



THE ÞINGVALLAVATN WRECK

An underwater archaeological assessment
of the remains of a boat wreck in Vatnsvík, Þingvallavatn, Iceland

Wreck survey
Þingvellir National Park
Iceland

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Cover image, front: Drone photo of the wreck site in Þingvallavatn taken from the south. The image in the centre of the picture is showing the wrecksite at the bottom of the lake. Photo: Dr Kevin Martin & Jens Lindström/NMG.
Cover image, back: The wreck site at the bottom of Þingvallavatn. Photo: Jens Lindström/NMG.

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SUMMARY

On September 7th, 2022, marine archaeologists Dr Kevin Martin & Jens Lindström from Nordic Maritime Group (NMG) undertook a non-invasive underwater archaeological assessment to investigate the remains of a potential historic boat wreck situated on the northern shore of Þingvallavatn. The assessment was conducted on behalf of Þingvellir National Park (*Þjóðgarðurinn á Þingvöllum*) to assess the potential historical and archaeological character of the boat wreckage and advise the National Park in relation to the future management of the wreck site. As part of the assessment the wreck site was fully cleaned, surveyed and recorded using digital photogrammetry. The immediate area around the wreck was also inspected to determine if any other associated cultural remains were present within the vicinity.

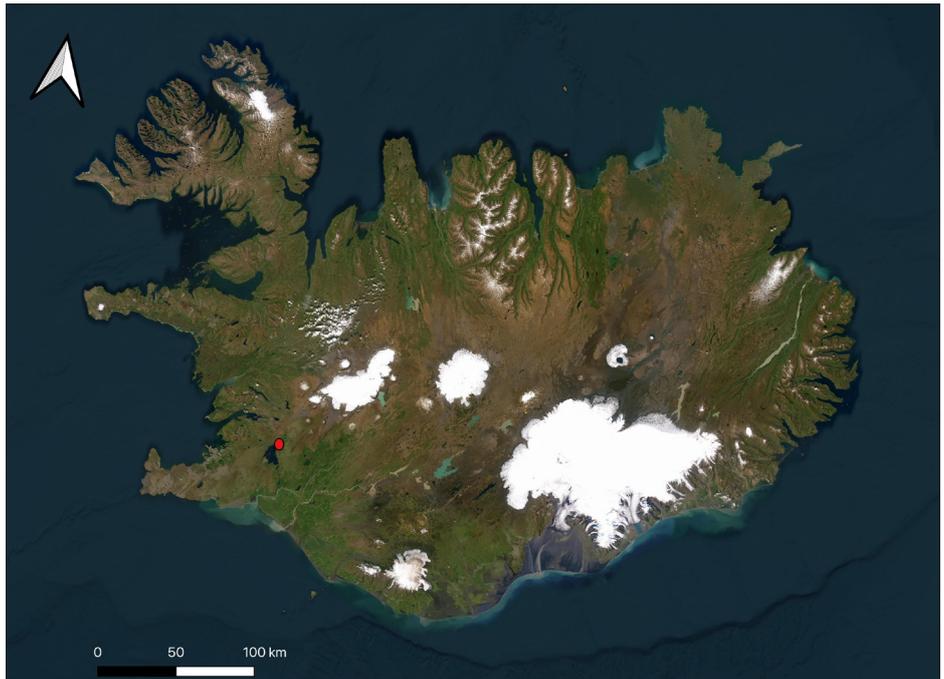


Figure 1. Location map of the wreck site within Iceland. The red dot marks the site. Map: Google Earth.



Figure 2. Location map of the wreck site in Iceland's largest lake Þingvallavatn. Map: Google Earth.

SITE LOCATION AND BACKGROUND

The wreck site is located on the northern shore of Iceland's largest lake Þingvallavatn, within a small bay known locally as *Vatnsvík* near a glacial water spring called *Vellankatla* (Figure 1 & 2). The coordinates of the boat wreck are 64.244196, -21.047254 (64° 14.652'N, 21° 2.835'W), ISN93: 400.716, 417.350. The wreck was first discovered in October of 2018 by diver Erlendur Bogason and in December 2018 was first investigated by archaeologist Dr Bjarni F. Einarsson (2018), (Leyfi No. 201810-72). Einarsson's preliminary report stated that the boat was 16th century in date and was constructed of Scots pine (*pinus silvestris*). The dating of the boat was largely based on the results of two C-14 samples – one obtained from a timber sample from the wreck which produced a 95.4 percent probable date range of 1482–1646AD and one-horse bone (molar) found 30 metres away (Figure 3) which was thought by Einarsson to be potentially connected to the wreck as it had produced an overlapping date range of 1458–1635 AD with a 95.4 percent probability (Einarsson 2018).

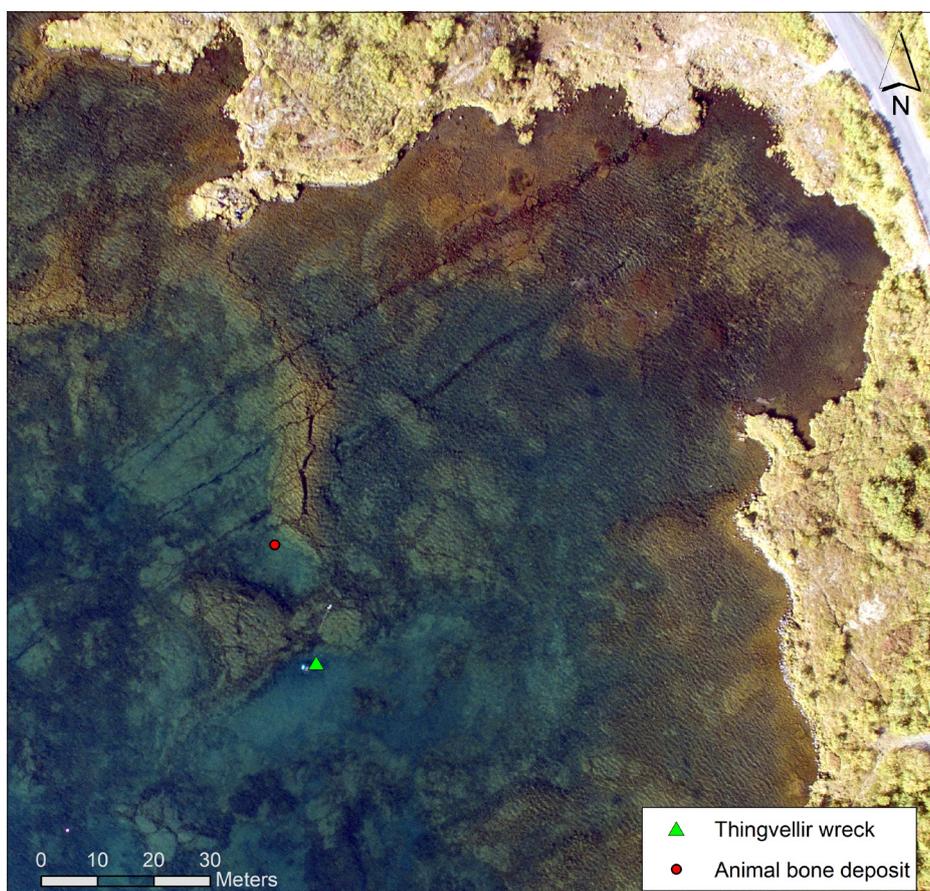


Figure 3. Drone photo showing the wreck site (green triangle) and the nearby animal bone (red circle) in Þingvallavatn. Map: Dr Kevin Martin and Jens Lindström/NMG.

2022 WRECK SURVEY

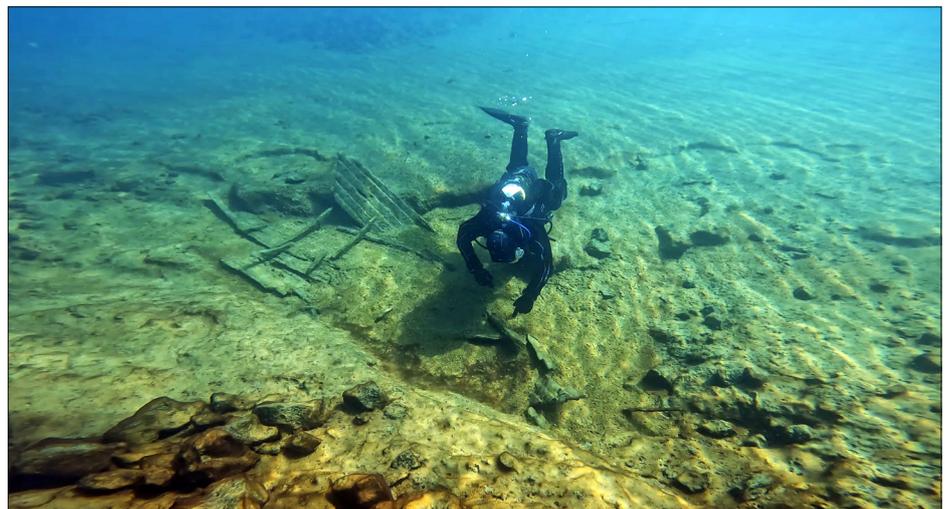
The 2022 underwater archaeological assessment took place during optimum weather conditions on September 7th 2022. Diving was conducted from land given the wreck sites close proximity to the northern shore of the lake and its shallow depth (Figure 4). As visibility underwater within the lake is normally excellent and usually over 20–30 metres, the wreck was first located by a combination of a drone fly-over survey and a snorkel survey within the bay.

Once identified sitting within natural hollow depression on the lake bed at a depth of 4.5 metres and 80 metres from the shore, the wreck location was

Figure 4. View looking south over the area of the wreck site in Þingvallavatn. The location for the shore diving base is shown to the left in the picture. Photo: Dr Kevin Martin.



Figure 5. Initial orientation dive on the boat wreck site in Þingvallavatn. Note the depression in the lakebed which the wreck sits in. Photo: Jens Lindström/NMG.



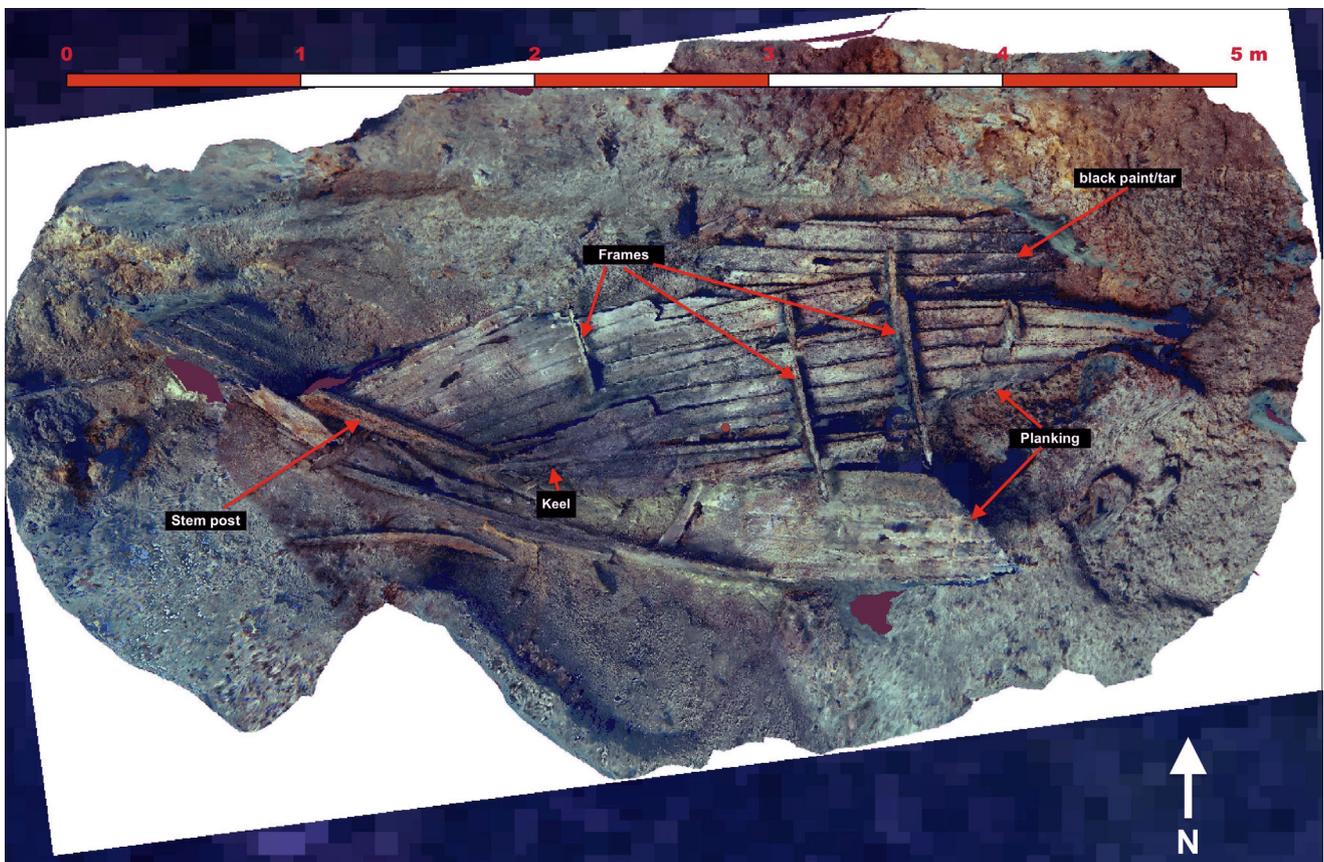
marked with a surface buoy to make it easier to find during follow up dives. The buoy was later removed once the survey project was completed.

Initially an orientation dive was conducted on the wreck by Dr Kevin Martin and cleaning of the wreck site commenced. It was evident from images taken during the 2018 investigation that the wreck had only been partially exposed (Einarsson 2018). This was confirmed during the orientation dive as parts of the wreck were still covered in lake sediments and silt approximately 5–10 centimetres deep (Figure 5). For this assessment, cleaning and exposing the wreck was carried out using an established underwater archaeological technique called *hand fanning*. This is one of the most basic, non-invasive and least disturbing techniques to uncover archaeological remains underwater and essentially uses a sweeping or fanning hand motion action to direct silt and sediment overburden away from the cultural remains.

During the cleaning, examinations were made regarding identifiable construction components of the boat which were still present including any unusual or specifically typological features and also an assessment of the overall condition and preservation of the timbers was made (Figure 6). The wreck was fully cleaned within 60 minutes and at that point Jens Lindström began a photogrammetric recording. This was conducted using two GoPro Hero 10 cameras mounted to each end of a 2 metres pole and filming at a rate of 30 frames per second.

The 3D recording was carried out by the diver swimming parallel overlapping transects over the wreck site in a *lawnmower* pattern and filming each transect swim. Still images of the wreck were also taken during the survey. Post-processing of the video footage was conducted using the photogrammetry software Metashape Pro from which an orthophoto mosaic of the whole boat wreck site was generated from overlapping still images taken from the video footage and stitched together (Figure 6).

Figure 6. Orthophoto mosaic of the boat wreck with scale and main components identified labelled in the figure. 3D model: Jens Lindström/NMG.



DISCUSSION

Our assessment determined that the wreck represents the remains of a modern clinker built or lapstrake (where the hull planks overlap) row boat originally approximately 4–5 metres in length which today is in quite poor condition, largely broken up, flattened out and fragmented with most of the surviving timbers noted to be in a fair to bad state of preservation. The most intact structure of the wreck is orientated east to west with the remains of the stem (bow) on the western side and the remains of the stern on the eastern side. From east to west the wreck extent measures 4.5 metres and from north to south 1.6 metres (these measurements include timbers which have broken off and are not in their original positions).

Part of up to four internal frame (ribs) timbers remain *in-situ* and run north to south across the inside of the hull planking (Figure 6). The hull floor planking was the most preserved construction element with parts of it coated either with tar or black paint on the interior surface (Figure 8). This may also have been present on the exterior side of the planking. Circular copper headed rivets/nails were visible in most of the planking (Figure 8). The planks measured between 7–10 centimetres wide and were up to 3 metres in length. The keel was visible and measured 2.05 metres long, 8–10 centimetres thick and 3.5 centimetres wide.

The stem post was identified on the western end of the wreck site and its visible area measured 86 centimetres long and 10 centimetres in thickness (Figure 7 & 8). Several copper circular headed rivets/nails were also evident along its surface.



Figure 7. Frame timber in the image centre with cut outs for planking and keel timber. Note the white residue on the timber and the oxidation on the stem post. Photo: Jens Lindström/NMG.



Figure 8. View looking west over the western part of the wreck. Photo: Jens Lindström/NMG.



Figure 9. Frame and planking timbers with orange paint residues next to the rivet head. Photo: Jens Lindström/NMG.

Approximately 20 metres directly north of the wreck, a concentration of approximately ten complete and fragmented disarticulated animal limb bones (likely from horse or cow) were noted lying within the rocks on the lake bed (Figure 11). These are interpreted to be part of the same bone concentration mentioned by Einarsson in 2018.

Analysis of the bones recovered in 2018 identified most of them (11) as being from horse and two from cattle (Pálsdóttir 2018). A C-14 date obtained from one of the bones (horse molar) produced a 95.4 percent probable date range of 1458–1635 AD (Einarsson 2018). On the basis of our assessment the bones identified during the 2022 survey have no apparent or obvious connection to the boat wreck. Their presence suggests that this part of the lake was a dumping area for

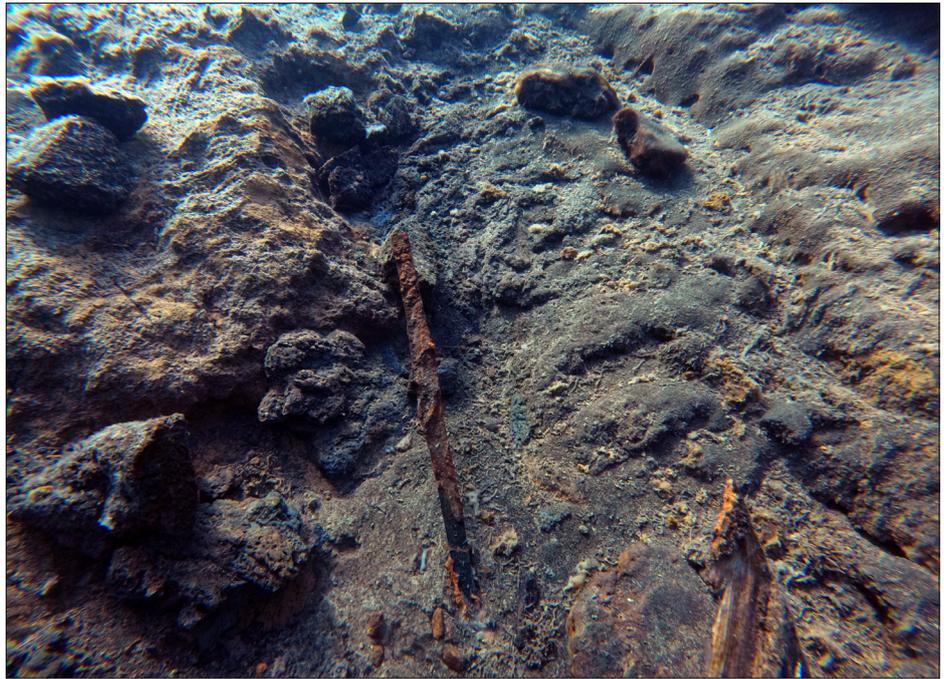


Figure 10. Iron strip (keel band) which was originally fastened to the outside of the keel. Photo: Jens Lindström/NMG.



Figure 11. Disarticulated animal bones found on the lake bed approximately 20 metres north from the boat wreck. Photo: Jens Lindström/NMG.

domestic waste such as animal bones in the past. A footnoted comment from Einarsson's (2018) report referenced the practice in the first half of the 20th century of horse and cattle remains being thrown into the southern side of the lake because of the spread of anthrax. This practice may have also taken place on the northern side of the lake which might explain the origin of the bone deposit nearby to the wreck site.

DATING OF THE BOAT WRECK

Based on our assessment, the boat wreck in Þingvallavatn does not represent evidence of a 16th century craft but is most likely the remains of a modern row boat dating to the period of the late 19th to mid-20th century. This interpretation is based on a number of factors. Firstly, the use of copper rivets/nails recorded on the planking and the stem post is a feature which appears around the early 20th century on similar sized boats known in Sweden (Prenzlau-Enander et al. 2007:75). The nails observed on the Þingvallavatn boat wreck exhibited regular formed shanks and were not handmade. They are examples of machine cut nails with forged circular heads. This manufacturing technique was invented at the end of the 18th century and became more widespread during the 19th century. It was later replaced by the development of rounded wire nails in the later 19th century. An iron nail (2018-84-1) recovered by Einarsson in 2018 from a timber sample from the wreck displays machine cut features such as top and bottom parallel planes and slightly curved edges (this assessment is based on analysis of a number of images taken of the nail and included in the 2018 report). It also indicates that both iron and copper nails were being used on the boat construction for fastening timbers.

Another indication of the more modern dating of the wreck comes from the remains of what is interpreted as part of an iron threaded rowlock (also known as an oarlock) which was visible on the south side of the wreck (Figure 12 & 13). These were usually U-shaped in form and attached to the gunwale or gunnel of a boat to support and guide the oar providing a fulcrum for rowing.

Figure 12 (left). View looking south west showing threaded iron rowlock fixed to the gunwale (gunnel). Photo: Jens Lindström/NMG.

Figure 13 (right). Close up of threaded iron rowlock. Photo: Jens Lindström/NMG.





Figure 14. A rowlock in a Swedish traditional clinker-built west coast boat from the late 1930's. It's equipped with the same type of rowlock as the wreck in Þingvallavatn. Source: Digitalt museum 2017.

The final indicator of a modern date for the boat wreck was that several planks had what appeared to be evidence of traces of orange or red paint on them (see Figure 9). In places the paint was visually quite obvious and was not considered to have formed through oxidation or rusting (as this survey was non-invasive the paint was not sampled, therefore this conclusion was based on visual assessment).

As stated earlier, a C-14 sample taken from one of the boat plank timbers during the 2018 investigations produced a 95.4 percent probable date range of 1482–1646 AD (Einarsson 2018). There are a number of factors which make this radiocarbon date problematic for accurately dating the wreck and relate to the issues of *old wood effect* / *old wood problem* and *fresh water reservoir effect*. In relation to the *old wood effect*, the C-14 date returned from the plank sample may be from the heartwood (inner part of the tree) which might indicate that the tree was several centuries old by the time it was felled. Another issue is that the C-14 date does not take into account a delay between the tree being felled and the timber being used, which in the case of pine driftwood (this is one potential origin for the timber) may be several centuries apart. The timber sampled may also be a re-used timber from another older boat. For accurately dating shipwrecks, dendrochronological dating is a much more reliable and accepted dating methodology and dating a selection of timber samples from the same wreck is considered best practice.

In relation to Þingvallavatn the issue of *fresh water reservoir effect* is particularly relevant for the accuracy of C-14 dating analysis of organic matter such as wood or animal bone which has been recovered from the lake. This was previously highlighted by Sveinbjörnsdóttir & Johnsen (1992) who noted that radiocarbon analyses of the water, particularly around the *Vellankatla* spring (the area where the boat wreck is situated) produced an anomalously high age due to influx of CO₂ from the mantle. According to Philippsen (2013) 'the freshwater reservoir effect can result in anomalously old radiocarbon ages of samples from lakes and rivers'. This would suggest that it's possible for timber from a later 19th to mid-20th century boat which has been submerged in Þingvallavatn for 50–100 years to produce a much earlier radiocarbon date because it has exchanged carbon with the 'older' lake water over that time (the same effect would apply to the dating of animal bone).

COMPARATIVE AND CONTEMPORARY ICELANDIC BOATS

Two comparatively sized examples of early 20th century rowing boats are evident within the Icelandic Sarpur database. The first example, Sarpur No. R-6099 (Figure 15), may be a very similar sized boat to the wreck in Þingvallavatn and was said by Skógasafn to have been built around 1930 (Einarsson 2018). It measures 4.05x1.52x0.48metres and the following information is listed within its Sarpur database entry:

Ferjubátur frá Tungnaá, smíðaður af Pálmari Jónssyni í Unhól í Þykkvabæ, súðbyrðingur, tvístefna. Lengd 4,05 m, breidd um miðju 1,52 m, dýpt 48 cm. Tvær þóftur og tvö ræði (keipar) ásamt tveimur árum. Þarfnast viðgerðar. Jórunn Eggertsdóttir í Lækjartúni kom með ferjuna. (Sarpur n.d.a).

Figure 15. Ferry boat from Tungnaá, Sarpur: R-6099. Note the rowlocks and the iron keel band (Sarpur n.d.a).

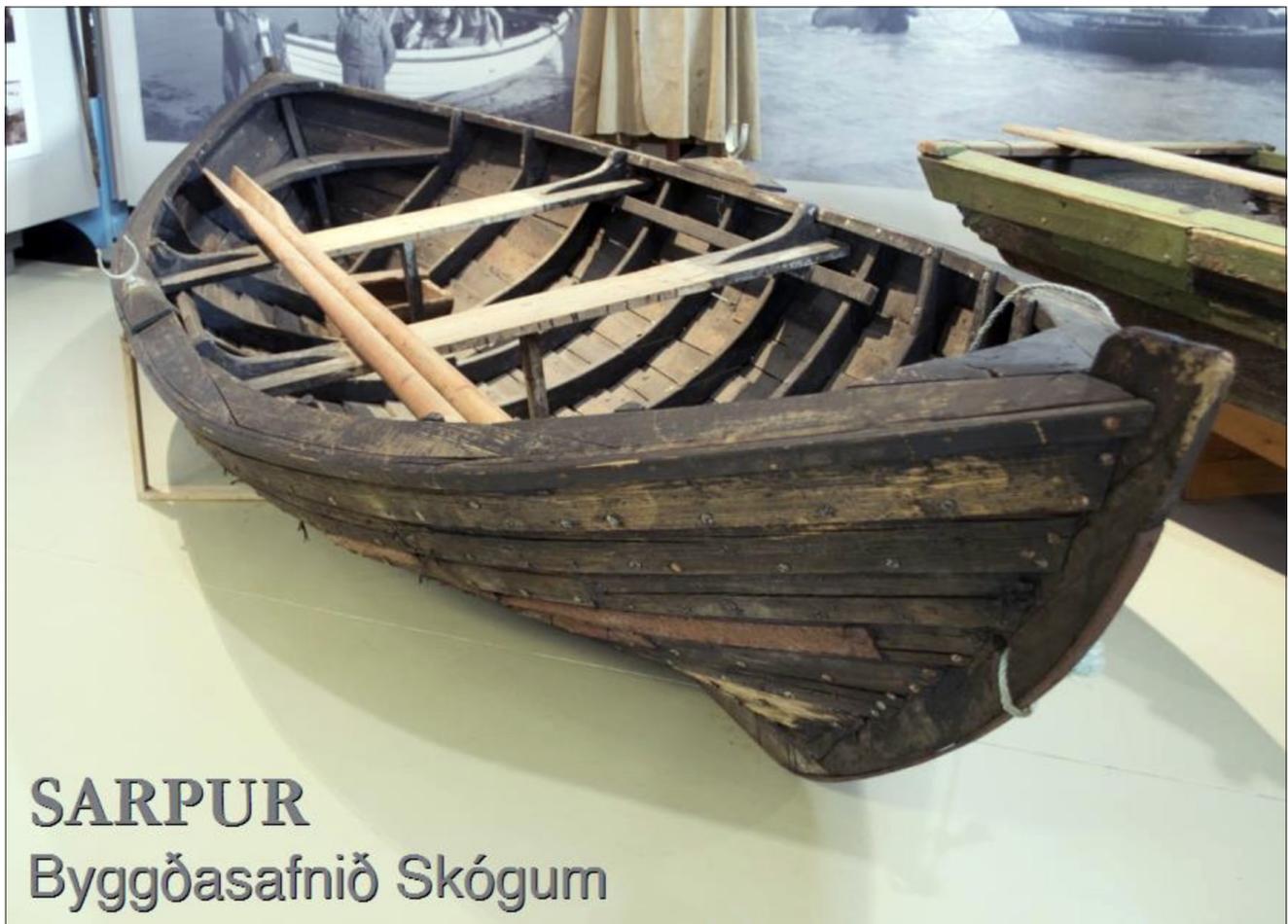




Figure 16. Ferry boat from Þjórsárholt, Sarpur: SE/1984-708. (Sarpur n.d.b).

The second example (Sarpur No. SE/1984-708) is described as preserved ferry boat from Þjórsárholt in Árnessýsla and likely dates from 1930 (Figure 16). Its measures 4.85x1.72 metres and the following information is listed within its Sarpur database entry:

Trébátur með sjö böndum fyrir tvær árar. Járngjörð undir, notaður til að ferja fólk. Svartur á litinn. Ferjubátur frá Þjórsárholti. Hann mun hafa verið keyptur frá Eyrarbakka eða Stokkseyri um 1930. Að sögn heimildamanna var hann jafnan nefndur Eyjabáturinn og var hann aðallega notaður við flutninga á fé og heyi úti Ölmóðsey. Á síðustu árum ferjuflutninga við Þjórsárholt um 1960–70 var að vísu gripið til þessa báts við ferjuflutninga stöku sinnum m.a. til að halda bátnum í góðu ástandi. Báturinn barst safninu uppúr 1970. Gert var við bátinn um 1988 af Sigurjóni Kristjánssyni í Forsæti. (Sarpur n.d.b).

Both examples listed here are rowing boats of approximately 4–5 metres in length and 1.5–2 metres in width. Both feature a number of similar construction features seen in the remains from the wreck site in Pingvallavatn including clinker built, the use of nails/rivets, an iron band/strap fastened under the keel, rowlocks for the oars.

ICELANDIC CULTURAL HERITAGE LEGISLATION

According to Article 3 of the Icelandic law of cultural heritage from 2012 (Lög um menningarminjar 2012) archaeological features or objects are items 100yrs or older that have been used by humans or are man-made and have been found in or on the ground or glacier, in water or sea. In addition ships and boats from before 1950 are considered archaeological cultural heritage.

Forngrípir eru lausamunir 100 ára og eldri sem menn hafa notað eða mannaverk eru á og fundist hafa í eða á jörðu eða jökli, í vatni eða sjó. Skip og bátar frá því fyrir 1950 teljast til forngrípa. Til forngrípa teljast einnig leifar af líkómum manna og hræjum dýra sem finnast í fornleifum, svo sem fornum haugum, dysjum og leiðum.
(Minjastofnun Íslands n.d.; Skrifstofa Alþingis 2012).

Based on our assessment the boat wreck examined in Þingvallavatn dates from the early 20th to the mid 20th century and consequently comes under the protection of the Icelandic cultural heritage legislation. The animal bones recorded 20 metres to the north are not considered to be connected to the wreck and may have originally been thrown into the lake from the nearby shore.

RECOMMENDATIONS

No further recommendations or interventions are currently advised for the future management of this wreck site in Þingvallavatn. The site is not considered to be in any immediate danger or impact threat and its unmarked position in a natural hollow on the lake bed at a 4.5 metres depth sufficiently protects it from damage. Sports diving and fishing within this area of the lake are closely regulated, managed and monitored by the Þingvellir National Park so interference on the wreck from this activity is not considered a likely issue. This survey has created a highly detailed 3D photogrammetric record and model of the wreck which can be used access any changes or impacts to the wreck site over time through follow up dive surveys. As the wreck is situated within the area of a recognised Unesco World Heritage Site of Þingvellir National Park the first rule of Unesco general principles (Maarleveld et al. 2013) for the preservation of underwater cultural heritage should be applicable along with the generally accepted archaeological best practice standard which is the *in-situ* preservation of cultural remains whenever possible.

RÁÐLEGGINGAR

Við mælum ekki með neinum frekari aðgerðum til framtíðar á flakinu í Þingvallavatni. Þessi staður er ekki talin í neinni hættu eða að valda skaða. Ómerkt staðsetningin í náttúrulegri lægð á vatnsbotninum á um 4.5 m dýpi ver þáð næginlega frá skemmdum. Sportköfun og veiðar á svæðinu eru undir eftirliti þjóðgarðsins nú þegar svo þáð ætti ekki að koma að sök hvað varðar flakið og verðun þess. Við rannsóknina (*survey*) var búið til nákvæmt þrívíddarmyndar módel sem hægt er þá að nálgast komi eitthvað til með að breytast til framtíðar. Þar sem flakið er staðsett innan Unesco friðlýsts svæðis í Þingvallabjóðgarði er regluverk Unesco (Maarleveld et al. 2013) um varðveitingu minja neðanvatns er sterklega mælt til að varðveita þáð á fundarstað (*in-situ*) sé þáð mögulegt.

TECHNICAL INFORMATION

Site location:	Vatnsvík, Þingvallavatn, Þingvellir National Park
Coordinates:	400.716, 417.350 (ISN93)
Task:	Archaeological assessment of shipwreck
Water depth:	4.5 metres
Date of survey:	September 7th 2022
Field participants:	Dr Kevin Martin & Jens Lindström
Company:	Nordic Maritime Group AB Lingonvägen 2 266 52 Vejbystrand Sweden
NMG project-ID:	I-97.2022
Project manager:	Dr Kevin Martin irisharch@gmail.com +3547734748

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