

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

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Floating frisbees and coastal currents

UCSC No 2945 A

This drifter is being used in a scientific study of ocean currents by the University of California, Santa Cruz. We would greatly appreciate your filling in the following information and dropping the card in a post box. The results of the study will be sent to the finder if interested. - Yes

Date & Time found 11 AM 17 November 1972

Location found North Point Reyes Beach, ^{North} of Light house

Name & Address of finder Lance Williams 760 Lockwood Pacifica, CA 94044

DRIFTER No. 233WA200 KAHL SCIENTIFIC INST. CORP., EL CAJON, CA 92022

A waterproof numbered postcard was attached to each of the drifters we dropped offshore in a coastal current study in the early 1970s.

Forty years ago Santa Cruz had some local water quality problems, mostly from older sewer outfalls that were located too close to the beach. Last October I wrote about Sewer Peak, or the old East Cliff outfall that discharged just 200 feet off Pleasure Point. The Santa Cruz outfall was a bit longer, 2000 feet off the end of Almar Avenue, but still too close for swimmers and surfers on the West Side when the waters were moving towards Steamer Lane.

Both of those old outfalls were subsequently eliminated, the level of treatment greatly improved, and a new outfall line was built that takes treated waste water several miles offshore of Natural Bridges. Before figuring out where to put these outfalls 40 years ago, however, we needed to find out which way the coastal currents flowed so treated water was discharged in an appropriate place.

In 1970 there was also a proposal to build what would have been the nation's largest nuclear power plant on the coast just north of Davenport. Knowing that the nearshore waters would be used for the discharge of very large volumes of cooling

water raised another coastal current question, which way was that effluent going to go?

Today we use a shoreline based radar system to track ocean currents along the entire coast of California in real time, and don't even have to leave the comfort of our office and computer screen. While we now have some very sophisticated tools for monitoring which direction the coastal waters are moving, this wasn't the case in 1970. My personal interest and scientific curiosity at the time for nearshore water quality and where any present or future discharges would end up led me to undertake a study of currents around Monterey Bay. I wanted to know where all that stuff was going.

Being a bit short of funding at that early stage in my career as a young assistant professor, I opted for an inexpensive and simple approach. There were plastic current drifters available commercially that could be dropped in the water, and which behaved just like the notes in bottles cast adrift by shipwrecked sailors. The drifters looked like small Frisbees, each had a tail and a small brass weight that caused it to sink and move with the bottom currents. But by cutting off the weights, the Frisbees floated and moved with the surface currents where most of the action was.

We stapled preprinted waterproof postcards to each drifter, which included a catalogued number, a return address and postage, and a request to write down where and when the drifter was picked up, and then mail it back. In order to get a regional picture of Monterey Bay currents, I decided to drop the drifters monthly along a series of transect lines extending offshore from Davenport, Almar Avenue where the Santa Cruz outfall discharged, Pleasure Point or Sewer Peak, and also Moss Landing. Six months into the study, I decided to extend the transects northward to Año Nuevo, and southward to Point Pinos and Point Cypress.

In order to make the process of dropping the drifters as efficient as possible, rather than using a small boat, which might have taken several days, I decided to go with an airplane. Another factor tipping the scale for me personally in favor of using a plane was that I had planned at least a 12-month study, and the sea conditions along the central coast are not always ideal for spending two entire days at sea in a small boat every month.

So the next step was locating a pilot and plane. I knew a graduate student who had recently flown along the coast and taken pictures, so asked him who the pilot was. He explained that the night janitor in the building occasionally rented a plane and

flew out of the old Scotts Valley airport. Today doing University business is far more complicated, with requirements for commercial licenses and multi-million dollar liability policies, but this was 1970, so I called him and we set up the first aerial drop of the drifters for the next week.

I bundled the surface and bottom drifters into packets of 10, held together by inserting their plastic tails into a salt ring, which would allow them to fall together after being dropped from the plane. When they hit the water, the salt would dissolve letting the weighted drifters sink to the bottom while the unweighted drifters would move with surface currents. So far, so good.

While this all seemed pretty straightforward and simple in principle, it got a little more complicated when the plane was flying over the waves at 80 or 90 miles an hour and we had to open up the door and drop the bundles at precise locations. The janitor was a nice weekend pilot, but I was asking him to do some things that I soon discovered weren't particularly safe or smart. I also was a bit surprised when we got into the plane on our first flight and he got out an instruction sheet explaining how to start up the plane. This did not instill in me a large amount of confidence in his experience as a pilot, but I later realized that this is routine practice for almost all pilots.

Flying perhaps 50 feet above the ocean, typically under windy conditions, opening up the door repeatedly and dropping drifters out, proved on more than one occasion to be life-threatening. The incident I recall best was on our 2nd or 3rd trip, when the pilot suddenly turned around with a frightened look on his face, and asked "Can you see the tail of the plane? The aircraft isn't operating properly". These are not the words you want to hear when you are 2 miles off Davenport with the cold ocean just a few feet below you. I had to tell him I couldn't see the tail of the plane.

It turns out that one of the bundles of drifters I had just dropped didn't make it into the ocean, but was wedged into the elevator or that movable part of the tail that allows the airplane to move up or down. This was not a good thing. We didn't know what the problem was, however, until we had returned to Scotts Valley, minus use of the elevators, and made an emergency landing.

This great research project I had dreamed up to find out which way the coastal currents were going had suddenly become much more difficult than I had envisioned.