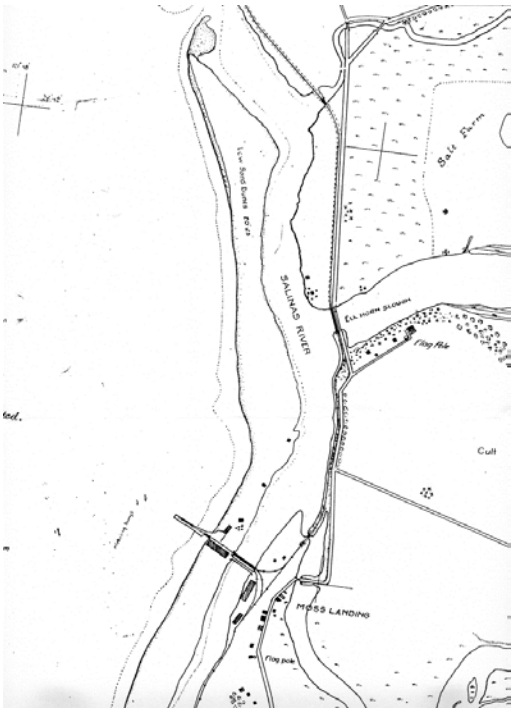
Our Ocean Backyard — *Santa Cruz Sentinel* columns by Gary Griggs, Director, Institute of Marine Sciences, UC Santa Cruz.

#162 July 12, 2014
Salt from the Sea

Salt ponds in San Francisco Bay with different species of algae producing different colors as salinity changes. Photo Courtesy of Robert Campbell Photography, San Francisco Bay Area.



Moss Landing, the Salinas River, and the Salt Farm

Unfortunately for us, every gallon of seawater contains nearly five ounces of salt. It doesn't sound like much, but it's enough to make it essentially undrinkable and pretty toxic for most crops; well, unless you're cultivating seaweed. And there are somewhere around 320 million cubic miles of it out there, covering nearly ¾ of the Earth's surface. While coastal waters are relatively shallow, on average the oceans are over two miles deep. This vastness became abundantly clear to me on our recent round the world voyage when it took us almost 18 days just to cross the Pacific. There is a just a lot of salty water out there.

Although the average salt content is about 3.5%, the salinity of the oceans varies a bit from place to place, particularly in coastal areas. It can be essentially fresh a number of miles offshore where large rivers like the Amazon discharge, and saltier than normal where evaporation is very high, places like the Red Sea or tropical lagoons.

No matter where we are in the world oceans, however, and no matter what the specific salinity is at that particular location, the % of the salt contributed by each of the individual ions or elements remains exactly the same. Stay with me here. Chloride always makes up 55.1%, Sodium 30.6%, Sulfate 7.7%, Magnesium 3.7%, Calcium 1.2%, Potassium 1.1%, and on through the periodic table. These six most abundant elements or ions, however, make up 99.36% of the total salt content. The ocean is really like a massive slow motion blender, with currents constantly mixing up all the salts or ions that are delivered by rivers, volcanoes, and seafloor vents and distributing these individual elements evenly throughout the world oceans.

This raises an interesting issue, in this era of trying to be natural and organic: No matter what label or name is on that container of salt you buy (sea salt, organic salt, extra-virgin salt, etc.), if it comes from evaporated seawater, its all essentially the same stuff. Well, except many salts have iodine added, which is an important trace element.

All the world's salt comes from the evaporation of seawater, whether this took place millions of years ago from ancient oceans where it was preserved as rock salt in places like Kansas, New Mexico, Texas, Florida, and a number of other states; or it is harvested from evaporation ponds along the edges of today's oceans, bays or lagoons. South San Francisco Bay, for example, has had evaporation ponds for salt production operated by Cargill for decades. If you want to see some amazing images of these ponds, Google "San Francisco Bay salt ponds" and you will what

look like ponds with bright food coloring; but in fact the colors are from different types of algae that grow in the ponds under different salinity conditions.

There were also salt ponds on the north side of Elkhorn Slough for years, and some of the old buildings are still visible just on the north side of the harbor bridge. The Salinas River was named from the world salina, meaning salt flats or salt works, and the river formerly flowed through this area before discharging several miles north of the present day harbor entrance. This area on the 1910 and 1933 maps is clearly labeled “Monterey Salt Works” and “Salt Farm”.