Livingston: This is July 9th, 2009, and we're continuing an interview with Bob Schmieder of Cordell Expeditions, and speaking about early diving and subsequent dives on Cordell Bank. The interviewer is Dewey Livingston, and with us here is also Jennifer Stock from Cordell Bank National Marine Sanctuary. So this, in essence, is part two.

In context with diving Cordell Banks, and your experiences there, how did it differ or was similar to other areas that you've dived?

Schmieder: Cordell Bank was of course deeper than most places that I had been diving, and that members of the group that I was diving with had normally been diving. Sport divers are normally restricted to less than 100 feet of depth, and in depths like that, and close to shore, there's a community of organisms that we're quite familiar with. And so, getting to a place that's far off-shore, 20 miles, and going down from 100 feet to 150, 60, 70, 180 feet, the community, visually and numerically and functionally, of course, are very, very different. But, there were other places that we could compare them with, because there are other off-shore banks, some of which are far enough offshore to be relatively isolated.

So, there's a bank on the back-side of Catalina Island that is visually very spectacular, as we found Cordell Bank to be. In that sense, it was similar to what we had seen on that bank; colorful, abundant, and so on. But, it's tougher to compare it – of course, anything can be compared, but the comparison to, say, shore-line communities makes less sense than the comparison between off-shore banks.

Livingston: Could you name the bank off of San Catalina?

Schmieder: Tanner Bank. And then there's the Cortez Bank, which is shallower. It's off of Los Angeles. Tanner Bank is the other one that I was thinking of. There's a bank, of course, off Point Sur, and we were the first to explore and describe that. And I can tell you about that at some appropriate time, whenever you wish.

Livingston: Comparing your experiences at Cordell Bank with diving off of Point Sur would be of interest.

Schmieder: Well, the first thing you realize is that, even though the Point Sur Bank is a little closer to shore, it's about three miles off instead of twenty miles off, it's still far enough away to be mechanically pretty isolated. So, the community that lives there, as on Cordell Bank, is pretty much isolated. That's why we refer to it as an underwater island. It's insular. The two banks, Cordell Bank and this other bank are about the same size, and about the same depth. The shallowest depths are about the same, 120 feet or so, and they are both – the topography is a very small number of very isolated shallow ridges or pinnacles.

It's not as if, in either place, there's a large flat area that's at 120 feet. These are extremely tiny, spiky protuberances that stick up, and that's where the most dense communities live. This is in common with both places. Also, both places are along the coast, and so they're subject to the California current, which is a southward flowing current. And they both experience the Davidson current during the right time of year, which is the fall, and which comes up and flows the other direction. So, the environment in which these two places – and there are many other places that are similar – are immersed are very similar, so it makes sense to compare them. And we did compare them, because we did explore the other bank, and we did numerically compare what we saw in the communities on those two places.

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Livingston: Speaking of diving at Cordell Bank now, and again throughout the period that you have dived there, could you address the surface wildlife that you saw in the area, if there were any memorable wildlife encounters, et cetera?

Schmieder: Well, the most memorable one I described earlier in our discussion here, and that was our locating the bank, a diveable place on the very first dive that we made on October 22nd, 1978. We were searching for the shallow place, which we thought we knew we could find. We thought we could find this place, but for hours we searched and searched, and found absolutely nothing diveable. And then, I said, "Well, over there are the birds," and it was Edward Cordell who located the bank back in 1869, by looking at where the birds were.

So, we went over to where the birds were, and sure enough there was the shallow point. Now, that could be partially coincidence, but it's not entirely coincidence. The birds are there feeding on what is accessible to them. Some of them are diving birds, Cormorants, for instance. And their food is coming from the benthic community. So, where it's shallow, the community is most dense. The fish are there feeding on the invertebrates. The birds are there feeding on the fish. And so, in addition, the whales and marine mammals, which have a larger range and will move around much more broadly, are still going to be attracted to where they will encounter whatever it is they consider food.

So, it's the fact that the topography has these shallow pinnacles that are densely covered with organisms, the community. That's what acts like a magnet for the birds and mammals to be located there.

Livingston: And were you able to observe that in the case of whales, or in sharks, et cetera?

Schmieder: The whales tend to range much more broadly, and we certainly saw whales. We didn't actually try and track them or keep track of them. The reason, of course, was that we were busy trying to carry out dive operations. So, we would make note, and I tried, and usually did, have somebody on board who was a bird/mammal person who would keep his or her notebook. So, those records were made, and some of those were incorporated. Steve Cooper and Mark Webber put together a report on the birds and mammals early on. We certainly saw blue sharks quite abundantly. On some days, we would feel we were in the midst of a huge – let's see, what would it be? A herd of – not a herd of sharks, a – a – a something of sharks. And we dived among them. They were not a threat to us at all.

Blue sharks are just fish to us. We would see a few marine mammals. We sighted a northern fur seal. We were able to sight the tag and capture the number on that tag. And that animal was tracked back to its origin in the Pribilof Islands. And of course, they were right there where we were, and we were there because of

the shallow places. Beyond that, we were unable to make any more systematic observations. Were they, you know, hanging out above the pinnacles? Or were they ranging more broadly? I just don't know.

Livingston: Do you have any idea if just your presence there was attracting - ?

Schmieder: I suspect so. We found things like the seals to be somewhat curious, somewhat disdainful. Now and then we would have dolphins that would ride the bow wave with us, but then they would, I guess, get bored and go somewhere else. Once or twice, we encountered a whale or two that seemed to be very attracted to the boat. Now, I don't really know – we thought that they were attracted to us. We were whistling at them and saying, "Gee whiz, look at that", and stuff like that. But, I think maybe it was Jenny [Stock] who suggested that they were actually looking for food in the shadow under the boat, which was a good thought, I wish we had understood that at the time. But, we found them mildly attracted to us, maybe. Nothing obvious. Nothing really to write home about.

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Livingston: To go back to the Big Sur Bank/Cordell Bank comparison, can you list species you saw that were similar, and species that differed? You know, for instance, in one place but not the other?

Schmieder: Yes. Pretty much, our goal, our task in carrying out the dives, the field operations, was to accumulate a species list, and for me, that was pretty much the invertebrates and the algae. And so, each time we would go out, that would be our goal, is to collect things that we had not collected before, so that we could extend the species list. Regardless of counts, we didn't attempt to quantify how much of this species versus that species. Furthermore, we neglected – as I've just described, we neglected the birds and mammals because that species list is well known. We documented it, and there was one very interesting example of an albatross, and I'll tell you about that.

So, as time went on, we accumulated this species list. The Cordell Bank list got to be over 400, 450 or so. The list from the Point Sur bank – we didn't spend as much time there, but it was a similar

kind of collection – and I think the species list got to 186 by the time we were finished. Now, these were species of all of the invertebrates and algae we could see, of which maybe a quarter of those species were algal species. The rest were invertebrates ranging from sponges to tunicates. Probably the largest group was the mollusks, the largest individual taxonomic group was the mollusks, 'cause they were easy to get lots of. Because, we would collect buckets of the sediment, not necessarily live specimens, but specimens appearing in this bucket of gravel that we would collect as representing the population over the recent past.

So, regardless of what the population was of mollusks at that moment, we would have a collection representing, say, the accumulation over hundreds or thousands of years. And because of that, the species list, the number of those species was very high. Jim McLean at L.A. County Museum processed a good part of that material, and was very careful to identify those. So, there are probably 50 or 60 mollusks in that group. There was a surprisingly small – surprising to me – small overlap overall, for all species, between Cordell Bank and Point Sur. There was about a 50 percent overlap, that is the species in common. The biggest and most obvious is *Allopora californica*, the California hydrocoral. And some of the algae, *Desmarestia*, and others were very common. The *Corynactis*, the little anemone *Anthopleura*, many of these are very common species, and we found them very, very common on both places.

But, when you look at the numbers, how many species – with different named species there was an overlap of only about 50 percent, which I thought was surprisingly small, because of the similarities that I described between these two places. Because of that, I came to the understanding, or I sort of created a model in my mind which is based on the MacArthur/Wilson model of island bio-geography; and I'll give you just the essential basic of that. What that model says is that the farther away the island is from a source, a continent, a reservoir of species – and the smaller it is – the farther away and the smaller it is, the fewer species can be sustained on that island.

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So, the count of the number of species is a measure of those two parameters. It depends on those most strongly. Almost no other parameters, wind, sunlight, don't matter. It's how far it is, and how small it is. So, here we have two banks that are not so dissimilar, very, very similar, and yet they have significantly different populations. How do we account for that? The answer is that the island itself, what we should functionally call this underwater island, is not the size of Cordell Bank, five-by-eight miles or so – both of them are about five square kilometers above the 30-fathom line. We should not call that the island. We should call the island something above, say, the 130 – maybe 150-foot depth contour, maybe even shallower, 140-feet, that area is extremely tiny, on both Cordell Bank and the Point Sur Bank.

So, the islands themselves are nowhere near the size, functionally, as an underwater island, nowhere near the size that you would draw a circle on a chart and say, "Okay, it's this big oval, here." Because of that, the MacArthur/Wilson model is consistent. It says, "The smaller the islands are, the fewer species can be there." So, what happens is that if you have a very tiny island, and it's supporting a small number of species, but there is a reservoir of a much larger number of species that could live there just as well if they happened to perch there, then that population will change with time. A good visual image is, you've seen a bird sitting on a post – say, a seagull sitting on a post. Along comes another seagull, flies in, and the first one goes away, and the second one sits there. He now occupies that post. That's what's happening at Cordell Bank and Point Sur, and many other places very similar to this.

These populations – I use the word "Scintillation" – they are scintillating. It's like starlight. You look at a star, and it's not a constant brightness. It's scintillating. That's what's happening to these populations. You have about the same number of species, maybe 300, or 400, depending how you define your counting method. But, the specifics, 20 years from now – 20 years ago, certainly 500 years ago, 500 years from now, the specific list of species will be completely – not completely – it will be significantly different. Because of that, the recognition of that in a place like Cordell Bank, and now having the ability, or at least potential ability, to monitor those populations over time, to take

samples visually or with divers or imaging or submersibles, that's a really critical and valuable function that the sanctuary can perform as a monitoring function to essentially make our observations over and over again at sensible intervals.

It would be nice once a year, but even once every ten years, like a census, would give great insight as to what's happening in the populations. And because this is a dynamic system, managing it properly, as is the charter of the sanctuary, and protecting it, part of the charter, will depend critically on understanding how those populations *scintillate* in time, and how they change in time. So, that emerged from comparing those two banks, those two underwater islands, if you like.

Livingston: Now, would I be correct, then, in looking at your criteria of islands out there that, then, Cordell Bank, rather than being one big island, is actually a number of smaller islands?

Schmieder: Yes, and there's actually a whole subject called "Meta-population theory", the theory of meta-populations. A meta-population is a population of populations. So, if you take, say, one island – take the southeast Farallon Island, and you say, "What lives there?" Well, if it were populated nearby with other islands, and of course there's the middle Farallones, which is – and the north Farallones which is just a rock and a small number of rocks. That becomes a meta-population, and part of the dynamics – and this is captured in mathematical models that are – that are part of what professionals in this field do, they'll set up differential equations for the rate of change of these populations – the populations will move. So, if, say, one anemone, or one mollusk is living on this particular pinnacle, and not on another, you might say he has existed on this pinnacle, but extinct on that one.

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Come back next year, you might find that reversed. So, it's a critical part of the dynamics – it was a very good insight in your question – to understand the detailed topography of Cordell Bank, or the bank off of Point Sur, and to build that into the model, what are the areas of these specific places? What are their distances between each other? What is their relationship to the reservoir, which is the mainland, say, the coast? And all of that has to be in

the model. There's some job security there for someone who's really interested in it.

Livingston: Getting back to your experiences on Cordell Bank, what changes did you observe, year-to-year?

Schmieder: It was difficult for us to do anything like systematic observation year-to-year. And I have one example that we did do, but essentially all of the time that we were going out there, we were in sort of opportunistic exploration mode. And furthermore, I drove the whole project to be as broad and opportunistic as possible. In spite of advice that we would get from people who had the luxury of –maybe they're studying rodent populations on the desert, and they will take certain transsects, or they will take random samples, or grid samples of certain plants. We did not have that luxury. So, I deliberately biased the sampling for diversity. I strove and drove our project for diversity.

There was one case that stands out. We were able, because we were forced – because we ran out of new places to go to, because essentially, in our surveying, we discovered the other four or five places that are diveable, besides the one that led us there, which we called "Craine's Point." We went back over and over to the same places, and in some cases like the shallow ridge on the northeast side, the northeast corner, we became familiar. I have a mental image of what that looks like. I could walk you around it and describe a shelf on the west side, and so on. And so, on one occasion, we decided to – believing that we might be able to see this again next year, we decided to clear – completely scrape clean to the best of our ability, one patch. It was about one meter square. And this was done by the diver with a garden trowel, our standard collecting thing. He just scraped and scraped and scraped, and it all just went away, whatever it was that was there. And I don't actually know what was there.

And we took photographs and documented this bare space. It wasn't totally clean and bare, but it was essentially scraped of any erect organisms. We were able to go back the next year, and rather easily find that place, and document it again. And so, there was a one-year interval – and this is a good example of the kind of thing

that could and should be done – we were able to document what would be the first colonizers of that space. What would arrive first? You know we're familiar with forest fires and what springs up. Well, Redwood trees come right up, because they actually need the fire, and so on.

In this case, it was *Corynactis*. We found that square patch almost uniformly and solidly covered with this bright red anemone that's about a centimeter across, the *Corynactis*. We know that *Corynactis* is quite an aggressive organism. It has competition with other small anemones, *Epizoanthus*, and so on. But this is what we found. And so, that was a data-point for us, an interesting observation. Probably more interesting, because it indicates this is the kind of thing that can be done, and so I am able to relate what we did in hopes that, perhaps with sanctuary support or the research community in general, at large, can carry out such things in the future. And I believe that that's exactly what can and will happen.

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Livingston: I would assume that you would need to do a number of those tests, depending on depth and the direction it's facing, or a flat spot, a vertical spot?

Schmieder: Well, in field science, there are all levels in terms of what you define as, shall we call it, quote, "Good science," or "good research." If you're going to a place that has never been seen before, just observations are really good science. After all, Richard Burton and John Hanning Speke and others, searched for the origin of the Nile in the late 19th century. Just locating a lake, or a river, or a set of lakes as the source of the Nile would be – I mean, that's just an observation, simple observation. No measurements taken of any kind, except maybe elevation and barometric pressure for elevation, or something like that.

We were very much in that mode. It depends, if a person is interested and has the resources, perhaps an indicator species – you might pick the California hydrocoral, *Allopora californica*, because so many other organisms depend on it; they are commensals, or obligate commensals. So, someone might take an interest in studying that, as we have studied populations off the

Channel Islands, I've been part of those studies, systematic studies. I think any scientist who does that is going to have to concentrate on a – one or more indicator species, and define his project. If he wants to see how the *Allopora* is going over time, we will learn that.

That's not what we did in our project, of course, with the exception of the case that I told you about, and minor other observations.

Livingston: Any other changes that you might have observed?

Schmieder: Yes, there is – there is a significant one, but I can't defend, scientifically, that is quantitatively, I can't defend what I'm about to say. Qualitatively, I felt that we saw fewer populations of fish around the places that we were diving. The very first dive, which I described last time in great detail, had so many fish that it not only obscured our vision, it completely covered our ability to see the bank, until I actually passed through the fish, and then suddenly there it was. As the years went on, I felt that we were seeing fewer. Now, that's about all the documentation I can give you. We didn't make any quantitative measurements of it. The photographs don't give any real valid information, although if somebody went through the photographs – we have so many photographs, many thousands of underwater photographs – if somebody went through there, they might be able to examine – or they might be able to pay attention to the fish in the environment around there, and maybe make some rough – roughly quantify that.

It was my impression, only, but it was a strong impression, and I remarked on it at the time, and I've remarked on it since.

Livingston: What was the span of years that you're talking about?

Schmieder: Well, we started in 1978. That was the first dive. And I think it was through 1985, then we made one more dive in the mid '90s, 1995, I think. And so, it was that period. The dive in '95 was a difficult dive. I didn't have all of the same team. We certainly didn't have the momentum and the edge up. So, mechanically, it was harder. And so, the documentation was poorer, and it it was well separated from 10 years earlier. So, it was kind of a weak

data point in all of that. But, over the time from '78 to '85, I thought the trend was to fewer and fewer fish.

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Livingston: Did you note whether they were juveniles, or adults, or - ?

Schmieder: Yeah, in the early days, there seemed to be more juveniles. In the later years, it seemed to be mostly adults, and fewer of them. Now, maybe my impression of fewer fish was that there were fewer juveniles. And I can't tell you, for sure. There were fewer fish, perceptibly, and it seemed to be more adults than in the earlier years. But, I've seen the video that was taken with the submersible, by the sanctuary, over the three years, and there are many, many fish – sort of, that evoked the images that we had in the first few years of our diving. So, I wouldn't be at all surprised. I wouldn't in any sense claim that there's a trend toward fewer fish. I would claim only that that was my perception, and that it's probably a chaotic function as most detailed observations in nature are. They are chaotic. Only on broad, statistical grounds are they regular.

Livingston: Based on your experiences diving there, what kind of questions came up for you – for example, abundance or absence of species, and over time did those observations shift?

Schmieder: Well, there was one case, and this is a rather narrow answer to that question, which maybe I could speak about the broader issue. But, there was one case that was very interesting to me, in particular, because it serviced my interest in characterizing, describing Cordell Bank as an island. And that was this diatom called *Entopyla incurvata*. It's a very rare diatom. It's rather large. And it's considered a relictual species. It's a relict. The reason is, it's normally a shallow-water diatom, but we collected it at Cordell Bank in what you would call deep water. So, here it was, very abundant in our collections. And in fact, we were able to pass the specimens on to a person with a scanning electron microscope. And we got the first real detailed images, and they're in the book, a full page of those images of that diatom.

Well, the reasons that's such a significant diatom is because, if it truly is a relict, then it apparently is known from only a few places

– three, four, five places in the world. What we're seeing is, that diatom has survived on Cordell Bank, even though the water depth – the water is rising now. The bank stays more or less where it is. The water rises and gets deeper and deeper. So, this plant, the diatom, finds itself in deeper and deeper water. And in most places in the world, it just becomes extinct, because it needs higher light level, or whatever it needs. At Cordell Bank, it did not go extinct. So, is there a reason for that? Would there be some other member of the community there, maybe an alga that this diatom attaches to, it would be an epiphyte, a plant living on a plant. Would it be the abundance of some other algae that would enable *Entopyla* to survive this terrible depth-increasing event? And if so, what is it?

Let's say this is alga-X. Well, alga-X is going to depend on other features, or factors, or parts of the community. Maybe there is some other organism, maybe it's a starfish that preys on this particular alga, or does not, and that starfish is or is not present on Cordell Bank. And why would that starfish be there? Because maybe there's an absence of marine mammals, sea otters, or something, because the sea otters can't survive in that deeper water, but that enables the starfish to. And then, that cuts down on the algae, or some process like that, some chain like that. Well, that's a very rich concept to explore. And that's why *Entopyla incurvata*, that little diatom, in my mind, was and remains so significant.

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We were able to get a loan of the specimens that were collected by Edward Cordell in 1869, as he made the first discovery mapping of Cordell Bank. And one of those, we, with permission, opened and examined the materials under a microscope, to see if that diatom was present in the material that he collected. Disappointingly, we didn't see any, absolutely zero, not one single *Entopyla incurvata* diatom. In fact, we didn't see diatoms at all, which may be because he didn't collect any. He would not have known, of course, because these are microscopic. And more likely was because the diatoms that he collected, being glass, are absorbed into the glass vial that he put them in. So, sadly, our record is lost. It should've gone into polyethylene, or something like that, which he didn't have.

But, that was a – for a moment, a nice possible opportunity to see how – now, and maybe it's significant. Maybe there were no *Entopyla incurvata* diatoms 100 years ago, and there are now, which would raise an even more significant question. How in the world can a relictual species get there if it didn't hang on and hunker down, and be a relict? So, these are really interesting questions.

Livingston: I want to get back to looking at the Cordell collections, but I think there's a better spot for that. Anything else come up, though, on that same [previous] question, then? If there were other questions that came-up for you as you were diving that might be of interest for this interview? Even if it's more about the changes through the ten or so years?

Schmieder: Yeah, there were many organisms that we were familiar with in diving at other places, especially along the coast, that we did not see at Cordell Bank, and we remarked about it at the time. For instance, we never saw an octopus. But, in the video tapes from the submersible, there are the octopus, very, very prominently. It probably doesn't take any leap to explain that. We probably scared them away. We were there in the day time, they like to come out at night. And so, that's not too important. We didn't see any large kelp, and we came to understand from Paul Silva at Berkeley, who accessioned and described all of the algae that we collected, that the light, as a function of depth, is really the critical factor for plants; less so for animals.

But, for plants it's really critical, so the big kelps have to have 100 feet of depth, or less. And so, what we found very prominently at Cordell Bank was an alga that sticks up like a single leaf, sort of like an elongated oak leaf, and it's kind of brown. It's called *Desmarestia tabacoides*, because it's like tobacco. So, we found in a zone from maybe 140 to 160 feet that was pretty common. Below that, was an alga called *Maripelta rotata*. And this is sort of like a little mushroom, but not with a thick cap. It was like a single vertical stalk of a couple of centimeters high, and then a flat disk perpendicular on the end of that stalk. Well, that was a light adaptation. It's red so that it can absorb whatever blue light is available. And it's flat and faces upward, so that it has the

maximum projection exposure to the light. And we found that, and that was consistent with the general models of what should live where, and not only where in a longitudinal sense, like up and down the coast and out in the ocean, but where up and down in the depth. The depth variation of these various organisms was a critical part of what we were aware of and trying to document.

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And in fact, in the collections that we made, there are hundreds of new depth records. We collected these specimens, or observed them and documented them, deeper than they were ever known to live before. And that demands – that begs an explanation. And we have a partial explanation for that. So observing these various species and groups of species, and documenting where they were, was all part of this process of trying to understand what lives there, and why does it live there, which is captured under the title "Ecology of an Underwater Island."

Livingston: And so, based on what you saw in the shallow spots, did you have assumptions on what the rest of the bank looked like? Did you spend time thinking about that?

Schmieder: Not really. As divers, we had a limitation. We certainly didn't want to dive to 200 feet. We did on inadvertent occasions, and I described that last time with the 1979 dive. But, we had to stay shallower than about 140, 50 – 160 feet, say. And that's really all we were really concerned with. We could document – because, we could look down and sometimes photograph deeper, but as the community tapered off there, the density of organisms, and it became, you know, solitary corals and brittle-stars, and things that are okay living in deeper water, but pretty thin, basically our interest tapered off, because we had no opportunity to document anything there.

We tried very hard to document the very shallowest points. So, on the northeast ridge, the shallowest point was 114 feet or so, plus or minus tide. And we photographed the blazes out of that place, in trying to see what was – and in fact, discovered in the process, that the top four, five, six feet of it is covered with barnacles, not *Corynactis*, not the anemones. You just go down five feet below the top of that ridge, and it becomes very quickly a different

community, and the community that's familiar in so many of the photographs. But, the very tip-top of that ridge is solid barnacles that seem to compete successfully for all the space against almost everything else. And that's a significant observation.

Livingston: When you dived there, did you feel like you were near shore in terms of diversity of species?

Schmieder: Oh, absolutely not. We always had the feeling that we were very far away. Certainly when I dived, I – in my head – you know, you can carry on several thoughts simultaneously in your head. You're aware of this, and because you have various senses, I was always very aware that I was way out in the ocean, and that just over to the side over there is darkness and death. And that, of course, is captured in the idea that Cordell Bank is an underwater island. If you move away from it, you die. That's why we had rules for stretching out transect lines. Divers were never ever to go away from visual sighting on a line, and preferably stay within arm's reach of a line that returns you to the surface.

So, we knew, and we felt that this was very far away, and it was quite different, visually, and of course in the numerics, very different from the shoreline that we were familiar previously from dives.

Livingston: Did you observe evidence of human activity? And we'll get into the holes, so –

Schmieder: *(Laughter)* Yeah.

Livingston: Maybe first, if you saw evidence of marine debris, fishing gear, disturbances, and then let's get into the holes.

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Schmieder: Sure. Well, the answer, of course, is yes. At first, we didn't see anything, and I have to say I was surprised. I kind of expected to find anchors, and shipwrecks, and skeletons, and whatever. But, we didn't see anything. It seemed to be just the community, the natural community, the plants and animals that live there; and that surprised me. As we did more dives, and I became more familiar

with – and we started looking more carefully, and we started seeing debris. A lot of it was – or very often, we would see the lead balls from fishermen's weight. Attached to that, often, was the monofilament line, and sometimes loose hooks flying around on the ends of those lines. I can't say that it was in – that was really totally wrapped-up in lines.

I've dived a place off of Baja called Rocas Alijos, also what we consider an isolated underwater island, and one of the pinnacles there was wrapped up in so much monofilament, it would have been dangerous to even come close to it. And you can't see that monofilament in the water. Cordell Bank was not like that. Now and then we would see a boat anchor, maybe a fishing pole, some of those lead balls, some monofilament. Not terribly often, but often enough for me to be disturbed, because I would see a lot of broken hydrocoral. And I felt that it was not natural process – it was not fish bumping into it in the night. They don't do that.

To a great extent, this debris was getting covered over by the organisms, by the cover. So, imagine that some fisherman loses his tackle box, and it sinks to the bottom. Well, suddenly there's a chunk of surface that's unoccupied, and the organisms that live there have no choice. They gleefully jump up and colonize it. The water is just – it's a soup of – they're called propagules. These are larvae, or other, you know, nascent organisms that are capable of growing into an adult large organism, if they find some substrate. Almost all of them don't. They float away and they die. It's an island after all. But, some of them do.

And so, whenever there's a new piece of surface, it gets very readily colonized. And because of that, when you see Cordell Bank on the shallow points, it's not like a desert with a bunch of junk. This is not an automobile junkyard visually, even though I suspect that there's a lot more junk than we would see visually, because it gets covered. Same happens in the Caribbean, or other places where there are coral reefs. You know, the old Spanish ships, to a great extent, have been just completely smothered in coral. It doesn't happen to that extent out here, but it's the same process.

Livingston: Any other debris that would not have been related to fishing? For instance, something that might have been dumped out of a ship?

Schmieder: No, I don't think so. You know, the Cordell Bank has been a target for fishermen, sport fishing out of Bodega Bay, sometimes out of San Francisco. And this activity is one of taking fishing lines with lead weights on it, and banging around, and feeling for the bottom, because that's where the ling-cod, and the other rock-fish are. If you were to dump something randomly, probably it would not land on a place that we had access to as divers. They are so tiny. It would fall somewhere else. And maybe the submersible videos, or ROVs if that can be deployed, will reveal those kinds of things.

There was one exception that was really significant to us, but we didn't collect it as divers. We hung around Bodega Bay a lot, and people would talk to us about Cordell – we would try and engage people about Cordell Bank. I'll tell you a little funny anecdote about that after I tell you this. We were sitting at a restaurant having a sandwich or something, and someone came up with a bit of a pot. This was a pottery jug. And said, "I got this on Cordell Bank. What is it?" And we didn't know exactly what it was, but we surmised that it was Chinese, and that it was utilitarian. This was no great museum quality discovery – well, that is, art museum quality discovery. And so, I subsequently took it off to – and found some experts who knew what they were, and said, "Oh, yes, we recognize this." This was a jug made in thousands, many tens of thousands, and brought with Chinese when they came across the Pacific.

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And it would contain oil, or perfumes, or other things that could be poured out of this jug. It was about one liter volume jug. And then they would throw it over. And this was one of those. So it – and others, essentially identical, had been found at China Camp, and other places on land where the Chinese had worked.

Livingston: Why wouldn't it be covered with - ?

Schmieder: Well, that's a really good observation question. The rate of sedimentation is probably so low over geologic time, it's sufficient

to bury things maybe hundreds and thousands of feet deep. After all, that's how we get sedimentary deposits. But in historic time, since the discovery of Cordell Bank, and certainly the incursion of population from Asia into California across Cordell Bank, unknowingly, any items that might've been dropped in the last hundred years are probably just sitting down on the bottom, maybe looking a little dusty, but probably right there; just uncovered and waiting to be observed.

Livingston: Now, you had an anecdote about Bodega Bay?

Schmieder: Oh, yeah. *(Laughter)* Thank you. We made our first dive in 1978. And in those years, I was vigorously pursuing any lead about information about Cordell Bank, including anecdotes, and other people who conceivably might have dived out there. Because, we believed, with some justification, that we were the first humans ever to see Cordell Bank. I would be the first person to see Cordell Bank. So, in part of doing that, part of what I did was I tracked around Bodega Bay, and I would just grab somebody randomly out on the street, a fisherman, or somebody in a restaurant who looked like he would be willing to talk. And I would say, "Do you know anything about Cordell Bank?"

And generally, they would say, "Oh, yeah, well – yeah, we go out fishing now and then," stuff like that. So, this one guy, who was a fisherman, apparently would go out on the sport fishing trips, and he seemed more willing than others to talk. So, we talked for half an hour or so. And I asked him, "Did you ever recover anything? Did you ever pull up anything unusual?" And he screwed up his face, and he says, "Ah, let's see. What do you mean unusual? You mean, like, unusual?" I said, "Yeah, unusual." He says, "Nah, not really. Let's see, I pulled up a torpedo once. I don't know, you think that's unusual?" I said, "Yeah, that's unusual." He said, "Well, yeah, we pulled up an airplane, too." I said, "Well, that's pretty unusual." I said, "Well, did you ever hear of anybody else – any unusual things happening out there?" He said, "Oh, my God. Oh, my God. The craziest thing, last year – you won't believe this. There were some crazy people out there diving." *(Laughter)* And it had been us from the previous year, but I did not

tell him that it was us. *(Laughter)* Whoever he was, I've forgotten now, had no idea that he was talking to the crazies.

But, he editorialized. He said, "Oh, my God, those crazy people, I would never dive out there. That's shark city. That's where they live." And I just kept quiet and thanked him profusely for his information.

Livingston: You proved him wrong about the sharks, we hope?

Schmieder: Yes, I think that's right. Yeah. There are sharks out there, but not sharks that were dangerous to us, that we know about.

Livingston: That's good. Now, the holes that you found?

Schmieder: Oh, yeah.

Livingston: Could you discuss that?

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Schmieder: Well, let me set the stage, briefly, for that discovery, which changed our mental/emotional state. We believed all this time, as I preached to my group, that we were explorers. Every time we saw something, we were the first humans ever to see it. This stimulated the group. This salved my hunger for doing exploratory work, as I described in a previous session. And was a carpet underlying everything that we did. Then, we made a dive on – I think it was 1981 – on the shallow pinnacle that we had discovered, a shallow ridge, on the northeast corner. And what we discovered, and got excellent photographs of, was a hole that was about a meter in diameter, and probably two or three meters deep, and almost perfectly a right circular cylinder. Almost perfectly round, and with a flat bottom. And I instantly said, "That cannot be a natural feature." Now I'm aware of potholes, they're ground by rocks. I've seen them many places in Hawaii, for instance. You get a boulder, and it grinds around with the surf. And it can drill a hole. But, that's not what happened here.

The location of this hole was right at the shallowest point on a razor-sharp ridge, right on the razor's edge. Imagine a razor-blade,

and now you're going to drill a hole in it. You're more likely to drill a hole, you know, on the side somewhere, or – you know, on an edge, and it's gonna be an irregular, imperfect hole. This was smack on the razor's edge. It was smack straight down, an exactly right circular cylinder. So, as I have spoken and written, apparently, obviously, somebody with a lot of resources and a lot of motivation went out there and made that hole. At that time, we knew of only one such hole.

As we carried on our diving that year, and subsequent years, we discovered more of those holes, including some that were much larger, and much less perfectly circular, but still, to my eyes at least – and it's documented in the photos – in the book there are, I think, six or so photographs – clearly not natural features. These were man-made. What happened to us? The team, after that first dive when we discovered the hole, we just went – we finished and we went home. And a week or two later, we kinda compared notes, and we found that all of us, including myself, had experienced real depression, real pensiveness about this. We were very tentative. We were very unsettled about this observation.

We didn't know what it meant. We didn't know if we were in danger. And we didn't know what to do about it. It certainly violated the concept that we were the first humans ever to see Cordell Bank. And so, as I said a few minutes ago, it just qualitatively changed our image of the project we were doing. So, there was an issue of what to do about these holes, if anything. And there was an issue, and so I'll describe that. Let me take just a breath. Let me just get a drink, and then ask me to take it up again, and I will carry on with this story, because it is interesting.

Okay, so I'm going to now sort of complete, or give you the story of what happened after we discovered the first hole, and how I feel I pieced together what I think is a rational explanation for them, supported by data from several independent sources, which for me, makes it credible. So, after the discovery of the first hole, we were very disturbed. I said we were depressed. We were pensive. We were kind of sad. For me, as expedition leader, I had a task. The task was to know what it was those holes were about. For instance, one possibility is that there was something dangerous in

that hole. I shouldn't say, "Those holes" yet, because we hadn't discovered them all, yet.

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Was there anything threatening in that hole? The bottom of that hole was filled with some sort of debris, but we were frightened from even digging into that, for fear there would be something – something terrible. Now, what could it possibly be? I don't know. That was part of our fear about the unknown. So, I started tracking into every source that I could to try and get some information about it. And I had a friend, Hal, who had obtained for one dollar the tektite habitat, and for a while had it on display down at Fort Mason. And Hal was interested in collaborating with my group to document the exploration of Cordell Bank.

Hal was quite a mysterious guy to me, but he seemed to be very knowledgeable about inside information. So, I asked Hal – I showed Hal a picture, the photograph of the first hole that we discovered, which is the clearest example. And I said, "Hal, do you know anything about this?" And he paused for a very long time. He clearly knew, but did not want to say. But, then he finally capitulated, and said, "Yes, I do." He said, "Those holes were made by commercial divers for the U.S. Navy in the 1960s. And I said, "Any of those commercial divers still around?" And he said, "Yes." And he gave me the name of one such person.

That person was an employee of a commercial dive shop in Oakland, and I instantly tracked off and found him. And his first response to me was, "I can't tell you anything about that." And so, I cajoled, and I – you know, I sort of pulled teeth. I did everything I could to get him to talk, and eventually he loosened up a little bit. And he said, "Yeah, we – several of us commercial divers were contracted by the Navy. And we went out to Cordell Bank, and we made those holes for them to put instruments in." "Well, how'd you make those holes," I said. He said, "With shaped explosive charges." I said, "How many are there?" He said, "There are holes all over." "All over what?" He said, "There are holes all over Cordell Bank, and all over other banks all up and down the coast." I said, "What? You mean this is a big project? What kind of instruments? Were they measuring water temperature?" "Oh,

no," he said, "those were hydrophones. They were listening for submarines."

And that's pretty much the whole story that I got from him, but it was very, very credible because of the way he described it to me. I did not believe for one second that he was trying to impress me. He was trying to hide it from me. He said, "I'm legally restrained from talking to you about this. This is classified." I said, "I have a security clearance. I work for a national weapons laboratory. I have a security clearance, and I have a need to know, because I have divers that I'm taking out there. I need to know if there's anything dangerous. Is there radioactive material in there?" And he said, "No longer." *(Laughter)*

And so I felt even more unsettled than I did before, because for all I knew, since this was part of military and defense, and was clearly a clandestine project, that it was possible that there were things in there, even though he said, "No longer" – I think he qualified it. He says, "Not to my knowledge," or something like that.

It was not enough to assure me that these – that this hole, and the ones we subsequently found were benign. I thought, maybe, if we dug into that, we would trip a land-mine, and the thing would explode, or something like that. Now, some of that is in hindsight or retrospect, needlessly melodramatic. But, at the time, I took it all very seriously. So, what I did was, I used resources that I had available to me working in a weapons lab, quietly, to find out where this project might have originated. And it turns out that it originated in San Diego. There's a Navy group, it's called Group-something – Group-One, or something like that in San Diego. So, I drove down there. And I went in the front door with my photographs of this hole.

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And I said, "Good afternoon, I'm Bob Schmieder. I have a group. We've been exploring Cordell Bank with divers, and we have run into a situation that I need your help with. I need your advice on this, because there is a safety issue involved, potentially also national security interest involved. I work for a national lab. I have a security clearance. So, I'm hoping that you will talk with me about it." I'm kind of reconstructing the conversation that I

had with the young officer who met me at the reception area. And he looked at my photographs, and he was obviously startled. And he said, "Could you wait for just a minute?" And he went out of the room with the photograph, and he was gone for 20 or 30 minutes. And he came back and he said, "Where did you get this?" I said, "We took it." He said, "You mean you were diving on Cordell Bank?" I said, "Yes. We're – we're diving. We're exploring Cordell Bank. This is a scientific project. We are describing it." And he left the room, again.

And he came back another 15-20 minutes later, and this cycle was repeated over two or three hours. After about an hour and a half, he came back and he said – and I'm practically quoting him – he said, "I need to tell you that you might not be allowed to leave here this afternoon, today." I said, "You mean I'm going to be arrested or confined?" He said, "I don't want to say anymore. I need you to wait here." *(Laughter)* And I – my feelings were in bifurcation. I was scared, and I was elated, because I knew that, right down the hall, he was talking with somebody who knew about Cordell Bank. And in those days, finding anybody who had ever heard of Cordell Bank was a great triumph, because there was almost nobody. So, I was thrilled that I had found the right office, and I was panicked – not panicked – I was frightened that I was in some kind of legal trouble.

And I was a bit bewildered, but I was secure in my motive, and my procedure. I went to them as a safety issue. I have divers in the water. Their safety is at issue here. And as far as I know, we are legally entitled to do this until somebody else – somebody tells me that we cannot. And after about three hours, he came out and he handed me my photograph, and he said, "Thank you very much, you're free to go." And I went – I did a double-take, and I said, "Well, what can you tell me about the – you know, about this project and what happened?" He said, "Nothing. I don't know anything about it." He said, "You're free to go." I said, "I'm – am I being – said, 'You're going now', is that – am I being sort of ejected or something like that?" I didn't use that word. And he said, "Yeah, you need to leave." And as I walked out of the building, I realized that I had learned one thing, and that was I had not learned one other thing. They were so good.

But, there was even a name of the project. It slips my mind at the moment, but there was a name of that project. Okay, so after that, I went back to my commercial diver and I talked with him. And I told him that interaction. And then, I talked with Hal, my friend with the tektite. And I talked to some other people. And I also did a little more research in the lab's libraries. These were files accessible to me with my security clearance. And here's the story that I pieced together, which seems to explain it. And by this time, a year or so later, we had discovered in our diving – we had discovered, I don't know, maybe a dozen of these holes, in various places, on various ridges, on Cordell Bank.

And I was told by this diver, that they were in other places. But, we didn't see them in any other places like Point Sur. Although, he had mentioned Point Sur as well. So, here is the story, as I understand it, and I believe it's consistent, and I believe it's correct. During the 1960s, the Department of Defense funded a research program, pilot program, to install hydrophones. In fact, it was a whole chain of connected hydrophones, connected by cables on the sea floor, to listen to traffic out there, including ship traffic as well as possibly submarine traffic. And this is part of the defense of the United States.

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So, there's nothing surprising or unexpected about the military carrying out secret projects. That's what they are chartered to do. They should be doing that. And this is what they did, but no one knew about it. These were instruments that were placed in holes that were constructed for their protection, because they had to be powered by some sort of a power source; not from a cable from the shore, but a local power source for about one year of running time. And the power source was an RTG, that's a Radio Thermal Generator. It's a small, electric generator, powered by radio-isotopes. These are used on spacecraft. How do spacecraft go to Jupiter, and Saturn? They have an RTG onboard. Because the radioactive materials last for hundreds of years, and they provide enough electric power generation to power these.

So, these instruments, these hydrophones, were powered by RTGs. The RTGs were manufactured under contract by Sandia National

Laboratories, where I worked. That's how I was able to get access to the information. So, I actually saw the design, the drawings for these RTGs. And this came, of course, in – like I said, independent source of information. And they operated this project for about a year or so, until they – the project – the funding was stopped, and any activity was stopped. The instruments were left there, because apparently there was no motivation to remove them. I subsequently found in the records that they were removed from Cordell Bank on October 21st, 1978, one day before we made our very first dive on Cordell Bank.

So, apparently, the Navy – now I'm inferring something. This is an inference. Because there had been newspaper publicity about – we were going to go to Cordell Bank and explore it as divers, that was an article that Skip Garretson had written in the *Oakland Tribune* – the speculation – my inference is that the Navy saw that we were going to go there, said, "Wait a minute. We can't have those guys fooling around with our RTGs that are still sitting out there", and they went out and removed them, one day before we were there.

Now, this whole story may not be true, but it is consistent, and I deal with data that – and this is my career – when you get data coming from various sources that are consistent like that, it's much tougher to find some alternative explanation. One day in advance? After 15 years of no activity? That's more than a coincidence. That strains credibility to be a coincidence. It could be. So, finally, after, you know, all these years of pulling this story together, it seems to be reasonable. It's not sinister. It seems to hang together. It's consistent, and it's all part of a very interesting picture of what goes out there. Sadly, it turns out, apparently, I am not the first human ever to see Cordell Bank. It was the commercial divers, Frank was his name, and the other – I spoke to another person briefly – who were the first humans, actually, to see Cordell Bank. And that's the story of the holes.

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Livingston: Is there an indication of how many of these instruments were there on Cordell Bank?

Schmieder: We found probably as many as a dozen, but some of those dozen are poorly – are not as clear. You look at the pictures in the book, those are maybe the most clear examples. And when you look at those pictures, I think it's quite easy to agree, well, gee whiz, this looks like a set of holes in the rocks. I mean, it's not an accident. Something happened there, with some – either it was some humans deliberate motivation, or it was God playing – fiddling with us, or something. So, let's say that there were – you could easily imagine that they tried to make these holes with their explosives, and maybe it didn't work every time. And so, they weren't good enough for the Navy. The Navy didn't like them. But, the one that we discovered first, which was the most clear example, was perfectly placed. Maybe it wasn't the first one. Maybe it was the last one they made. They finally got it right, or something like that. And so, the Navy said, "Okay, yeah, let's do that."

But, I was told, and I believe, that this project was done all up and down the coast as part of a much larger project. So, even though I've never heard of reports of holes on, say, the Point Sur Bank, or Tanner Bank, or Cortez Bank, or these other places, I do tend to believe that the project was done there as well. There are probably the holes there. It's just the remnants. It's the footprint of a project that was sensible at the time, appropriate at the time. But, because of the mystery surrounding it, really caused us to have a significant wiggle, or warp in our psychological and project timeline.

Livingston: About the timeline for figuring this out – did you continue to dive when it was still a mystery?

Schmieder: When we discovered the first hole, I went into concentration mode to solve that, because I was not a – what I told the team was, "We're not going diving out there unless – until I get an answer." Are we going to run into something dangerous in those holes? Because, we couldn't resist going there, but now, everywhere on the bank was suspect. The whole place was a bit of a fright to us, knowing that we were not the first humans walking into a virgin area. We were afraid of everything. So, I said, "We're not gonna do anything." But, within a fairly short time, I talked with Hal. I talked with Frank the diver. I talked with the Navy guys. And I

started to believe this picture that the project was long ago, that there's nothing out there that's going to really be a threat to us. And we went on diving, and we got kind of comfortable, as you do with things. We kind of got excited, and interested, and we were thrilled when we would discover a new hole.

Livingston: Okay. Thank you. Let's take a break.

[01:18:35, end of audio file 3. Begin audio file "CBNMS Schmieder 4" at 00:00:00]

Livingston: We're continuing in the afternoon, July 9, 2009. This is the second part of the second session of the interview with Bob Schmieder. Coming back, a few more questions about diving the bank: It's a fairly large area, but you're talking about these smaller pinnacles, so to speak, and ridges. Can you give a brief overview of how many of those places you think you dived, some sort of geographical reference? I recall you named one, even. It was Craine's Point. Is there a way you could describe the places you have dived?

Schmieder: Sure. The first one, of course, was in the southern – it was in the bottom, if you like, or the southern tip of the oval that kind of just encircles Cordell Bank, and that was a mark on the chart at 20 fathoms or 120 feet. That's where we did our first dive, and we've done multiple dives there, and just to give it a reference, I started calling it Craine's Point for Mike Craine, the skipper of the boat that took us out the first time.

It has a characteristic shape or depth profile when you go across it in a boat with a depth sounder, and it has a ridge. It seems rather flat on the north side. Then it rises up a ways, and then it falls abruptly to a rather flat place. So this profile is easily recognizable, so when we would search for it, we would be looking for that profile, and when we found it, we knew that we had found this place.

The ridge itself is maybe 100 feet long with a profile like that, so it was relatively easy to find in spite of our experience of having such difficulty finding it. Nowadays, with GPS navigation, you

could go right there, steam across it, and you would see that profile.

So that's where the first specimens came from that led to the beginnings of the species list. Then after that first success, we spent a fair amount of our time doing surveys, so we would run as straight lines as we could run, which were a little wiggly, looking for shallow places, and we would get a hint about a shallow place, because as I was plotting the position of the vessel, I would notice that we were suddenly off to the side, and then a few minutes later we would be suddenly back on our line again. In other words, we had a little bit of a side shift and then back again.

Then we would come back on an adjacent line or nearby, and none of this was very precise, but it was enough to be recognizable. We would be thrown out the other way, a bit of a shift out the other way. When you stare at that long enough, you realize there is what looks like a high place in the ocean that's pushing you away. It's a mountain or a high barrier, and you're deflecting around it, sort of like a pinball would be deflected off of a mountain.

Well, the water isn't piled up. The water is flat, but the current, when there's a current, the current is being deflected, so the water is being deflected to the left and the right of the central flow line, and the vessel went with it. So that was an indicator that we had a shallow place, and once we got an indication, we would go back to that place.

We found if the vessel went too slow, we would never see it. We would never get to a shallow place. But if we would run fast enough, maybe six, seven knots instead of one or two, where we were trying to find it by hovering over it, instead we would run across it and, boink, there would be a shallow place.

So once we kind of figured that out, we essentially surveyed on a fairly coarse grid the entire bank, the central part of the bank, and in doing so we discovered a place in the center that was about 22 fathoms that was divable for us. It turns out to be a rather big, very flat plateau that shows prominently as a polygonal terrace on the bank. Then the shallowest place, which is in the northeast corner

that turns out to be about 115 feet, 19 and a half fathoms, and we dived on that repeatedly, and it forms the most characteristic place, and that's where we discovered the first hole that we discovered.

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To the west of that shallow place is another sort of mountain that leaps out of a flat plane and plateau, and we dived on that only once. It's also about 22 fathoms. In assigning names, I think I gave that one the name Tor Hakluyt. Hakluyt was a mapmaker from the 16th Century. Tor means mountain.

And then further to the west is a point which I think is one of the most exquisitely beautiful and interesting places. We did not dive on that enough from my point of view. I wish I could see that more. It is extremely steep-sided and complex. It's like a structure that's been constructed. It seems to jut out. I don't thin it actually overhangs, but as we would swim around it, it wasn't simple to comprehend its geometry.

It had ridges, and it had gullies, and it had the rock slabs that overhung this place or that place and big cracks, a really complex place, and among the densest and most interesting of the cover of the plants and animals, and that also was at about 20 fathoms, 21 fathoms or so. Between all of those places, we knew about the first one to begin with and discovered the others, which were subsequently confirmed by the high resolution surveys that Davidson in 1986 and then the even higher resolution surveys done in the 1990s.

Livingston: That parallels, in a sense, a question that we had for later that I think fits now: on the subsequent dives – you've explained in quite a bit of detail the first dive, and you have referred to the dives that followed that – could you tell us a little about those dives? So, for instance, were you looking for a particular place the next time you went out, or were you planning to revisit a place you'd been before? How does that relate to these areas that you just described?

Schmieder: Yeah, the question sort of is what strategy would we use to pick targets, and, yeah, I understand your question. It was, shall we say, an adaptable strategy or adapt*ed*. When we had a scheduled diving

expedition, I would have a target, a tentative target, but sometimes it occurred that maybe the conditions were different from those that we expected. So maybe the sea was higher, and we knew that this place would be tougher to find, so we would decide on the spot to go to an easier place to find. Because of the depth profile, we could find it more easily.

Very often or numerous times, we would survey, do surveys, and we would find a shallow place, and we would dive on it on the spot on that day. This happened, I think, with at least two of those other new places that we found. We would say, "Holy smokes, we've got a shallow place here. Let's dive," and we would do that, and we would do that all in one day.

In retrospect, that seems rather miraculous to me that we were able to get out there, do those surveys, and everybody except myself was sick. I wasn't sick, because I had a job to do, and it was very tough. The divers had to overcome their exhaustion, their boredom, their sickness, and we would establish a line and carry out several dives in one day. Those were really good days.

Livingston: Is there a way you could describe almost chronologically the dives from beginning to end? Not that you can't skip one or something, but to give a sense that we started out doing one dive. Then we would do three or four or six dives per season.

Schmieder: Well, what we scheduled was three diving expeditions in the fall, and I think we typically would succeed on two, maybe, of those weekends, three possibly, when we were lucky. On a good weekend dive, we would have three diving days. We certainly didn't get those all the time. On each of those successful diving days, we would get as many as five teams of three divers in, one after another, one team at a time, and that completed the day.

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And on a number of weekends, we would have all 3 days and all 5 dive teams times 3 divers or 15 divers. In fact, sometimes it was 6 teams, 18 divers, 6 dive teams, 3 divers times 3 days in one weekend. That meant a lot of pictures and a lot of specimens, so very productive events like that.

We didn't succeed in doing that, partially because of the sea state. It's unpredictable. In one case, on one day we had a problem with a diver who had an emergency on the bottom, made an emergency ascent, and I decided to cancel the diving for that day. We came back the next day and had a beautiful day and a very successful series of dives. So that kind of shows you how the statistics of the diving went, and you can multiple all those together, and that's how many we did.

In terms of the flow from the first year to the last year, we started at the 20-fathom mark on the chart that we knew that attracted us out there, but very quickly we got into the surveying. Now, that was 1978. In 1979, we had only one dive team, and I described that before. It was enough to keep the project going, but it didn't produce much useful data, the first photographs so we could say, "We now have photographs," and a few specimens but from too deep to be of any great practical use.

But the following year, '80, then '81, '82, '83, and into '84-'85, those were years where we had the strategy. We had the team. We had plenty of people. We had plenty of equipment. We had a good platform, and we carried out the dives as I described them.

We sort of moved according to my feeling for, "Have we covered this? What's the competition between wanting to go back and see something that we've seen before because it's reliable? We know we could do it. There were more things we wanted to see." That competes with, "Let's go to someplace new that we've never seen, but there's a risk that we will not succeed in doing that." There were just judgment compromises all the way.

Livingston: And you mentioned '83, '84, '85. How long did these expeditions go on?

Schmieder: The last in that major series was in 1985, and then we got interested – by that time, the sanctuary nomination was well underway. The species list was starting to saturate. That is, it was approaching sort of a constant list, although if we had worked as hard in the last years as we worked in the first years, we probably

could have extended the species list by another 100 or 2 species, 100 or 200 species.

But by that time we were getting interested in going to other places to try and elaborate this idea that Cordell Bank is an island, an underwater island, so the bank of Point Sur was a very attractive target, and in 1987, then '88 and '89, I took the boat down to – by that time, I had my own boat, the *Cordell Explorer,* and we took it down to Monterey and then to Point Sur, and we did our basically the similar kind of series of expeditions out to this bank, collected specimens, passed them to many of the same specialists that we had been passing the Cordell specimens, collecting their identifications, doing our own surveys, and we did exactly the same on that bank that we did at Cordell Bank.

We surveyed back and forth. We got rather good at it, recording depths and positions, and identifying, and we discovered all the shallow points there and dived on all of them, and the description of those points and those dives is very, very similar to the experience and the physical layout at Cordell Bank. They are very comparable. As I described earlier here, they are sufficiently similar that a comparison makes sense.

00:15:15

Livingston: Thank you. Well, moving along to Cordell Expeditions, could you give us a brief rundown on the formation of Cordell Expeditions as a non-profit entity?

Schmieder: I described before that when I pulled the project together, we called it Cordell Bank Expeditions. It seemed perfectly sensible, but by 1980 or so, it was clear to me – even though it may not have been clear to anybody else in the project, it was clear to me that what I wanted to do was go beyond Cordell Bank. That is, I saw – once the sanctuary was nominated, that became a project with an end on it. Rather than a lifetime of personal exploration of Cordell Bank, this became – it started transferring the ownership to something else, namely a government entity, so that when the final establishment of the sanctuary was done, essentially I had no more ownership other than intellectual ownership in that.

So, looking toward broadening what it was we were going to do – and what I wanted to do was explore and describe other places on the California coast. After all, we had a great team. We now had a boat. I'm sorry, that was a little later, but we had access to a boat, and we had the procedures, so I looked into and then established a non-profit organization and simply called it Cordell Expeditions.

For a while, I toyed with the idea of forming the Cordell Society, and this is unabashedly a copy of the Cousteau Society. The basic idea is that the Cordell Society would be an organization, a membership-volunteer kind of organization that would go do expeditions to remote places with the driving purpose to describe them, to enable rational management and protection of the resource. That was our charter.

But the Cordell Society as an organization never flew, and just as the name Cordell Bank Expeditions persisted and still persists – things like photo credits and so on, we still see the name Cordell Bank Expeditions. The documents that I wrote and sort of the things that I – sort of the ideas that I circulated about the Cordell Society, once in a while someone asks me, "Well, how goes it with the Cordell Society?" And so the lesson of this is you want to be very careful what you say, because whatever you say, somebody always remembers it and forever.

But it became the Cordell Expeditions, and we completed the exploration and description of Cordell Bank by 1985. Then we went on to Point Sur. We dived at Middle Farallon and a lot at North Farallones and made some discoveries there, and after that, Cordell Expeditions as the sort of umbrella, parent organization was the lead in a whole bunch of other expedition projects, Rocas Alijos off the Baja coast, Antarctica, Easter Island, and so on.

Livingston: You mentioned a dive on Cordell Bank in 1995, so what drew you back ten years later?

Schmieder: Addiction, I guess. It was stimulated by a person who was a very energetic and very competent diver whom I got to know after 1985, after our main interval there, and he was very keen on diving at Cordell Bank, and so I toyed with the idea of going back. After

all, there would be really good motivation for going, namely to compare ten years later what we would see, and I was not so much interested in just the pleasure, and it's a lot of work having fun like that. I was not so much interested in just the adventure of going to dive there. Maybe he was. I think he probably was interested in that, but for me the attraction was the opportunity to make some comparisons over a ten-year interval.

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So we, in fact, prepared, and I pulled some of the same team together. We got some new people, and we went out and dived on Cordell Bank. It was quite successful. We had really good conditions, extraordinarily good conditions.

Unfortunately, because we didn't have the ongoing momentum of a larger project and a larger group of people, the collections were not as extensive or as well documented. The debriefing was not as well done. Did as well as we could do, but I think not everybody really – it didn't have the same character that it had had before, and because of that, the information that resulted from it was weaker.

We were able to show consistency, collect specimens, and so on, but we can't point to it as a source of major new discoveries, and we essentially dived on the one place that we had dived before, the shallowest point, which is easy to find now and the most, I guess, the most interesting at this point. It's certainly the place I took Jean-Michel Cousteau in 2005, when he and his team went to dive there.

Livingston: By that time, 1995, did you know of other people diving Cordell Bank?

Schmieder: As far as I know, there is only one other group that's ever dived on Cordell Bank, and that's Cousteau's group, and I was there with them. I've heard a lot of people claim that they've dived on Cordell Bank. My usual response is, "Really? How deep were you diving?" But when they say, "Oh, really deep. It was 60 or 80 feet," I know that they are mistaken. It's somewhere else they were diving.

I don't know of anybody. I've heard stories. I think maybe Jenny related a story of somebody who attempted to dive there but not very successfully, so it may depend on what you mean by a dive. For me, a dive is you get the people down. You get to the bottom. Get their job done. You get them back safely, healthy, and alive, and so on. That to me is a dive.

Livingston: Well, you mentioned diving with Cousteau in 2005.

Schmieder: Yes.

Livingston: Can you briefly tell us that story?

Schmieder: Yeah, it was such a pleasure. It was more than just the pleasure of the moment. It was validation to a great extent, independent of the sanctuary, the existence of the sanctuary, which is a fantastic validation of what we had done. But Cousteau and his group, Ocean Futures from Santa Barbara, was pulling together a video documentary of all of the National Marine Sanctuaries, 11 or 13 of them. So he and his team had been going to every sanctuary, diving, and video documenting this, and it was pulled together as a very handsome two-part, two-hour PBS documentary called "America's Underwater Treasures."

So Cordell Bank was one of the sanctuaries, and they contacted me many months before and asked, probably with the guidance from Jenny [Stock] and Dan [Howard] and the sanctuary people, that it might be useful to have me involved with them because of my experience. And, besides, I had been a friend of Jean-Michel Cousteau for many years, anyway. I had seen him, I guess, two years before at a NASA conference in Monterey.

So I got in contact with the expedition leader, Cousteau's expedition leader. It turns out, ironically, he and Jean-Michel and the others were in the Bay Area with their boat in the early eighties while we were going out to the Farallones. In fact, it was 1986, and we interacted with them on their boat, on the *Halcyon*, and it was still the same expedition leader, so I interacted with him.

We planned to go out to Cordell Bank, and I would go with them, which we did. And so the project, that was successful, although there was a bit of irony and a bit of satisfaction on my part and pride in my own team. The Cousteau people are fantastic professionals in what they do, but Cordell Bank is different from anything they had ever done before, and I think that they had not understood in advance how difficult it is to dive there, even how difficult it is to find the places to dive there.

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I knew how tiny these places are, 20 feet across and 120 feet down in unknown currents that might reverse below the surface. How do you establish a descent line there? And this was far more difficult than any of the other sanctuaries, presented more difficulties than any of the other sanctuaries had presented to them.

So it was very good that I was on board, and they did allow me – and I felt privileged – allow me to set up the vessel and say, "Okay, drop the anchor now," and this is a technical procedure. I described it in the earlier part of the talk here, the interview, where we can establish.

So I put the anchor right on the middle of the shallowest ridge, exactly where I wanted it. Probably I was ten feet away from where I thought it would be. I actually was quite proud of it, but it was the result of a lot of experience, and Cousteau's team did their dives. We had to come back another day. The day got too late to complete that.

It took several more days to get the weather in alignment, then a successful day of diving and videotaping, and they stitched it into the program, which is magnificent. So I came away with a great deal of pride in my team, which had been able to accomplish this when Cousteau, as well as they were prepared, still had great difficulty, and they acknowledged that this was very difficult for them. So that was an affirmation that what we had done over those years had not been easy and that we had had to have a really good team to do it, and we did. And we did.

Livingston: Jumping back, I wanted to ask about the situation of getting your boat. Could you tell the story of getting the *Cordell Explorer*?

Schmieder: Sure. I don't think it's terribly interesting, it's pretty straightforward. We had used several boats. We started with party fishing boats from Bodega Bay, and I was constantly soliciting boats, because that was critical to what we wanted to do.

At one point, I connected with a boat in Berkeley, which was a previous shrimp fishing boat, 67 feet long at the water line, and I thought, "This is about the right size for the team of divers." We wanted to have about 15 divers or so. I was able to come into agreement with the fellow who owned it, Breck Greene, and for quite nominal cost, essentially the fuel cost, he would take us out, and he did over the years – I think it started in '81 and all the way through '85.

As time went on, I think everyone transitioned out of the early on intense romance into more of a feeling like, "Gee whiz, this is really a lot of work. Do I really want to do this?" This is quite natural in all relationships and all circumstances, and we experienced that, including Breck experienced that, and so the price for using his boat went up and up and up, and I kept saying, "Okay, Breck. Okay, Breck," you know, and we would go out.

We also suffered a little, because he would bring us up to Drakes Bay and go out in the morning, and he would, what I thought was almost slightly deliberately, run too close to the head, where the waves are always very high, and he would say, "It's way too rough. We can't do this," and turn around and go back, and so it became increasingly difficult to get Breck to do what we needed to be done, and at one point I said, "I'm finished with this. I'm gonna get my own boat," with a few other words.

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And so I had a number of friends, one of whom had a boat in Bodega Bay. He had several. He had taken us out to Cordell Bank, diving, on a successful dive trip before, Wilson Landrum, and he had this boat called the *NanB 2*, and he said, "Boy, have I got a deal for you," and he sold it to me for $6,000.

The seagulls owned it at that time. It was a wreck. I thought it was beautiful. He got it down to the Bay Area, and we spent one

full year refurbishing it, almost all new woodwork, took all the electrical out, all the fishing hydraulics, everything off, refurbished it, and boy, did it shine at the end of the year. We took it out to the Farallones, and that's when I met the Cousteau people out on that maiden voyage, and I've used it ever since for either the expedition projects off the coast, down to Point Sur, out to the Farallones, and what I do with it mostly now is I take students out from classes at nature centers on education/research cruises in the Bay Area and up the river. In fact, I have three trips tomorrow, Saturday, and Sunday.

Livingston: Where is she berthed?

Schmieder: Berkeley.

Livingston: If you could describe your relationship with the science community and how you dealt with all these specimens you were bringing back, and I think I'd like to actually start that with how did you know what to collect and bring back?

Schmieder: Okay, part of it is easy to understand, because I've already described this is an opportunistic exploratory project. It is not systematic, statistically meaningful research. That takes a different kind of skills and resources, but what was important here was to strive for as great a diversity in the documentation as possible. What is going to be there? We wanted to collect as many different kinds of things as possible, and that was my instructions to the team, and usually it worked well.

Now, how did I know what to look for? I didn't need to know what to look for. We were going to look for and collect and document in whatever way we could anything that we didn't have before. That's the diversity, and so it was not necessary for us to be marine biologists in any sense.

After all, biology now is done to a great extent in a laboratory and has to do with complex biochemical dynamic systems and so on. Here it's much simpler. You see something you haven't seen before. You grab it and put it in your bag and take it home. What happens after that I'll describe in a moment.

For us in the field, it was relatively simple. It was rape, pillage, plunder, and so on. Could we hurt the bank? No, not significant, in negligible, trivial, non-existent harm, and what I argue regularly is whatever tiny amount of harm we ever did is easily eclipsed by the knowledge that we are gaining. That's what we mean by sampling, after all.

So we would come back with, on a successful expedition, perhaps three or four cubic feet solid of materials, already separated and distributed into a variety of jars, typically. We spent a lot of money on jars with black screw-on lids. What we did was we knew enough or learned enough so that we could perform a basic sort.

In no sense did anybody, including myself, attempt to claim that we were biologists or even taxonomists, but we learned enough and knew enough to know what the basic phyla are. We knew a sponge from a crab, for goodness' sake, and so we could separate these into arthropods and mollusks and porifera and cnidaria and so on, basically the major taxonomic groups, because we knew that, and we either knew it because we knew it all of our life.

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Somewhere we learned it, or we were studying the materials that we had, and we had many very fine handbooks. Dan Gotshall has a whole bunch of well illustrated books. [Joel] Hedgpeth's book, *Between Pacific Tides*, was a major important handbook. We studied those and learned enough so that we could perform an initial processing of the specimens.

We would have sorting parties in my back patio, and we would further divide as far as we could, to whatever taxonomic level we could, and we would apply unique numbered labels to each of the bottles or containers of whatever specimens they were. There were a lot of duplicates, and we got to know a lot of the species that are common, like *Corynactis* and *Allopora californica*, the California hydrocoral, and so on.

A lot of these we already knew from our sport diving. Most of them we learned as we went along, and we became rather expert at

the common species, and we use the Latin names. We almost never called them by common names, because we learned, you know, *xanthrograficum*, *Anthropleura xanthogrammica*. We learned these names, and that's what we did.

Then, once that secondary sorting at home, say, was done, I would parse these, parcel these out. I would separate these, send these to specialists, and I used both my personal knowledge of friends and friends of friends, my reading of the literature. I would find people who were the most visible specialists in an area. If they were polychaete worms, I found the person who was the polychaete expert, and I would ask other people, "Well, who knows this category?"

So, for instance, Cadet Hand popped up as one of the experts on West Coast cnideria. It used to be called coelenterates, and so I would then contact those people, tell them that we were exploring Cordell Bank. "I have specimens. This is from a previously unsampled area. Would you be interested in receiving these specimens?

"You can keep them and accession them into your collection if you wish. All I ask is for you to give me back your identifications and whatever documentation and optional comments, if you like, as well as identify any new discoveries. Discoveries would include undescribed species, depth records, range, extensions, and that sort of thing."

And so I assembled probably 25, 30, maybe more such professional specialists. Almost all of them are well known, were at the time, and many of them still are extremely well known specialists in their areas, highly visible and highly regarded in the community. Routinely I would ship them off, and they would give me back within a few weeks a list of the species with all the documentation that I asked for and the citations and so on, and usually they kept the specimens. They accessioned them into their collection.

So, for instance, specimens went to the National Museum of Natural History in Washington, D.C., this is part of the

Smithsonian. A lot of them went to Los Angeles County Museum of Natural History, Santa Barbara Museum of Natural History, the California Academy of Sciences, Bodega Marine Lab, and may other institutions around the country, some in Texas, Mary Wixton at Texas A&M University.

In some cases, they would return the specimens to me after the identifications, and so almost to this day I have had possession of them. I no longer have possession, and I will tell you what happened to them, but the result of all of that was an accumulating, ever-growing list of species identified by professional specialists in their own field.

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All of that documentation was carefully preserved. The names were extracted to form the species list, which I think ended up about 450 or so species by the time I stopped adding to it, and now forms – and we are just in the process of going back to re-encounter or to encounter these documents to provide the fully documented account of the species that were collected and identified from Cordell Bank during that period of time.

And that process worked extremely smoothly. I believe that many of the people were appreciative of the specimens. After all, in some cases there were new species described, and there are all together, believe it or not, more than 1,000 new records. These are range extensions, depth extensions, first observations, new species, new genera, and that sort of thing.

Livingston: Are there any undocumented specimens?

Schmieder: In the sense that are there any buckets that contain things that have no identification, no, there is nothing. Everything had a number, but not everything has been examined in detail, and certainly not everything has been identified. In fact, in many cases, the specialist would say, "Unidentified brown alga." Paul Silva at Berkeley would say, "Well, I have an alga here. It's new. He might say, "An undescribed species," meaning he recognizes it as something he doesn't recognize, but it's not yet described in the literature.

So it's a new species, but you can't refer to it yet, because he hasn't described it and may never. There are many, many – you know, there are a million species discovered every year or something like that or 100,000, some large number of new species discovered every year, but most of them are not described. They just recognize them as new.

Livingston: Earlier, you referred to going and looking at Cordell's collections. Could you talk about that?

Schmieder: Oh, my gosh, what an exciting time that was. It was a period of a year or two years. It was a discovery, I think, as electric as the actual physical exploration of Cordell Bank. I told you that I got my first hint about Edward Cordell from the San Rafael Civic Center, and from that I went to the Bancroft Library in Berkeley and then eventually to the National Archives, and each of these places had some documentation. In some cases, it was the original handwritten documents, say, by Edward Cordell or George Davidson to or from Cordell or about Cordell.

As I did that, every time I would come across something new, it was with trembling hands. How poetic can I be? I probably can't be poetic enough to capture my feeling at the moment. This process, which historians like yourself, Dewey, know very well, is not only exciting, but it has its own geometry. You may come to a place where you think you are at the end of your exploration here, and yet there is a little crack of light. And you follow that, and you squeeze through it, and suddenly you're in an entirely new, huge chamber of vast proportions, and that's what happened repeatedly with Cordell, exploring Cordell's life.

I would think, "Okay, I've got everything there is," and then suddenly I would find this trove of new materials, and every time I would learn something new, it would be like a birth. Besides going to the archives here, I went to Germany. Edward Cordell was born in the area around Baden, Germany, a town called Phillipsburg, in 1829, and it turns out that there is a state archives in the state. It's sort of the same kind of state as California, Arizona, and in the archives are various documents relating to not

only Edward Cordell but his family, including the report cards of Edward Cordell from his school days.

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So I know every course he was taking, every class he had. I have the reports on his discipline. Was he well behaved? No, not particularly. Did he attend classes? No, he was always absent or often not attending classes. His grades were mediocre to not-so-great, but the problem there was that as he was growing up, he was getting distracted, because Germany was having a revolution. He was getting interested in that, being sort of a liberal student kind of a person, and eventually left Germany and came to America, as I described before.

So the process of discovering that was maybe like the process of discovering the love of your life. The excitement of that is just beyond description, and I know that you know how that feels. That's the way it felt for me in discovering and sort of bringing Edward Cordell back to life.

Livingston: Did you say that you actually had physical specimens that you could compare notes with over the century?

Schmieder: Well, Cordell himself, when he discovered Cordell Bank, collected eight specimens of the bottom. He had a lead called the Stellwagen Lead. This was Stellwagen that he had worked for. Cordell had worked for Stellwagen when Stellwagen discovered Stellwagen Bank out of Boston Harbor.

So Henry Stellwagen had designed a sounding lead, and that had a little cup on the bottom that could capture some specimens. So Cordell in his log records the collection of eight such specimens during that week in June when he discovered Cordell Bank. Those specimens were put into jars and sent to the archives, to the Coast Survey Office in Washington, D.C., and now they reside – at least four of them do – reside in the National Museum of Natural History.

I found those four, or staff there on my request found those four. We don't have any indication of where the other four are, and that's what I referred to earlier when I said for about one year I had

loan of those specimens. I had them in my possession, and we ultimately opened one and examined the contents of that one, looking for those diatoms that I talked about.

Livingston: For the most part, were the specimens similar to what you were seeing then?

Schmieder: They were pretty paltry, dried-up little things. Cordell described them in the log as red, slimy things. Well that, now we know, is *Corynactis californica*, the little anemone, and, sure enough, in the jars were a few, two or three, five little dried up pea-like things, and those were undoubtedly the remains of *Corynactis*.

It was, I must say, a little disappointing. When I got the jars in the mail and looked at them, there was just sort of some dirt and dust inside. Of course, that's a totally scientifically incorrect description of what was inside, and to me it was treasure beyond measure, almost, but visually it was maybe disappointing, and someone who is not keyed in at an emotional level with this might have said, "Oh, God, what a crappy bunch of stuff that is." And then it was disappointing when we examined the contents of the one and couldn't find those rare diatoms that were so interesting.

Livingston: So we'll change gears now and ask about your relationship, cooperation, et cetera, with NOAA, National Marine Sanctuaries. So first, at what point did you think about promoting Cordell Bank for conservation? How did you act on that?

Schmieder: In retrospect, it seems so totally natural, but I remember the instant that I heard about the sanctuary program, and I think it must have been 1980, and I was somewhere in Marin County, and I think I came somewhere either to give a talk or hear a talk. And so I was engaged, and I don't remember who it was, but I was having a bit of a conversation with somebody. I should recover that person, because it was pivotal in this.

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He remarked to me, almost quote, "Well, you know, there is a National Marine Sanctuary Program sponsored by NOAA. Do you know about that?" and my response was, "No, I don't know anything about that." He said, "Well, you might think about it.

Now, that sounds very prosaic, and in retrospect, it was. It was very, very prosaic, but I tracked after it.

Now, how would I have tracked after it? That was 1980. We weren't connected on the internet. There was no personal computers, so I guess I must have – and I just don't recall, but I must have simply called some sort of federal government directory information and looked after, tracked it until I found a Sanctuary Programs office, and I guess, sure enough, there was NOAA and a Sanctuary Programs office within NOAA.

And what must have happened, and I'm confessing I'm a little vague on the details here, but what must have happened is that I got their address, and I wrote, because that's what we did in those days. I wrote a letter, didn't even send faxes in those days. I wrote a letter to them saying, "I'm exploring Cordell Bank. It's been suggested that this might be considered as a sanctuary. Are you the right people to tell about this? Would you be interested?" or some generic stimulus like that.

What I got back – well, again, I don't remember the specifics. I remember that it was surprisingly motivating, because the response I got was, "Oh, yes, we are *very* interested in that." It was enthusiasm for that, and it was very quick, a very short time after that that we were exploring with the possibility of nominating this place to be a sanctuary.

I mean, suddenly our vocabulary changed. It was as sudden as when we discovered the holes, and we knew that we were not the first humans ever to see Cordell Bank. Suddenly, we were talking about the sanctuary, and so what I did at some point there was I assembled a short report – I think it was 15 or 20 pages – providing the basic geography as we knew it. It was called "A Preliminary Summary of Knowledge of Cordell Bank," where it is, roughly what's known about it, our species list, the dives that we've done, the history that I knew so far about Edward Cordell and so on.

And apparently it was enough to get them to respond more positively, saying, "Yes, we want to know more about this. Would you consider nominating Cordell Bank to be a sanctuary?" And

this came surprisingly quickly. I was amazed, and I felt almost a little empowered, you know. "Whoa, look, I'm affecting something."

My response, as I think I've told you, was, "No, I will not consider nominating Cordell Bank, because we don't know enough about it, and I would not want to" – what's the metaphor? Hamstring? Hogtie? Emasculate? Whatever the verb is – "any such possible nomination by having it not complete," and I was really serious about that.

So they said, "Well, okay. We'll talk to you later," and so sometime, I think, in the next year, they contacted me again and said, "Will you nominate Cordell Bank?" I said, "No, I will not. We still don't know enough," and at that point they said, "What would you need to learn enough about it to nominate it as a sanctuary?"

Well, I have to take a little credit here. I was together enough to say, "I need money. We need resources. We have so much we can do but not at zero level. If you can fund us at some level – can you?" I didn't even presume to say, "If you can." I said something like, "We would need some funding. Are you in that area? Is it possible?" or something like that.

And very quickly they picked it up, and we started negotiating. I think this must have all been done by letters and maybe some phone calls, although I'm not a telephone person. I'm a written document person. And they agreed to provide some funding for us, which they did for two years running. It was about $15,000, $17,000 each of two years, I believe, maybe $12,000 and $17,000 or something like that, which when it finally came –

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I remember – this is a little selfish. I remember feeling, "Oh, gee whiz. This isn't as much as I thought it would be." Of course, I was very grateful for it, but I worked for a – you know, I worked for a national lab, and I was used to spending big bucks to do government business, and I didn't realize that things like the Sanctuary Program are chronically strapped for money, and so I

thought in terms of government programs. And so I kind of expected maybe $75,000 or something like that.

However, it was enough to placate Breck, who had the boat, and his rising demand for more money to carry out these expeditions, and that's what enabled me to say, "Sure, Breck, we can do that." And, in addition, it provided money to buy more bottles, buy alcohol, things like that, so it really enabled us to expand and flower and, even more than that, to be successful.

We could design the project in such a way that the probability of success was much higher than what we had done before. With zero resources, you suffer a certain fraction of success. With that $15,000, $17,000 from NOAA, the success rate went way up, and that's when we were able to collect the large amounts of specimens, have successful dives, and so on, so it was very critical seen in retrospect.

Livingston: What was the date of that first report that you sent to them and then these subsequent grants?

Schmieder: Well, that had to be about 1981 or 1982, and I don't recall the exact date. It's in the documents, which are in the sanctuary office. Jenny knows exactly where those are. Whatever date I applied to that was probably the day I typed it. All those were typed on a typewriter. There was no such thing as a word processor.

Livingston: So who was involved from NOAA that you were corresponding with? And then if you'd continue the story.

Schmieder: Well, not surprisingly, I corresponded mostly with Nancy Foster, who was the Director of the Sanctuary Programs Division of NOAA, so it was her primary responsibility to manage the projected development of new sanctuaries as the sanctuary system was expanded. So I interacted with her in various ways, and she was the one, I believe, who authorized the financial support for us.

For one reason or another, I would find some excuse to be in Washington at least once a year and I always made it a policy to go

and go to visit the people in the office there, so I interacted with a bunch of staff people there whose names I don't have at this moment, but one of them was Nancy Foster. I did not see her as much as I expected to and thought maybe I should, since we were the most important project going on anywhere. You get the sarcasm? But whatever the details were that I didn't see, the project went ahead.

That is, the apparent desire, and supported actual realized desire on the part of NOAA to establish a Cordell Bank National Marine Sanctuary was there, and to my surprise, NOAA took this seriously enough to give us money to do something. I don't want to call it official, because it wasn't official yet, but we converted from being a sort of a closed group of people who were just exploring and describing with some vague concept that what we were doing was pushing back the frontiers of scientific knowledge into being part of the bureaucracy of the federal government of the United States of America and having just excavated or exhumed all of the records of Edward Cordell, the records being there because Cordell worked for the federal government.

01:00:38

Suddenly, everything we did, I knew, if this ever happened, would become part of the permanent records of the federal government of the United States of America, would live forever. And so we were no longer explorers, we were part of destiny, part of history. As tiny and unimportant as all of this is, it has those labels on it, and we took that very seriously.

So, I responded as formally and as completely and as well as I could to the request from Nancy Foster and the Sanctuary Programs Division to provide them with whatever information they wanted and to do it – one of my requirements as a scientist – I am a professional scientist, I know what data means, I know how to collect it, I know how to document it and describe it. All of that skill which I used in my regular research and physics was applicable to all of this and ensured the integrity of the data that we got.

I believe that people had the confidence that we weren't over-describing or distorting the records of what we had, that it was

genuine. I think the evidence for them respecting what we were producing is that the sanctuary actually came to be, because that initial document, "A Preliminary Description of Knowledge of Cordell Bank," became the sort of core documentation for why Cordell Bank should be protected as a sanctuary. So, both – we did the best we could, and I ensured the integrity of the data. I think they accepted it on face value and properly so.

So, as time went on, to my pleasure and some surprise, there became these other activities. Now and then we would hear somebody else that we didn't already know and was not part of our group utter the words "Cordell Bank," and every time I would hear somebody else say the word "Cordell Bank," I would be amazed.

It would be an astonishment that someone else knew about it, and even in those early days I couldn't quite come to grips with the idea that anybody else would think it was important, because, after all, Cordell Bank is a little place way out of the way. Who would consider this important?

But then a big event occurred, and that was a bill was introduced in Congress to establish the Cordell Bank National Marine Sanctuary. Now, that's not the way NOAA normally did their sanctuaries. Those are established by regulation. All of the other sanctuaries to my knowledge in the system are established by regulation within NOAA, and, to my understanding, each of those could be undone if some administrator somewhere – and I'm not making light of this, I'm trying to describe what I understand is the structure – could simply delete one of those sanctuaries off of the list without too great a consequence. An Act of Congress is tougher to get around.

"Well, why did we have an Act of Congress?" I said, and the answer was, apparently, during the two terms of the Reagan administration, not a single sanctuary was designated. Somehow, the SPD of NOAA went into cold storage. Maybe you can associate it with the politics of the Republican Party or something like that. I don't know what the truth is there, but by 1988-89, there were people, and I will name them, who were getting rather irritated that there were no more sanctuaries being developed.

Well, what was available? Cordell Bank was available. It's in the pipeline. My original letter that I had written was stimulated by a direct request from – I think it was Nancy Foster, and that might have been 1983 or so. We could check the record on that, a short letter nominating, and it's a trigger to start that process. So that was five years earlier, and all that time Cordell Bank had been sitting on somebody's in-basket.

01:05:30

Well, Diane Feinstein, Doug Bosco, a Congressman, and the current Speaker of the House, introduced a bill in the Congress to establish the next national marine sanctuary, the Cordell Bank National Marine Sanctuary, and it was passed. And it went to the President, President George Bush, Senior, who signed it as the first environmentally oriented law in his new administration early in 1989.

The years leading up to that were for me a period of transition out of it. I not only caused myself but I watched myself kind of exit from this ownership, this total exclusive ownership of Cordell Bank. Every time I would say – in the early days, I would say "Cordell Bank" to someone, and they would respond with a blank look. I had the semi-satisfaction out of saying, "Well, Cordell Bank is a rocky bank off the coast of Point Reyes." And then as time went on, I would encounter someone that I didn't need to tell that to.

Here is an example that was both sweet and slightly bitter to me, so there is that combination. It was Maxine McCloskey who founded and ran a thing called The Whale Center in Oakland. It was an environmental activist volunteer organization. Maxine not only mastered what it was Cordell Bank was, where it is, and what it's about, but provided a lot of support and stimulation and education to people, to the public who were needed to support such a nomination to actually bring about approval of the sanctuary. After all, if the SPD threw a sanctuary party and no one had ever heard of the place before, it might have fallen flat.

So, for me personally, I watched these things happen with increasing pleasure that other people were learning about this place

and a bit of a decrease, a kind of a letdown, kind of a deflating experience that I was not the only word in town, that there was somebody else who was also worthwhile listening to about the phrase "Cordell Bank." And that process continued right up until designation. There was a still slightly bitter – not bitter. That's too hard a word, but a disappointment.

I knew in advance when the President was going to sign the bill, and one of the – somebody, I actually don't remember who it was who said, "Well, I think you should be there when he signs it." I said, "Well, yeah, actually, that's appropriate, isn't it? Gee whiz. How did this come about? This would be appropriate. The President usually has somebody ceremonially around," and until the day before, I thought I was going to be at the White House for the signing of this bill.

And then suddenly the connection seemed to break. It was sort of like a radio station going off the air or a phone clicking out. Suddenly, I couldn't get any response. I would call and leave a message, or they would say, "Well, I don't really know. Things are changing around."

I understand all of this in the sense that the President's schedule changes a lot, and they have to do things informally and quickly. I think I also understand it in terms that I was not quite as significant and important a character. By the time it got to the White House for the President to sign, my role, Bob Schmieder's role in all of this, was not terribly recognizable. That is, the Diane Feinsteins and the Barbara Boxers and so on were the personalities associated with this, and I am not ungrateful at all.

01:10:25

This wouldn't be a sanctuary if someone else hadn't taken it up. I was not able to make a sanctuary out of it. I was only able to nominate it and do the field work that provided the scientific justification for it, but the politics had to be done by people who carry around big political hammers.

But, for me, missing the chance to go to the White House to stand by the President of the United States as he signs this bill was a real disappointment, and I wanted that picture to take back to my team

to pay them, to reward them for what they had done. It was a small thing, and this is the only time I've ever described my own personal feeling at that. It would have been nice, but it's okay, because look what we have now, this fantastic sanctuary, and so the satisfaction is there even if this particular event was missed.

Livingston: Did you have any personal involvement during that period when the legislation was being prepared?

Schmieder: Practically not at all, and it was a bit of a surprise to me that I didn't, and part of it was my own fault for not doing anything, but, after all, I'm a scientist. I am not a politician. I don't think I would have been very good at the politics, although I was asked to come back, and I did go back to Congress, and I testified in front of the committee that evaluated and approved this nomination.

So I had a chance to play the role of a technical expert, which I did. I showed pictures and said why this should be a sanctuary, but I felt outclassed in the political arena. I didn't think I knew anything about politics, and I certainly didn't know any of the players.

To be honest, I didn't particularly want to do that. It's not my interest. My interest is the science, and I did the science well. I did it reasonably completely given the resources we had, and then my interest waned, and I got interested in going to other places, which is exactly what we did.

Livingston: Could you describe briefly how your book came to be?

Schmieder: The book originated in an idea from NOAA, and that was how to reach the public concerning a sanctuary, Cordell Bank, that was so inaccessible. So, what they proposed was that we create a book that would be distributed in public and appeal to a general reader, a general interested reader, and they approached me about the project, and I readily agreed to write the book, and it was appropriate.

And so I did, drafted the original manuscript for the book, and then over some period of time, maybe the next year or so, I think some

things changed. Perhaps priorities changed. Perhaps funding changed. I don't really know, but what came to me was that NOAA was not interested at this time in publishing this book, and they made it clear that I had complete rights to what I had written, even though originally it was done under contract, that I was free to do whatever I wanted to with the manuscript.

So I consulted with my good friend at the time and still good friend, Dan Gotshall, about what could we do with this. He supported the idea that we could turn it into a book and publish it, and so I worked for perhaps five more years in completing it, laying it out. I did the entire layout on my Macintosh computer, page layout and finding a publisher and so on and having it proofread by a whole variety of technical specialists. Paul Silva at Berkeley in particular put in extraordinary effort to make sure that every phrase, every implication of the words was correctly done, and then I published it, and now we have copies of the book.

01:15:20

Livingston: *Ecology of an Underwater Island*.

Schmieder: Yes. I might remark with some bragging that my younger son, Randy, who got a combined scientific illustration/biology degree from University of California, did a lot of the illustrations inside of this book as well as this cover, the color cover which, as you see, folds. The front cover and back cover fold out as one large image, and he assembled this, synthesized this from examining literally hundreds and hundreds of our underwater photographs. And it is an extraordinarily accurate representation of what we saw as divers, maybe a little more colorful than we saw it under most conditions, but it's really quite an accurate representation of what Cordell Bank actually looks like.

Livingston: You mentioned this while the recorder was off, so I want to get back to it. You last dived Cordell Bank in 1995, I understand.

Schmieder: Yes.

Livingston: And did you intend that to be your last dive there?

Schmieder: Every year that we did the diving, we would evaluate whether we were going to do it again the next year. Usually, my team said, "That's the last dive, right, Bob?" and I would say, "Yes, that's the last dive," but inevitably we would come back and do it again.

I will confess here for the first time that I lied. I never intended it to be the last dive. I always knew that from the moment, as I described it for you, from the moment I saw Cordell Bank, the first one second, I knew I would be there for ten more years, and I was. So I humored them in their last dive comments, but I knew I would carry on. It was only when it sort of became a *fait accompli* with the sanctuary that the motivation to go there tapered off, and therefore the team energy tapered off.

The return in 1995 was stimulated by some people who were very eager and very technically competent, and for me it was a chance to return after ten years to observe potential changes that had happened in the bank, but in 1995 I knew with almost certainty that I would not dive there again. The only hope that I still have is that someday I might be invited aboard a submarine so that I could go out and see it again.

Livingston: Good luck with that.

Schmieder: Thank you very much.

Livingston: So we've talked for quite a while here about your overall experience of diving at Cordell Bank. So how does this experience rate with other adventurous experiences you've had in your life?

Schmieder: Well, a distant second after meeting my wife, Kay. We'll take that as a calibration. You do understand that Cordell Bank was for about ten years an obsession. I was slave to that obsession. There was no way I could not do that. I thought about it day and night.

I was immersed in it. I pulled together and pulled along and pushed and carried the team, not unwillingly, but it was my obsessive driving interest to see this project through to what appeared by 1980-'81 to be the potential for establishment of a

national marine sanctuary. It would have been wrong to do anything else.

It was also very exciting. I want to make sure it's clear. We did not do this for the adventure. You can throw yourself out of an airplane or anything else. Walk on hot rocks if you want adventure.

We did this because we believed in the validity of the scientific pursuit. This is field science. It's not field fun. It was fun. It was adventure for us, but that was ancillary to the deeper, wider purpose, namely to document what's out there to support the rational management protection of whatever it is that's out there.

01:20:20

By the time it got to be the mid-eighties, I think my obsession had solidified. You know, living things calcify, and they become solids. My obsession with Cordell Bank has become a calcified, solid thing, not dead, but not going away, not diminishing, not changing, but also not an urgency. I sort of evolved into other urgencies, and we carried out a lot of expeditions to a lot of other places, but it clearly was a life – not a life-altering, a life-swamping experience for me.

Livingston: How does that experience influence your interests today?

Schmieder: Well, part of my interest is in what we're doing right here at this table at this moment, and that is capturing what it was that happened then, and for that I am deeply grateful that you have provided this opportunity, that the Sanctuary Program has underwritten this, that you're taking your time so that we can capture that, because not only does it help complete this process and because as a scientist I want this process completed, but also it's helping me to relive the excitement and the interests that we had there.

Right now in my life I'm concerned about other things. I have a startup company involving a whole new architecture for computers, nanotechnology embedded in it, so I spend a lot of my time thinking about that. We're remodeling our house, so my head is no longer filled with the details of Cordell Bank. Thankfully,

those details are in the competent hands of sanctuary managers and, I hope, some scientists who would do really good science. I will be thrilled when I see any kind of scientific reports of work or any other data.

We mentioned high resolution surveys. I don't think I've ever had the chance to look at side-scan survey data. I would love to do so, and I would actually love to be involved in research projects. I no longer have the capacity to lead or carry out – I have the capacity – I no longer have the position to carry out any kind of extensive ambitious research program, but it's right there with me every day all day.

Livingston: What image or thought about this experience sticks with you after all these years? Is there any one something?

Schmieder: As I've described before, the most intense image is that very first glimpse of Cordell Bank, October 22, 1978, when I broke through the fish and saw the place, but, of course, that image is compounded or enhanced by the extensive preparation that we had had to go through to get there. So that was partially the same exhilaration that Hillary must have felt when he summited Everest or Armstrong and Aldrin felt when they landed on the moon, and we likened ourselves to that. It was a giddy kind of a feeling. I think that will always remain the one most intense visual, psychological thing or image that stays with me.

There is, of course, Don Dvorak's famous photograph of the rosy rockfish that is reproduced on the sanctuary documents and many other places. That's an image that never goes away. It's become a semi-classic photo, if you like, and, of course, there are literally thousands and thousands of other images that are there.

Livingston: What do you tell your friends or family or colleagues about Cordell Bank today? For instance, how would you describe it to somebody?

01:24:53

Schmieder: I tell them that I am absolutely astonished and thrilled that there is a national marine sanctuary in really good hands and that long ago we did a project that was tough, and we were tough, and that it

doesn't always work for it to come to a good or a productive end. Sometimes, the plane crashes. Sometimes, the ship gets frozen in ice in Antarctica, and the expedition leader has to row over 1,800 miles to get his men rescued and so on.

Here, the process worked, and I was the beneficiary of a good employment situation which gave me vacation time, a sensible salary that gave me money, a great team of people that did it, and then it all resulted in what appears to be a permanent part of our historical environmental culture. That's what I tell people now about Cordell Bank.

If they care to know what's at Cordell Bank, I have a few things I can say, but what I tell my friends is how proud I am that what we did – we did something that led to something. What we did can never be undone, and we hope and believe that what is there now will never be undone, either. So we're part of history.

Livingston: Based on your experiences and what you saw there, what would be your biggest concerns in terms of the use and potential harm to the area?

Schmieder: I don't fear any harm to Cordell Bank itself. Part of it is its natural isolation, insulation, because of its remoteness. I don't think there's any threat, although I may be naïve, and I'm certainly not keeping up with the threats. I don't think there's any threat from somebody trying to drill an oil well out there. The threat of fishermen dropping their lead balls on the bank has been effectively dealt with, and I am extraordinarily pleased that they've taken that step. I advocated it in my comments on the draft management plan when the sanctuary was established, and I was not terribly popular with the fishermen, by the way, in that.

So I think that the threat is not going to be mechanical. The threat is going to be political, economic. It's going to be one of – if there is a threat, it's going to be lack of interest. There has got to be people who care about the national marine sanctuaries, just as there are people who care about the National Aerospace Museum on the Mall.

If people sort of drift away and don't – if nobody is an advocate for the sanctuary system – and they have to be smart about it, and they have to be in powerful places. It can't be just people with throwaway comments, "Oh, well, we need this nice place." It has to be people with enough clout to not only preserve the system as such but keep it growing at a sensible rate.

America is founded on sensible growth rate in everything we do, so that means funding at some appropriate level to keep staff on and the important work that Jenny does in communicating, in pulling together, codifying materials and reaching out and so on. I think that that's critical. What we're doing here today I think is part of what is necessary to keep Cordell Bank protected.

If I were to be more activist, I would say what it needs is some research funds. It needs some research programs. It needs some scientists. It's a beautiful laboratory out there. It's a little tough to get to. There's a bit too much water around it, but somebody needs to designate some funds to support somebody to do some – look at all these "somes" in here – somebody to study, say, the – say a ten-year study.

Here's an example, a ten-year semi-quantitative – it could be photographic study, using divers, of the cover. What are the plants and animals that live there? It would be – scientifically, it would be trivially simply. Mechanically, it's challenging. It's going to take resources but simply photographing what is there at known control described intervals to see what changes are happening.

01:30:15

Surprise is the most powerful tool of a military organization. If you want to win, surprise your enemy. If we want nature to win, let her surprise us. If we want to win, which means we want to keep on living here and live in a safe, secure, beautiful environment, we need to not let nature surprise us, and the way to prevent that is support these sanctuaries to some extent so that we can observe, collect, analyze the data, and understand what's going on there.

This, of course, is the charter and the motivation of the sanctuary and the people who run it. It's just that this has to be done, or we

run the risk that the sanctuaries will get old and dusty, and eventually they'll be moved into the hallway, and finally someone will say, "What's this for?" and they'll ship it out, well, metaphorically speaking, of course.

Livingston: Well, when you broke through those fish and you saw that first view of that beautiful color with the Cordell Bank, did you have any idea that this would turn into what it did, the protections, the national marine sanctuary?

Schmieder: I did not, because at that time I did not know a thing about the sanctuary program. I didn't learn that until 1980, but, as I've told you in a couple of ways, I knew instantly when I saw that that I would be back, that this was my own personal obsession, and I spoke, and I think I wrote that. I've written that in articles that I've published about Cordell Bank, that my obsession with, commitment to – with the knowledge that we could do it. We succeeded with the first dive. "See, we can do this," and therefore, for me, it was reflexive. "We *will* do this. One way or another, I will do this."

The arrival of the sanctuary option in our project changed the project, and I think, even though from the beginning I believed that if you go somewhere and explore someplace on earth that has never been characterized, you are guaranteed to make discoveries, discoveries never get undone. They don't get undiscovered, by and large, and forever after you are the one who did it first, and that the world has changed for having made the discovery. That was there from the beginning.

The actual embodiment of that in a working national marine sanctuary I didn't foresee, and it was only as it evolved and then when the President finally signed it and it became a reality that I drew a breath and said, "Holy smokes. This really happened," and this was a surprise and a really good one.

Livingston: Do you have any last thoughts as we're wrapping up here –

Schmieder: Probably that was my last thought on how I felt, how I felt about this, except that I will just repeat what I said a few minutes ago,

how important I think what you're doing is in this process, how effective Jenny and Dan and the rest of the staff are being, and how important you, Dewey, are in capturing this little piece of it, how important it is, because Cordell Bank is an important piece of an important chunk of an important country and an important world, and I'm thrilled to have been a part of that and to have perhaps left a footprint somewhere that might still persist long after I can no longer make any footprints.

So thank you very much for giving me the chance to share how I felt about this, what we did in some detail, but especially how I felt about this and what it meant to me and, to a great extent, to some of the other members in my group and my team. So thank you very much.

Livingston: You're welcome. Thanks for taking so much time with us.

[01:34:59, end of audio file 4; end of interviews.]