Windermere Jetty Museum

The Conservation of Steam Boats

By P G Wrobel FREng FRINA

Contents

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Introduction

"Nowhere in the world is there anything to equal the stunning collection of Lakeland Vessels which the Pattinson family brought together on the shoes of Windermere"

Director National Historic Ships.

The collection housed at the Windermere Jetty Museum is the largest and highest quality collection of steam vessels preserved together anywhere and is combined with important motor boats, rowing boats, sailing boats and other vessels which are all associated with Windermere and include boats of national and international significance. Eleven vessels in the collection are listed on the National Historic Ships UK National Register of Historic Vessels with four vessels holding National Historic Fleet status due to their national significance. The smaller craft in the collection are all on the National Small Boat Register and include vessels of national and international significance.

Naval Architect and Trustee of the Museum, Paul Wrobel recounts the history of the Museum, its association with Windermere, and its role and work today in the conservation of historic steam and other boats. In six case studies, he describes how that conservation is achieved in practice.

Acknowledgement

The Royal Institution of Naval Architects and Paul Wrobel would like to pay tribute to the conservation work of the Windermere Jetty Museum, which has provides much of the material in this booklet, and to that of the many volunteers in providing this invaluable practical and living record of the craft and skills of naval architects and boat builders of the past.

For those who have an interest in historic boats, a visit to the Museum to view the boats which are featured in this booklet and to hear first hand about its conservation work is highly recommended.

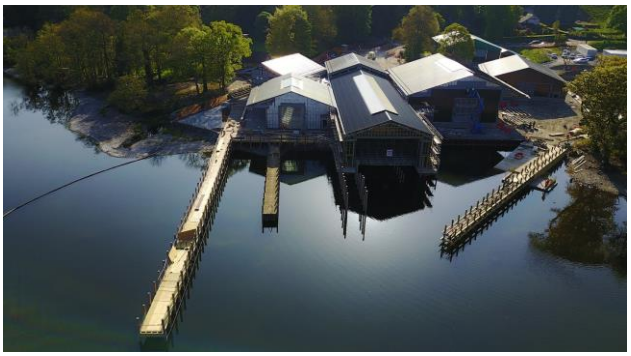
More information about the Museum is available at https://windermerejetty.org/

Trevor Blakeley
Royal Institution of Naval Architects

Windermere

There may have been a ferry crossing at the southern point of Belle Isle from the Roman period. The ferry, or 'Great Boate' is first mentioned in 1454 and is further documented whenever the rights of ownership of the ferry, Ferry Inn and fisheries changed hands. In 1635 a large number of people and horses making the crossing between Hawkshead and Kendal were drowned when the ferry sank. The disaster provided the inspiration for the Romantic painting Windermere in a Storm by Philip Jacques De Loutherbourg (1740- 1812) which is in the collections at Abbot Hall Art Gallery. The remains of Mary Anne are evocative of this much earlier ferry, being a rowed vessel with the capacity to carry passengers, goods and horses across the lake. A steam-powered chain ferry replaced the row service in 1870 and steam provided the method of propulsion up until the Drake, which was converted to diesel in the 1950s. Steam power also transformed the passenger boat services on Windermere. The launch of Lady of the Lake in 1845 promoted wonder from some but annoyance from others, 'that their darling lake should be disturbed by the revolution of the paddle, or their clear atmosphere contaminated by the smoke of a funnel'.

The railway was built to Windermere in 1847 and Lakeside in 1869 and opened the Lakes up to the many more people, making day trips from Manchester and Liverpool a reality. People in the towns and cities in the North of England saw the Lake District as a haven on their doorstep. Bowness expanded rapidly with the construction of houses, hotels and shops. Lavish new villas and holiday homes were built around Windermere.



Pattinson Builders constructed many of the buildings including Belsfield, a large house in Bowness, Ferry Hotel, and Windermere Railway Station. The tourist industry grew to serve the visitors and sell them souvenirs, momentos and postcards - a popular image was of the rowing boats lined up for hire in Bowness Bay.

Early steam enthusiasts such as Alfred Fildes, who owned SL Dolly in about 1850, and the industrialist Henry William Schneider, who travelled each day on his steam yacht Esperance, on his way from Belsfield in Bowness to his iron works in Barrow, were pioneers of private steam ownership. The owners of the new houses on the lake such as Fell Foot, Brockhole, Langdale Chase, Wray Castle and Blackwell also built boat houses to house their steam launches like Swallow and Branksome, Windermere yachts such as Manana and Dawn and later motor launches and motor boats such as Penelope, Raae and Jane.

The rapid expansion of tourism prompted a response from established residents like William Wordsworth, John Ruskin and Canon Hardwicke Rawnsley who were concerned about the development of the Lakes and new transport links. The spectacular landscape around Windermere has provided literary inspiration for many including Beatrix Potter and Arthur Ransome (1884-1967), who went to school in Windermere. Holidaying in the Lakes as a child, he wrote Swallows and Amazons (1930) and Winter Holiday (1933) after witnessing the freezing

of Windermere in 1895. Esperance features in both of these books as Captain Flint's houseboat and the Fram.

The leisurely regattas of the eighteenth and nineteenth centuries became increasingly focused on a quest for speed leading to regular yacht races on the lake. John Christian Curwen, who purchased Belle Isle, owned the yacht Margaret and famously raced Manx yacht Peggy in 1796.

From 1853 to 1860 yachting on the lake was active, and a series of matches took place every year. There was no limit to the size or sail area and the boats varied in size from 14 to 32 feet with races having a time handicap worked out on length. In 1861 the Windermere Sailing Club was formed, becoming the Royal Windermere Yacht Club in 1887. The need for standardisation led to the evolution of hull shapes and resulted in yachts like Dawn, a 1934 17 foot class Windermere Racing Yacht. Steam launches were used to follow the yacht races. The quest for speed also resulted in the building of a series of fast steam launches such as Otto designed by Alfred Sladen in 1896.

The Museum's 1898 motorboat was the first boat on Windermere powered by an internal combustion engine. In contrast to this leisurely craft, Canfly, built in 1922 was the first speedboat on the lake. It used the 1917 seven litre Rolls Royce Hawk engine that had formerly powered Royal Naval Service airship SST3. The Windermere Motorboat Racing Club was formed in 1925 and formalised casual racing between motorboats and hydroplanes on the lake and a programme of races continued until the introduction of the 10 mph speed limit in 2005.

Various water speed record attempts were made on Windermere, most notably Sir Henry Segrave's fatal attempt in Miss England II in June 1930. Boats in the collection that were used for other classes of water speed records are White Lady II in the 1930s, Miss Windermere IV in the 1950s, Cookie in the 1960s and Trimite and Shanida III in the 1980s. These represent the range of speedboats used on Windermere and show the great advances that were made in the evolution of hull shapes to achieve greater speeds.

As well as boating on Windermere local pioneers also took to the skies. An early waterplane, Waterbird was successfully flown in 1911, a modified Slingsby Falcon II Glider was the first to take off on water in 1943 and Shorts Sunderland Flying Boats were constructed on the lake near Calgarth.

The Museum

The collection at the Windermere Jetty Museum is a highly significant part of the UK's dispersed national boat and maritime collection, as individual vessels and as a collection that is associated with Windermere. It attracts international interest as the largest and highest quality group of steam vessels preserved together anywhere, combined with an important group of historic boats. It tells a compelling story of technical innovation and sophisticated design. The collection was largely amassed by George Pattinson, a local builder and steam enthusiast with a passion for the boating history of the Lake District. The Museum site, owned by the Pattinson family, was a Sand and Gravel Wharf from 1921 until 1975, after which George Pattinson converted it for use as a public museum which closed in 2006 through a lack of investment in renewal.

With the help of grants from the Heritage Lottery Fund the new Museum re-opened in 2019. The facilities house and display the collection in the exhibition gallery, wet dock and have a publicly viewable conservation workshop with facilities for conserving and maintaining the collection to a high standard. New jetties and slipway enable operation of selected vessels. The Museum's lively activity programme facilitates engagement with historic boats, connecting people and communities directly to their heritage.

The Museum, collection and stimulating site create enormous scope for interpretation of conservation and describing the history and significance of the boats. Visitors to the Museum and local communities contribute to and are involved in caring for this collection, whether they just come to explore the Museum, take part in workshops or volunteer to get actively involved in conservation.

Windermere Jetty is part of Lakeland Arts, one of the most significant arts and heritage organisations in the North of England, with a national and international reputation for the quality of its historic buildings, museum and gallery collections, and programming. It has a diverse portfolio of attractions also including Abbot Hall Art Gallery and Museum of Lakeland Life & Industry in Kendal, Blackwell, The Arts & Crafts House in Bowness-on-Windermere. See https://windermerejetty.org.

The museum facilities include:

- A large dry exhibition space where the boats are shown in the context of the lake and stories of the people who built, owned and used the boats.
- A central wet dock housing boats that have been conserved for display afloat. Boats bob on the water where they might be used for steam demonstrations and engagement activities. Given the richness of the boat collection and the conservation demands of floating exhibits, the museum will regularly review the vessels in the wet dock and rotate them with vessels from the conservation workshop, or stored collections and dry displays as appropriate.
- A multi-function learning centre providing space for schools, young people and community groups to participate in activities.
- A temporary exhibition space to allow for delivery of a temporary exhibition programme and associated learning activities.
- A lakeside cafe with stunning views across Windermere and a large reception and retail area providing excellent visitor facilities and supporting the future sustainability of the museum.
- A Conservation Workshop that provides a space for the collection to be restored on site, utilising traditional boatbuilding skills in a conservation context and providing opportunities to pass these on to future generations. Visitors are able to view the work progressing on the collection and learn about traditional conservation techniques.
- The conservation programme that includes work to 45 boats and the associated small objects in the collection
- A programme of learning and engagement activities that ensures that a wide and diverse audience have new opportunities to learn about, and engage with, the collection of nationally significant boats and the associated social and industrial heritage.

The Collection

The collection housed at the Windermere Jetty Museum is the largest and highest quality collection of steam vessels preserved together anywhere and is combined with important motor boats, rowing boats, sailing boats and other vessels which are all associated with Windermere and include boats of national and international significance. Eleven vessels in the collection are listed on the National Historic Ships UK National Register of Historic Vessels with four vessels holding National Historic Fleet status due to their national significance. The smaller craft in the collection are all on the National Small Boat Register and include vessels of national and international significance.

The collection includes:

Steam launches

- SL Dolly, 1850
- TSSY Esperance, 1869 (steam engine no longer fitted)
- SL Bat, 1891
- SL Lady Elizabeth, 1895
- SL Branksome, 1896
- SL Otto, 1896
- SL Kittiwake, 1898
- SL Osprey, 1902
- SL (now MV) Water Viper, 1907 (steam engine no longer fitted)
- SL Swallow, 1911

Sailing Vessels

- Yacht Margaret c. 1780
- Ice Yacht, late 19th/ early 20th century
- Otto's tender, 19th century
- Hardman Dinghy c.1920 Yacht Dawn, 1934
- Uffa Fox international sailing canoe c.1954
- RNSA 14 dinghies Swallow, Swallow 2 & Amazon (on loan)
- Windermere 17 Merlin, 1908

Motor Vessels

- 1898 motor boat
- MV Rigmaden c.1904
- MV Canfly, 1922
- MV Lollipop, 1923
- MV Uncle Sam, 1924
- MV Penelope II, 1930
- MV Jane, 1938
- MV Raae, 1938
- MV Pyewacket, 1960
- Anchorage day cruiser Silvi, 1962

Hydroplanes

- White Lady, 1930
- Miss Windermere IV, 1958
- Cookie, 1962 (long term loan)
- Shanida III, 1980
- Chris Applebee, 1984
- Trimite, 1988

Working Vessels

- Sandbarge Elizabeth c.1830
- Ferry Mary Anne, pre-1870
- SS Raven, 1871

Rowing Boats

- Berthon boat c.1880-1900
- Beatrix Potter boat c.1890
- Brockbank's rowing boat c.1890
- Borwick's hire skiff, early 20th century
- Duck Punt Anser, 20th century
- Clinker dinghy
- Tarn boat

Canoes

- Canadian 4 man canoe
- Rob Roy canoe c.1870
- Single person canoes
- Double canvas canoe
- Granta folding canoe
- Struer K4 Olympic canoe, 1955
- Struer K1 Olympic canoe, c.1960

Aircraft

- Slingsby Falcon Glider, modified
- 1943 Sunderland float, 1939-45

Steam Engines

- Dolly, single cylinder engine, Stephenson's valve gear, c.1850-60
- Raven single cylinder vertical engine on cast "A" frame, Stephenson's valve gear, A Campbell and Co, Glasgow, 1871
- Bat compound engine with Stephenson's valve gear, c.1905
- Branksome compound engine with Marshall valve gear, maker's no 502, Sisson of Gloucester, 1896
- Otto triple expansion engine with Sisson's valve gear, maker's no 500, Sisson of Gloucester, 1896
- Lady Elizabeth single cylinder steam engine with Stephenson's valve gear, date unknown
- Osprey compound engine, maker's no 591, Sisson of Gloucester, 1901
- Swallow triple expansion engine, maker's no 1032, Sisson of Gloucester, 1911
- Kittiwake triple expansion engine, maker's no 611, Sisson of

Gloucester, 1901
- Triple expansion marine engine, maker's no 794, Sisson of Gloucester, 1908

Internal combustion engines

- Esperance twin 4 cylinder Ford Model B petrol engines marinised by Vosper Thorneycroft.
- Early Motor Boat single cylinder four stroke (converted from two stroke) petrol engine 1898
- Water Viper 6-cylinder Morris Commodore Mark 1, 1934
- Canfly Rolls Royce Hawk 6 cylinder aero engine, 1917
- Uncle Sam Dispro E1 single-cylinder, 3hp, 2-stroke engine, 1924
- Penelope II BMC Navigator 4-cylinder, overhead valve petrol engine
- White Lady II Scripps 5.5 litre, 135 hp engine 1930
- Raae 4 cylinder Grey Motor 1934
- Jane 6 cylinder Chris Craft 95 hp 1938
- Pyewacket Two Volva Penta engines with outdrives, 1959-60
- Cookie 1800cc Volvo P18 petrol engine, 1962
- Shanida III Hillman Imp engine
- Chris Applebee Koenig 700 cc engine, 1984

Conservation – Methodology

The collection of over 40 vessels and associated material requires a broad range of conservation. The Conservation Management Plan set out the Lakeland Arts Trust's aims, policies and approach to conserving the collection in line with best maritime conservation practice and according to National Historic Ships guidelines, particularly as detailed in Conserving Historic Vessels. The conservation methodologies explain the decision process and practice and provide a rigorous framework for approaching the whole collection. A series of case studies, focusing on six of the most significant and complex vessels, explains how these methodologies were applied. The six methodologies and associated case studies are:

1. Stabilisation - Dolly 1850
2. Preservation: Dry display - Branksome 1896
3. Restoration: Static - Lady Elizabeth 1895
4. Restoration for Operation - Osprey 1902
5. Stabilisation for Adaptive Re-use - Raven 1871
6. Phased Deconstruction - Ferry Mary Anne pre-1870

The conservation route for each boat in the collection has been assessed individually using the conservation gateway guidance set out by National Historic Ships. This includes whether a particular boat should be conserved with minimal intervention in order to preserve the fabric or whether a degree of operational use is desirable and feasible. The activity, interpretation and business plans include use of some vessels for operational use carrying passengers and a boat trip is something that visitors would like to experience and was a key feature of the old Museum For example, the Trust identified SL Osprey as suitable for regular operational use, but the more delicate and historic SL Branksome has been identified for conservation and display in the exhibition gallery. The payback potential from operating the vessels is mainly in improving the visitor experience and supporting learning and outreach activities. Operation puts boats at risk of damage and the Museum will address this through careful management and strict procedures.

Decisions on the conservation route have taken the following into account:

- Vessel significance
- Extent of and nature of remaining original material
- Previous conservation treatments and current condition
- Level of intervention/extent to which original material would be compromised by the chosen conservation route
- Suitability for “wet” or “dry” display
- Payback potential in terms of visitor experience and supporting business plan of the vessel relating to the level of intervention required
- Outreach and engagement potential afforded to a particular conservation route
- Visitor expectation

If “wet” is found to be most suitable from a conservation viewpoint, suitability for operational, or static display is assessed, taking into account the following:

- Degree of strengthening, intervention or adaptation required for operational use
- Potential strain on vessel of operational use •
- Specific risks posed to the vessel by operational use
- Specific benefits to vessel of operational use (e.g. to engine and moving parts)
- Impact on original vessel fabric of level of maintenance required
- Impact of operational use on associated original fixtures and fittings
- Impact on vessel fabric/structure of substantial numbers of people accessing it over a prolonged period

Conversation - Case Studies

Case study 1: Stabilisation - Dolly 1850

Case study 2: Preservation - Branksome, 1896

Case study 3: Restoration: Static wet display* - Lady Elizabeth, c.1895

Case study 4: Restoration Operational - SL Osprey 1902

Case study 5: Stabilisation for Adaptation - SS Raven, 1871

Case study 6: Phased Deconstruction* - Ferry Mary Anne, pre-1870

Case study 1: Stabilisation - Dolly (1850)

SL Dolly was believed to be the oldest operational mechanically steam powered vessel in the world. Her status is recognised in her inclusion in the elite National Historic Fleet. At approximately forty years older than the other wooden launches in the collection, she was clearly designed and built for pleasure, with extremely appealing sweeping lines. She sank on Ullswater in the Great Frost in 1895, was discovered accidentally by divers in 1962, brought up from the lake in a dramatic salvage operation and restored to use by George Pattinson, using her original engine and boiler. Her engine and boiler are an excellent example of early steam technology. The boiler is significant for its use of early safety valve operation and her engine for its demonstration of Stephenson's linked valve gear.

Built of larch or pine on oak frames, SL Dolly has a clipper bow and counter stern and a length of 41' and beam of 6'6". She is fitted with a single cylinder engine. Dolly's age and design make her particularly interesting as an original example of early steam launch design. Not only does she embody the technical advances and experiments in the earliest years of steam on the lake, but she also survived a dramatic salvage operation 50 years ago. At 163 years old, with her original frames and planking, the hull and engine are too significant and fragile to justify a return to wet display or operational use. Time is needed to carry out detailed research and vessel surveys and materials analysis, she was selected for stabilisation before conserving her for dry preservation. The full conservation project will have significant potential for interpretation and outreach.

A major concern is the structural integrity of the hull and its response to pressure tests revealing excessive plank movement and many areas of softness showing decay. Initial surveys revealed that operational use would require extensive rebuilding of the entire hull structure. Dolly is therefore be placed in the conservation gallery in stable conditions whilst investigations continue. All areas are monitored for movement and moisture content, focusing on vulnerable areas such as the stem, deadwoods and forefoot and apply localised protection if needed. The state of the iron fixings in the oak is of particular concern and a priority for condition monitoring, both because of their intrinsic historic importance and the implications of their failure for the overall structural stability of the vessel.

Case study 2: Preservation - Branksome (1896)

Built by Brockbanks on Windermere, Branksome with 50’ full length varnished teak planking, and irreplaceable wide teak panels, set the standard of luxury for wooden steam launches on the lake.

High quality bespoke brasswork and castings, and ornate filigree carving on bow and stern combine with extravagant interior fittings and furnishings to match her stunning design and lines. The entire vessel reflects the luxury lifestyle of a flamboyant lake socialite. Her triple expansion engine built by Sisson of Gloucester is a fine and significant example of steam launch marine engineering.

Branksome is the epitome of Victorian opulence and extravagance. Preservation means it is possible to display, in a controlled environment, a vessel complete in every detail from tasselled Parisian velvet to engraved silver tea service. Through preservation in the main exhibition space the vessel will remain stable and in controlled light conditions. The most light sensitive material will be inside the cabin where levels are lowest.

Branksome is substantially larger than the other wooden launches in the collection but is still lightly built, combined with a lack of longitudinal and transverse stiffening. These issues, together with the engineering situation, mean that there would be substantial intervention to her structure required if she was returned to operational use. This would involve additional strengthening, some new planks, disruption to the misaligned stern gear and propeller shaft in order to rectify engineering faults. Consideration would also be needed for separate display for her more vulnerable original fabrics and fittings, in the interest of their long term preservation. In opting for preservation the need for substantial hull work is reduced. The hull misalignment and light Windermere construction can remain unchanged, providing a fascinating insight into the unique build of our launches. From investigations into similar panels on other vessels it is known that the characteristic alternating pattern of teak and American black walnut can be problematic because of the walnut’s particular susceptibility to rot.

SL Branksome is fitted with her original compound engine, no 502, built by W. Sisson & Co. Gloucester in 1896. The riveted side fired locomotive type boiler was made in 1970, the original being lost. The engine and boiler are significantly heavier than the other wooden steam launches, and the propeller is the largest.

As with the other wooden launches, the stern tube and propeller shafts show clear evidence of misalignment problems. In order to operate the engine without experiencing serious vibration problems, substantial work to the hull and stern gear would be required.

The physical condition of hull and superstructure are monitored. Targeted environmental readings are required in areas where there is concern over microclimates, for example on top of the stern tube inside the cabin. Preventive conservation and a ‘conservation cleaning’ approach will be applied.

Case study 3: Restoration: Static wet display* - Lady Elizabeth (c.1895)

Lady Elizabeth clearly reflects the graceful and aesthetic qualities of a vessel that conforms to the natural laws of hydrodynamics as designed by an experienced naval architect. The high level of experience that went into the design details of this small vessel, with its original counter stern and beautiful lines and proportions, makes it extremely significant. There are few surviving boats of this size where there is such attention to aesthetic detail.

SL Lady Elizabeth is 18' long, with a 5'3" beam, vertical bow and counter stern. She has a single cylinder steam engine with Stephenson's valve gear and a Lune Valley boiler fired by paraffin and believed to have been built by Lune Valley Engineering in 1910. She requires little intervention for static wet display and will be best appreciated in the water.

The boiler and engine have already been placed in storage but the pipework in the hull will need removing in order to enable access for a full survey and internal hull paint specification. The operational condition of the boiler is unknown but it will be displayed in the exhibition gallery for better visitor appreciation and interpretation. This will be beneficial for its preservation due to the more controlled environment. However, the boiler casing and funnel can be assembled and the engine parts will look as original although not functional. Engineering parts will be cleaned and protected for the wet dock environment. Associated items Lady Elizabeth's boiler, engine, steam kettle, funnel and the majority of the engineering parts are currently listed, numbered and stored separately.

The Museum carries out regular monitoring and maintenance of Lady Elizabeth. In the longer term, the operational methodology will be applied to Lady Elizabeth to enable the vessel to be used for demonstration. The information gained in reinstating the engine and inspecting the boiler will enable us to gain a clear idea of the work required to do this and whether it is a viable route.

** As part of the continuing review this boat will now become "Operational"*

Case study 4: Restoration Operational - SL Osprey (1902)

Osprey is one of the finest examples of Edwardian elegance in steam launch design and craftsmanship. She demonstrates the art of traditional boat building of the highest quality with an extremely complex canoe stern. Her Sisson engine, no 591, was once on loan to the Victoria and Albert Museum as an example of technical advances in engine design and represents a type of engine popular with Windermere steam launch owners. A working steam launch is an essential part of understanding the collection in an operational museum. Osprey was identified in 2012 as a good choice for operation.

Carvel built of teak on oak frames, Osprey has a canoe stern with a length of 45'9" and a beam of 8'1'. She is fitted with a compound steam engine built by Sisson of Gloucester. Osprey's engine and boiler are in good condition.

The majority of interventive work required for putting her into the water would have been necessary in order to stabilise the stem, keel, stern and hull from further damage. With a clear understanding of the canoe stern construction, the failure to carry out restoration would have led to unacceptable loss of original hull fabric.

Osprey was clearly in a less stable condition than the other boats and would deteriorate. This contributed strongly to her selection as the first vessel for conservation. Seven hull planks in total in the bilge area had been replaced pre-2007 incorrectly using low grade material and rot was clearly evident. These were removed and replaced with original teak planking. The stem was not original and had suffered from high impact with 5 poorly fitted plank sections each side; large amounts of tar had been poured inside the stem to substitute for the lack of wood support. This was removed and replaced with a traditional curved oak stem. The keel had been replaced in sections and was not holding the vessel in shape to the internal hog, meaning full keel replacement was necessary. The stern area had suffered from substantial modifications and poor repairs which were clearly causing it to lose its shape. This was compounded by large areas of cracking on the stern tube sections and clear evidence of propeller shaft misalignment. As this is the most important area of any wooden power driven vessel, all features in this area had to be addressed, including the rudder and complete stern gear assembly. The covering boards and gunwale capping showed some fastening movement, indicating areas of active rot. These were removed to provide access for the replacement of rotten areas of gunwale. All of the engine and boiler support bearers and internal frames had failed, by burning and poorly rectified repairs due to lack of access. These have all been replaced in English oak. The forward cabin area on the starboard side had high impact damage and required removal from the vessel, a relatively simple

job as it was only screwed to the gunwale. This made the fitting of longitudinal stringers considerably easier. These were going to be a new integral part of the hull structure. The addition of stringers to the original fabric was justified in the interest of preserving the remaining structure of the boat for the future. Clear hull failure was shown where no stringers had been fitted and, if Osprey was going into regular operational use, it was a necessity.

The engine's crankshaft main bearings were found to be badly water corroded and the crankshaft was reground to avoid further damage to the engine during operation. The main bearings have been scraped and fitted to the new bearings on the crankshaft. The boiler is not original and is a replica locomotive-type steam launch boiler with side-fired firebox. It has been pressure tested and undergone a complete paint specification.

Case study 5: Stabilisation for Adaptation - SS Raven (1871)

From 1871 Raven delivered all supplies around the lake: building materials, gunpowder, beer, groceries, medical supplies, coal, people and animals. She broke the ice in winter to keep transport going. Only Raven had the capacity to deliver the full length wooden logs needed by boatyards and construction businesses around the lake. Her significance is recognised through her inclusion as a member of the elite National Historic Fleet.

Built in 1871 by T.B. Seath of Rutherglen near Glasgow, with a length of 72’ and 15’ beam, Raven has an iron hull with counter sunk rivets. 5.14.3 Environment. She is the only working iron vessel in the collection, with all of her original operational fittings, including engine and crane. Raven was an extension of the Furness railway and, through her deliveries, she was pivotal in the growth of communities around the lake. Her later uses included minesweeping training, salvage operations, social and passenger trips and she remains much loved and cherished.

Risks were as follows:

- Sinking due to water ingress primarily through the hull and large rotten areas of the deck
- Corrosion throughout the bilge area of the vessel under concrete
- Corrosion on original external metalwork (crane) where painted surfaces have deteriorated.

To stabilise the vessel, with a view to adaptive re-use involved:

- Removing any vulnerable metalwork to the correct environment
- Moving vessel onto a newly manufactured cradle and power wash bottom
- Withdrawing propeller and investigate potential corrosion around stern gland inboard and outboard bearing
- Plan and implement removal of concrete from bilges, marking all frame and floor positions
- Erecting temporary cover and put in place safety and environmental procedures to shot blast and paint hull, crane, funnel and boiler.
- Conservation of the engine and preparation for display in the gallery.

Following this method statement enables the Museum to consider options for future use of Raven, including adaptive re-use, and how these could be funded through a future project. It is recognized that an adaptive reuse project for a vessel as large as Raven will require the museum staff and infrastructure to be completely bedded in and to have the proven ability to deliver this project, as well as sufficient resources.

Case study 6: Phased Deconstruction* - Ferry Mary Anne (pre-1870)

Ferry Mary Anne is of national importance. She is believed to be the oldest ferry boat in the UK and possibly the earliest surviving public service working boat. As the last surviving rowed ferry, salvaged from the lake, she is part of a ferry service that operated on Windermere from the 1450s to the present day. Mary Anne was left outside, unprotected by the old Museum, and the structure has deteriorated. The ferry is an excellent interpretation and engagement tool which inspires visitors to discover more about the methods and risks involved in early travel on the lake. Everyone can engage with the endearing thought of horses and other animals being rowed in the ferry across the lake. The high degree of decay and dilapidation, her size and the resources required to conserve her mean that long term preservation is not viable and would effectively be replication. However, by following a controlled deconstruction programme all significant information is retained.

Ferry Mary Anne's suggested construction dates ranging from 1799 to 1860. She is 39'6" long with a beam of 11'3". There has been significant fabric deterioration since the ferry's salvage, but it remains our ambition to record and then to preserve its shape for accurate recording. The purpose of this is to:

- Aid understanding of a highly significant vessel
- Record significant detail before it is lost in order to allow for future research, replica, scaled replica or model
- Record and pass on information about traditional boatbuilding techniques for working vessels, as opposed to the luxury leisure vessels which would have required greater detailed drawings

Additional support can be added in the form of grown frames, and this process brings learning opportunities. In doing this, it is preserved for longer, but the protection provided will not retard deterioration forever. There will be key parts like the ramp which will require removal and protection. These can be replaced with replicas to preserve the shape and aid understanding.

**As part of the continuing review this boat may not be "De-constructed" instead the approach would be to re-construct and wire together skeletally where components are missing.*

Future Management & Maintenance of the Collection

The Trust has reviewed the management and maintenance requirements of the collection as part of the project development and this has informed the Conservation Management Plan and related information has been incorporated into the Business Plan.

The Lakeland Arts Trust is ensuring it maintains heritage skills both within its core staff and through the volunteers participating in activities at the Museum.

There is currently an active initiative to rebuild the museum library. The library will focus on an understanding of Windermere boats and their context. The focus is very much on Windermere boats and will continue to make use of resources at other museums such as the NMM holdings in London and Falmouth.

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