MARINE MAMMALS AND SEA ICE LOSS; CONVERGENCE OF ECOLOGICAL AND EVOLUTIONARY TIME

Nothing in biology makes sense except in the light of evolution - Dobzhansky

Likewise, Arctic environmental change needs to be understood in evolutionary terms

Brendan P. Kelly
Peter Boveng
Fossil remains of *Cynognathus*, a Triassic land reptile approximately 3 m long.

Fossil remains of the freshwater reptile *Mesosaurus*.

Fossil evidence of the Triassic land reptile *Lystrosaurus*.

Fossils of the fern *Glossopteris*, found in all of the southern continents, show that they were once joined.
<table>
<thead>
<tr>
<th>Region</th>
<th>Area (km²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asia</td>
<td>44,579,000</td>
</tr>
<tr>
<td>Sea ice</td>
<td>36,000,000</td>
</tr>
<tr>
<td>Africa</td>
<td>30,065,000</td>
</tr>
<tr>
<td>N. America</td>
<td>24,256,000</td>
</tr>
<tr>
<td>S. America</td>
<td>17,819,000</td>
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<tr>
<td>Antarctica</td>
<td>13,209,000</td>
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<tr>
<td>Europe</td>
<td>9,938,000</td>
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<tr>
<td>Australia</td>
<td>7,687,000</td>
</tr>
<tr>
<td>Islands</td>
<td>1,387,000</td>
</tr>
</tbody>
</table>
Breeding species

Latitude

90°N 0° 90°S

True seals
Seal lions, fur seals, walruses

Kelly 2001
I) Southern species move north and interbreed with Arctic species
II) Atlantic forms reconnect and interbreed with Pacific forms
III) Interbreeding among Arctic forms
Northern right whale
_Eubalaena glacialis_
Beluga
*Delphinapterus leucas*
Hooded seal pup
(*Cystophora cristata*)

Harp seal pup
(*Pagophilus groenlandicus*)

Kovacs et al. 1997