



A shipwreck research project funded by the European Union Culture 2000 Programme

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Introduction

Carl Olof Cederlund
Editor

The texts in this newsletter are written by Carl Olof Cederlund, but for the one on the deterioration and damaging of

the wreck of the E. Nordevall, which has been written by Reinhard Grosch, Forsvik Shipyard Assoc.

What is MoSS?

MoSS is a three year shipwreck research project funded by the European Community Culture 2000 Programme. The project opens an underwater window to four significant European shipwreck sites in the Netherlands, Germany, Sweden and Finland. The project is organized by six European countries in 2001-2004. The project deals with the monitoring, safeguarding, and visualizing of shipwrecks. The project aims at telling European citizens about underwater cultural heritage and the importance of its protection.

The MoSS project is based on four shipwrecks, all of which are of great significance from a European point of view and show a diversity of intercultural relationships throughout a long period of history. The wrecks are located in Netherlands, Germany, Sweden, and Finland, and they represent different vessel types. The oldest of the wrecks is dated to the 13th century whereas the youngest is from the middle of the 19th century. The wrecks are in different kinds of underwater environments; in sea, lake, and brackish waters, and the conditions on the sites are both stable and unstable. The wrecks have been preserved extremely well; two of them are almost intact.

The MoSS project has three main themes: monitoring, safeguarding and visualizing shipwrecks. The first theme includes monitoring the condition of the wrecks, or in other

Sallamaria Tikkanen

words doing research on the degradation of shipwrecks under water.

The aim of this theme is to develop and improve the methods used in monitoring the physical and environmental conditions of shipwrecks. The second theme is safeguarding, which aims at outlining and developing models to protect shipwrecks so that also the needs of different public groups are taken into account. The third theme is visualizing. The four shipwreck sites will be made physically visible using underwater and other images. The project will be advertised multilingually to the European public.

The MoSS project will consist also of fieldwork, Internet site, publications, posters, leaflets, reports, articles, meetings, and seminars. One of the objectives is to produce information not only to the general public but also to the experts in the area of protecting the cultural heritage. The aim is to awaken European peoples' interest to our common underwater cultural heritage and to have the general public participate in protecting the heritage. The wrecks of the project - ships that sailed on European waters - act as examples of maritime history as they tell us about the many local and international dimensions of the European culture.

The MoSS project is organized by The

Maritime Museum of Finland (co-ordinator), The Mary Rose Archaeological Services Ltd. (United Kingdom), The National Service for Archaeological Heritage: Netherlands Institute for Ship- and Underwater Archaeology ROB/NISA (the Netherlands), The National Museum of Denmark/Centre for Maritime Archaeology (Denmark), The Department for Preservation of Archaeological Sites and Monuments / Archaeological State Museum of Mecklenburg-Vorpommern (Germany), and Södertörns högskola – University College (Sweden).

The MoSS Project is the first international shipwreck project that European Community Culture 2000 Programme funds. The European Community Culture 2000 Programme is a programme that supports international cultural co-operation projects that involve organizers from several countries. The objectives are among other things to encourage co-operation, to promote the common European cultural heritage, and to disseminate the knowledge of the history and culture of the peoples of Europe.

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The history of the E. NORDEVALL



The only known photo of a steam ship built in Sweden in the 1830s is the one of the "Gustaf Vasa", launched in 1834 which worked along the coast. It is here shown in an unknown harbour in the 1860s or 1870s, probably near the town of Sundsvall in the north (Photo: The Swedish Maritime Museum).

The steam-propelled ship was introduced in Sweden in 1816 when the first trial of a steam engine in a ship took place in Stockholm.

Just a few years later, around 1820, the first ships driven with steam engines were working on Lake Mälaren west of Stockholm. The E. Nordevall was one of five paddle steamers built in the 1830s for the newly opened Göta Kanal, which crossed Sweden from the Baltic Sea to the West coast. The idea of digging a canal across Sweden from the Baltic Sea to the North Sea to create new and better conditions for Swedish trade and seafaring had been around

for about 300 years. King Gustav Vasa had originally proposed the canal in the 16th century. It was only at the beginning of the industrial era that the technology could be mobilized to make the huge task a reality.

By 1809 Sweden had lost the war against Russia, and had to surrender Finland, which had been part of Sweden since medieval times. The peace treaty after the war was the most humiliating Sweden had ever had to concede. The war resulted in a revolution and the king was overthrown. For a time the country was nearly a military dictatorship and in a very precarious economic situation with high inflation and low

demand. The economy was based mainly on agriculture, several years of crop failure created very difficult conditions for the people. The country and economy took decades to recover.

One vital factor in this recovery was the building of the Göta Kanal. The building of canals for shipping had been developed in Britain in the 18th century. The construction technology of the Göta Kanal was similar to that used in Britain. The canal took more than 20 years to build. The canal links a series of lakes. Nearly 90 kilometres of canal had to be excavated, using 58 locks to give a maximum rise of over 90 metres above sea level.

When the canal was opened in 1832, it was one of many steps being taken in Sweden to improve communications. These projects combined the forces of surveyors, engineers, designers and entrepreneurial financiers. Which in turn led to the development of iron works and mechanical workshops, which became the basis of the modern Swedish engineering industry. The canal project and the support required was a major preoccupation of parliament involving the monarchy and politicians together with the military, because many of the thousands of workers required to build the canal were soldiers. These infrastructure

projects involved of course the people in general both as workers, in the provision of support services and as spectators.

When the canal was opened the route by steam ship from Stockholm to Gothenburg soon became a popular new way to travel much preferred to the old stagecoach.

The introduction of steam power was a necessity for traffic on the canal. The intensive traffic on the canal would have been difficult to manage without steam driven ships.

Specialist workshops were established, not only for the construction needs of the canal but also for the

manufacture of steam engines for the ships and pump installations. One of these workshops was established in the town of Motala, where the canal emerged into Lake Vättern. The Motala Verkstad, (The Motala Mechanical Workshops), was to become one of the most important company's in Sweden's 19th century engineering industry. Today the Canal has become a major tourist attraction with both passenger ships, followers of the E Nordevall project, and during the summer many yachts and motorboats.

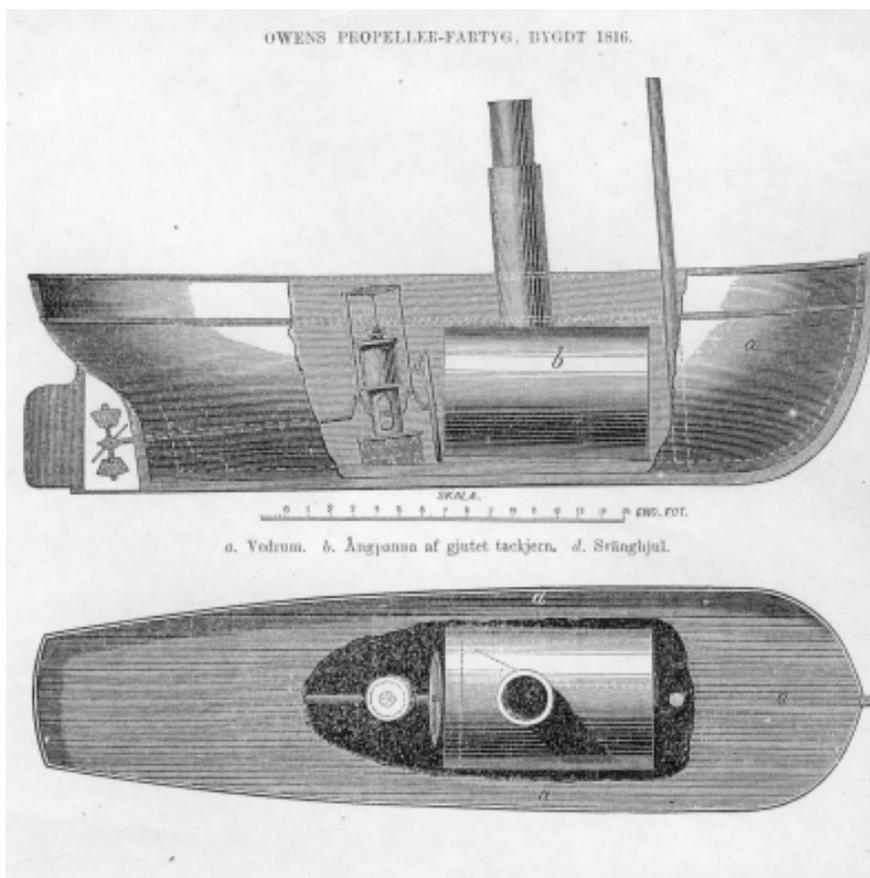
The "Fiddle boats"

Steam-propelled paddle steamers had been used in Sweden for a little more than a decade when the first canal steamers were built. These were a very small part of the merchant fleet at the time, but attracted a big novelty interest. Steam ships did not outnumber sailing ships until the end of the 19th century. The E. Nordevall and her sister ships were the beginning of the Swedish industrial revolution.

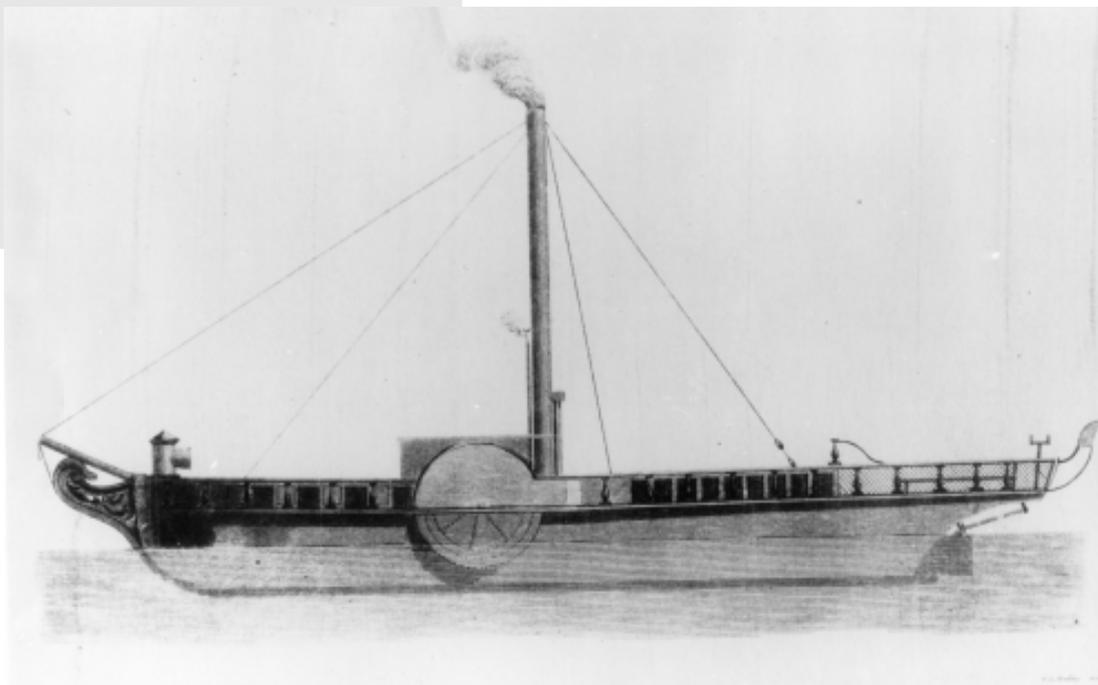
The ship had a distinctive shape, the beam narrowed amid ship by the paddle wheels to reduce the beam to fit the narrow canal locks. This distinctive shape gave rise to the now traditional name of "fiddle boats".

The man it was named after

For the new route across Sweden, a new company was established, *The Ship Company for Steam Boat Trade between Stockholm and Gothenburg* (*Direktionen för ångbåtssjöfart emellan Stockholm och Göteborg*) to operate the new paddle steamers. The first ships of the company were named after individuals who had played important roles in the development of the canal. The first ship, launched and put into service in 1834, was named the *Amiral von Platen* after the man whose will and



The first steam ship in use in Sweden was the "Witch of Stockholm" - a propeller driven, experimental vessel, designed and tested by the Scotsman Samuel Owens in Stockholm in 1816. The drawing is a reconstruction done later by Samuel Owen's son, who saw the same steam vessel in action (Ny Illustrerad Tidning No 19, May 1874; also published in 1874 in the British journal "The Engineer").



A pamphlet by Gustaf Broling with the title "Bref om ångbåtar" ("Letter on steam ships"), published in 1816, shows this Scottish canal paddle steamer (Broling 1816). It may be seen as a prototype of the first generation of steam ships in use in Europe, in different shapes and sizes, during the 1820s and 1830s. The E. Nordevall was a similar design of ship.

energy as a politician had carried through the project. Another of the ships was the E. Nordevall, brought into service 1837, named after an engineer who built the foundations for the locks in Göta Kanal. Erik Nordwall (1783-1835) was one of the most prominent technicians in canal and lock building in Sweden in the late 18th and early 19th centuries.

The dimensions of the paddle steamer E. Nordevall were: length over all 28.6 metres, beam 5.8 metres at the forward end of cabin deck, outside the paddle wheels 6.5 metres, inside the paddle wheels 3.9 metres, and load draught 1.75 metres. Construction was oak and pine. The vessel was built at the Hammarsten shipyard in the town of Norrköping in 1836-1837. The ship represents the first generation of European general use steam ships. The E. Nordevall was designed by one of Sweden's most prominent ship designers of the time, a naval officer Johan Gustaf von Sydow. Daniel Frazer a Scottish engineer, who was then technical

director of Motala Verkstad, designed the two side-lever-engines that powered the E. Nordevall.

The loss of the E. Nordevall

The E. Nordevall had a working life of twenty years on the Göta Canal. Until on June 4th 1856 she grounded on a shoal off the small town of Vadstena on the eastern side of Lake Vättern. With some difficulty she was pulled off the shoal, but sank within some hundred metres when under tow. Evidently the damage to the hull overwhelmed the pumps. The passengers had all been safely lifted from the stranded vessel no lives were lost.

The wreck of the E. Nordevall

After 124 years underwater, brothers Olaf and Åke Svensson relocated her at a depth of 45 metres, on September 27th 1980. The E. Nordevall had been well preserved on the bottom of this flat and current free, fresh water lake. At the time when the ship was located the main part of the exterior was still intact and the interior

was in the same state of preservation as when she sank.

Interest in the ship has developed since she was rediscovered, as more information of the unique condition of the paddle steamer has become known.

References:

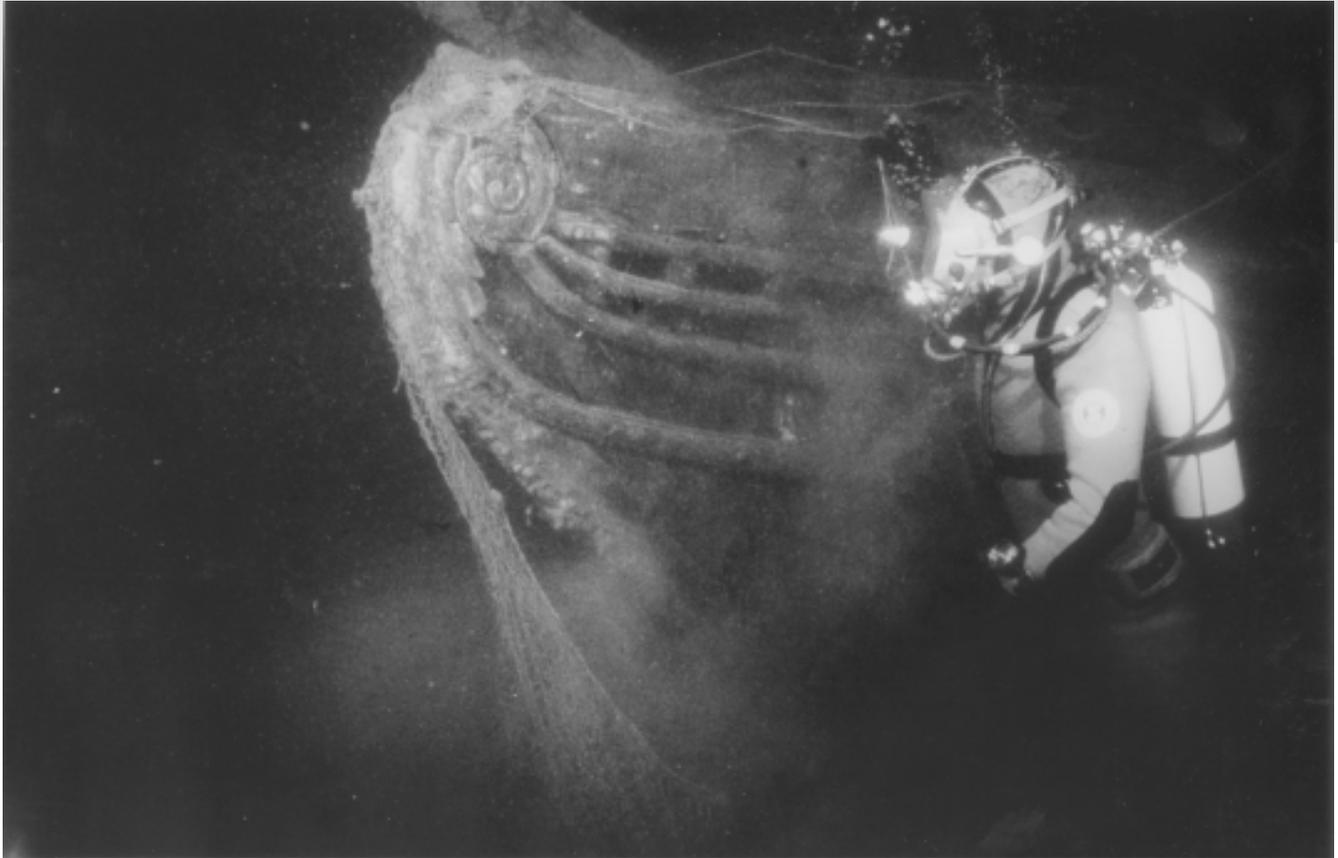
Broling, G., 1816. *Bref om ång-båtar*. Stockholm. Facsimile 1978.

Cederlund, C. O., 1987. *The Eric Nordwall - an early Swedish paddle steamer*.

Theoretical Approaches to Artefacts, Settlement and Society. Studies in honour of Mats P Malmer. B.A.R. International Series 366, 1987, p 515-539.

Also in the *International Journal of Nautical Archaeology and Underwater Exploration* (1987) 16.2, p 109-134.

The under water investigations since 1980



A diver at the port bow of the E. Nordevall in the early 1980s (Photo: Tony Holm).

Gunnar Samuelson a civil engineer wrote on April 28th 1976 to Motala town municipality proposing that the wreck of the E. Nordevall should be located and to investigate complete or partial salvage. His letter was also an application for financial support. He had also been in contact with a variety of other funding bodies, among them the head of the care of ancient monuments at the Östergötland County Administration (Dnr SSHM: 1976:938).

Diving and recording activities during the years after localisation

During the weeks following the discovery in 1980 a series of dives were made on the site by the brothers

Svensson and others. At this time the starboard nameplate and the steam whistle were recovered. The ship's bell had been found on the first dive but was lost during recovery and not relocated until 1982 when it was eventually salvaged. In October 1982 the first professional site survey was organized, in conjunction with the Swedish National Maritime Museum. The Neptune salvage company also took part, to evaluate the salvage potential. The ship was recorded photographically for the first time and in May 1983 the vessel was video recorded (Cederlund 1989, 3 f).

Under water archaeological investigation and evaluation of the E. Nordevall 1985-1989

In November C. O. Cederlund of the Swedish National Maritime Museum

presented a plan to the Manager of the Göta Kanal Company to investigate and if possible prepare the E Nordevall for salvage, conservation and museum display (ERIC NORDEWALL SOM MARIN-ARKEOLOGISKT PROJEKT. Några planeringsfrågor 1984-11-02).

The following year the Swedish National Maritime Museum started to investigate the site including full photographic and film documentation of the ship. This research continued from 1985 to 1989. This work was carried out in cooperation with the Göta Kanal Company, the Dept of Diving Technique at Chalmers University of Technology in Gothenburg, the unit for the care of ancient monuments at the Östergötland County Administration and

also the Central Office of National Antiquities in Stockholm. The initial project plan covered the following:
Step 1: documentation and recording of the ship as it exists by physical survey, photo and video. Strength and integrity of the hull calculated to assess for salvage.

Step 2: recovery of loose artefacts on the deck and elsewhere. This may also include fragile or removed hull/ship parts.

Step 3: the preparation for and implementation of hull salvage, conservation and an appropriate receiving museum in the town of Motala.

On the 25th May 1985 a meeting was held at the head offices of the Göta Kanal Company to form an Eric Nordevall project group. The objective was the investigation and possible salvage of the vessel. A sub-committee was formed to evaluate the use of a Swedish ROV called the Sea Owl for the investigation and recording of the wreck site.

1985 Survey Season

During 1985 the main part of the starboard side, and part of the stern were systematically photographed for the preparing of photo-mosaics of the same. Additionally interesting details of the hull were recorded by hand held camera. Finally all parts photographed were also recorded on video.

1986

Activity in 1986 was partly site preparation; wires, fishing nets and other unrelated materials were removed from the ship. Reference points and scale tapes were also positioned on the hull for the survey. And more loose artefacts were removed from the ship. The photo documentation undertaken during 1986 covered the bow; starboard side of the bow; the upper parts of

starboard side from the bow to the paddle wheel; the ships side at cabin deck as well as the upper part of the flat stern. The photography was used to create photo mosaics of the ship. Video recording covered the starboard side and part of the port side, parts of the flat stern and smaller parts of the main deck. Finally parts of the interior were recorded: principally the aft saloon, the passenger cabins, the forecabin, as well as parts of the engine room and engines.

1987

During this year activity concentrated on vertical photography of the cabin deck, the main deck on the port side and part of the starboard side. Followed by video and film recording of the same parts of the ship and its interior. Activities during this year were also recorded by a BBC, UK film unit, for the Underwater Discoveries series launched worldwide in 1988.

1988

Vertical photography of the main and cabin decks, as well as photo recording of parts of the starboard side of the hull, the wheels and the wheelhouses on both sides continued. The same parts of the hull were video recorded.

1989

An evaluation of the technical conditions for the salvage of the E. Nordevall was performed as an examination thesis at the Dept of Marine Technology, at the Chalmers University of Technology in Gothenburg. Special sampling of the hull was undertaken to investigate the strength and durability of the wood. In summary the results showed that the hull retained enough integrity for salvage (Egeland, L., & Thulin 1989). Bo Zachrisson of the Dept of Archaeology, Stockholm University, produced a horizontal projection plan

of the vessel, and also a side view, as it existed then. These plans were based on the surveys and recordings carried out since 1985. A report on the 1985 to 1988 research was presented in 1989, which included photo plans, and records of the vessel as well as the drawn plans mentioned and an explanation of the performance of the same (Cederlund 1989).

The 1990's onwards

The site has been revisited several times to undertake additional recording. This additional research has been undertaken in support of the Eric Nordevall II replica project and as part of the planning for salvage of the ship (see below).

References:

Cederlund, C. O., 1989. Rapport över den marinarkeologiska undersökningen av hjulångfartyget E. Nordevall 1985-1988. Statens sjöhistoriska museum. Stockholm.

Egeland, L., & Thulin, K. 1989. Bärgningsmetoder / bärgning av Erik Nordewall, CTH

The Archives of the department of the Care of Ancient Monuments of Östergötland County Administration, Linköping, and the Marine Archaeological Archives at the Swedish National Maritime Museum.

Plans of salvage 1990-1991



The salvage of the ship's bell a few years after the rediscovery of the E. Nordevall (Photo: Kent Hult).

At a meeting in September 1990 it was decided to establish a working group to investigate the viability, methodology and costs of salvage, conservation and display of the E. Nordevall in the town of Motala.

Members of this group were drawn from the following organizations:

- Motala town and municipality
- The Göta Kanal Company
- The Swedish National Administration of Shipping and Navigation
- The Swedish National Maritime Museum
- The Östergötland County Administration
- The Chalmers University of Technology in Gothenburg
- The County Museum of Östergötland

The salvage and its methodology

The working group initially stated that salvage was technically possible. A conventional salvage technique was advised, which had been proposed by The Chalmers University of Technology, Gothenburg (see Egeland / Thulin 1989). A salvage company in the Östergötland County presented a cost estimate and salvage proposal.

Hull salvage integrity

The working group accepted the findings of The Technical University of Gothenburg which concluded that the hull retained enough integrity to withstand the stress of salvage. The representative from the Swedish National Administration of Shipping and Navigation in consultation with the salvage company "Röda Bolaget" endorsed the conclusion.

The archaeological excavation after salvage

On the 18th January 1991 the Swedish National Maritime Museum presented plans for the post salvage/ excavation process. The first step specified a plan before recovery to register, record and treat information about artefacts and find circumstances in, on and in the debris field surrounding the ship [this plan was later expanded 22-02-91]. This plan contained the following steps:

- The documentation for loose finds on the bottom, around the ship, before the raising
- The raising of these finds and delicate parts of the hull structure, including recording
- Protection measures to support the funnel
- The raising of parts of the paddle wheels

The archaeological procedure during salvage comprised of the following:

- Continuous monitoring of hull strength, and if required reinforcing.

- The retrieving and recording of artefacts onboard
- The registration, recording and storing in water of artefacts retrieved

The group proposed that the vessel should be placed in one of the dry docks at Göta Kanal in Motala, for archaeological investigation. The general aims of the research were defined as the gathering and registering of knowledge about the ship, its structure and state of preservation, for the reconstruction of the hull and the engines, for research, exhibition and information.

The excavation was expected to comprise of the following:

- The dismantling of mast, funnel and paddle wheels
- The registering and photography of

artefacts, sampling

- The dismantling and the lifting of the engines from the hull
- The conservation of the engines
- The measuring and the preparation of plans of the hull
- The archaeological photo documentation of the hull and the excavation process

The working group wanted the whole process filmed, video recorded and photographed through all phases, both under and above water, before, during and after the salvage and during the excavation and the following work process.

The Östergötland County Museum agreed to take formal responsibility for the excavation, in cooperation with the Swedish National Maritime Museum.

Conservation planning

The working group consulted the conservation department of the Swedish National Maritime Museum about procedures and methods for the conservation of the ship after salvage. In a proposal [28-02-1991] it was suggested that conservation would be achieved by polyglycol spray of the hull in a humidity and temperature-controlled environment. Loose timbers to be immersed in a polyglycol solution. It was estimated that the wooden hull would take 10 to 15 years to conserve. Ferrous and non-ferrous parts of the engines, hull and other fixtures and fittings should be removed, cleaned and blasted. Possibly the engines had to be treated with electrolysis at an industrial establishment.

A diver above one of the paddle wheels of the E. Nordevall (Photo: Kent Hult).



Preservation and visualization of the ship after excavation

Two alternative scenarios for the preservation and visualization of the E. Nordevall were developed:

-As a museum exhibit with the hull and its fittings exhibited in a museum hall. This alternative also meant that the hull, engines etc must undergo conservation to be stabilized for the future.

-As a floating ship, which would mean that damaged parts would have to be replaced. This alternative meant that major parts of the hull would have to be rebuilt.

It was estimated that the costs for the preservation as a floating ship would be much less than for conservation and exhibition in a museum. The floating alternative would require regular maintenance and repair of all parts including the hull. The Central Office of National Antiquities were consulted who stated that if the vessel is to be preserved floating and to be used, it could no longer claim to be a relic in the meaning of the ancient monuments act. This was because progressively the structure of the ship would be replaced by new material. If this was the case the working group had to record the vessel in full and then strike the vessel off as an ancient monument. The Swedish National Administration of Shipping and Navigation suggested that a decision could not be made until the vessel had been salvaged.

Museum premises

Motala had space available for a permanent display of the salvaged E. Nordevall within the towns Industrial History Museum. The Göta Kanal Company had offered to make available a mooring for the paddle steamer near the dock at the Motala Verkstad if it was to be preserved in a floating state.

The municipality of Karlsborg (on the western side of lake Vättern) also had said that they would be prepared to take care of the E. Nordevall after its salvage.

Diving programme for the salvaging of the E. Nordevall

The Department of Marine Technology at the Chalmers University presented a proposal for diving, underwater work and costs for the salvage of the E. Nordevall. This was over and above the archaeological salvage programme.

The 1991 conclusions of the investigation group

Mrs. Ing-Marie Munktell, Curator at the Seafaring and Canal Museum in Motala presented an investigation report in May 1991 (Munktell 1991). The members of the working group concluded unanimously that the E. Nordevall was of unique importance from the general cultural perspective and also in the context of industrial history. It could if it was salvaged become an extraordinary attraction in the town of Motala and the county of Östergötland. The risk of deterioration, pilfering and plundering of it, if it was left in situ was seen as another argument for the salvage. The wreck would be difficult to preserve on its wreck site.

The following plan for the realization and performance of the project could now be made:

-Salvage is possible

-The transporting of the hull to the dry dock at Göta Kanal in Motala through the lock in the Göta Kanal was possible with the ship partly submerged

-Immediately after the placing of the ship in the dry dock, it should be sprayed with water

-Premises for an appropriate museum did exist in Motala

The working group came to the conclusion that the ideal would be the preservation of the ship in a museum environment. The alternative to preserve the ship in a floating condition was also recognized as a realistic alternative. Both alternatives for preservation could be achieved.

The establishment of a non profit association for the project

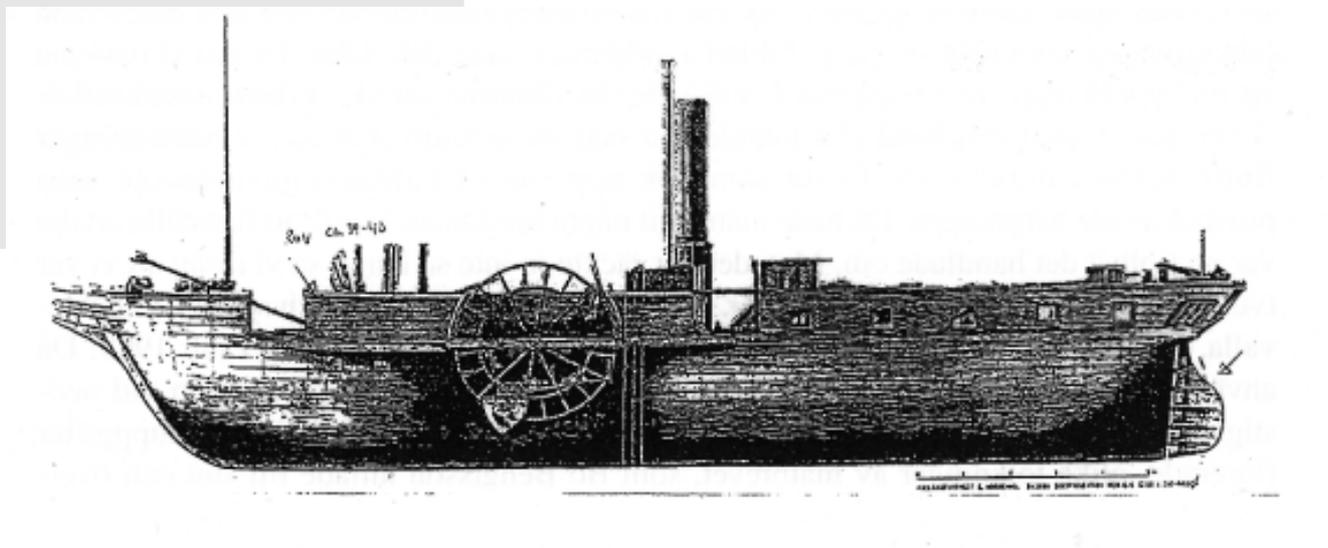
At this time the working group and the Östergötland County Administration, discussed the idea of a non-profit association to manage the project. This was agreed.

References:

Munktell. I. M., 1991, Hjulångfartyget E. Nordevall. Bärgning och Bevaring. Beskrivning och kostnadsuppskattning. Uppsala (Unprinted source).

Correspondence as well as minutes of the salvage investigation group meetings 1990-1991 in the Archives of the department of the Care of Ancient Monuments of the Östergötland County Administration, and in the Marine Archaeological Archives at the Swedish National Maritime Museum.

Evaluations of the E. NORDEVALL and its possible salvage, 1991-1992



Side view of the E. Nordevall, performed in 1989 on the basis of photo mosaics and measure recordings of the ship (By Bo Zachrisson).

In the autumn of 1991 the Östergötland County Administration distributed the report on the possible salvage of the E. Nordevall, to 19 interested parties [authorities, scientific and other institutions, societies and associations], for their evaluation (1991-10-07; Dnr 229-10616/91). The responses to the report were summarized in April 1992 (SSHM Dnr 340/91).

The answers were organized in to four groups defined by the type of organization, namely:

1. Organizations for the care of ancient monuments, and museums
2. Other state authorities
3. Organizations of the society in Östergötland county and at Lake Vättern
4. Associations and societies

Below are the answers given, as to the historical value, the salvage and the preservation of the E. Nordevall. The responses to each of the three questions have been treated under one heading, to give a consolidated evaluation for each issue.

The historical value of the E. Nordevall

The Swedish National Maritime Museum suggested that the E. Nordevall is a very interesting ship from the point of view of ship and technical history. It would if exhibited in a museum be a very interesting example of shipbuilding and marine engineering of the time. Also the modern way of travelling at sea could be illustrated in the context of such an exhibition.

The administrative board and the Museum of Skaraborg County claimed that the E. Nordevall is a unique ship type and that it has been preserved uniquely well. The cultural and historical value of the E. Nordevall was suggested beyond discussion. The point was also made that salvage and an exposition would be an important tourist attraction for the region. The County Museum gave its full support to the project.

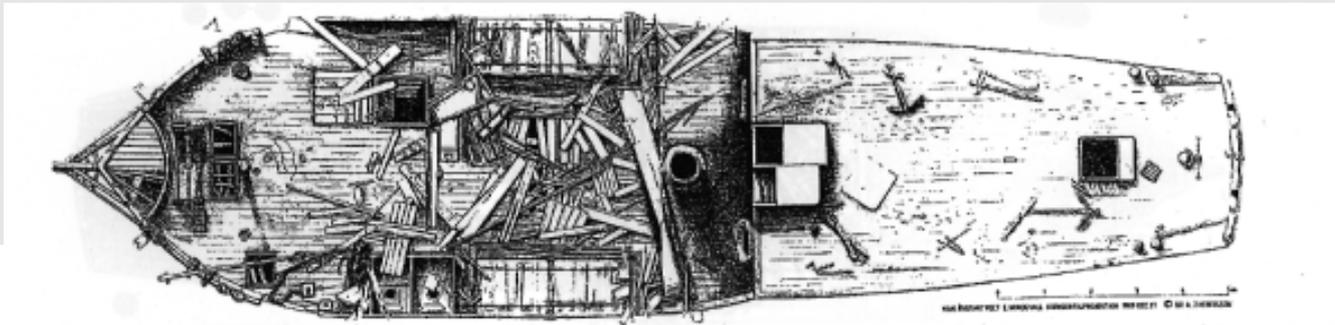
The Östergötland County Administration forwarded the opinion that the E. Nordevall, which is the only preserved ship of the so called "fiolbåt" ("fiddle boat") type and which had been working on the Göta Canal, would of course be of a great historical interest and would be a considerable tourist attraction, not least for

travellers on the canal today.

The Crown Lands Board had the view that the salvage and preservation would have a considerable interest both from the point of view of general and seafaring history.

The Swedish National Administration of Shipping and Navigation suggested that the E. Nordevall represents the beginning of the epoch of mass communication and belongs to the early generation of ships driven by engine. The ship is, still after 130 years on the bottom of lake Vättern, intact and very well preserved. Because of this the technical conditions for a salvage and continued preservation are good. Restored the E. Nordevall fits well in the museum exhibition of technical history, which is planned for the town of Motala, and could become a considerable tourist attraction.

The Swedish State Power Board, Eastern Sweden, considered the ship a unique find, which should be preserved for the future. They also suggested at the same time that it is of importance that the ship is placed in the larger context of early industrial development, represented by the establishment of the Motala Verkstad



Horizontal projection plan of the E. Nordevall, performed in 1989 on the basis of photo mosaics and measure recordings of the ship (By Bo Zachrisson).

and other companies.

The cultural affairs committee of Karlsborg town municipality forwarded the opinion that to see the E. Nordevall, the so-called "fiddle boat type", would be a unique opportunity, and that it is part of the history of the Göta Kanal. This is of importance culturally and historically for the Karlsborg community.

The municipal executive board of the town of Motala was positive about the idea of salvage and a preservation of the E. Nordevall.

The cultural affairs committee of Norrköping town municipality underlined the ship's great value from the point of view of cultural and industrial history. The ship's special value was that it had been built on the Hammarsten shipyard in the town. It could throw light on a part of the history of the harbour and seafaring of Norrköping, something, which has not been fully documented. From the point of view of technical history this well-preserved steam ship can be judged as outstanding in its kind. It would, when salvaged, conserved and integrated in its historical context, stand as a symbol for the early phase of industrialism in Sweden. Because of this it could become a first class historical attraction, connected to one of the most important monuments in Sweden, the Göta Kanal.

The cultural affairs committee of

Vadstena town municipality put forward the view that to be able to salvage and in an appropriate way preserve the E. Nordevall would be culturally and historically valuable. The construction techniques used in the ship may also be historically important. A salvaged and preserved E. Nordevall would be something worth seeing and become of a great value for culture tourism in the whole of the western part of Östergötland county.

The municipal executive board of the town of Vadstena stated that they fully supported the declaration of the cultural affairs committee with the addition that the town sees the salvage as a concern of the whole nation.

The council of tourism of the county of Östergötland saw that the E. Nordevall would be a unique tourist destination in Östergötland County. The ship would generate interest, not only in Sweden, but also abroad. They were certain that salvage would be of a great media interest.

The non-profit organization "The Archipelago Boat Association" put forward the idea that a well-preserved steam ship from 1836 would be internationally unique. No first generation well preserved steam ship, existed anywhere else in the world. The E. Nordevall can be compared to the 17th century naval ship Vasa and

should be treated similarly. Other surviving steam ships are not as old and are considerably reconstructed. Only smaller parts of these ships are still original. Of the few, which have been preserved in the world, none is as completely preserved as the E. Nordevall. Not least the ancient engines are of a special value and unmatched elsewhere. Also the hull of the ship and its design is of great interest. These old steamships represent the transition, when they still had a strong similarity to the traditional characteristics of sailing ships. The E. Nordevall is the only paddle steamer that survives in Sweden. It represents the first fully developed generation of steam ships. Also internationally the ship represents a very early phase. It is important to recover the ship and to learn more about this important period in early steam propulsion. It could be seen as an obligation to do this, when the unique potential of the E. Nordevall is within our grasp.

The SS Great Britain Project, Bristol, UK, stated that in the earliest phase of civilian steam shipping the main part of the steam ships were small passenger- and case-goods carriers driven by side-lever engines of a British design and with paddle wheels. A few side-lever engines can be found in British museums, but none of the early steam vessels have survived

above water today. The E. Nordevall therefore has an enormous international interest and value, as the only surviving steam ship of the first generation and typical for its class. The steam ship has usually been seen as a British product and feat, at least when it comes to the European development in this field. The E. Nordevall constitutes an excellent example of the type of ship, which was developed out of this British pioneering technology. Therefore salvage, conservation and exposition of the ship would be of the greatest interest to historians in Great Britain. The ship would constitute an excellent example of a first generation steam ship and would be complimentary to the remaining example out of the second generation; the iron and propeller ship The Great Britain. The latter had been recovered from the Falkland Islands and was now under conservation and restoration in Bristol.

The society of Rear Admiral J. G. von Sydow's descendants supported the project, not only because its members are descendants of the man who designed the E. Nordevall. They saw that the ship has a great cultural and technical historical value and that the ship preserved in a museum in Motala may be of great importance not only for the town and the county but also internationally.

The proposal to salvage the E. Nordevall

The Swedish National Maritime Museum supported the concept of salvage with the condition that financial resources were available to perform the project from the recording on the bottom to a final exhibition in a local museum. The Swedish National Administration of Shipping and Navigation suggested that, as no other comparable shipwreck has been found, it would be of a very great

technical and cultural historical importance that the E. Nordevall was salvaged and preserved for the future. The cultural affairs committee of Karlsborg town municipality stated that it supported the idea of salvage, conservation and preservation of the E. Nordevall. The municipal executive board of the town concurred with the council of culture.

The non-profit organization "The Archipelago Boat Association" strongly recommended that the E. Nordevall be salvaged conserved and preserved in a museum arranged for the same. The SS Great Britain Project, Bristol, England held the strongly expressed hope that salvage and a stabilization of the E. Nordevall should be undertaken. Sweden with the knowledge and experience reached through the Vasa project is in a uniquely strong position. The society of Rear Admiral J. G. von Sydow's descendants wholeheartedly supported the future salvage of the ship.

The preservation of the E. Nordevall

The Swedish National Maritime Museum opposed the idea of partial salvage from an antiquarian perspective; this arose from the idea of salvaging, recording and then returning the vessel to its wreck site. The museum also opposed the proposal that the original ship should be restored, fitted out and used as a floating historical ship. Such a program would interfere too much with the originality of the vessel, as it exists. The Local building committee of the town of Karlsborg made the further point that the ship was in use on Göta Kanal between 1837 and 1856, which meant that communities other than Motala Verkstad could be alternative museum locations for the ship. For example in the town of Karlsborg a location could be found

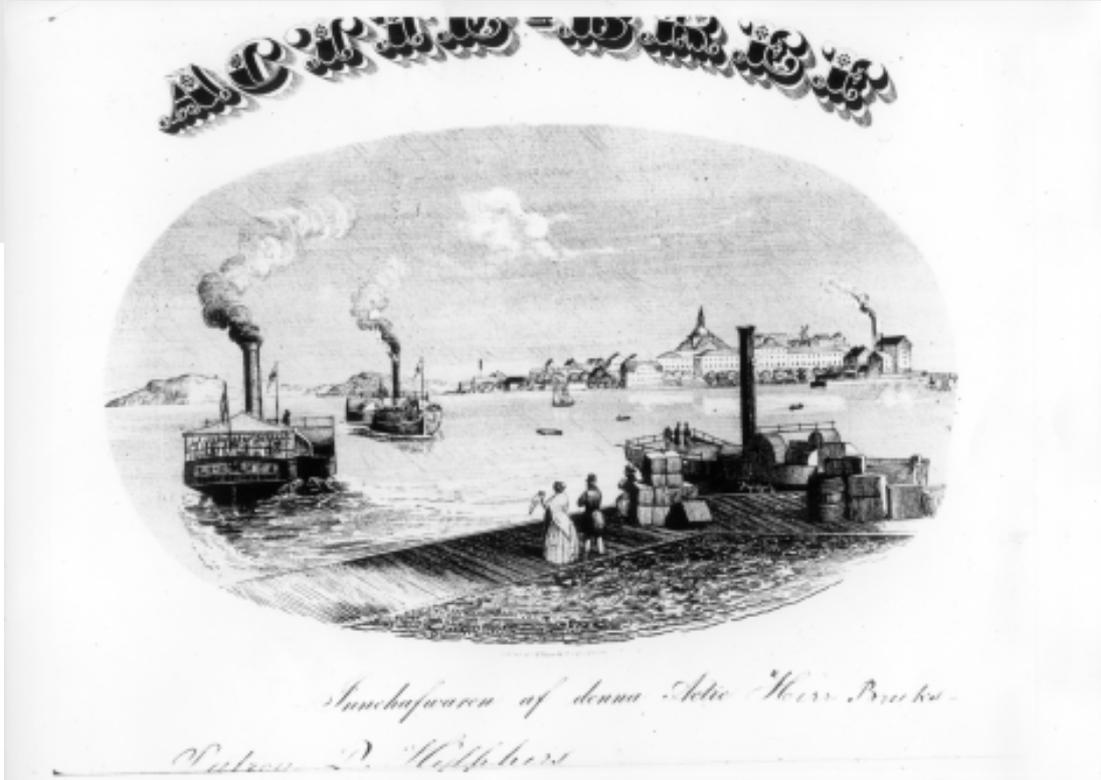
for the ship in the big forge hall in the Forsvik Industrial Heritage. The municipal executive board of the town of Karlsborg concurred with the councils of culture and building construction that there is a great interest to preserve and keep the E. Nordevall for example at Forsvik Industrial Heritage in the municipality. The society of Rear Admiral J. G. Von Sydow's descendants recommended preservation in a museum rather than as a ship afloat. The latter alternative would in the long run be too costly. The non-profit organization "The Archipelago Boat Association" held the view that such an old wooden ship must be preserved indoors. The alternative would be the eventual reconstruction of the whole ship. In which case the historical interest in the ship would be lost. Other wooden ships, which are preserved outdoors, are proof of this.

References:

The Marine Archaeological Archives at the Swedish National Maritime Museum.

Motions to the Swedish Parliament on salvage

Early paddle steamers at port in Lake Mälaren in Stockholm. The steamers shown are of the early type to which the E. Nordevall belonged (Illustration of the shares of a company managing this seafaring).



Since the 1993/1994 parliamentary session the liberal MP Karl-Göran Biörsmark of Östergötland county has presented a series of motions to the Parliament proposing that the government should support an investigation of how the E. Nordevall might be salvaged, preserved and displayed in a museum. Mr Biörsmark made the case that E. Nordevall is a high value and world-class monument of the history of industrial technology. He went on to say that the E. Nordevall is well preserved because of the fresh water in lake Vättern. Nowhere else exists a completely preserved steamship of the first generation. Even if smaller and not as old Mr Biörsmark compared the E. Nordevall to the Vasa.

In the Parliamentary year 1994/1995,

Mr Biörsmark described further the interpretation of the ship's value: for example that steam was the first modern kind of energy, which powered the industrial revolution. How steam ships made it possible for ordinary people to travel and also created the basis for a modern transport network. Biörsmark suggested that nothing better suited the spread of knowledge and interest than to be able to see the real thing. The parliamentary motion in 1994/95 petitioned that the government should take action on the salvage of the E. Nordevall and its future preservation in a museum.

In the motion to the session of 1999/2000 Mr Biörsmark also referred to the Swedish National Maritime Museum's statement that if the ship was exhibited in a museum it would create an interesting example of ship building and the transport industry at the beginning of modern marine travel.

According to the motion the state should be the body to take the initiative and salvage responsibility. The motion was tabled again in 2000/2001.

In 2001/2 the Social Democrat MP Sonia Karlsson delivered another motion concerning the salvage of the E. Nordevall. Mrs Karlsson referred to earlier investigations and evaluations and proposed that Parliament should urge the government to offer state support for the salvage of the ship. She was of the view that the E. Nordevall was because of its historical importance a national responsibility.

References:

The Library of the Swedish Parliament.

The “Eric Nordevall II” – a full scale copy of the E- Nordevall

The Association “Forsviks Varv” (Forsvik’s Shipyard Assoc.) was in 1995 founded at the Forsvik Industrial Heritage (Forsviks Industrierminnen) with the aim of building a full-scale copy of the paddle steamer E. Nordevall with the name the “ Eric Nordevall II”. Great pains would be taken to construct the “Eric Nordevall II” as a historically true copy of the original, with the exception of certain modifications imposed by the safety regulations of the Swedish National Administration of Shipping and Navigation.

The reconstruction of one of Sweden’s first paddle steamers is being carried out in close co-operation with under water archaeologists, the Swedish National Maritime Museum and several other institutions concerned with Swedish cultural heritage. The goal of the *Eric Nordevall II Project* is to see once again an authentic paddle steamer in passenger service on the Göta Kanal, as well as on Lakes Vänern, Vättern and Mälaren and in so doing, present the public with a living example of cultural history from the period when Sweden’s modern industrialism was in its’ infancy.

The paddle steamer is being replicated at the Forsvik Industrial Heritage close by the town of Karlsborg at the western side of lake Vättern. For the reconstruction drawings are being used that are based on the survey measurements taken from the archaeological investigations of the ship. When the hull and superstructure are completed, the ship will be towed across Lake Vättern to the Motala Verkstad where its’ reconstructed machinery will be installed. This same Motala Verkstad is the company, which provided the original steam

engines for the original ship.

In 2003 the frames of the hull have been raised and the fastening of the boarding planks have begun on the Eric Nordevall II. Designs for the structural parts of the engines have been produced in Forsvik. The iron parts have been cast at different forges in the area, and collected at Motala Verkstad for the mounting of the engines.

A seminar was arranged in October 2000 at Forsvik to discuss aims and objectives of the reconstructed replica: should it be built as a modern tour ship or as a historically true copy of the original ship?

The proceedings of the seminar were later published in:

Hjulångfartyget Eric Nordevall II under byggnad och under ånga. Nossebro 2002 (ed. Carl Olof Cederlund).

In 2002 planning began on how the replica was going to be used when it had been launched and fitted. A sub-committee was formed, which had its first meeting in January 2003.

The main dimensions and building data of the “Eric Nordevall II”
Type of vessel: Side-wheeler steamship

Length: 28.6 meters (95 ft)
Beam: 6.5 Meters (22 ft)
Width of hull inside wheelhouses: 4.3 meters (14 ft)



The hull of the Eric Nordevall II after that all the frames have been put into position and fastened in the autumn of 2002 (Photo: Patrik Simonyi).



One of the four stands of iron for the engines of the Eric Nordevall II has been cast and is lifted out of its mould at the Mölltorp iron foundry (Photo: Patrik Simonyi).

Draught: 1.9 meters (6 ft)
Displacement: 150 tons
Propulsion: 2 side-lever steam engines of 17 hp each
Speed: 7 knots
Passengers: approx. 80
Wooden planking on 58 ribs of oak

(The hull dimensions vary to some degree to the ones of the original vessel, which is due to adjustments to present day safety regulations.)

References:
Cederlund, C. O. (ed.) 2002. *Hjulångfartyget Eric Nordevall II under byggnad och under ånga. Nossebro.*

New plans for the salvage in 2000



The Swedish ROV, the Sea Owl, which has been used extensively for the under water recording with video and still photography of the E. Nordevall (Photo: Carl Olof Cederlund)

- Time plan;
- Cost calculations.

The aim is to remove the iron and metal parts of the hull, including the engines, for special conservation treatment. The conservation is to be undertaken by specialist conservation institutions in Sweden. The way in which the ship is to be housed and exhibited permanently will be decided while the conservation is in progress [an estimated 5 to 10 years].

A non-profit-making society was formed in 2000 whose aim was to salvage and preserve the paddle steamer E. Nordevall - "Föreningen hjulångaren Eric Nordevalls bärgning" ("The society for the paddle steamer Eric Nordevall's salvage").

On the 1st December 2000 the Society requested permission to salvage the E. Nordevall from the Östergötland County Administration (Raä Dnr 321-809-2001). In the request the Society described the objectives: since the building of a full-scale copy at Forsvik in 1996 interest in the ship and the salvage of the original had increased. The aim of the society was to salvage and preserve the paddle steamer as well as to install it in a museum of industrial history, for example in the old Locomotive Production Hall, in the old premises of Motala Verkstad.

The Society's view was that in the

future the two Nordevall projects, would complement each other.

The society made the salvage request after consultation with among others The Swedish National Maritime Museums, The Östergötland County Museum, The Göta Kanal Company and the town municipality of Motala. The salvage and conservation project is to be financed by sponsorship. The archaeological work would require support from the state.

The salvage project plan

Attached to the request is enclosed a detailed plan showing how the different steps of the salvage are planned, from salvage through to conservation. The project plan covers the following:

- Administrative management;
- Technical management;
- The archaeological tasks;
- The salvage;
- The conservation;
- Alternatives for the preservation of the ship (the final housing of the ship);

The development from 2000 of the

salvage project

In a letter [18th March 2001] the chairman of the society for the salvage of the E. Nordevall, informed the County Governor of Östergötland about salvage planning and preparations. The letter also stated that a royal patron was being sought for the project and a national committee was to be formed to support the project. Additionally an administrative and technical management group was established at the site and a special sub-committee was formed to consider details of the final preservation of the ship and the museum.

The salvage request was by the county administration transmitted to the Central Office of Ancient Monuments, the Swedish National Maritime Museum and the Östergötland County Museum for consideration.

The Central Office in a report [22nd May 2001 -Dnr 321-809-20019] appreciated and supported the effort to

salvage this very valuable shipwreck and to exhibit it thereafter. However permission was still conditional on full financial provision for the complete project before the work is started, including archaeological work before and after salvage, and conservation. Uncertainties about how the ship is to be stored and exhibited after the salvage had also to be resolved.

The Swedish National Maritime Museum [27th March 2001 *Dnr 198/01-51*] stated that they had no objections to salvage under the same conditions, which had been given by the Central Office (see above). The museum was prepared to assist the association with cost calculation for the archaeological work associated with the salvage.

In the judgement of the application for the salvage of the E. Nordevall,

given by the Östergötland County Administration 2001-07-03 (*Dnr 220-558-01*), it states that the ship is of high cultural and technical historical value, because it is of the first generation of steam ships. The administration agrees to the statement that the ship has to be preserved one way or another for the future. It would also be of a great value if it could be exhibited and shown to the public.

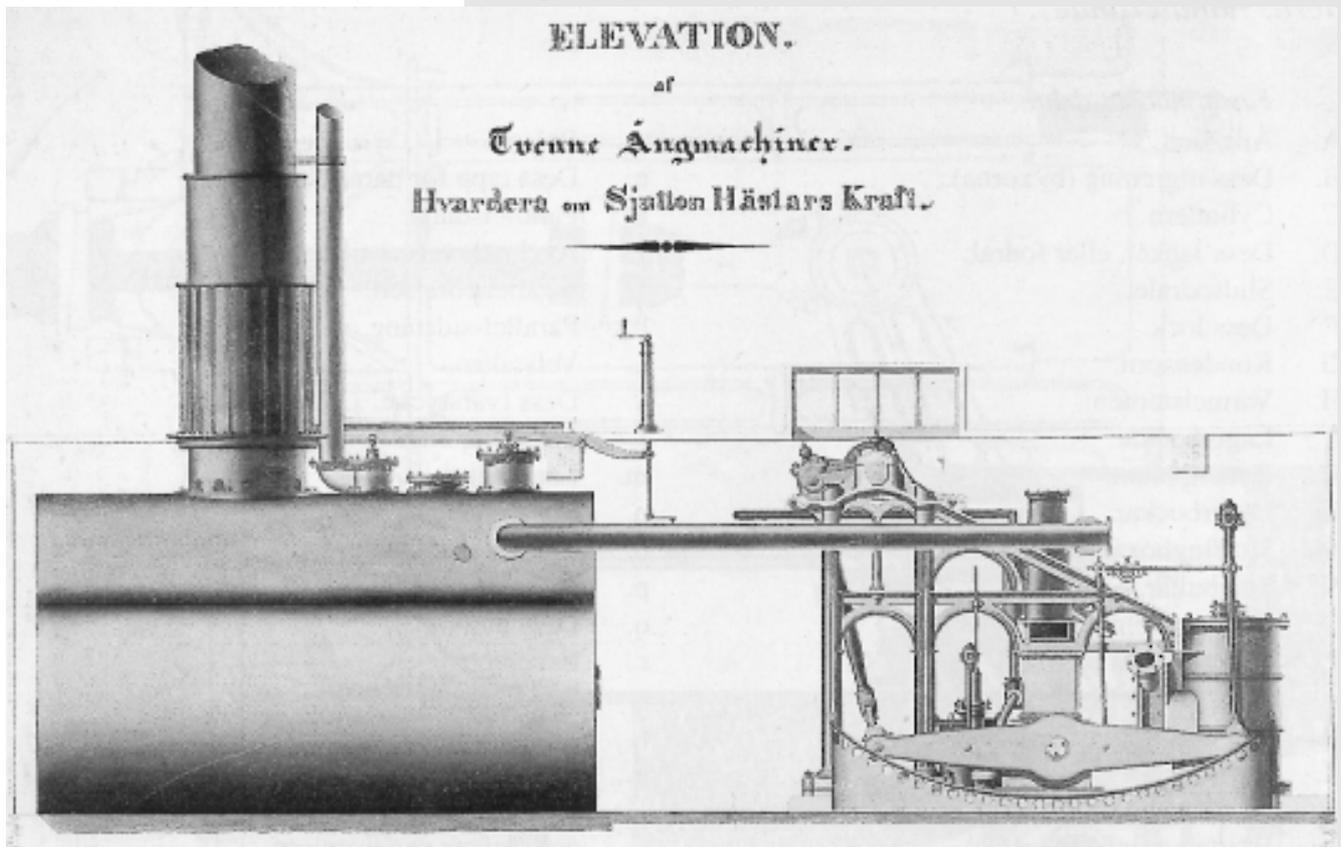
The country administration supported the concept of salvage but would not give a permit until the conditions set by the Swedish National Maritime Museums and the Central Office of National Antiquities were fulfilled.

References:

The Archives of the department of the Care of Ancient Monuments of the

Östergötland County Administration, Linköping; The Archives of the Central Office of National Antiquities; and The Marine Archaeological Archives at the Swedish National Maritime Museum.

The five construction plans of the side-lever engines of the E. Nordevall have been preserved and today belong to the Swedish National Maritime Museum. Here shown is an elevation of the engines and the boiler (Photo: The Swedish Maritime Museum).



Observations on the deterioration and damaging of the wreck, since its localisation

General aspects
The identification of depredation to the wreck of the E. Nordevall is based on divers observations, and comparisons with early surveys, still photos, film recordings with hand camera and ROV and the present condition.

When the wreck was located in 1980 it was festooned with fishing nets, ropes etc. caught by the ship on the bottom. Several times [for example in 1986] debris had been cleared away, but over the years new debris had accumulated. This meant fishing and other activities continued over the site. Fishing equipment not only

became snagged by the wreck, but also tore loose structural parts. For example the gaff, which earlier was resting on the fore deck had been removed to the bottom a short way from the ship (see the following).

The ongoing corrosion of iron in the hull is substantial, which has the effect that screws, nails and bolts simply rust away. Lighter constructional details thereby come loose and fall away.

A light current exists in the area. An indicator of this are the erosion pits in the bottom sediments, caused by the currents around the wreck and other bigger objects on the bottom. The current may also have carried smaller, loose pieces of the ship's structure away.

Finally there are examples of diver intrusion and depredation. This is particularly evident below deck, which is protected against currents and fishing damage. Examples of such damage are that the stairs down to the cabins in the stern has been removed, a cupboard demolished in the captain's cabin as well as the bulkhead between the fore saloon and the engine room which has been torn down.

It should be mentioned that no more windows and portholes have been broken since the early survey of the ship. The present situation is that of the ten larger glass windows in the cabin, four were missing or broken at an early stage, the others are intact.

The privy in the wheelhouse on the port side. This wheelhouse was relatively intact at the localization of the E. Nordevall, but has later been demolished. (Photo: Kent Hult).



The superstructure

The early survey shows that the compartments forward and aft of the wheelhouses were partly torn down, with the exception of the one forward of the wheel on the port side, housing the heads, which was nearly intact, except for the roof. Today all this is demolished.

The doghouse for the stairs down to the cabins and for the cargo hatch has lost the roof and hatchway lids. The combined binnacle and skylight on the aft deck has been partly demolished.

Loose construction parts lying on deck

Mid ships there was a scattered pile of planks consisting mainly of parts of the wheelhouse. Although planks and boards have been added to the pile from compartments of the wheelhouse, the pile is still getting smaller as wood is taken. For example the long planks, which once may have constituted the bridge, are not possible to locate any more. It is possible that some of this material has moved to the lakebed, but on a recent survey little could be found.

The davit on the port side at the stern had been lying on the deck and is now missing. The starboard davit, which had been in the right position is now torn loose and lies at the steering position.

Hull construction

The structure supporting the figurehead is now missing from the starboard side. One stanchion supporting the figurehead has partly been loosened from the hull.

The gates in the openings in the safety rail on the aft part of the port side were in position but are now missing. The gates on the other openings have been missing since the recording of the ship started. No changes have been observed to the

state of the hull itself.

Other constructions and artefacts on deck

The funnel, which was standing supported by stays, may have lost some of its height. The upper part is since the localization lying on the deck aft of the funnel towards the port side. A diving line damaged the vertical safety valve during work in May 1990. This copper tube (diameter 2-3 inches) has been bent down to deck level and now points forward. One of the brass tips, which was on the ships steering mechanism, is missing. The handle itself is manufactured of iron and is heavily corroded. The mast is intact. The gaff, which earlier was lying on deck, was carried away from the ship and later relocated and salvaged (see the following). Several metal and ceramic artefacts lying on deck and recorded in early photo documentation are now missing.

Constructions below deck

In the fore saloon the fixed benches are more dilapidated than earlier. The legs of fixed tables are gone. The aft bulkhead of the saloon towards the engine room has been demolished. A big number of empty (return) soda water bottles stored in this saloon have all been taken away illegally. The stairs going down to the cabins in the stern part of the ship has been tossed stern wise and is blocking the corridor between the cabins. The cupboard in the captain's cabin has been demolished. Damage has taken place to many detailed parts of the interior for example the carafe holders in the aft saloon have been partly demolished.

Conclusion

The natural environmental deterioration processes have been accelerated by human activity since the wreck of the E. Nordevall was

rediscovered. Partly this process is inevitable, in spite of the unusually good conditions in lake Vättern, which has enabled the wreck of E. Nordevall to survive. It is on the other hand no brave statement to say that unauthorised diving on the wreck, before and after the diving ban, has accelerated the demolition. According to a letter to the county administration from the Swedish National Maritime Museum the demolition of the ship has continued after the introduction of the ban [16th October 2000; Dnr 506/00-412].

The safeguarding of the E. Nordevall since its localization

Law protection

The Swedish Heritage Conservation Act automatically protects the vessel because it was lost more than one hundred years ago.

The law in question states in its introductory provisions that "the care and preservation of our cultural environment is a matter of national concern. All share responsibility for this. Both private persons¹ and public authorities must show consideration and care towards the cultural environment. Anyone who plans or carries out work must ensure that damage to the cultural environment is, as far as possible, avoided or limited." In chapter 2, Ancient monuments and remains, and ancient finds, Section 1, the law states, "Ancient monuments and remains are protected under this Act." Under point 8 in the same section it says that this applies to "shipwrecks, if at least one hundred years have presumably elapsed since the ship was wrecked." The E. Nordevall was lost in 1856 and so is classified as an ancient monument and protected by law. The wreck has since its discovery in 1980 been subject to a series of measures by the authorities responsible for the protection of ancient monuments. The most important of these has been the decision in 1999 by the Östergötland county administration to establish an anchoring and diving ban, because of the damage caused by persistent diving on the wreck site. This is an unusual measure in Sweden, which has been imposed on only a few old shipwrecks of unusual historical value. Other safeguarding measures have also taken place since the ship was rediscovered:

Safeguarding measures

During 1981 and 1982 the Central Office of National Antiquities following

discussions with the Swedish National Maritime Museum gave permission to the Canal and Seafaring Museum in Motala for the salvage of the wooden nameplate, the steam whistle, and a few smaller objects from the wreck.

In a letter dated 11th August 1982 to The Swedish National Maritime Museum the Motala museum society of local history (Motala Musei- och Hembygdsmuseum) suggested that the engine and boiler (not salvaged from the wreck) could be displayed in the Motala Verkstad Museum of Industrial History. These would be displayed in context because they had been constructed at Motala Verkstad and would fit very well in the collection in the old Locomotive Production Hall (Lokhallen). This hall was planned to house an exposition

of the collections of the Motala museum (SSHM Dnr: 1982/1525). 1982-10-14 (4437/82). The Central Office of National Antiquities in a letter to Motala Musei- och Hembygds-förening (The Society and Museum of Local History in Motala) stated that it was not the intention to recommend further salvage from the E. Nordevall. The Office suggested that further investigation of the site should be restricted to a non-disturbance survey of the wreck.

The Östergötland County Administration in cooperation with the Central Office issued the necessary permissions for the investigation and recording

done on the ship during 1985-1988. Reports of the same were produced by the project and delivered to the authorities mentioned (Cederlund 1989).

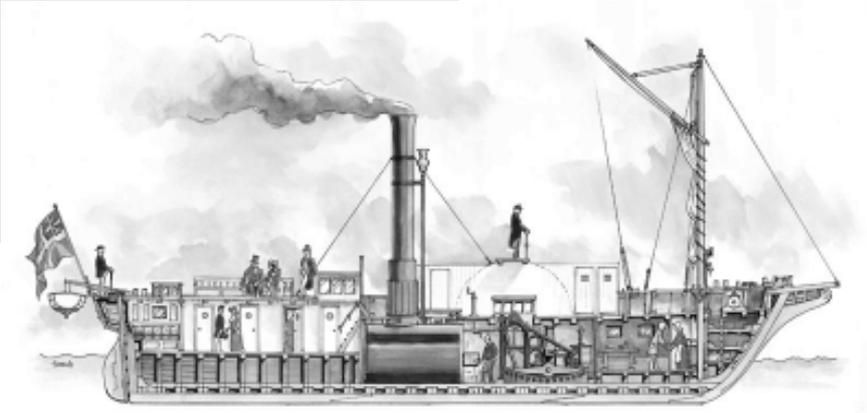
During 1990 and 1991 the Östergötland County Administration had a central role in the planning and investigation of salvage, excavation, preservation and exhibition of the E. Nordevall, which was performed within the special investigation group established for this (See section about salvage in 1991-1992 above).

In 1996 the gaff and other objects were removed from the ship. The removed objects were later located near the site and salvaged.

The Swedish National Maritime Museums in a letter [5th December 1996] to the Dept of the care of

The wreck of the E. Nordevall on the flat bottom of deep Lake Vättern (Painting by Reinhard Grosch).





Length section showing a reconstruction of the interior of the E. Nordevall (Drawing by Reinhard Grosch).

ancient monuments at Östergötland County Administration pointed out the ongoing deterioration and unauthorized interference to the E. Nordevall and asked for special protection for the site. Again The Swedish National Maritime Museum wrote [4th June 1999 -360/99-411] to the Östergötland County Administration recommending that the wreck and site should be protected by a diving and anchoring ban. The main reason for this was that the museum had been monitoring developments at the site since 1980, and was aware of extensive deliberate disturbance and

damage to the same. The Östergötland County Administration [17th August 1999- 125-4403-99] stated that the gaff had been salvaged and would be returned to the site. As a result the Board made the decision to ban anchoring and diving on the site. The reason was unauthorised diving on the wreck site and consequential damage.

The administrative board of Östergötland County Administration received a request for permission [16th January 200- 220-558-01] to salvage the paddle steamer E. Nordevall from "Föreningen Hjulångaren Eric

Nordevalls bärgning" [The society for the salvage of the paddle steamer Eric Nordevall] [see section above on salvage plans in 2000].

During 2001 and 2002 the Östergötland County Administration a few times have given special permission for a skin divers' group to dive at the E. Nordevall in order to record the same. According to the report given by the group 2002-03-01 one had performed six diving operations in order to film and photograph the same.

References:

The Archives of the department of the Care of Ancient Monuments of the Östergötland County Administration, Linköping; The Archives of the Central Office of National Antiquities; and The Marine Archaeological Archives at the Swedish National Maritime Museum.

1 Any reference to 'person' in this translation refers, where the context permits, to both natural and legal persons.

The paddle steamer "E. Nordevall" in the European Community Culture 2000 Programme MoSS.

The paddle steamer "E. Nordevall" has been chosen as the Swedish case for study in the under water archaeology project within the European Community Culture 2000

Programme: "Monitoring, Safeguarding and Visualizing North-European Shipwreck Sites: Common European Underwater Cultural Heritage – Challenges for Cultural Resource Management" (MoSS). The Swedish partner in the project, The Södertörns högskola (University

college) and professor Carl Olof Cederlund, will study the conditions, options and alternatives to preserve and visualize the paddle steamer "E. Nordevall" historically in society - today and in the future.

The paddle steamer E. Nordevall (1837-1856) and the future



The characteristic silhouette of a paddle steamer- the Cometen - passing the locks at Södertälje in 1840. This is a view of the Swedish coast and lake landscape that has not been seen for several generations. The Cometen was of the same type and size as the E. Nordevall (Water colour by Jacobina Swartz 1840).

The information we have today of the paddle steamer E. Nordevall is based on extensive under water recording, which has been done at a depth of 45 metres, with still camera to produce a photo mosaic supplemented by a video record. Additionally we have a hull survey, a horizontal projection plan and one side view of the ship in its existing state of preservation.

A full-scale replica – the Eric Nordevall II – is at present under construction and will be launched in a few years to be used to carry passengers on routes the original ship used along the Göta Kanal and in lake Vättern. This replica of the paddle steamer will be as true to the original ship as possible. The replica will be driven by steam engines built from the original plans. The ship replica will make it possible for people today

and in the future to experience the environment and life onboard one of the first passenger steamers in Sweden.

The Swedish Ancient Monuments Act protects the original paddle steamer as it foundered more than one hundred years ago. The site has also since 1999 been protected by a diving and anchoring ban. It has all the same since its discovery deteriorated. The hull of the vessel is still more or less intact. Since 1980 parts of the superstructure have been damaged and the interior partly demolished. Several parts of the vessel itself, for example the gaff, have been taken away from the ship, which also is the case with many artefacts originally belonging to the equipment of the ship. Fishing trawls may have created some of this destruction, but divers visiting the site have evidently done some of it. Damage to the interior of the ship can for example hardly have been done in any other way. This

destruction is a worrying fact seen in the perspective of the historical value this vessel is given by society and which has been illustrated in this newsletter.

What is the future of the paddle steamer E. Nordevall? It is today a well-documented and highly valued cultural asset, which is connected to the history of the early 19th century of Sweden. This is an eventful and dramatic period in which the qualities, which this ship represents, played an important role.

Three alternatives

There exist, broadly speaking, three possible alternatives to deal with the E. Nordevall for the future:

1. Not to do anything with it, but maintain the protection of the Ancient Monuments Act and the diving and anchoring ban.

2. To preserve it in situ in Lake Vättern

by active safeguarding, monitoring and by visualizing the wreck site for the interest of the public above the water.

3. To salvage, conserve and preserve it as part of a museum exhibit.

These three alternatives raise a series of questions, when the potential and the uncertainties connected to the different alternatives are examined. It will not be possible to either fully present or solve these alternatives and questions in this short text. Several of them need thorough investigations, of for example technical or chemical nature, before they can be answered and realised. The main aim here is to try to clarify how the E. Nordevall might be preserved under the different conditions of the three different alternatives.

Let us take the latter in the order they are presented and discuss some aspects of the same:

Today's situation

1. No other action is taken for the protection of the paddle steamer other than the one created by the Ancient Monuments Act and the present diving prohibition:

If the ship is left in situ without any special protection or safeguarding or salvage it will successively deteriorate. This will supposedly mean that the superstructure, the wheels and parts of the interior, such as the engines, will be destroyed. The hull will stand more or less intact for a longer time, if nothing drastic happens to it. In this alternative the ship as an ancient monument will in the foreseeable future lose the unique, cultural value it has today in Sweden as a first generation intact steam vessel.

On site preservation

2. The vessel is preserved in situ by active safeguarding and monitoring. It may also be visualized for those who cannot visit the site:

Initially a decision has to be made about the state of preservation the E. Nordevall should be maintained in, if it is preserved on its site. Planning will depend upon the decision made. Scenarios could for example be created depicting the state of preservation of the paddle steamer E. Nordevall in 50, 100 and 150 years time, in order to show the effects of the deterioration process on the ship under water.

Main questions; is it possible technically and financially to:

- Restore it under water
- Monitor and safeguard it in situ
- Visualize it for divers and also for the general audience on land

Safeguarding and monitoring

A safeguarding and monitoring program should be developed for the site to investigate the impact the environment has on the site of the E. Nordevall – to forecast the deterioration over time. This applies both to naturally occurring conditions and human interference. This would mean continuous sampling and data logging at the site and on the ship, taking in environmental data on the former, and evidence of deterioration on the latter. This should be done by similar techniques as those, which have been developed for the MoSS project. This data should be gathered permanently if the ship is to stay on site.

This monitoring should include sampling and analyses of the state of the wood in different parts of the hull and the separate metal components. The engines would need careful monitoring to understand the impact on the iron of the ship. It is in this context important to investigate

the condition of the cell structure and the strength of the wood. The integrity of different parts of the hull such as joints will need constant monitoring. The same applies to the non-organic parts of the structure such as paddle wheels, engines, boiler, windlass and funnel. This monitoring should be done in a regular programme. These measures would also have to be undertaken in preparation for salvage of the ship [see below under point 3]. The regular monitoring should also record the damage done by fishing, anchoring and unauthorised diving on the site. This can be done by regular inspection. It could also be arranged through optical supervision of the site with special monitoring systems such as CCTV, if this can be done in a practical and safe way.

Visualisation

Another issue of interest is the possibility of visualizing the E. Nordevall for the interested land based audience, who cannot see the site. It would mean that cameras would have to be located on site in secure housings of such a construction that they cannot be demolished or taken away illegally.

Still another important issue in this context is the question of the granting by the authorities of permission to dive on the site. Today there is a diving ban but the county administration does license dives with the condition that the divers record what they have seen of the site and deliver the documentation to the county administration afterwards. It is important for the protection of the ship and the site that this diving ban is upheld in the future because of the damage to the site before the protection was introduced in 1999.

It seems reasonable to permit controlled diving on the site, if the result is good information about site conditions. The ideal would be if such

diving arrangements could be monitored by either the county administration or county museum through one or more under water archaeologists who would accompany the divers. Such arrangements should be organized so, that the monitoring archaeologists could introduce the divers to the history of the ship, the under water recording etc. through lectures, videos or written information material.

Protection measures

For some sites it is possible to provide the hull with physical protection. For wrecks on soft sand or silt where they have been buried and are more or less level with the bottom surface a system of covering the site with gauze and sand has been developed. Such measures are not possible on sites like the E. Nordevall; the hull still is intact and raises several metres above the lakebed. This condition is not uncommon in waters like the Baltic Sea and in fresh water where conditions may preserve the ship uniquely well through time. In these cases other protection strategies have to be developed (see the following list of possible safeguarding strategies to investigate and take).

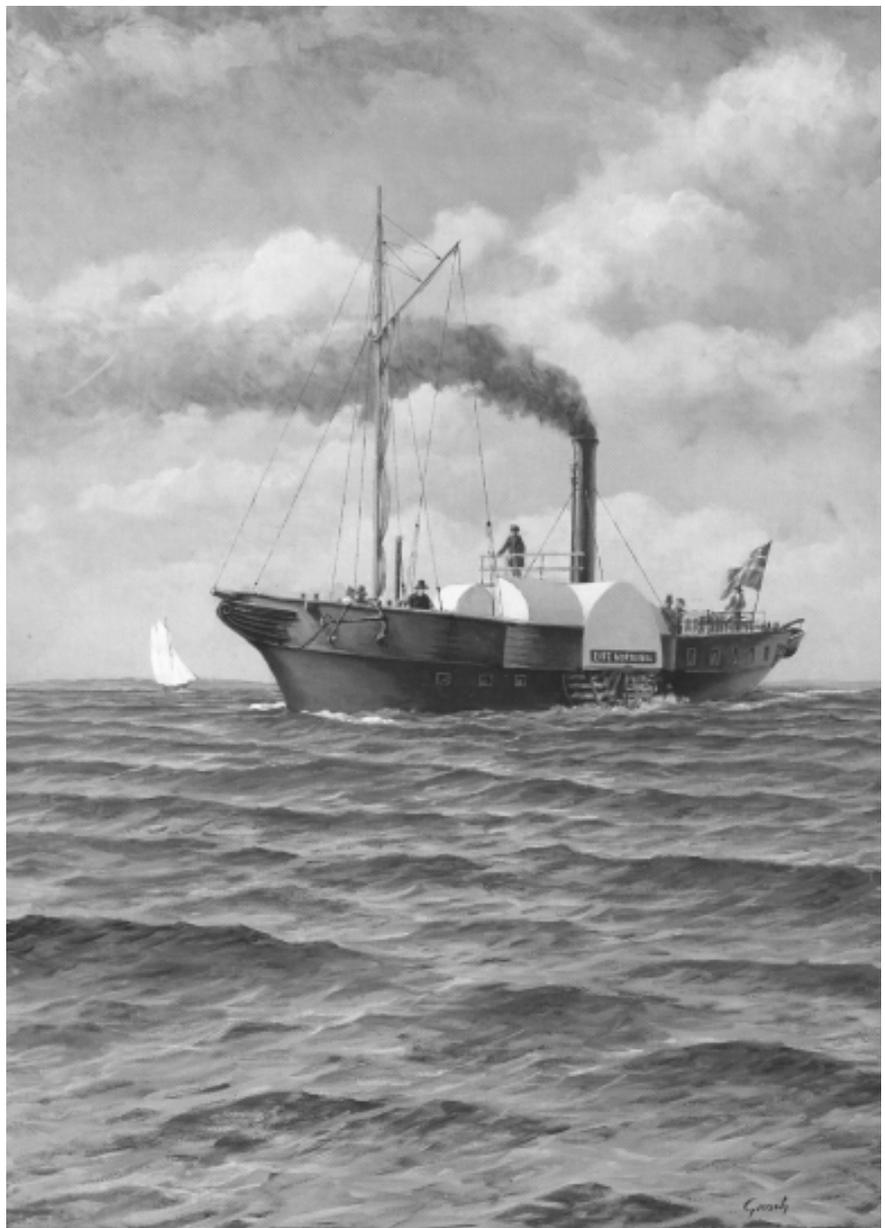
There are a number of measures that could be taken to preserve and visualize the E. Nordevall under water, for example through:

- Continuous camera surveillance
- Continuous radar surveillance of Lake Vättern at the site
- The closing of the openings in the hull to hinder destruction by diving of the very delicate structures and conditions inside, for example the engines
- The removing of loose parts of the

hull and its fittings to store the same in a safe way, for example in a closed, heavily built box on the bottom near the hull

- The ferrous components of the ship particularly the engines and wheels could be protected by electrolysis
- One important characteristic of the

ship is that it is still intact, with the funnel and the mast standing. This makes it impossible to cover the ship as is done for wrecks, which are more decayed. So alternatives have to be considered to preserve intact hulls, like the E. Nordevall. One alternative may be the building of a transparent, water filled dome over the hull, which would protect it from interference but



Painting showing the E. Nordevall in reconstruction under steam at lake Vättern. (By Reinhard Grosch).

would allow visual monitoring of the environment around the ship. This alternative, which may seem futuristic, might not be so in a generation or two. It can be realized in different ways, which have to be investigated. It would give visiting divers the possibility to visit and study the ship without risk to the structure. It would make it possible to install lights to improve visibility. The ship could also be restored on site within the dome, by replacing some loose pieces of the structure found on the site. This is also a futuristic idea today, but perhaps not tomorrow.

-Another visualization idea would be to organize supervised diving trips to the site. Such visits could be coordinated with courses in wreck management taught at a centre for this (see below), perhaps including a formal examination. Such monitored diving on the site should be done with one or more professional under water archaeologists as diving guides.

-Finally CCTV could continuously monitor the site, either as it is, or under a water filled dome. Such "real time" transmission could be used both in a museum display about the ship and for surveillance of the site.

The salvage alternative

3. The vessel is salvaged, conserved and exhibited in a museum:

The salvage, conservation, preservation and exhibition of the E. Nordevall has been discussed and planned for to a considerable degree since the ship was located in 1980. In the early diving operations in the 1980s personnel from a salvage company were involved in investigations. Great interest has been shown by institutions in Östergötland, and also by members of the Swedish parliament in salvage. The tourism potential of a museum

for the E. Nordevall has been underlined.

A complete salvage of the vessel demands big financial resources, as does the long term conservation and display of the ship. Will it be possible to mobilize such resources? One of the conditions put by the Östergötland County Administration for salvage is that all necessary funding for salvage, conservation and the museum must be in place before the project is started. This might be a difficult aim to reach, not least because the financing of several of the phases in such a treatment is difficult to plan and calculate the cost for.

As an alternative to complete salvage, should part salvage be considered, for example of the engines? Such partial salvage has been performed on other sites, for example on the wreck of the British paddle steamer Xantho on the Australian west coast in 1983-1984 (McCarthy ed., p 179 f). The engine of the Xantho was raised. Recently also the gun turret and the engine of the American battle ship The Monitor were salvaged. The aim for such partial salvage is to conserve and exhibit the parts salvaged while the rest of the vessel remains on its site.

The conservation issue

The raising of the complete E. Nordevall and its loose components, as well as the excavation of the ship should be no bigger problem technically or archaeologically. However of a special interest will be *the question of the conservation of the vessel*. If it is salvaged, is it advisable to preserve the wooden parts of the E. Nordevall with polyglycol? This question should be viewed in the context of the recent experience of the effects of sulphur in waterlogged wood and the transformation of the sulphur into sulphuric acid, when conserved with

polyglycol. In this process among other things the polyglycol and iron parts in the hull play an active part as chemical agents.

An example of this is the Swedish warship Vasa [1628], the hull of which is deteriorating due to the influence of the sulphur turning into sulphuric acid in the wood (Fors 2002). The E. Nordevall may be even more vulnerable to sulphuric acid if polyglycol is used for conservation because it is built with and contains much more iron than the Vasa. If polyglycol is to be used to conserve the hull all the metal in the ship would need to be removed, bigger and smaller parts, including all bolts and nails, which would be complicated and expensive. One important task in the preparation for salvage and a conservation of the E. Nordevall must be to sample and investigate the amount of sulphur in the wood. It might be the case that it contains much less than wrecks in more polluted environments.

However the question has to be asked, if the sulphur problems of the Vasa have not been solved, is it realistic to salvage the E. Nordevall? Perhaps there is an alternative: Maybe this is the end of the use of polyglycol for conserving old ships of this character, with sulphur contamination and the reaction with iron fastenings etc in the hull? Before the E. Nordevall is salvaged a proven and tested alternative would have to be available.

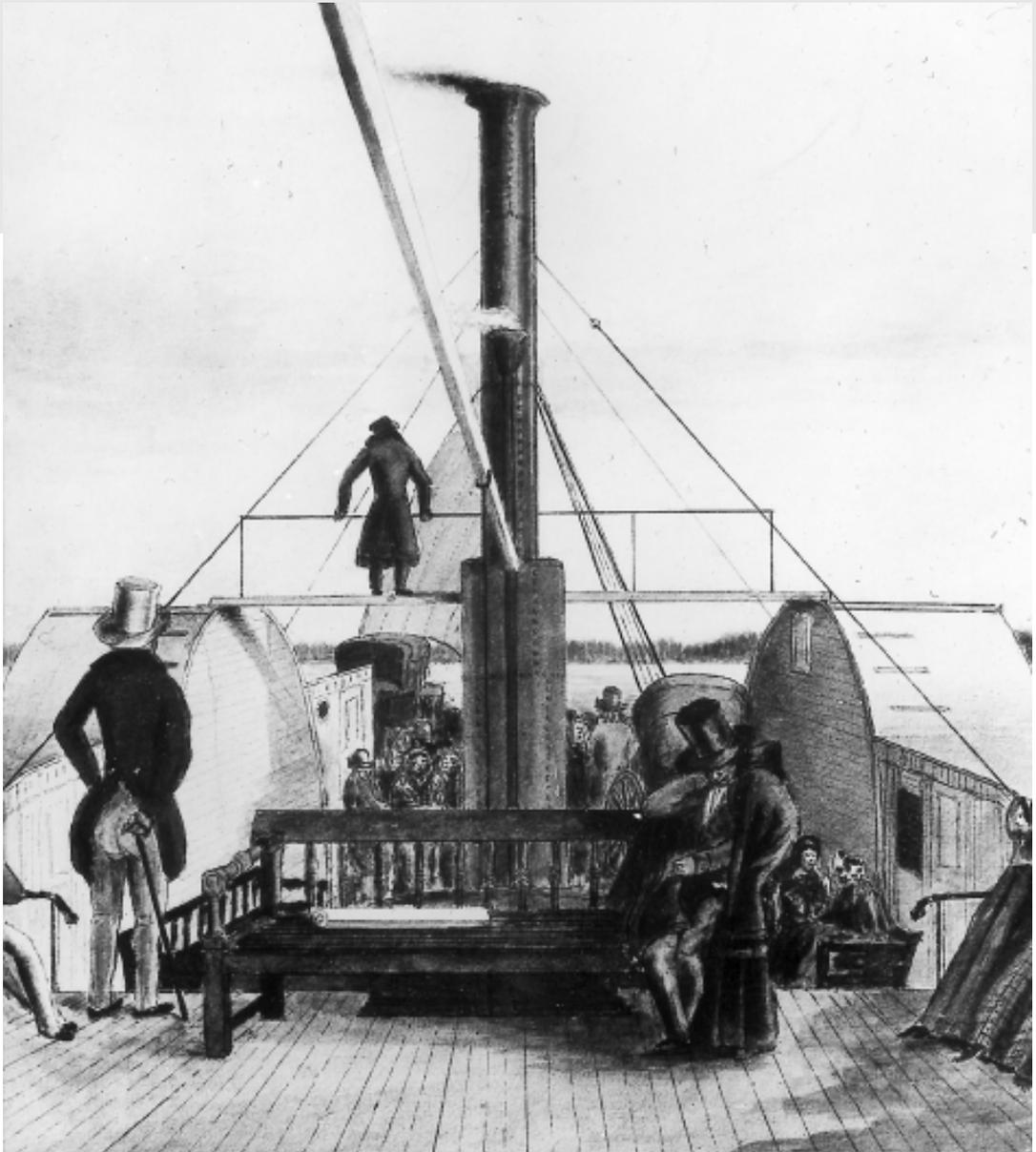
Another possible alternative exists which would be to salvage the E. Nordevall and let it *be subject to controlled air drying*, as for example in the case of the 17th century pinasse in Ketelhaven museum in Holland (Cederlund 1983, p 114). This would mean that it would not be necessary to perform a proper conservation treatment, which in its turn would make the process less

costly. The wood would not be impregnated with polyglycol or any other preservation agent. Such a drying could also be done while the ship is on exhibition in its museum premises, which means that it will be available for the public more or less directly after the excavation of the ship.

In order to perform such a controlled air-drying process the state of the wood will have to be analysed to calculate the amount of shrinkage that will take place. It may be assumed that such treatment would be easier to apply on the wooden hull of the E. Nordevall, compared to such older ships in which the wood has degraded more. The freshwater, relatively calm, natural environment on the bottom of Lake Vättern might mean that the wood in the hull has degraded less than in

areas, such as in the Baltic or in salt water environments.

A controlled drying out process also does not need so much after-treatment as conservation with polyglycol or any other agent, which further reduces costs for the preservation of the ship. If such an alternative is considered one must still remove bigger iron and metal parts in the hull to conserve them



A watercolour by J. Schultz from 1843 shows the main deck of the Wikingen seen from cabin deck. At the former one can see the throng of passengers together with two horse drawn carriages.

separately.

The problems of conserving large composite finds such as the E. Nordevall, with many different types of material in the construction, have still not been satisfactorily solved. The conservation of bigger iron objects such as the engines also has to be considered carefully. According to the video and photo recording of the engines in the E. Nordevall these

have little or no concretions, which is also the case with the iron parts of the paddle wheels. This means that it will not be difficult to clear these parts of the ship from oxidation crusts after salvage, which should be the first step in the iron and metal conservation.

Conclusions

The E. Nordevall has been chosen as

the Swedish wreck for treatment and discussion within the MoSS project as a basis for the development of a "management plan" for this and similar shipwrecks for their long-term preservation. Such a plan has to consider and integrate possible ways to preserve the ship for the future. Today it seems that no effective plan exists to preserve the E. Nordevall whether it is left in situ or salvaged. Until such a plan is agreed and funded the ship must be safeguarded as well as possible on the bottom of lake Vättern. A management plan has to be developed for this situation. This would be the case even if it were to be salvaged for preservation in a museum in the future. Without such a plan the uniqueness of the E. Nordevall will be degraded or lost and then there will be nothing to preserve either on the site or in a museum. Just as interesting as salvage, is the question of how a well-preserved, old ship and its history can be visualized underwater. This idea points toward a future in which man is more integrated in the under water world and its different kinds of environments. This will involve research into diving techniques as well as making the underwater world more accessible. It is also pointing to new ways to introduce history and archaeology to the general public. Maybe in a few generations salvaging ships for visualization will no longer be considered? Maybe it will be possible to preserve them in situ and make them accessible for both those who dive on the sites and by virtual representations of the ship for those above water or on land. Virtual techniques are progressing rapidly and make such things feasible already.

A preservation centre

As the ship has an unusual historical value, agreed by all parties, it would

perhaps be more useful to start by working for *the development of a centre at Lake Vättern for the monitoring, safeguarding, visualization and salvage of the E. Nordevall*. Such a centre could include several activities for the preservation of the E. Nordevall and also several means to visualize it for the general public. The main aim for this centre would initially be to campaign for the preservation of the original ship on the bottom of lake Vättern. If this is not done the whole historical value of the ship will lose its meaning. The centre might be made a centre for the development of strategies generally for the monitoring, safeguarding and visualization of well-preserved old shipwreck sites, as important ancient monuments. One important objective for such a centre would also be to work for sponsorship for the project. It should also work for the visualization with different means of the wreck under water, and in the shape of the replica being built at the Forsvik Shipyard. It can also be done through different kinds of exhibitions at the centre. The centre should finally work for the development of a reliable conservation technique for vessels of this type, if or when the ship is salvaged.

One may also in the same centre arrange teaching and training by professional under water archaeologists on preservation management and technology for important shipwreck sites, resulting in an examination at university level. It could be connected to a university teaching and training in under water archaeology.

The idea and organization of such a centre located on the shore of Lake Vättern may be included in the initial management plan of the E. Nordevall with the aim of preserving the ship as it is, either if this is the permanent location or if it is salvaged.

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McCarthy, M. (ed.), Iron ships & steam shipwrecks. Papers from the first Australian seminar of the management of iron vessels & steam shipwrecks. (ISBN 0 7309 15212)

This chapter is also based on information on the matters discussed which have been received from several Swedish and international scholars and specialists in the subject, as: Dr Michael McCarthy and Dr Ian Godfrey, The Maritime Museum of Western Australia; Dr John Broadwater, The Monitor Project, Newport News, USA; Former BBC producer Ray Sutcliffe, Hampton Wick, UK; Senior Lecturer, Dr. Jon Adams, Dept. of Archaeology, Southampton, England; Ingrid Hall-Roth, Head of conservation, The Vasa Museum, Stockholm; Bengt Häger, Head of Dept of the care of ancient monuments of the Östergötland County Administration; The staff at Forsvik Shipyard Association: Director Lars Bergström, project manager Bengt Breeding, reconstruction specialist Reinhard Grosch and master shipwright Patrik Simonyi.

Meetings:

The project meetings are staged for discussion within the project and are mainly held for and by the representatives of the different nations in the project. At the meetings the partners discuss the project, its general aims, the development and planning of the different themes within the project. The different themes may also be discussed in sub groups. Practical and scientific questions are discussed and the project progress and methodology is evaluated. The aim is to arrange two meetings a year, one in early March and one in November. Extra theme meetings have been held when required. Since the first newsletter was published one meeting has been held in Schwerin in early November 2002 following the open project seminar and two extra monitoring project meetings were held in January 2003 one in Portsmouth and one in Helsinki. A regular meeting was held in March in Stockholm. The next meeting will be held on June 29 following the June 27 and 28 open seminar in Sweden. This meeting was originally scheduled for autumn of 2003.

Seminars:

Maritime archaeological scholars, experts and practitioners from around the world are invited to these open seminars to hear and discuss progress and evaluation of the project themes. Two more seminars are scheduled, one has already been held.

The first open seminar was held in Schwerin on November 10 2002 on the theme of "*Documentation of Shipwreck Sites and Photogrammetry.*"

The second seminar will be held at the Vasa Museum in Stockholm the 27th of June and at Forsvik Shipyard Association, Karlsborg, on June 28 2003. To discuss "Visualization of Shipwrecks and Shipwreck Sites." It is to be arranged by Södertörns högskola (University College), The Maritime Museum of Finland, Helsinki, The Swedish National Maritime Museums / The Vasa Museum, Stockholm, and The Forsvik Industrial Heritage / Forsvik Shipyard Association.

The third seminar will be held in Portsmouth, UK, during June 3rd to 6th 2004, on the theme of: Monitoring, Safeguarding and Management of Ship Wreck Sites. More detailed information will be available in spring 2004.

Publisher:
The National Board of
Antiquities
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M&S newsletter

Published quarterly with the support of the Culture 2000 Programme of the European Union