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INTERVIEWS

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Interview of Jim Stewart by Eric Hanauer [5 Dec. 2001]

Transcribed by Betty Shor, May 2002

Tape 7, side A

H.: Today is the 5th of December, and this is catch-up day where we're filling in holes and Jim is explaining his work in the Antarctic. So go ahead.

S.: Well, as we just discussed, my role, back in the beginning when I first started going down there — I would go down and relieve the then assistant biologic lab manager who was also responsible for the diving program, diving locker: overhauling regulators, pumping air. I'd take over that responsibility when I went down there so he'd go and do what he did normally. And I did that up until we got our scientific diving coordinator in place. The science was, again as in here, you submitted a proposal; I reviewed the diving characteristics, the equipment, the safety procedures, all those kinds of things. And then the science, if it was funded, then they'd send me a list of the people who they considered necessary to complete their diving, and I'd review their credentials. And they would go down many times before I would. My whole thought on that was to let them go down, get set up in the field, see if they had the things in place they told me they were going to have — of course, I did that when I got down there — I'd go out, and I'd visit each of the base camps, live with them for a day or two and just see what they were doing. And then I'd get, usually on a weekend, we'd bring either the whole party in or at least a couple of representatives from each of the parties plus the NSF rep and their health and safety officer and the support contractor. And we'd all sit down and discuss: "What do you need? What do you feel we need to put in place down here? Do you have any problems? If so, what are they? And if we can fix them right now, we'll fix them right now; otherwise next year.

H. Now, was this strictly for the U.S. based —?

S. Yes.

H. What about where they were working with foreign scientists? Did they come under your jurisdiction?

S. Yes, because they were diving under our program, under our auspices.

H. Were there any incidents or anything you can remember where people were kind of just way off base and doing things very strangely?

S. No, not particularly. We are much less conservative than the New Zealanders, or the Australians. The Italians are about where we are, and we do have people working with the Italians; they're about 300 miles out. We have never had any problems. We dived together with them. Whosever project it is: those are the guidelines under which you work. The New Zealanders were obviously right around the corner from us. When you go in the water, you have to be tethered, and we never found a need for that. We stop-gapped that as I described on our down line where you have down line on the bottom; you have a little flag just under the edge of the ice and you always check that, see if there's any current whatsoever or any belly in the line, you have a strobe just under the ice and a strobe just off the bottom and always a pony bottle and regulator, and we've never had any problems. In the early days, with the Poseidon, we had some problems. It had that alcohol-freeze cap on it, and once in a while you'd get a leaky one: lots of times you'd never catch it, and so we had some freeze-ups even with those. They were pretty good, but nothing like the ones we use today. That's why people there stayed with the two-

holers as long as they did, because we didn't really have a single-hose regulator that you could really depend on. So that's why we put the pony bottle on the bottom of the line. And of course this was before we had the alternate air sources and things like that, and now we use the slingshot valve: the Y valve with two independent regulators on it. So one goes down, you shut it off and go on the other one. But that was my task. I'd go out and physically live with the people, see the conditions under which they worked, and in the early days I'd go out and dive with them, just to see what their environment was in which they were working. It worked out pretty well; it gave me a lot of perspective on number 1, what they were doing; number 2, it gave me really a good chance to go look at the bottom at a lot of different sites. So, if you send me a proposal and you want to dive in this site, I have a little background to give you some intelligence as to what you're going to run into there, what I think you need, what you need to set up in the way of safety procedures, and all that. So, that was my main task as we went along. I don't think I talked about the formation of the Diving Control Board, did I?

H. The Antarctic diving control board? No, I don't think so.

S. For years, and I can't tell you how many — the whole diving operation was run under — forgot what they call the group — the operational group that runs the Antarctic, in conjunction with the support contractor. We had no health and safety officer as such, for the ice. So Dave Bresnahan and a couple of other guys who were in operations division ran the diving program. It really wasn't until probably the mid-80s or early 90s, probably the mid-80s, that they set up a health and safety office and got a health and safety officer, and he had to come over from NASA, and didn't and still doesn't know a lot about diving. So I put together a Diving Control Board, composed of two scientists from each of the different kinds of areas — you're studying a soft bottom and he's studying a soft bottom. I had two people because I felt if we were going to have a meeting or had to send somebody down there, we're such a mobile community that trying to find two people to do anything is probably not going to work. But I might find one; I wanted somebody who had experience in the soft bottom, some on the hard bottom, some up under the ice, some in the lakes and the dry valleys, some shipboard diving at Palmer, so I suggested two people plus a couple of people like Glen and Lee Summons, who had backgrounds in a variety of things. That particular aspect of it was turned down and there was a Diving Control Board picked, most of whom I had suggested but they only gave me one in each group. Finally I put my foot down and said, "I want Glen on the Board. Period." And I was never able to get Lee on the Board. At that same time I wrote the guide for diving safety, put that thing out, and then as AAUS came into being, I upgraded that, brought it into line with AAUS. And now we have a Diving Control Board, and it really works out quite well. I have the names and I can give them to you if you want to put them on there.

H. It's not important.

S. We've had two meetings, one a year, and the bad part of the last one was that people were already on the ice, a couple of people who we needed there.

H. Where are the meetings held?

S. Washington, D.C. Well, Fall Church, Virginia where NSF is headquartered, there at Bolston [right?]. And we had some really good meetings. You know, we had some strange things, because for some reason the health and safety folks got the impression that all diving had to be scientific. If it's not scientific you don't dive. Over the years there's another portion of NSF that's called Artists and Writers.

that all diving had to be scientific. If it's not scientific you don't dive. Over the years there's another portion of NSF that's called Artists and Writers.

H. That thing that Norbert —

S. Norbert went down, a whole bunch of guys have gone down. And they're not doing science; they're doing something that will increase public awareness of what the Antarctic's all about. I authorized probably ten of them in my tenure as Diving Officer.

H. When did that start about?

S. When what?

H. The artists and writers thing. And who were some of the other people that had done that?

S. Good Lord.

H. Roughly.

S. I can't tell you.

H. 80's? 90's?

S. No, in the 60's and 70's. It had been in place for a long time, because the *National Geographic* people would go down; some of them could dive, some didn't dive. Long before I got there. Carleton Ray and those guys were down there diving. They built something called a Hydroscope; it's a piece of pipe about that big around that's bolted together, and then on the bottom is this ball — if you will — with windows so you could hang it down through the ice and anybody can go down and see what's happening under the ice.

H. What Williamson was doing in the teens.

S. Yeah.

H. Shooting movies in the tube.

S. Yeah. The trouble is it's difficult to do that because the windows steam up; you have to keep wiping the windows and it doesn't do much for your photography.

H. Do you remember some of the early names?

S. No, as a matter of fact, I don't. They were so infrequent. It didn't happen on a yearly basis. We might go five years between these people coming down. You only saw the people who were on dry land; every year the *Geographic* and a reporter from here and a somebody from there would come down to the ice, just to see what's going on. And this was especially true back in the early days, because almost all of those old camps were just as the people the year before had walked off and left them.

H. Does the early days mean in the 60's?

S. Yeah, and before that, in the 50's. A lot of that stuff was left over from the International Geophysical Year in '57. It was more expedient to leave things there than it was to bring it back. I'm sure you've been out in the countryside some place where you go around an old ranch house and you find the combines and the tractors and the stuff and the old trucks from the beginning, all piled out there someplace. In case you need a part you can go get it. Well, that's exactly what they did in the Antarctic. You know, if you get down to the ice, especially on one of their fly-ins, and you either don't have something that you thought you had or you break something, you can always go out in the junkpile and find something that might not be just exactly what you needed but it would let you survive until the next airplane came down. And that was the rationale they had.

H. And it's pretty well preserved because of the dryness?

S. Well, sitting right on the ocean, but anything up on a plateau won't. Essentially zero humidity.

H. The dogs [word?] that died in the teens and they're still preserved.

S. Yeah, and you find penguins the same way. You pick up a penguin and he looks like a tennis racket. About that thick. I'm not sure I want to put that on tape, but that's what they look like. Anyhow, there were a lot of things that went on then.

H. Can you recall incidents where people were way off base in terms of violations of procedures where you had to do some education?

S. No, I really can't. People knew — first of all, they knew I was coming down there, so they were doing exactly what they told me they were going to do, and had all the equipment. When I left, they went back to what they'd been doing in the beginning. But they knew that you only screw up once. The word gets out, because what you do affects everybody else.

H. I know that people, for example, dived deeper than 130 feet.

S. I know that too. I was one of them. But the reason we had the 130-foot limit was because the Navy had the control over the diving. We were limited to 130 feet. And of course this was before we had a chamber down there as well.

H. So basically anything over 130 was logged as a 130-foot dive?

S. That's just the way it went. Keep them happy. And then finally I got it through their thick heads that we really didn't have to do that, but it stayed on at 130 feet just because. That will be changed.

H. It will be changed? And hasn't been changed yet?

S. No, it hasn't been changed yet, because we haven't updated the thing in probably six or seven years. Theoretically, that's being updated now. I've made a few deep dives down there myself. Paul Dayton has, and everybody else has. But fortunately, nobody got hurt doing it. If I were there, and knew somebody was doing it, then if I wasn't the heck myself, I'd have to say, "You probably shouldn't do that." You have to kind of roll with the punches in a place like that because you know very well that if you're at 130 feet you find something brand new that's 150 feet you're going to go get it or take a picture of it. That's why I never wrote rules. That's why I wrote guidelines. You give me a lesson plan and if you get down there and find you can't do exactly what you told me you were going to do, then it gave you the flexibility to go try something else and then give me a call and tell me about it. Where if you write rules, regulations or standards, they're cast in concrete. You can't do anything about them. But I think with the new technologies we have today and all of that, depth one of these days will be of no great problem. Basically, mixed gases and whatever. But I'll tell you what, I would hate to dive helium/oxygen in 28.6° water. Even with a heater on it. That's why I suggested they go back — I suggested to Bev Morgan they go back explore this hydrogen converter that we have. That gave you 125° breathing error and moisture. It worked well, but nobody liked to play with hydrogen. We always bought it in 3% hydrogen in air, which was non-combustible, and we'd put 750 pounds in the 70 and then pop it up to 2250 with air and you had one percent equivalent. It really worked like a charm. Pete Hacker and some of those guys, when they were on the [word?] project, used them, tried them out, said —

H. This was when?

S. Oh, probably in the 60's. 50's and 60's. Come on in. [interruption from someone at the door]

S. Oh, probably in the 60's. 50's and 60's. Come on in. [interruption from someone at the door]

— Cape Crozier [word?] is on the other end of the island; it's probably 50, 60, 70 miles away from McMurdo, and the only way you could get there in winter was by Trackmaster or truck on the ice, and in the early days we could go up there. It's a big emperor penguin rookery, and then they set that aside, specifically "Stay out of there." And so I'm a little concerned about how these guys got in there to take the pictures of the emperor penguins that are up at Crozier, because I thought it was totally off limits. Maybe it's just to the United States, I don't know. Well, we have the Marine Mammal Act, and they have a person on the ice responsible for policing the Marine Mammal Act, so you don't harass the seals, or you don't harass the penguins. You can't even pick up a penguin feather there; they'll lock you up. I mean it's that strict. If that makes any sense. Just looking at the *Geographic* I was trying to figure out how they got in there and did that. Either that or they've changed the regulations under which that thing is guided.

I guess one of the things — I don't know whether we've talked about it or not. One of the things, when you look at the Antarctic, when you are out at a base camp, or especially up around Mt. Erebus, up around pyramid [word?] ice tongue and those kind of places or back around [word?] cliffs. There's a big kind of indentation at [word?] cliffs and cinder cones are tucked in the back and then you come out you have the Erebus ice tongue. You get back into the really pristine ice environment — it's all ice; you don't see — well, you've got a couple of islands that are rock, but the rest was all white. A couple of little points stick out. That's where Shackleton and Scott built their houses. But you think of this being really quiet pristine environment, but it's one of the noisiest places you'll ever be, because the ice continually moves downhill, and it cracks and pops and it whines. It makes a noise that really gets you. You look around to see where it's coming from. And the same is true up in the dry valleys. We were diving in Lake Fritzel years ago.

H. [word?] Fritzel?

S. F-r-i -t-z-e-l. I think so.

H. Named after a German?

S. I think so. We were out on the ice, we were diving at midnight, one o'clock in the morning. We were living in little mountain tents. We had three squad tents —

H. This was summer and it was still light?

S. Yeah, I missed night. Sun goes down, sets the last time, I think, on the 27th of October. Then the sun just goes round and round. The only night you really have, from about two in the morning until probably four, when the sun goes behind Mt. Erebus, comes out the other side. It's never dark. I mean, it's just you don't see the sun. We were out there, we were diving at midnight and so quiet in those dry valleys unless you have a wind blow. I mean just: if a rock drops and it's been described as the area that probably looks closest to what they saw on the moon. Not on the moon, on Mars — little rocks of all kinds. But you'd be there, suddenly you hear what sounded like a bullet ricocheting — Wheeee. It's just that the ice is moving around, cracking a little bit, either from the Kennedy Glacier or from the lake itself. Out there, just dead quiet, and somebody's under water and we had 'em in the first few years we were using surface-supplied. You know, with a mask and we just had a diver in the water, tethered.

H. Full face mask?

S. Yeah, using a Kirby-Morgan. And that worked fine. And then we started putting them in with scuba. The big problem was that lakes in the dry valley were all stratified, have all different layers of salinity and of chemical composition.

H. They don't turn over like warm-water lakes.

S. No, kids are always cold. But one of the problems with putting bubbles down there is the bubbles come up. You have a mixing, and so that's why I was exploring the use of rebreathers, trying to find some carbon-dioxide absorbent that would work under those temperatures. To my knowledge there ain't none. I'd work in 28°, about 28 to 32 in fresh water. And I guess they've got some new stuff out now that may in fact work, there's some method of warming the CO₂-absorbent canister, probably a more realistic approach to it. Anyhow, just the noises that are associated with the Antarctic; you think of this pristine environment, and all of a sudden: Bang, Crash, Rip, Wheee! All these weird noises.

What the hell else?

[end of Tape 7, side A, a short tape compared with others]

[there is nothing on side B]

Interview of Jim Stewart by Eric Hanauer, December 6, 2001
(transcribed by Betty Shor May 2002)

Tape 8, Side A

H. December 6, 2001, and we're talking with Jim Stewart. Okay, we're on.

S. This is a lead-in, just a run-through of some slides that I put together for that lecture on more-or-less history of diving here at Scripps and some other places. This first shot is of Connie Limbaugh. Most of the time you see him in his wet suit, with a mask up on his head. But this particular case, this was probably 1956; we are on a chartered fishing boat, out of Santa Barbara. Actually we met them up at Goleta. We were on an explosives test. Back during that period — a little before that actually when they were doing all of the oil research in Santa Barbara Channel, they were shooting one-pound blocks of dynamite suspended five feet below the surface and getting a bottom return so they could look at the sub-bottom profiles of Santa Barbara Channel for oil drilling. Well, five feet down is right in the area where most of the bait fish swim, and the schooling fish. They were shooting 500 shots a day.

H. Now who's "they"?

S. The oil companies, whoever they were. But there were numbers of seismic groups up there working. So Fish & Game said, "We'd better really take a look at that and define what the kill radius of that blast is." Concurrently with their shutting down of the blasting until they found out what the blast radius was, the fertilizer explosives first came out, and both Hercules and DuPont had their version of fertilizer explosives. One of them was called Vibranite and the other one Nitramon. We took representatives of both Hercules and DuPont and we had Fish & Game aboard; we rented two boats, one was the shooting boat and the other was the recovery boat and helped us with what we were doing, kind of a supply boat if nothing else. And then every night we'd run back in. We launched from the Goleta Pier and then we'd go back and spend the night in a hotel, motel. This was in the fall of '56. We were out there for about a week. We had built three or four cages that were probably 8 x 8 inches square and probably 8 feet long, covered with — not screen, but some version of that, with a little larger mesh, compartmentalized. And we would take — we'd go into Santa Barbara or they'd bring out bait, whatever bait fish they had, and we'd hook-and-line fish, to see, and we'd put these in these little compartments, and we would suspend a blast as they did from a plastic bag — kind of a plastic pillowcase type thing — for size; we hung these blasts five feet down, and then we'd walk our fish in until we started to get blast damage. I say "walk them in"; we would move them, we had them on floats, and we'd start at, let's say, 150 yards from the blast and then walk 'em in until you could see that there was blast damage. One of the strange things about that — let me see; no, I don't have it any more until we get back a little further — but one of the things we found was — you would expect blast damage in both the liver and the gas bladder of these fish 'cause there's your pressure wave going through, but what we found when we turned 'em over and tried to use a scalpel to open them up that there was nothing in 'em to open up. The refraction wave — the negative wave — had totally cleaned 'em out, of the big fish, gave you a little cause

for concern, you know, if you were in the water with the blast. [both talking] There was nothing in there. Anyhow, we [both talking]—

H. Obviously, you guys were out in the boat.

S. Obviously we were on the boat. It worked out that some of the French [name?] guys were staying in the water with low-yield blasts and they would just have a steel shield.

H. The French? I didn't catch the word.

S. The [Sojito?]. It's a French commercial diving group.

H. Oh, okay.

S. And they would stay in the water with the low-yield blasts. We had one serious incident here, as I think I may have told you, with Bill Fenical when they were diving. They were on the first interchange of diving or science almost with the Chinese; they were on a little Chinese boat, governmental boat, working out around the island of Quemoy, and Bill and [Mills Luntworth?] were from here and then Jim — can't remember his last name — and his buddy were from the Smithsonian, and they were in reasonably shallow water — 35, 40 feet of water — flying diving flags and whatever, and they were both in the water. They went in toward shore, so they're in 25 feet of water, and Bill and Mills went outside, probably 30, 40, 50 feet of water, and they're separated by probably a couple of hundred yards and the boat's in the middle, and this little Chinese fishing boat came in and their normal type [word?] is to throw a bottle of nitroglycerin in the water, which they did. And Jim's partner was down under a reef, so he was shadowed from the blast, and Jim was right out in the open. Of course, it broke his eardrums, gave him a hell of a mask squeeze, pretty well dinged him up. Mills and Bill were outside, and they got thumped, but not to the extent that it really did 'em any physical damage. Then they had the task of getting Jim into some kind of a medical institution, if you will, that perhaps had a pressure chamber, and I've forgotten where they had to take him but all this stuff can be dug out. So that was our experience with blasts. But we tried a little of everything. We put lobsters, we put chitons, we put limpets, we put everything we could find into those and walked 'em in, and what it looked like was with a block of dynamite you kill every fish within a hundred-foot radius of the blast, and I think that that's probably published data — I think Connie and Andy or Connie and Carl Hubbs finally wrote that up, or Andy, one of the two. So anyhow, it's in the library.

Anyhow, looking here at the next slide: This was my first class that I taught for the university. This has to be the summer of 1960 — I've forgotten: '60 or '61. This was my first or second class, because some of the people in there are from General Motors. General Motors had the defense research division up there in Goleta and Dave Potter, who had been Fred Spiess's counterpart — Fred was director of our Marine Physical Lab here and Dave Potter was head of the Applied Physics Lab up at the University of Washington, and essentially GMC bought him away, and he became the director of seafloor studies. Since we were doing a lot of work concurrently, they asked me if I would train some of their divers, and I did. Guy in the second chair is a guy by the name of Fred [Coopall?]; I think the guy right dead center behind him — tall guy with the dark glasses, looks like the red shirt — was Dale Wells; Wells ended up as their diving officer — USC graduate in geology.

H. He was the guy who was on the Teledyne [word?].

S. Oh, Teledyne. Yeah, that's Dale. Anyhow, this was the first research dive. In those days it became obvious the University of California was going to decentralize. So the first three years I ran a statewide class open to all the campuses, sent people down, go through the program, see what it's all about, get indoctrinated in the way things were done, and that was really what brought on the president's office asking me to develop a university-wide program, because we obviously couldn't train 'em all and certify them all either here or there. So that's what that slide is all about. One of the things that happened when I first came in here — fellow by the name of Bill Batzloff was also a member of the Bottom Scratchers and was running the diving locker, and we opened that diving locker in 1958, and he was brought in to run it as a principal laboratory mechanic. In those days we had a total machine shop down on the locker; it was all two-hose stuff, and once in a while you had to machine something to make 'em work. So we did that, and then, when Bill died — I guess he was still alive in this one, this had to be the [word?] dive in '66, so this is probably '63 — myself on the left, Emil Haubecker [name?] who had been a chief in the Navy — we'd get him scientific leave to go on our research cruises with us; Warren Cleve [?] is the only other guy in San Diego who's ever been bitten by a shark — he has the gray —, holding the lobster there; and then Al Stover, who was the biologic collector and marine tech for Carl Hubbs in Marine Biology. Actually, had Ron McConnaughey's job. When Bill died, Al Stover lateraled over and became my diving-locker supervisor. Anyhow, we were charged with going to Guaymas, Mexico, just prior to Christmas of 19 — 63, I think, and we were looking for a small yellow-fin croaker that had been described once in 1898. So we were camped on the beach at San Carlos Bay, when there was absolutely nothing there but one palm tree. I think they had just moved the Seri Indians in, some of 'em from Tiburon, and they were living up in the mangrove swamps. But we didn't suffer a lot; we ate snapper and lobster, and white-winged doves, and whatever else we could get our hands on. And we never did find the fish; we were pulling a beach seine in a little embayment down there at two o'clock in the morning on the high tide, and all we got was coal. We had a Santa Ana pick up up here and that kind of reflects right down the Gulf of California, and we had high seas and it went from 65 to 57 in the water almost overnight, and we had one night over 35 degrees. So it was a tad nippy down there.

Some of the other lobsters. Obviously, this is the university cruise; that, I think is the *Orca*, just looking at the fantail on her. I don't know which cruise this would have been; we ate a lobster or two in those days. We'll back up just a little bit. You take a look at that depth gauge on my rear, and you'll also notice there is no nylon on that suit. I think that was one of the first ones I got from San Diego Divers; DivaSurf [?] built my first one and then San Diego Divers built the next generation or two. But that was one of the early depth gauges, and it was a diaphragm-type depth gauge; I think it was a Spiro Technique [?], and rather than being a [word?] tube they had a diaphragm, oil-filled diaphragm —

H. When was that?

S. Oh, late fifties. And this was about the same time. This is, I think, '58. This is down in Guaymas as well, and that's a rooster fish. Coronado Islands, and this had to be between '52 and '58 some time, or '60.

H. Okay, picture of three black sea bass.

S. There's actually three. That little one I shot for meat — I shot the big one, Tom [Theese?] shot the other one. This was the Kelp Kings Diving Club, sponsored by the Navy, and we'd take a Navy sport-fishing boat out and dive the Coronado Islands. And that big one probably weighed — oh, 350; little one probably close to 300. Little one weighed 82 pounds, and that was the one I wanted for meat. Little white sea bass. H. 1950s, looks like.

S. That was that same trip. Coronados. I had one of Prodanovich's 38 power heads on the end of my spear shaft, and we had dived the north tip of North Coronado Island for black sea bass. And it was kind of cruddy in there that day so we went on down to the south tip. There was a big big kelp bed in there, but there was also a big swell, so we came back up to Middle Ground Island and on the northern side of that toward Middle Ground Rock was an extensive kelp — the whole thing was kelp, all around the Coronado Islands. The only way you could get through between the Middle Ground Rock and South Island was where the boats had gone through and chopped the kelp up. Anyhow, we had lunch, and two of us jumped on our paddle boards and went out, and we'd just gotten to the edge of the kelp there off Middle Ground Rock, about 50, 75 feet of water, and of course all breath-hold diving with no wet suits in those days, and I got right on the back of these two great big black sea bass. And just as they got in the kelp they stopped, and my partner says, "Jesus, go shoot him." I said, "What am I going to do with a fish like that?" "We shoot him, I'll take care of him." I dropped down, and I pulled on this black sea bass, and he's probably 10 or 12 feet from the tip of my gun and had this white sea bass swim between me and the black sea bass, and I shot the white sea bass.

H. In those days were you pretty sure of finding black sea bass every time you went to the Coronados?

S. Well, we usually started seeing 'em about the first of May, and then they'd be in there until probably October, and then where they went I don't have a clue. But very seldom did we see 'em in the winter.

H. You know, that's the same thing as Catalina now. They start appearing late in the spring, at about 30 feet, and then as the summer goes on, they go deeper and deeper, and by October, November they're at a hundred foot and then they're gone.

S. Well, Bev Morgan — was the first dive I made with Bev, when I quit my job and was going back to graduate school; I was living up in Alameda with my ex-wife's folks. And we were going to go out to Anacapa; I think Herb Sampton who built the Sampton [word?] cameras, and some other guy that I've forgotten. We took two boats out — either Billy or Bobby Mistral, and Bev and I went out in one, and these other guys went out in the other. We launched from Port Hueneme, off Anacapa. And we were just on the east end of Anacapa; we went out after white sea bass primarily. Jim Christenson had just shot some of the big ones up there. We went out and started looking around in the sand. Bev and I were in about a hundred feet of water, flat sand bottom, huge gorgonian corals — you know, the *Lophogorgia chilensis*, the apricot-colored coral. It looks like you're in the sagebrush forest, with this stuff on the bottom. And suddenly here come these black sea bass, and we must have had 10 or 15 around us. In those days we didn't have the kind of break-away pack that we later had. Prodanovich had developed an ice bag, like you'd put on a shoulder or on your head, and he rigged a mouse trap type arrangement that powered a CO2 cartridge and

he'd just put it in his sleeve and, as the fish would run, this would come out of the sleeve and this thing would pop and it punctured the CO2 bottle and you had lift. Well, Bev came out anyhow, and he had a hundred feet of parachute-shroud nylon; he looked like he was wrapped in a plate of spaghetti, and he's trying to shoot this 300-pound fish. I grabbed him and told him I didn't really think that was what he wanted to do. Halibut, I got him with a pole spear. And it's kind of ironic; I got him up here at Dike Rock, and actually that's over at Children's Pool. I took him over there for some reason. My Bottom Scratchers jacket; I still have that, but when the other guys wore theirs to club functions, I wore mine continuously, and it looks like it. But I hit this guy with my pole spear; he was behind Dike Rock, and just as I started to hit him, and I always hit 'em right behind the gill slits and tried to break his back and paralyze him, this guy came out of the sand and with that long pole spear I couldn't hold him down and then mistakenly he stopped and I got him. Probably a 30-pound fish. And then there was Andy Rechnitzer. Andy had this little '54 Chevy pickup; he'd done a little skin diving, but not much. So I got him up, we got him a gun and took him out to the Coronados a few times, and was able to get him to shoot this one. He was a 300-pound plus fish. We loaded this thing in the back of his station wagon, and he drove all the way up to Encinitas with that thing dangling off the back of his tailgate. H. Somebody must have thought he'd got a mermaid in there.

S. Yeah. People go by and look at him and shake his head. That was our collecting trip around Baja. This has to be after we'd been at Abreojos, probably on the way home, that's looking pretty dry. But the canary-yellow stuff that's found in the Gulf of California is also found at Abreojos, as is the other gorgonian you see up in there. There and Punta Maloremo are about the only two places I've ever found that other than in the Gulf itself.

H. What was that second place?

S. Punta Maloremo, just outside the entrance to Scammon.

H. I know.

S. I had and probably still have one of the top collections of gorgonian corals around. I sent a lot of them back to the Smithsonian, and then in our collections here. Back in the early days, we had the old flat-bottomed skiffs, a Johnson engine. I think we had two at the campus. That's our old launching device there on the north side of the pier. Looks like that's before they put in IGPP. No, IGPP's off — no, it can't be. Yes, I guess it is, looking off the other way, just off the corner of the pier. I'm trying to figure out where in the world I'm standing. But a lot of the old T buildings are still there. I think IGPP should be right on this point right here, right behind the boat. I don't know what I'm looking at back up on the hill there. That was 1983, that was the day that we broke the 23 pilings on the pier. I was giving a final exam to the class over in 114 over here, and I decided I'd walk out and stretch my legs while they were taking the test. I went out there; at that time I was responsible for the pier.

H. How big were those [legs?]? Looks like they go halfway out the pier. Fifteen foot?

S. Yeah.

H. Fifteen foot.

S. Yeah, at least. And they were right in the —. It was not a high tide. That sign was about halfway out the pier. And those waves were breaking outside of that. I got out there, and I felt this weird feeling. I looked over one of our pilings and broken in two

places, and at that point — and next day we went out and found we'd broken about 23 of them. Of course, that was built in 1915 or '16, held up well. Now this is looking down. They've moved the lifeguard shack to down where it is now, that was '82 or '3, I've forgotten which. I think that's the one that took the windows out of the La Jolla Beach and Tennis Club.

H. Wow.

S. Well, there's that famous slide of all of us. There's my dive and surf suit. And that's a Bottom Scratchers' face mask.

H. I was going to say it looked like a homemade mask.

S. Well, that's what Wally Potts used to build. Built out of probably five-sixteenth inch drop-hammer rubber and you had to sand the thing to fit your face. Now that lens in there — I still have that mask. That lens, after Jack got his eyes taken out, I had a friend who was in the glass business, car glass, and I had him take a piece of an old window out of a car and make me a face-mask lens out of it. So that was safety glass. And that weight belt; I think it's maybe up in that stuff up in the aquarium room with my box there, but that's when I built that first quick release out of that wrapped welding rod, and —

H. And when would that have been?

S. Oh, early '50s some time.

H. Early 50s.

S. Chuck Fleming and Andy Rechnitzer.

H. Yeah, I'd recognize Andy.

S. That's when he had hair. Jumping off a boat some place. Some place in the kelp bed. That was me 'cause I recognize the trunks. This was our kelp cruise in 1957, down to Baja. [name?] O'Connor, who is no longer with us, fellow with the bald head sitting on the rail there was Harold Scotten, I buried him off the end of the pier here within the last year. Art Kelly's got the cap on in the back.

H. Is that Wheeler in the Hawaiian shirt?

S. Yeah.

H. Second from the right.

S. You can tell by the top of the head and the ears. Cabo San Lucas.

H. Nothing there.

S. You noticed. That's how it was all the years we were there. This was with Giff Ewing. Wheeler and Mike Neuschel and I flew the peninsula prior to our kelp cruise, and we spent the night in La Paz and we're just going back up around the other side now. But it was like that all the years we were there; maybe I've got some pictures in here; there were some shark fishermen shacks right up along where that last pump is where the Finisterre is now, in that saddle. Down where the first [word?] is. That was where the fish cannery was, and now of course it's wall-to-wall whatever. We camped right on this [word?] beach, on the outside here. And right between those two rocks out on the end, right where the arch is, that big Kaiser gypsum ship had gone in.

H. Yeah, I —

S. That's when they filmed "Rivers of Sand." That was our camp. Fellow with the big hat on was a fellow by the name of Lemke; he was a Dane, he discovered some little critter called a *Neopilina* when he was down off one of Hubbs's cruises, seeing what he could find in Baja California. There's my old flat-bottomed [word?] skiff with a

30-horse engine on it. This is Tom [Theese?] on our trip to Guadalupe with Andy; we found this goat. You know, there were about 60,000 goats on Guadalupe then, and they had eaten everything down to nothing. And we found this little goat that had got himself trapped right at the water line; it had come down this rock ledge into a cove, couldn't get back out. We loaded it into the skiff and took it back to the *Paolina-T*, and that became our garbage-disposal unit. We all tried to figure out how to smuggle him home, finally had to put him back on the beach. *Tampico*. Some place I have a picture of the other side of that, where it shows how much it's opened up, because it opened it all the way from essentially under the foremast all the way back to the after mast. I think we've talked about the *Tampico*, and the oil spill and all that. That was one of our summer beach camps. That's probably Chuck Mitchell, with a hat on his head there. That was when it broke up. We were down there the night it broke up, and this was obviously some time after that. Some place I have a picture of the two ends, just after it broke apart. There's the bow.

H. Now what were the years that you guys studied the *Tampico*?

S. It went in in '57, and we studied it — oh, God, a long time after I left the kelp program, well into the '60s. Wheeler continued that study when he was up at Caltech. These are just some of the invertebrates, some of the shells, some of the invertebrate animals that were killed. It killed every invertebrate for probably two miles down the beach. That was our camp. Connie and Art Flechsig. Carl Hubbs was a great excavator of [things?]; he found this Indian midden — this was about half a mile north of Punta Cabras, and we cut this little trail down, and we'd cut a meter square out of the face, and we dug up an Indian burial. It was a female; she's down in the Museum of Man now. The little stone ring or oblong, and she was buried in a fetal position facing the sea, and covered with two metate rocks, big flat grinding stones.

H. And about when was this?

S. Well, obviously before Connie died, so it had to be '55, probably late '50s. That was one of our blasts on that first — when we were doing the Nitramon/Vibramite studies. That's a one-pound block of explosive, five feet down. That's what it looks like just afterward.

The [word?] classes I taught for the [word?] and Fisheries in Canada. This is up on a quarry out of Winnipeg, about 20 below. You can see one diver in the water, waiting for the other one. They were on the push-pull that I described to you yesterday. There's Glacier Bay, class I taught up there, for the National Park Service. You can see — what the crap the name of those mountains are? Normally you can't see those at all. The white mountains way out there?

H. Uh-huh.

S. But this was on a high tide. That's on the low tide.

H. Wow.

S. About a 20 foot rise and fall of the tide, [word?] used dry suits up there. The whole bottom of that thing was just lined with Dungeness crab. This is when I took them up to a place just out of the glacier; some of them had wet suits, some of 'em had dry suits. This is the Muir Glacier. I put 'em in right in against the glacier where it wasn't calving, but just outside. You know, you think of ice as being very crystalline water; not around a glacier where you have all the sediment and everything else that's trapped in the ice.

H. It looks pretty cold.

S. It was cold. This was another dive with the National Park Service. This is Hetch Hetchy Reservoir, you know, out of Yosemite. One of the first retrainings I did with them on high altitude, the altitude table, and we didn't dive Hetch Hetchy; we went on up. There were two roads — two lakes, called Eleanor and Cherry; they're up on top. And they were both natural lakes. And they had dammed one of 'em, to give it a little more depth. And they were raising cattle up in there at the time, and we went up and made a dive in the lake, and they're swimming across the lake, and you run into a barbed wire fence. The only thing I think we saw in there was a crayfish.

H. [word?] from the vehicles this was 1950?

S. Well, I taught my first class for the Park Service in '63 and then —

H. Have we talked about how you initially got involved with the Park Service?

S. Yeah, I think we have, because I got that call from the [word?] training center and they sent me Bob White. Cabrillo National Monument was then responsible for Channel Islands National Monument, which was Anacapa Island, and then they added Santa Barbara, and then they moved the headquarters for that operation up to Oxnard. But they sent me those two guys in '63 and then we kind of formalized things. The first formal class I ran for those guys I think was '66, so that was just after that.

H. And are you still involved with them?

S. I'm sorry.

H. Are you still working with them?

S. No, I got out of that when they got their own program started. I helped them draft their program, and I worked with them as an advisor. I did, I taught over 450 rangers to dive. So it was a long thing. This was the boat I had built. This was called the *Macrocystis*. And I had a 32-foot Jeffreys built, 22-foot Jeffreys, I'm sorry. And I had a towing I put right in the bow of that thing, and we'd tow it behind our 65-foot T-Boat, took it all over southern California. We used the T-Boat as a restaurant and as a gas station, and then we'd run around in the boat and dive out of that. Had a 325-horse Chrysler. And there's Cousteau's saucer. We had it down here in '64.

Westinghouse leased it, and we went to the submarine canyons here, did all those good things, then we took it down to Cabo San Lucas. And that's where we put Fran Shepard in the boat and took him out and tried to find a sandfall to show him. There wasn't any sand falling, so we had to get up just out of his sight and shovel sand — Bob Dill and Bob Dietz and I. Ah, that's somebody jumping in off the Verconi [?] on SeaLab II. That's a Mark VI, semi-closed unit. This was the electrically powered suit; this was [Goodyear's?] that Hank [Fye?] was responsible for. Didn't work worth a damn.

H. Wet or dry?

S. I couldn't hear you.

H. Wet or dry?

S. Dry. It was a dry suit. No, that's not true. It was a wet suit, I'm sorry.

H. Is that somebody's funeral back there?

S. Well, that's Thomas Keller, and that's Catalina, and that's them getting suited up prior to the thousand-foot dive. Actually — that was a day or so before, making the 300-foot dives. This is the Shell Oil barge drilling barge *Eureka*, and that's what they

staged their dive from. You can see the yellow bell over under that A-frame on the left-hand side there?

H. Yes.

S. [word?] when they made their dive, just with the gas rack, and you can see the bell in the background there. We're over on the *Swan* now, and this was the day of the thousand-foot dive. There it is going in the water. Brad and Dale Will [?] and I were on the *Swan*, and Dave Potter and Bob Workman and —

H. Brad. Hugh Bradner?

S. No, Brad was with me on the *Swan*.

H. Okay.

S. They wouldn't allow people on there; once *Skindiver* picked it up. I mean, the Navy had no formal responsibility to it other than the fact they'd issued the first contract. So they were only allowed aboard as guests. Dave Potter had enough horsepower, and says, "I'm going to go anyhow." They brought the thing back up. Well, this is all of our ships. This is the *Horizon*. You know, we've talked about this dive.

H. Yeah, we've done all that.

S. That device on the back there is that truck cage I described to you. If you look in the corner to the right, you'll see a five-gallon Nalgene bottle, you know in the upright position, and the same is true over here. And in the corner that we're looking through, those were upside down and they had no caps on 'em, so I could open the caps on those two that I'd cut the bottom out of, and they'd flood and the other two then compressed as we went down and as you put air into those [phrase lost] they'd start back up and then the air in the tanks would re-expand. I thought that was a pretty cheap way to build a shark cage that was reasonable.

H. And what were you using it for?

S. Well, that was during the Carmarsel trip where we weren't sure what we were going to get into, and they wanted to dive some of the deep banks. [Mogami?] Bank was about the only time we ever used it, and that was down about 125 feet, and there was so much current that the cage started to tumble. We yanked 'em out. This was Nanimaweto. That was the first island we dived. As I said, they were just like they would have been a hundred years ago.

H. Okay, the name of the island again?

S. Nanimaweto.

H. And it's —

S. In the Marshalls.

H. Okay.

S. It's about the closest island up towards Guam.

H. Towards Guam in the Marshalls?

S. Yeah.

H. It's a long way from the Marshalls to Guam.

S. Oh, yeah.

H. Okay.

S. We came down through the Marshalls, and went back up. I'm sorry — went down through the Carolines, came back up through the Marshalls. That makes more sense.

H. So this island was —

S. In the Carolines.

H. In the Carolines.

S. Yes, because it's just above Truk.

H. Okay.

S. You have the [word?], and you have the little villages all over the island. That's Bill Newman, with a pipe in his mouth there. Joe Curray with a camera. This was Truk, where we were anchored. You know, there were no cars at all down there. This was an old Japanese road, went back in there, came to an opening, and the whole place was full of— the whole trees were full of fruit bats, flying foxes. [Canoe?] making out of the breadfruit trees; that was on Eniwetok. There's that drunk pig I told you about. They'd had a fermented coconut party the night before, and some place — I haven't found it yet — there's a picture of that pig standing on two legs on the same side. That's just kind of a shot of the after deck. We took a whole bunch of our old skiffs, that we'd had on the pier here for years, took 'em out and gave them to the Peace Corps guys out on the islands there. That's launching the shark cage. Neil Marshall, Perry Crampton, Joe Curray, Franz Emil, and the big guy in the back is George Hohnhaus.

H. Was the shark cage necessary?

S. Huh?

H. Was the shark cage necessary — or just kind of —?

S. We didn't know. We were the first ship allowed in there. Remember, nobody'd ever been there before. Joe Curray and Bill Newman and Perry Crampton about to go in the water some place. We carried little short five-tines with us, called those the five iron. Taking a transect line down.

H. [phrase lost] People were in regular just shirts.

S. Yeah. Joe's got his double-level with him, inclinometer and the compass, get dip and strike to the rock. I have to think that's probably a photo page, just the way that island looks.

H. Yeah [phrase lost]

S. This is Wick. Wick Island, southern end of Wick Island. Here's the animal that bit me.

H. Eeeuw.

S. That's what the bite looked like a few weeks after the fact.

H. Wow.

S. This is the wreck of the *Leonore* —

H. I've been there just free diving.

S. I don't know what all I've got there. It was too dark to see much.

H. There wasn't much there.

S. That was the boat that was given to us by Bob Peterson, who was one of the co-owners of Jack in the Box. Gave us that ship called the *Dolphin*. That's [word?] Santos down in the Gulf. One of our collecting trips. Now back to the Saucer. Oh, we're down at Cabo San Lucas now; this is when we had it down at the Cape. The guy with the bald head over there on the right is Andre [LeBon?], when he was still with 'em. One of the other things I do in my life — that's right over in Arizona. Idaho. Antarctic. This was our camp, that big piece of ice over there is the [name?] glacier; that's Scott's hut off to the right. This is where we camped. Putting in growth

experiments out there in 45, 85, and 130 feet. That's 55 below in that picture. My famous diving flag, in case the icebreakers came in.

H. Wet suit —

S. Oh, yeah. That's the hole. Getting out after the dive. After you do that you go up to the 109th drinking squadron and have a few toddies and go on this device. You look at the tires on that, they're so large that, if that thing goes through the ice, it won't sink. The flotation in the tires themselves. And they have a hatch cut in the top of that thing. The slides that I had that were stolen; they built a bus on the same concept, called it Ivan the Terrabus. The old 130s, Erebus in the background. This is flying back into [name?]. This is just about the time you start to see the southern lights, when you get back into there, back in New Zealand. I tell people I show a sunset like everyone else, but this is noon. I'm going horizontally from your right to your left across the horizon. That was on a winter fly-in in '74. That's it.

H. All right. Good. And you did not run out of tape.

End of Side A of Tape 8

[nothing is recorded on Side B of Tape 8]

Interview of Jim Stewart by Eric Hanauer, Dec. 11, 2001
[transcribed May 2002 by Betty Shor]
Tape 9, side A

H. Today is Tuesday, the 11th of December, 2001.

S. How come my watch says — [break]

H. — holes on some of the previous interviews and we're starting with the Antarctic, and Jim wants to fill in a few things here.

S. I think some of the main things that I would throw in were some of our experiences in going —

H. Not the Antarctic; we're talking about the atomic tests.

S. Okay. From that standpoint the one thing that I want to get on tape is just the aftermath of the tsunami I talked about that was created by the testing of the nuclear depth charge, where it essentially overran the island and took our camera shack and the whole stuff with it. But the day prior to that Chuck Fleming and I had made a dive to 200 feet. We had a Mike boat, landing craft, on the outside. This was when — that's how we took out the big 20-foot post that we had painted black and white that we looked at through the camera. But while we were doing that, we made a 200-foot dive in there, you know, just a 200 for 10, so in those days you took one at 20 and 4 at 10 on the way back up, which is no big deal there, had a down line in and a [word?] on the end of a weight. But that area just on the outside of the reef was probably one of the most fragile and delicate areas I've ever seen: there was just a lot of the little lettuce corals and fine corals of all kinds. The closer you got to the surface the more it was impacted by typhoons and whatever, but at 200 feet it was really a very very beautiful area. And the day after the shot — we had gotten our camera and went back out to see what else we could find — we made a drop in the same place: 200 feet, 10 minutes, and it looked exactly like it was a granitic slope — there was nothing at all; it was almost mashed flat, and we're talking sheer vertical. You couldn't — I mean there was no bottom; it was just off into the blue. And at 200 feet it was like looking at this wall. It was almost the color of my shirt, as I recall; it was just a gray. All of the fragile things were just turned to powder, I guess, by the impact.

H. This was Bikini or Eniwetok?

S. It was Eniwetok.

H. Was this an H-bomb or A-bomb?

S. It was an A-bomb. It wasn't a hydrogen device.

H. What about radiation at that time?

S. We were a long ways — they tested way outside. We couldn't even see the ship from where we were. We could not see the ship; it was out over the horizon, which means 17 miles or more. I have the feeling it was out probably 25 miles. The resultant wave that came in — the tsunami that came in and washed over our island, washed over our shack — there was no radiation where we were. Not from that shock. Just the remembrance of how that looked and trying to put that into perspective to what those things would do to a city or something like that — when you see the force that came into that island — the hard coral is like concrete; it looked like it had been sandblasted. Anyhow, that was just one of the remembrances I wanted to get down because that has always stuck in my mind.

I'll go back a little bit. When Red Gilmartin and I first started going out there, we had a landing craft that we used — a Mike boat — and in the early days — we had some 21 stations across the lagoon, so we'd go from a shoal maybe 15, 20 feet on a coral head to a deep. We'd run transects down and we'd go down and establish transects. The whole area out there — some of our areas were in areas that had been impacted by previous blasts, 'cause this would have been '55 through '57 that we were working out there, and some of those areas had obviously been impacted by blasts before, because knowing what I saw after that depth-charge shot and what it had done to the coral was very much the same as we saw. And of course we didn't really realize what it was in those days. And, of course, we didn't wear film badges or anything in those days either, because it was an atomic shot — I mean it wasn't a test, and what you were getting was just residual and obviously it didn't do us any damage. But some of the bottoms out there obviously had been impacted by something, and we don't know where those shots were. They were still blowing up islands in those days and then they started to run out of islands, so they had to use shot barges. One of the remembrances I have — the three islands, the two islands — Eniwetok was a military island, Perry was a scientific and construction island, and the deep channel ran out through there between Perry and a little island called Japtan.

H. What was the name?

S. Japtan: J-a-p-t-a-n, I believe. Jap-tan. And it was still a really luxuriant island, all palm trees, still some of the big monitor lizards on there, and some coconut crabs, and all the things that you anticipate finding out there. That path had a terrific tidal current in it and just [word?]. I can still remember seeing the schools of sharks, if you will, in that pass.

H. Gray reefs?

S. There were gray reefs and there were whitetips. I didn't see any blacktips, but gray reefs and whitetips primarily.

H. In the Marshalls that's primarily what we've seen. We saw a tiger on one of our decompression stops in Bikini.

S. No, thank you.

H. Yeah, the thing was about twice as long as I was.

S. Oh, God, no. The only one I've ever seen was at Wake. And he was in the boat basin.

H. I've seen two; I've seen one at the Revillagigedos and then the second one was just last month at Bikini.

S. You know, they've taken only one here; they caught one off Crystal Pier in Pacific Beach in 1940, the only documented record, but Prodanovich swears he saw one at the La Jolla caves.

H. You can't mistake a tiger shark.

S. No, no, it's pretty obvious. And he'd seen enough sharks in those days; he was sitting on his paddle board, and he said he had this thing go underneath him, and he said there was no doubt in his mind what it was. It was almost the size of his paddle board and had a very blunt nose.

H. [comment too faint to be heard]

S. Well, Crystal Pier has, too, and that was a small one. Must have been an El Niño period of time. Anyhow, back to Eniwetok. We only made one dive in that channel, and that was enough to satisfy our interest in looking at the channel. They had an old concrete barge that was just run aground, and I don't know whether it was vintage of the landing that they made there — the battle — or nobody seemed to know when it had been put

there. And they used it as a fishing barge, for sport fishing; people would go out, and they'd take them out on their days off and they'd go out and fish. You can imagine around a fishing barge where there are lots of fish there are also lots of sharks. The closest thing I got to with that was sticking my face in the water and looking down from the ramp of a boat, and I felt I didn't really need to go in the water with them. Other than that, I really can't think of much that we need to talk about on the atomic tests. As I say, we got to Bikini that once and swam all the wrecks, and again we didn't have much air or much time, so we did a cursory look at 'em. Or putting in or taking out the tsunami recorders; I mean that was pretty straightforward. We had a landing craft with a big A-frame on the bow; we'd load those things on the ramp and take 'em out. One of the crazy things that I did see out there: Red Gilmartin and I had been up towards the northwest passage and were coming back, and we had the ramp of the Mike boat up, and we were up standing on the ramp, and we got hit by a squall, and they have those little flying fish out there. This flying fish got up and got hit by that squall; he must have gone straight up a hundred feet and then the wind quit: Konk! One of the other crazy things we had happen: we were collecting coconut crabs, and the coconut crabs, as it turned out, were pretty radioactive. We didn't realize that at the time, so — they're big ugly things — I guess on most of the islands the natives eat 'em; they're a delicacy.

H. Supposed to be very good, supposed to be sweet.

S. Anyhow, we got two or three of these big crabs and put 'em in a cardboard box and were flying back in a helicopter — one of these big double-rotored helicopters — five or six hundred feet in the air — had the door open. We're sitting there in our flip-flops and our shorts and our T-shirts going back in, look over, and this king crab had gotten out of the box and he's crawling up the wall. Had that cargo netting in there. We did a lot of quick shuffling around to see where the rest of them were so they didn't take a toe off.

Ah, what else? I talked about the vermouthe running out. That was a shock to our system. Buying a Rolex watch for \$58 was a nicety. I think that's about everything I can say on that.

H. Okay. You mentioned that there were some things that you wanted to go over on the early skin-diving days.

S. I've talked about buying my mask and the fact that we formed the Manta Ray Club, and all of those things. It might be kind of fun to talk a little about the evolution of our weaponry, if you will. When we first started diving, and I mentioned a little bit in that thing we did for the Aquarium on the ghost forest — but the abalone were honestly three and four and five deep, right at the La Jolla caves, and like down ten feet. You'd pry off the bottom one, and you had half your limit right there.

H. These were red?

S. No, they were greens. The reds were never above the thermocline; we found those out at Cross [word?] Rock and Point Loma and places where it was cold. And we got the [Sorenson] and the [humilis?] deep too. It became obvious when you were swimming into the La Jolla Cove and you'd look down in five feet of water and there'd be a 15, 20-pound halibut lying there, that we probably should have some means of taking some of those home.

H. Now this was when you were still in high school?

S. Yeah. We'd go out there early in the morning. Well, all of the high schools had a broom-ball team. You'd use a volley ball, you'd take a broom, cut it on a 45° angle,

black-tape it, and you'd play hockey. We'd take a couple of chairs out; there was a [pie-shrink?] called Glacier Gardens down at 8th Street and Harbor Drive, and we had a professional hockey team here. All the high schools had these broom-ball teams, and we got out and beat the shit out of each other on Friday nights and then — we rented a garage just above the Cave Store, and we'd keep our sleeping bags and our abalone irons and our swim fins, masks — really all of our gear in there — cost us a booming ten dollars a month or something to rent the garage. Coleman stove in case we wanted to cook something for dinner.

H. How many of you were there?

S. Well, in those days there were five of us.

H. Any of the names?

S. Oh, sure. The five of us who started were Romero Comas.

H. Spell it please.

S. C-o-m-a-s. Romero was half Puerto Rican and half Panamanian Indian, built like a fire plug. Chuck Moelter — M-o-e-l-t-e-r. Bob Plummer. Charles Lunford Saunders. And myself. There were four of us for quite a while and then Chuck Saunders came in. Some of us would play, after we started taking some of the other kids in — Hedy Ladue [name?] and Corky Christopher and Jack Shearer and Davis L.C. Janis, Jr. He built him — he was on a submarine, he was on the *Redfish*, and he built him a rebreather. It died in a swimming pool on Midway Island; didn't know much about building scrubbers in those days. So it died. Anyhow, we all played ice hockey or skated or something, and then we'd come out when the rink closed, we'd get in our cars and we'd drive out, get our sleeping bags out, and we'd sleep on Goldfish Point. In those days it was all Torrey pines, almost all the way out to the point. There were some little flat spots and we'd sleep there, and then right on the point was a big rookery — not a rookery — the whole caves in those days were populated with cormorants. That's where they nested. And pelicans and sea gulls and whatever. But the pelicans would primarily roost right on Goldfish Point, right above the clam, where the clam is. So we'd get really brave; I guess we ought to talk a little about evolution of underwater lights. We tried to figure out how we could waterproof a flashlight, and they had some sealant that they used for sealing automobile windshields. And we'd just take a regular flashlight and seal the lens. We'd change the batteries after each dive. And that worked reasonably well. So then we got the bright idea: why don't we take a bicycle inner tube and vulcanize one end of it and put the flashlight in there? And then put a battery clamp or a hose clamp around the front, and then we'd seal it and waterproof it, because we got tired of buying batteries. That worked like a charm. So we'd take our flashlight down, and we'd sneak down, and here are all these birds roosting with their heads under their wings — cormorants, pelicans, sea gulls — and you'd turn a light on this thing, and the head would come out, and, especially with a cormorant, you had to be really careful when you grabbed him by the neck, which end of the neck you grabbed him by, because that beak — many of the guys found out — really do a number on you. The last time I did that with a pelican — it was a bright full moonlight night — and I grabbed this pelican, and I got the pelican right here — they're covered with bird lice — and the damn bird lice, I was just crawling — of course, they won't stay on you because your temperature's not right, but in a blink I was covered with lice. The beak is going Clack, clack, clack in my face, and then he crapped on me. I thought that was adding insult to injury, so I threw him over the side and I just dived in,

followed him in, washed myself off. And then we got really good with slingshots, and we'd — either at the caves or over at the double slide on the other side — we all had marbles in those days and the marbles would go pretty straight. We'd shoot at the pelicans and sea gulls and cormorants as they were trying to land.

H. Now you can go to jail for that.

S. Oh, yeah, in a blink. So, right down the street from my Dad's house was an aircraft engine dump, where they took the airplane engines, and they had these big trays of 3/8th inch bearings out of aircraft — ball bearing — and we'd go down and relieve them of some of those once in a while.

H. Poor birds.

S. Those really were deadly.

H. Now I think you were going to make a connection with the broom-ball sticks and pole spears. Right? I think that's what you were leading to.

S. That's where we were leading to, but just going back a little bit. Because we had the broom handles and so Flugger made a five-tine spear, and so we thought, "Why can't we take one of those spears — they called 'em frog gigs — and take it underwater?" So we did, and we had broom handles. Well, you had to be awful close to a fish to get him with a broom handle, except for halibut. Jump on 'em and you got 'em. The first thing we tried was oak transom poles, like you opened the windows with, tried those and they were a little heavy, so we went to just one-inch round, but they were so long — we wanted them long enough so we could spear something, because in those days we didn't have surgical tubing or bungee rubber or anything like that. You had to swim up and you'd hold your spear and you'd give a big scissor kick and go: Brp, and try to get your fish. But we had to leave them in the garage, because we couldn't carry them on the bus, so one day I got the bright idea, "Well, Jesus, I've got a fly rod; it's got a ferule joint in the middle." So we got some one-inch ferule joints, and then we sawed them in two and put 'em together, and then we could carry them on the bus. And the bus drivers we were never very popular with, because we'd get aboard the bus with a pole spear and a bag full of abalone — usually in a canvas bag of some kind, and we'd always ride in the back seat, put the abalone up over the back seat. Of course, they leaked, so we were never very popular with them. But we got a lot of abalone. As the pole spear progressed, and it really wasn't until after World War II, that we had shock cord. We didn't use shock cord at first; we would take a piece of inner tube and cut an inner tube and then just tie it — a piece of inner tube about that wide — and I'd never realized how much drag there is, 'cause I used to swim a crawl with my pole spear, put my hand down through the pole spear, and I could go a long ways, and just swim a regular crawl. Then I put that inner tube on the end of that thing, and it about broke my arm, just dragging that through the water.

H. Now had you seen this being used by others or did you —?

S. Well, Jack and those guys had pole spears, but they didn't put anything on the back end of them. They were still purists and they went out and tried to stab something. And it was about this time that Jack came up with the spear gun. Don Clark brought the spear guns back from Florida with him, when he came out here, and —

H. So the Florida spear fishermen had been using spear guns before the Bottom Scratchers?

S. Yeah. That's when Don shot that big black sea bass back on the *Massachusetts* — big battleship they use as a bombing practice place. He got, I think a 440-pounder, that picture of him kneeling alongside this — looks like the Goodyear blimp.

H. Don —?

S. Clark. Now dead. He was the guy that was taken into the Bottom Scratchers the year before I was. He worked in naval aviation in some capacity, so he was back at Pensacola, and they'd go out and dive this wreck. So then Jack developed his guns. And then Wally refined 'em. But after the war we came back and somebody started using the inner tubes and then that got to be such a pain we had this bungee shock cord, and so that's what I used on my spear. Probably three-eighths inch, make a loop of it about two feet long, tie a knot in it, and I just had a screw eye on the back of my pole spear and you could [word?] that down. That really worked quite well. But during the days when we were first looking at spear guns, we tried everything. We tried using screen-door springs, to make a spear gun that's narrow, and Bob Miller made a crossbow, underwater crossbow, a bear to cock the thing. And you couldn't keep a line on it; it would shoot the dart right off the line. We probably ate more garibaldi than most folks around. They're not bad.

H. Were they protected then?

S. No. They've only been protected a brief period. Ate a lot of those. You'd catch them when you were surf fishing, you'd catch a lot of garibaldi — that's what people ate. So, anyhow, that loosened the guns. I have the second one that Jack built. I think he built his first one, and a year later I got mine. That was about the time — have I talked about helping him land that first grouper?

H. Yeah. It's on here, helping Jack Prodanovich land the first fish.

S. First gulf grouper that was speared.

H. Let me check on this. Because I think we went on to something else at that time, and you didn't describe that. You didn't talk about it.

S. Well, let me go back. We had — we're still in the Manta Ray Club, and we were diving, at the La Jolla Cove primarily, and every once in a while we'd walk down to the Children's Pool and jump in there just for something new. And we'd always go down to South Casa and spear halibut, or look for halibut, white sea bass. And I saw a manta ray in there, only manta I've ever seen up in there, and he was probably an eight-footer, and no doubt in your mind what he was when you saw him. And that was one of the early El Niños, and I've forgotten what year but Mr. Manta was in there. And he was in shallow water, probably 15, 20 feet of water. There used to be a kelp bed in there, just beyond the Children's Pool, a little kelp bed in there, and Wally Potts got a 24-pound white sea bass with a pole spear in there in the kelp. Anyhow, we had walked from the Cove down to Children's Pool and went out looking for fish. And I saw Jack sitting on his paddle board; he had a pretty characteristic old gray paddle board. We were down there probably an hour, and were going back, and Jack's still out there on his board. "What the heck?" So I threw my pole spear in the water and swam out to him, out in the grouper ground a couple or three hundred yards out. So I'm out to him, he says, "I've got this big fish, and I can't get him up." He'd broken his eardrums, and he couldn't get out. So I dived down; he had him on the line, piece of hard-wrap swordfish line, and the fish had gone down and he'd gone through a hole in a reef and had turned sidewise; he'd toggled. So Jack was pulling, and he was not going any place, so I came up and got a breath — about 40, 45 feet, I guess — came up and got a breath and went back down, and turned the fish

around and pulled him out. Came up and got a breath and I went back down, 'cause for some reason as I came down I didn't see him. I thought, "Jesus, did he swim away?" So I took this breath and went down; I put my feet on the bottom to push myself off, and I looked up, and that grouper was right over my head with his mouth open. He was deader'n than a doornail. But that would have been a shock had I done myself in, being bitten by a grouper. So, anyhow, I helped him get that thing up, so he brought him on in.

H. You say Jack broke both eardrums. I'm assuming that's not the only time that's happened to those guys while they were —

S. Say that again.

H. I assume that's not the only time they broke eardrums in their [word?] days.

S. Well, they had earplugs made. And those earplugs were made by dentists. They'd take an impression of your ear, and we all had friendly dentists in those days, and they would simply make you an earplug that was the size of your ear, and you'd put it in there. It didn't do any good; people thought they did. I think I may still have that set of mine.

H. Did you ever see the pictures that they —

S. Oh, yeah, had 'em on a string, tied onto the mask, that's what they had.

H. All those guys and a couple of you guys that are there.

S. Yeah. Anyhow, we helped him with that. And when they did the things in 1947 — I'd just gotten out of the Air Corps — having been in Nome, Alaska for a year and a half, came back down here, and I was what is esoterically known as lizard-belly white, and I spent about three days at the La Jolla Cove, and first thing I got red and the second day I got purple, decided I'd probably had enough of that. So I got out in July; I was home for about three or four weeks, trying to decide what to do with my life. Ben Stone and I were talking one day and he had this old '36 Ford; he was a gardener over at Point Loma High, where he and Jack both worked. Don Clark was up at Moffat Field, you know there in the Bay area. We thought, "What the heck? We'll go up and we'll meet Don at Monterey." So we loaded our paddle boards and our pole spears and our sleeping bags and the Coleman stove in that '36 Chevy of his, and off we went. We dived essentially every point where we could get in the water between San Diego and Monterey, Carmel and Monterey. We dived the whole San Simeon coast; we dived Morro Bay, all the way up to Santa Barbara. Took us about two weeks to get up there, just poked around. Of course, we had no wet suits or anything in those days. And met Don up there. I can remember — we'd spent the night just sleeping in the sand dunes there at Carmel.

H. Now was that your first time doing any serious diving outside the San Diego area?

S. Uhhh, no. The first serious diving we did was just at the end of the war when we could get gas and got old enough to drive. And we started diving Aliso there at Laguna Beach, between Laguna and south Laguna. And there was really a neat reef off there and we just looked for a place to dive 'cause the Scratchers had dived at Salt Point — not Salt Point —

H. Salt Creek.

S. — Salt Creek area, that was their favorite spot, so we looked for other places to go. There was a walkover overpass there, as I recall, and some stairs that went down to the beach. So we went up there on our first trips out, thought, "Boy, we're a long ways from home." Went out there, all kind of big green abalone, and there was the Treasure Island trailer park, just on the point. You could watch the surf come up; it was really a steep beach, planted you about half the time; we tried to body-surf there, and they were all

stuck-your-head-in-the-sand type waves. But you could look out, you could see the corbina, right in the surf. We went along, tried throwing our spears at 'em, you know, and that didn't work. We got one once in a while.

H. Do you remember some of your first impressions of the diving as you moved up toward Monterey? And how it compared with what you were used to.

S. Much colder, obviously, once we got around the point, you know, on the north side. There were several things memorable that happened on that trip. I remember some place around Gaviota Pass, and I have yet to be able to figure out where that was — the train used to run up through there. There were a bunch of lemon orchards around; we were looking for a place to spend the night, and we thought, "Well, we'll just go down this old dirt road" that went down along this row of eucalyptus trees. So pretty dark by that time, went up, threw our sleeping bags down, and crashed and burned, and all of a sudden the ground started to shake and I thought, "What in the? Gotta be an earthquake." Our heads were about 12 feet from the railroad track, just on the other edge of those trees, and those were steam locomotives in those days, and — God, what a shock that was. So we moved our beds a little further away from the train, and I think that was the only one that went by that night. But that was interesting. Then we got to Pismo Beach and we decided we'd make ourselves some fried clams. You didn't have to dive for clams in those days; they were just on the beach. So we just pulled out again on the sand and parked and threw our sleeping bags out, and about the time the bars closed there comes this pickup down, guy and a gal, and she got out to take a pee, and she let one of the most horrendous farts known to mankind. They were both dead drunk, and we were sleeping about 12 feet from where they were parked. They had a boxer dog that kept trying to pee on me; finally they gave up and went away. We were wide awake by that time. But we dived there and we dived at Avila. There's a cave in there, some place between Avila and Pismo Beach there's a big cave, sea cave. We dived off that and then dived at Avila and then came up to Morro Bay and dived Morro Bay and then we dived several spots along the San Simeon, wherever we could get down to the water, I'll put it that way. We dived Carmel; we didn't dive Point Lobos, but we dived Carmel and Monastery Beach. And I remember body surfing with the sealions there at Carmel, in the surf. And we just threw our sleeping bags out, spent the night there, and came on home. We were home, I think, over a weekend, dived here in La Jolla, and then picked up another couple of the guys in the Manta Ray Club, and we thought, "Well, we're going to go to Mexico, down to the tropics." So we went to Santa Tomas — cold — Uuh. We spent one night there and came on up and when — what's the Mexican restaurant — what's the famous one there in Ensenada?

H. You're not talking about Hussong's, are you?

S. Hussong's. Well, that was a Chinese restaurant. So we stopped at Hussong's and had dinner and a fog closed on us. So we were going to go out to Punta Banda, but we didn't know how to get there. So we're driving out where we thought we were going down and were down at the south end of the Estero, and it was all farm country in those days. And we see this light out there in the field; there's some guy out there with a pole and a lantern, irrigating. So we came up and in our best border Mexican asked him, "Where's the road to Punta Banda?" and in this Texas drawl he says, "Well, you go down the road —." We did, went down and followed his directions implicitly and got out and we could hear the surf; we were poking along on the dirt road. Threw our sleeping bags out and we

were really thankful we stopped where we did 'cause another 25 feet and the road stopped; it had fallen away, and we were on a sheer vertical cliff about 500 feet up out of the water. We spent the night there, and then dived Papolote Bay and some of those other places. And then we came on back up, and we stopped at La Misión. In those days the road went up essentially following where the freeway goes now but it went all the way up to La Misión and went inland and then up over the top of the mountain and it came back in. So, there was an old old road, because when I was a little bitty kid we used to go down there and get abalone, and you drove across this old rickety bridge — you know, about every other plank was gone — and by this time they had a dirt road that came down the other side. So we drove down and found a place to park, and we went out and lived on clams and lobster and abalone and fish for the next week, four of us, and came on back up. Those were some of the early trips, just when we were getting started.

H. Okay. One of the things we kind of skimmed over were your early days with the Bottom Scratchers, between the time you got out of the Army and the time you joined the Bottom Scratchers.

S. That was '47 through '51. I was taken into the Bottom Scratchers in May of '51. Well, I think, going back to those days, when I got out of the military, all the guys — most of them that were in the Manta Ray Club were a couple of years younger than I was, so they were getting drafted, going into the Korean War and all that kind of stuff. So I found myself with no one to dive with, so I started hanging out with the Bottom Scratchers and diving with them. And then I had Jack build me that gun, and I can recall going out to the Coronado Islands on a doctor's boat. We anchored there on the north side of the Coronado Island — of the middle ground island. You could physically lean off the side of the boat to shoot sheepshead. I shot my first sheepshead. It was fun, one of those brilliantly clear days and a beautiful kelp bed, and so I recall doing that. We just did a lot of diving together, nothing very spectacular. About that same time — when we had that first underwater spearfishing contest, and I've forgotten exactly what year it was — near Laguna Beach — '50 or '51 — we actually formed a Los Angeles Council of Diving Clubs, and since we had no council down here, I was appointed, being the only guy on the block to drive up and go to the meetings and, of course, as I told you, that's where I met Connie, 'cause we were both driving up, it seemed much more reasonable to ride up with somebody in back, and we'd get out of there at midnight and drive home, and I'd go to work, and he'd come back into school. I was appointed essentially vice-chairman of the council for San Diego and Imperial counties, and so it fell to me to go to all the new dive clubs as they were starting, and that's about the time diving really got popular. And I'd go to the dive clubs and inform 'em about the problems we were having with the hook-and-line fishermen and being legislated out of the water.

H. I don't think that's changed much.

S. No, but I don't think that you know that Fish & Game through a wording fluke eliminated spear fishing, I think that was in 1946 or '7. What it said was that there will be no spear fishing allowed, and what they were thinking of was people who were on the piers or especially on the Mission Bay bridge, and they'd stand there and they'd spear anything that came by and leave it there and it would rot. Well, the trolley ran across there, and the buses ran across there, and the people downwind of that got a little upset, and they pressured Fish & Game to do something. So that's when the Scratchers wrote Fish & Game and said, "Change the wording, so if you're totally submerged you can

spear fish.” So that got that changed. But for years, I can recall one of the first dives I made in the Cove, I was swimming around towards the caves toward Goldfish Point, and I’m out there probably a hundred yards off the rocks and this guy is fishing with hook and line. And he’s yelling, “Get out of there! Get out of there! You’re scaring all my fish.” Well, I’d done the same thing. You know, with a fishing pole you just sit there, and you know there’s just something about the bite, and here I am swimming across his line — there wasn’t a fish within a hundred feet of his hook. But, boy, they just knew we were chasing all the fish away. We had some real knock-down drag-outs down at the north tip of North Coronado Island between the spear fishermen and the hook-and-line fishermen. They were throwing jigs at boats and doing all kinds of things. So, anyhow, in my function as chairman of the area down here [phone rings], I got to meet all of the new clubs as they were coming along. One of the clubs — well, the club that was formed by the Navy, we called the Kelp Kings, formed at 32nd Street and it was open really to anybody who wanted to join, but primarily the Navy, and that’s really what got us into the Coronados and a lot of other places that they had a sport-fishing boat. And when the sport-fishing boat wasn’t used for sport-fishing, that’s what we used to take out to the Coronados. And then Tom [Theese?] became the chief in charge of the Navy diving boat at North Island, and we’d take that out to the Coronado Islands ‘cause it was equidistant between getting the thing out of the bay to where a plane would go in or coming back in from the Coronado Islands. And one of the guys — another chief in the Navy — name of Charlie Richards — was an avid canoeist and one of the first canoeing instructors here through the Red Cross. So he’d take his canoe along and they’d get in that canoe and they’d spear blue sharks, had a detachable-headed pole spear and go Pttt and get the blue sharks to take ‘em for a ride.

H. From in the canoe.

S. Yeah. So anyhow, we’d go out there. We did a lot of diving, really before we found the big bunch of black sea bass. You’d see one here, and one there. But we had the diving boat out one day, and it didn’t have a fathometer on it. But it was just one of those brilliantly clear days, in the winter, and we went out on the lee side of the South Island, place called Jackass Rock. And Jackass Rock was named because they had a couple of mules on the island that they used to take propane down to the lighthouse on the southern end of the island — propane-fired [light?]. That’s where that old mule used to hang out was around that rock, so they called it Jackass Rock. We went out — just ran 90° off Jackass Rock and got out where we could no longer see color — you could see a rock pile and then total — dropped a couple of guys in, and we had a concrete clump — block— and tied a line to it, and kind of drug ‘em along just off the bottom so they could see what was there, and then all of a sudden one of ‘em popped up. That’s when we found that big mess of lobsters there off Jackass Rock. I still have yet to go back to that place. But we took a lot of big lobsters on that trip. And then later on Ron Church and I were out in the *Macrocystis*, and we’d gone around the Coronados and were coming back in. I guess we had the *T-Boat* out there; we were doing something [studying] kelp, and everyone else went back on the boat, and Ron and I took a little tour around the island, inadvertently turned the fathometer on. We were following these dolphin, and Ron thought they’d get close enough to get some underwater pictures of them, so going along in 80, 85 feet of water, nice flat bottom, and all of a sudden here’s this reef — you know, about as high as this room, comes up and back down. So we thought, “Gee, we ought to

go look at that.” And we did, and my remembrance of my first dive on there was really something, ‘cause you broke down covered with fish, covered with lobsters, covered with rock scallop, 85 feet down, sand on each side. And that reef — it’s called Stewart’s Reef, by the way — runs parallel to the South Island, 85 feet of water. We anchored the boat and then went up-current— pretty good current going — went up current and drifted back with the current. The bottom was all sand, and it was absolutely covered with brittle starfish. It looked like a shag rug. You couldn’t see the sand, there were so many brittle stars. So we dived that quite often, and — God, I wish I knew where that footage was. I got that picture of Wheeler North: here’s this big electric ray coming across and he’s coming at Wheeler and Wheeler goes “Oof” and the ray goes “Urr” and stands on his tail and opens his mouth, and you know they have jaws that will evert and looks like a cartoonist’s version of the guy spitting out his false teeth — Phhht, got this whole face full of teeth looking at you. I just see these two fins going out of sight in the frame. Anyhow, we ran into a lot of critters out there. And then somebody put a big trawl on it, dropped it, and it’s still out there, just totally wrapped the reef and tore part of it up. But it’s since become part of the reef. Then another of the spots we found — again, we just inadvertently found it when we were just out looking around one day, and we found this rock pile down toward the southern end of the island, out in about 85, 90 feet of water. That’s pretty flat all the way across. We dropped in on it, and the ledges again — they were parallel to islands and they dipped toward the west, and it was a series of ledges, almost like my hand with my fingers spread out here, and they were a hundred yards long, and each of those things was wall-to-wall lobsters. You’ve probably seen the pictures of the guy standing behind that big pile of lobsters — I don’t know what book it’s in — but that was one of the first trips we made there. I can recall bringing back — not bringing back — I can recall seeing a 13-foot whaler with lobsters stacked as high as you could stack ‘em. Anyhow, we did eat lobster.

H. One thing — I’m still looking through my notes here. And I don’t have anything on when you began diving with scuba. Do you remember the occasion? I know the Bottom Scratchers kind of looked down their noses at scuba —

S. Except for one.

H. Yes?

S. Lamar Boren.

H. Tell me about it.

S. Well, Lamar, you know, did the Flipper series —

H. I know.

S. You know Lamar. Anyhow, he did a lot of that stuff, and he was one of the first people to have a regulator. And we were out one day, and Emil had cobbled a bunch of oxygen demand regulators and made ‘em workable, as long as you changed the springs about every tenth dive. Anyhow, we had several of those aboard. You know the old admonition: don’t hold your breath and come up.

H. Now this was about when?

S. ‘48, probably ‘48. ‘48, ‘49, but probably ‘48. But again, I was kind of like the rest of them, I thought, “Jesus, if I can’t skin-dive for it, I don’t really need it.” Until I put one on.

H. Do you remember the occasion?

S. Yeah, Coronado Islands, and I used —

End of side A of tape 9

Side B of tape 9

S. It was always my thought that it wasn't really the Aqualung that made diving possible; it was the concurrent development of the wet suit. With scuba you can go deeper, stay longer, and get colder. That was about the only advantage was that you could go deeper, and, as I told you, all of our early 200-foot stuff when we mapped the canyon was in sweaters or long handles, 'cause we didn't have — I think we had one or two suits here on the whole campus. We went out for 32 minutes at 10 feet for a 15-minute 200-foot dive, and got pretty chilly. Anyhow, those first dives were fun, and I didn't get my own regulator until '51 — that true? No, '52. But, of course, I used regulators here. Is that true? No, I started diving here in '52, and I'd used scuba before that. I didn't have my own. I don't know who I used, but I'm sure Emil had put together — oh, that's when we had the oxygen-demand regulators, that's what we used.

H. Now was Emil working here at the time?

S. No, he never worked for Scripps. Emil was a master chief machine repairman in the Navy, and we'd get him scientific leave to go on our cruises with us, and he'd dive with us and he could fix 'em faster than we could break 'em was what it boiled down to. And he and I had a lot of fun. When I had that 26-foot Jeffries made, we'd tow it behind a T-Boat. He was a shooter, a member of the 11th Naval District pistol team. We'd ride the *Macrocystis* towing 500 feet behind a T-Boat on the way down to Todos Santos or San Benitos Islands or Turtle Bay, or someplace. We'd take a couple of cases of beer, several thousand rounds of .22 shells, and we'd throw the beer cans in the water and sink 'em. That was our amusement. They'd pull us aboard. We got our own breakfast and lunch usually, and then we'd stop some place for the night and we'd go aboard and have a warm dinner. Had an alcohol stove on the boat, so that worked out all right. But anyhow, we had a lot of fun doing that. But Emil could make you most anything. He'd make you a watch or a battleship, and they'd both work. Just one of those people who have the finesse.

H. When you were first using the Aqualung — you say, '48 — not the Aqualung but —

S. Some kind of underwater breathing device.

H. Did you see that as the future? Or did you think it was just something — ?

S. I thought it was a real pain in the ass, really. I could put on my mask, fins, and even — I was never a great snorkeler. I didn't like snorkels. [Name?] convinced me I should use a snorkel on my first trip to Eniwetok, where I had a lot of sharks around me and every time I'd have to stick my face up to take a breath, I thought, "Hmmm, that's why they have those."

H. So at what point did you change your mind about scuba?

S. Well —

H. What was it that made you change your mind?

S. Well, it's the fact that we have a submarine canyon here primarily. And the only way you can get into that canyon really was scuba. And I walked over a lot of mountains, both above and below water, and so that was just one more way to go investigate something. A means of transportation, let me see a lot of things that I would have not seen any other

way. And, as I say, with breath-hold diving you're down for just a second or two. But I got my first regulator — it had to be in '52, 'cause I'd just come back from one of the atomic tests — and I got it from some Marine lieutenant who swore up and down that it had been overhauled. I gave him a hundred bucks for it. In those days you didn't have many scuba tanks, so we had fire-extinguisher bottles, which, as you know, are about that thick and weigh about 50 pounds. Emil built us some adapters for 'em, so you could put a regulator on 'em. So we were out — had to be a Navy boat — 'cause the guys I was diving in were all in the Navy — put my brand-new regulator on, turned the air on, worked fine. I had a Air Force Mae West life jacket, with two little bottles, tied to my tank, I thought if there was a real problem. I don't think I even had a weight belt, the tank was so heavy. We jumped over the side and dropped into the slot between Middle Ground Island and Middle Ground Rock — about 75 feet of water. You could see the boat up there. My partner hit — he hit probably from me to that file cabinet, probably 6, 8 feet — 6 feet — and he's looking the other way. I took a breath and got air, exhaled, next breath was all water, had nothing to exhale. I knew I couldn't get his attention; I could see the boat. I thought, "No problem. I've got this really neat Mae West now." I got two bubbles about the size of walnuts. I thought, "Whoops, James, you'd better leave now." So I had nothing to exhale, and I swam to the surface.

H. Get your weight belt?

S. I don't think I had a weight belt. I think that tank was heavy enough I didn't need one. But the diaphragm on that old two-hose regulator was leather, and it had cracked right down the middle.

H. Leather diaphragm?

S. I said it had turned leathery.

H. Oh, it turned leathery.

S. Well, with a thing — you couldn't get parts. We wrote the first overhaul manual for the scuba regulator out here. Probably by IMR. I gave my copy to Deborah. But we made 'em out of nauga hide. Some of the guys over in the Research Support Shop would take a piece of nauga hide, just like you put on your car, and they'd put the plate on with the ears that make the thing work. And it worked fine. But mine had not had that conversion done to it yet. And that was an education. By that time I was diving with Scripps, and Earl Murray and Chuck Fleming used to do the overhaul, so I brought it out and they put it back together for me. We did a lot of things. I used to get the damndest fire fights — Did you ever know Al Benke?

H. I know who Al Benke was, but I didn't know him.

S. He and Pete Scholander, who was over at PRL, were great friends. Benke came down here; I guess it was after he retired, and he was working up at [BART?] as a consultant. He'd come down here, and he said, "There's no way you can dive to 200 feet with a scuba regulator; breathing resistance is too great." We said, "Al, did you ever think about it? All we did was just increase the first stage pressure." Leaked a little bit on the surface, breathed fine at 200 feet. "Ah, you can't do that, you know." And we really got into it when we started using single hose. He couldn't believe you could dive to those depths on scuba. I said, "Al, we're doing that every day."

H. Now, was he a diver himself?

S. Al Benke. Oh, sure, he was captain of submarine medicine, back in the experimental diving unit.

H. That doesn't especially mean he was a diver.

S. He was a hard-hat diver. He had been trained in hard-hat, I'll put it that way. As all those guys had in those days. But anyhow, those first few scuba dives were really fun, and then when I really got involved here at Scripps, it was kind of a means to an end. By that time I'd decided to go back to college. In '55 I found myself one of two botanists in the United States who was also diving, and I was a dry-land botanist, growing up in the National Park Service or State Park or something as a naturalist. And that didn't work. So, when I went to work for Wheeler, in '58, when we started the kelp disappearance studies, I got to go out and study the plants that I thought I was going to study anyhow. And it worked fine. But to my knowledge I put the first underwater transect line under water. Coming from a dry-land environment, that's what we used.

H. I think we have that on tape.

S. Yeah, but nobody'd ever put one underwater here. Now of course we have a lot more things, much more sophisticated. You can now buy a plastic tape and stretch it out on the bottom, and it works fine. Anyhow, those first few dives were interesting.

H. Okay, maybe we should —

[end of side B of tape 8]