ANCHORAGE MUSEUM

Conservation Examination Report and Treatment Proposal

Accession #: 1988.13.1
Object: Model, Umiak with Sail
Classification: Models and Miniatures

Artist/Maker: Artist, once known
Culture: St. Lawrence Island Yup'ik (attributed)

Object Date: c. 1960 (attributed)
Medium: Marine mammal digestive organs (walrus stomach?), wood, paint, woven textile, metal (copper alloy, iron/steel), plastic, sinew, hide with skin and fur follicles
Dimensions: 67.5 x 57 x 18 cm / 26.6 x 22.4 x 7.1 in (L x H x W, overall)

Reason for Treatment: Stabilization for storage

Examined By: Daisy Diamond (Graduate Objects Conservation Intern, Anchorage Museum and Graduate Fellow Winterthur/University of Delaware Program in Art Conservation)
Consulted: Monica Shah (Deputy Director of Conservation & Collections, Anchorage Museum); Stephanie Black (Conservator, Anchorage Museum)

Proposal Date: June 25th, 2025

Description

This model umiak has a white, painted, and slightly translucent marine mammal digestive organ (walrus stomach?) stretched around the wooden frame with hide lashing.[1] The hull is composed of one skin that is shaped by seams at the bow and stern. In unpainted areas, the hull fluoresces a pale yellow-green, with more prominent fluorescence in areas that are thicker. The interior of the wooden frame is painted gray.[2] General umiak terminology is used throughout this report in English (fig. 1), but more specific terminology and Siberian Yup'ik words related to this model boat can be referenced "Appendix II: Diagrams and Terminology."[3] In addition to the components depicted in Figure 1, the model umiak has an off-white, woven, and hand-sewn mainsail attached to the mast and boom with twisted cord and hooks (similar to those from hook and eye clasps). The sail has a diamond twill weave structure with alternating numbers of warps skipped. The hooks are attached to the sail with a whip stitch. There is one small cleat at the base of the mast, which holds the main sail up with a half hitch knot. The mast is partially supported by two cords tied to the bow and stern ends of the same gunwale. The hide lashing still has fur attached with 1-3 mm wisps of hair. The cords on the model are approximately 1 mm in diameter and range from a bright white to a dull, light gray-brown.

A detachable tiller and rudder (1988.013.001b) can be joined to the umiak by sliding the two stacked, L-shaped hooks into 4mm U-shaped nails on the stern (fig. 2). Umiak and whaling equipment are depicted in Figure 3 and described in greater detail in "Appendix I: Additional Information Regarding Model Accessories."

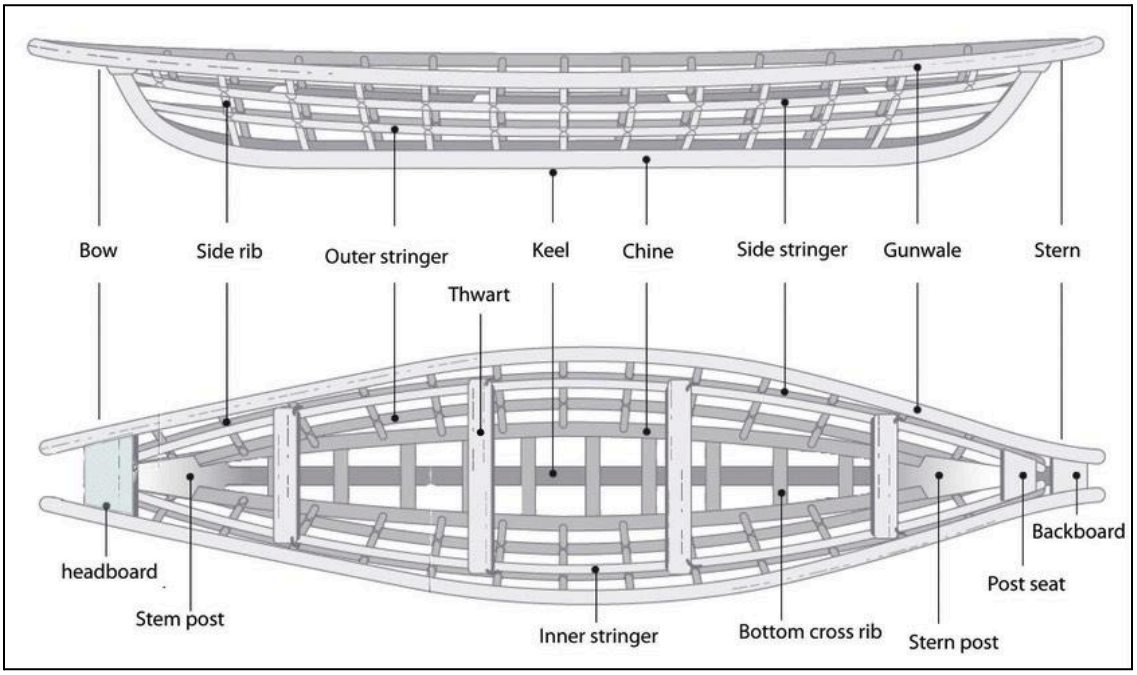

Figure 1. Diagram of umiak frame and terminology. Image source: Braund 1988, 82.

[1] Terminology around marine mammal digestive organs can vary, particularly around the use of the term "gut." For some scholars, "gut" can refer to any internal gastrointestinal organ tissues such as intestine, stomach, bladder, and esophagus commonly from marine carnivores of the suborder Pinnipedia (seals, sea lions, and walruses) or, less commonly, whale and bear. However, for other scholars, "gut" is used only with specific reference to the small intestine. Refer to "Materials and Manufacture" for additional information. From here on out, this will be referred to as the hull or marine mammal organ.

[2] The gray paint on the interior of the stretched organ and hide lashing indicates the wooden frame was painted after the hull was stretched in place.

[3] Additional research on Yup'ik and Inuit terminology for parts of the umiak could be clarified at a later date with the following resources: *Kangiryuarmiut Uqauhingita Numiktittitdjutingit* by Ronald Lowe (1983), *Inuinnaqtun English Dictionary* by Gwen Angulalik (2021), *Asuilaak Inuktitut Living Dictionary* produced by Inuit Uqausinginnik Taiguusiliuqtiit (2010), *Yup'ik Eskimo Dictionary Second Edition: Volumes 1 and 2* by Steven A. Jacobson (2013).

Figure 2. Tiller and rudder, attached.

Figure 3. Model accessories: umiak and whaling equipment.

Significance and Cultural Context

Saint Lawrence Island, known as *Sivuqaq* by the Siberian Yup'ik people who live there, is located in the Bering Sea (fig. 4). The umiak open boats created with marine mammal skin hulls on Saint Lawrence Island are specifically called *angyapik.* The intense weather and sea conditions in the Bering Sea required these watercraft to be highly robust, ensuring that the tradition for boat construction was transmitted through generations with adaptations made frequently in response to trade and watercraft needs. These boats provided transportation for people and cargo. In addition, they were used to hunt seals, walruses, and bowhead whales for subsistence living. Full size boats had hulls made from female walrus skins that were made by drying and splitting the skin and replaced every two to three years. Male walrus skins were too thick, scarred, tough, heavy, and wore out more quickly (Braund 1988, 17-18, 24).

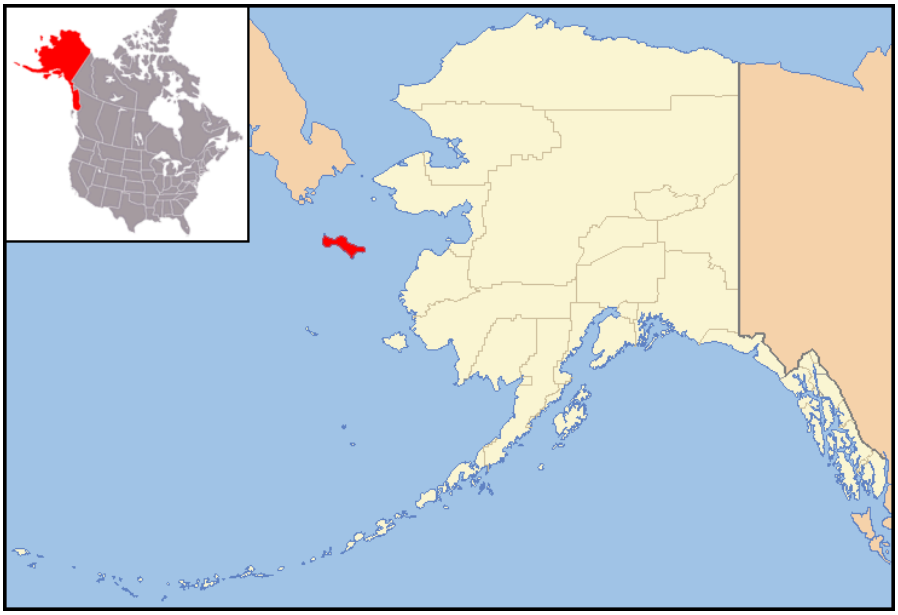

Figure 4. Saint Lawrence Island indicated in red, located in the Bering Sea. Image source Wikipedia.

This whaling umiak model is fitted with accessories that represent the umiak's use for sailing, paddling, and traversing with an outboard motor. Similar models were created with sails and walrus stomach (fig. 5). Additional model umiaks were created from baleen and ivory, which point to the importance of the umiak and creative depictions in coastal Alaskan Indigenous communities (figs. 6-7).

Edward "Trader Ed" Shepherd, the donor of this model to the Anchorage Museum, operated a trading post on St. Lawrence Island, AK between the late 1940s and early 1960s, where umiak use with sails during whale hunts is documented (fig. 8). The cultural background of the maker of this specific model umiak is no longer associated with the object. It may have been made by – or inspired by models made by – Yup'ik or Inupiaq artists.

Figure 5. "Model, Umiak with Paddle" (2003.002.024ab). Yup'ik or Inupiaq artist, once known (attributed). Mid-20th century. Seal hide, wood, walrus stomach (?), babiche, ocher, cotton thread. Image source: Anchorage Museum Online Collections.

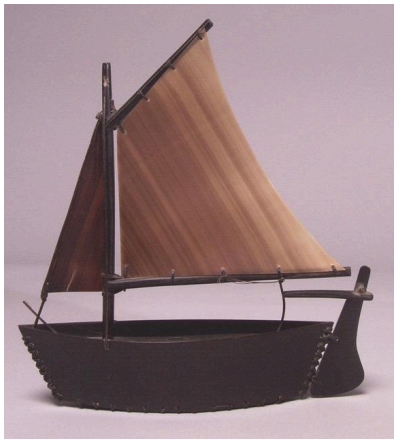

Figure 6. "Model, Umiak" (2002.022.005). Inupiaq artist, once known (attributed). Late-20th century. Baleen. Image source: Anchorage Museum Online Collections.

Figure 7. “Model, Umiak” (1982. 070.033). Inupiaq artist, once known (attributed). 1928. Walrus ivory, baleen. Image source: Anchorage Museum Online Collections.

Figure 8. Umiak with Sail. View of people sailing in umiak during whale hunt at Gambell on Saint Lawrence, Alaska (Anchorage Museum, Ward Wells Collection, 1966). Photographer: Ward W. Wells. Image source: Anchorage Museum, Ward Wells Collection (AMRC-wws-4393-192).

Materials and Manufacture

As a flexible, water-replant, and vapor-permeable raw material from animals, marine mammal organ materials are highly desirable for their aesthetic, practical, and spiritual significance (Carrlee 2020, 2). Processing of these materials includes removal of the tissue from the animal, removing mucosa layers with a blunt tool, soaking and washing, drying by inflating and/or stretching, and cutting. Once prepared, these tissues are formed with stitchwork by many circumpolar cultures to make drums, raincoats, windows, sails, containers, boats, dolls, and more (Carrlee 2020, 4, 154, and 179). If these creations got wet, as would be particularly useful for raincoats, windows, sails, and boat hulls, the stitch holes of the material would swell and prevent leaks (Holdcraft et al. 2021, 8). This particular hull was suspected to be sourced from a walrus stomach. Because the hull is one large, single piece, it could have only been sourced from an organ that would be large enough. Therefore, esophagus and small intestine can likely be ruled out since they would not have been large enough to cover the model hull in one piece.

Condition

This model umiak is in fair structural condition due to the large tears on the embrittled hull that are stable with proper handling. There are disfiguring losses within the tears, regions of tenting paint, moderate surface grime, and localized stains (fig. 9). Overall, object legibility is retained such that a viewer could quickly and easily see, recognize, and distinguish the umiak and its individual components.

Structurally there are: seven tears on the embrittled hull. There is one large tear on the central PL side: approximately 28 ¼ cm x 1 cm (L x W, overall) that now has a gap due to material fluctuations. There are five tears on the PR side, from bow to stern: 1 x 0.1 cm, 2.1 x 0.1 cm, 9 x 0.3 cm (wraps around the gunwale), 1.5 x 0.1 cm, 1.75 x 0.2 cm (L x W, overall). There is an additional branching tear (3.5 x 2 cm) visible on the interior bow of the hull (figs. 10-11). The hull is brittle. Embrittled marine mammal organs in heritage objects is common, and sometimes deemed preferable, in museum collections (Cruickshank and Sáiz Gómez 2009, 3). The tears have planar deformation along the break edges, with edges curling out on the PL side, and a 2 mm shelf between edges on the longest tear on the PR side. There is a risk of tears lengthening, although comparison to prior photo documentation does not indicate that this has occurred. This brittleness contributes to the necessity of structurally supportive storage housing and minimal handling for this umiak.

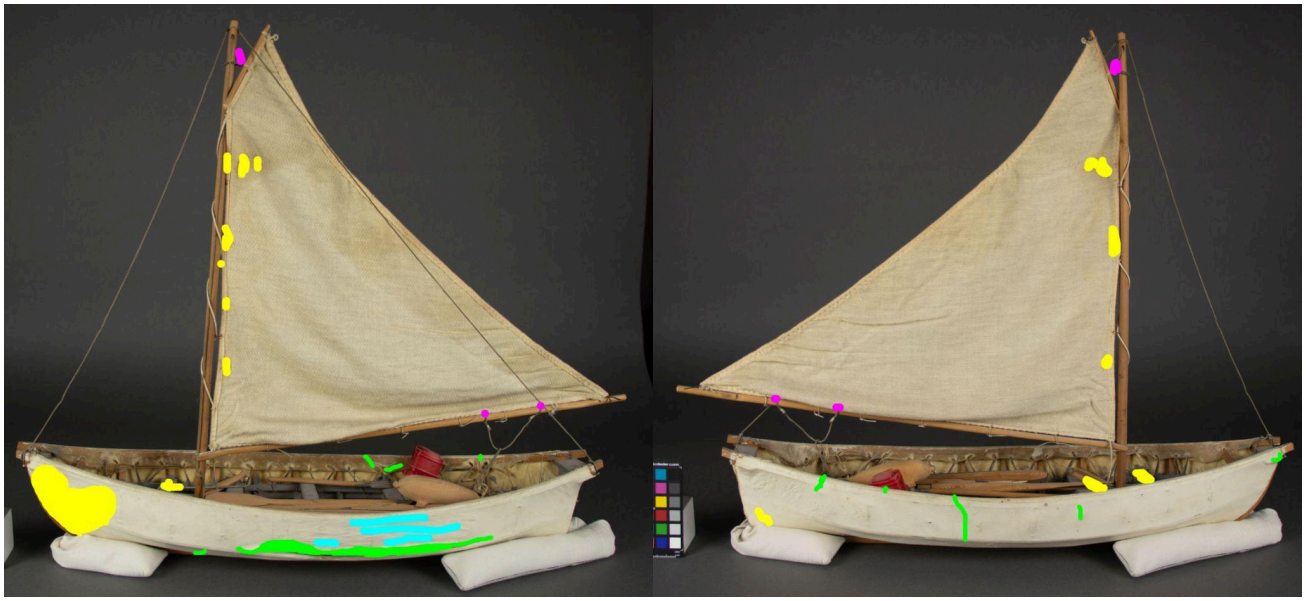

Figure 9. Condition diagram. Left: proper left (PL) side, right: proper right (PR) side.
Legend: **Tears**, **Staining**, **Corrosion**, and **Tenting paint**.

There are additional structural condition characteristics to note. Loose knots that attach the sail to the boom are at risk of unravelling which would result in loss of the original maker's process (fig. 12). The bow seat is at an improper orientation, likely since it shifted off the original nail holding it in place (fig. 13). Additionally, sprung wood on the PL side results in a gap between the outer stringer and side rib that increases the likelihood of the marine mammal organ fluctuating (fig. 14). Paint cracks (tented) on the hull likely resulted from the tensioned material fluctuating slightly with the absorption and desorption of moisture. There is a 2 cm abrasion and 1 x 0.75 cm area of wrinkled paint on the center thwart (fig 15).

There is moderate surface grime and dark red-brown staining on the model. The staining is located on the bow painted exterior, bow thwart and bow interior, and woven sail (figs. 16-18). Dark accretions and soiling deposits are scattered across the painted exterior hull (fig. 19). These stains and accretions mostly absorb ultraviolet (UV) light.

There is also light, compacted corrosion on several of the tools and metal components (figs. 20-22). These corrosion products are white, red, and blue-green. The blue-green, powdery corrosion is more likely to be unstable. The red motor is missing one notch of the mounting bracket which likely snapped off at an unknown point. Both sides of the mounting bracket appear white, likely due to stress-induced embrittlement.

The sail is creased and sags at the lowest edge. There is minor and stable fraying at the corners of the sail (fig. 23). One rope attached to a bow thwart is in a disorganized pile in the hull.

The accession number for the umiak is on the side of the keel in hand-written black paint with no barrier layer detected in visible or UV light. There are small accession numbers on the tools in hand-written black paint with no barrier layer detected in visible or UV light, with the exception of the two longer paddles (88.13.1p and 88.13.1q) which do have either a barrier layer or coating. The accession number on all of the model accessories is "88.13.1" with no specification of individual numbers, except on the longer paddles. The accession number on the tiller is mostly covered by the rudder. Accessories that are unnumbered include: one short unpainted paddle, two ropes (one attached to a thwart and one loose), and two wooden buoys shaped like seal skin buoys. There is no long-term housing enclosure for the umiak. There is uncertainty regarding the intentionality of model accessory placement in the umiak. Regarding treatment history, there are no records or evidence of prior intervention.

Figure 10. Hull tear (exterior, PL bow) and accession number (keel).

Figure 11. Hull tear (interior, PL bow).

Figure 12. Loose knots that attach the sail to the boom.

Figure 13. Improperly oriented bow seat. The red circle and arrow point to a pin, likely indicating the original position.

Figure 14. Gap between the outer stringer and side rib, visible through the gap. Longitudinal paint cracks on the PL hull exterior.

Figure 15. Abrasion and wrinkled paint on the center thwart.

Figure 16. Staining, PL bow painted exterior.

Figure 17. Staining, bow thwart and bow interior.

Figure 18. Staining detail, woven sail.

Figure 19. Dark accretions and soiling deposits on the hull exterior.

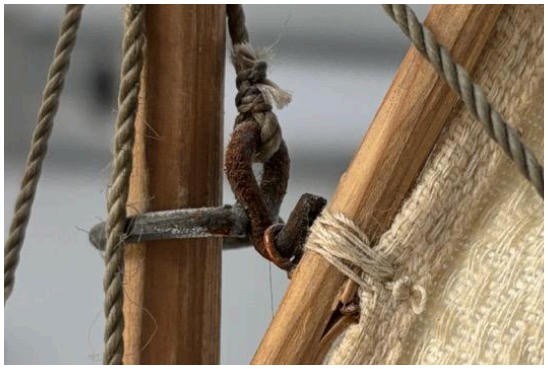

Figure 20. Dark red-brown and white corrosion products, top of the sail.

Figure 21. Blue-green corrosion product, hook near the stern of the boom.

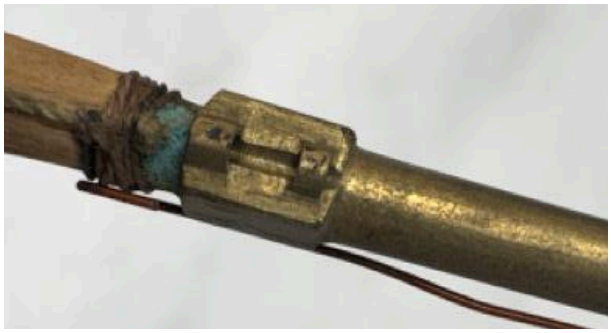

Figure 22. Blue-green corrosion product, top of the darting gun.

Figure 23. Minor and stable fraying at the corners of the sail, likely originating from when this model was made.

Purpose of Treatment

The purpose of this treatment is to stabilize tears of the umiak, preventing further damage and improving aesthetic legibility. This treatment aims to support the long-term preservation of this model while re-establishing the possibility of exhibition at a later date.

Treatment Proposal

1. **Carried out pre-treatment examination and photo documentation** (*4 hours, completed*).
2. **Tighten and secure ropes** (*est. 0.25 hours*).
    - Tighten sail knots to minimize risk of unraveled threads. Add a conservation-grade adhesive to secure the original knots long-term.
    - Secure the rope attached to the bow thwart with the same knot technique as the other rope attached to the mast.
3. **Conduct cleaning of the umiak and model accessories** (*est. 3 hours*)
    - Overall surface clean with a low-speed HEPA-filtered vacuum, soft brush, and cosmetic sponge to remove dust and dirt. Following testing of wet and dry methods, reduce grime on the red motor accessory.
4. **Conduct stain reduction on the painted hull and sail with wet cleaning methods, as possible following testing** (*est. 2 hours*).
    - Potential stain reduction solutions could include reverse osmosis water, ethanol, isopropanol, and surfactants.
5. **Remove pressure sensitive tape and residue from the bow hull exterior with a heated spatula, tweezers, and a spatula** (*est. 0.25 hours).*
6. **Reduce and stabilize corrosion products on tools with mechanical action, mineral spirits, and a coating** (*est. 1.5 hours*).
7. **Re-secure the bow shelf with conservation-grade adhesive** (*est. 0.25 hours*).
8. **Stabilize the gaps that occurred when the wooden outer stringer separated from the side rib on the PL side of the hull** (*est. 1 hour*).
    - Following testing, use a somewhat flexible, conservation-grade fill material that can accommodate slight movement caused by expansion and contraction of wooden frame components of two out of four stringers to ensure the treatment is sufficient, but minimal.
9. **Stabilize tears and complete aesthetic compensation** (*est. 12 hours*).
    - Relax the edges with highly localized moisture, humidity, heat, or a combination of these methods to minimize planar deformation along break edges.
    - Apply a backing material composed of long-fibered mulberry papers (i.e. *kozo*, *tengucho*), nonwoven polyester (i.e. Reemay, Hollytex), or goldbeater's skin[4] for untoned areas. Kozo was noted to be suitable

[4] Stephanie Black noted that during consultations with Supiaq communities in the past, they did not wish to have land mammals used in the treatment of sacred cultural heritage made from sea mammals. The relevance here is unknown. Since this umiak is a model that was not meant for use, ceremonial, or sacred contexts, this did not seem inappropriate to at least test.

for larger repairs or repairs requiring greater strength on marine mammal organ materials like intestine or stomach (Cruickshank and Sáiz Gómez 2009, 5).

- Adhesives for attaching the backing material used could include Jade 403 PVA, BEVA 371 film following testing of heat sensitivity (Fenn 1984), 3:1 mix of Lascaux 498 HV:360 HV (Holdcraft et al. 2021, 8), or a 15% w/v solution of Butvar B-98 in industrial methylated spirit [noted to dry matte and adhere well to gut (Cruickshank and Sáiz Gómez 2009, 4)]. BEVA 371 film was noted to be one of the most common adhesives used for gut treatments in conservation settings (Horelick, McHugh, and Madden, 2011, 7). The adhesive should be stable, reversible, bond to the backing and gut material with sufficient strength, not cause stains, not penetrate the gut excessively, and quick-drying to minimize risk of creep during drying (Cruickshank and Sáiz Gómez 2009, 1; Fenn 1984). Direct application is desirable over solvent-reactivation, as the gut material is likely solvent-sensitive.
- The backing could serve a dual function providing structural support and loss compensation, or a secondary component could be added to aesthetically bridge the loss while remaining easily identifiable as a repair material. Aesthetic loss compensation should match the color, opacity, texture, and topography of the surrounding hull. Inpainting can be completed with conservation-grade acrylic paint.

10. **Carry out post-treatment photo documentation and write a treatment report** (*est. 2 hours*)

Total est. time: 26.75 hours

Daisy Diamond		**Date:** June 24, 2025
Monica Shah	[verbal approval]	**Date:** July 24, 2025
Stephanie Black	[verbal approval]	**Date:** July 24, 2025

1. **Carried out pre-treatment examination and photo documentation** (*4 hours*).

2. **Tightened and secured ropes** (*0.25 hours*)**.**

    - Tightened six knots attaching the sail to the boom. Brush applied one pass of 15% Paraloid B-72 in 1:1 acetone and ethanol over the center of the knot (figs. 24-25*)*.

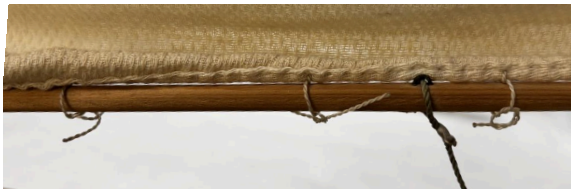

Figure 24. Three of six knots, before tightening threads.

Figure 25. Three of six knots, after tightening threads.

    - Tied the rope attached to the bow thwart with the same knot technique as the other rope attached to the mast (figs. 26-27).

Figure 26. Bow thwart rope, before tying.

Figure 27. Bow thwart rope, after tying.

3. **Conducted cleaning of the umiak and model accessories** (*2.5 hours*).

    - Dry surface cleaned with a soft-brush and low-speed, HEPA-filtered. Reduced embedded dirt and dust with cosmetic and soot sponges (figs. 28-29).

Figure 28. Surface cleaning the backboard.

Figure 29. Sponges after the first pass of dry

cleaning.

- Reduced grime from the red motor accessory with swab-applied reverse osmosis water (figs 30-31).

Figure 30. Before cleaning.

Figure 31. After cleaning.

4. **Reduced stains and embedded grime from the hull exterior and interior as well as the sail** (*3.5 hours*).

- Reduced brown stain on the hull exterior with swab-applied Triton X-100 (0.5%) in 10:1 reverse osmosis water and ethanol and cleared with reverse osmosis water, following testing (table 1, figs. 32-33). After this process, the surface chemistry was altered such that the stain could be effectively reduced further with swab-applied 1:1 reverse osmosis water and isopropanol.

Table 1. Stain reduction tests.

Solvent, swab applied	Paint solubility	Stain reduction and efficacy
Reverse osmosis water (room temperature and warm), ethanol, acetone, 70% isopropanol in distilled water, mineral spirits, 1:1 ethanol and reverse osmosis water, and 1:1 ethanol and isopropanol	No impact	No impact
1:1 ethanol and acetone	No impact	Minimally effective at stain reduction, requires mechanical swab action
Orvus (0.5%) in reverse osmosis water, cleared with reverse osmosis water	No impact	Minimally effective at stain reduction, requires mechanical swab action
Triton X-100 (0.5%) in reverse osmosis water, cleared with reverse osmosis water	No impact	Moderately effective at stain reduction, required less mechanical action than Orvus.
Triton X-100 (0.5%) in 10:1 reverse osmosis water and ethanol, cleared with reverse	No impact	Effective at stain reduction. With similar mechanical action as Triton

osmosis water		X-100 without ethanol, more stain reduction is possible.

Figure 32. Before surface cleaning and stain reduction, hull exterior.

Figure 33. After surface cleaning and stain reduction with 0.5% Triton X-100 followed by isopropanol, hull exterior.

- Reduced the brown stain on the inner painted frame and hull and thwarts with swab-applied deionized water (figs. 34-35).

Figure 34. Before stain removal, interior frame and hull.

Figure 35. After stain removal, interior frame and hull.

- Minimally reduced stains from the woven sail and decided to not progress further. The goal of this step was twofold: to break the chemical bonds between the textile and stain, and then to remove the stain material. A drop of isopropanol was tested followed by 3-5 drops of reverse osmosis water. Blotter paper was placed with finger pressure on either side of the sail. There was minimal dark brown residue visible on the blotter paper after 20 seconds of pressure for each area of staining. After further discussion with Stephanie Black, this step was deemed too risky to continue, given the high likelihood of tidelines and patchy appearances since the sail cannot be entirely removed from the model for stain reduction. Additionally, the primary goal of this treatment was stabilization, and the stain sail reduction was determined to be less essential.

5. **Removed pressure sensitive tape and residue from the bow hull exterior with a heated spatula, tweezers, and a spatula** (fig. 36-37) (est. 0.25 hours).

Figure 36. Before tape removal.

Figure 37. After tape removal.

6. **Reduced corrosion products with an insect pin, porcupine quill, and microswab-applied mineral spirits from the darting gun, ice space, and seal float as well as the metal components joining the sail on the mast and boom (figs. 38-39). Removed loose corrosion products from the surrounding cord with a low-speed HEPA-filtered vacuum. Stabilized metal with a 3% Paraloid B-48N coating (*est. 3 hours*).**

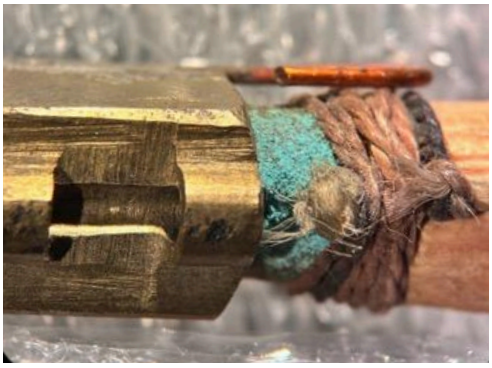

Figure 38. Before corrosion reduction, darting gun. 10x magnification.

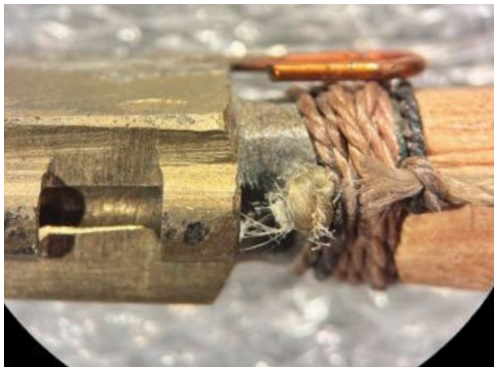

Figure 39. After corrosion reduction, darting gun. 10x magnification.

7. **Re-secured the bow shelf with 15% Paraloid B-72 in 1:1 acetone and ethanol brush-applied to the pin (figs. 40-41). Pressure was maintained with finger pressure for 5 minutes** (*0.25 hours*).

Figure 40. Before stabilizing the bow shelf.

Figure 41. After stabilizing the bow shelf.

8. **Stabilized the gaps that occurred when the wooden outer stringer separated from the side rib on the PL side of the hull (fig. 42) with a fill that bridges the gap (*1.5 hours*).**

    - A barrier layer of 15% Paraloid B-72 in 1:1 acetone and ethanol was applied with a brush. The fill was composed of BEVA gel bulked with cellulose fibers until the material formed a putty. It was applied with

a spatula and shaped with isopropanol and a porcupine quill (fig. 43). Inpainted with Golden Artist Acrylics (fig. 44)

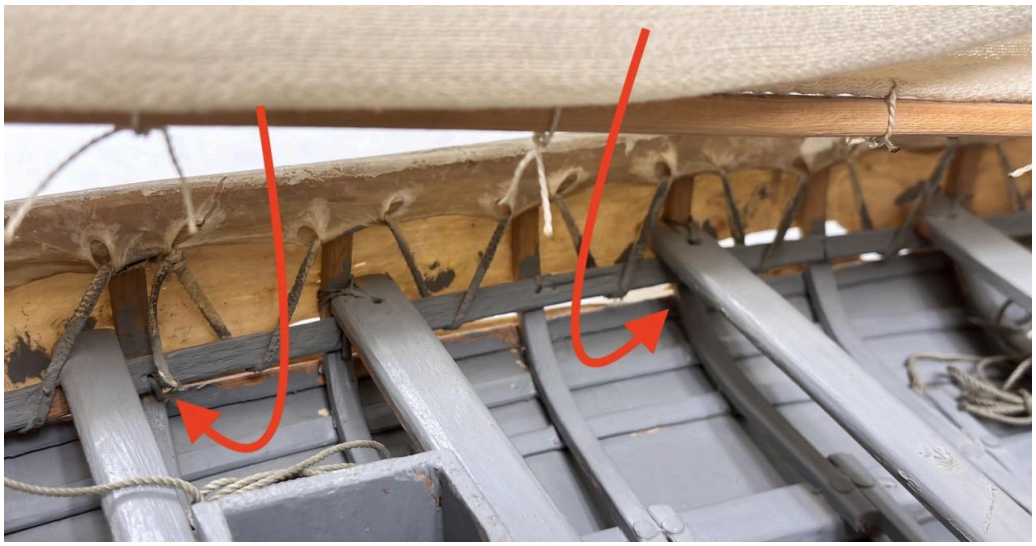

Figure 42. Fill locations between the outermost side stringer and the side ribs on the PL side.

Figure 43. After smoothing.

Figure 44. After inpainting.

9. **Stabilized tears and completed aesthetic compensation (*13.5 hours*).**
    - **Testing:**
        - **Heat tested the painted hull to evaluate the potential use of heat-activated BEVA 371 film**: a heated spatula held in place for 8 seconds on a low setting over a silicone-release paper on the hull caused no notable damage, actually gently relaxing the hull and allowing for slight re-establishment of planarity.
        - **Mock-ups:** Tested three backing materials and three adhesives on 1-ply alum taxed goldbeaters skin to mimic the marine mammal organ painted hull (fig. 44, table 2). One final mock-up was completed with BEVA 371 film, the most promising option, to adhere goldbeaters skin 2-ply transparent, tengucho (thick), and sekishu (medium) to 1-ply alum taxed goldbeaters skin. The two-ply goldbeaters skin buckled less and had a nearly invisible appearance while maintaining sufficient strength. The thicker tengucho did not have any issues with gloss.

- **Results:** BEVA 371 film was selected as the adhesive material. 2-ply goldbeaters skin was selected for smaller fills, and tengucho medium was selected for the large gap on the PL side of the hull.

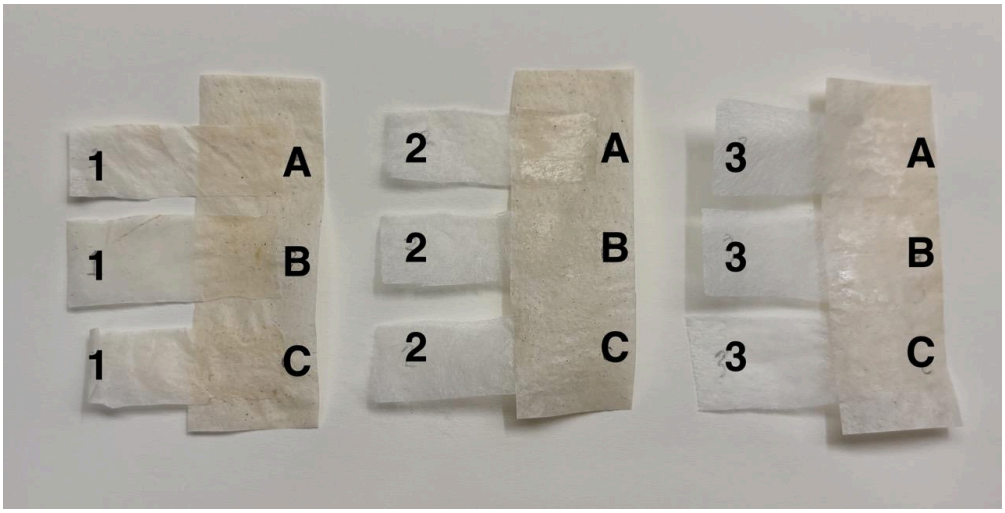

Figure 44. Mock ups. Materials tested: 1-ply alum tawed goldbeaters skin (1), 5 gsm sekishu thin (2), Tengucho mm (3). Adhesives tested: BEVA 371 Film (A), 3:1 Lascaux 498 and Lascaux 303 (B), thick wheat starch paste (C).

Table 2. Mock up evaluation.

	1-ply alum tawed goldbeaters skin (1)	**5 gsm sekishu thin (2)**	**Tengucho mm (3)**
BEVA 371 Film (A)	Slight bucking. Easiest application method. Promising for difficult to access applications.	Too glossy. More planar. Easiest application method. Promising for difficult to access applications.	Too glossy. More planar. Easiest application method. Promising for difficult to access applications.
3:1 Lascaux 498 and Lascaux 303 (B)	Slight bucking.	Too glossy. More planar.	Too glossy. More planar.
Thick wheat starch paste (C)	Slight bucking.	Too glossy. More planar.	Too glossy. More planar.

- **Backing layer application:**

  - For the smaller gaps, BEVA 371 film was attached first to 2-ply translucent goldbeaters skin, cut to shape 2 mm larger than the loss on all sides, and heat activated to adhere to the interior of the hull. The goldbeaters skin was held in place against the hull with a silicone-release paper and blotter paper (for planarity/stiffness) with finger pressure. Since access to the interior was not possible, the film was heat-activated from the front.

  - For the larger gap, the backing layer was prepared with aforementioned methods, but with tengucho (thick) paper instead of goldbeaters skin for additional support. The fill was adhered in place with a heat spatula (figs. 45-48).

Figure 45. Toned paper with BEVA 371 on the outward facing side. Slits were cut every 3-4 inches so the backing could be continuous and attached in sections.

Figure 46. The top edge of the backing layer was tucked behind the hull tear edge.

Figure 47. With one hand, a wide-tipped and dull-edged spatula was used to maintain pressure while head activating the BEVA 371 film. The heat spatula was used with silicone release paper folded around the tip.

Figure 48. Once the top edge was attached in place, the lower edge was attached in place by maintaining pressure with the wide-tipped, dull-edged spatula between the stringers and side ribs of the umiak. The heat spatula was then used to attach the lower side of the fill in place. This process was repeated for each section of the backing paper.

- **Fills:**
  - After testing, a fill was created to match the surface topography, gloss, color, and texture of the surrounding hull. A combination of the following was selected:
    - 1 part Golden Artist Colors (GAC) Specialty Acrylic Polymer 500 additive (to improve the leveling ability and hardness of the fill while reducing tack and maintaining minimal flexibility)

- 1 part Golden Acrylic Medium (mixed 1:1 matte and gloss to achieve desired sheen)
- 2 parts Golden Artist Acrylics (color matched before mixing)

- The fill was painted in layers and leveled with a spatula. Final inpainting was completed with Golden Artist Acrylics to further integrate the visual appearance of the fills.

10. **Carried out post-treatment photo documentation and finalized the treatment report (2 hours).**

Total treatment time: 30.75 hours

Treatment complete: August 4th, 2025

Handling notes

The umiak should be picked up with one hand on the bow and one hand on the stern, avoiding placing pressure on the sides of the hull, particularly the PL side with the large fill. The umiak should not be tilted, as the boom will swing

Future treatment

Future treatment could include further investigation of stain reduction of the sail. Accession numbers and letter addendums could be added to tools that lack them. Additionally, object housing could be constructed for long-term storage, minimizing space, and stabilizing the object in case of earthquake-induced vibrations. Lastly, curatorial consultation could help clarify the desired placement of model accessories within the umiak.

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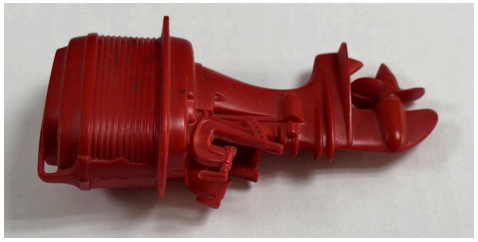
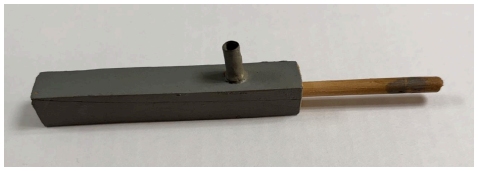
Appendix I: Additional Information Regarding Model Accessories

Table I.1. Model accessories details: umiak and whaling equipment.

Image	Accession Number	Description	Material
[Refer to fig.II.1]	1988.013.001a	Umiak	[Refer to p.1]
[Refer to fig. 2]	1988.013.001b	Removable tiller and rudder	Painted wood
	1988.013.001c	Red commercially-cast outboard motor	Plastic (potentially cellulose acetate, polyvinyl chloride, or polystyrene)
	1988.013.001d	Wooden cover to block the well when the motor is not in use	Painted wood and metal, synthetic cord
	1988.013.001e-h	Four unpainted paddles	Wood
 	1988.013.001i-j	Two models of seal floats with attached braided lines and harpoon heads (one might be missing?)	Wood, sinew, thread, ivory

	1988.013.001k	Bailing pump	Wood, paint, metal
	1988.013.001l	Harpoon	Wood, ivory, thread, sinew
 	1988.013.001m	Darting gun and harpoon head	Wood, metal, thread
	1988.013.001n	Ice space with a solder join	Wood, ferrous metal, solder
	1988.013.001o	Rope hook	
	1988.013.001.p-q	Two long oars (gifted by Ed in 1994)	Wood
	[No associated accession number]	One short unpainted paddle	Wood
	[No associated accession number]	Rope	Sinew (?)

Appendix II: Diagrams and Terminology

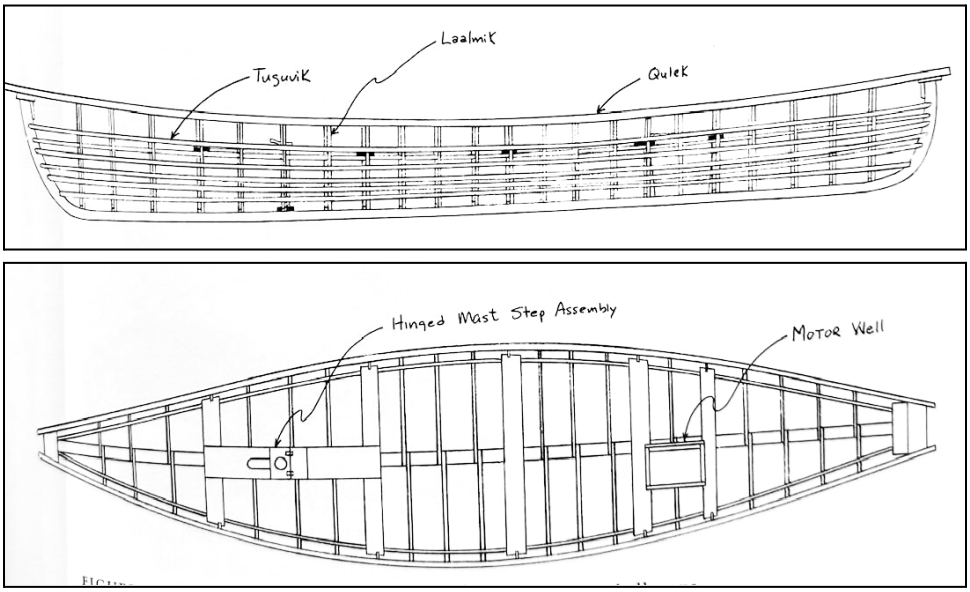


Figure II.2. Side and top-down view of a contemporary angyapik. Image source: Braund 1988, 45.

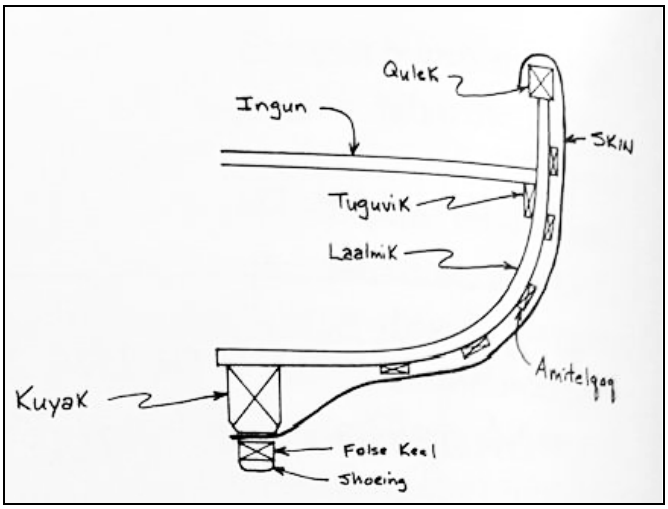


Figure II.1. Cross section of contemporary round-bottom angyapik frame and names of wooden components. Image source: Braund 1988, 82.

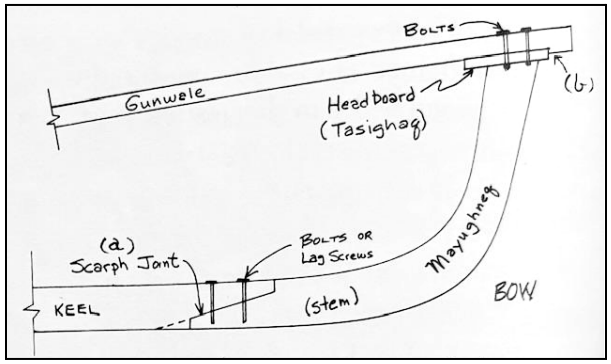


Figure II.3. Detail of a scarph join attached to the post (*mayunghneq)* and keel (*kuyak*). Image source: Braund 1988, 38.

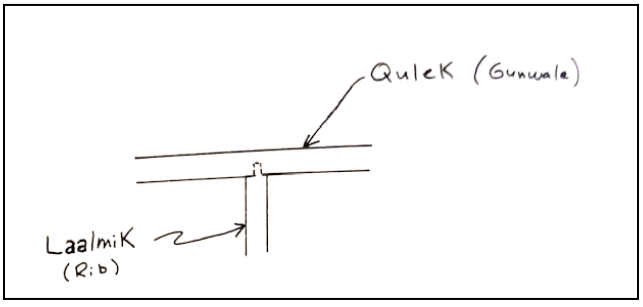


Figure II.4. Detail of rib where it attaches to gunwale. Image source: Braund 1988, 38.

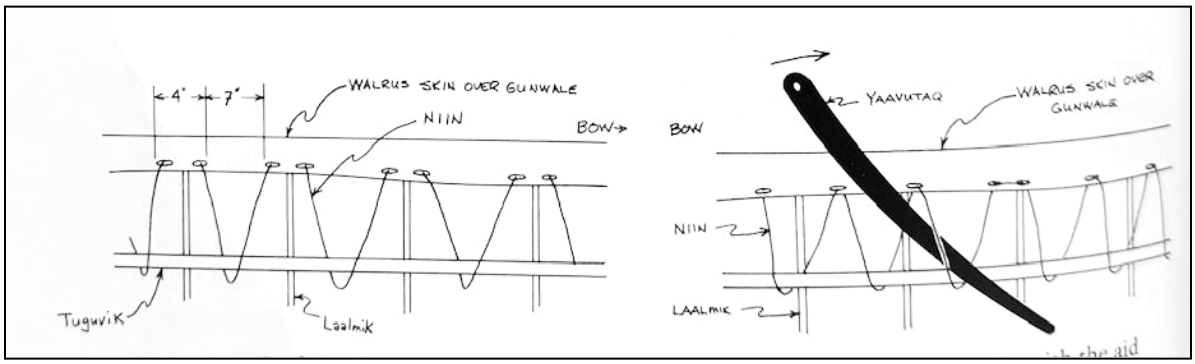
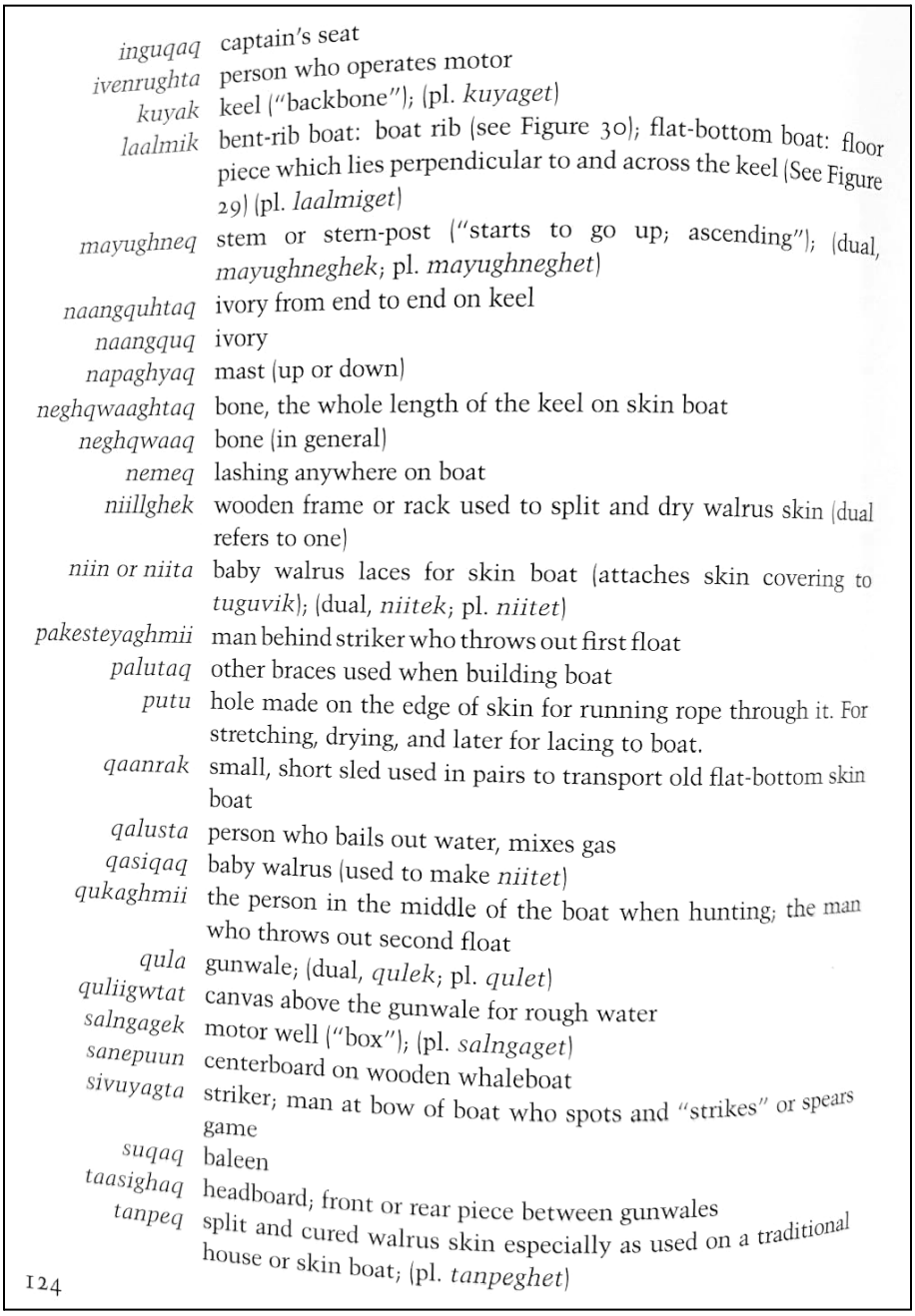


Figure II.5. Detail of lashing for attaching the walrus skin to the angyapik. Tightening the lashing with the aid of a whale rib (*yaavutaq*). Image source: Braund 1988, 22.

aglughtaq	mast step
amighqaq	skin prepared for use on frame of boat
amiiqaq	whole walrus skin; not processed
aminghhaq	skin boat cover; a newly covered boat
amitelqaq	outside longitudinal stringer or batten (usually 5–7 per side); ("narrower than keel"); (pl. *amitelqat*)
angwaaghun	paddle; (pl. *angwaaghutet*)
angyaghwaaq	wooden whaleboat; (pl. *angyaqhwaaghet*)
angyalek	boat owner; captain; (pl. *angyalget*)
angyapik	skin boat (either round or flat-bottom); literally means a "real" or "genuine" boat—original boat (pl. *angyapiget*)
angyaq	boat (any kind); (pl. *angyat*)
angyilghaq	rack for storing a boat; (pl. *angyilghat*)
aquutaq	rudder; (pl. *aquutat*)
ayagleghaq	tiller
esavghaq	small sled used to move a boat on sea ice; person (hunter) moving a boat with small sleds
ighu	leg or side piece on flat-bottom boat; (pl. *ighut*)
ingtaghan	brace or spreader used between keel and gunwale when building skin boat frame; (dual, *ingtaghatek*; pl. *intaghatet*)
ingun	thwart; seat; (pl. *ingutet*)

Figure II.6. Siberian Yup'ik words related to skin boats. The left column is generally singular. Image source: Braund 1988, 123.



inguqaq captain's seat
ivenrughta person who operates motor
kuyak keel ("backbone"); (pl. *kuyaget*)
laalmik bent-rib boat: boat rib (see Figure 30); flat-bottom boat: floor piece which lies perpendicular to and across the keel (See Figure 29) (pl. *laalmiget*)
mayughneq stem or stern-post ("starts to go up; ascending"); (dual, *mayughneghek*; pl. *mayughneghet*)
naangquhtaq ivory from end to end on keel
naangquq ivory
napaghyaq mast (up or down)
neghqwaaghtaq bone, the whole length of the keel on skin boat
neghqwaaq bone (in general)
nemeq lashing anywhere on boat
niillghek wooden frame or rack used to split and dry walrus skin (dual refers to one)
niin or niita baby walrus laces for skin boat (attaches skin covering to *tuguvik*); (dual, *niitek*; pl. *niitet*)
pakesteyaghmii man behind striker who throws out first float
palutaq other braces used when building boat
putu hole made on the edge of skin for running rope through it. For stretching, drying, and later for lacing to boat.
qaanrak small, short sled used in pairs to transport old flat-bottom skin boat
qalusta person who bails out water, mixes gas
qasiqaq baby walrus (used to make *niitet*)
qukaghmii the person in the middle of the boat when hunting; the man who throws out second float
qula gunwale; (dual, *qulek*; pl. *qulet*)
quliigwtat canvas above the gunwale for rough water
salngagek motor well ("box"); (pl. *salngaget*)
sanepuun centerboard on wooden whaleboat
sivuyagta striker; man at bow of boat who spots and "strikes" or spears game
suqaq baleen
taasighaq headboard; front or rear piece between gunwales
tanpeq split and cured walrus skin especially as used on a traditional house or skin boat; (pl. *tanpeghet*)

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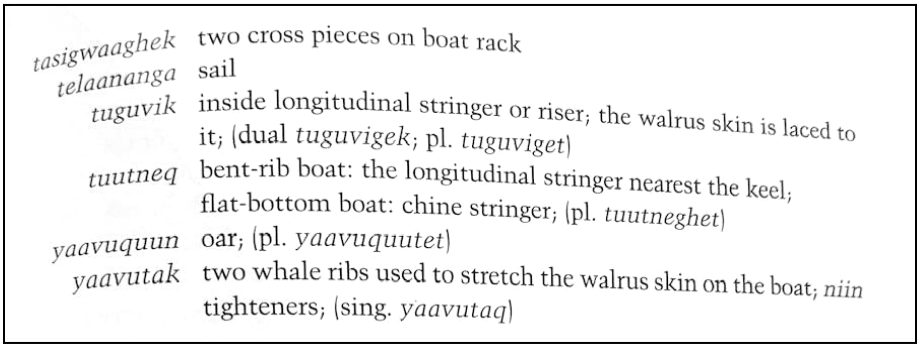
Figure II.6. Siberian Yup'ik words related to skin boats. The left column is generally singular. Image source: Braund 1988, 124.



tasigwaaghek two cross pieces on boat rack
telaananga sail
tuguvik inside longitudinal stringer or riser; the walrus skin is laced to it; (dual *tuguvigek*; pl. *tuguviget*)
tuutneq bent-rib boat: the longitudinal stringer nearest the keel; flat-bottom boat: chine stringer; (pl. *tuutneghet*)
yaavuquun oar; (pl. *yaavuquutet*)
yaavutak two whale ribs used to stretch the walrus skin on the boat; *niin* tighteners; (sing. *yaavutaq*)

Figure II.7. Siberian Yup'ik words related to skin boats. The left column is generally singular. Image source: Braund 1988, 125.

Appendix III: Before Treatment Photo Documentation

Figs III.1 through III.5 were documented with a Canon EOS 80D DSLR camera (100 ISO, 1/60s, f/3.5 to f/4.5). The light source was the Interfit F5 Two-Head Continuous Fluorescent Lighting Kit with two five-light lamp heads, ten 32W fluorescent 5600K daylight lamps, and two softboxes. Post-capture processing included cropping, white balance adjustment, and exposure adjustment (+0.35 for fig. III.1-III.2, +0.55 for fig. III.3, -0.05 for fig. III.4-5) within Adobe Camera Raw.

Figure III.1. Before treatment photo documentation, overall PL.

Figure III.2. Before treatment photo documentation, overall PR.

Figure III.3. Before treatment photo documentation, top view.

Figure III.4. Before treatment photo documentation, tiller and rudder side A.

Figure III.5. Before treatment photo documentation, tiller and rudder side B.

Appendix IV: After Treatment Photo Documentation

Figs IV.1 through IV.4 were documented with a Canon EOS 80D DSLR camera (100 ISO, 1/60s, f/4). The light source was the Interfit F5 Two-Head Continuous Fluorescent Lighting Kit with two five-light lamp heads, ten 32W fluorescent 5600K daylight lamps, and two softboxes. Post-capture processing included cropping, white balance adjustment, and minimal exposure adjustment within Adobe Camera Raw.

Figure IV.1. After treatment photo documentation, overall PL.

Figure IV.2. After treatment photo documentation, overall PR.

Figure IV.3. After treatment photo documentation, top view.

Figure IV.4. After treatment photo documentation, model accessories.