Stretched Skin Consultation with M. Mecklenburg
Smithsonian Museum Conservation Institute (MCI)

History of Recommendations:
On May 17th Dawn Biddison

Anthropology Conservation Recommendation for Exhibition:
In the initial assessment of the objects slated for loan to the Anchorage Museum the loan conservators recommended that the two drums be removed from the loan because of the unstable condition of the hide. However, NMNH curatorial staff has subsequently requested that the drum be included in the loan.

22 October, 2008
Senior Research Scientist, Marion Mecklenburg, with the Smithsonian Museum Conservation Institute met with the Anchorage Project loan conservators in the Anthropology Conservation Laboratory (ACL) on 22 October, 2008, to view the condition of a stretched skin drum (E1276133) slated for loan to the Anchorage Museum and help assess under what condition catastrophic damage to the stretched hide is likely to occur.

Mecklenburg has published widely on the mechanical properties of various materials and the measurable effects of fluctuations in temperature and relative humidity on those materials (see References attached to this report). Mecklenburg has also been consulted by the Anchorage Project team regarding engineering questions relating to exhibition hardware.

Based on information provided by Mecklenburg during the first consultation Anthropology Conservation Laboratory Supervisor Greta Hansen requested that Mecklenburg be invited to return to the ACL to review all the stretched skin objects included in the Anchorage loan.

12 November, 2008
Mecklenburg returned to the ACL on 12 November, 2008 to view all the stretched skin objects from the NMNH collection included in the Anchorage Loan. All the objects covered in these consultations are fabricated from animal hide stretched and restrained over either flexible or solid wooden frames. Mecklenburg provided an overall view of the expected response of both wood and hide when subjected to fluctuations in relative humidity and how these two materials might be expected to interact based on specifics of fabrication. The following is a summary of the information provided by Mecklenburg during the two consultations.

Properties of Materials:
Select properties of hide and wood, and how those properties influence change in a composite object in response to changes in relative humidity are summarized in the following list:
1. Wood resists compressive or tensile stress parallel to the grain far more readily than if those same stresses are applied perpendicular to the grain. Therefore wood will warp and twist longitudinally in response to applied stress.

2. Shrinking and swelling of wood as a result of changes in relative humidity is greatest across the grain and negligible parallel to the grain.

3. Stretched skin hides can appear to be **taut** when they are actually **rigid** or thick, but no longer under tension.

**Solid Frames vs. Flexible Frames:**
Mecklenburg considers the bent board frames on the Tlingit, Tsimshian, Sugpiaq and Unangan drums included in the loan as **solid** frame structures. The circular bent wood frames supporting these stretched skin drums do not shrink or expand in circumference to any appreciable degree in response to changes in relative humidity. Hides stretched over these frames, and held under tension, are at the greatest risk of catastrophic damage if subjected to relative humidity levels below 40%; the hide will shrink while the frame remains rigid, and tears will propagate in the skin in order to release the stress built up in the hide.

The frames for the boat and boat models included in the loan, are all fabricated from multiple pieces of wood that are pinned, pegged or nailed together to make an internal, **flexible** structure. Hides stretched over these frames, and held under tension, are at a considerably reduced risk of catastrophic damage if subjected to relative humidity levels below 40%; the hide will shrink causing the frame to flex in response, thereby dissipating the increased stress on the hide.

**High Risk Objects:**
The following figure provides a breakdown of the stretched skin objects slated for loan to the Anchorage Museum. The objects highlighted in yellow are considered highly susceptible to catastrophic damage as they involve both solid frames and tightly stretched skins, while the remaining objects involve taut skins over flexible frames, or rigid skins over solid frames.

<table>
<thead>
<tr>
<th>Catalogue #</th>
<th>Object Name</th>
<th>Culture</th>
<th>Wood Frame</th>
<th>Condition of Hide</th>
</tr>
</thead>
<tbody>
<tr>
<td>E016275</td>
<td>Kayak model</td>
<td>Sugpiaq</td>
<td>Flexible</td>
<td>Taut</td>
</tr>
<tr>
<td>E020611</td>
<td>Drum &amp; drumstick</td>
<td>Tsimshian</td>
<td>Solid</td>
<td>Taut</td>
</tr>
<tr>
<td>E036180</td>
<td>Kayak model</td>
<td>Yup'ik</td>
<td>Flexible</td>
<td>Taut</td>
</tr>
<tr>
<td>E038882</td>
<td>Umiak model</td>
<td>Yup'ik</td>
<td>Flexible</td>
<td>Rigid</td>
</tr>
<tr>
<td>E072505</td>
<td>Drum</td>
<td>Sugpiaq</td>
<td>Solid</td>
<td>Rigid</td>
</tr>
<tr>
<td>E073019</td>
<td>Umiak model</td>
<td>Unangan</td>
<td>Flexible</td>
<td>Taut</td>
</tr>
<tr>
<td>E073020</td>
<td>Drum</td>
<td>Unangan</td>
<td>Solid</td>
<td>Rigid</td>
</tr>
<tr>
<td>E127613</td>
<td>Drum</td>
<td>Tlingit</td>
<td>Solid</td>
<td>Taut</td>
</tr>
<tr>
<td>E129214</td>
<td>Kayak model</td>
<td>Unangan</td>
<td>Flexible</td>
<td>Taut</td>
</tr>
<tr>
<td>E153656</td>
<td>Kayak model</td>
<td>Inupiaq</td>
<td>Flexible</td>
<td>Taut</td>
</tr>
<tr>
<td>E383165</td>
<td>Umiak model</td>
<td>Unangan</td>
<td>Flexible</td>
<td>Taut</td>
</tr>
<tr>
<td>E419041A</td>
<td>Kayak</td>
<td>Yup'ik</td>
<td>Flexible</td>
<td>Taut</td>
</tr>
</tbody>
</table>

List of the stretched skin objects from the NMNH collection slated for loan to Anchorage Museum.
Case Study: Tlingit stretched skin drum E127613

This stretched skin drum was part of a display of Northwest Coast Art in Hall 9 of the Smithsonian’s Natural History Museum. Hall 9 opened December 8, 1957, and the drum remained on view until November 1991. There is no written object specific documentation of these early exhibits, although there are some photographs of the objects on exhibit. During long-term exhibition this drum was subjected to uncontrolled temperature and humidity fluctuations and two tears are now visible on the sides of the drum; the point at which these tears occurred is unknown.

Materials and Construction:
The drum is fabricated from sheep skin, stretched over a round wooden frame; the frame is 52 cm in diameter and 6 cm high. The skin on the drum is under tension. The drum has an elaborate painting on the surface of the stretched skin; it is the only painted Tlingit drum in the NMNH collection. There are two tears in the skin on opposing sides of the drum that begin at the base of the wooden frame and travel up the side; one tear has rounded the upper edge of the frame and has begun to travel into the painted portion of the drum. The surface of the hide in the tear is white and has not oxidized; suggesting that the damage occurred after the drum was collected and very likely began while the object was on exhibit in the environmentally unstable exhibition conditions mentioned above. The drum has been selected for a 12 year loan to the Anchorage Museum.

Results of Consultation:
It is Mecklenburg’s opinion that, due to the high level of stress the stretched skin is currently under an increase in the size of the tears in the drum can be anticipated if the it is subjected to relative humidity of 40% or lower; the same applies if temperatures are elevated for as little as six hours. The type of damage these conditions would encourage would result in further tearing, which would travel across the face of the drum, through the painted hide; this type of damage is considered catastrophic.

Recommendations:
Given the severity of damage which can result from modest alterations in environmental conditions the Loan Conservator’s strongly recommend that the Tlingit Drum (E127613) and Tsimshian Drum (E020611) should not be included in the Anchorage Loan.

References


