The Misidentification of a Shipwreck in Cardigan Bay, West Wales, Designated under the Protection of Wrecks Act 1973

(Diver preparing to recover timber samples from the designated site for dendrochronological Analysis)

Ian Cundy

Malvern Archaeological Diving Unit

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Malvern Archaeological Diving Unit: 17 Hornyold Road, Malvern, Worcs. WR14 1QQ

Tel: 01684 574774 / E-mail: MADUdiving@gmail.com / Web: www.madu.org.uk

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Author:

- Ian Cundy (Malvern Archaeological Diving Unit)

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ABSTRACT

In 2002, the site of a shipwreck in Cardigan Bay, west Wales, thought to be the final resting place of the fully rigged ship *Diamond*, was designated by Cadw under the Protection of Wrecks Act 1973. Subsequent investigations into the remains of the vessel on the seabed by the Malvern Archaeological Diving Unit, together with comparisons made against documented historical research relating to *Diamond*, led to the conclusion that the identity of the ship on this underwater site was almost certainly mistaken. This deduction is, however, not the end of the matter, as while it answered the long-standing question relating to the validity of the name *Diamond* being ascribed to this shipwreck, it neither threw any light upon the actual identification of the vessel on the site, or the possible location and final resting place of *Diamond*. This article is an attempt to answer both these two pertinent and outstanding questions.

KEYWORDS:

- Cardigan Bay / *Danube* / *Diamond* / Protection of Wrecks Act / shipwreck identification / volunteer projects

Introduction

The site of a shipwreck in Cardigan Bay, west Wales, thought to be the final resting place of the fully rigged ship *Diamond*, was designated in 2002 by Cadw under the Protection of Wrecks Act 1973. The vessel's remains were investigated by the Malvern Archaeological Diving Unit and historical research relating to *Diamond* was undertaken. The results revealed that the identity of the ship on this underwater site was almost certainly mistaken. This article is an attempt to answer two pertinent and outstanding questions: what is the actual identification of the vessel on the site, and where is the possible location and final resting place of *Diamond*?

As readers will see, to assist with the progression of events from the early 19th century to the present day, the article is presented in the form of a timeline, commencing with details relating to the fully-rigged ship *Diamond*, from being launched in New York in August 1823 to being wrecked off the coast of Wales in January 1825.

The account then moves forward to the beginning of the 21st century with the discovery of a shipwreck on the Sarn Badrig Reef in Cardigan Bay, the designation of the site by the Welsh Assembly in 2002, and subsequent seven years of investigations of the site and documented records relating to *Diamond* carried out by volunteers and professional archaeologists. The conclusions derived from this work threw considerable doubt upon the vessel on the site being that of *Diamond*. However, no definitive suggestions were made at the time as to the true identity of the vessel, or where the final resting place of *Diamond* might be.

Finally advancing in time to 2020, a Covid-19 volunteer research project devised by the Malvern Archaeological Diving Unit, and run in collaboration with the Nautical Archaeology Society, resulted in a collection of 275 reports being prepared relating to vessels that had been involved in maritime incidents in the north Cardigan Bay area where the designated site is located. These reports, together with information derived from the earlier research, stimulated a re-evaluation of the wreck on the site, and the conclusions derived from this examination have inspired the proposals set out below for both the identity of the vessel on the site, and the final resting place of *Diamond*.

Background

1820s

The three-masted, twin deck, wooden square-rigger *Diamond* was launched from Noah Brown's New York shipyard on 1 August 1823, for the owner Josiah Macy (1785–1871). Built as a commercial passenger and cargo ship to ply between America and Great Britain, *Diamond* made four successful return trans-Atlantic passages before being wrecked on 2 January 1825, on the fifth outward leg from New York to Liverpool with the loss of ten lives (Lloyd, 1993, pp. 38, 87, 293). Probably due to poor navigation, *Diamond* ran aground on the Sarn Badrig Reef (St Patrick's Causeway), in the North Cardigan Bay area of west Wales, before floating free to sink upright in deeper water (Iles, 2001). As recorded in Coflein (2012), just 17 months after being commissioned, *Diamond* grounded on the reef and was lost while carrying passengers, together with a cargo of cotton, apples and potash (Larn & Larn, 2000a; Thomas, 1997–1998).

2000

In the Summer of 2000, two local divers (Tony and Helen Iles) discovered the remains of a ship in 6-10 m (20-33 ft) of water, approximately 3.75 km (2.33 mi) offshore, just to the north of the Sarn Badrig Reef (**Figure 1**). This reef stretches around 20 km (12.4 mi) in a south-westerly direction out from the beach at Morfa Dyffryn, between Barmouth and Harlech (Ordnance Survey, 1995). Many sections of this narrow causeway dry, particularly during low spring tides (Admiralty Chart, 2002), and over the years numerous vessels have run aground on this reef, with many ending their days on the rocks or in the immediate vicinity (Holden, 2003, pp. 14–16, 20; Jones, 1973/2001, pp. 19–32).

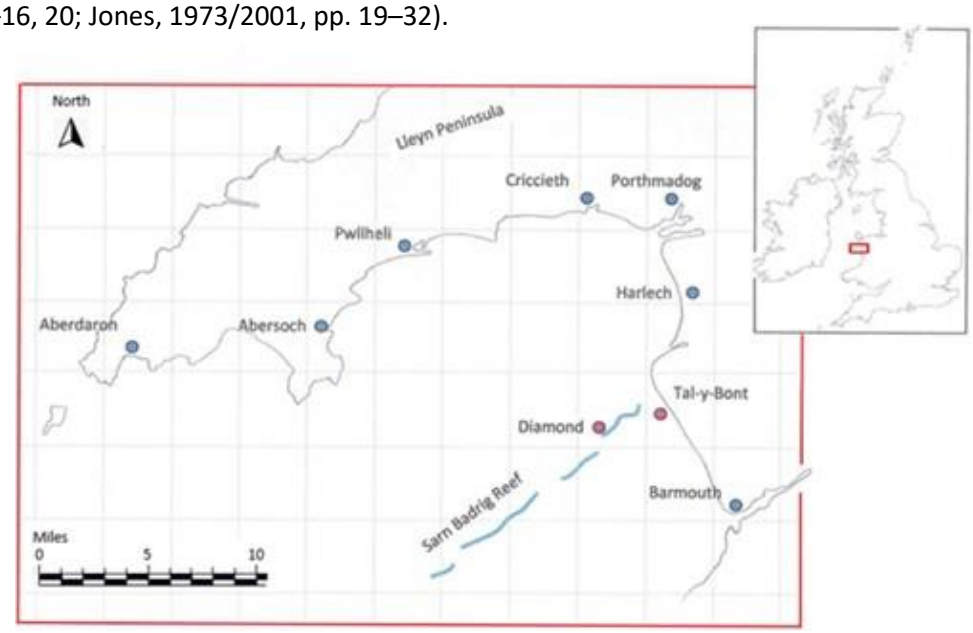

Figure 1. Map showing the location of *Diamond* and Tal-y-Bont designated wreck sites, local to the Sarn Badrig Reef in the north Cardigan Bay area of west Wales (© Ian Cundy – MADU).

2001

Initial opinions regarding the identity of the shipwreck discovered by the divers in 2000 were that it could be that of *Diamond* (Bowyer, 2001; Iles, 2001), and during 2001, discussions were held between Cadw (the Welsh Government's Historic Environment Service), the Advisory Committee on Historic Wreck Sites (ACHWS), together with numerous other interested parties, to determine whether the site should be designated under the Protection of Wrecks Act 1973. Following these consultations, it was generally agreed that the wreck site was of significant importance and should be protected (ACHWS, 2001).

Assessment of a shipwreck under this act is made using criteria relating to consideration of the Historical, Archaeological or Artistic importance of the remains on the site, and in the United Kingdom, designation can be made by the heritage agencies of the respective devolved nations. Once designated, an exclusion zone is placed around the site, inside of which diving, mooring or tampering in any way, with the wreck or the site, is prohibited without an authorised licence.

2002

On 1 April 2002, Cadw duly designated the site under the Protection of Wrecks Act 1973 (National Archives, 1973), making it the 56th site in UK waters to become protected under this act, and only the sixth site to be designated off the coast of Wales (**Figure 2**).

Figure 2. A poster showing the six protected wreck sites off the Welsh coast, produced to help publicise and promote maritime archaeology in Wales (© Cadw, 2008).

Following designation, and partly due to disagreements between other interested parties (Diver Magazine, 2002), the Malvern Archaeological Diving Unit (MADU) were invited by Cadw to carry out an evaluation of the site, and to compare underwater findings with historical archival evidence relating to *Diamond*. The purpose of this exercise was an attempt to confirm the identity of the wreck on the site and between 2002 and 2009, under licence from Cadw, MADU carried out periodic dives on the site and undertook research into *Diamond's* background. Diving activities over this period included monitoring, recording and survey exercises, as well as some limited excavations to recover various samples of timbers for species identification and dendrochronological investigation, together with small fragments of sheathing for metallurgical analysis (Cundy, 2002–2006, 2008–2009).

An Overview of the Site Work and Research (2002–2009)

2002

Diving during the 2002 season revealed the relatively well-defined structural outline of a partially composite shipwreck, with the vessel sitting upright but mostly concealed by a covering of sand and shingle. Protruding from the seabed were the vertical remains of large timber frames, estimated to be visible from a position that would have been just above the turn of the bilge. The frames included the remnants of possibly sheathed outer planking, and iron reinforcing knee riders attached to what would have been the interior face of the frames. Some of the knees stood several metres above the seabed, together with additional large structural iron members (**Figure 3**).

Figure 3. Black bream (*Acanthopagras butcheri*) nesting in the shadow of a large structural iron reinforcement feature on the designated site (Photo: © Ian Cundy – MADU).

Investigations into *Diamond's* construction and specification however, have not revealed any information relating to there ever having been any iron reinforcements included when the vessel was built (Lloyds Registers, 1824–1825). It is noted on the web site of the Royal Commission on the Ancient and Historical Monuments of Wales (Coflein, 2012), that: 'There was some suggestion that after the sloop's [ship's] initial voyage to Liverpool, the vessel was fitted with iron framing to augment the original oak framing'. No confirmation of this has been uncovered, however, there are records showing that *Diamond* arrived in Liverpool for the first time on 16 September 1823 and sailed again on 10 October (Lloyd's List, 1823–1824).

While this 24 day stop-over would have been more than adequate to discharge the cargo, re-stock with provisions and take on board a new consignment of goods for export, there would certainly not have been the time to undertake the considerable amount of work that would have been necessary to retrospectively fit an iron knee rider to each of the vessel's wooden main frames. The timeline of *Diamond's* movements, over its short 17-month lifespan, during which nine crossings of the Atlantic were made, confirm that it was never in port long enough to have embarked upon any major re-fit (**Table 1**).

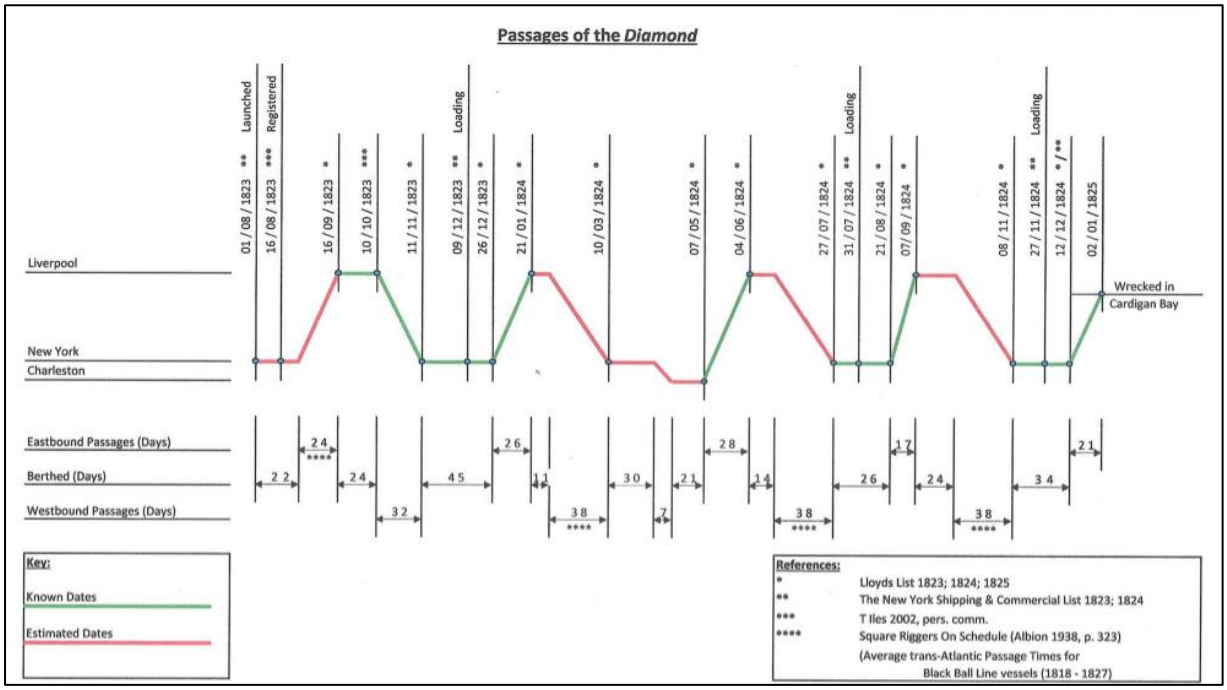

Table 1. Timeline of the passages undertaken by *Diamond* (© Ian Cundy – MADU).

Also observed around the site were several large cuprous pins (typically 590 mm long by 25 mm diameter), used as fasteners to connect the knee riders to the main frames (**Figure 4**). One of these pins, recovered prior to designation, was observed to be stamped with the letters *MUNTZ PATT*, from which it was concluded that these fastenings were made from patented Muntz metal. However, this alloy, used for bolts and other fastenings, which was developed in the UK, was not patented until 1832 (Muntz, 1832b), which was nine years after *Diamond* was built, and seven years after it was lost.

Figure 4. Underwater images showing cuprous pins still attached to knee riders and passing through space (where the main frames would have been), to the sheathed outer planking (Photos: Wessex Archaeology, 2006 / © Cadw).

In addition to the iron knees and Muntz metal pins, two large riveted tanks were also observed on the site, situated around amidships, and thought to have been used for the storage of potable water. These tanks were noted to have a distinctive stepped top plate (**Figure 5**), and are thought to have been fitted in the bilge area, with the step in the top plate used as a method for locking the tanks in place below one of the intermediate deck beams above, thereby stopping the tanks from moving during rough weather. Wooden

water barrels were being replaced by iron tanks from the mid-1820s (MacGregor, 1984, p. 147), which is around the time *Diamond* was built, however, no mention of these tanks has been found in any reference to *Diamond*. This style of tank is more typically found in later vessels, such as *Jhelum* (Kearon & Stammers, 1992, pp. 104–106), which was built in Liverpool in 1849, 26 years after *Diamond* was built, and 24 years after it was lost.

Figure 5. One of the riveted tanks on the designated site, showing the stepped top plate. In the foreground is the remains of an iron knee rider (Photo: © Ian Cundy – MADU).

2003

During this season, a survey revealed that the visible structural remains on the site provided a general length for the wreckage of approximately 48.77 m (160 ft), which is around 12 m (40 ft) longer than the overall recorded length of *Diamond*. However, as this site measurement is assessed to have been taken close to the turn of the bilge, the overall original length of the vessel on the site would almost certainly have been even greater.

2004

In conjunction with Wessex Archaeology, during 2004 small samples of timber for species identification and sheathing for metallurgical analysis were recovered (Wessex Archaeology, 2006; 2007). The timber samples were analysed by Nigel Nayling at the Department of Archaeology and Anthropology, University of Wales, Lampeter (Nayling, 2005), and the results revealed that the:

- Outer hull planks were elm (*Ulmus* sp.)
- Framing timbers were larch (*Larix* sp.)
- Ceiling planks were elm (*Ulmus* sp.)
- Scarfed outer hull plank was pine (*Pinus* sp.)
- Main frames were quartered oak (*Quercus* sp.)

Diamond was a wooden vessel, known to have been built using white oak and locust [1] (W.O. Locust) (Lloyds Registers, 1824–1825; Morrison 1909, pp. 20–21). No locust was found; however, we do not know exactly which part of the ship was constructed from this type of timber, and we could easily have been sampling in the wrong location.

The sheathing samples recovered were analysed at the Metallurgical Laboratory of the School of Earth, Ocean and Planetary Sciences, Cardiff University, and the results revealed that the chemical composition of the samples obtained, fell within the following ranges:

- Copper content (Cu) = 60.97-62.83%
- Zinc content (Zn) = 37.17-39.03%
- Lead content (Pb) = 1.6% (in one sample)

As initially patented in 1832, the composition for Muntz metal plates was specified to be 50–63% copper and 37–50% zinc (Muntz, 1832a), nominally accepted as 60% copper and 40% zinc. This patent was however updated in 1846 to 56% copper, 40.75% zinc and 3.25% lead (Muntz, 1846). From this we conclude that the vessel on the site was sheathed in yellow (Muntz) metal, and possibly dates from after 1846 when lead was introduced as a recommended element. However, as for the cuprous fastenings, Muntz metal plates, were not initially patented until 1832, which was nine years after *Diamond* was built, and seven years after it was lost. We also know that *Diamond* was not sheathed using Muntz metal when built in 1823 but in copper (s.C23) (Lloyds Registers, 1824–1825; Morrison, 1909, pp. 18–19), although many vessels built in New York in this period often ' … had to wait until they reached England before being sheathed' (Albion, 1938, p. 95).

2005

Research continued during 2005. However, underwater site work was put on hold while funding for further analytical work could be established. At the end of the season, an article relating to the site was provided in the form of a case study for the Advisory Committee on Historic Wreck Sites, Annual Report 2005 (Cundy, 2005).

2006

This season saw work on the site resume with a small excavation, and the recovery of additional timber samples from six of the main oak frames, but this time for dendrochronological analysis. The samples were again analysed by Nigel Nayling at the University of Wales, Lampeter, and the results from five of the six samples, provided a continuous cross-correlation of rings totalling 215 years. The sequences dated from AD 1614 to AD 1825, with an estimated *terminus post quem* felling date for the trees, from which the main frames were constructed, of 1840 (Nayling, 2006), which is 17 years after *Diamond* was built, and 15 years after the vessel was wrecked. The provenance of the oak samples however, indicated that they originated from around the Great Lakes region of the Northern American continent. This implies that, although the timber was not from *Diamond*, the vessel on this site may still have been built in North America or Canada, although by the 1830s, large quantities of timber were being imported into the UK from the North American continent, in particular for the British ship building industry (Melby, 2012; Morrison, 1909, pp. 11–13; Wallace 1924/1973, pp. 14–17, 23, 32).

Following work carried out on the site during 2006, one of the season's volunteers used the experience as the basis of a master's thesis with the title: *Processes and Problems of Shipwreck Identification: Case Study of a 19th Century Merchant Vessel, Cardigan Bay, Wales* (Harvey, 2006).

2007

Research continued during 2007, however no licence was applied for to visit or carry out any work on the underwater site this season.

2008

By 2008, deterioration of the site was becoming increasingly noticeable, with a considerable amount of the standing ironwork having collapsed. The ongoing loss of information due to climatic and environmental effects were also exemplified by the reduction of the two tanks on the site to basic skeletal frameworks, without any sign of the previously observed features associated with the platework remaining.

2009

By this phase of the investigations, sufficient information had been obtained to be able to compare the work carried out associated with the underwater site, with the documented historical research uncovered relating to *Diamond* and an assessment of the results could be made (**Table 2**). As can be seen from this table, there are several obvious areas of conflict between the site and the research, particularly with regard to the following:

- Length – *Diamond's* length is recorded as being 36.8 m (120 ft 9 ins), however, the site provided a length (close to the turn of the bilge) of around 49 m (160 ft), which would indicate that the overall length of the ship would have consequently been in excess of this measurement.

- Tonnage – *Diamond's* size is recorded as being 491.62 tons, however, from **Table 3**, it can be seen that for sailing ships of the period, a 49 m vessel is likely to have been close to 700 tons, and as the vessel on the site is considered to be significantly longer than this, it could actually be closer to 1,000 tons.

- Timber (Species) – *Diamond* is recorded as having locust incorporated in its construction, however, none has been identified on the site, but where the locust was used is unknown. It may have been used for the decks, but it could as easily have referred to the vessel's treenail fastenings (Wallace, 1924/1973, p. 30). Regrettably, no samples from any decks or trenails were recovered for analysis.

- Timber (Dating) – *Diamond* was built in 1823 and lost in 1825, however, dendrochronological analysis of the timber used for the vessels main frames has provided a *terminus post quem* felling date of around 1840.

- Metalwork (Reinforcement) – There is no record of any iron reinforcement, or any other metalwork having been incorporated into *Diamond's* construction, however, on the site, iron knee riders have been observed, together with a considerable amount of additional structural ironwork.

- Metalwork (Tanks) – *Diamond* was built in 1823, however, assuming the two large riveted tanks on the site were used for potable water storage, no record has been uncovered to indicate that *Diamond* was ever fitted with metal water tanks. Additionally, iron water tanks did not start to replace wooden water barrels until the mid-1820s, with tanks having a stepped top plate appearing at an even later date.

- Fastenings & Sheathing – *Diamond* was built in 1823 and is recorded as having the hull sheathed in copper; however, the wreck on the site was sheathed in Muntz (yellow) metal, which is also the composition of large pins that were used as fastenings, and neither were patented until 1832.

- Location – *Diamond* is reported as having been wrecked at the eastern end of the reef, 'about a mile from the land', however, the designated site is 3.75 km (2.33 mi) offshore (**Table 4**).

- Depth of water – *Diamond* is reported to have been lost in 12.8 m (42 ft) of water, however the designated site is between 6-10 m (19.7–32.8 ft) depending upon the state of the tide. This may not of course have been the case in 1825, as the topography of the seabed is likely to have changed over the years. However, today, at the eastern end of the causeway (as shown on current charts), the greatest depth of water recorded is only 7.4 m (24.3 ft), and in most places it is considerably less (Admiralty Chart, 2002).

Details			Protected Wreck Site (Observations & Work)	*Diamond* Documented Research
Vessel:				
General:	Type			Fully Rigged Ship
	Built:	Date		August 1823
		Builder		Noah Brown
		Location		East River Shipyard, New York
	Owner/s:	Name		Josiah Macy (1785–1871)
				Samuel Hicks?
		Address		New York
	Use			Transatlantic passenger & cargo
Dimensions:	Length		> 49 m (160 ft)	36.8 m (120 ft 9 ins)
	Breadth		~ 9 m (30 ft)	9.19 m (30 ft 2 ins)
	Draught (laden)			4.88-5.18 m (16-17 ft)
Tonnage:			> 700 tons	491.62 tons
Additional	Timber:	Species	Oak	White Oak
Details:			/ Elm / Larch / Pine	/ Locust
		Date	> 1840 (Main Oak Frames)	< 1823
		Provenance	North American Great Lakes	North America
	Metalwork		Wrought Iron reinforcement	None Recorded
			Iron Tanks > mid 1820s	None Recorded
	Fastenings		Muntz Metal (Patented 1832)	None Recorded
	Sheathing		Muntz Metal (Patented 1832)	Copper (1823)
	Lloyd's Certification			A1
	Plans / Half Models			None Found
	Images			Painting exists / not located
Routes:	Regular			New York–Liverpool
Loss:	Date			2nd January 1825
	From / To			New York–Liverpool
	Master			J. Macy
	Location		Sarn Badrig Reef	Sarn Badrig Reef (East End)
			3.75 km (2.33 mi) offshore	About a mile from the land
	Reason			Navigational Error
	Description			Ran onto the reef / Floated clear / Sank upright in deep water
	Cargo		None found	Apples / Cotton / Potash
	Loss of Life			10 (3-crew / 7-passengers)
	Saved			< 38
Site:				
Location:	Co-ordinates		52° 46' 32''' N / 04° 11' 02'' W	?
	Grid Reference		SH 52791 22007	?
Conditions:	Water Depth		6 - 10 m (19.7 - 32.8 ft)	12.8 m (42 ft)
	Seabed		flat / shingle, shale, pebbles	?
Wreck:	State		Upright	Upright
	Orientation		Bow 290° / Stern 110°	?
	Areas of Conflict			
	Areas of Agreement			

Table 2. Comparison between underwater observations together with additional work associated with the protected wreck site, and documented research related to *Diamond* (© Ian Cundy – MADU).

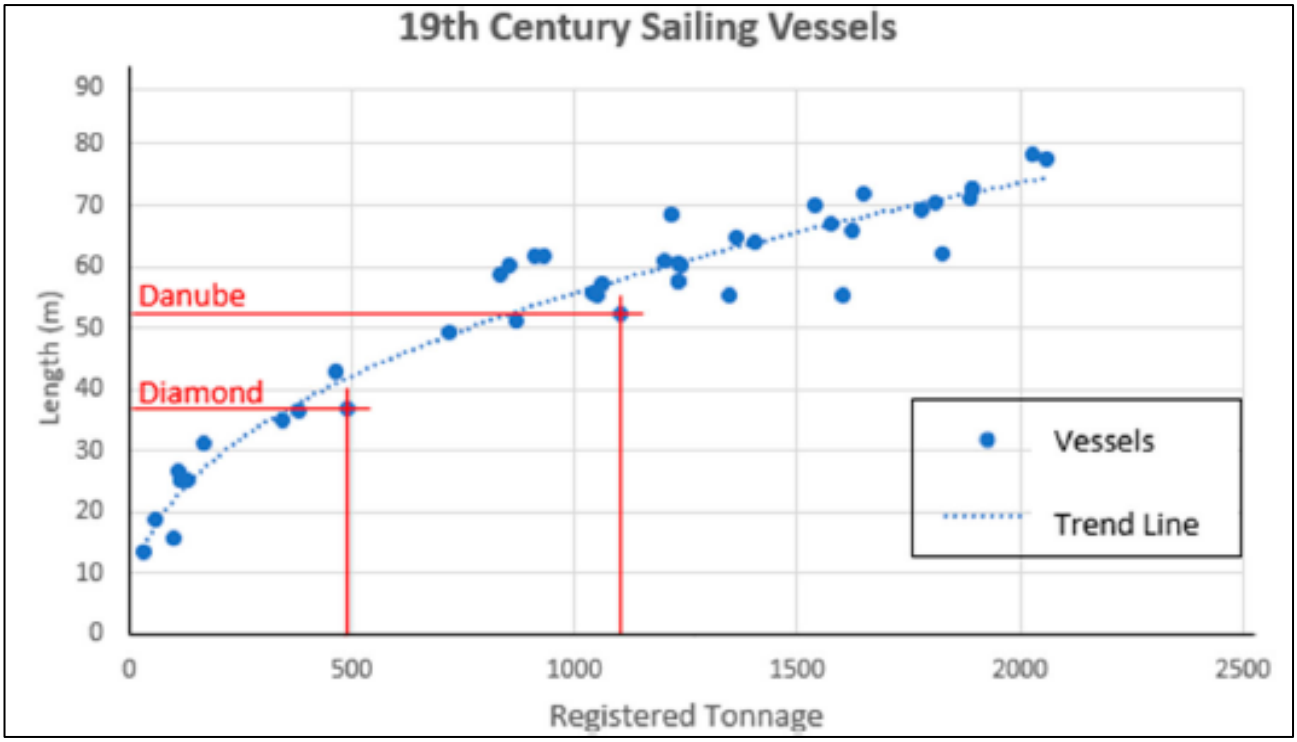

Table 3. Distribution of registered tonnage against length for 19th century sailing vessels. Data compiled from *Wooden Ships and Iron Men* (Wallace, 1924/1973) (© Ian Cundy – MADU).

	Wessex Archaeology			OS	Co-ordinates		Offshore		Magnetic	
Detail	ID	Easting	Northing	Grid Ref.	North	West	km	mi	Gradient nT/m	Notes
Designated Wreck Site (Not The Diamond)	7254	420132	5847961	SH 52791 22007	52° 46′ 32″	04° 11′ 02″	3.75	2.33	1162.5	Possible site of the *Danube*? Includes a 200 m radius exclusion zone.
Designated Wreck Site (Tal-y-Bont)	7137	423951	5848295	SH 56649 22292	52° 46′ 45″	04° 07′ 36″	0.45	0.28	390.4	Bronze Bell wreck site containing cannons, anchors and marble blocks.
Danube (from Coflein)		416680	5844513	SH 49339 18559	52° 44′ 37″	04° 14′ 00″	8.45	5.25		Site on the reef where the *Danube* first grounded.
Shore (south east site)	7176	422826	5849400	SH 55485 23446	52° 47′ 21″	04° 08′ 40″	0.71	0.44	3.9	2nd choice site for the *Diamond*?
Shore (north east site)	7177	422333	5849478	SH 54992 23524	52° 47′ 23″	04° 09′ 07″	1.12	0.70		1st choice site for the *Diamond*?
West of the NTD site	7179	419823	5847893	SH 52482 21939	52° 46′ 29″	04° 11′ 18″	4.08	2.53	20.2	Possibly just a debris field.
Mid causeway site	7180	415288	5844089	SH 47947 18135	52° 44′ 22″	04° 15′ 13″	9.90	6.15	4.9	A probable wreck site.
West of the mid causeway site	7181	414158	5842738	SH 46817 16784	52° 43′ 37″	04° 16′ 11″	11.59	7.20		Mound which may be a buried wreck?

Table 4. Location and details relating to the wreck sites referred to in this article. Compiled from the Wessex Archaeology (2011) report (© Cadw) together with data gathered from research into the wrecks of the area by the author.

From the above discrepancies, particularly the felling date derived for the vessels main frame timbers, the inference must be that the wreck on this designated site is not that of *Diamond*, and since arriving at this conclusion, the site has affectionally (but unofficially), been referred to as the NTD (Not The *Diamond*) site.

Review of the Site Work and Research (2002–2009)

The above is a précis of the overall work carried out relating to the site, together with the research associated with *Diamond*. A more comprehensive account can be found in a report: *A Shipwreck Site in Cardigan Bay, West Wales, designated under the Protection of Wrecks Act 1973, and known as the Diamond: An Interim Report on the Site (2000-2009)* (Cundy, 2009).

Having answered the initial question posed back in 2002 regarding the reliability of the vessel's identification being that of *Diamond*, and providing the answer that it is extremely unlikely, this is not the end of the story. This conclusion has posed two subsequent questions:

- If not *Diamond*, what is the actual identity of the vessel on the site?
- Where is the final resting place of *Diamond*?

In order to maintain a chronological order to this article we will look at the second question first.

Location of *Diamond*

2010

In April and May 2010, Wessex Archaeology (WA) carried out a series of marine geophysical surveys for Cadw at various locations off the Welsh coast, using both a high-resolution side scan sonar and a magnetic gradiometer. The surveys included an area in south Wales, just outside Milford Haven, and an area in north Wales adjacent to the Lleyn Peninsula, including the entire length of the Sarn Badrig Reef together with an area around a second protected wreck site known as the Tal-y-Bont (or Bronze Bell) site.

2011

The results from the 2010 surveys were published in March 2011 (Wessex Archaeology, 2011), and for the work undertaken in north Wales, the report noted that on or adjacent to the causeway, 86 anomalies were identified, of which only six were considered to possibly indicate the site of a shipwreck. A site plan showing the location of these anomalies can be seen in **Figure 6**, with the six potential shipwreck sites being labelled using the identification numbering system employed by Wessex Archaeology (WA ID). **Table 4**, together with the following abbreviated notes from the Wessex Archaeology report, relate to these six anomalies (author's comments in brackets):

- '7176 is a possible wreck site located at the northeast end of St. Patrick's Causeway in the channel running between the causeway and the shore'. [this location is estimated to be around 0.71 km (0.44 mi) offshore]

- '7177 is a wreck on the northern tip of St. Patrick's Causeway, roughly 1.7 km west of the shore'. [this location is estimated to be around 1.12 km (0.70 mi) offshore] '7178 is possible debris associated with 7177 … '.

- '7179 is a possible wreck on the northern side of St. Patrick's Causeway and roughly 315 m west of 7254'. [this location is estimated to be around 4.08 km (2.53 mi) offshore]

- '7180 is a probable wreck site on the northern side of St. Patrick's Causeway and roughly 12.5 km west of the shore'. [this location is estimated to be around 9.90 km (6.15 mi) offshore]

- '7181 is a mound on the southern side of St. Patrick's Causeway in an area of coarse seafloor, … This maybe a buried wreck site'. [this location is estimated to be around 11.59 km (7.2 mi) offshore]

- '7254 is a wreck site that was thought to be the *Diamond*'. [this location is estimated to be around 3.75 km (2.33 mi) offshore]

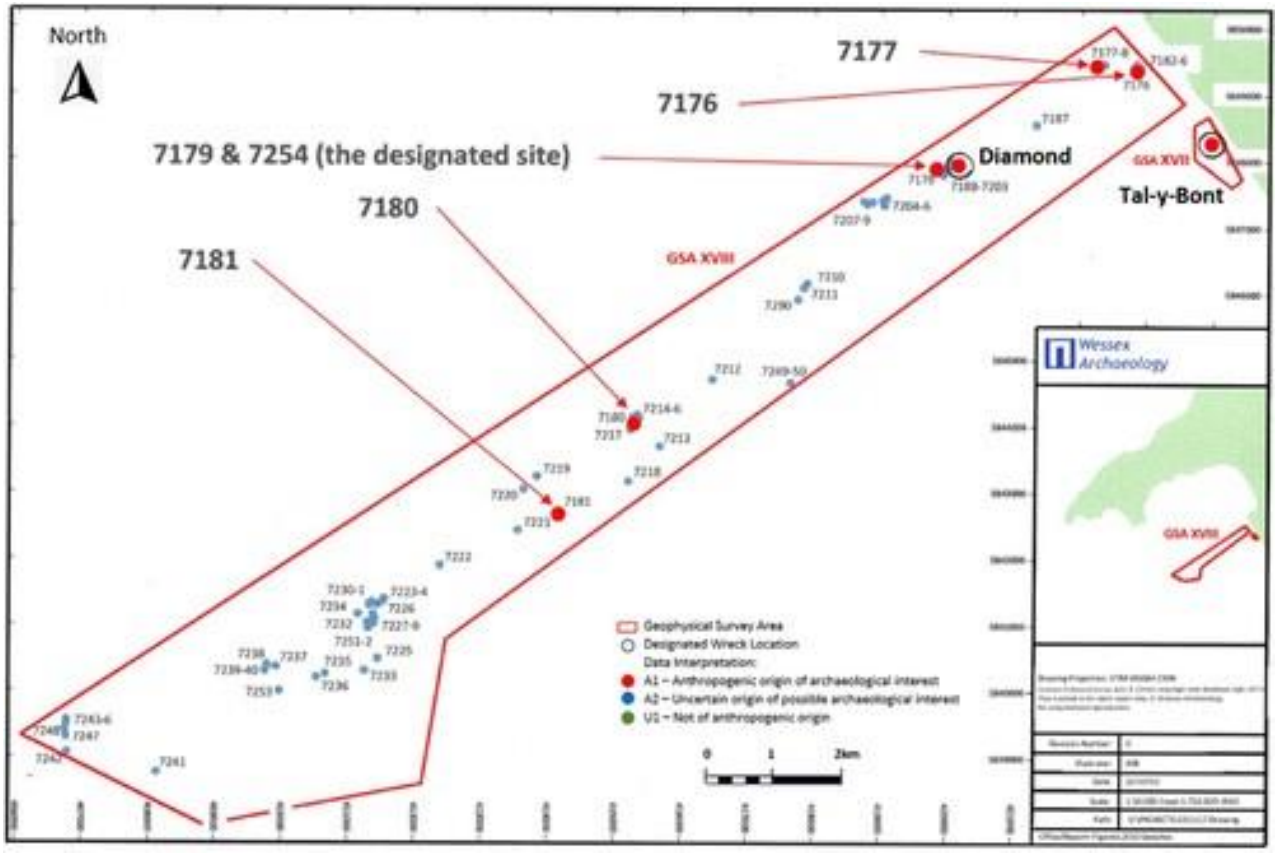

Figure 6. The anomalies identified by Wessex Archaeology during their 2010 geophysical survey of the Sarn Badrig Reef, with the six sites considered most likely to be shipwrecks highlighted (Wessex Archaeology, 2011 / © Cadw).

Full details of each of these sites can be found in the main body of the Wessex Archaeology report (2011, pp. 25–26, 29–30), and in *Appendix III: Gazetteer of Geophysical Survey Results – GAS XVIII: The* Diamond *and Other Wreck Sites off St Patrick's Causeway* (Wessex Archaeology, 2011, pp. 55–57, 64).

In an article by Iles & Iles (2007), there is the transcript of a letter by an unnamed passenger who was on board *Diamond* when it wrecked, noting that in the early hours of the morning, ' … the ship seemed firmly stuck on the sandbank where she first struck about 2 miles offshore … '. Further on in the article it is noted that, ' … if she struck at 1 a.m. then it was near low tide as high water was at 8.56 on Sunday morning, so she floated off the causeway on the rising tide and sank in deep water nearby, where she lay quite upright in 7 fathoms (42 feet)'. Elsewhere in the same article, there is the comment that, 'When the tide moves north up St. Georges Channel it also moves many miles to the East setting a ship unknowingly into Cardigan Bay … and has no doubt been responsible for other disasters' (Iles & Iles, 2007, pp. 12–15). In the *Salopian Journal* dated Wednesday 12 January 1825, p. 2, c. 5, there is an article reporting on the wrecking, noting that *Diamond:*

> … was running about eight knots an hour when she struck at half past four on Sunday morning, on the east end of the Causeway, in Cardigan Bay, and sank in deep water (seven fathoms), between Mochras and Barmouth, about six miles from the latter place. She was quite upright in the water and lay about a mile from the land.

From the above accounts, we conclude that the final resting place of *Diamond* was likely to have been to the east of where the vessel initially grounded, possibly around 1 mi (1.6 km) offshore, and not 2.33 mi (3.75 km) as per the location of the designated site. In this respect, it is proposed that the remains of *Diamond* could be the site shown as 7177 in **Figure 6**, together with an associated debris field 7178. These sites are around 1.12 km (0.70 mi) from the shore, and today, they look to be in less than 8 m of water, however, ground proofing the site will need to be carried out to corroborate or refute this idea. In the Wessex Archaeology report (2011, p. 25), the full transcript for these two sites is as follows:

- 7177 is a wreck on the northern tip of St. Patrick's Causeway, roughly 1.7 km [1.12 km] west of the shore. The seafloor around the wreck is sandy with no obvious features such as ripples or boulder fields. The surrounding sand has largely covered the wreck, forming a mound with a roughly east-west orientation. Some structural elements are exposed at the western end of the mound with two roughly parallel linear features following the orientation of the mound and spaced roughly 5 m apart. Six separate elements can be seen along the more northerly of these features. These run south towards the other long linear feature and are fairly evenly spaced at roughly 2 m intervals. The site measures a total of 35.3 m long, 16.4 m wide and reaches a height of 1.3 m.

- 7178 is possible debris field associated with 7177 formed of two elongated parallel anomalies. The anomaly is located roughly 81 m west of the wreck and is orientated roughly north-south. 7178 measures 5.7 m, long, 2.2 m wide and 0.3 m [high].

The Wessex Archaeology report also contains several side scan images of the anomalies that may be shipwrecks, including the designated (NTD) wreck site 7254 (**Figure 7**), and the proposed possible location of *Diamond* 7177 (**Figure 8**).

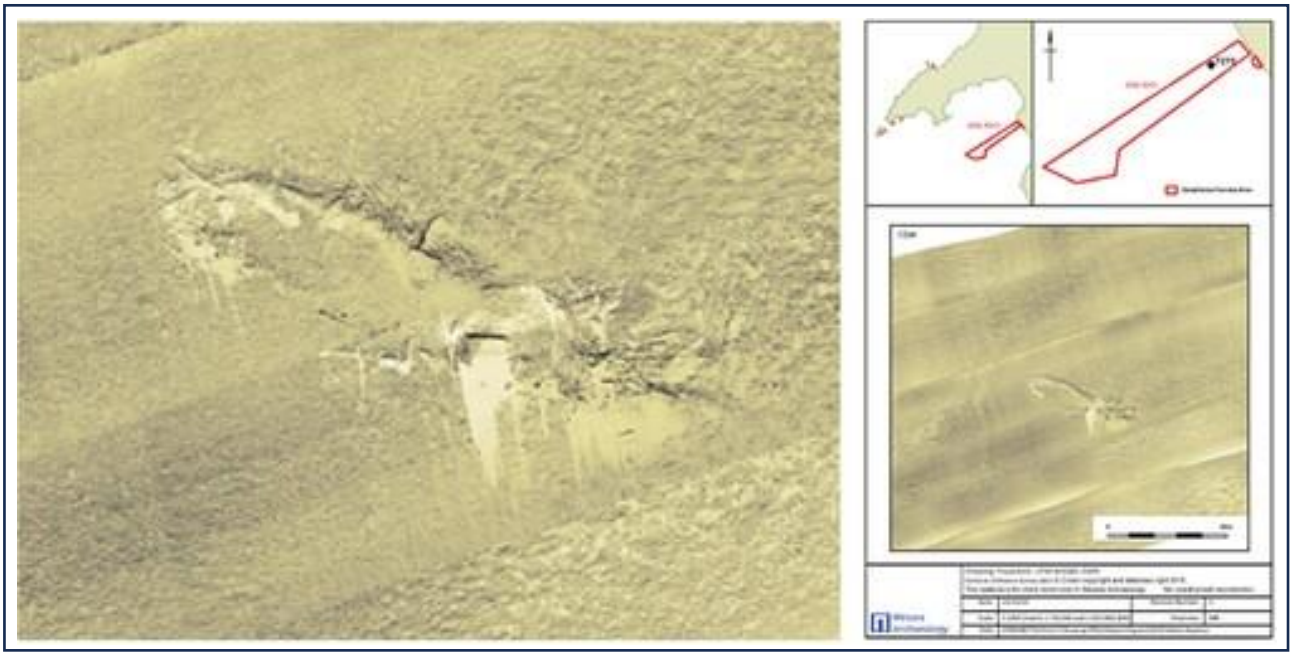

Figure 7. Side scan images of the designated wreck site (WA ID 7254), and the possible location of *Danube* (Wessex Archaeology, 2011 / © Cadw).

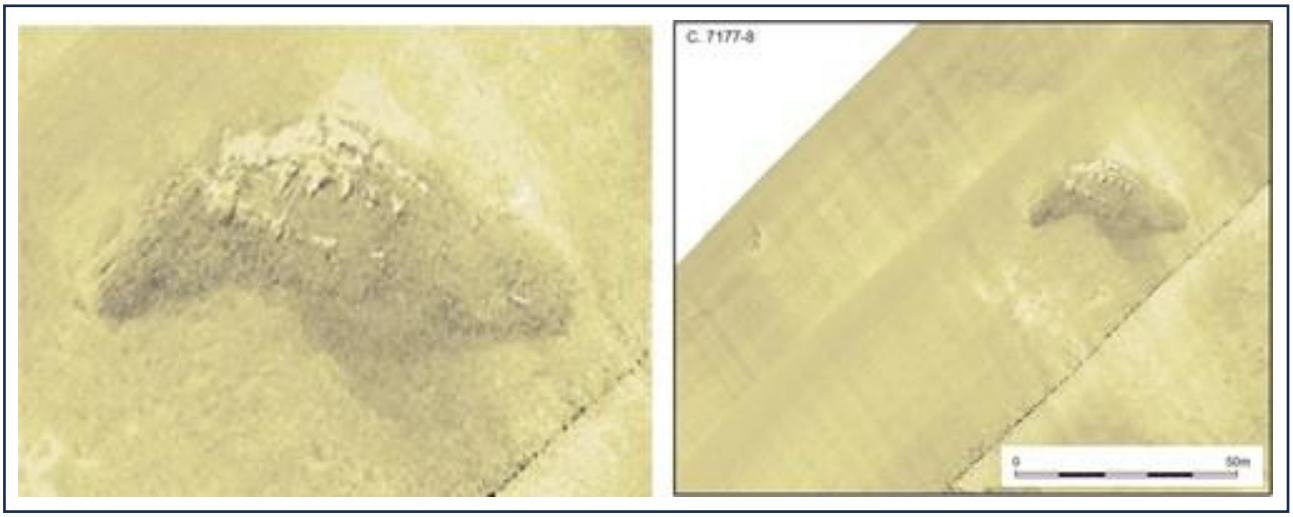

Figure 8. Side scan images of the wreck site (WA ID 7177) together with an associated debris field (WA ID 7178), and the possible location of *Diamond* (Wessex Archaeology, 2011 / © Cadw).

During research into *Diamond*, we were advised that, following the wrecking, a painting was produced of the vessel sitting upright on the seabed, with the masts clearly visible above the water. Until sometime in the 1990s, this painting hung on the wall in the entrance hall of a rectory, local to where *Diamond* wrecked (T. Iles, pers. comm., 2002). Unfortunately, we have been unable to locate this picture, despite there being an on-line plea for assistance with our search [2]. This is particularly frustrating, as, despite probably containing some degree of artistic licence, the image is likely to include invaluable detail regarding the vessel's approximate location, its distance from the shore and orientation in relation to the land.

Alternative Identification of the Wreck on the Designated Site

During the latter stages of the work carried out by MADU between 2002 and 2009, as it became apparent that the vessel on the designated site was unlikely to be *Diamond*, and in an attempt to answer the question relating to the true identity of the vessel, a database was compiled by volunteer Sue Barker, containing a list of all the vessels known to have been involved in maritime incidents in the North Cardigan Bay area. From this it was hoped that we might have been able to identify any likely candidates, and if possible, to home in on the name of the actual vessel on the site. The register of contenders steadily grew and eventually reached a total of 453 vessels, each of which was entered onto the database as a single line entry, in date order of their respective incident. The dates ranged from 1590 to 1993, and as would be expected, many of the earlier and later vessels were readily rejected as not matching information derived from the site. Other vessels that could be eliminated included those that were known to have survived, or where positive confirmation of alternative locations for their loss was known. Regrettably, this still left an extensive list of possible vessels, and without the time and resources to investigate each in more detail, the database lay dormant in the MADU office pending tray for the next decade.

2020

Moving forward to 2020, the global Covid-19 pandemic struck with a vengeance, with people in many parts of the world being forced to lockdown and isolate themselves. One of the many consequences of this was that diving and hands-on field work, together with face-to-face training courses run by the Nautical Archaeology Society (NAS) came to an abrupt halt, and the charity put out a plea for ideas on how they could continue working with their members, and engaging people in Maritime Archaeology. The notion of offering the MADU database to anyone with an interest in undertaking some on-line, lockdown research, and reporting on their findings seemed like it might be one possible solution, and from this idea, the Welsh Wreck Web Research Project evolved.

People were invited to e-mail MADU to register their interest in the project, and in return, they were sent a digital copy of the database to select any vessel/s they might like to investigate. Their name was then entered against the vessel/s on the database, and they were sent a set of Guidance Notes and a sample Report Template to help them get started. Once their research had come to an end, they were invited to submit a report on their findings, and any NAS members who completed a report, would receive credits towards their future qualifications.

At the outset, we had no more idea about who, or how many people, might be interested in participating in this exercise, than anyone had about how long the pandemic and lockdowns might last. We set an arbitrary date of nine months to cover the length of time the project would run (i.e., until the end of 2020), however the take-up exceeded our expectations (as well as how long the virus would be with us), and the exercise was eventually extended to a full year (i.e., until Easter 2021), by which time the project had amassed the following statistics:

- 102 people, from 15 different countries, had enquired about engaging with the project.
- 75 people followed through and selected one or more vessels to research.
- 132 additional vessels were discovered and added to the database, bringing the total to 585.
- 369 vessels were selected to be researched.
- 275 reports have been received, from 42 researchers (**Figure 9**).

Figure 9. A selection of some of the submitted Welsh Wreck Web Research Project's reports (© Ian Cundy – MADU).

Most of the reports submitted related to a single vessel, and ranged in length from a handful of pages to several that were extensive, containing well over 100 pages. Many of the reports were extremely detailed, including full accounts of the vessel's life from being launched until their demise, information about the builders, owners, masters and crews, the passages undertaken, cargoes carried, incidents encountered along the way, and the necessary repairs carried out. They include maps, charts, pictures, and a suggested At-a-Glance table summarising the vessel's details and life story in a single page. There were no restrictions, conditions or specific qualifications required for anyone to take part in the project. Consequently, the people who joined the team, had a wide range of ages, experience, knowledge, ability, and came from diverse backgrounds. There were students and professors, but what had not been appreciated at the commencement of the project, was that it would, not just interest a few people in Wales, but that it would attract people from many parts of the world, and as such, it became a truly international exercise.

From a negative standpoint, this project could have been seen as an opportunistic method of encouraging volunteers to carry out research and to report on their findings, with the sole purpose of attempting to identify the vessel on the designated site; however, this could not have been further from the truth. The overriding aim was to provide people with an interesting, rewarding, and educational exercise, one that they could dip into whenever time allowed, while at the same time having no financial cost to themselves, and hopefully helping to take their mind off the epidemic that was raging around them in the outside world. It transpired that this main objective was certainly achieved, as acknowledged by the positive response and feedback received from many of the volunteers who engaged with the project. Although working in isolation, they came together, and by giving up their time to research and submit reports on their discoveries, there now exists an impressive open access archive of 275 maritime incidents, based around this dangerous Cardigan Bay reef. In addition to greatly enhancing the existing Welsh record of maritime cultural

heritage, a further offshoot from the exercise has been the possibility of analysing the huge amount of data brought together by the volunteers, and as a by-product, potentially helped answer the outstanding question relating to the name of the vessel on the designated site. At the outset, the project looked like it might be a worthwhile exercise, and one that anyone could take part in (providing they had access to the internet). In actuality, the results have greatly exceeded our expectations.

2021

At the conclusion of the project a detailed overview of the exercise was compiled, the results of which can be found in a report: *Welsh Wreck Web Research Project: A 2020/21, Covid-19, volunteer, on-line, research project, investigating vessels that have been involved in maritime incidents in the North Cardigan Bay area of West Wales* (Cundy, 2021) [3].

2022

The Welsh Wreck Web Research Project (WWW Research Project) produced a wealth of information relating to vessels that have been involved in maritime incidents, including those that ended their days in the North Cardigan Bay area, and one of the many positives to surface from the projects has been the ability to scrutinise the data contained within the volunteer's reports. Amongst the many questions that might be answered by interrogating the data was the possibility that the name of the vessel on the designated site might be revealed.

Although the wreck on the site provides very little resemblance to that of *Diamond*, the remains are indicative of having been a large, wooden, mid-19th century, trading, sailing vessel, typically a fully rigged ship, barque, or similar.

Of the 585 vessels included in the WWW Research Project's data base, 437 date from the 19th century, of which, 65 are recorded as being fully rigged ships or barques. Of these, 25 are documented as having made contact with the Sarn Badrig Reef; however, three were constructed with steel hulls, and 13 were re-floated and survived, or salvaged. Of the remaining nine vessels, six were (like *Diamond*) considered to be too small for the size of the wreck site, or built before the 1840 felling date derived by dendrochronology for the vessel's main frames. Therefore, assuming the data base contains details of the vessel that lies wrecked on the site, we are left with just three fully rigged ships as possible contenders:

- *Pride of the Sea* – Built in 1853 at Baltimore, USA, with a crew of 37, this almost new, 1,660 ton clipper, carrying a cargo of cotton from New Orleans to Liverpool in challenging weather conditions, ran onto the reef in December 1854 while under full sail. After being abandoned, the ship caught fire and burned for up to 48 hours before eventually sinking (Larn & Larn, 2000b). 'Wreckage, presumed to be the remains of the *Pride of the Sea*, still lies in only a few metres of water, just off the eastern side of the causeway where it may even dry out at low-water on spring tides' (Holden, 2003, p. 23). – No obvious signs of burnt timbers have however been observed on the designated site, and the size of this vessel is probably larger than is indicated by the dimensions of the remains on the site. In addition, the suggested location of the wreck, in shallow water on the east of the reef, is at odds with the designated site which lies to the north west of the reef in 6–10 m of water.

- *Kenilworth* – Built in 1855 at Thomaston, Maine, USA, this square rigger, in thick fog, ran onto the reef in January 1870 with a cargo of cotton and tobacco while on route from New Orleans to Liverpool. At 1,275 tons and a length of 188 ft (57.3 m), the ship was reported in the *Caernarvon & Denbigh Herald* (22 January 1870) to have ' … struck on Sarn Badrig, alias St Patrick's Causeway, eight or nine miles out at sea, opposite Pwllheli'. – This location is at the extreme western end of the reef, with co-ordinates provided by Larn & Larn (2000e), and this is further corroborated in the

subsequent Board of Trade enquiry, where it was noted that 'She struck on the south-western portion of the shoal'. By comparison, the designated site is only 2.33 mi offshore close to the north-east end of the reef. Subsequent reports also refer to the vessel having broken up (possibly in two) with pieces being washed ashore to the west of Gimblet Head, Pwllheli.

- *Danube* – Built in 1854 in Quebec, Canada (Wallace, 1924/1973, pp. 73–74), this ship ran onto the reef in March 1861 with a cargo of cotton and staves, while on route from Mobile, Alabama, to Liverpool (Lloyd, 1993, pp. 312–314) – At 987/1,104 tons, and with a length of 171 ft (52 m), this is the smallest of the three vessels, but has a specification and wrecking story that conforms most favourably with the underwater picture that has been obtained from the site [4].

Having analysed these ships in detail, the conclusion is that *Danube* is the most likely of the three to be the vessel on the designated site, and the following is a more detailed overview of this vessel, including the background leading to the wrecking.

Danube was constructed in wood from oak, elm, red pine, spruce and tamarack (O. E. RP. S. & Tam), together with iron bolts (I.B.) and sheathed in Yellow (Muntz) metal over felt in 1854 (F. & YM.54). The owner was David Grainger of Belfast (Anderson, 1951/1984, pp. 11–13), who ran the ship under a UK flag with the registration number 14362 (Lloyds Registers, 1855–1860). Working routes between Liverpool, America and India, in 1861, *Danube* was on the outward leg of a trans-Atlantic crossing under the command of William Heasley, who was on his first passage as captain. By dead reckoning, around midday on 5 March, Heasley noted that they were abreast of Tusker Rock (close to Skomer Island) and around 17 mi (27 km) off the Pembrokeshire coast. The vessel then sailed north, mid-channel, covering 50–55 mi (80–89 km), when at 08:00 the course was altered to south-east entering Cardigan Bay. By 06:00 on the 6 March, they were close to Strumble Head, and changed course again heading east-north-east. This bought the ship close to shore, and at around 11:30 *Danube* struck the submerged Sarn Gynfelyn reef (known as the Patches) just north of Aberystwyth (Larn & Larn, 2000c). The vessel was severely damaged but rode clear, sailing on until grounding for a second time on the Sarn Badrig Reef (St Patrick's Causeway). Here, *Danube* became firmly stuck around 5 mi (8 km) offshore, and eventually became a total wreck (Larn & Larn, 2000d). Seven of the crew made it safely ashore in one of the ship's boats, but one was drowned in the attempt. The lifeboat crew from Criccieth failed to reach the stricken vessel on their first attempt, but on the 7 March, they successfully managed to land the master and remaining 16 members of the crew ashore (Parry, 1969; Raffles, 1861). When the wrecking took place, the weather was described as, thick, and hazy with poor visibility and gale force winds, however by the 11 March the weather had improved, salvaging the cargo could commence, and by the 20 April much of the work had been completed.

As for *Diamond*, sufficient historical information has been obtained from research relating to *Danube* for it to be similarly compared with the designated site, and a full assessment of the results can be seen in **Table 5**. Contemporary accounts do not record the exact location where either *Diamond* or *Danube* initially struck the reef, or where either vessel ended their days. Neither are the vessel's final orientations known, nor the exact depth of water they were in; however, as can be seen from **Table 5**, some areas of conflict still exist between the designated site and documented research uncovered relating to *Danube*, as follows:

Details			Protected Wreck Site (Observations and Work)	*Danube* (Documented Research)
Vessel:				
General:	Type			Fully Rigged Ship
	Built:	Date		August 1854
		Builder		A & W Parke
	Location			Lauzon, Quebec
	Owner/s:	Name		David A Grainger & Sons
		Address		Belfast
	Use			Commercial cargo vessel
Dimensions:	Length		> 49 m (160 ft)	52 m (171 ft)
	Breadth		~ 9 m (30 ft)	~ 9 m (30 ft)
	Draught (laden)			~ 6 m (20 ft)
Tonnage:			> 700 tons	987 tons / 1,104 tons
Additional Details:	Timber:	Species	Oak / Elm / Larch / Pine	Oak / Elm / Red Pine / Spruce / Tamarack (Larch)
		Date	> 1840 (Main Oak Frames)	1854
		Provenance	North American Great Lakes	Canada
	Metalwork		Wrought Iron (reinforcement)	Iron Frame Reinforcements
			Iron Tanks > mid 1820s	None Recorded
	Fastenings		Muntz Metal (Patented 1832)	Iron Bolts
	Sheathing		Muntz Metal (Patented 1832)	Felt & Yellow Metal (1857)
	Lloyds Certification			A1
	Plans / Half Models			None Found
	Images			None Found
Routes:	Regular			New Orleans – Liverpool
Loss:	Date			6 March 1861 (6.5 years old)
	From / To			Mobile, Alabama – Liverpool
	Master			William Heasey
	Location		Sarn Badrig Reef	Sarn Badrig Reef
			3.75 km (2.33 mi) offshore	5 miles offshore / floated off
	Reason			Navigation Error
	Description			Damaged and ran onto reef / Slipped off the reef / Sank / Total loss
	Cargo		None found	Staves / Cotton (~3,000 bales)
	Loss of Life			1 – crew member
	Saved			25
Site:				
Location:	Co-ordinates		52° 46′ 32″ N / 04° 11′ 02″ W	52° 44′ 22″ N / 04° 14′ 00″ W
	Grid Reference		SH 52791 22007	SH 44741 15706
Conditions:	Water Depth		6 – 10 m (19.7 – 32.8 ft)	?
	Seabed		flat / shingle, shale, pebbles	?
Wreck:	State		Upright	?
	Orientation		Bow 290° / Stern 110°	?
	Areas of Conflict			
	Areas of Agreement			

Table 5. Comparison between underwater observations together with additional work associated with the protected wreck site, and documented research related to *Danube* (© Ian Cundy – MADU).

- Tanks – No reference to the two tanks on the site has been found in relationship to *Danube*, however, they are not mentioned in Lloyd's Register's for *Jhelum* either, where we know they were fitted (Kearon & Stammers, 1992, pp. 104–106).

- Fastenings – Lloyds Registers note that *Danube* was fitted with iron bolts. However, in Canadian built vessels it was not uncommon for iron fastenings to be used above the waterline with copper being used below (Wallace, 1924/1973, pp. 26, 29–30). This would correspond to the cuprous Muntz metal pins being found on the site, as the remains of the vessel observed are from around the turn of the bilge and therefore well below the waterline.

- Location – *Danube* is reported to have struck the reef around 5 mi (8 km) from shore (Shipping & Mercantile Gazette, 1861a), and remained there for several weeks during which time the cargo was transhipped. Then being considerably lighter, it is reported to have lifted off the reef on the spring tides, to founder in deeper water on the north side of the causeway (Shipping & Mercantile Gazette, 1861b).

While the exact location of *Danube*'s final resting place remains unknown, as can be seen from Table 4, the position where the vessel first struck the causeway, as recorded in Coflein (2008), is just over 5 mi (8 km) from the beach, and around 3 mi (5 km) further offshore than the protected site. Once the vessel had floated free of the reef however, it is likely that the prevailing south westerly winds would have taken *Danube* towards the north east to founder in the vicinity of, or even at, the protected wreck site (**Figure 10**).

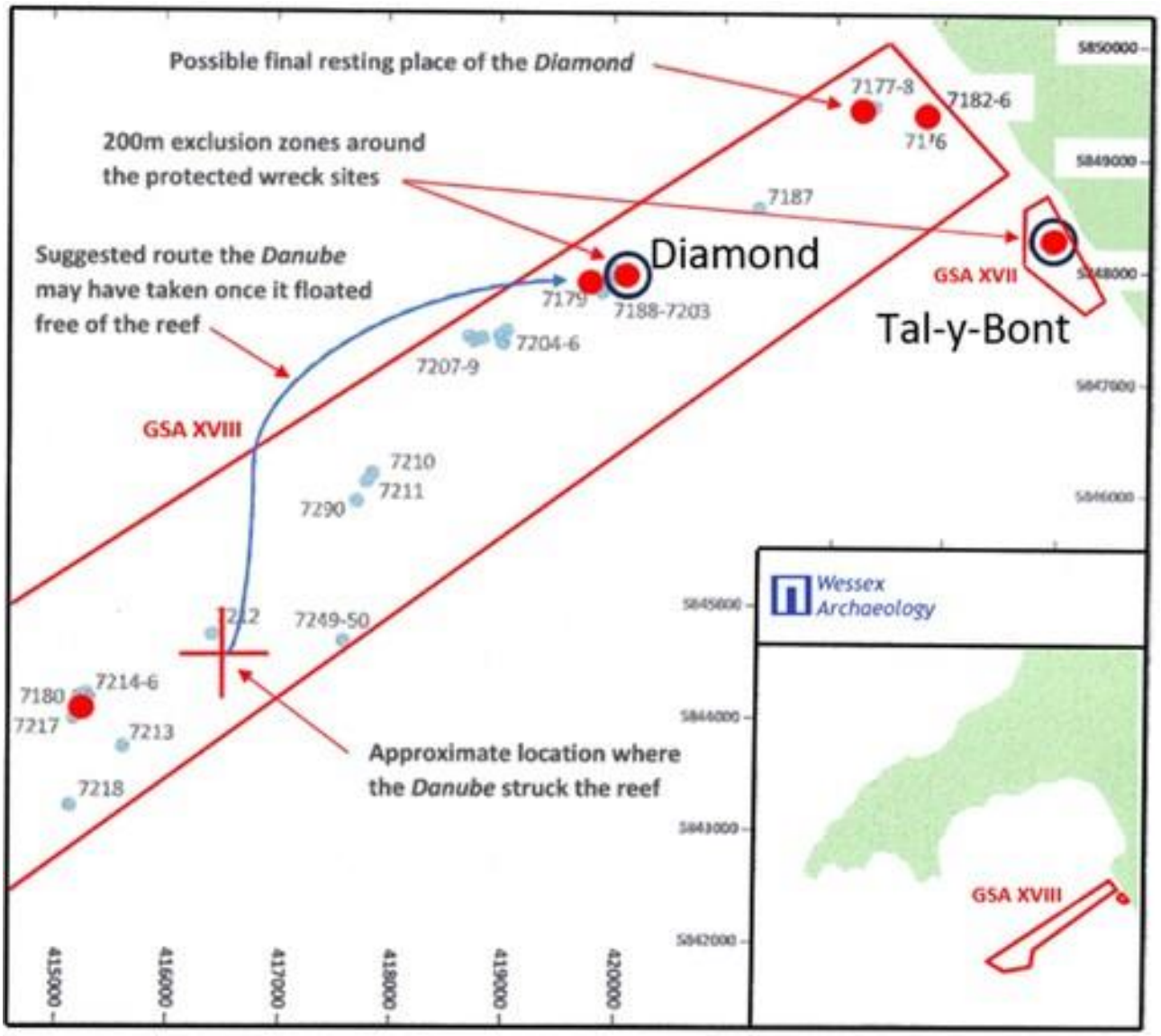

Figure 10. The approximate location where *Danube* struck the reef and the suggested route it may have taken when it floated free, together with the possible final resting place of *Diamond* (Wessex Archaeology, 2011 / © Cadw).

Although this is speculation, the prevailing wind direction in the area is from the south-west, and this is confirmed at the time of the wrecking by members of the crew who left *Danube* in one of the ship's boats and landed on Dyffryn Beach at the north eastern end of the causeway. In the Board of Inquiry report into the loss of *Danube* (Raffles, 1861), it notes: 'The Boatswain and seven men who had been in the longboat to bail out the pinnace were drifted away from the ship, and after a vain attempt to pull up again, made for the nearest land'. With land visible from *Danube* to the north and east, it is likely that they took the easiest option, allowing the prevailing wind and currents to take them ashore, and as such, it is probable that once abandoned and after floating free of the reef, *Danube* would have travelled in a similar direction.

As seen in **Table 5**, the known details relating to *Danube* associated with its dimensions, tonnage, dendrochronological results, iron reinforcements, together with Muntz metal sheathing and fastenings, all correlate closely to the conditions found on the wreck site. In addition, the species of timber found on the site, in particular the use of Larch [6] (sometimes referred to as Tamarack or Hackmatack), together with red pine for ceiling planks, and elm for underwater planking, is typical of the timber used in many Canadian vessels built in the mid-19th century. These ships were referred to as soft-wood built vessels, unlike those that were built predominantly of hardwoods in the UK or America (Wallace, 1924/1973, pp. 7, 27–28). As such, the proposition that the wreck on the designated site is *Danube*, cannot be ruled out.

Further information relating to the locations of all the sites referred to in this article can be seen in **Table 4**.

Discussion

Designation

During the process to determine whether the site qualified for designation, consideration was given by the ACHWS (2001) to several non-statutory criteria before recommending the application. These included under (author's comments in brackets):

- Documentation – 'should the wreck prove to be that of the *Diamond* [this is now considered to be extremely unlikely], it was agreed that it would meet the criteria'.

- Diversity – 'although built at a time when sailing ships were built of wooden construction, the *Diamond's* construction included iron frames [no veracity to this has been found] which reinforced the wooden structure. It was agreed that the transitionary designs such as this were of archaeological interest, particularly as many such modifications were often poorly documented'.

- Potential – 'it was agreed that should this prove to be the *Diamond* [this is now considered to be extremely unlikely], there was a high likelihood of archaeological significant material being found in this wreck'.

Following these discussions, the recommendation was for: 'Cadw to take forward the ACHWS recommendations to designate the wreck of the *Diamond'.* In 2002, following an additional consultation process initiated by Cadw with other interested parties, the final recommendation was that: 'given the information provided, it would be prudent to designate the site pending further investigation' (Cadw, pers. comm., 22 July 2002). On 1 April 2002, the site duly became protected under the Protection of Wrecks Act 1973.

By 2009, the recommended 'further investigation' had been completed and the wreck on the designated site had been demonstrated to not be that of *Diamond* (Cundy, 2009). As such, the designation criteria, relating to the site's Documentation, and Potential, no longer meet the recommended measures for approval. In addition, under the Diversity criteria, as research has not shown that *Diamond* was ever fitted with any structural strengthening ironwork, the wreck on the site, may not represent an early example of the transitional hybrid period between the building of all wooden, and all iron vessels. Coflein (2012) notes that for *Diamond*: 'It was designated in April 2002 after it was potentially identified as the oldest known example of a American composite built hull'. As this has been demonstrated not to be the case, the site no longer meets the three original designation criteria above, and as neither *Diamond* or *Danube* exhibit any obvious signs, or are known to have had any significant Historical, Archaeological or Artistic importance, there would appear to be little or no justification for the site to remain designated. As such, there must now be an argument for the de-designation of this site, thereby reducing unnecessary regulation and opening the site up to increased scrutiny and investigation.

Specifications

Diamond was registered as being 36.8 m (120 ft 9 ins) and 491.62 tons, while *Danube* was recorded as being 52 m (171 ft) and 987/1,104 tons [5]. The site survey indicated that the vessel on the site was likely to have been in excess of 49 m (160 ft), which from the trend line shown in **Table 3** would indicate a size well in excess of *Diamond*, and far closer to that of *Danube*.

Ironwork

In relation to the geophysics undertaken in 2010, where 86 anomalies were detected on the Sarn Badrig Reef. The Wessex Archaeology report (2011), detailing the work carried out in north Wales, also included a similar exercise just to the south east of the reef, around 450 m (0.3 mi) from the shore, on and around a second designated site, that of the Tal-y-Bont wreck (**Figure 10**), and in this area 39 additional anomalies were identified.

As previously mentioned, in addition to using a side-scan sonar, the geophysical survey also included the use of a magnetic gradiometer to record the magnetic evidence associated with each of the anomalies detected. As can be seen from **Table 4**, there is a column with the heading Magnetic Gradient, with units measured in nT/m (nano Tesla per metre, where nano is 10^{-9}, and Tesla is a measurement of flux density). As expected, due to the number of anchors and cannons scattered around the Tal-y-Bont site, all 39 anomalies provided a magnetic signature. By comparison, on the Sarn Badrig Reef, only 35 of the 86 anomalies produced a reading, indicating a lack of any magnetic indicator at 51 locations. This includes the wreck site 7177, which is indicative of a vessel having little or no iron associated with it, and the suggested possible location for *Diamond.* By comparison, the designated (NTD) wreck site 7254, produced the largest magnetic signature of any other anomaly, which suggests a vessel comprising a substantial amount of iron, as might be expected from a later composite vessel such as *Danube*.

Timber Species

Unlike UK and American built wooden 19th century merchant vessels that were primarily constructed using oak and teak, Canadian builders regularly used spruce, larch, pine and elm. As such, they were referred to as soft-wood vessels and as these types of timber have been found on the site, it provides further credence to the possibility that the vessel on this designated site may have originated from Canada, like *Danube*, and not been built in America, like *Diamond*.

Location

Diamond was reported to have wrecked 'about a mile' from the shore, not 3.75 km (2.33 mi) offshore which is the location of the designated site, and the anomalies 7177 and 7178 at just 1.12 km (0.70 mi) from the beach, could well be *Diamond's* final resting place. Locating the painting produced at the time of the wrecking would almost certainly be a useful adjunct to help prove, or disprove this proposition.

Although *Danube* initially ran onto the reef around 5 mi (8 km) offshore, once it was unloaded and floated free, it would almost certainly have been driven by the wind and tides towards the shore, as does almost everything that enters the north end of Cardigan Bay, and as such could easily have finished up closer inshore and be the vessel on the seabed at the designated site.

Welsh Wreck Web Research Project

The Covid-19 lockdown project has resulted in a legacy of on-line, free-to-access reports on 275 vessels. The scope for evaluating the data contained within these reports is potentially extensive, and bringing all the information gathered by the volunteers together into a single sortable extended archive would be very beneficial. It has been demonstrated above, where, in an attempt to identify the name of the vessel on the designated site, large, 19th century, square riggers, were interrogated, and the analysis was able to reduce the initial 65 vessels down to just three for more detailed investigations and comparison.

One of the suggestions to the volunteers who engaged with the project, was the inclusion in their reports of a single page At-a-Glance summary of the specification and history of the vessel/s they were researching,

and a suggested example was provided for guidance. Of the 65 vessels analysed as described above, 51 had reports submitted, and of these, 39 included a summary sheet, which proved to be invaluable, as these précises removed the need to read through entire reports just to retrieve a single piece of information.

It is hoped that the project's open-source collection of reports, in particular for vessels that have been lost, will in due course be cross-reference linked with the on-line Coflein database of heritage sites in Wales. For the other reports, relating to vessels that survived their recorded incidents, maybe an addendum to the Coflein web site could be developed to include maritime incidents that did not end in the complete loss of the vessel.

In addition, an Unpath'd Waters Project (https://unpathdwaters.org.uk/) is currently being rolled out, integrating many of the existing catalogues of maritime heritage data, making them publicly accessible through a single on-line portal. The possibility of having the WWW Research Project's volunteer reports included as part of this exercise, has recently been approved and their reports are due to be available to view using the above web site before the end of 2023. This will provide greater access to all the data relating to the vessels researched as it will be freely available on-line through both the Archaeology Data Service (ADS) library, and the European ARIADNEplus research portal, further validating the immense amount of work the volunteers have contributed to the Welsh historic record.

Finally, it is hoped that this project may also provide the template for possible similar future volunteer exercises. However, it is hoped that incentives, similar to the Covid-19 pandemic, will not be the stimulus necessary to successfully repeat the exercise elsewhere.

Conclusions

The arguments set out above point to a possible location for *Diamond*; however, this proposition will need to be ground proofed to compare site 7177 with known details relating to the vessel, thereby confirming our hypothesis (or otherwise). In addition, a similar exercise will need to be carried out relating to the currently designated (NTD) site and *Danube* to prove (or otherwise) the suggestion presented in this article. This would ideally include both an underwater investigation of the site, carrying out strategic areas of excavation to reveal any additional structural features and/or artefacts that may aid identification of the vessel, together with an interrogation of the recent multi beam survey of the Sarn Badrig Reef carried out by the Geological Survey of Ireland as part of the CHERISH Project (CHERISH, 2021). Once this re-evaluation has been concluded, if no significant Historical, Archaeological or Artistic importance can be demonstrated for the vessel on the site, a strong argument must exist for the site's de-designation.

Finally, distilling all the data contained within the WWW Research Project's reports into a single sortable archive would be a valuable resource. However, it would be a considerable administrative undertaking, as the reports contain almost 9,000 pages of text from which the relevant information would need to be extracted, and a suitable funding source would need to be found to facilitate this.

Statement on Permissions

The author confirms that permission to dive and carry out work on the wreck site currently known as *Diamond*, that is designated under the Protection of Wrecks Act 1973, was granted by Cadw to MADU between 2002 and 2009, by the issuing of licenses as required. In addition, the use of original primary fieldwork data contained in this article, that has been prepared by Wessex Archaeology (2011), for and on behalf of Cadw, has kindly been granted by Cadw.

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This article is based on two volunteer maritime archaeological exercises:

- Fieldwork and research, carried out between 2002 and 2009, associated with the underwater shipwreck site known as *Diamond*, that is designated under the Protection of Wrecks Act 1973.

- The Welsh Wreck Web Research Project, carried out during the Covid-19 pandemic in 2020 and 2021, associated with on-line investigations into vessels that are known to have been involved in maritime incidents in the North Cardigan Bay area of West Wales.

The only financial assistance provided during these two exercises, has been as set out below, with all other costs having been born by the many volunteers, who are, regrettably, far too many to mention individually in this article. To all of you, who have given up your time to engage with, and participate in, these two projects, we would like to express our sincere thanks, and hope that you both enjoyed and benefited from the experience.

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Notes

1. Information on Black Locust (*Robinia pseudoacacia*) can be found at: https://www.wood-database.com/black-locust/ (viewed 10 January 2023).

2. An on-line plea for assistance in locating the painting of *Diamond* where it wrecked close to the shore has been made, and can be found at: https://www.walesonline.co.uk/news/wales-news/lost-painting-could-hold-key-1931595 (viewed 28 February 2023).

3. Access to the open-source archive of all the individual reports submitted by the volunteer researchers can be viewed at: http://www.madu.org.uk/Page%204.42%20-%20www%20Research%20Project%20-%202020.dwt (viewed 28 February 2023).

4. Reports on these three vessels can be found in the open-source archive compiled by volunteers, as part of the on-line research project.

    - *Pride of the Sea* (Millar, 2021), see: http://www.madu.org.uk/Images/www%20Project%20-%20Pride%20of%20the%20Sea.pdf

    - *Kenilworth* (Holden. 2021), see: http://www.madu.org.uk/Images/www%20Project%20-%20Kenilworth.pdf

    - *Danube* (Whitewright, 2020), see: http://www.madu.org.uk/Images/www%20Project%20-%20Danube.pdf

    (viewed 28 February 2023).

5. The first figure represents tonnage using the 'new measurement law' of 1836, while the second figure is derived from the later 'Moorsom rules' which formed the basis of the British tonnage act of 1854, details of which can be found at: https://www.ggarchives.com/OceanTravel/ShipTonnage/HistoryOfGrossAndNetTonnageMeasurements.html (viewed 2 March 2023).

6. Information on Larch (*Larix laricina*), sometimes known as Tamarack or Hackmatack can be found at: https://www.wood-database.com/tamarack/ and https://www.treesofnorthamerica.net/show/tree/Hackmatack/80 (viewed 10 January 2023).

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