

**Our Ocean Backyard — *Santa Cruz Sentinel* columns by Gary Griggs, Director, Institute of Marine Sciences, UC Santa Cruz.**

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**Traveling an Ancient Coastline**



*An abandoned cement works on along the north coast of Scotland*



*Ruins of ancient castle along the northeast coast of Scotland*

We have again heeded the call to travel, and for the months of September and October, are working our way along the coasts of Scotland, England, Spain and Portugal. So, Our Ocean Backyard will be coming from about 8000 miles away for about two months.

Scotland was our starting point, in part because it is the home of some of my ancestors, in part because I wanted to see how their coast differed from our own, being a much older and rough-hewn landscape. I have also wondered for a long time about the history of the Scottish in Santa Cruz County, with names like Loch Lomond, Ben Lomond, Bonny Doon and many others.

Scotland is usually thought of as an independent country, and in most ways it is, other than its use of the pound for currency and a habit of driving on the wrong

side of the road as they do in England. I am still trying to figure out what language they speak.

Climate and weather were among the immediately observable differences as soon as we arrived. They experienced what has been frequently described as a miserable and wet summer, quite different than ours.

Everything in this entire country is green and there is no water shortage. It appears that about half of the population is engaged in cutting and trimming grass. Then there are the hundreds of thousands of sheep we've seen nibbling their way across coastal pastures that drop off to the cold sea below.

There are the tractors cutting grass along the roadsides; the sit-down mowers working their way through parks, front yards, and the areas around and within the ruins of castles and cathedrals; and then the odd weed whackers, which are cleaning up all the edges. Grass is meticulously maintained everywhere we have been in Scotland, and it provides a nice touch of formality and order.

The coastline is as varied as the country's topography and geology. Scotland is quite diverse, from the southern lowlands where most of the cities are, to the sparsely populated and northern highlands and the rugged and more remote islands. The country is small at 30,400 square miles, only about 1/5th the size of California.

But when it comes to coastlines, the statistics are reversed. Although length of coastline is a number that varies depending upon the scale of the map one is using, California's coastline is about 1100 miles long. The coast of Scotland, on the other hand, is usually given as 6,200 miles, over five times longer than California's. It takes a long time to go very far, and many of the coastal roads are only single track or one lane.

The edge of Scotland is extremely irregular by virtue of its Ice Age history of glaciation, which produced the many deep lochs and forths, which penetrate far into the coastline. These Scottish fjords or embayments, combined with a tidal range of between 12 and 25 feet, allows the sea to extend miles inland from the outer coast.

The California coast is young, geologically speaking, with the San Andreas Fault forming an active zipper that more or less parallels the coast producing its share of earthquakes. Most of the rocks exposed along California's outer edge have been

accreted or plastered onto an ancestral coast as plates collided and scraped accumulated seafloor sediments onto our western edge over the past hundred million years, give or take a few million.

Scotland, is eons older, and we have been driving through rocks that go way back in time, nearly three billion years-some of the oldest rocks anywhere on the planet. They look old, covered by lichens, ground down and smoothed over by thousands of years of Ice Age glaciation.

Scotland's oldest rocks were formed somewhere near today's South Pole. Through the subsequent billions of years the landmass that is present day Scotland, migrated northward as a part of an older drifting continent, crossing the equator about 300 million years ago.

Between about 250 and 200 million years ago Scotland and England were deserts and vast sand dunes were laid down and preserved. About 200 million years ago the Atlantic Ocean began to open up as North America and Europe began a long-term separation leaving a new ocean, the Atlantic, behind.