

Ancient Sea Levels on Lasqueti

People often tell me that they've seen shells or blue ocean clays in unlikely places on Lasqueti – well inland and at much higher elevations than current sea levels. These deposits are remnants of higher ocean levels at the end of the last Ice Age and can be used to figure out where Lasqueti's shoreline was in the ancient past. Since Northwest Coast peoples usually settled along the shore, understanding ancient sea levels can in turn help us find the archaeological sites associated with Lasqueti's earlier occupants.

In the past 15 years, archaeologists, working with various other “paleo-scientists” have learned a lot about ancient sea levels on the BC coast. For a long while, scientists thought about sea level using a very basic equation: during the Ice Age, when much of the ocean's water was tied up in ice, sea levels at the *global* scale were lower than today. More recently, however, advances in a range of analytical techniques have made it possible for scientists to reconstruct detailed, *local* sea level histories. This is especially important in British Columbia where sea level history is vastly different from region to region. For instance, the sea level histories of the lower Fraser Valley or the west coast of Vancouver Island are quite different from the one early Lasquetians experienced.

Several factors cause sea level history to vary from one area to another. In the case of Lasqueti, among the most important factor was the enormous weight of the ice that covered the Island during the end of the last Ice Age (the Pleistocene), some 14,000 years ago. At that time there was a sheet of snow and ice several hundreds of meters thick that covered most of mainland BC and extended to just south of Seattle. Because the earth's crust is flexible, the weight of the ice pushed *down* the earth's crust (termed “isostatic depression”) and the *relative* level of the sea rose. This is despite the fact that a significant amount of the ocean's water was tied up in that ice. In places that were ice-free south of Seattle, sea level was relatively lower, because there was no depression of the earth's crust.

When the ice started to melt rapidly after 14,000 years ago, changes in sea level were dramatic. The melting of the ice sheet resulted in the crust immediately (geologically speaking) springing back (termed “isostatic rebound”)—which should result in relative sea level decreasing as the earth's crust rose. However, at this same time, *globally*, sea level was rising because of the input of the melting ice into the ocean. The result is that changes in sea level can reflect a complex interaction between local isostatic rebound and global sea level rise.

What does this mean for Lasqueti? Well, thanks to the work of geomorphologist Ian Hutchison and others who visited the island about 10 years ago, and to Wayne Bright for showing me (very) old shells on his property, we have a pretty good idea of the local sea level history of our island. The geomorphologists sampled several lakes on the north end, and obtained radiocarbon dates for the layer of clams (an old beach) on Oben Road (at ~ 56 meters elevation). The attached figures show you

what Lasqueti looked like between 14,000 – 13,300 years based on the work of the geomorphologists and a date on one of Wayne's ancient beach shells.

Lasqueti's Sea Level History

Before 14,000 years ago, Lasqueti was actually represented by a few islets, with the largest island centered on Mt. Trematon (so, in protecting Mt. Trematon, we actually were conserving Lasqueti's oceanfront, the ancient core of what is now a larger island!). A deposit of large clam shells found while digging a pond on Teapot House land likely dates to this time when sea level was 150 meters higher than today.

Between 14,000 – 12,500 years ago, the relative sea level around Lasqueti dropped dramatically and quickly, associated with the removal of the ice's weight and consequent isostatic rebound. One of the shells sitting in the old beach in Wayne's orchard (~47 meters elev.), dating to ~13,300 years ago, shows just how rapidly sea level dropped: from 150 m above current level to 47 m above the current level in just 700 years (see images). The shells collected by Ian Hutchison's team from the ancient beach at Oben Road (~56 meters elevation) were a similar age. By 12,500 years ago, sea level was about where it is today, but it didn't stay at this level for long.

First Nations oral traditions from throughout the coast recount dramatic changes in sea level that almost certainly refer to these dramatic post-Ice Age changes in the land and sea. For example, the Sto:lo of the Fraser Valley have stories about some of the First Peoples taking refuge in caves or on mountainsides during times of rising water. The places on the landscape today that mark these refuges are about 200 m elevation – that is, just above the high sea level mark. We don't know when the earliest people settled on Lasqueti, but we do know that people made it to the southern tip of Chile by ~15,000 years ago, and the oldest sites found in BC so far (from Haida Gwaii and the Central Coast) date to ~12,500 years ago; older sites in BC are almost certainly now covered by the ocean.

After 12,500 years ago, the sea level around Lasqueti continued to bounce around until the crust finally settled down. That is, the island's shore was the same 12,500 years ago as it is today, but then sea level fell to a few meters below current levels and then rose a few meters above the current shore line until at least 5,700 years ago. As a result of this constant movement of the shoreline, finding really old sites on Lasqueti is going to be a challenge, since this rising and falling of sea levels could have easily obliterated lower early coastal sites (much like rising sea levels today will do to many coastal communities). We don't yet know what happened to sea level in the last 5000 years, but my recent work on Quadra suggests that sea level has been falling there for the least 1500 years. Whether this is true for Lasqueti remains to be seen.

If you want to know more about Lasqueti's sea level history, here's the reference to research that resulted from the geomorphologists' working here. It's a good article, but some people might find it to be a bit academic.

Hutchinson, I., James, T. S., Clague, J. J., Barrie, J. V. & Conway, K. W. 2004.
Reconstruction of late Quaternary sea-level change in southwestern British Columbia
from sediments in isolation basins. *Boreas* 33:183–194.