

Dave Leighton – Audio Transcript—Interview 19 December 2013

>> Certainly. My name is David Leighton and I am a native Southern Californian I grew up in the Claremont area, our home was adjacent to Pomona College. My dad was a professor of chemistry there. I became interested in the field of marine biology in graduate school at UCLA. There I studied growth and reproduction in black abalone. I also did a lot of work with sea urchin dissections, urchins that had been collected up and down the coast to study reproductive cycles.

>> What year was it?

>> This was in the period 1957 - 1959. So I entered, I'd just gotten out of the Army the year before, which is a separate story entirely. I took a course in marine biology at the Kerckhoff marine lab which belonged to Pomona College and Caltech. That really opened my eyes as to the whole field of marine biology.

>> Do you remember who taught it? Was it MacGinitie?

>> It was Willis Pequegnat from Pomona College. Jim Stewart was taking a course at the same time. So I got to know him right away. Then as a grad student at UCLA, involved in my masters degree research, which studied the growth and nutrition of the black abalone, I really had my eye on doing work with other species of abalone. But this one was intertidal and at that time I had no experience diving. I was envious of those who had wetsuits and could put on scuba gear and get in the ocean and really see what it was like. That came later on. So at any rate, with this course in marine biology, as I say, my eyes were opened. It was a few years while I was doing my graduate studies at UCLA that Carl Hubbs came up knowing about the possibility I might be interested in joining the kelp investigations program at Scripps. I was really excited when the opportunity was given me. So the first thing I did was take the scuba course there at Scripps under the leadership of Connie Limbaugh. Connie and I formed a close friendship right away, as soon as I met him, because he was interested in many of the things that I was doing. He loved the fact that I was able to embed marine specimens in plastic. He thought this was really great. He was going to be looking for Crinoids I think possibly in the tragic experience that he had in 1960, I believe it was, when he was diving in a sub marine river along the south coast of France, that he got disoriented in this labyrinth of caves and he lost his life. But Wheeler North went over and got together a professional diving team, went up and they recovered his body.

>> Where did the recovery it--
Near Cassis, France.

>> Wheeler was involved in that recovery?

Yes

>> Jim Stewart was also?

>> No, Jim Stewart was not. So at any rate, following that tragic event, Jim Stewart was made the diving safety officer at Scripps. We were all using what we call the aqualung, a two hose devices. Pretty primitive. But allowed us to do things underwater which was just marvelous. I want to tell you a short story about Jim Stewart. He was also made skipper of the kelp investigations program boat, *Macrocystis*. And we made a trip out to South Coronados Island to make a dive. We explored the rocks and so on right around the island itself, but then getting along toward noon or so, Jim said, hey, there's a seamount that's located about five minutes away from the South Coronados Island. I said fine, let's go for it. We approached this seamount, cast the anchor on it, and Jim knew that there were big lobster on this. Well, when we descended to the top of that seamount it was absolutely beautiful. There were rocks everywhere with the antennae of big lobsters sticking out. But more thrilling was the fact that everything was covered with brittle stars. They seemed to have different colors. I think they were probably all one species, *Ophiothrix spiculata*. Their arms were extended up, so they were actually feeding in the current there. A beautiful spot. My job was to hold the bag, the gunnysack for the lobster. Very shortly I felt I was drawing a little hard on air. I signaled to Jim that I was going up the anchor line. I had of course a bit of reserve within those two tubes, probably two liters of air, but as I came up of course the pressure was reduced and I managed to get another breath or so. Jim came right up the line past me, went right on up to the boat, signaled to me, stay back. He went up to the surface. I came behind him because there was just enough reserve air in those two tubes that I could make it safely to the top. When I got to the surface I said, why did you do that? Why did you signal me to stay behind? "I wanted to check for the federales." Because we were diving in Mexican waters out in the middle of nowhere. He did have a couple of big bugs in that bag. So, at any rate, I gained a very special

respect for the two hoses, the two hose system we had in scuba at the time.

>> That breathing up is what we did all through the early 60s, too. You run out of air, and then you just suck your way up, sipping a bit for each breath.

>> Yeah. That's exactly what happened. Absolutely. And nowadays of course you've got a gauge on there and you know when you don't have enough air. But, we were at the end of a day's diving to try to take on a seamount, so that was quite an experience – but a bit stupid too

>> And you got only two big lobsters?

>> Well, only two because the guy that was supposed to hold the bags decided it was time to come up.

>> That's good. That was what? About the late 60s, 61?

>> This was 1960. So I had only been with the kelp investigations program for about eight months or so at the time.

>> So you joined the kelp program and at that time Carl Hubbs was the PI?

>> Yes. He was on the board; John Isaacs was head of the Institute of Marine Resources.

>> And it was really being run by Wheeler?

>> Correct.

>> And you were then working with Wheeler on the kelp restoration because the kelp had all been wiped out by the El Niño of the late 50s. So that is okay, so at that point there was still a lot of really raw sewage coming out of San Diego Bay. They hadn't built the outfall.

>> That's correct. They completed that outfall in 1963. And we had to be very careful when we were diving out there because they were blasting away trying to create a channel for the effluent lines.

>> So they were blasting underwater while you were---

>> They were blasting, but we always checked to learn their schedule. We had to be sure that we were not out there driving in the kelp beds off Point Loma at that point in time.

>> Do you remember what Wheeler was doing? What were you actually trying to do for the most part?

>> Well, my task was to study the rate of ingression of the urchin fronts into the kelp beds. So I set up a couple of large quadrats, permanent quadrats by driving stakes into the bottom and so I had a line going along, and I was able to follow front of urchins as they encroached on the little macrocystis that was around at the time. They moved at the rate of about a foot a day. About 10 meters a month's time. And so when I first joined the program, Carl Hubbs told me that I was to spend a lot of time in the kelp beds and it would be my laboratory. I thought, well, that's great. I'll follow through and do the best I can. So we did a lot of experiments there. Underwater photography was just coming in, so we have some shots that I have in some of my records and publications that show what the situation looked like at that time.

>> Do you remember was most of the work done in the central area, near New Hope Rock, there was a place that Wheeler had that he called the Shiner because there was always an urchin barren there. \

I don't remember Wheeler's use of the term. Most of my work was well south of New Hope Rock. We had stations A through D, A starting up near the entrance to Mission Bay and then D was almost in the navigation channel entrance to San Diego Bay. D is the one we spent most of our time at, which is south of New Hope Rock and all that area. It was pretty much urchin barren at that point in time.

>> Yeah, do you remember whether, did you have the sense that the garbage, the sewage coming out of the bay was also influencing the urchins? They do eat it, they can absorb it, so...

>> Well, because of the fact that there were many more urchins in that southern section, it would certainly suggest that

there was a relationship to all the nutrients that might be flushing out of San Diego Bay. The stations that we had farther up the coast towards Mission Bay were generally overgrown with coralline algae and other things that stood out in quite a contrast to what we found at the southern end. So most of our efforts were devoted to work at the southern point.

>> Do you remember what was the predominant species of urchin? Were they reds then or mostly purples?

>> Mostly purples. I would say that 90% of the urchins were purples.

>> Yeah, that's interesting to me. How about around the say station B and C in the middle part, were they still the same, is that where the kelp came back when you first came back after the big El Niños.

>> After the big El Niño of 59 and 60, yes, kelp did return there, but it was only after our liming in the south part of the Point Loma peninsula that kelp came back in abundance.

>> Maybe this would be a time to tell us about the quicklime work that you developed and how you got the idea and you did some research on other things. You had a paper on abalone grazing that you did in the lab if I remember. It was quite an interesting paper. So you were doing interesting things in the late 50s and early 60s. You want to talk about that?

>> Well sure. I guess the best point to start there was that I had learned that Victor Loosanoff had been successful in controlling starfish, *Asterias*, that were devouring the oysters in Chesapeake Bay and elsewhere. He used quicklime and it was very effective on *Asterias*. I thought well, okay. Urchins are echinoderms also and they might respond to quicklime. So I did some tests in the lab and right away it was obvious that it would affect the urchins. They release their grip to a surface, via their tube feet and would perish in the course of a few days. Well, that was very interesting to be able to observe this in the laboratory. In fact, containers nowadays are plastic, plastic containers are all over the place now, but they were not available then. Carl Hubbs made sure I had some containers, but the only thing we had were these fairly large pickle jars. So I had a whole series of those set up in a wet lab the at Scripps and I could do experiments on the effect of lime on the urchins.

>> And it was mostly purple urchins?

>> Mostly purple urchins, yes. I found them a little easier to work with in small containers. The franciscanus generally had fairly long spines and were large tested anyway, so I did most of my work with those. But I was aware that there was an easily accessible area at the entrance to Mission Bay, where urchins had over-grazed the kelp and it was essentially an urchin desert in one area there. So I took a couple of Ziploc bags with pebble quicklime and swam out to this area and spread it over the urchins.

>> You actually swam out, you did not take a boat.

>> No. Right from the shore. And I could get immediately back to that same point a little bit later on. Well, the initial effect was the urchins were releasing their grip on the bottom. Any surge in the area was just rolling them around. Sea cucumbers were also here and there rolling around. It was obvious that it was affecting any kind of echinoderms in the area. This was in the early spring, May 2nd I believe it was. And that would be 1962 when I started this. I returned to that area about three weeks later and it was a whole different story. There were young kelp plants coming up, and eventually *Macrocystis* dominated. It was just beautiful. The kelp investigations program had come to its end about six months earlier. Wheeler had actually taken a temporary job with Lockheed, I believe it was, the oceanographic group, or maybe it was North American. I've forgotten exactly. And he was on a cruise. I wanted to make sure---

>> Wheeler was on a cruise in '62 in May and you went out and brought back this young forest.

>> Absolutely. When Wheeler returned from his cruise, I made sure he knew exactly where to go to look at that. And he was just totally excited and very soon it became pretty obvious that this method did work to reduce the urchin populations sufficiently to allow kelp to come back. By the end of May, that was just a month since the initial application of lime in that area, we had *Macrocystis* plants that were a couple feet high! By the summer they had reached the surface that was just in a 15 foot depth location. So they reached the surface.. So, when he saw that, he said we've got to try this in deeper water to see if maybe larger quicklime, in pebble form, would reach the bottom and spread out. Well the Institute of Marine Resources at Scripps was the agency that we were operating under. They gave us a one-year grant for the kelp.

>> Kelp Habitat improvement project?

>> Kelp habitat improvement project. Thank you very much, Paul, for that. So that was it. We had quite a bit of lime and we had all the help we could muster from the Kelco company that was extremely successful at the time, (there's a whole separate story there, as to how important kelp was to Kelco company). Eventually we ended up using kelp harvesters to distribute quicklime and that was done primarily at the south end of Point Loma, this area that had become totally dominated by urchins for a period of time. And interestingly, when we carried out the initial deep water liming experiments, Kelco was interested in the South end where you had all the urchins and they were giving you a harvester to disburse it?

>> Correct. So we could distribute tons of lime per treatment interval. It was obvious that it worked effectively. The line of the pebbles as they dropped through the water column would become hydrated very rapidly to the hydroxide. Then it was like snowstorms underwater. You'd watch these particles get down a few meters and sort of expand and then rain more and pretty soon it covered the bottom at just about the concentration we were aiming for was about a pound per square meter of bottom. To jump ahead, just briefly, by the time the urchins had been essentially removed in those areas, the kelp came back as abundant sporelings, which showed pretty effectively that there was a short gametophytic stage, an almost microscopic stage, that was probably already there at the time the lime hit the bottom. But the sporophyte stage then took over and within a very short period of time diving in it was a bit of a challenge because it was reminiscent of a sweet pea forest. These two stipe *Macrocystis* plants were coming up on the order of perhaps 10 to 20 per square meter of bottom. Well you know that can't last because they get entangled and.. So that ultimately we had maybe one very large kelp plant per 10 m² or something like that in the established forests. But what that meant to Kelco was that they no longer need to rely on their newly purchased bow-fronted vessel to go all the way up to Santa Barbara to collect kelp. They could collect it right there in their own backyard. So they used this process for a period of about 14 years. But a number of things happened along the way. One of them, abalone had been pretty well starved out through competition with the urchins. So when we first began our liming operations off Point Loma the abalone were starving and were being preyed on because they were easy prey to Sheepshead and lobster and other predators in the area. But there were sufficient adults of red abalone nearby to produce larvae. Recruitment was unbelievable. Following the initial liming, you'd turn a rock and you'd find juvenile stages of red abalone in abundance. This was at a depth of around 40 to 50 feet, which was within red abalone depth range off Point Loma. Well that was pretty exciting, and then through the next decade or so I'd make an annual trip to the area and I would look for juvenile red abalone. And I found each year there would be a new size class moving along. By 1970 or so there were certainly sport legal sized red abalone in abundance there. That was pretty exciting to see this happening.

>> I think just an interjection because, to give you credit here, much of this that you were looking at was responding to your developing that quicklime technique, which basically got the kelp to come back from the El Niño. So now you pretty importantly helped the kelp come back and of course the ocean did too, because it got cold and more nutrient. So you actually kickstarted that whole recovery which I think is pretty wonderful.

>> I'll tell you there was another exciting event that occurred about that time, too. About 1970. The kelp was back and Kelco no longer needed to go all the way to Santa Barbara to harvest kelp, so they could harvest it all right there in their own backyard. But the red sea urchins became abundant then too, and before long a new industry had been born.

>> Do you think that the red sea urchins came back from the kelp recovery more than the purples? Or did they sort of come back together?

>> They came back together. They came back together, but it seemed that every time we'd study a situation where you had a mixed population, the red abalone were the first to invade the larger holdfasts and *Macrocystis* where they would get to the top and then chew away and clip off the stipes and thus set those stipes free to drift, end up on the beach, or well, wherever.

>> You mentioned that the reds were starting to get harvested. That was more like '73 or '74 that they got into that.

>> Well in 1972 through the efforts of Sus Kato at National Marine Fisheries Lab, a market developed right away with Japan Airlines being able to transport live, fresh urchins to Tokyo markets. So that really started things going. This was about 1972 that this happened. And then the headaches occurred. Kelco was trying to get rid of the urchins. Here was a new industry developing that became increasingly valuable throughout the state. On the order of a \$50 million a year industry developing there. Well Kelco did everything they could, I think, to cooperate with the new sea urchin fishery. Even set up feeding bins where the red urchins could be assembled and then fed kelp so they wouldn't be advancing on established beds at all. They worked out a very elaborate routine of pumping chopped kelp from the boat where the kelp had been brought aboard, chopped up, and blasted down these tubes to feed the urchins.

>> And they used the same tubes in the 70s to lime because the divers in the bottom would have better control.

>> Right. Absolutely. So it worked out very effectively in spreading the lime just in the grazing front where the urchins were attacking.

>> That was Charlie somebody.

>> Charlie Martin and Ron McPeak. Yes.

>> Just to get the names into the record.

>> Sure. And a few years earlier we had, at the end of the Kelp Investigations Program, a meeting in 1961 held at the California Department of Fish and Game office in Long Beach and Charlie Martin was there.. This was at the point where we'd just established that, yes, the urchins do destroy the kelp.. The question came from Charlie Martin, well, what are you going to do about it? Well I didn't have a clue what I could do about it effectively. So that leads into the story about starting the liming program. All of this despite Kelco's effort to cooperate with the budding urchin fishery. It was quite a hassle. And I think that this was the primary factor involved in Kelco's ultimate demise. They had some tough times there.

>> Well they, just let me interject, because I was on the scene at that time myself and I was worrying about it. And they very graciously included me in their liming programs. I worked with them on the bottom and saw what was happening. But they also helped me by protecting and not harvesting patches for me to have a control to all of my kelp work. And I think that you're right; Kelco did everything they could to cooperate with the scientists. And it was a different era where the industry and the scientists worked very well together and we don't see that so much anymore. But, you were in a pretty wonderful time, in a sense. And meanwhile, while the Kelco business actually continued for a while, they sold out, but you personally had switched to abalones, as I recall.

>> That's correct. At that point in time, once I completed my doctoral program there at Scripps I sold my home in Pacific Beach and moved my family up to the Morro Bay Area. That is where I started, in a very primitive way, trying to set up an abalone farm.

>> You are too modest. Let me just put it into the record. In my perspective you had been doing other things, and seeing the abalones and you were always interested in them. You'd done the feeding experiment, you know what they ate, how fast they grew and you were doing it for fun and you really, I think more than anybody, developed the entire abalone aquaculture business at Cayucos. Would that be an overstatement?

>> Well, there were a number of others that were I guess favorably impressed with what we had been able to accomplish. But we didn't have abalone overnight when we set up that operation. It was all construction and so on. Our first few spawnings were spawnings that simply happened in the tanks where we would bring in fresh brood stock from the field. We'd come in the next day and would find a tank that was full of eggs. And way too much sperm. But we still got some larvae out of it. The end of our first year, certainly all of our construction took most of our time. So there really wasn't much of an opportunity to do much abalone culture work there. But at the end of the first year we had 60 little red abalone in our tanks. The following year the numbers came up and we had 1000 or two.

>> Did you actually do any experiments to get the sperm and egg ratios right and to raise the food for like the abalone larvae? I mean it is a complicated business and you laid all the groundwork by your own trial and error and your scientific sense of how to do these things. It was pretty wonderful.

>> Well we were guided primarily by the few cases where we had successful settlement of the larvae and progression through the post-larval stages to early juveniles and so on. But, we were essentially creating giant tidepools 85 feet above sea level there. And we used a pump that was a diesel operated pump and we set up a short intake, so we could suck seawater up at high tide or mid tide and pump it all the way up the hill to a header tank and that would go into this laboratory building that we had put together. So there wasn't much opportunity to do much science in the abalone culture work there. But as I say, through the next few years we began to produce more and more juvenile abalone and we were able to supply Fish and Game, for example, many abalone for their first plant at Abalone Cove there in Palos Verdes. That was a fairly successful plant. Going back several years later I remember Mia Tegner had obtained some samples from that area and the report, either from Mia or from some of the Fish and Game guys that were studying the effects of the plant, they got, they had been supplied about 2000 abalone that I had carefully reared in the tanks and created color bands, because they will incorporate pigment from their diets. So you feed them red algae, they'll produce a red zone on the shell and so on. So we had them all marked pretty much so they could be distinguished later on as being progeny from a given plant. We got 136 during that first study of the plant a year or two after it was initiated. And that was one of the better returns for the Fish

and Game plants. Not to criticize the Fish and Game, but there were methods that seemed to work out a lot better for planting juvenile abalone in the ocean than just broad casting them off the back of the boat, where you end up feeding the fishes. And the crabs. And the lobster. And everybody else out there anxious for an abalone dinner.

>> Let me just go back because I think this is important to get the background to the entire abalone culture. You did furnish Fish and Game those things. I was involved and they were very healthy and you also furnished fish and game their abalone for their own culture system up north wherever that little lab was that they had. So you were a very important key player to the academics working on them and you were still trying to make a living. How did that work?

>> Well that's quite a story in itself. When we started the abalone farm north of Cayucos, we had one fellow who had been a medical drug salesman for Smith, Kline and French. He had established quite a circle of acquaintances, physicians primarily, in the Orange County area. He interested them in going along with the first attempt to try to create an abalone farm in California. We knew that already Japan had been very successful in setting up abalone hatcheries and so on. We also had a friend of mine whose name is Buzz Owen who worked with a shellfish operation near San Francisco at Pigeon Point. He was producing abalone along with the oysters they were producing there. So I had that as encouragement that this would work. And so, Hugh Staton, one of my general partners at the abalone farm, John Perkins, a good friend of Hugh Staton's, managed to put together this operation with just enough support to carry us along until we could show some progress. And that was quite a fortunate series of events where we had a party that was interested in taking a chance along with us. But you're right that we were sort of struggling to get along during those first few years until we could demonstrate that, by golly, there is some potential here to cultivating abalone. And there were others that began in the same way that became familiar with our successes there. In fact, I think there were 10 or a dozen operations For awhile.

>> Of course you get lots of copycat people horning in on your operation. That probably wasn't pleasant, but it's the way the world works.

>> That is right.

>> But you had a head start, so were you selling abalone commercially then?

>> Actually it took us quite a while before we had abalone that were large enough to try to market for abalone steaks. So mostly we were producing young stages and supplying to Fish and Game and others hoping to grow red abalone.

>> So your was supporting the research arm of the state and Scripps too, because Mia and I were involved with that, that was actually paying a lot of your bills. That's good to know. Hard to believe, but good to know.

>> That's true. And we did gain, it was set up as a limited partnership. The three of us were general partners at the abalone farm, as we called it then, and it's still called that today. Now it's really a huge operation. They've been very, very successful. It would be nice to be on, to have retained a financial interest in it. I have not. But it has been a limelight on that central California coast, the successes of the Abalone Farm.

>> I think this is pretty interesting history just because you never really get a perspective of somebody that develops an industry like that and I saw it a little bit with Lummi's when they developed their oysters and salmon, but it is pretty hard. There's a lot of research that has to go into making something like this work and it's fundamental.

>> Interesting that you would mention the Lummis. I was very impressed at the time I visited their operation. And this was probably about the time we were starting to do the work at the abalone farm and I was very impressed that they would use these large silo tanks and strain out the larvae at different sizes and put them into new tanks. That was a major operation going there. It turns out that we now, here at Carlsbad Aqua Farm, have a mini version of the same thing. We have these silo tanks and we'll try to process larvae. Right now they are all full of mussel larvae because the mussels that have been brought in for depuration have been spawning. This is the time of year when the bilvalvia, the galloprovincialis mussels begins to spawn.

>> You know, just to interject something for your interest with the history of the Lummis because that was really Wally Heath who was a University of Arizona scientist who went up there in 1963 and saw this and started working with the Indians who were impoverished and helped them. But he built, he and I actually built a little shed with a little electric motor, not in the Lummi reservation, he had to show them it could work but on another island where he got somebody to let him have permission and we were pumping water and screening those things with smaller bowls. You know, skinny thing. It was all done the same way you did, very trial and error, very hesitantly moving along, Loosanoff came out and showed us how to have the spat settle on plastic there was a sheet and you rolled the plastic over a roller and the oysters pop off. And

that was all in '65.

>> Wow.

>> So I'm quite impressed with the overlap of these two programs.

>> That is wonderful. It's exciting in retrospect to think about how these various operations get started and some of them are the offspring of research at San Diego State, the Scripps institution, and then expanded upon. And I think that when we started the abalone farm north of Cayucos there wasn't that much backing for it. But nowadays, yes. Some very, very important work has come out of the work of say, Dan Morse at the University of California Santa Barbara, with his establishing the basic science behind abalone spawning as well as larval success, larval settlement, inducers to settlement and so on. And so with all this information supporting what we're trying to do on the aquaculture end, it's really been marvelous to see all of this come together.

>> Yeah, I'm quite impressed. I think we might have enough of the culture, do you think, or, but I'd like to push it back into your first dives and have you remember you know, what it was like with the old two hose thing bouncing around on your back and but what were you seeing? Because at that point you still have big herds of white Sea Bass, you had, can you just think back to some of your early dives and the biology that you actually saw in the kelp forest?

>> Well, of course getting in to the kelp forest was truly exciting. And seeing the various kinds of things that were living on the kelp was very impressive. The *Norrisia* snails for example with red borders to their feet and so on, hanging onto plants, sea hares up near the top, near the surface of the canopy, many kinds of encrusting growths, bryozoa and all that sort of thing coating some of the older blades on the kelp and then new blades coming up that are just shiny and completely free of any kind of growth. Yeah, it was quite exciting to see all the life that existed in the kelp forests. And that's just up in the canopy. Then down on the bottom of course the holdfasts were crawling with all kinds of interesting things and one of my first observations when I first joined the kelp program at Scripps was to go through some of the large holdfasts that would be washed in on the beach. I was very impressed to find abalone on those holdfasts. And in fact, one holdfast that was probably three feet across contained 53 red abalone. Seldom did I find any pinks or greens or anything like that on the *Macrocystis* holdfasts. But it occurred to me that it's because these larger holdfasts came from a depth which was appropriate for the red abalone and thus we didn't get the shallower species and so on in the holdfast. They would be abundant on the primary stipe primarily, that part of the plant at the apex of the holdfast. And you would find a few maybe scattered around the haptera that extended out along the periphery of the holdfast but generally those were all along the primary stipe. I would find them from sizes up from just a couple millimeters where they were still pretty white shelled at that point up to maybe a quarter or half an inch or so.

>> So you had your eye out for the abalones all along.

>> I did, yes. I really did.

>> Did you work with Ray Gelhardy or any of the Fager students?

>> Well, I did not work with Ray, but he was there when I first learned to dive. And yes, toss out a few more names and maybe I could recall them.

>> Ray was working on the holdfast fauna. And Fager had some a fish guy, Tom Clark who was working on Garibaldi, I think. They had some intertidal people, their name sort of escapes me at the moment, but you didn't really interact with the Fager people.

>> Not much and I think when we talked earlier mentioned Jay Quast.

>> Yes I would be interested to hear your relationship.

>> Jay was a very fine fellow to know as a friend and he did some very interesting experiments in the kelp beds by creating a wall net, and that was at a time when it was sure that there was a school of fish within the kelp. They would encircle the whole kelp stand with this net and some of us helped string the net out and that was a little bit of a scary situation to be looking up and you're looking through the net and you say well now the boat is up. Which way do I go to get out of this net? So, but when I think of Quast I think of the wall net exercises and the fact that Carl Hubbs was very excited about what he was able to discover and capture and account for in those wall net operations.

>> Was he pleasant Jay Quest?

>> Oh yes, very pleasant individual.

But he was surveying fish all over the place as well, at Quast rock, about around La Jolla as well at least I've read some of his papers. But you guys, the kelp project didn't work with the NOAA too closely, then?

>> No we did not and I can't really say why, but I think that we were working in different areas. And there wasn't that much interest in NOAA in nearshore communities.

>> Yeah well, Quast was there, then there was Hobson, Ted Hobson showed up and he was a very good diver. Did you interact with him much?

>> No I did not. I did not know him.

>> What was it like, because I've done it for myself for many years, but could you describe for anybody that's watching or reading this what it was like to work with those old two hose regulators? You were working with very primitive equipment, the air came out both ways and you had to roll over on your left side to clear it. Do you want to just remember it a little bit for fun?

>> Well, you know, to me I didn't envision an improved version of the underwater air supply. So I was completely content with the two hose regulators and as I related earlier, it really came to my salvation when I came up rapidly from a 90 foot depth on the seamount off of South Coronados Island to find that yeah there was little bit more air in there I could get another suck on it before I had to switch over to my snorkel at the surface.

>> So this is, I might come back and share some stories with you if we have some time on the tape, but I was interested in the relationship between the diving community, the lay people and the scientists at the time because my sense of those days is that if you were out there doing research the fishermen were your friends, you could talk to anybody, they actually sort of respected you. How was it with Diving Locker in the early days that Wheeler and Chuck Nicklin was starting up with his friends? What was it like?

>> Well it was a good group. We all got to know each other and I didn't have any formal connection with the diving locker. But Wheeler North did and Harold Scotton and several others whose names---

>> Chuck Nicklin

>> Chuck Nicklin was there to manage the place.

>> Mitchell was involved with that, too?

>> Chuck Mitchell, yes, yeah. Great guy. And I would attend any meetings that they would hold every once in a while and talk about the abalone work I was doing up north at the abalone farm and so on, This was in the early 70s, so...

>> Do you ever remember interacting with John McGowan as a diver or was he just an oceanographer when you came?

>> I believe I didn't know that John did any diving.

>> In the 50s he was, he actually published the first reviewed scuba paper on the squid, the market squid.

>> Oh, interesting.

>> And that was in '54.

>> Okay.

>> So he was involved early on.

>> All right. I wasn't aware of that. Well I will be darned.

>> This is interesting, and we are basically finished. Is it okay if I tell a story? Because we were doing all of this, I started diving in the mid-50s, with a tank that I made myself in the Gulf of California then went to graduate school in Seattle and started diving quite early in the mid-60s. By this time we had single hose regulators but no sea view gauges. We had the J valve but it always snagged on something, you could not count on that, so I just ignored it. And we were working on starfish biology, their foraging biology, and we all dove alone. No, it was just a way to do it. You had some time, you went out to catch some food, get some data. So you go drive someplace, you climb down with all that gear, that primitive wetsuit, you'd climb down these rocks and you'd go in and you go down. You follow your nose looking for something interesting, and you get down to 80 feet where it gets pretty dark, 80, 90 feet. Since we are studying the starfish we would look for them and watch their behavior. That was just the way of life. We made hundreds of those dives I think and it was fun, but I had one experience that you'd enjoy with the sucking up an empty tank. I was at 80 feet in an area with a pretty good current that was sort of worrisome, but it was starting to slack and I was turning over a starfish, and I sucked the tank dry, you know its time to quit, I put my slate in my bag and that point one of those huge Northwestern octopus that get to be like 14 feet across, thought that I was a crab because I was on my hands and knees with the starfish and stuff putting things away and all of a sudden I'm just covered with octopus. It pushed my mask down and I'm hanging onto my regulator with my teeth and I'm starting to panic and rip his arms off and they look soft and squishy but they're not, they're like steel when they try to get their arms off and I was going to lose the battle and I didn't have any more air. I just relaxed completely but with my legs bent down with my feet on the bottom and just totally relaxed and let him sort of pull me down and I could feel him relax a little bit, her, probably. Then I just pushed off really hard and I popped her off. At this point octopus and I are going up, she still wrapped all around my head and they have those big beaks and it was back into my bare neck and I'm a little bit worried but every 10 feet or so you get another sip of air, we were sucking our way up. The octopus was slowly sort of disentangling itself from me and we popped up, the octopus and I, off Eagle Point and when I got my bearings and got my mask back on, here is this octopus with its big eyes just sort of pulling back looking at me and I'm looking at it and we communicated nonaggression. And it sort of slowly moved away from me and I got everything together. I didn't have any air. And with a lot of real eye contact it started it made its arms into what looked like wings from a space shuttle because it's all sort of with a big body and flattened out as its arms came out, big arms it's a good-sized animal and started gliding down it was one of the most beautiful things I have ever seen in the water, so I just took a deep breath and followed it as far as I could and it was watching me with its eyes but we had a nonaggression pact. I thought. So it went down and I came back up and gathered my wits together and swam ashore.

>> What part of Puget Sound?

>> It was San Juan Island, Eagle point in San Juan Island. I did a lot of diving there. One time I came up and the purse seiners were shooting at the Orca that were robbing their fish and I'm out of air because I'd sucked my way up of course. I'm sort of climbing up the rocks at Eagle Point again and there are bullets cracking and I'm terrified, sort of dodging behind rocks. I finally figured out where the fisherman was and got behind a rock to tell him to stop. He never heard me. Another time I am on the sand bottom in Eagle Cove trying to see how fast a Luidia was chasing a brittle star and not paying much attention to the boat noises overhead when there was a huge crash and a cloud of dust right in front of me! When I got my wits together I saw it was a purse sein with a wall of net going over head. I heard him rev his engine to pull the sein and I was not sure whether I was inside or outside the net, so had to wait to see it move toward me so I was inside and I went to the net and rolled on my back so the regulator would not get caught and lifted the lead line and wiggled out and swam to shore on the bottom!

>> What a story.

>> We had our adventures, too.

>> I'm sure you've written this up.

>> I haven't.

>> You have not? You've got to do it. That's just absolutely amazing.

>> It's sort of the same thing as you and Jimmy with your lobsters. I think the old days were a lot of fun.

>> That's exciting to hear.

>> They were good times. Back to the evolution of aquaculture.

>> Aquaculture was developing and you were heavily involved, and there were parallel projects, Loosanoff was probably

the first and the best, but he was very generous. Did you meet him in person?

>> I did.

>> A big round Russian.

>> On several occasions, but one in particular there was an aquaculture symposium held in San Diego here and this would be around 1970 or so and he was present at that. And I was so thrilled to see him and this was after the quicklime developed from what he had been doing with the starfish in the Chesapeake Bay, I was giving a brief talk there and I just said and it's certainly wonderful to see Dr. Victor Loosanoff here in the front row you know. Well, he was thrilled with that. He thought that was great. And I think that following that I think that Jim Sullivan was a little bit disgusted that I would take that sort of lax attitude, the way I was up in front of him, yeah right. And in fact I think I had a floating lab in Mission Bay at the time and I invited Jim Sullivan to come down and see the thing and he said no. He just wasn't interested. So he was turned off on me at that point.

>> Did you talk to Loosanhoff much?

>> No, actually not.

>> I'll tell you a story that you'll like because Wally and I spent a couple days out on the little island where he was showing us how to do all this stuff. Did you know he was a Russian Cossack that escaped the revolution?

>> Oh my gosh, really?

>> So we had him going like you but all night because he liked his scotch. We were keeping him awake and talking and oh, he had so many adventures and he loved his horse, he would tell us about this horse and he had about two or three of them and three or four of his buddies were just a few steps ahead of Lenin as they escaped to the West and then he got into the aquaculture business in the 20s, I think. Pretty interesting character. So by the time you met him he was probably in his 70s, maybe close to late 80s.

>> Yeah, that's correct, he was. I wonder if I should unplug this.

>> There is no rush.

>> Did you run into Lloyd Bridges up at marine Land?

>> I did at Marine land when I was doing my master's work and I used the lab there at Marine land of the Pacific. I was keeping some abalone in some buckets tied to the top of the pier and I pulled that thing up. I guess he was there getting set for filming. He came over to watch me put kelp into the buckets and seemed delighted to hear what I was doing. He was pretty excited about that, and so that was the only interaction.

>> Was he a pretty nice guy?

>> Oh yeah, and he admitted that the tanks they threw over his back were balsa wood.

>> Is that right? We had the same thing with Cousteau when he came up to Friday Harbor in the 60s. I just thought he was the most important person to me because he was the one who got me from killing things to be loving them in the 50s with the Silent World. I just thought he was wonderful, and that he was a fraud with those antenna coming out of helmet. Worse he just stole all of our observations and natural history that we discovered (that is how we saw it, not being very mature) and took credit for all of it in his movie. So I was quite disgusted with him for several years, but later, I came to realize that he was really very concerned about conservation. He should've been my best friend over my whole career, but I was immature enough to not appreciate the difference between the man and Hollywood. All because of those stupid yellow helmets with the antenna, as though they could talk underwater, it just turned me off, seemed like phonies when he had been my hero but I should have made friends because those guys had good hearts.

>> But he sent you a letter did he...

>> Yeah he sent me a letter. He didn't remember me from the Friday Harbor Days. It was thanking me for conservation stuff. So the history is interesting because that was a different era. And it was Cousteau that educated Archie Bunker, Mid-

America, and got people so it was respectable to be excited about underwater research. And it's no longer respectable. Now we're demonized and in my lifetime it's gone to being just magic, to being very defensive. I suppose you guys understand. And I wish that I had been more mature. Interacted with him better.

>> Very interesting. Very interesting.

>> One of my advisors I know she was in Australia and when Cousteau came by with his crew and his sons and they were on their way and they needed some outboards for their skiffs and they wanted to take the ones from the research center and they were like no, I'm sorry, we can't let you have them. Well when Cousteau left the next day the outboards were gone.

>> He stole your outboards?

>> It wasn't ours. It was at a research advisory that my advisor was at.

>> Who is your advisor?

>> At the time it was up here at Cal State San Marcos. It was Denise. Denise was in Australia doing a postdoc.

>> And he just ran off?

>> Thing was they had something very important they needed to do. They gave them back, they did not take no for an answer because they felt very self-important about what they were...

>> So maybe I read it correctly a little bit.

>> I think you're right. I think it's Hollywood versus, they have to sell the show.

>> A bit of that for a while...Wes Anderson's movie with Bill Murray, did you see it? They were kind of these crazy cowboys out there making movies and selling a good message, though. So I mean the message was awesome.

>> When I was a kid in the early 50s I built myself a scuba tank in Tucson to take to the Gulf, and I just killed things. It was his movie and the book that converted me and at that point I found another hero, Ed Ricketts. But in case it was not because of *Between Pacific Tides*, but the old *Baja* book, the *Sea of Cortez* book with all the names: it was a Bible. And I just, I got them secondhand for free basically and I just wore that thing out. So here I had some pretty substantial heroes as a snotty-nosed high school kid. And they just made my life. What an interesting afternoon. Thank you.