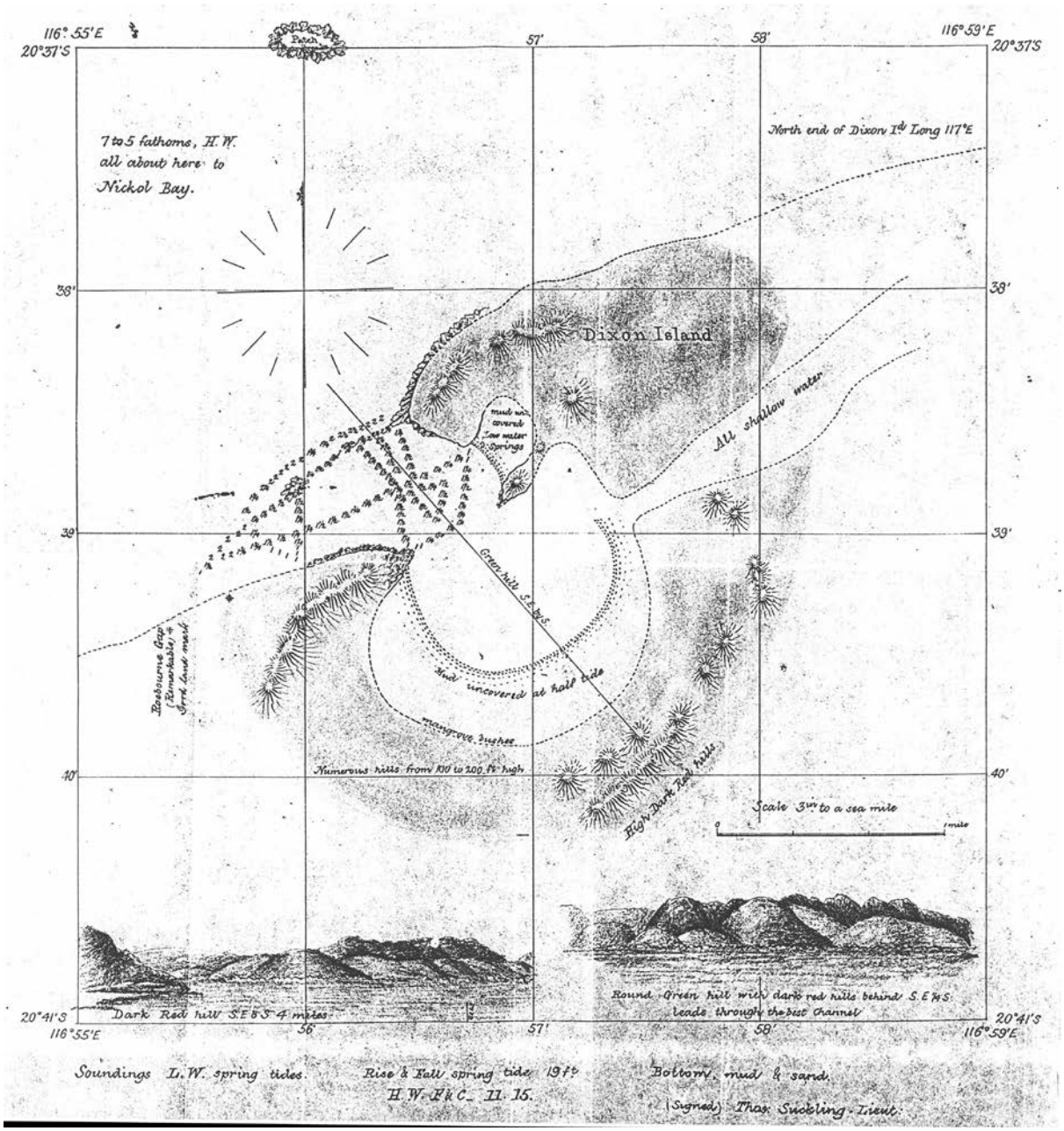

Figure 35. Survey of Port Robinson and Dixon Island by Lieutenant Thomas Suckling (courtesy Rod Dickson).

Jarman Island

Jarman Island, Perseverance Rocks and Star Rocks are situated at the eastern entrance to Butcher Inlet, connected by a shallow sand bar that becomes exposed at low tides. A rock cairn with a mast and tub beacon placed at the highest point of Jarman Island was used for navigational purposes prior to construction of the Jarman Island lighthouse in 1888 (Figure 36).

Jarman Island is described as significant 'for its associations with the development of the north-west of Western Australia and, in particular, the Roebourne area. The history of the lighthouse is

inextricably interwoven with that of the Port of Cossack, which was the first port in the north-west, and for many years, the main point of access for the settlement and development of the Pilbara region' (HCWA Assessment Jarman Island P2337).

Figure 36. Jarman Island lighthouse under construction in 1887, with original tub beacon and rock cairn at right (SLWA 020827PD).

Jarman Island lighthouse is a prefabricated cast iron lighthouse of 50 feet (15.24m) height manufactured in England by Chance Brothers of Birmingham. It was shipped to Cossack for reassembly under the supervision of the Public Works Department's Resident Engineer William Lambden Owen. This in itself was a major feat, as Owen used unskilled labour made up of Indigenous, African, European, Filipino and Malay prisoners from Roebourne jail. All of the heavy crates were lightered over to Jarman Island, to be hoisted to the top of the island using a man-powered windlass and tramway built for the purpose. The windlass was salvaged from a shipwreck. Owen also devised a work creation scheme for managing disorderly prison labourers, by having them move piles of rocks from one end of the beach to the other (Owen 1936: 33-35). The lighthouse keepers' quarters designed by Public Works Department architect George Temple Poole are of a unique vaulted roof design, and were also constructed under the supervision of Owen. Both Jarman Island lighthouse and keepers quarters are now abandoned and in ruinous condition, while Jarman Island lighthouse's third order dioptric light has been removed and is on display at Cape Naturaliste lighthouse (Jarman Island Lighthouse and Quarters, Assessment Documentation, HCWA, 2000).

Other historical and maritime archaeological features reported on Jarman Island include the foundations of the rock navigation beacon, remains of the lighthouse keepers' boatshed and slipway, two large underground water tanks, abandoned asbestos mine, pathways and rubbish dumps. Jarman Island was not inspected during this survey.

Sam's Creek

Sam's Creek is a small mangrove inlet lying between Point Samson and Cape Lambert that is still used by commercial fishing boats. There are a number of old lugger chain moorings and anchors in the creek, an old pearl shell-sorting shed, and a large, old tamarind tree near the landing (R. Vitenbergs, pers. comm. 25 June 2012). It was undoubtedly historically used from early times by pearling luggers as a protected anchorage, and probably also as a layup area and camp.

Butcher Inlet foreshore archaeological survey

Foreshores and inter-tidal zones in port areas are well known to be rich sources of evidence for historic maritime activities, with their muddy and wet environments often providing excellent levels of preservation for buried, and semi-buried objects. Prior to this survey there was little information on Cossack maritime archaeological sites existing in Cossack other than the obvious features of the Cossack wharf and shipwreck SS *Silver Star*. It was predicted that a foreshore survey would reveal further maritime archaeological features.

Butcher Inlet is a broad shallow tidal inlet that forms the outlet for the Harding River to the sea when it floods. Since the early 20th century Butcher Inlet has been silting up as a result of natural causes, and this level of siltation increased after construction of the Harding River Dam in 1983-84. Today most of Butcher Inlet is quite shallow with extensive drying sand flats at low tide. Historic photographs of the Cossack foreshore show that the area south of the wharf previously had no mangrove trees present, though whether the mangroves had earlier been removed for firewood and/or building purposes by the time of the photographs being taken is unknown.

Figure 37. Aerial GIS image showing maritime archaeological features surveyed along western foreshore of Butcher Inlet as red dots.

Figure 38. Detail of foreshore area in Butcher Inlet showing maritime archaeological features, with shipwrecks and ballast mounds (some ballast mounds are potentially also shipwrecks) marked green.

Figure 39. Base fragment of an Asian celadon ware ceramic bowl (Feature CK37).

Figure 40. Fragments of copper alloy hull sheathing and baler shell (Feature CK48).

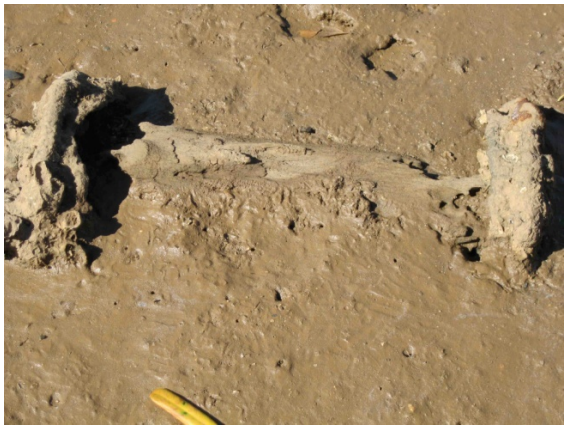

Figure 41. Wooden axle and iron cogs of a small windlass preserved in the muddy foreshore (Feature CK40).

Figure 42. Two wooden ships' keels, piles of rock ballast, chain mound and a windlass mark at least one probable wreck site (Cossack UNID 6).

Foreshore surveys were conducted between 26 and 29 June 2012 by walking along the western shoreline of Butcher Inlet at low tide. The stretch of accessible shoreline from Vampire Island to the Cossack wharf is characterised by mud and mangroves, while northwards from the Cossack wharf to the western entrance of Butcher Inlet is found a predominantly rocky shoreline. The majority of features were recorded in the inter-tidal zone, among the mud and mangroves south of the Cossack wharf.

The Cossack foreshore shows evidence of having been a rich zone of maritime activity, with over fifty archaeological features located including maritime infrastructure (1890s stone wharf built over earlier jetties, concrete building foundations, Cossack sea wall), nine shipwrecks, ships' windlasses, a ship repair and lay up area south of the wharf, stone ballast mounds, corroded mooring chains, iron posts and mangrove moorings, and numerous artefacts (Figure 37, Figure 38, Figure 41, Figure 42). An Asian green celadon ceramic ware fragment (Figure 39), copper sheathing fragments and baler

shell fragments (Figure 40) were also found in this ship repair and lay up area (see Appendix B for GPS positions).

In 2010 storm force winds and associated storm surge from Cyclone Glenda removed a layer of sand from the foreshore, revealing much previously buried material in the inter-tidal zone south of the wharf (Nayton 2010). Due to the aforementioned increase in siltation and growth of mangroves, it is likely that further maritime archaeological features such as anchors and moorings, shipwrecks, ballast and artefacts lie buried in the mud.

New shipwreck sites were discovered that included wooden sailing vessels and one and small wooden steamship. Two large wooden wrecks high on the beach and now overgrown with mangroves are the remains of a wooden lighter barges, most likely to have been blown ashore in the 1894 'willy willy' (See 'Shipwrecks' below).

Butcher Inlet remote sensing survey

The Department's 6.7 metre aluminium survey vessel *Sea Spray* was used to carry out a remote sensing survey of Butcher Inlet (Figure 43). Marine survey equipment included a Differential Global Positioning System (DGPS), echo sounder, magnetometer and side scan sonar.

Figure 43. WA Museum vessel *Seaspray* with Cossack wharf in foreground.

Figure 44. Nic Bigourdan ready to deploy the magnetometer towfish. Side scan sonar towfish in support cradle at left of image.

The Marine Magnetics Explorer Towfish 21125 Overhauser type magnetometer (Figure 44) measures the strength of magnetic fields, and can detect anomalies in the earth's background magnetic field. Natural geological features (for example rocks with inherent magnetism such as granite or iron ore) may cause magnetic anomalies, while ferrous metal typically found in shipwrecks as iron anchors, chain, fittings and fastenings also cause anomalies.

The Marine Sonics side scan sonar towfish emits fan-shaped sonic pulses that when reflected from the seabed topography provides a sonar image of the seabed. Natural and cultural features can be identified by their acoustic reflections and shadows. The side scan sonar scans an approximately 50-100 metre wide swathe of seafloor depending on whether low or high frequencies of 60 and 160 kHz

respectively are used. The operator uses Seascan PC software on a Windows operating system for data display and system control. The sonar data is processed and stitched together to provide a continuous 'waterfall' display of the seabed visible on the operator console in near real time as the vessel progresses along its track, and the operator can mark particular targets of interest as they are recorded during the survey.

Figure 45. Image of side scan sonar survey data overlaid onto GIS aerial image of Butcher Inlet.

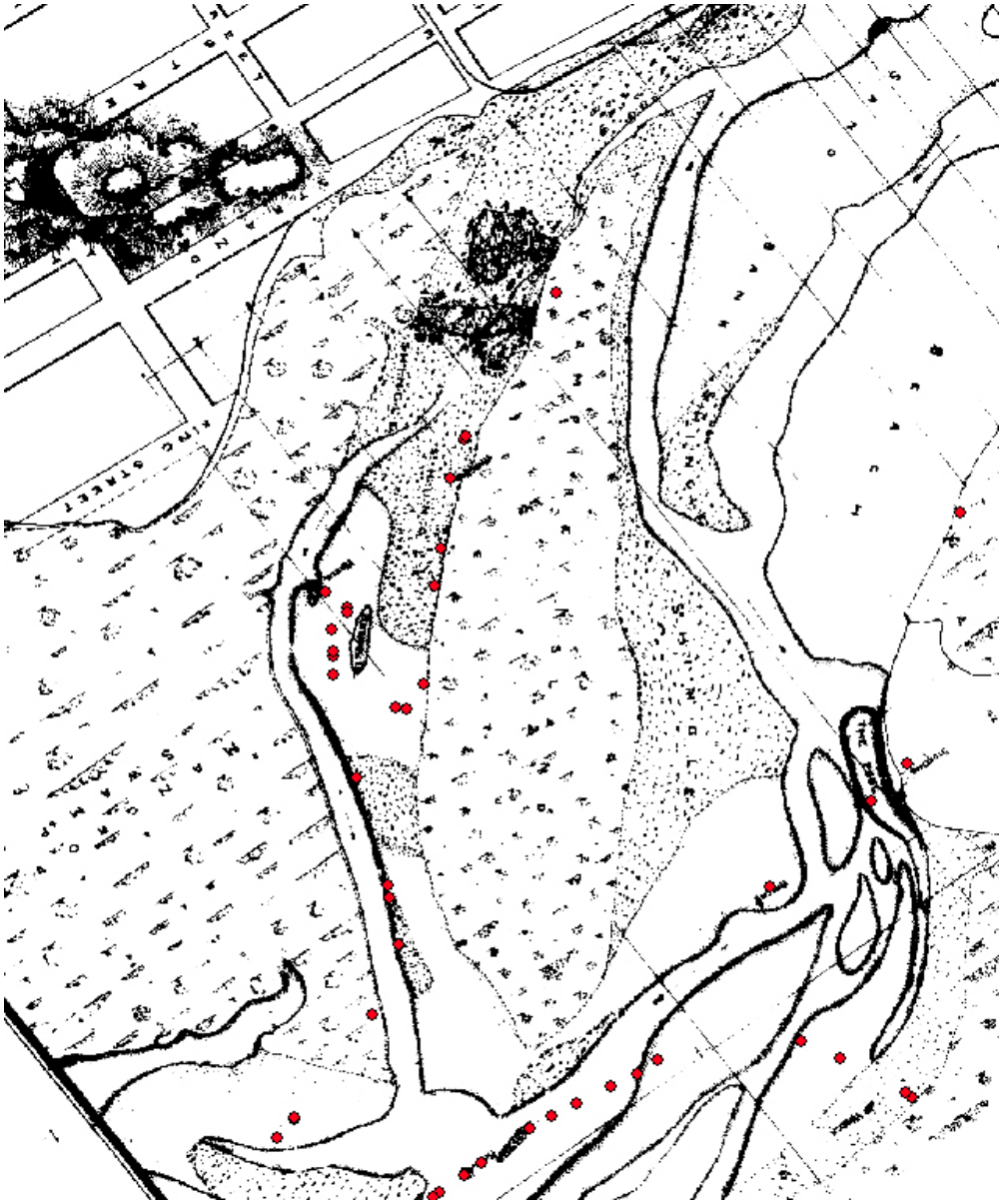

Figure 46. Magnetic anomalies (red dots) overlaid onto historic Cossack map (SRO PWD 1788). Most of the anomalies are likely to be moorings. At least two magnetic anomalies correlate with locations of shipwrecks.

Due to the confined and twisting nature of the Butcher Inlet channels an overall magnetic contour map could not be produced, though anomalies were marked onto a chart.

Both the magnetometer and side scan sonar data are linked to a Trimble DGPS receiver through the Seascan PC software for geographic positioning, so that magnetic and sonar targets can be related to their exact geographic position within one to two metres accuracy. The resulting geo-referenced magnetic anomalies, sonar imagery and targets are overlaid onto aerial photographs and historic maps on the Department's Geographic Information System (GIS) using the ArcGIS desktop mapping program (Figure 45, Figure 46).

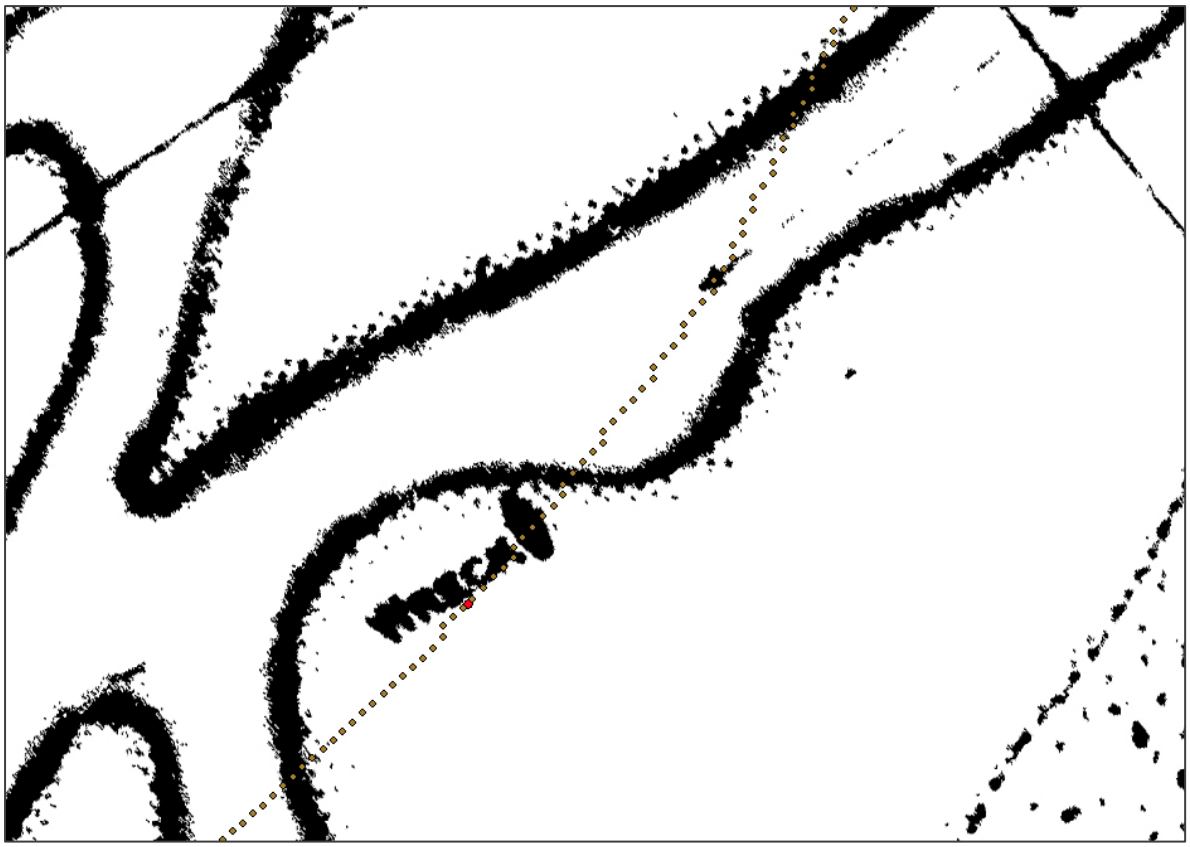

Figure 47. Detail of survey vessel track with magnetic anomaly (red dot) correlating with georeferenced historic charted location of a wreck.

The remote sensing survey was carried out during high tides in the afternoons of Tuesday 26 June and Thursday 28 June. Numerous magnetic anomalies were detected, including two magnetic targets that correlate with geo-referenced positions of shipwrecks (Figure 47) marked on historic chart PWD 1788 (SRO) dating from the 1890s. These wrecks are therefore no longer visible and are buried in the seabed. Most of the other anomalies are likely to be anchors or chain associated with cyclone moorings, used by the pearling fleet during the lay-up period as they sheltered in Butcher Inlet.

Good quality side scan imagery of Butcher Inlet and the Cossack foreshore was obtained, providing a sonar map of the seafloor and foreshore areas.

Shipwrecks

There are 51 shipwrecks recorded in the study area, of which eleven have now been located. Cossack's first shipwreck was the 143 ton schooner *New Perseverance*, wrecked in 1867 when blown ashore in a cyclone just north of the present day wharf (Figure 49). The beached hull of the *New Perseverance* was utilised to become one of the first 'buildings' in Cossack, and was used in a number of capacities including a storage hulk for pearl shell, water police office and a taproom called the 'Ship Inn' (Cairns & Henderson 1988: 64-65).

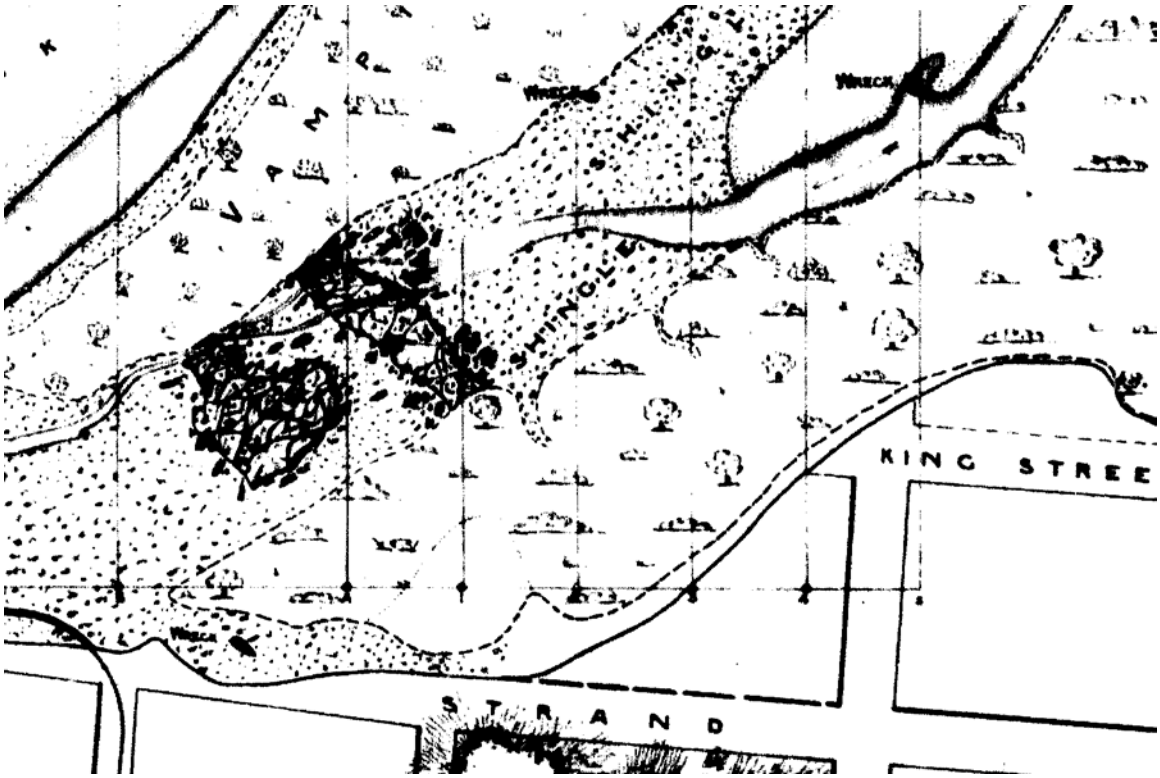

Figure 48. Detail of a historic map dating to circa 1888 showing five wrecks in Butcher Inlet, with three visible in this detail (SRO PWD 1788).

Figure 49. Detail from 1863 chart of Tien Tsin Harbour showing wreck site of *New Perseverance* opposite Wellard's house, pencilled in as 'Perseverance' (State Records Office 3423/6).

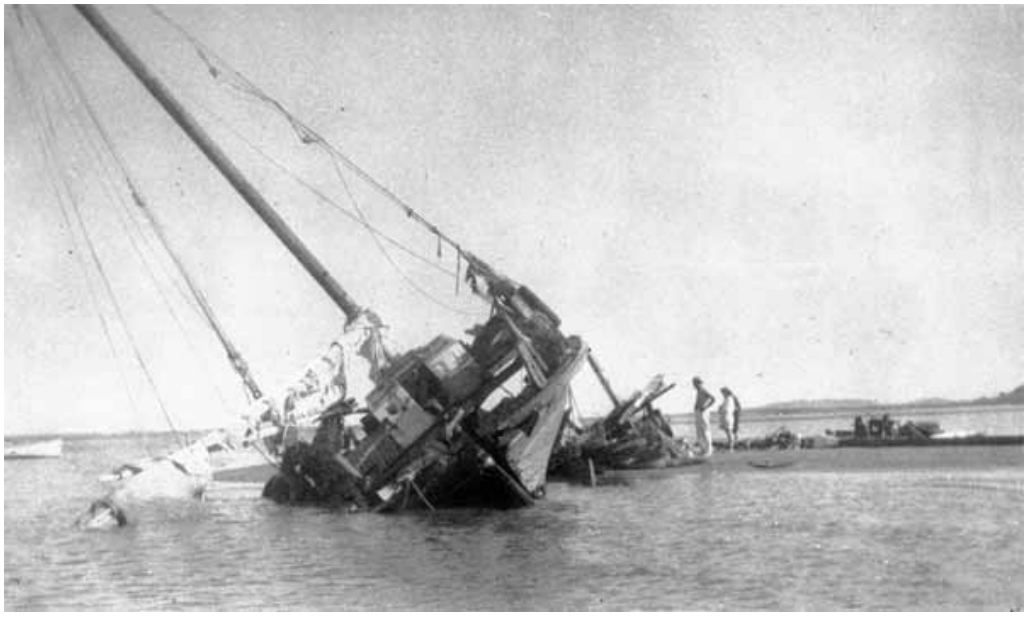

Figure 50. Wreck of *Eva* (1936) at entrance of Butcher Inlet (WA Museum, Department of Maritime History).

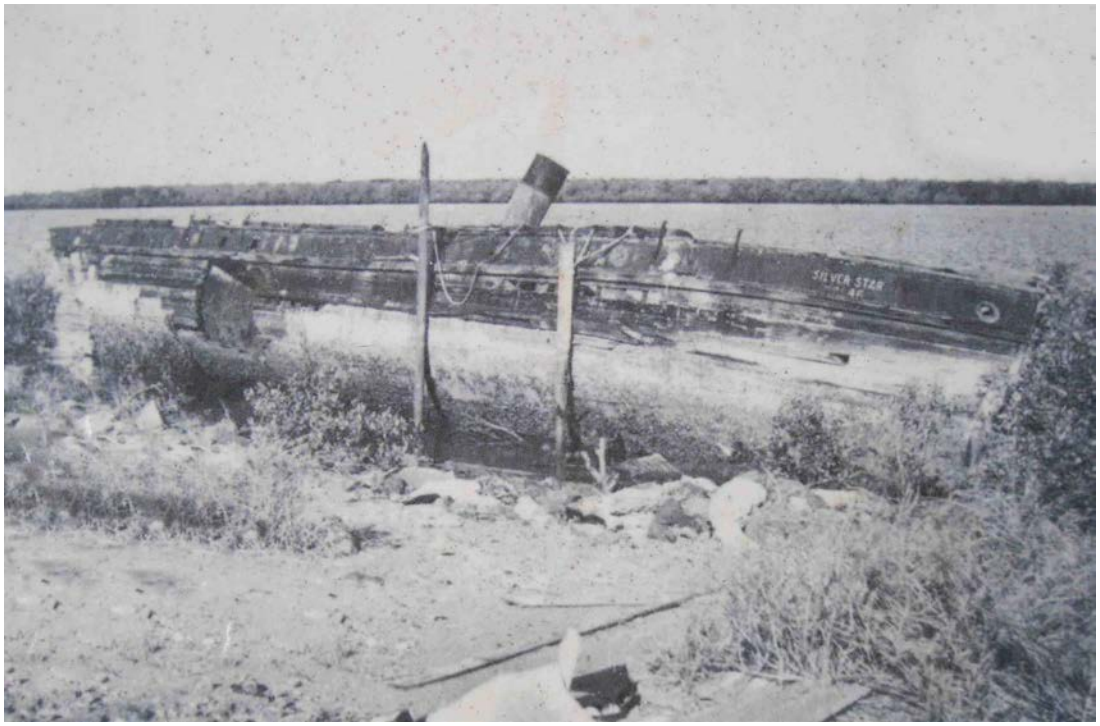

Figure 51. SS *Silver Star* wrecked on Cossack foreshore before being burnt (Battye Library 75079P).

Figure 52. SS *Silver Star*'s corroded boiler rolled onto its port side showing two furnaces, collapsed furnace doors and boiler tubes.

The Cossack area wrecks reflect a diverse range of vessels including pearling cutters and luggers, a dandy, a pinnace, ketches, a brigantine, barques, brigs, cargo lighters, hulks and a lightship. The sites can be divided into five main categories:

1) Pearling cutters, schooners and luggers between 3 and 150 tons;

2) Maritime services - Sailing and non-propelled towed lighters and barges used to service coastal shipping and regional ports, hulks, lightship;

3) International sailing vessels;

4) Steamships;

5) Small boats and dinghies less than 3 tons.

The composite steam lighter SS *Silver Star* lying just south of Cossack wharf (Figure 51, Figure 52) is the most obvious and accessible shipwreck at Cossack, and was previously well known as an ex-Swan River ferry and Albany excursion steamer. Its flat-bottomed design made it ideal for lightering wool in shallow Butcher Inlet, where it spent its final years before colliding with the wharf in 1936, splitting its stempost. It was run ashore and later burnt to obtain its metal fittings for scrap.

The only other steamship wreck recorded in Cossack is that of the steam launch SS *Tui,* wrecked in a collision during the 1894 cyclone. As a small vessel the *Tui* was most likely used to tow barge lighters out to shipping in the Port Walcott roadstead. Wreckage of a small wooden hulled screw steamer found during the foreshore survey is tentatively identified as the remains of the SS *Tui*. The site includes a small Scotch boiler, collapsed funnel, engine, rock ballast mound and chain.

Three large international sailing vessels wrecked in the study area are the wooden barque *Mariano* (1879) that foundered at the entrance to Butcher Inlet in a leaky condition with a cargo of guano from the Lacepede Islands; the Norwegian wooden barque *Solveig* (1901), blown ashore with a cargo of piles for construction of the Point Samson jetty, and the steel barque *Glenbank* (1911) believed to have struck Delambre Reef in a cyclone with a cargo of copper ore from Balla Balla with the loss of 23 lives and only one survivor. Of these wrecks only the *Solveig* has been located, lying broken up on the intertidal platform on the northern shore of Point Samson.

Of the 51 shipwrecks in the study area over half (n=28, 55%) resulted from damage caused by storms and cyclones. When combined with high spring tides and flooding caused by the attendant heavy rainfalls, cyclone damage could be particularly severe to shipping even in the protection of Butcher Inlet. In some cases small vessels were washed kilometres inland into marshland and coming to rest against the foot of hills, while even large steamships were blown ashore well above the high water mark, as occurred with the SS *Beagle* which ended up with its stern resting on top of the Cossack wharf in 1898. Water levels at Cossack are recorded to have risen up to six metres with combined storm surges and high tides. Cyclone damage to the Cossack-Roebourne road, tramway and telegraph lines cut off communications and caused major difficulties for inland transport and communications also. The 1894 cyclone was one of the worst ever recorded and was reported in the *Argus* newspaper as follows:

> THE "WILLY WILLY" AT ROEBOURNE: FURTHER PARTICULARS: GREAT LOSS OF LIFE: IMMENSE DESTRUCTION OF PROPERTY.

> The following additional particulars of terrible “willy willy " which occurred on the 9th inst. at Roebourne have been received:—Many outbuildings were demolished, verandahs being carried away and picket fences destroyed. The shipping at Cossack suffered to a very great extent by the tide and the heavy floods, which caused the creek to rise above the embankments. Nearly all the luggers were carried on to the mangroves. The *Empress* was sunk off *Emerald*, two men being drowned. The *Silvia* and *Verona* were carried on to the top of Vampire Island. The schooner *Harriet* and the lighter *Cossack* were carried across the roads. The *Sree P'as Sair* was carried on to the top of Vampire Island, but was blown back into the stream again. The *Dawn* was saved by being dismasted. The *Diamond*, fully loaded and ready for sailing, was carried two miles up the creeks and stranded on the mangroves. The *Prospector*, *Gem*, and *Amherst* were blown on shore. The *Maud* was carried against the new goods shed, and bent three of the uprights in it, the vessel being totally wrecked and swept out to sea. The pearling lugger *Anne* was sunk in the Flying Foam Passage, Z. B. Erickson (the owner), his wife and child, Denman, Hayward, and a crew of nine coloured men being drowned. A man named Green went out to take provisions to some Chinamen on a small island and was drowned. In all there have been 27 lives lost so far as is known at present in the district. The sea wall has been carried away in places, and the tram line has been completely destroyed two miles across the marsh. It is estimated that it will take three months to repair it. All traffic is suspended. All the bridges are damaged and impassable. The telegraph lines were injured, but are now, excepting those to the eastward, working again.
> (*The Argus*, Monday 29 January 1894: 5)

The 1898 cyclone caused similar devastation, as summarised in another report:

> THE STORM AT COSSACK: TERRIBLE DISASTERS.
> Communication was cut off by road, but several daring spirits walked up to Roebourne through the mud and slush to communicate the news of the terrible disaster that had befallen Cossack, which appears to have been the very centre of the hurricane. The experience of some of the residents was heartrending. Mr. and Mrs. Wilson, observing their dwelling collapsing, left it with the intention of proceeding to the house of Mr. C. W. Paterson, a few hundred yards away, and had a terrible time. They were for four hours hanging on to spinifex in the midst of the storm before they reached their destination. Wilson lost sight of his wife for an hour, and only found her by chance. S. Hemingway and B. Thompson, after their residence had collapsed, got into a four hundred gallon tank to save their lives, and remained there in the water till daylight. The jetty sank down many feet, and the goods-shed was torn about. The sea burst in the doors facing the creek, and swept away a quantity of cargo. Fearful damage was done to shipping. The steamer *Beagle* is piled upon the rocks at the south side of the jetty in front of the Weld Hotel, with its stern resting on the fallen wall of the jetty and the bows on the rocks. The *Maggie Mollan* [*sic*] is a total wreck on the beach towards Japtown, the masts lying on the dilapidated jetty. It was fully loaded with general merchandise for Condon, and the cargo is now strewn along the strand from one end to the other. The schooner *Harriet* is high and dry on the beach close to the north side of the jetty. The steamer *Croydon*, which was moored near the Stock Jetty, on the opposite side of the creek, was carried fair on to the high land, and the cutter *Rose* was washed up between the residences of A. Rouse and A. S. Thompson. Smaller craft, such as passenger boats, etc., were carried greater distances inland, and the only boat that remained at its moorings was the police boat. Not a single boat other than this is safe. G. A. Lee and Co.'s offices, H. Wilson's residence and outbuildings, the Weld and the White Horse hotels, and Paxton's boarding-house were scattered in all directions. The new Customs house and the residence of J. Meagher were unroofed, and a deal of other damage was done. The Mercantile Co.'s premises were flooded, and the company is a heavy loser through the damage done to merchandise, which is floating

about the stores. Japtown is one heap of ruins, and the houses, which comprised wood and iron, flimsily put together, were felled like skittles. The tramway from the jetty sank down 3ft., leaving the station standing far above it.
(*The Inquirer & Commercial News* 8/8/1898: 15)

Figure 53 SS Beagle blown ashore at Cossack wharf in 1898 (*Western Mail* 5/4/1934:5)

Other causes of wrecking included a combination of human error, tidal currents and the narrow entrance to Butcher Inlet that claimed the *Mariano* (1878), *Myra* (1898), *Dreadnought* (1904) and *Eva* (1936). Some wrecks sank at their moorings or were broken up such as the *Azelia* (1887), *Lady Denison* (1887) and *Sisters* (1875). Others were purposely scuttled including two or three luggers run ashore and burnt in 1942 to avoid them falling into the hands of any potential Japanese invasion forces. In World War II amid fears of an imminent Japanese invasion of Australia's north, Geoff Tozer burnt a number of luggers in Broome, then sailed three luggers to Cossack and burnt them in the mangroves/ layup area south of the township to avoid them falling into enemy hands (T. Eastwood, pers. comm. July 2012). These luggers were possibly the *Gladys Olive*, *Lotolop* and *Siput* owned by the Japanese pearler and merchant Jiro Muramats (M. Gregg, pers. comm. 2012)

Pearling luggers, schooners, cutters and ketches were mainly locally-built in Perth or Fremantle, with some built in New South Wales (*Lady Denison, Herald*), Queensland (*Eban*) and Tasmania (*Bessie*). Overseas-built vessels include the *Glenbank* (Scotland), *Solveig* (Norway), *Maggie* (Isle of Man, UK), *Sea Ripple* (Sunderland, UK), *Mariano* (Boston, USA) and SS *Tui* (New Zealand).

The following table lists all historically known wrecks in the study area. Where recorded, information on their name, tonnage, construction, rig, official number (O.N. – used for insurance purposes), date and place of build, place of registration (not all vessels were registered), dimensions in the format length x breadth x depth (in metres), owner(s) and location and circumstances of wrecking are

described. Some vessels that were possibly refloated are included, until further research can confirm with certainty whether or not they were wrecked.

Further details on individual shipwrecks, including sources, may be accessed on-line at the Department of Maritime Archaeology's Western Australian Shipwreck Database (http://museum.wa.gov.au/maritime-archaeology-db/wrecks).

Table 2. Port Walcott, Cossack and Port Samson area shipwrecks.

Name and date of loss	Description of vessel and summary of loss
Amethyst (1/4/1894)	11.34 tons wooden sailing vessel b. Fremantle; O.N. 101499; Reg. Fremantle 13/1891; 14.2 x 4.1 x 1.9m; Owner R.S. Kirby, Broome; Driven ashore in Butcher Inlet with cargo of pearl shell.
Amy (1923)	May be 33 ton *Amy* O.N. 61102; Fremantle 3/1871 that went ashore at Dongara and was refloated. It was later owned by John Abbott, George H. Roe and Farquar McRae (all pearlers of Roebourne) and Frederick Pearse, trader of Cossack. If so this vessel was a significant vessel in the history of Cossack and Broome pearl fisheries.
Azelia (1887)	85.14 ton wooden sailing lugger b. Fremantle 1871; O.N. 61103; 25.6 x 5.5 x 2.6m; Owner Manning & McRae. Vessel sunk Butcher Inlet and removed with explosives.
Bat (12/4/1919)	8 ton wooden sailing vessel; Owner J. Muramats; Driven on shore at Port Samson.
Beatrice (1/3/1893)	4 ton cutter wrecked near Rosemary Island, Dampier Archipelago with five Chinese crew while fishing for trepang. Owner Wah Ching, storekeeper of Cossack.
Bessie (8/3/1882)	27 ton wooden sailing lugger b. Penguin Creek, TAS; O.N. 32262; Reg. Fremantle 1/1874; 15.5 x 4.6 x 1.8m; Owners Clarkson Brothers, pastoralists of Midland. Foundered without trace in cyclone off Cossack.
Bonnie Dundee 1 (20/3/1872)	wooden sailing vessel, previously foundered 1871 cyclone and repaired/ refloated. Blown ashore in Butcher Inlet during disastrous 20 March 1872 cyclone.
Colonial pinnace (8/2/1865)	The government's wooden sailing pinnace sank in Butcher Inlet while assisting the schooner *New Perseverance*, which had struck a rock and subsequently also wrecked.
Conch (20/3/1872	5 ton wooden sailing vessel, blown three kilometres westward into marsh and badly damaged during disastrous 20 March 1872 cyclone.
Cossack (1/4/1894)	Wooden lighter, blown ashore high up on Cossack Beach in 1894 cyclone.

Crest of the Wave (25/12/1870)	Wooden sailing lugger, disappeared in Butcher Inlet with two men aboard during 1871 Christmas Day cyclone, some wreckage was washed ashore but vessel believed to have been carried out to sea.
Daisy (14/4/1906)	Unregistered wooden sailing lugger; Owners Messrs Dennis, Follett and Dennis, pearlers. Struck Devils Gap Reef in Port Walcott and sank.
Derby/ The Derby (9/1/1894)	46 ton carvel-built wooden sailing lighter, b. 1878 Canning River by B. Mason; O.N. 75320; Reg. Fremantle 1885; damaged in April 1887 and February 1889 cyclones, sold 1889 to Messrs R.A. England and William Miller of Cossack. Damaged when driven against Cossack jetty in 1889 cyclone. Lost on Cossack Beach in 1894 cyclone.
Dreadnaught/ Dreadnought B273 (18/4/1904)	8 ton wooden sailing lugger; Owners Lambert & Steward, Master K. Nasujiro. Arriving at Cossack from Depuch Island, struck Perseverance Rocks when missed channel entering Butcher Inlet.
Eban (10/1/1894)	10 ton wooden sailing lugger; O.N. 94143; Reg. Brisbane QLD 1892. Sank in storm 3-4/1/1892 and found lying bottom up on Butcher Inlet river mouth bar with masts gone, a total wreck.
Emerald (9/1/1908)	12 ton wooden sailing lugger, sank in Butcher Inlet during cyclone.
Emma (18/3/1889)	10 ton wooden sailing lugger b. 1882, Longnose Point, Balmain NSW; O.N. 83716; Reg. Sydney 107/1882; 11.3 x 3.3 x 1.4; Owner F.J. Gibbins, Sydney. Foundered in pearling grounds off Cossack.
Eva (29/4/1936)	41 ton wooden aux. motor ketch, b. 1888 Fremantle; O.N. 75325; Reg. Fremantle 2/1888. Struck sandbar between Reader Head and Jarman Island with cargo of timbers salvaged from Point Samson jetty. May have been refloated and later sank Swan River in 1936.
Flying Scud (19/8/1870)	Wooden sailing lugger; Owner George King. With three crew aboard struck reef between Cape Lambert and Point Samson with loss of one life. Aboriginal crewman Boorancabba reached shore and spread the alarm.
Flora (11/5/1902)	Lugger wrecked off Perseverance Rocks while returning from Popes Nose Creek and Antonia's Myia with firewood. Crew Wolla (master), Ah You, Ah Hoy and Ah Kie. Anchored in heavy seas as too dark to see entrance, but vessel swamped. Ah Kie drowned attempting to float ashore on two paddles.
Glenbank (7/2/1911)	1481 ton iron sailing barque b. Rogers & Co., Glasgow, Scotland 1893; O.N. 102561; 73.2 x 11.3 x 6.4m; Owner J.A. Zachariassen; Master F.R. Morgan. Disappeared 20 miles off Cossack in cyclone with 23 lives lost and only one survivor just after departing Balla Balla with 1800 tons copper ore. Believed to

have struck Delambre Reef or reefs adjacent to Legendre Island.

Herald (12/1889) 53 ton composite schooner b. New Zealand 1869; O.N. 52455; 21.1 x 5.7 x 2.2m, owner Frederick John Gibbins; Captain Sydney Hadley; wrecked Horseshoe Reef, east of Roebourne.

Iolanthe (10/1/1894) 11 ton wooden sailing cutter, wrecked and sunk in Butcher Inlet in 1894 cyclone.

Lady Denison (9/12/1887) 129 ton wooden sailing brig b. Sydney NSW 1859; O.N. 41091; Reg. Hobart TAS; 28.4 x 5.6 x 3.0m; Owner Plush. After sailing from Lagrange Bay to Cossack the old, leaky brig sank at its moorings in Butcher Inlet and commenced breaking up.

Lily (3/1889) The *Lily* owned by Chinaman Ah Wee went missing in a cyclone west of Cossack, with Ah Wee and three Chinese crew aboard.

Maggie (20/3/1872) 186 ton wooden sailing brig b. Isle of Man, UK, Reg. Hong Kong. Scuttled in Butcher Inlet in 1872. May be same brig named *Maggie* that went ashore and was refloated at Fremantle in 1848.

Maggie Gollan (2/4/1898) 58 ton composite sailing 2-masted gaff ketch, b. Manning River NSW; O.N. 73298; Reg. Fremantle 5/1895; 21.8 x 5.7 x 2.1m; Owner J.M. Tiffany, lighterman of Cossack. Sank at Cossack wharf with full cargo of goods for Condon during severe storm, was blown ashore when lines snapped and totally wrecked.

Mariano (24/12/1878) 589 ton wooden sailing barque b. 1861, Boston USA; O.N. 74670; Reg. Melbourne; 45.7 x 9.1 x 4.3m; Owner F. Beaver, Melbourne, Master Capt McDonnel/ Walcott; Commenced leaking on voyage from Lacepedes to Melbourne with cargo of guano. Put into Port Walcott to remove guano and in process of entering Butcher Inlet to make repairs to hull, grounded close to Perseverance Rocks and later abandoned during a storm.

Mary, Lugger 3F (28/2/1889) 12 ton wooden sailing cutter; b. 1868 Fremantle WA; O.N. 61082; Reg. Fremantle 3/1868; 11.4 x 3.5 x 1.4m; Owners Farquhar McRae & Frederick Pearse of Roebourne, merchants. Lost at sea without trace following a cyclone off the Northwest coast.

Maud (10/1/1894) 25 ton composite sailing cutter, carvel, one deck, b. 1866 Fremantle; O.N. 52232; Reg. Fremantle 2/1866; Owner L.A. Manning; Parted its chains, smashed into steam launch *Tui* then went ashore in 1889 cyclone but damage repaired. Was later either washed out to sea or sank in Butcher Inlet in disastrous 1894 cyclone.

May (1886 or 1888) 26 ton composite sailing cutter b. 1868 Perth WA; O.N. 61089; Reg. Fremantle 6/1869; 14.6 x 4.3 x 1.9m; Owner McRae and Pearse, Cossack. Wrecked off Point Sampson 'sometime in 1888'. Probably the same cutter *May* described as having drifted ashore with 27 bales of wool on board and becoming a total wreck in November 1886.

Myra (21/1/1898) 52 ton composite sailing lighter b. 1875 Fremantle; O.N. 72475; 19.5 x 5.2 x 2.2;

	Owner C.W. Paterson Master H. Bartlett. On voyage from Balla Balla to Cossack struck 'Gravesend Rock' at Reader Head and commenced sinking rapidly.
New Perseverance (20/12/1866)	105 ton wooden sailing schooner b.1857 Swan River Capt. William Owston; O.N. 40476; 25.9 x 6.3 x 3.0; Owner William Owston. Was carrying a cargo including wooden police quarters and materials from failed Roebuck Bay settlement when blown ashore in a gale. Another cyclone in 1870 shifted the wreck further up Butcher Inlet, and a subsequent storm and/or tidal event shifted the wreck so far inland it was permanently dry. The wreck was Cossack's first building and remained intact enough to be used as a storage hulk, police quarters and public house named 'The Ship Inn'.
Sea Ripple (25/2/1893)	187 ton wooden sailing barquentine b. 1863 Sunderland UK; O.N. 36550; Reg. Fremantle 2/1864; Converted for use as a hulk and lightship in Carnarvon 1886-1892. Sold to A. Clark of Ashburton and was being used as a hulk and lightship in Cossack, when blown ashore during a cyclone and totally wrecked.
Sisters (3/1875)	9 ton wooden dandy b. T. Mews, Perth 1858; O.N. 36538; Reg. Fremantle 1/1859; 10.67 x 3.26 x 1.25m; Owners Farquahar & McRae of Roebourne. Ex-Swan River cargo barge used for pearling, reportedly broken up at Cossack in March 1875.
SS *Silver Star* (1936)	96 ton composite screw steamer b. 1905 Perth WA. O.N. 120009; Reg. Fremantle 7/1906; Owner Alexander Armstrong of Albany. Caught in tide when struck Cossack wharf and split stempost, was later run ashore and burnt for fittings sometime in 1936 or 1937.
Solveig (19/2/1903)	574 ton wooden barque b. 1877 Porsgrund, Norway; 48.2 x 10.1 x 5.2m; Reg. Trondheim, Norway; Owner H. Gunderson, Acties Solveig; Master Capt. R. Ostreddt. Parted cables during a cyclone and went ashore at north beach Point Samson.
Sylvia/ Silvia (9/1/1894)	Wooden sailing lugger, broke moorings and deposited on top of Vampire Island in 1894 cyclone.
Square and Compass (20/3/1872)	Wooden pearling vessel, owner James Herbert. Was washed inland during 1872 cyclone and irreparably damaged, various reports describe it as being 3 or 10 kilometres inland in the direction of Roebourne and at the foot of a verge of hills.
Tribune (3/1881)	38 ton wooden sailing cutter b. 1869 Perth WA; O.N. 61088; Reg. Fremantle 5/1869; 16.8 x 4.9 x 2.2m. Was being used as a lighter when it foundered during a cyclone while transhipping livestock to the SS *Rob Roy*. Wreckage found washed up at Point Samson.
SS *Tui* (28/2/1889)	Steam launch, surface condensing steam engine possibly b. A.E. Brown, New Zealand. In the disastrous cyclone of 1 March 1889 the lighter *Maud* parted its chains and smashed into the *Tui*, causing it to be totally wrecked.

Verona (9/1/1894)	Blown on top of Vampire Island in 1 January 1894 cyclone. Appears to have subsequently been refloated to be later blown ashore on 80 Mile Beach on 29 June 1904.
Yule (1889)	17 ton wooden sailing cutter, carvel built, b. 1874 Perth WA. O.N. 72475; Reg. Fremantle 9/1875; Owner J. Tagg (or G. Tagg and W. Matthews). Was damaged in 1887 cyclone and refloated, but subsequently driven ashore at Cossack in 1889 cyclone and broken up.
Two unidentified pearling boats (20/3/1872)	During the March 1872 cyclone a boat belonging to stockowner and pearler David McKay disappeared, and a 3 ton boat belonging to Edward Chapman was smashed to pieces at the base of a hill about a kilometre from Cossack Creek.
Unnamed whaleboat (6/1872)	A whaleboat belonging to the controversial entrepreneur and pearler Francis Cadell capsized in a squall off Tab-a-Tab Reef while on a voyage from Condon to Cossack, with the loss of all hands including six Malays.
Water Police boat (1880)	The Water Police boat was sunk at its moorings after being caught in the mooring chain of the lugger *Ariel* as the tide changed.
Unidentified passenger boat (13/7/1896)	A sailing passenger and cargo boat owned by the Adelaide Steamship Company got into difficulty while transferring passengers, twelve sheep, cargo and mails to the SS *Albany*. It struck a bank near the entrance to Butcher Inlet and broke up, the men being saved.
Various unidentified small craft (5/4/1898)	'A number' of small craft were lost in the 1898 cyclone.
Unidentified lugger (12/7/1889)	Owned by Frank Bell. Two men went on a fishing trip and had anchored at Bezout Island when the tide went out causing the vessel to bump heavily and it sank.
Unidentified lugger possibly *Gladys Olive* (1942)	One of two or three luggers owned by Jiro Muramats that was reportedly burnt by the Army or Royal Australian Navy during World War II.
Unidentified lugger possibly *Lotolop* (1942)	One of two or three luggers owned by Jiro Muramats that was reportedly burnt by the Army or Royal Australian Navy during World War II.
Unidentified lugger possibly *Siput* (1942)	One of two or three luggers owned by Jiro Muramats that was reportedly burnt by the Army or Royal Australian Navy during World War II.

Lighter wrecks

Of the fourteen lighters recorded as having operated at Cossack seven are recorded as having been wrecked in the study area, most within Butcher Inlet. The lighter wrecks are therefore a significant maritime archaeological resource that relate to the operation of Cossack and Northwest ports generally.

On 8 November 1886, the cutter *May* was lightering 27 bales of wool when it went ashore at Cossack, losing all of the wool and becoming a total wreck (*Western Mail* 13/11/1886 p.17)

Among a number of losses during the 1894 cyclone the schooner *Harriet* and lighter *Cossack* were stranded high on the beach at Cossack (*South Australian Register* 23/1/1894 p.5). The ex-Adelaide Steamship Company lighter *Derby* was also wrecked 'on the beach' at Cossack. The owners of the *Derby* Captain England and Miller owned the steam launch *Tui* that was also wrecked in 1894. The *Tui* probably operated as a tug to tow the larger unpropelled lighters such as the *Derby* and *Cossack* to and from vessels in the Jarman Island roadstead.

On 27 November 1894 the lighter *Myra* sank off Jarman Island with 60 tons of cargo for the SS *Albany* (*West Australian* 29/11/1894 p.5), and was later refloated.

The 58 ton ketch *Maggie Gollan* was owned and operated as a lighter by its owner James Frances Tiffany, lighterman of Cossack, and was wrecked in a severe storm at Cossack in 1898 with a full cargo of goods for Condon (Cairns & Henderson 1995: 290).

In the same cyclone that sank the ship *Crown of England* at Balla Balla, on 25 March 1912, the lighters *Steady*, *Clyo* and *Enterprise* were wrecked on Depuch Island. The wooden screw steamer *Clyo* was transporting 14 passengers to the SS *Bullara*, most of whom were witnesses for a murder trial at Roebourne. Among the dead included Edward Maginnis, wharfinger for the Whim Creek Co. at Balla Balla, and Thomas Hill, manager of the Federal Hotel at Whim Creek (*Kalgoorlie Western Argus* 2/4/1912 p.31).

Ex-Cossack resident Mr W.A. Thompson recalled that the lighter *Amy* was wrecked prior to 1890 on the beach opposite Nanny Goat Hill, and that the keel was still visible there, along with the remains of other vessels including one which 'may be the lighter *Cossack* which was still in casual service in the late 1890s' (Thompson n.d.: 35)

On 1 May 1936 the schooner *Eva,* described as having 'been used for some time as a lighter by the Cossack Lightering Co.' was transporting twelve tons of timber from the Point Samson jetty when it was wrecked at Reader Head in a strong easterly wind with high seas. No lives were lost (*West Australian* 5/5/1936 p.11). (Figure 50)

In 1936 the ex-Perth river ferry and Albany excursion steamer SS *Silver Star* was owned by the Cossack Lightering and Trading Company when it rammed the Cossack wharf and split its stempost. It was beached just south of the wharf where it became a total wreck (De L. Marshall 2001: 239) (Figure 51).

Butcher Inlet shipwreck sites

The following eight shipwrecks were all located during the foreshore survey, lying buried in thick mud in the intertidal zone. There was difficulty measuring some of the sites that were partially overgrown with mangrove trees, though GPS points were taken of the bow and stern features where discernible:

Table 3. Butcher Inlet shipwreck sites

Name	Description	GPS position (GDA94)
Cossack UNID 1	Wreck of a wooden cutter or lugger that is almost totally buried in mud. Visible remains consist of an iron hand winch with concreted chain attached, a small section of copper alloy sheathing and eroded hull timbers.	S 20.68173 E 117.18555
Cossack UNID 2	Wreck of a wooden cutter or lugger. Remains consist of a rock ballast mound, section of keel with iron keel bolts, corroded iron artefacts, copper alloy sheathing, chain, iron fastenings, iron tiller stock and two chain mounds – one each at the bow and the stern. There appear to be few timbers left apart from a section of keel and frame, though more could be buried beneath the ballast mound.	S 20.68173 E 117.18555
Cossack UNID 3	Wreck of a wooden cutter or lugger. Remains consist of rock ballast, timber frames, hull planking and two broken sections of keel, copper alloy sheathing, small anchor with corroded chain and iron hand winch. Frame spacing is 40-44cm and total length 22.4m. The anchor shank measured 1.06m. Hull plank width is 14cm. The winch measurements are 0.9m axle width and 40cm winch cog diameter.	S 20.68165 E 117.18563
Cossack UNID 4	Wreck of a large wooden lighter. Remains consist of the bottom of the vessel with timber keel and frames, a wooden knee, two broken winches, a bollard/ bitt, iron fastenings, rock ballast, wooden sternpost, stacked iron beams (probably for laying across hatches to increase deck cargo carrying capacity) and hawse pipe. Possibly the *Amy* (1923), *Cossack* (1894) or *Derby* (1894).	S 20.68172 E 117.18537
Cossack UNID 5	Wreck of a large wooden/ composite lighter. Remains consist of a large winch, iron knees, wooden keel, stempost with iron heel plate, iron fastenings, two mooring ports, wooden frames including paired frames, rock ballast. Possibly the *Amy* (1923), *Cossack* (1894) or *Derby* (1894).	S 20.68194 E 117.18542
Cossack UNID 6	Wreck of a wooden cutter or lugger. Remains consist of a wooden keel, frames, iron hand winch and rock ballast.	S 20.6814 E 117.1861
Cossack UNID 7	Concentration of nine intact, or partial fragments of iron knees with iron fastenings on the rocky boulder shoreline north of the Cossack wharf and Asian cemetery. Dimensions of two sizes of intact knees are 54 x 65cm and 103 x 78cm. Possibly remains, or partial remains of the *Maggie Gollan* (1898) or *Sea Ripple* (1893).	S 20.67505 E 117.19503
Cossack UNID 8	Wreck of a small wooden hulled screw steamer. Remains consist of a cylindrical scotch boiler with a single furnace, two cylinder compound engine, rock ballast mound, chain, one	S 20.6811 E 117.1863

iron knee, two winches and a collapsed iron funnel. This site is believed to be the steam launch SS *Tui* (1889), the only other steamer along with the *Silver Star* recorded to have been lost in Butcher Inlet.

Figure 54. Windlass and copper alloy sheathing on Cossack UNID 1 site, wooden cutter or lugger wreck.

Figure 55. Timber frames and copper sheathing on Cossack UNID 3 site, wooden cutter or lugger wreck.

Figure 56. Cossack UNID 5 wooden lighter wreck in mangroves.

Figure 57. Small anchor on Cossack UNID 3 site.

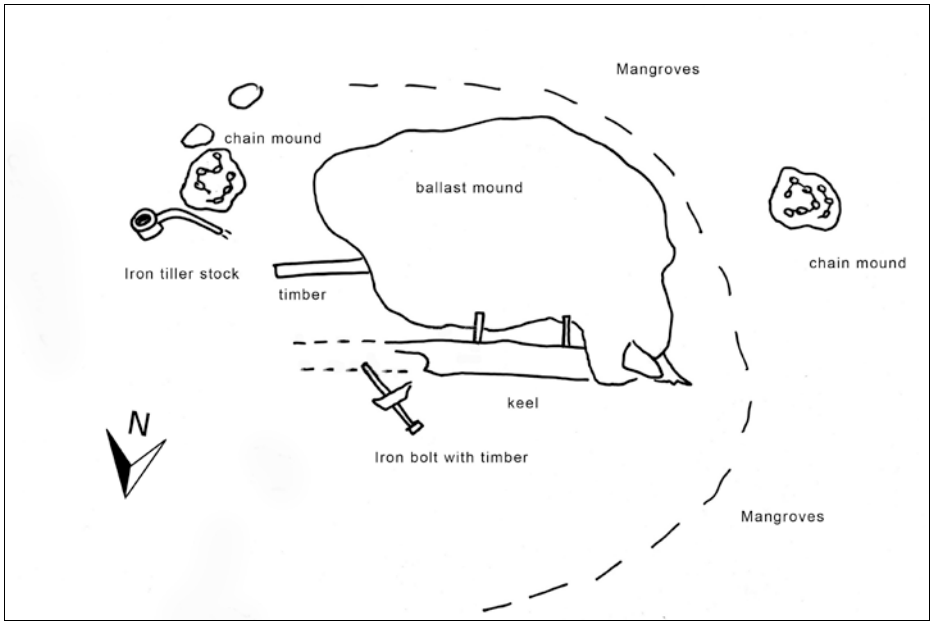

Figure 58. Sketch plan of Cossack Unidentified 2 shipwreck site.

Figure 59. Wooden keel with windlass on Cossack Unidentified 6 site.

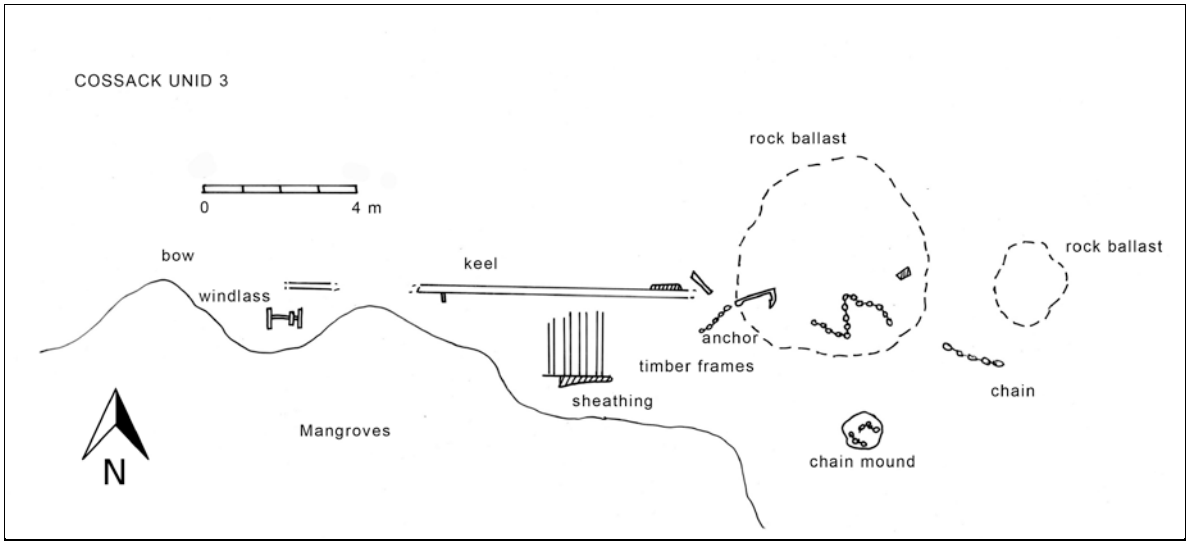

Figure 60. Cossack Unidentified 3 shipwreck site plan.

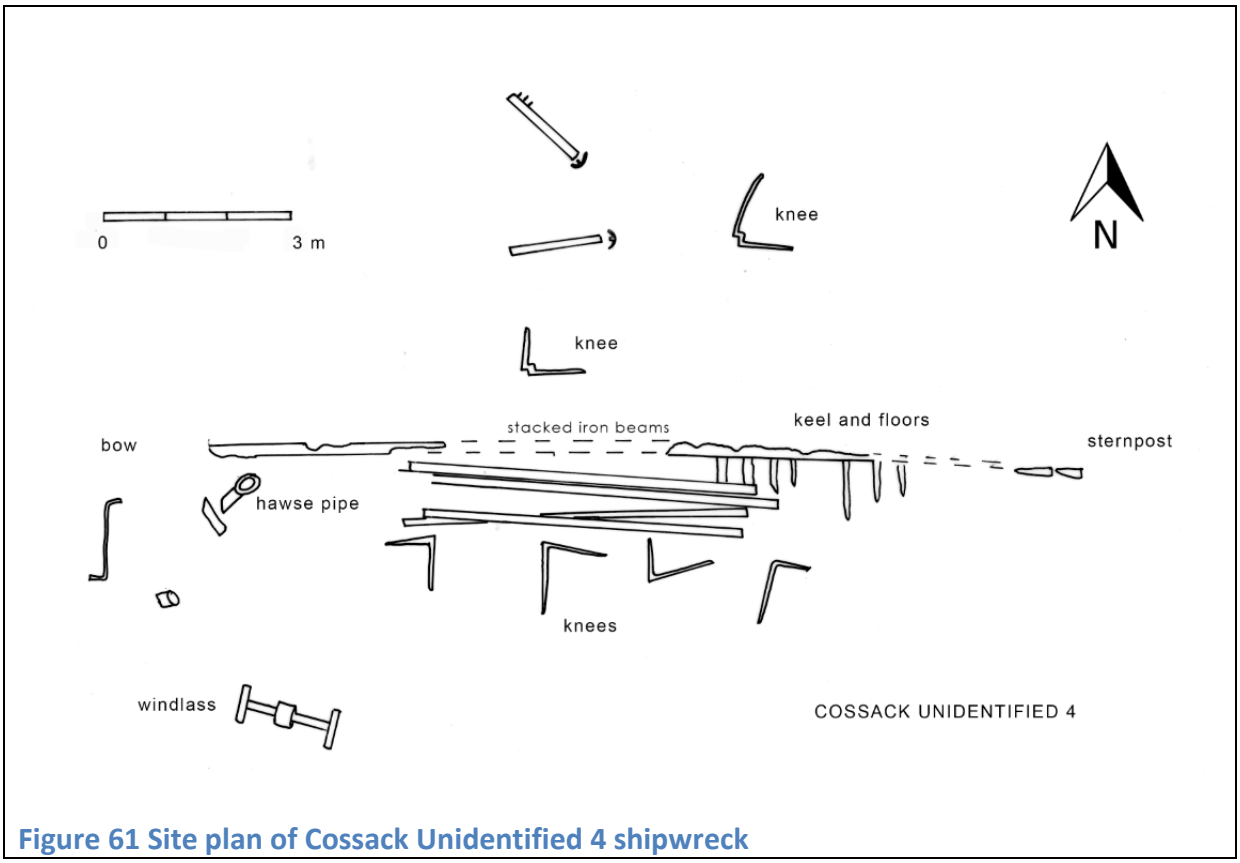

Figure 61 Site plan of Cossack Unidentified 4 shipwreck

Figure 62 Keel, floor frames and stacked iron beams on Cossack Unidentified 4 shipwreck

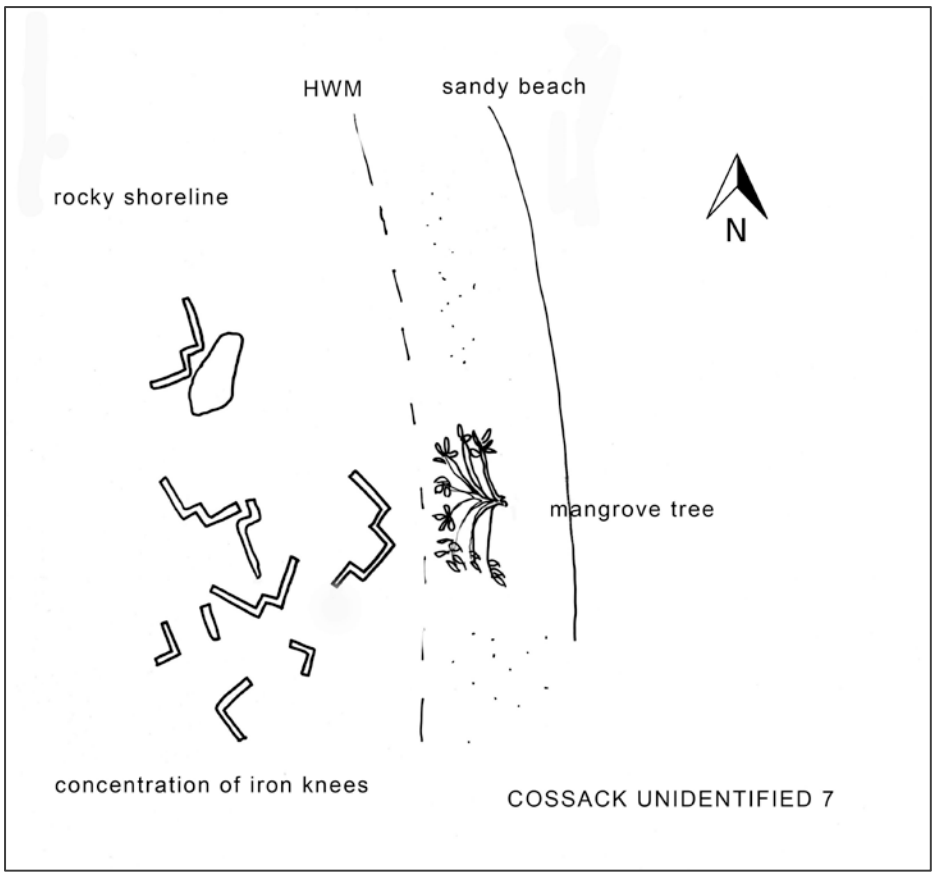

Figure 63. Sketch plan of Cossack Unidentified 7 shipwreck.

Figure 64. Detail of iron knees at the Cossack Unidentified 7 site.

Figure 65. Cossack Unidentified 8 is tentatively identified as the wreck of the New Zealand-built wooden steam launch SS *Tui* (1894).

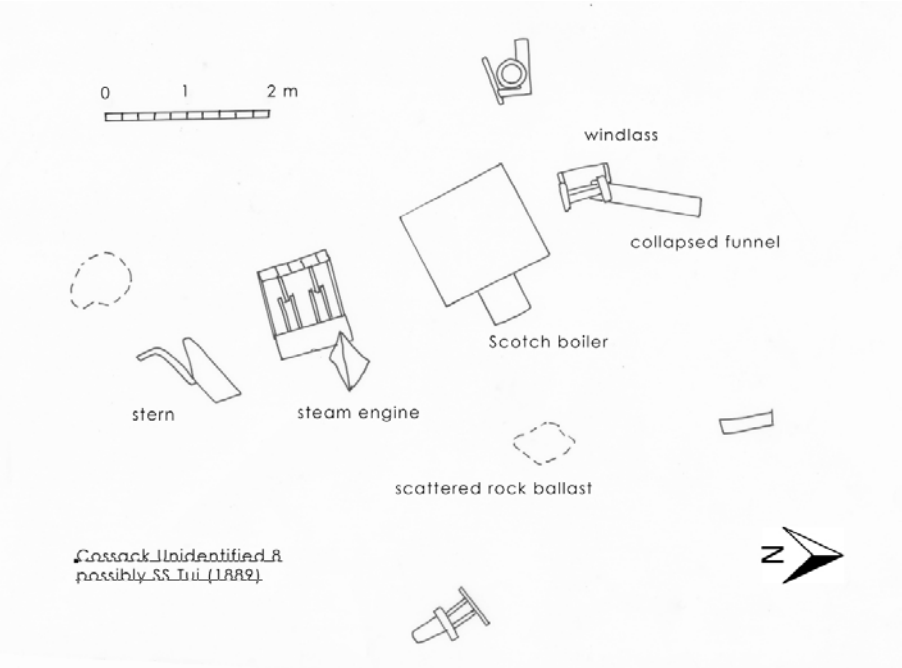

Figure 66. Site plan of Cossack Unidentified 8 steam shipwreck.

Ballast mounds

The Cossack foreshore surveys located ten ballast mounds, three of which were associated with wreck sites and one with a possible wreck site. Ballast mounds are recognisable as discrete, circular pile of (usually) non-local rock boulders. Large rounded river cobbles were often favoured as ballast. Those ballast mounds not associated with shipwrecks may be from stranding events where vessels blown ashore were lightened by removing their ballast in preparation for refloating. They may also be piles of ballast that were removed from vessels during lay-up periods or while undergoing repairs.

Another ballast mound was located at Point Samson that is probably associated with a wreck or stranding event.

Figure 67. Ballast mound at Point Samson.

Figure 68. Ballast mound overgrown by mangroves on Cossack foreshore.

Miscellaneous ship artefacts

Aberlady bell

A ship's bell from the *Aberlady* hangs from a bell tower in the grounds of the Holy Trinity church in Roebourne. The *Aberlady* was wrecked in the South China Sea in 1877, and the bell bought back to Roebourne by a ship's captain (Gregg *et al*, Department of Maritime History database, accessed 2/9/13). It is a reminder of the maritime trading network that connected Cossack and Roebourne directly with the Indian Ocean and Southeast Asia.

Figure 69. Holy Trinity church, Roebourne.

Figure 70. *Aberlady* (1877) bell.

Results

Maritime archaeological surveys and historical research have provided new information on the diversity and extent of Cossack's maritime industries, shipwrecks and other maritime archaeological sites.

Historical research added a number of new wrecks to the Department of Maritime Archaeology's Shipwreck Database, including *Flora* (1902), *Beatrice* (1893), *Lily* (1889), three luggers scuttled during World War II (1942) and a Water Police boat (1880). Timber identifications from the located wrecks that were sampled show that all of them were built in Australia.

Geo-referencing historic charts and plans of Cossack identified locations of five previously unknown shipwreck sites. A remote sensing survey undertaken within the southern portion of Butcher Inlet confirmed the presence of numerous magnetic targets, including two buried targets correlating with positions of shipwrecks derived from the historic plans. A note on the plan that one of these sites was 'proposed to be removed' indicates it could be remains of the *Azelia* (1887) that is recorded to have been 'removed by explosives' during channel dredging for the Stock Jetty improvements around 1897.

The foreshore survey recorded over fifty new archaeological sites and features, including eight previously undocumented shipwreck sites, in the inter-tidal zone. One of these wrecks is tentatively identified as the New Zealand-built SS *Tui* (1889). Although there were no timbers visible to sample and enable a positive timber identification, it is the only other steamship wreck recorded in Butcher Inlet. A detailed condition survey was made of the Cossack sea wall (Anderson and Bigourdan 2013), as well as a photographic condition survey of the seaward side of the Cossack wharf.

The scattered remains of *Solveig* (1901) shipwreck at Point Samson were recorded (Bigourdan 2012) along with the Point Samson jetty remains in the intertidal zone. The Point Samson jetty piles show evidence of being copper sheathed, with the added cost of this measure being offset by increasing longevity and stability of the structure, and associated reduction in maintenance in this remote area. A ballast mound was located on the Point Samson north beach as was another feature believed to be part of the Port Samson jetty beacon, most likely destroyed along with the jetty in the 1912 cyclone.

Discussion

The Cossack area maritime archaeological sites may be viewed through the lens of Indigenous, Asian and European labour to understand the sheer physical effort involved in the colonisation, maritime, pastoral and industrial development of the remote Northwest. This labour reflects the importance of maritime trade and communications to the development of the Northwest.

Cossack's function as an international trading port in the wool and pearl shell trade is not widely known. Its early contribution to the development of the globally significant northern Australian pearl shell industry and Western Australian economy is also not well recognised, following Broome's succession as the modern hub of the Northwest pearling industry from the 1890s.

From a historical-environmental perspective the maritime archaeological sites show how colonists adapted to the Northwest's unique environmental conditions, from using and adapting the natural advantages offered by Butcher Inlet as the site for a landing and subsequently a port, the operations of the pearling, turtle and trepang industries targeting marine resources, the use of mangrove tree moorings and mangrove inlets to protect shipping, and attempts to create durable maritime infrastructure to cope with the regular impact of severe cyclones. However Cossack's natural disadvantages, particularly its shallow inlet and exposed outer anchorage, made it unsuitable as technology progressed to larger ships.

This report highlights the importance of lighters, and the lightering trade, to Cossack and the Northwest generally. The co-dependence of pastoralism, mining and maritime trades is also evident in the archaeological remains of historic maritime infrastructure such as Cossack quay, Jarman Island lighthouse, Cossack explosives jetty, the Cossack seawall and Point Samson jetty. From a port development perspective the natural features of Butcher Inlet largely remain intact, and the operations and working of the early port can be interpreted through the visible archaeological sites.

As well as pearl shelling, other maritime resources such as turtles and trepang were exploited, the latter predominantly by Cossack's Chinese population. The few references located on trepanging provide additional insight into the activities of the Chinese in Cossack, who are better known for their involvement in market gardening and storekeeping. The scale of Chinese fishing and trepanging may be more significant than expected, as recent historical archaeological research into Chinese fishing activities in Victoria has revealed that Chinese fishermen and merchants played a dominant and lucrative role in developing the colonial fishing, fish curing and fish markets in Victoria and New South Wales (Bowen 2012).

Fragments of Asian ceramics and broken baler shells on the foreshore may be the only evidence of cross-cultural contact and ethnicity in the maritime sphere, although it is known the pearl-shelling workforce was made up of predominantly Asian and Aboriginal people. When viewed in context with the terrestrial archaeological sites in Cossack, they provide a more complete story of the port's domestic, mercantile and industrial operations.

Overall the maritime archaeological sites are integral to Cossack's historical and archaeological values, and should be considered in any future assessment of Cossack's heritage values and significance.

Recommendations

Due to the limited duration (five days) of the June 2012 fieldwork most of the time was spent in searching for sites, and not all sites could be adequately recorded. The following recommendations are made for future research, fieldwork, and protection of maritime archaeological sites:

1. That the foreshore area from Reader Head to Nanny Goat Hill, including Vampire Island and Butcher Inlet be protected by the Shire of Roebourne on its Municipal Heritage Inventory, and included within the Cossack Townsite Precinct on the State Heritage Register. The site includes the remains of eight known shipwrecks and three potential shipwrecks, ballast mounds, ship lay-up and repair areas, chain moorings, Cossack wharf and goods shed, Cossack seawall, Explosives Jetty and Stockyard Jetty;

2. That the *Solveig* (1901) shipwreck site, remains of the Point Samson jetty and Point Samson ballast mound are protected by the Shire of Roebourne on its Municipal Heritage Inventory;

3. That the SS *Silver Star* (1920) shipwreck site is protected by the Shire of Roebourne and listed on its Municipal Heritage Inventory;

4. That the shipwreck Cossack Unidentified Site 2 is excavated to provide further information on this shipwreck and its extent and construction;

5. Timber samples should be obtained from the Cossack Unidentified Site 8 tentatively identified as that of the New Zealand-built SS *Tui* (1889) to confirm its identification;

6. Further fieldwork to record detailed site plans of Cossack unidentified shipwrecks and foreshore sites is required;

7. Remote sensing surveys should be carried out in the northern portion and entrance of Butcher Inlet to locate the wreck of the *Mariano* (1878);

8. Future maritime archaeological fieldwork be undertaken to visit Delambre Island, Bezout Island and Jarman Island and other sites in conjunction with Ngarluma community members;

9. The Lazarette and Stockyard Jetty site on the eastern side of Butcher Inlet be visited and recorded in conjunction with Ngarluma community members;

10. Copies of this report are provided to the Shire of Roebourne, Cossack Museum, National Trust of Western Australia, Ngarluma Aboriginal Corporation, State Heritage Office and Battye Library.

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ITEM 30/ 716 Registration of natives in pearling industry

ITEM 32/ 72 Cons 430 Lighting arrangements Reader Head

ITEM 32/ 121 Treatment of natives in pearling industry/ Treatment of natives aboard the *Pearl*

ITEM 053 Illegal detention of Aborigines aboard ships at Cossack

ITEM 32/ 571 Cossack – Report of death of Aboriginal native diver Peter

ITEM 1902/022 Wreck of the lugger Flora

ITEM 1926/ 618 Inspector Mitchell visit to Cossack lazarette

ITEM 7469/ 00 Pearling licences

ITEM 1904/ 1349 Roebourne – wreck of lugger *Dreadnought* at Cossack – man missing

ITEM 1906/ 2217 Roebourne – report on the wreck of the lugger *Daisy* on Devil's Gap Reef near Cossack

ITEM 1911/ 0837 Wreck of barque *Glenbank* near Cossack – only one survivor

ITEM 1905/ 3937 Roebourne – attack on Captain Young and Messrs White and Prince on the schooner *Eclipse* by 5 Japanese employees at Cossack

ITEM 1926/ 2001 Cossack lazarette

Public Works Department Plans

ITEM 4589 Cossack Roebourne Marsh Road 1896

ITEM 6023 Cossack Point Sampson Harbour scheme

ITEM 24778 Cossack lazarette proposed quarters

ITEMS 04209 and 4208 Cossack Harbour Works – Stock Landing

ITEM 04448 Cossack explosives magazine, includes plan of townsite

ITEM 04589 Cossack - Roebourne marsh road.

ITEM 04659 Cossack stock jetty land resumption.

ITEM 06024 Cossack Harbour Works, Tramline. Point Sampson Scheme.

ITEM 09142 Cossack Water Supply, general plan & underground tank.

ITEM 11541 Cossack Harbour Works, Jarman Island Lighthouse red sector.

ITEM 11542 Cossack Harbour survey, proposed new works.

ITEM 01788 Cossack Harbour improvements, Plan of Townsite and surroundings.

ITEM 01983 Cossack Jetty and approaches, also includes 1890 Townsite plan.

ITEM 00360 Cossack Harbour improvements, and proposed jetty extension.

ITEM 00637 Cossack - Roebourne Tramway.

Appendix A

Timber samples and identifications

Dr Ian Godfrey, Department of Materials Conservation

Job No. 12/54

Date: 6 December 2012

COSSACK UNIDENTIFIED 2:
GPS 211 Frame recovered 29/6/12
The end grain had the following features - red-brown colour; rays narrower than pores; no discernible soft tissue; pores that were moderately numerous, small to intermediate in size, predominantly solitary and with an oblique arrangement; abundant tyloses; pores were slightly irregular in size with some larger and some smaller but not consistent with that associated with growth rings.

Features are consistent with the sample being a Eucalyptus species (*E. amygdalina, S. marginata, E. crebra, E. paniculata, E. pilularis, E. propinqua, E. siderophloia, E. sideroxylon, E. sieberi*).

GPS 211 Keel recovered 29/6/12
Key features were as for the above frame sample. Hence Eucalyptus species.

COSSACK UNIDENTIFIED 3:
GPS 209 Frame recovered 29/6/12 (Cu fastening attached)
Key features were as for the Cossack 2 Unidentified samples. Hence Eucalyptus species.

GPS 207 Keel recovered 29/6/12
Key features were as for the Cossack 2 Unidentified samples with a minor difference - there was a much more pronounced oblique arrangement of the pores. Hence Eucalyptus species.

GPS 208 Plank recovered 29/6/12 (21mm plank thickness)
Key features were as for the Cossack 2 Unidentified samples. Hence Eucalyptus species.

COSSACK UNIDENTIFIED 4
GPS 205 Frame recovered 29/6/12
Key features were as for the Cossack 2 Unidentified samples. Hence Eucalyptus species.

GPS 204 Knee recovered 29/6/12
End grain features included the following - brown colour (not red-brown); rays narrower than pores; soft tissue was not easily discernible; pores are moderately numerous, large in size, predominantly solitary and with an oblique arrangement; abundant tyloses but not as prevalent as for other Cossack timbers.

Although there were no matches for the above features on the CSIROID timber identification program, the features are typical of a Eucalyptus species.

GPS 203 Keel recovered 29/6/12
End-grain features included - red/brown colour; rays were narrower than the pores; soft tissue surrounds the pores; pores are moderately numerous, small to intermediate in size, predominantly solitary in an oblique arrangement; tyloses are abundant.

The above features are characteristic of 12 Eucalyptus species.

Figure 71. Cutting a timber sample from the keel of a large wooden lighter Cossack UNID 4. Note large iron hawse pipe indicating the bow area, and scattered pieces of corroded chain moorings.

Appendix B

GPS positions of Cossack maritime archaeological sites and features

Feature No.	Description	Longitude	Latitude
ck1	Cossack Unid 1: Hand winch, Cu sheathing, eroded timbers	117.1853628	-20.6825657
ck2	Metal pot	117.1853051	-20.6824754
ck3	Metal x2	117.1853626	-20.6824031
ck4	Metal x1	117.1853626	-20.6823669
ck5	Chain and metal	117.1854779	-20.6824662
ck6	Clump Unidentified shoreline	117.1855067	-20.68243
ck7	Smal knees x2	117.1855161	-20.6822945
ck8	Unidentified metal	117.1855161	-20.6822674
ck9	Winch cog, rails	117.1853817	-20.6822766
ck10	Pipe and square link	117.1853913	-20.6822675
ck11	Metal	117.185372	-20.6822224
ck12	Ballast mound	117.185487	-20.6820415
ck13	Winch cog and axle	117.1855061	-20.681924
ck14	Cossack Unid 2: Ballast mound, keel, metal, Cu sheathing, chain, fastenings	117.1855539	-20.6817342
ck15	Cossack Unid 3: Ballast, timber, anchor, planking, keel, Cu fastenings, sheathing, frames, broken glass	117.1856306	-20.6816438
ck16	Ballast mound and metal (possible site)	117.1856117	-20.6818968
ck17	Corroded base 44 drum	117.1857265	-20.6816166
ck18	Ballast mound in mangrove	117.1857073	-20.6815805
ck19	Sheathing fragment (15x10cm)	117.1857457	-20.6815804
ck20	Chain	117.1857937	-20.6815442
ck21	Ballast and iron work (probable wreck site)	117.1857744	-20.6814629
ck22	Mangrove tree chain mooring	117.1858032	-20.6814538
ck23	Mooring posts	117.1859281	-20.6815892
ck24	Chain in mangrove	117.1859087	-20.6813814
ck25	Chain and section rail	117.1859855	-20.6813543
ck26	Cossack Unid 6: Keel, winch, chain, timbers, rock	117.1860623	-20.6813542
ck27	Timber	117.1860719	-20.6813451
ck28	Ballast, chain in mangrove, sheathing fragments, glass	117.1860525	-20.6812277
ck29	Heavy chain in mangrove, round feature (upside down feature capstan?)	117.1861197	-20.6811734
ck30	Steel cable and chain	117.1862253	-20.6811733

ck31	Windlass	117.1861677	-20.6812004
ck32	Timbers x2 related to WP 80	117.1862446	-20.6812365
ck33	Timbers x2 related to WP 80	117.1862158	-20.6812727
ck34	Cossack Unid 8: Corroded Boiler, engine bed, ballast, chain, knee, winches x2, funnel	117.1862924	-20.68111
ck35	Round iron ring (mast band?)	117.1863883	-20.6810014
ck36	Unidentified features ways x3	117.1864171	-20.6810104
ck37	Asian ceramic fragment	117.1864171	-20.6810014
ck38	Small handwinch handle and axle in mangrove (rock behind)	117.1864459	-20.6809742
ck39	Boat shed or slipway foundations	117.1864747	-20.6809742
ck40	Winch with wood still on axle	117.1865515	-20.6809741
ck41	Ballast mound and chain	117.1865227	-20.6809651
ck42	Ballast mound	117.1865611	-20.6809832
ck43	Chain	117.1866379	-20.6809469
ck44	Chain	117.1866763	-20.6809198
ck45	Upper landing winch	117.1760776	-20.7072888
ck46	Cossack Unid 4: large wreck inside mangroves (possible Eva?), knees, stacked iron, sternpost, hawsepipe, winches x2	117.1853714	-20.6817164
ck15	Cossack Unid 3: western end of the baseline	117.1857171	-20.6817521
ck15	Cossack Unid 3: eastern end of the baseline	117.1855248	-20.6815716
ck26	Cossack Unid 6: western end of the baseline	117.1860335	-20.6813452
ck26	Cossack Unid 6: eastern end of the baseline	117.1860912	-20.6814084
ck47	Cossack intertidal zone feature southern end of the baseline	117.1864075	-20.6810195
ck47	Cossack intertidal zone feature northern end of the baseline	117.1865707	-20.680938
ck48	Cu sheathing with Baler shell fragment	117.1854381	-20.6813097
ck46	Cossack Unid 4: Broken winch	117.1854766	-20.6814
ck46	Cossack Unid 4: Broken winch and axle	117.1854478	-20.6814181
ck46	Cossack Unid 4: Concentration of broken chain and copper sheathing	117.1854479	-20.6814362
ck46	Cossack Unid 4: Concentration of broken chain and copper sheathing	117.1854096	-20.6815627
ck46	Cossack Unid 4: Broken chain and copper sheathing	117.1853712	-20.6815627
ck46	Cossack Unid 4: Stern post	117.185429	-20.6817073

ck46	Cossack Unid 4:Hawse pipe	117.1852946	-20.6817074
ck46	Cossack Unid 4: Centre of winch	117.1852946	-20.6817164
ck46	Cossack Unid 4: Wood sample from keel	117.1852562	-20.6817707
ck46	Cossack Unid 4: Wood sample from knee	117.1852946	-20.6817435
ck46	Cossack Unid 4: Wood sample from frame	117.185381	-20.6817254
ck46	Cossack Unid 4: Broken winch axel	117.1854672	-20.6815536
ck15	Cossack Unid 3: Wood sample from keel	117.185621	-20.6816709
ck15	Cossack Unid 3: Wood sample from planking	117.1856018	-20.6816438
ck15	Cossack Unid 3: Wood sample from frame	117.1856018	-20.6816438
ck14	Cossack Unid 2: Chain mound	117.185477	-20.6816982
ck14	Cossack Unid 2: Frame, Keel, Ballast, Iron bolts, and wood sample from frame	117.185573	-20.6817252
ck14	Cossack Unid 2: Chain, Fe tiller stock	117.1855923	-20.6817432
ck49	Mangrove tree mooring point and heavy chain loop disapearing into mud, 128 mm links	117.1852952	-20.6822405
ck50	Corroded fragmented metal box?	117.185104	-20.6829365
ck51	Scatter of intact and broken bottles on rocky point	117.1850756	-20.6832166
ck52	Cog, up the mangrove, flat area possible camp	117.1835784	-20.6838146
ck53	Broken glass scattered, lead sheet, ceramic dish fragments	117.1835592	-20.6837785
ck54	Scatter of black glass, corrogated iron, ceramics, window glass, collapsed ship tank, possible humpy camp site	117.1833574	-20.6836793
ck55	Scatter of broken glass bottle	117.1837217	-20.683209
ck56	Scatter of broken glass bottle	117.1837696	-20.6830915
ck57	Rock mound	117.1837788	-20.6828114
ck58	Scatter of broken glass bottle	117.183654	-20.6828206
ck59	Scatter of broken glass bottle	117.1839801	-20.682522
ck60	Timber and Cu bolt	117.1847761	-20.6817441
ck61	Chain and Cu sheathing	117.1852752	-20.68159
ck62	Scatter iron bolt, glass, copper sheathing	117.1851508	-20.6819063
ck63	Cossack Unid 5: Hawse pipe	117.1852181	-20.6819966
ck63	Cossack Unid 5: Winch	117.1852949	-20.6820056
ck63	Cossack Unid 5: Pair of knees	117.1853909	-20.6819784
ck63	Cossack Unid 5: knee and iron bolt	117.1854293	-20.6819332

ck63	Cossack Unid 5: Fe knee, stern	117.1854293	-20.6819422
ck64	Large iron bolt	117.1851126	-20.682069
ck65	Explosive magazine: NE corner	117.1958429	-20.6711327
ck65	Explosive magazine: SE corner	117.1958429	-20.6711598
ck65	Explosive magazine: SW corner	117.1958141	-20.6711418
ck65	Explosive magazine: NW corner	117.1958141	-20.6711056
ck66	Cossack Unid 7: Fragment of Fe knees and fastenings	117.1950318	-20.6750552
ck66	Cossack Unid 7: Fragment of Fe knees and fastenings	117.195003	-20.6750733
ck66	Cossack Unid 7: Fragment of Fe knees and fastenings	117.1950222	-20.6750643
ck66	Cossack Unid 7: Fragment of Fe knees and fastenings	117.1950126	-20.6750553
ck66	Cossack Unid 7: Fragment of Fe knees and fastenings	117.1950222	-20.6750462
ck66	Cossack Unid 7: Fragment of Fe knees and fastenings	117.1950126	-20.6750462
ck66	Cossack Unid 7: Fragment of Fe knees and fastenings	117.1950126	-20.6750462
ck66	Cossack Unid 7: Fragment of Fe knees and fastenings	117.1950222	-20.6750462
ck66	Cossack Unid 7: Fragment of Fe knees and fastenings	117.1950414	-20.67501
ck67	Explosive stone jetty: eastern end	117.1965266	-20.6727403
ck67	Explosive stone jetty: Fe bolt	117.1963826	-20.6727044
ck67	Explosive stone jetty: Fe bolt	117.1963922	-20.6727043
ck67	Explosive stone jetty: Fe bolt	117.1964114	-20.6727224
ck67	Explosive stone jetty: concrete block	117.1964595	-20.6727494
ck67	Explosive stone jetty: timbers x2	117.1961804	-20.6722709
ck67	Explosive stone jetty: bolts in rocks	117.196104	-20.6725872
ck67	Explosive stone jetty: bolts in rocks	117.1960848	-20.6725692
ck67	Explosive stone jetty: bolts in rocks	117.1960752	-20.6725601
ck67	Explosive stone jetty: bolts in rocks	117.1960463	-20.6725511
ck67	Explosive stone jetty: bolts in rocks	117.1960367	-20.6725421
ck67	Explosive stone jetty: bolts in rocks	117.1960175	-20.6725331
ck67	Explosive stone jetty: bolts in rocks	117.1960079	-20.6725241
ck67	Explosive stone jetty: bolts in rocks	117.1959983	-20.6725241

ck67	Explosive stone jetty: bolts in rocks	117.1959887	-20.672515
ck67	Explosive stone jetty: bolts in rocks	117.1957581	-20.6723978
ck67	Explosive stone jetty: rock embankment	117.1957485	-20.6723888
ck68	Cossack seawall outline (northern end)	117.1883265	-20.679906
ck68	Cossack seawall outline	117.1881729	-20.6799242
ck68	Cossack seawall outline	117.1880481	-20.6799695
ck68	Cossack seawall outline	117.1879234	-20.6800148
ck68	Cossack seawall outline	117.1878178	-20.6800601
ck68	Cossack seawall outline	117.1876643	-20.6801235
ck68	Cossack seawall outline	117.187645	-20.6801055
ck68	Cossack seawall outline	117.1875971	-20.6801417
ck68	Cossack seawall outline	117.1875203	-20.6801689
ck68	Cossack seawall outline	117.1875011	-20.680196
ck68	Cossack seawall outline	117.1874147	-20.6802232
ck68	Cossack seawall outline	117.18729	-20.6802776
ck68	Cossack seawall outline	117.1872036	-20.6803228
ck68	Cossack seawall outline	117.1870885	-20.6803862
ck68	Cossack seawall outline	117.1869541	-20.6804496
ck68	Cossack seawall outline	117.1868678	-20.680522
ck68	Cossack seawall outline	117.1867718	-20.6805582
ck68	Cossack seawall outline	117.1866567	-20.6806126
ck68	Cossack seawall outline	117.1865319	-20.6806669
ck68	Cossack seawall outline	117.1864552	-20.6807032
ck68	Cossack seawall outline	117.1863592	-20.6807394
ck68	Cossack seawall outline	117.1862152	-20.6808028
ck68	Cossack seawall outline	117.1861577	-20.68083
ck68	Cossack seawall outline	117.1860041	-20.6809115
ck68	Cossack seawall outline	117.185889	-20.6809568
ck68	Cossack seawall outline (southern end)	117.1857834	-20.6810111
ck68	Cossack seawall condition survey	117.1883649	-20.6798878
ck68	Cossack seawall condition survey	117.1883936	-20.6798426
ck68	Cossack seawall condition survey	117.1882785	-20.6798879
ck68	Cossack seawall condition survey	117.1882209	-20.6799061

ck68	Cossack seawall condition survey	117.1881537	-20.6799333
ck68	Cossack seawall condition survey	117.1880386	-20.6799966
ck68	Cossack seawall condition survey	117.187981	-20.6800057
ck68	Cossack seawall condition survey	117.1878754	-20.680051
ck68	Cossack seawall condition survey	117.1876739	-20.6801326
ck68	Cossack seawall condition survey	117.1875203	-20.6801779
ck68	Cossack seawall condition survey	117.1874435	-20.6802322
ck68	Cossack seawall condition survey	117.1872612	-20.6803137
ck68	Cossack seawall condition survey	117.1871749	-20.6803771
ck68	Cossack seawall condition survey	117.1870405	-20.6804314
ck68	Cossack seawall condition survey	117.1868678	-20.680531
ck68	Cossack seawall condition survey	117.1865703	-20.6806669
ck69	Chain mound	117.1900441	-20.6790547
ck70	Fe concreted round feature (30cm diameter)	117.191032	-20.6782133
ck71	Fe bar (approx. 1.5m long)	117.1919239	-20.677381
ck72	Fe circular feature, very concreted, possible winch wheel	117.1955792	-20.6751269
ck73	3 Fe posts, possible mooring points	117.1983309	-20.6721329
ck74	Fe posts, possible mooring points	117.1980724	-20.6727115
ck75	Fe posts, possible mooring points	117.1980533	-20.6727838
ck76	Fe posts, possible mooring points	117.1977753	-20.6730913