STEPHANIE HEIT

Vanishing Line, 2016
Oil on canvas, 60 x 46 in

COURTESY THE ARTIST

RON EBY

Going Mainstream with the Sea Otters

A citizen scientist makes an important discovery monitoring otters

It was midnight at Moss Landing and I was out to spy on sleeping sea otters. I had just pulled into the parking lot at Moss Landing State Beach Park, at the mouth of Elkhorn Slough, lights off before turning in and careful not to slam the door. It was another cold and foggy night in April 2007 and Robert Scoles, my partner and friend, was waiting as we took turns watching the otters coming out of the water to haul out on the sandy beach below the bluff at the edge of the parking lot. We had to be careful. The otters were nervous while on the beach. A garbage truck across the harbor, noise from the power plant, a boat blowing its horn, even a squirrel could easily flush the otters off the beach. Normally, when one otter flushed, the others followed suit. Only when they felt the danger had passed would they gradually return, if they did at all. Otters are clumsy and slow moving when hauling out or coming ashore, but when they are flushed, they move quite quickly. Robert told me there were twenty-four otters on the beach. We were elated and excited to see so many of them. We knew we were seeing something rare that few had ever observed.

Our adventure together began when Robert asked for volunteers at one of our Team OCEAN training sessions. Robert had retired from the sheriff's department in 2005 and began volunteering as a guide at the Monterey Bay Aquarium. In 2006, he joined the National Oceanic and Atmospheric Administration (NOAA) volunteer programs Team OCEAN and Bay Net, managed by the Monterey Bay National Marine Sanctuary. Volunteers for the Team OCEAN program patrol Monterey Bay and Elkhorn Slough by kayak to inform citizens of rules aimed at preventing disturbances to marine mammals. Bay Net is the land-based counterpart to Team OCEAN. Robert's experiences in the sheriff's department and as a military policeman in the army groomed him to investigate and question human behavior and ultimately the natural world. His investigative skills, our friendship, and the synergy of our experiences and skills led us on a magical journey we never anticipated.

The suspects in our new lives as citizen scientists were otters. The crime was going ashore or "hauling out." Hauling out was normal for northern sea otters and was not a violation for southern sea otters if only done occasionally, but the training we had received told us that this was rare and usually in small numbers. Robert's observations led him to question the frequency and number of otters hauling out.

Robert asked for volunteers to help him at the 2007 training for Team OCEAN and Bay Net. I was the only volunteer that raised his hand and "wanna watch some otters" became our mantra. His plan was to take turns monitoring the beach at Moss Landing State Beach Park. Robert had seen enough signs of otters hauling out that he was convinced that southern sea otters hauled out on a regular basis. Standing watch for long periods was nothing new to Robert or me: Robert from his career in law enforcement and me from my twenty year career as a naval officer during which I spent as much time as possible on ships at sea.

Together, Robert and I began monitoring the beach and found otters hauling out almost every night. We took turns doing six-hour shifts and despite the cold and sometimes wet weather, we were thoroughly enjoying our new roles as citizen scientists. We kept notes, recording the number of otters that hauled out every half hour and shared our observations with friends and scientists alike. We met Dr. Daniela Maldini in June of 2007. Dr. Maldini took us under her wing and designed an observation

protocol that would occupy us for the next two years. Her advice was that in order to make our point scientifically, we would need to monitor the otters for two twenty-four-hour periods per month for the next two years, recording not just the number of otters hauled out, but also the number of otters in the raft that hovered near the beach, the temperature, wind speed, wind direction, tide, water conditions, etc. Dr. Maldini was the first of many scientists and otter experts that guided us over the next decade. They guided us, befriended us and made us feel part of their community.

Two years later, with the help of a few other volunteers, we had the data Dr. Maldini suggested we collect. We learned that the colder and more miserable we were, the more otters hauled out. One full moon night, during a cold snap, I was able to get a photo of eighty-nine otters hauled out at once. A simple Excel chart plotting the number of otters hauled out versus the temperature was enough to convince Dr. Maldini that the otters were hauling out to get warm, or for thermoregulation. Our work was done, but it took two years for Dr. Maldini to have the data analyzed in sufficient depth to get the paper peer reviewed and accepted for publication. Robert and I wouldn't have the patience for the meticulous efforts of drafting a scientific paper so left that to Dr. Maldini and continued on in our preferred roles as citizen scientists in the field. We enjoyed the long hours observing otters and nature in general. We had found our niche.

After the haul out study, a new project was planned for Elkhorn Slough to install an underwater barrier to slow the water leaving a 460-acre area behind a railroad structure and they needed marine mammal monitors to ensure that no marine mammals were disturbed during construction. We assembled a team of about twelve people and for two years we monitored the otters and harbor seals using this area for one half hour prior to until one half hour after any construction activity. What we observed surprised us and led us toward our next project discovering "new" behaviors in the southern sea otter. Parts of a nearby creek called Yampah Creek were visible from the stations we had built for the monitors and we regularly saw otters occupying the network of tidal creeks.

For our next project we found a better place to make the transition from the sill project to observing the otters at Yampah. We found a nearby hill that gave a better view of Yampah Creek and once again began observing and recording. We soon realized that the otters here were behaving differently from the otters that had been studied along the coast. The difference seemed important. Otters along the coast were reported to spend approximately one third of their day foraging. They needed to do that to keep up their high metabolism to keep warm. Otters don't have blubber like other marine mammals. Instead they rely on their thick fur and high metabolism. The otters in Yampah Creek seemed to do very little foraging and spent a lot of time resting, either in the water or on land. We discussed our observations with Dr. Kerstin Wasson, the lead scientist at Elkhorn Slough National Estuarine Research Reserve (ESNERR), and she agreed this was indeed unique and worth studying and documenting. We began four- to six-hour-weekly observations of the otters in Yampah Creek, recording data much as we had with the harbor study.

After collecting data for three years, we presented our analysis to Dr. Wasson. Our data showed that the otters in Yampah Creek spent slightly more than half their time resting and only four percent of their time foraging. Although the otters spent only part of their day in Yampah Creek, foraging as they came and went, the amount of time spent resting in Yampah Creek was surprising. Dr. Wasson presented our conclusions to the local sea otter research group consisting of representatives from the University of California, Santa Cruz (UCSC); U.S. Geological Survey (USGS); U.S. Fish and Wildlife Service (USFWS); California Department of Fish and Wildlife (CDFW); and Monterey Bay Aquarium (MBA). This group decided our results were important enough to warrant a three-year study of the otters in Elkhorn Slough—the first study to look at otter behaviors unique to this estuarine environment. Robert and I were more than thrilled to be invited to be part of the team for this study. We were benefiting from the friendship and counsel of a host of scientists and other citizen scientists we had encountered along our magical and serendipitous journey. "Wanna watch some otters?" You bet.

The three-year study working with ESNERR, USGS, CDFW, MBA and UCSC began in September 2013 with the capture of an initial group of twenty otters that were tagged and implemented with VHF radio transmitters. Six additional otters were tagged and implemented at a later date. Preliminary results during capture efforts showed that the otters at Elkhorn Slough were in better body condition and weighed more than their coastal counterparts. This was an exciting result possibly confirming our belief that if otters were foraging less and resting more, they must be getting their caloric needs met more easily than outer coast otters. Also, because they spent less time foraging, that left more time for resting, interacting or other behaviors. These otters had it made compared to their coastal counterparts. No waves to deal with, plentiful crabs and clams in shallow water, and protected areas away from people where they could haul out and rest.

It will take years before all the data from the Elkhorn Slough Otter Project is analyzed and papers are published describing otters in an estuarine environment; however, it is clear that the otters in Elkhorn Slough are in better body condition and spend less time foraging and more time resting than their ocean counterparts. Robert and I are elated. Our magical journey continues to this day.

From the outset, we had a dream of seeing otters colonize other estuarine environments like we learned they had done historically. Now many of the areas they could use to move north or south from their current range have been developed into marinas and resort areas and are no longer suitable locations for the otters to reinhabit as stepping stones to the north and south. The problem is further complicated by a growing number of white sharks to the north and south of their range. Now the Elkhorn Slough Otter Project has shown clearly that otters thrive in an estuarine environment. The surrogacy program run by the Monterey Bay Aquarium's Sea Otter Research and Conservation (SORAC) program recovers sea otter pups that have been found abandoned and can't be reunited with their mothers. For the past decade, these otters have been raised by surrogate mothers in the aquarium and then released into Elkhorn Slough. It is estimated that about half the otters in Elkhorn Slough are the result of these otters and their descendants. How exciting to think that a small group of otters might be located in another suitable estuarine environment outside the current otter range and then be augmented by the surrogacy-raised otters. Why is this important? Studies have shown that the otters along the coast are food limited. Their numbers are basically stable and not expected to increase unless the range is expanded, and that hasn't been happening naturally.

Another study Robert and I worked on now comes into play. Otters are iconic marine mammals, known for their important role in the kelp forests where they keep the urchins under control, thus allowing the kelp to flourish, but many may wonder "why go to all this effort to help establish otters in another estuarine environment. Just to increase their numbers?" The answer is that not only is the estuarine environment good for the otters, the otters are actually good for the environment.

What we discovered in a study led by Dr. Brent Hughes from UC Santa Cruz changed the perception of the value of otters to the environment. Elkhorn Slough is one of the most polluted estuaries in the world. The main cause is excess fertilizer coming from the Salinas River and the surrounding agriculture fields in the Salinas Valley, Monterey, California. This excess nutrient fertilizer enhances the growth of algae that grows on the eelgrass and prevents it from photosynthesizing. Historical data showed that as the amount of fertilizer sold in Salinas increased, the eelgrass beds decreased—up until 1984 when the otters first began colonizing Elkhorn Slough. As the number of otters increased, the eelgrass beds increased in size and became healthier. When the otter population had a temporary decrease, the beds retreated. What this study showed was that the otters kept the crab population under control, which in turn allowed the grazers (which the crabs would have eaten) to survive and keep the eelgrass free of algae and flourish. Eelgrass, just like kelp, functions as a carbon sink storing carbon in the mud. It also functions as a nursery for fishes and other animals and helps capture silt and prevent erosion. Healthy eelgrass beds are good for estuaries, good for the environment, and by slowing currents, capturing silt and stabilizing the mud, may help slow the effects of water levels rising due to global warming.

Retired naval commander and citizen scientist **Ron Eby** has put in more than ten thousand hours—the equivalent of about five years of normal working hours—as a volunteer for the Elkhorn Slough National Estuarine Research Reserve monitoring wildlife in the slough and contributing data to the Monterey Bay Aquarium's research program for sea otters. A scientific paper based on the observations of Eby, Robert Scoles, and Daniela Maldini was published in 2011.