Oral History of

John Arthur McGowan

Interview conducted by Laura Harkewicz

17 January 2006

TABLE OF CONTENTS

ABSTRACT:

John Arthur McGowan was interviewed in his office in Ritter Hall at Scripps Institution of Oceanography (SIO) on January 17, 2006. McGowan was born in Oshkosh, Wisconsin on August 22, 1924. He received his B.S. in 1950, and M.S. in 1951, from Oregon State University. He received his Ph. D. in oceanography from the Scripps Institution of Oceanography, University of California, San Diego in 1960. His dissertation topic was, *The Systematics, Distribution, and Abundance of the Euthecosomata of the North Pacific.* His primary graduate advisor was Martin W. Johnson. From 1956 – 1958, McGowan served as a marine biologist for the Trust Territories of the Pacific Islands. He served as a member of the UNESCO (United Nations Educational, Scientific and Cultural Organization) Consultation Committee, Indian Ocean Biological Center from 1963 – 1966. He is currently a member of the Chile-American panel of the AAAS (American Association for the Advancement of Science), a position he has held since 1988. He became a professor of oceanography at SIO in 1972. The interview focused on McGowan's experience as a biological oceanographer, especially his work in climate and oceanic ecosystems and their links to climate change (global warming). We also discussed his interactions with Pacific Islands peoples. In addition, we talked about his experiences as a long-time member of the Scripps faculty and tensions he has experienced with other faculty in relation to funding and focus of research.

INTERVIEW HISTORY: The interview took place on a winter afternoon in McGowan's office in Ritter Hall at SIO in La Jolla, California on January 17, 2006. McGowan had several specimens of the top shell, *Trochus niloticus*, scattered throughout his office, an organism he had researched as an economic source in his tenure as a marine biologist for the Trust Territories of the Pacific Islands in the mid-1950s. We talked for a little over two hours. The tape was paused once when it appeared that McGowan's microphone had become unattached after he had shown me a well-worn but tightly woven hat he had purchased some fifty years ago in the Marshall Islands. Fortunately, there was no gap in the audio recording due to this apparent mishap.

Laura Harkewicz
Oral Historian, SIO/UCSD
April 10, 2006

John McGowan with squid. Transpac Expedition, 1953.
Scripps Institution of Oceanography Archives, UC San Diego

INTERVIEW WITH JOHN MCGOWAN: 17 JANUARY 2006

Harkewicz: ##[1]Good morning, Dr. McGowan.

McGowan: Good morning. Good morning. How are you?

Harkewicz: Fine. Thank you. This is January 17, 2006. I'm with Dr. John McGowan in his office. And, Dr. McGowan we want to talk to you a little bit about your experiences here at Scripps. So, first of all I noticed from your dissertation vitae, which you had mentioned that you had served in the Navy during World War II. And when I interviewed John Knauss he said that his experience in the Navy had a lot to do with him going into oceanography. And I was wondering if you had a similar experience?

McGowan: John Knauss is an old friend of mine, and his experiences in the Navy were about as different from mine as you can possibly imagine. He was an officer working with the Office of Naval Research in Washington. So he learned a lot about oceanography, especially at the higher administrative and political levels. I was an enlisted man on an ammunition ship. And I spent a lot of time swabbing decks, and chipping paint, and shooting guns. Later I got transferred to a cruiser. But, in a funny way, I did get interested in the ocean, because I was also a coxswain[2] of a landing craft. Very often we—well, our major job was to take ammunition to other ships, to the fighting ships. And sometimes we'd have to anchor in very shallow places where there were beautiful, beautiful coral reefs. I made myself diving glasses out of a pair of safety glasses for paint chippers. I filled up the holes with beeswax, and did some diving around coral reefs. Earlier as a small boy, I had lived in Wisconsin on a lake and I got interested in water and all its residents, denizens. So John and I shared the experience of being in the same United States Navy, but that was about it. I was always interested in the water and aquatic organisms since I was a kid.

Harkewicz: You grew up in Oshkosh, correct?

McGowan: I grew up in what was at the time, a small semi-industrial town in central Wisconsin, yes.

Harkewicz: So, did you have experience with marine organisms then, at that point?

---

[1] The symbol ## indicates that the tape or a section of tape has begun or ended. For a guide to tapes see the final page of this transcript.

[2] The literal meaning of coxswain (often pronounced "coxn") is "boat servant" from "cock" for small vessel and "swain" for servant or attendant. In the Navy, a coxswain is a petty officer in charge of the ship's boat and its crew, who steers. In sculling, a coxswain is the individual in charging of steering the boat, providing motivation and encouragement to the crew, informing the crew where they are in relation to other boats and the finish line, and making any race strategy decisions.

McGowan: No. I hadn't seen the ocean, of course. During the Great Depression my family moved to Southern California, as did many others, to escape the cold. And at the time the crack was, "Better to starve to death in a warm climate than a cold one." *[Laugh]* So, there was a lot of migration being done. And of course, the first time I saw the ocean I went down and tasted it. That's what everybody does, everyone from the Midwest. Put their finger in the water and taste it. Yes indeed, it's salty. So, so yeah. I went to high school in Alhambra, California. It's a suburb of Los Angeles. I did not do well in high school. As a matter of fact, I never graduated.

Harkewicz: Really?

McGowan: No. and, I still haven't. *[Laugh]* And, I wasn't a bad boy, I don't think—I just never listened to my teachers, not once. I stared out the window most of the time, as near as I can remember. I didn't dislike them, I just didn't care what they were saying. But the Navy, and World War II, changed all of that. I learned pretty quickly that an education was a good thing. So, when I got out—I was in the Navy about, almost four years—I worked for a while in a brick yard to earn a little money. And then the GI Bill came along, and that sounded almost too good to be true. And I went to what was then called Pasadena Junior College, and it was a city college. And it's one of those wonderful places that California runs that give kids a second chance, like me, or to educate people in trades, which they do very well, and to prepare people for university. There were many courses at that time, and today, that are acceptable at University of California, Berkeley. And, if you take enough of those you can enter the university as a sophomore. It's a wonderful institution. I recommend it very highly.

Harkewicz: And that is, it's now known as—is that Pomona College, isn't it now?

McGowan: That's—no, it is Pasadena City College.

Harkewicz: Pasadena City College?

McGowan: Yeah.

Harkewicz: Okay. And so you, how did you happen to get to Scripps? What brought you here?

McGowan: It was almost an accident. I went on to Oregon State College, now Oregon State University, and they had a marine station on the coast. I went to Oregon State to major in fisheries, but the courses were so stupid, and I was so disappointed, that I changed majors to zoology. I liked invertebrate zoology, so I managed to go down to their marine station three different summers: spent my summers there, studying invertebrate zoology and the

ocean. The last two summers I was a teaching assistant there and helped teach the course. The final summer I was a research assistant with a physiologist. By then I had done pretty well academically and, I was interested in graduate studies, but I didn't quite know how to apply to graduate schools. I wrote some pretty awful letters to Stanford, to Harvard, and I didn't know where else to apply, but there was a fellow at the marine station who said that Scripps Institution was starting a brand new plankton program. I was interested in plankton, even then. I had heard about it and looked at a little of it. So, I applied here and got accepted. I got accepted at Stanford, too, but Harvard didn't even reply. Just as well. Martin Johnson[3] was the invertebrate zoologist here, and plankton specialist. I suspected one of the reasons he accepted me is because I was from the Pacific Northwest and so was he. He'd been a farm boy in, I think it was South Dakota, and then had worked on the big salmon traps in the Pacific Northwest back in the days when they had big salmon traps. He was a guard. I'm ahead of myself. He worked in the woods as a logger and got injured, as it happens to most loggers. And so he took a job as a guard on a salmon trap, and he really had a rather spectacular youth, and how he got to research I have no idea, but he did, and came to Scripps. He was a very shy, retiring, an inarticulate man, but he had a pretty wild youth. So, he and I got along fine.

Harkewicz: And what year did you come here, then?

McGowan: You know, I can't be certain. I think it was 1952.

Harkewicz: Okay.

McGowan: I think it was the fall of '52.

Harkewicz: All right. I can verify that.[4]

McGowan: Yeah. It must be in the record someplace.

Harkewicz: Right.

McGowan: Yeah.

Harkewicz: So, you were—Martin Johnson was your advisor then?

McGowan: He was my major professor. That is correct.

Harkewicz: And, what was he like as an advisor?

---

[3] Martin Wiggo Johnson (1893 – 1984), marine biologist at Scripps Institution of Oceanography (SIO).
[4] McGowan enrolled at SIO through the University of California, Los Angeles in the fall of 1951. (Biographical Information Files, Scripps Institution of Oceanography Archives, UC San Diego.)

McGowan: Very quiet. He didn't have much to say. He had—well, this CalCOFI[5] program was just starting up and it was going great guns and had a big budget, so he was able to take on graduate students to work on all the samples, all the material, that was being collected in the California Current. He quite properly decided that we didn't really know our fauna, flora or fauna, and that the first thing to be done with all those thousands of plankton samples that were being collected was to find out what lives in the California current. You know, old fashioned taxonomy, to identify things, and not just identify them but figure out their patterns of abundance, and how that changed with time. He assigned me to work on mollusks because I had already done some mollusk work up at Oregon Institute of Marine Biology. That was okay with me. Mollusks included squid and I was very interested in squid and some other little pelagic planktonic things that it turned out were not very important. They're interesting zoologically in terms of evolution and community structure and that sort of thing but they weren't very important numerically as fish food, for example. So we did that, and his other students were working on other groups. And, that was about the extent of my advice from Martin Johnson. He had very little to say. He lectured, of course, and frankly his lectures were kind of dull. But he was a very, very honest man and if you listen to him carefully he was quite perceptive and he had lots of very fine ideas, and he rejected a lot of bum ideas too. He was plenty smart. It just didn't come across because his kind of severe Scandinavian way.

Harkewicz: Did the fact that he was quiet and not say very much to you—was that okay? Did that work okay?

McGowan: No. I didn't like it at all. Not at all. We used to make fun of him because of that, good natured fun, you know. But yeah, we students would poke fun at him for that.

Harkewicz: So, how did he influence your research, then?

McGowan: I think it took a—well, he decided for me what I should work on. He did. I mean, it was a total influence. "You will work on mollusks," and which I did, "and work on the biogeography of them." That is, their patterns in

[5] CalCOFI, California Cooperative Oceanic Fisheries Investigation, was established in 1949 in order to research the causes of the failure of the Pacific sardine fishery off California and Mexico. The CalCOFI consortium is composed of the California Department of Fish and Game, the Coastal Fisheries Resources Division (now known as the Fisheries Resources Division) of the Southwest Fisheries Science Center (National Marine Fisheries Service) and the Marine Life Research Group of SIO. Since its founding, the central theme of CalCOFI has been to conduct cooperative biological oceanographic surveys measuring the biological, physical and chemical characteristics of the California Current area. The CalCOFI measurements are the longest and most complete time series of oceanographic and ichthyoplankton data in the world. In May 1997, the CalCOFI data base was recognized as a national science treasure by a peer review panel of distinguished scientists.

space and time. At the time it was very important because not many people had the time series and measurements over which they could ask questions about, "How do things change with respect to time?" That is a very important, it turns out, aspect of marine science today. It wasn't just him. Scripps, at the time, at that period, was imbued with the whole notion of finding out the patterns of the distribution of properties in the ocean and how those properties changed with time. Revelle[6] had just convinced—or very soon after I arrived—convinced Keeling, Dave Keeling[7], to start the CO_2 measurements on Mauna Loa, and he, himself, Revelle, had given several lectures, which I heard here, about the carbon dioxide problem. He could see it way ahead of time, and that influenced me strongly. And the physical oceanographers teaching here emphasized large-scale patterns, large-scale processes, rather than little tiny, you know, mini-diffusion things, turbulence in the centimeter scale. They weren't into that sort of thing. They were interested in the whole ocean. And to me that was a revelation. Martin Johnson was part of that. He wasn't a very articulate part of it, but he certainly was part of that, that intellectual group that cared about large-scale phenomena.

Harkewicz: I guess perhaps this is related to one of the other questions I had for you. In the chapter that you and Edward Brinton[8] wrote about Martin Johnson and the coming to Scripps, or the *Coming of Age: Scripps Institution*,[9] you had said that Johnson's emphasis on the physical functioning of organisms rather than individual biological or food, that that was like heretical at the time?

McGowan: Well sure. It still is. I mean, it's just now that some of our colleagues are beginning to understand what the hell it is we're talking about. But, it's the physics of the movement of water that has everything to do with the large-scale patterns that change with respect to time. And, it's the changes on the large scale that are the most important ones ecologically, in terms of population and growth, and population decline, and response to climate.

Harkewicz: Do you think Scripps was ahead of its time with this viewpoint then?

McGowan: Very much so.

Harkewicz: Okay.

---

[6] Roger Randall Dougan Revelle (1909 – 1991), SIO director, 1951 – 1961.
[7] Charles David Keeling (1928 – 2005), SIO geochemist.
[8] Edward Brinton (1924 -), research biologist, Integrative Oceanography Division, SIO.
[9] Robert L. Fisher, Edward D. Goldberg, and Charles S. Cox, editors. *Coming of Age: Scripps Institution of Oceanography, A Centennial Volume, 1903 – 2003.* (La Jolla, CA: Scripps Institution of Oceanography, University of California, San Diego, 2003). Chapter on Martin. W. Johnson written by Edward Brinton and John A. McGowan, pages 65 – 77.

McGowan: We were—that kind of biology was, and to some extent still is, considered out of the mainstream, but people are now, I would say in the last five or six years, beginning to get it. And, it's the global change issue.

Harkewicz: Right.

McGowan: They finally are beginning to understand that maybe, just maybe, it's got something to do with what we see in the ocean.

Harkewicz: I know a lot of historians of science have written things about post-World War II Scripps, sort of trying to put like a physical oceanography spin on biological oceanography? Do you think that's the case in your experience?

McGowan: Oh. *[Sigh]* Well I—yeah. I suppose it is. All of this was brand new to me when I came here. I had no concept of how it is populations, in the first place, interact with their environment and the environment is the physics of the ocean. That's the environment. Most biologists—*[clears throat]* excuse me—are trained as reductionists, and this is, whatever the opposite of reductionism is. It's large-scale stuff. And, as I say, it's the large scale that turns out to be the most important part of the variability that populations of organisms experience. And to me, population change is at the very heart of trying to understand evolution, because that's population variability on the even larger timescale; on the million-year timescale.

Harkewicz: So then do you think that some of these things that have been written by—like complaints from ZoBell and Fox[10] about the direction that Scripps was going—maybe were unfounded then, from your experience?

McGowan: I wouldn't use the word "unfounded." Sverdrup[11] certainly introduced the notion of biologists and physical oceanographers collaborating, and for biologists to learn something about the physics of the ocean, and vice versa. He insisted that every entering graduate student here take core courses, and that included physical oceanographers taking biology, and vice versa. My own impression was, and the rumor at the time among students was, that ZoBell was frustrated. He had wanted to be director and he didn't get appointed. And Fox was a biochemist, and generally considered to be inactive, shall we say. He didn't do much. And he was uninterested in the kind of oceanography that Sverdrup and Revelle, and others pushed. He just wasn't interested. And he, of course, was an opponent, I suppose, but he was such an apathetic guy that he never did much. I can say more, but I won't. *[Laugh]*

Harkewicz: Okay. That's fine. I don't want you to say anything you'll regret later on.

---

[10] Claude Ephraim ZoBell (1904 – 1989), professor of marine microbiology at SIO; Denis Llewellyn Fox (1901 – 1983), professor of physiology at SIO.
[11] Harald Ulrik Sverdrup (1888 – 1957), oceanographer and third director of SIO.

McGowan: Yeah, well.

Harkewicz: Do you think that Scripps has come to a proper balance between physical and biological oceanography?

McGowan: No.

Harkewicz: No? Where do you think . . .

McGowan: It still has not achieved what Sverdrup and Revelle wanted it to achieve. Quite the contrary, I think the biologists have gone away from physics and the physicists have gone away from biology. Not all of them by any means. There's certainly a hard core of physical oceanographers that collaborate with biology and do biological research themselves now, especially in the past few years. That is growing, because I think they understand that a lot of the major problems in physical oceanography had been pretty much solved. They're looking around for some other exciting stuff to do, and that certainly has to do with the biology of the ocean. There is plenty of good evidence that the ocean's biology is changing, and we don't know the direction, we don't know the rate, and we don't know the magnitude of the change, and what the internal complexities of it are. We certainly don't know the consequences of change that's going on, but there's a lot of evidence that change is happening. But, it's the usual kind of sloppy qualitative, almost anecdotal, biology. It's not precise and accurate the way physical oceanographers, physicists, work. The measurements are hard to make, and the biological systems are so damn complicated and there's so many parts, and they're all nonlinear and interacting and there's a lot of switching and all kinds of crazy stuff's going on. So, not intuitive, you know, non-physical.

Harkewicz: So, how do you . . .

McGowan: A lot of the principles of physics can't be applied to biological problems. They just can't be.

Harkewicz: Right. How do you think it could be improved then?

McGowan: Well I think, oh, the practical way is to infuse a lot of money into geobiophysical oceanography. If a big pot of money suddenly appeared, a lot of people would suddenly get very interested in it. But, quite apart from that, I think—I think our administrators here, and our directors, and some of the senior faculty ought to sit back and analyze the situation and see that, "Yes, this is a serious societal problem and an even more serious scientific problem for the future." The difficulty with doing that is there's no money in it. Washington doesn't see it. That's where the bucks come

from. And the reason Washington doesn't see it is the directors of Scripps, and Woods Hole,[12] and other places aren't telling them that that's the important stuff. So it's, you know, there's a feedback loop here, a negative feedback loop, that they're not, they're not being enthused about it the way Roger Revelle used to be able to go to Washington, and Walter Munk[13], and tell them, you know: "This is what you ought to be doing." And they'd mull it over and all of a sudden decide on themselves, "You know what I think we ought to be doing?"

Harkewicz: Well, we're looking for a new director here. You have any suggestions?

McGowan: Oh, yes. I sure do, but I think I'll . . .

Harkewicz: You don't want to say it?

McGowan: No.

Harkewicz: Okay. That's fine. All right. We'll come back to the present day, but I want to back up a little bit. As a graduate student you worked as a marine biologist for the Trust Territories in the Pacific?

McGowan: Yeah.

Harkewicz: Could you tell me a little bit about the kind of work you did there?

McGowan: Well, I can tell you how that happened. I was one of the first students to—here at Scripps—to get interested in scuba. They were called Aqua-Lungs at the time. Cousteau-Gagnon Aqua-Lung.[14] Connie Limbaugh,[15] who worked here for Carl Hubbs,[16] decided to teach a course in scuba diving. I took that course. It's one of the first courses in scuba. I successfully used scuba[17] in 1954, to study squid spawning off Scripps Pier. And to my knowledge, that's one of the first scientific uses of Aqua-Lung, scuba, and one of the first scientific papers where scuba was a primary tool. So, suddenly I became a diving expert, which I wasn't.

---

[12] Woods Hole Oceanographic Institution (WHOI), located in Woods Hole, Massachusetts.
[13] Walter Heinrich Munk (1917 -), physical oceanographer at SIO and professor of geophysics at UCSD.
[14] The Aqua-Lung developed in 1942 by French Canadian engineer Emile Gagnon and French oceanographer and diver Jacques Cousteau (1910 – 1997) was modified from Gagnon's demand valve for the automotive industry (with a function similar to today's carburetors). Modifications to the breathing unit included the location of the exhaust valve and adaptations to use the high pressure valves and cylinders marketed by Cousteau's company Air Liquide (originally for use in commercial and medical oxygen applications as well as flame throwers).
[15] Conrad Limbaugh (1924 – 1960), professor of biology and scientific diving officer at SIO. Limbaugh developed the first civilian scuba course in 1951, which later became the basis of the Los Angeles County dive program that developed into the first public scuba certification program. He wrote the first scientific dive safety manual and established standards that are still in use today. Limbaugh died in a diving accident in France in 1960.
[16] Carl Leavitt Hubbs (1894 – 1979), ichthyologist at SIO.
[17] Self-Contained Underwater Breathing Apparatus (SCUBA or scuba).

The Trust Territory of the Pacific, Micronesia[18], was a UN trusteeship that the United States was the director, the manager, whatever that term is. There was a guy who was a Washington operator who was the grandson of President Coolidge.[19] He was very interested in Micronesia, and he was pushing to establish a marine science station out in, probably, Palau, where there'd been a marine science station run by the Japanese. They'd done quite a bit of good work back in the thirties. Anyway, Coolidge discovered that one of the main sources of income for Micronesians, especially Palauans, and Yapese was a pearl shell called *Trochus niloticus*.[20] They thought—they weren't sure—that maybe the harvest was less than it used to be. And the catch regulations in force had been promulgated, put in force, by the Japanese back in the thirties, and they didn't know whether it was still valid or blah, blah, blah. So, they needed someone to come out and do something. Those were my instructions: "Do something." *[Laugh]* And, by that I took it to mean that I should try and understand the populations and what was happening to them, and whether or not new catch regulations were required. So, they came to Scripps and Martin Johnson was the invertebrate zoologist here and I'd been working on mollusks—and I knew scuba, so I got recommended for the job and I took it. I couldn't resist that. And, in the first place, it's a very romantic place, and my job would be to dive on coral reefs all day, every day.

Harkewicz: That doesn't sound too bad.

McGowan: Yeah. And, move from island to island and get paid for it, a pretty good salary at the time. So I did. And I took a leave of absence here. I was halfway through my thesis but I couldn't resist. So I went out to Micronesia and established a research program and halfway through it I got an eighty-foot ketch with a native crew and we sailed from atoll to atoll doing survey to see how much *Trochus* was where and what the size

[18] The Trust Territories of the Pacific was a United Nations trust territory in Micronesia administered by the United States from July 1947 until May 1994 when the trusteeship for the Palua district (the last location to maintain trusteeship ties) ended. The area was formerly the League of Nations Mandate administered by Japan and was taken by the U.S. in 1944 during the Pacific campaign of World War II. Today the area consists of four territories: The Republic of the Marshall Islands, The Federated States of Micronesia, The Commonwealth of the Northern Mariana Islands, and The Republic of Palau.

[19] Harold Jefferson Coolidge (1904 – 1985), primatologist and conservationist. Coolidge served as assistant curator of mammals at Harvard University's Museum of Comparative Zoology from 1942 – 1946. From 1947 – 1970 he acted as executive director of the Pacific Science Board, which had been established by the National Academies of Science to conduct scientific research and promote cooperation throughout the region. Under his direction, the Board sponsored nutrition research, various disease and pest control campaigns, and anthropological field studies.

[20] *Trochus niloticus*, the top shell, with its edible meat and mother-of-pearl shell is one of the most heavily exploited marine gastropods in the Indo-Pacific region. Due to unregulated harvesting,. the organism's natural populations have been reduced to near extinction levels. However, studies of the reproductive biology and ecology of T*rochus* by the Aquaculture Department of the Southeast Asian Fisheries Development Center have led to the development of spawning and hatchery techniques such as induced spawning and seed production, which have produced measured success, particularly in the Philippines, in recent years.

frequency was. The Japanese had transplanted *Trochus* from one island to another, and nobody knew how successful those transplants were.

I dug out a lot of old sales records from the trading companies. They all kept records. So, I could plot abundance, you know—catch, anyway—versus time and saw, yes indeed, the catch is going way down. And then tried to determine what to do about it. Of course, we could increase the legal size so that's more, there's more escapement of the younger ones. Escapement from harvesting. Then we could shorten up the season. But these, this fishery was very, very important. It was the second source of income for all of Micronesia. And I decided that before we did anything radical—I decided in the first place the Japanese catch regulations weren't all that bad. They were pretty good, except they were not protecting the population.

I thought that what had happened is that with so much harvesting that the shells had been dispersed, that instead of occurring in little clumps they are now one here and one there and one someplace else. They were quite far apart, and that led to a decrease in fecundity. They spawned in the open water and so, you know, in order for the eggs and sperm to mix in the ocean they had to be pretty close together to ensure fertilization. So, I decided to set up, or to recommend that they set up, a series of sanctuaries along the reef and that each municipality of the island, let's say Palau, owned a certain section of reef—that's traditional Palauan law—and that they ought to donate a small section of that as a no-take zone for anything, and by god they did it. That way, and then, oh, reseed the places with clumps of *Trochus*, get *Trochus* from other parts of the reef and put seven, or eight, or nine of them together in ten square meters or five square meters so that they'd have a chance to reproduce.

By then it was time to go home. I was unable to track whether or not this was successful. It'd take five or six years anyway. And, I never—I never got any communication from the Trust Territory saying whether or not it had helped. I don't know if they kept the catch record to find out whether it helped. That was my first experience with government administrators. Later, fifteen years later or something like that, I got a letter from a biologist that worked out there and he'd followed up on the catch records. And the *Trochus* population hadn't exactly recovered but it had stopped declining. And in one or two places it had recovered. Not as well as they once were, but they'd gone up. So, I was happy to see that.

But I spent an awful lot of time on various islands making scuba transects of the reefs. So, I know, I saw an awful lot of coral reefs, and got some impressions about coral reefs and how they're structured and how diversity was maintained, and the fact that some are different than others. And I

learned a lot[21] *[inaudible]* interior, and they were sold to Japan, where they made buttons, men's shirt buttons. And then about that time plastic was taking over so the button industry kind of collapsed. But they switched to jewelry and little fancy dress buttons. So, it was still is, it is still important today.

Harkewicz: I think I've seen some of those on the beach. Are they . . .

McGowan: Not here.

Harkewicz: Not here?

McGowan: No, they're tropical.

Harkewicz: Okay. I must be mistaken.

McGowan: Equatorial, yeah. Well, there are shells that look something like it. But, *Trochus* are very heavy, and they have a beautiful pearly interior.

Harkewicz: So, were you able to use—I mean, you say you learned a lot then. Was it the basic knowledge rather than the specific knowledge that you gained there that you were able to use it in the future?

McGowan: Yeah, it was basic, I think, with just another kind of community, marine community, that is famous for its complexity and diversity, but it didn't help me in my plankton research, no. No. So then I came back to Scripps after sailing around the Pacific from island to island.

Harkewicz: But did you regret taking this sabbatical, so to speak?

McGowan: No. I never have regretted it.

Harkewicz: That's good.

McGowan: Yeah. It set me back quite a ways, but no.

Harkewicz: I was wondering about your interactions with the Pacific Islanders, what was that like?

McGowan: Oh, it was quite good, as a matter of fact. They're nice people, but they're improvident as hell, you know, and I had to run a boat. The idea of preventative maintenance was just totally and absolutely foreign to them. If something broke they'd work hard to fix it, and lots of things did break. I was surprised at how poorly educated some of them were. They didn't

[21] The tape at this point of the interview is inaudible. McGowan had stood up to retrieve a *Trochus* shell from the top of his file cabinet and showed me the mother-of-pearl interior from which buttons were made.

even know simple arithmetic, although there was a school system there. I made some good friends among the Micronesians, and it's funny how the personalities on different islands are quite different. Their cultural backgrounds are such that they become different kinds of people. The Palauans are always very talkative, and loud. You think they're arguing with one another but they're not. *[Laugh]* And, they're full of fun and get in a lot of trouble. The Trukese are kind of bland and slow moving. Not very interesting. The Micronesians—I mean the Marshallese—have been strongly influenced by congregational ministers that the whalers introduced a long time ago. They all—the men never even wear shorts. They always wear long pants. The ladies all wear dresses, Mother Hubbard things from their neck down to their ankles, that sort of thing. On the island of Yap, however, it's totally different. They wear grass skirts, and the men wear little breechcloths and they're covered with tattoos, but the Yapese are very intelligent people. As a matter of fact they have a strong feeling of superiority. They think they're better than anyone else. They think their culture's better than anyone else. And, in some ways it is. Their canoes are marvelous engineering structures when sailing. They really know what they're doing. They're the people that have that big stone money, the big discs, you know, twelve feet in diameter. They mined those things on islands that were about 300 miles away and built rafts and towed them up to Yap under sail!

Harkewicz: Wow.

McGowan: Yeah.

Harkewicz: So, you didn't get the impression of too much cultural exchange between the different island groups, then?

McGowan: Well, they spoke different languages, Palauan, Yapese, and Marshallese are quite different. Trukese. Well, I'm sure they're related somehow. But—

Harkewicz: And which ones, which were the people that worked on the boats with you then?

McGowan: Well, I had three Palauans and the rest were Marshallese, and they were good sailors. I mean, they'd do what I asked them to do, but that was about it. I didn't ask them to do very much. The ketch had a captain and he was not very good. When he found out that I wanted to take the boat to this island, and that island, and that island, and take a big circuit around here, you know, about a thousand miles, he quit. *[Laugh]* So, I was left being the captain. I got some old hydrographic office navigational manuals, and a sextant, and of course we had a compass, and a clock. You need a clock for navigation, or you did in those days, and a sextant. I taught myself celestial navigation so that we could get from island to island. But I was

very uncertain of myself, so, the first trip we took I made friends with a local Jesuit priest because he could help you. He found a wave pattern navigator for me, a guy that worked for the church, in one of those family lineages that did wave pattern navigation. It's a carefully guarded talent that runs in families.

Harkewicz: Really?

McGowan: Yeah. And, his name was Zeppel de Brume. He was named after the graf zeppelin, back during, before World War I, I guess it was, that was German territory and the Germans had established hospitals and plantations. And the nurses in the hospital, whenever there was a baby born, they'd name them. And so they named this guy after this zeppelin. *[Laugh]*

Harkewicz: That's a good story.

McGowan: Yeah. Well, it must be true, how else would he get a name like that? *[Laugh]* And Zeppel was damn good. He really knew his wave pattern navigation. The price I had to pay was to take Father Hacker's boys band, Marshallese boy's band, up to this island 300 miles away to entertain the mission up there. And everyday, in the afternoon, they'd practice on deck as we were sailing up there. We only sailed at about five knots, top speed, so it took days to get up there. Yeah, and they'd play their, it was a kind of a German oompah band. *[Laugh]* And . . .

Harkewicz: You probably don't want to listen to that kind of music anymore?

McGowan: No. No. I thought it was fun. *[Laugh]* It was great fun. So.

Harkewicz: I was curious, though, at you know, the time period that you were there was the same time that we were doing atomic testing—

McGowan: Yeah

Harkewicz: And, I was wondering if that had any effect on your work?

McGowan: Yeah. Very much so. The Bikini people had been moved from Bikini to a small island, not far from Majuro. Kili. K-I-L-I. There was another group of them on Majuro itself. And they wanted me—and the Kili people needed a source of income, and of course anthropologists were telling them, "This island's no good. We can't farm, blah, blah, blah." But the government insisted on establishing the Bikini people on Kili, so I was sent there to see to it if we couldn't introduce *Trochus* like the Japanese had done on other islands. And, a local agriculturalist guy, whom was a friend of mine, was sent there to see to it that they could plant cacao, and

coconuts, and papaya for self-sustaining, and taro, and all that stuff. But, Kili, it turns out, was a rock. It wasn't even an atoll. It was just a miserable, barren, coral rock. Nothing would grow on it, and there was no reef on it for *Trochus*. It was impossible. But, the government built them plywood shacks, and subsidized them. The vessel run by the Trust Territory, the field trip vessel, would take food over there. So, they sat around and drank beer and ate canned salmon and rice. It was just a disaster, an absolute disaster. Those little plywood houses were hot and uncomfortable and full of bugs. Not like the nice well-designed grass palm leaf homes. The other group of Kili people that were on the island of Majuro, were doing much better but they were foreigners, and the local Marshallese objected to them. They didn't get along well. But the women were expert weavers and—could I get that? ## I bought a series of hats from them, and this is one of them.[22]

Harkewicz: Wow.

McGowan: It's beautiful.

Harkewicz: That looks in pretty good shape for . . .

McGowan: It's, well, it's finally started to fall apart after forty years.

Harkewicz: Ah.

McGowan: But, originally it had a pattern woven into it of sort of a crisscross like that, and it was dyed with potassium permanganate, which they got from the hospital, a disinfectant. And this, too. That was dyed. But, you can see now that it's coming apart here.

Harkewicz: You have to go back.

McGowan: I'd love to.

Harkewicz: I don't know if they still do that kind of work.

McGowan: No. They don't. These weavers were dear little old ladies that sat under a big tree all day and talked. Another thing they did was to cover gin and scotch bottles with a pattern woven like that, really a tight weave, a nice design. Beautiful work.

Harkewicz: I'm glad to hear about your experience because that's something that I'm interested in personally, the Pacific Islands.

[22] McGowan showed me a well-worn, but still sturdy, woven hat.

McGowan: I don't know what the hell happened to those poor folks. Yeah. I don't know what has happened lately either with the—I'm concerned about the rise in sea level.[23] Some of those beautiful little atolls—they had really functional societies there. They were very good. And they policed themselves. The places were—the little villages were clean, and sanitary, but of course life was dull. The young people all wanted to get the hell out, which most of them did. With a minimum amount of natural resources, they really made excellent little societies. They knew how to fish. They knew how to grow taro, and bread-fruit, and other stuff.

Harkewicz: At the time that you were there, did they have their own local governments?

McGowan: No.

Harkewicz: It was just the US?

McGowan: It was all—that's right. The UN Trusteeship and the UN used to send around teams to check up on things once in a while, but that was just a pro forma thing, you know. But there were American administrators and it was divided up into, I think, four or five groupings. There was a Palau District, Truk District, Marshall Island District, and up north, north of Guam, the Marianas, Saipan, Tinian. They were quite different, very different. They had been much more exposed to modern society, much more, both by the Japanese and by the Americans. I guess Yap was a separate district because the Yapese were so damn different than anybody else.

Harkewicz: It sounds like a very interesting experience.

McGowan: Oh, my heaven's, yeah. It was fun. *[Laugh]*

Harkewicz: So, then you came back to Scripps?

McGowan: And then I came back to Scripps.

Harkewicz: And did your dissertation?

McGowan: And, I never put a scuba tank out again.

Harkewicz: Really?

---

[23] Global warming has been linked to a measurable rise in sea level, which may threaten low-lying island nations such as the Marshall Islands and Tuvalu. See: http://www.actionbioscience.org/environment/chanton.html for more information.

McGowan: Not once. The water here was so cold, and so dirty, and so rough I thought, "The hell with that." ##

Harkewicz: ## So, you were saying that scuba isn't a very good research tool?

McGowan: No. There's a lot of prep time getting ready, pumping the tanks, getting all of your equipment squared away and tested. And, then finding a spot to dive, and a diving partner, and that sort of thing, and then you get to spend a half an hour underwater. You can't go very far, anyway, you can't cover much ground. If you choose to go a lot shallower, then maybe forty minutes at the most and it's all over with. And then you come up and get rid of all this junk and there's a lot of cleaning to do and washing it all off with fresh water, and blah, blah, blah. So it's, you know, half a day or two-thirds of a day for half-an-hour's work. And to hell with that. And furthermore, out in the open ocean, which I was interested in, you don't see much. It's hard to count anything, it's hard to capture anything. There's just not much there to see. What we need are big sampling tools like these nets we pull through the water. And that does it.

Harkewicz: You invented, so to speak, I guess developed, a bongo net. Is that right?

McGowan: That's right. Yeah. That was fun. We got concerned about the quality of our measurements of plankton. How much error was involved. And one of the reasons is that Bill Fager[24] appeared on the campus and he had an enormous influence on all of us biologists, and me in particular, I think. He was a biologist and an ecologist but he knew a lot of "applied statistics." One of his concerns was our sampling methods, and the design of sampling programs, too. Those are two different things. And so I and others—it wasn't just me—were starting then to look into how well our big nets sampled plankton, you know. The question was, "To what degree does the sample represent the universe being sampled?" Samples are supposed to stand for so many square kilometers of ocean. Well, does it?

We were beginning to find out how patchy things were distributed in the ocean. So, you've got to ask how good your sample is. One of the things we discovered was the big bridle that was preceding the mouth of the net tended to alert organisms that the net was coming, and they'd jump out of the way. Avoidance, it was called. And no one had a very good notion of how big and how important an issue that was. So, it occurred to me with, in conversations with other people—I must admit, one of them was John Isaacs[25]—that the way to get away, the way to test this, is to build a net that didn't have anything preceding the mouth of the net. And the way to do that was to get two nets on an axle, and have the wire that supported the net go through the axle instead of preceding either net. That way there

[24] Edward William Fager (1917 – 1976), SIO marine ecologist.
[25] John Dove Issacs (1913 – 1980), Scripps biological oceanographer.

were no bridles, nothing in front of the net. But you wound up with two nets, towed in pairs.

Dan Brown[26] and I worked on that and he—we decided we'd make open-closing nets out of them. In other words, we'd put a canvas hood over the mouth of the net and send it down, and then, at certain depths, open it and tow it, and then close the net. And it was Dan that decided to call them bongo nets because they looked like bongo drums, which were fashionable then.[27] So, it turned out that the nets worked very, very well, especially catching larval fish, which are good at avoiding nets. Larval squid, too. The catch rate for most things was higher with the paired net, the bongo net, as compared to the old meter net, which we had used. We spent years, literally years, doing these studies to test the validity of the bongo net versus the other net. And, then we worked on other avoidance problems, like just the sheer size of the net. Big nets do better than small nets, the proper diameter of nets, and the length of the net tows, and there was a lot of sampling questions that we worked on. By "we," I mean my students and I worked on it for four or five years.

[26] Daniel M. Brown, associate development engineer at SIO.
[27] See diagram and photo next page.

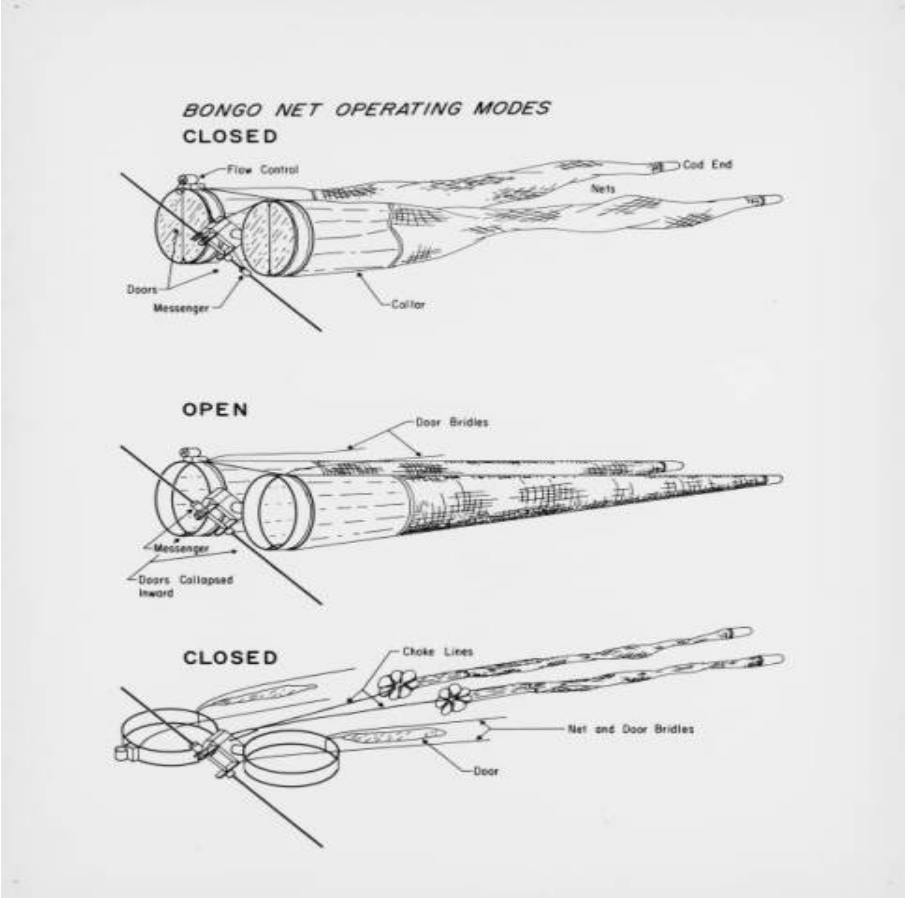

Diagram of bongo nets. Scripps Institution of Oceanography Archives, UC San Diego.

Photo of bongo net frames. Scripps Institution of Oceanography Archives, UC San Diego.

Harkewicz: Did you ever try to patent anything like that net?

McGowan: We thought about it but it turned out that part of Dan Brown's salary was paid for by the Office of Naval Research, the government. So, the government got the patents.

Harkewicz: I see.

McGowan: You know, ten percent of his salary, or something like that. And none of the work on the net had anything to do with the Navy, but, so, yeah. And the net is still in use in many places. National Fisheries Service uses it, not only here, but other places it's used a lot.

Harkewicz: You mentioned Bill Fager, and I have read that prior to his appointment to Scripps in 1957, instruction took a backseat to research. And, can you describe if you thought, if you think that's—

McGowan: I didn't think so.

Harkewicz: You didn't think so?

McGowan: No.

Harkewicz: Okay. You would disagree with that, then?

McGowan: Oh yeah.

Harkewicz: Did you feel like it—

McGowan: I was always involved in instruction. So. He was very much in favor of teaching and he spent a lot of time preparing lectures and giving lectures. He thought for some reason that's what professors were supposed to do. I agreed. *[Laugh]* And there are people here still today that don't think so. They just want to do their thing. That's always been a problem at Scripps, as long as I've been here. Appointments were made to important people in order to get them to come here, and one of the sort of unwritten but nevertheless understood parts of the contract is that you won't have to teach very much. And some people interpreted that as they won't have to teach at all. Or, they all wanted graduate students, because they do all the donkey work.

But you know, Fager was an enormous influence on biology at Scripps, and not all the biologists approved of him or agreed with him, by any means. Well, for one thing, he kept emphasizing the quality of measurements, and they had pretty much ignored that. He also emphasized the notion that there are lots of different things living together at the same

time, in the same place, and they sure as hell influence one another strongly. In other words, community ecology. And just by plucking a single barnacle off a rock and doing electrophoresis on it didn't necessarily tell you much about barnacle biology, or the ocean either. They didn't like to hear that sort of thing. They were all involved with their narrowly focused and specific problem, on the neurobiology of a sea slug or some damn thing, and they didn't want to hear this other stuff. His concern was with community dynamics, and he was a very good mathematician, not just statistician. He'd gotten degrees in biochemistry at Yale, and he'd worked on a program similar to the Manhattan Project at the University of Chicago. It was a parallel project, actually, on photosynthesis. He was doing biochemistry photosynthesis. And it was at Chicago, I believe, that he got interested in ecology, because there two very famous ecologists there at the time. And then he went on to study ecology under Elton,[28] at Oxford, and got a doctor of philosophy with Elton, and then came to Scripps. He'd just given up on chemistry. He was very embittered by some political conflicts with another research group.

Harkewicz: Here or elsewhere?

McGowan: Well, it was elsewhere. While he was at Chicago. So he quit that field. Just totally dropped it, and went into ecology which is what he wanted to do in the first place, I guess. He was always interested in natural history. But he was a great teacher and a great inspiration for everyone, and a very honest, straightforward, no bullshit kind of guy. You know, he emphasized total honesty and candor. Maybe too much sometimes. But, yeah. But he changed everyone's, all of us young students', outlook for sure.

Harkewicz: But, back to the instruction versus research question. It seemed sort of like you said one thing and then . . .

McGowan: Well, there were a number of people at Scripps that just didn't care much about instruction, teaching. And, that even showed up on ad hoc committees where they would look at someone's record to see whether or not they'd get their ordinary promotion and advancement. I served on many of those, and often enough the teaching contributions were sort of, not ignored, but not given much weight. But there was a strong group—and by "strong" I mean quite a few people that cared very much about

---

[28] Charles Sutherland Elton (1900 – 1991) was among the most important and influential ecologists of the twentieth century.. His book, *Animal Ecology*, published in 1927, soon became a classic with later editions remaining in print to this day. Elton founded the *Journal of Animal Ecology*, which he edited for nearly twenty years. He is best remembered for his studies on animal community patterns—including the idea of the "Eltonian niche," which he defined as the ecologic role that an organism plays in the community—and for his contributions to economic biology and conservation studies.

teaching. He was one of them, and I think I was one of them. And there were many others. Joe Reid,[29] and before him, Bob Arthur.[30] And certainly, there were several chemists. And no, I don't think it's fair to say Scripps was dominated by this argument or that there were two warring camps. That's not quite the case. It's certainly not my impression at the time. I just sort of wrote off these people as drones, the ones who wouldn't teach.

Harkewicz: Okay. So, your personal experience was that it didn't, you didn't have an issue with it?

McGowan: Well, I didn't like it. I didn't think much of it, but I was too busy to worry about that sort of stuff. Am I still plugged in? ##

Harkewicz: ##Okay. It looks like we had a little bit of a problem here with becoming disconnected, so I'll have to see what we got on tape and what we didn't get on tape.

McGowan: Okay. You want to come back and do that and then come back, or do you want to do it now?

Harkewicz: Well, let's just continue and if we need to make up for something we will see what we can do.[31]

McGowan: All right.

Harkewicz: Let's see where I want to go with this. Now we were—I feel like we were on a certain track here and I don't want to get us . . .

McGowan: Yeah. Well, I can get distracted very easily by wandering off in some strange direction.

Harkewicz: Well, let's talk a little bit about—we talked a lot about the whole sort of ecology emphasis, and I know that Sverdrup had this idea about dynamical oceanography. Do you think those are two different things or do you think they're the same thing?

McGowan: Not at all. Not at all. Sverdrup was not a trained biologist but he intuited a lot of the principles of ecology. And he said it more than once, he thought that organisms, populations of organisms especially, were strongly influenced by their environment. And, that environment in the ocean was described by a physical oceanography. Well, that's pure ecology, of course

[29] Joseph Lee Reid, Jr. (1923 -), professor of oceanography, Integrative Oceanography Division, SIO.
[30] Robert Siple Arthur (1916 – 1995), physical oceanographer, SIO.
[31] Although it had appeared that McGowan's microphone became disconnected, there was no gap in audio recording noted.

it is. And, had Fager and Sverdrup ever discussed it among them, between them they would have agreed. I never met Sverdrup but I read a lot of what he said, and yeah, sure. It fit right in with the notion, with Sverdrup's notion of this union of physics, and biology, and chemistry, that they're all, in the ocean at least, they all should be one big interdisciplinary study. I don't think he ever used that word, but he sure talked about it, and it was quite clear what he was saying.

Harkewicz: Do you feel like the people that were working at Scripps had that concept? I mean—how do I say this?

McGowan: I think I know what you're saying. The answer's "no." Yes and no. There was always a group here that did, even when Sverdrup came, there were two or three people that—two or three biologists—that immediately joined his outlook. Martin Johnson was one of them and W.E. Allen[32] was another. The other biologists—Fox, ZoBell, Sumner[33], and that fish guy,[34] I've forgotten his name—sort of backed off. And to this day there's that schism.

Harkewicz: So, there are still people that haven't gotten on the bandwagon, so to speak?

McGowan: I shouldn't call it a bandwagon. I think they, the marine biologists, believe that they are the ones on the bandwagon and we are the ones that haven't gotten on it, because we're not doing the, you know, genomics of some obscure worm. So the whole marine biology group over there separated themselves in their own building and they have very, very little interaction with the rest of Scripps. I can tell that by going to important oceanography seminars and seeing who's there and who isn't.

Harkewicz: So, okay, that's—is that what you might describe as a difference between your Integrative Oceanography Division and the Marine Life Research Group?[35]

---

[32] Winfred Emory Allen (1873 – 1947), assistant professor of biology at Scripps.
[33] Francis Bertody Sumner (1874 – 1945), professor of biology, SIO.
[34] McGowan is most likely referring to Percy Spencer Barnhart (1881 – 1951) who had the position of associate in oceanography and just published his book, *Marine Fishes of Southern California* when Sverdrup became director in 1936. Barnhart also served as curator at the Scripps Museum and Aquarium from 1914 - 1946.
[35] McGowan later corrected my question by suggesting that I meant the Marine Biology Research Division (MBRD), which currently does work in the fields of cell and developmental biology, ecology and evolutionary biology, microbiology, and physiology. The Marine Life Research Program was the Scripps component of a multi-institution program that began in 1948 and focused on the declining populations of sardines. CalCOFI is a later incarnation of this program with much broader areas of interest. See footnote #5 for more information. Unfortunately, McGowan never really responded to the question about his opinions in relation to the difference between the Integrative Oceanography Division (IOD), which he works for, and the MBRD.

McGowan: Why, it certainly—well, the Marine Life Research Group is now defunct and doesn't exist anymore.

Harkewicz: Well, at, what it started out as?

McGowan: The Marine Life Research Group started out as an ecology group working with CalCOFI and things like that. But it was very much ecologically oriented, yes.

Harkewicz: Can you tell me some of the, your more recent research in the California Current, what kind of things you've been doing?

McGowan: Yeah. I've been very much concerned with climate change in the California Current. The evidence is quite clear that there are big changes going on in the biology, and those big changes are, I am convinced, due to a trend for warming in the current. And, I can get into more detail if you wish, but basically that's it.

Harkewicz: Well, I think it's related to an interview, a radio interview I read a transcript from, in April 2004.[36] You talked about decline in fish and sea birds?

McGowan: Yeah. Yeah.

Harkewicz: And at the time of the interview, which, like I said, was April 2004, you had said that the amount of plankton was down by seventy percent, and fish numbers were down by fifty percent, and sea birds were thirty to forty percent? Are these numbers still decreasing?

McGowan: Yes. Well, they haven't increased. The more recent surveys haven't all been put together. We're doing time series research and it's of the nature of time series that time has to elapse before you get a significant signal. The ocean moves rather slowly, and that's one of the problems that most people have with this idea. And certainly many of our biologist friends don't see it. Well, you know, they don't see it because it doesn't happen from day to day, or hour to hour, or month to month. It takes years for these changes to happen. So, you need what's called a whole series, serial sampling, over time to see whether or not things are going up, down, or staying the same. We get all of these signals from a diverse spectrum of plants and animals, and the physics to say that things are changing. Some of the changes are pretty radical. If you've just started studying the system, well, you don't see anything. Or, if you don't study it at all, and as I say look at the genomics of a barnacle you plucked off a rock yesterday, you don't see it and you're not interested. That's even worse.

---

[36] "The Disappearing Plankton." 24 April 2004. *The Science Show* with Robyn Williams. Radio National. Available: http://www.abc.net.au/rn/science/ss/stories/s1090772.htm. Accessed: 5/23/2005.

Harkewicz: So, you think it's tied directly to the warming of the ocean?

McGowan: Absolutely.

Harkewicz: What do you say to people who say that global warming is just a political type argument, that there isn't any?

McGowan: Well, I, in the first place I'd like to say, "You're a stupid ass." *[Laugh]* But the measurements made with instruments—real thermometers, by real people—show that the earth has warmed up, consistently. There is a trend for warming, ever since people started making those measurements. Now it is true that maybe, you know, maybe the old backyard in Oshkosh, Wisconsin is a little cooler today than it was yesterday. That's possible, but not enough. But, what we're doing is averaging the whole earth together, not just this spot or that spot. Not just Tuscaloosa, Alabama or Tierra del Fuego, but the whole earth together, and the whole earth has warmed up by quite a bit. Now, it took a while for the ocean to respond. The ocean does lag. If you had to warm up a fifty-five gallon drum of water it would take a while, because water has this high heat capacity, and it's taken billons of cubic miles of ocean water a while to warm up, but that has happened. We now know that it's happened, from three or four different sources. Well, it is absolutely inevitable, it's a physical law, that warmer water is less dense than colder water. So, the surface few meters, probably about the upper hundred meters, what's called a mixed layer, is now warmer, and it's less dense, so that there's a big density difference now between the mixed layer and the deep water. That means it's much more difficult to mix, to stir up the deep water. And, the deep water's where the nutrients are, the plant nutrients. So there's no question that the rate of supply of nutrients from deeper water has been to some greater or lesser degree inhibited. In the California Current we have the time series to show the consequences, a seventy percent decline in plankton. And, that has not recovered, in spite of some naysayers, and contrarians, and ambitious entrepreneurs. To the contrary, it is not true that it's recovered. We have the data to show that.

Harkewicz: What kind of—I know that you had said, even, in the interview you said, even while we were talking here, that these, you know, measurements take a long time to demonstrate what you're trying—

McGowan: Uhm-hmm.

Harkewicz: —but as the interviewer said in this radio interview, you can't really wait for things to show you everything, to take actions?

McGowan: Yeah.

Harkewicz: So, what kind of action could we take?

McGowan: Well, I'm pretty much convinced that it's inevitable that the earth is going to continue to warm, and that's because I think the warming is due to the "greenhouse effect," which is from carbon dioxide. Society simply cannot afford to take the really radical steps necessary to stop producing CO_2, or to cut it down enough so that it's going to make much difference. That's especially true in China and India. Their economies are growing at the rate of six, seven percent a year, or some such incredible number, and it's by using fossil fuel that they're doing it. And, it's not just China and India. It's Brazil and Indonesia, and mainly Third World countries that want to get rich, because, you know, everyone wants to get rich. And, they see how we've done it: we used fossil fuel to do it, Europe and the United States, that's how we did it, and that's what they want to do, and they're going to do it. We could stop using fossil fuel tomorrow in the United States and they'd still go on. So, it's not going to make much difference what you and I do here.

Furthermore, the amount of CO_2 in the atmosphere right now is enough to ensure that heating is going to continue. Because the heat—the earth is now out of heat balance. We're absorbing more heat than we're radiating back into outer space, just with the amount of CO_2 in the atmosphere right now. And the only way to change that is to get that CO_2 back out of the atmosphere and put it where it came from, back underneath the earth in oil. Well, how the hell do you do that? So I think the steps that ought to be taken is that an enormous effort should be put into trying to understand the consequences of global change, because it's going to happen. And we can't predict, especially the biological consequences. People are now measuring consequences, and you see papers all the time in *Science* & *Nature* and other places, about how warming has changed this or that population or the incidents of plant diseases, tropical plant diseases, and the fact that the thermocline—I mean the permafrost—is melting and changing the whole ecology of the Arctic. And many things like that. But that's still not a prediction of what consequences will be to fisheries and agriculture, to say nothing of stuff like disease. All kinds of strange things are going to happen. We biologists are not used to working on environmental ecological problems of this scale. It's the barnacle-on-the-rock syndrome, narrow-focused, reductionist nitwits. And, without a huge big program, or a lot of programs, I don't think it's going to happen. It's certainly not happening here at Scripps. We're the one place in the world that really knows how to sample the ocean on a time-space scale that's necessary and we're not doing it.

Harkewicz: Why do you think that is? Is it the barnacle people again?

McGowan: Yeah, the barnacle pluckers and the fact that the administration here is desperately searching for money, and the money isn't in stuff like that. That's not what Washington wants done.

Harkewicz: If Washington was to finally see the light, so to speak . . .

McGowan: You mean re-elect Al Gore? *[Laugh]*

Harkewicz: Or something, yeah. I mean, what would that be, a—. Would that be a—

McGowan: Well, it's going to take a massive change, and it's not just here at Scripps. I mean, it's all over. And, I think that's only going to happen if there's some real major disaster, another several hurricanes. Re-destroy New Orleans, and maybe Miami, too. The most effective thing would be if it'd destroy Washington, *[laugh]* but, and that's not going to happen, not for a while.

Harkewicz: But, do you think . . .

McGowan: But they don't, people just don't get it.

Harkewicz: Do you think people have made the connection between the hurricanes, like Katrina and that?

McGowan: I think, in some cases, the press has. I think this notion that intensity of hurricanes, not the number, has increased is sinking in. But Kansas doesn't get it, and that's because it needs to be repeated over, and over, and over, and over again. It needs to get pounded in. And school teachers need to say it. You know.

Harkewicz: How do you get people to do that?

McGowan: I don't know. I'm just a retired little professor. I don't . . .

Harkewicz: You're a scientific expert.

McGowan: Well, yeah. That's right. I—. Well, I'll tell anybody who'll listen, like you.

Harkewicz: That sounds pretty depressing.

McGowan: Well, yeah. I think it is.

Harkewicz: Sounds like it will take a major disaster to do something.

McGowan: We'll see.

Harkewicz: All right. Well, let's see if we can, if we can . . .

McGowan: There are a lot of young people here at Scripps today that really care about that, that really know about it. And, I keep getting surprised just by our graduate students, for example. There are ones in geochemistry, and in physical oceanography, and in biological oceanography. They're pretty much aware of all this, and they care.

Harkewicz: But, tell me a little bit about this. I mean, you keep going into this, this barnacle people idea.

McGowan: Well, I don't know why I picked that example.

Harkewicz: I know, but I mean is it . . .

McGowan: No one in particular.

Harkewicz: Are you talking about—. Okay. First of all, two things. Do you think it's a problem between biologists?

McGowan: Yes.

Harkewicz: So, you don't see a problem between biologists and physical oceanographers as much as between biologists?

McGowan: That's right.

Harkewicz: Okay.

McGowan: Absolutely. You got it.

Harkewicz: So, is it just a disciplinary thing?

McGowan: Yes.

Harkewicz: And then . . .

McGowan: It's a philosophical thing, deep-seated.

Harkewicz: Okay.

McGowan: Yeah. Just basic fundamental difference about what should be done. I'm not saying that they do bad science, that kind of stuff. It's clearly not so. But every university on earth is doing that sort of thing. That's one of the problems. Why the hell should we do it? We're rather small, really, and not very well funded. I don't get it. I think we ought to be doing what

we're supremely well qualified to do, better than any other place on earth, is use those ships, and use our physical oceanographers, and our library, and our history of trying to understand how the ocean is structured and how that structure is changing. That's what I think Scripps ought to be doing in biology, and we're not doing it. All the new programs here have nothing whatsoever to do with that. They don't even know the questions.

Harkewicz: So, wouldn't that be a more administrative problem, then?

McGowan: I think so, yeah. But the administration, I do believe, responds to initiatives from the faculty, and it's the faculty in marine biology that's pushing this stuff because they think it's hot stuff. And it is hot stuff, but it's not hot stuff for us, but it's where the money is.

Harkewicz: The money is . . .

McGowan: Well, there's a whole new program of genomics here. They're going to build a building, for God's sakes. And, I've listened and read about what they plan to do, and it has nothing to do with this ocean change idea. Nothing.

Harkewicz: Okay. You think Scripps is getting into things other than oceanography?

McGowan: You bet. I certainly do.

Harkewicz: All right.

McGowan: The biologists at Scripps certainly are.

Harkewicz: So . . .

McGowan: But, they think I have a too restrictive of a viewpoint of what oceanography means. See, they will work on animals that come out of the ocean. They will do that that just happen to have lived in sea water at one time.

Harkewicz: So, where do you think the future of oceanography is?

McGowan: Global change.

Harkewicz: But do you think that will happen?

McGowan: It will happen. Once things get bad enough, yes. Uhm-hmm.

Harkewicz: Okay.

McGowan: But, I think they have to get a lot worse before, before the bell rings.

Harkewicz: Well, let's take a step back again.

McGowan: Okay.

Harkewicz: Because this, I don't know, I don't think it's totally unrelated. But they say, they used to say the sixties was the “golden age” of oceanography.

McGowan: Yeah. Yeah. I would say that.

Harkewicz: At the same time, though, we're talking a lot about these ecological-type—which started in the sixties—but this stuff like global change almost seems like it could be the big future of oceanography. So, do you think the sixties was the golden age? Will there be another golden age?

McGowan: It was the golden age in the sense that, in that it was a very fashionable all of a sudden. It had become a very fashionable science thing. And Roger Revelle had a lot to do with that. He was a very impressive guy, and very smart. And he sold oceanography, and the—. It was a golden age because you could get money to do research, the kind of research we thought ought to be done. And there wasn't much competition for that money. There's still a lot of money going into oceanographers, oceanography, but it's spread very thin because other institutions saw that there was money, and well, let's establish a department of oceanography and we'll use Scripps graduates to do it. So, most of our competition now is coming from our own students.

Harkewicz: So, it's almost like oceanography got too big for its own good?

McGowan: Yeah. Yeah. And there is competition for a limited resource and the money is, after all, limited. And lately, in the past few years, five or six years, it's been level funded. And a lot of it goes for nonscientific research, but it's called "oceanography." But it's looking at sewer outfalls and stuff like that, which is important stuff to do, and it's a contribution to society, but it ain't hardly basic science.

Harkewicz: Okay. So, that brings up the other, the big thing that a lot of historians of science have written about, is the idea of applied science versus basic research.

McGowan: I think science should be applied by somebody, but not at the expense of basic research. That's where the knowledge comes from. I think the whole argument's ridiculous. It's so damned obvious.

Harkewicz: Well, Elizabeth Venrick[37] told me about some people who had done some, done a study about, in Mexico, related to a salt company and how it was going to impact whales.

McGowan: I know about that.

Harkewicz: And she said that the people that did the study, because they—what they found was in favor of having this salt production—that they, their research was looked down upon.

McGowan: Well, it was criticized by environmentalists as if being bought and paid for by the salt company.

Harkewicz: But, if scientists aren't going to do it, who can do that kind of research?

McGowan: Well, yeah. I asked their major critic, you know, "If the salt company hadn't subsidized the research who would?" He didn't have an answer. Yeah. And, the two guys that did the research—I know them both, Clint Winant and Paul Dayton[38]—absolutely unimpeachable records. I mean, they weren't bought and paid for, their results. They just came up with what they felt was the appropriate conclusion based on the science they did. But I'm talking more about whether, I guess whether Dayton and Winant should continue to do that kind of research as opposed to doing some basic research—Winant in particular—on shoreline circulation processes. He's very good at that. But they, we all feel some debt to society. That's where our salary comes from. And so many of us have done applied research because of that and because it pays well. The money is important, of course. None of us get big salaries, and we all have kids in college and that sort of stuff. Baby needs a new pair of shoes sort of thing. So it's done. But some institutions, some individuals in some institutions, do that almost exclusively and I disapprove of that. Somebody's got to do the basic research so that we understand processes and events that are occurring in the ocean.

Harkewicz: So you think Scripps should stay away from that? Is that what you're suggesting?

McGowan: I am suggesting that. You bet.

Harkewicz: So, there should be some institutions that do applied research, and some that do . . .

---

[37] Elizabeth Louise Venrick (1941 -), research oceanographer, co-director of Integrative Oceanography Division at SIO. See *Oral History of Elizabeth Louise Venrick*, 15 December 2005. Available on eScholarship Repository website: http://repositories.cdlib.org/sio/arch/oh/ .

[38] Paul Dayton (1941 -), professor of oceanography. Clinton Winant (1944 -), professor of oceanography.

McGowan: Well, I wouldn't, I guess, I wouldn't put a complete threshold on it. There are times when it's appropriate for us here at Scripps to do applied research, crises of some various kind.

Harkewicz: Would you consider CalCOFI, at least as it started, as applied research?

McGowan: Yeah. I think it was, except from the very, very beginning, trying to understand the when and where the sardines spawned, and how that was influenced by, first of all, natural variability versus over-harvesting—was, in part, basic science. And very quickly it involved all of the plankton, not just the larval fish, and the chemistry of seawater, and the productivity of the ocean. Those are all basic problems. The idea that fish populations are—commercial fish populations—are affected both by harvesting and by natural variability is a very important problem still today. We'd like to know the degree to which sardine and anchovy, hake, and other important fish varied because of simply natural processes. And I think, for instance, El Niño, a natural process, has strongly affected larval fish survivorship. I'm equally convinced that this global change is affecting larval fish survivorship over and above any effect of harvesting. But how much is due to which is crucial. And, there are many fishery biologists and others that just sort of ignore environmental variability like El Niños and global change. They never mention it. What they're concerned with is tracking what happens to the populations no matter what the cost. That's okay, I guess. But, when you come to recommend regulations and restrictions on fishermen you've got to know more than just the fact that the populations are changing.

Harkewicz: So that comes back to your, that problem in biology itself then, again? Doesn't it, in a sense?

McGowan: Yeah. Yeah. It's part of it. Sure.

Harkewicz: There's these fisheries people, at least the way you see it, are stressing too much on that one fishery population?

McGowan: I think they've been very narrow minded, yeah, and quite unsuccessful because most of the world's fisheries are declining. So, their recommended fixes are not working. Now politics has a lot to do with that too. So you can't totally blame the fisheries biologists.

Harkewicz: There was a article which you actually were quoted in the *San Diego Union-Tribune*[39] recently, about CalCOFI's work. And in it, the writer said that CalCOFI's work "helped transform oceanography in the 20th century"

[39] Bruce Lieberman. "Scientists check pulse of the ocean," *San Diego Union-Tribune.* 1 July 2005. Available: http://www.signonsandiego.com/news/science/20050701-9999-1n1ocean.html . Accessed: 12/13/2005.

by studying organisms in their dynamic physical and chemical environment rather than individual organisms. Do you think that that, do you really, do you think that CalCOFI . . .

McGowan: Transformed oceanography? *[Laugh]* That's a bit of an exaggeration, but it certainly was one of the first and best ecologically oriented research programs in biology of the ocean. Yeah. Yeah. That's not entirely true, because there were always people in Europe and Britain, and on the East Coast, that were doing that sort of thing, but not in a systematical way, not in as scientific a way. The transformative contributions of CalCOFI are in the space-time series, not just the time series in one spot, but spatial, a whole bunch of places where samples were repeated over, and over, and over, and over again. And, that space-time series philosophy has transformed lots of oceanography. Yeah. Yeah.

Harkewicz: So, it's . . .

McGowan: The places that can do it, and that understand it, are doing it now and they didn't before. And it's the result of CalCOFI that they cite us.

Harkewicz: And that's affected the physical oceanography as well as . . .

McGowan: I think it's beginning to, yeah. Yeah. Yeah.

Harkewicz: Maybe you've already answered this, but what do you think this has been the most important change in research during your time at SIO? I guess, strictly, you can look at it both ways. You can look at it just as Scripps itself and then in oceanography in general.

McGowan: Well, I can't speak very well for the geophysicists, and physical oceanographers, and geochemists here. Certainly the big geochemical revolution was in plate tectonics, and that really changed geophysics. And a lot of that work was done here, a lot of the preliminary work, a lot of the at-sea work, the fundamental basic measurements. Those guys had designed their measurement program because they suspected something like that. You know, they didn't just go out and randomly start measuring the bottom of the ocean, the interior of the earth. They had a plan. So that certainly was a big change during my time at Scripps. In physical oceanography, certainly the understanding of the gross circulation evolved during that period of time. It had been described earlier, and it was acknowledged earlier, but the understanding of the atmosphere-ocean interaction with regard to the movement of water, currents, and the sinking of water, and the upwelling of water evolved strongly during that period of time. In geochemistry, much of the, our knowledge of what is called residence time of elements in the ocean, before they get sedimented out, they come out of the atmosphere, many of them, into the water and then

are mixed and stirred, and this chemical reaction goes on, and eventually they're transferred to the sediment. And the principles established there have everything to do with our understanding of oceans, and how much—
##

Harkewicz: ## You were talking about the mixing of ocean . . .

McGowan: Yeah. The geochemical understanding of residence time with elements in the ocean. They enter through the atmosphere from fallout of various kinds so it had to do with understanding how radioactive fallout was going to get scrubbed out of the atmosphere and into the ocean, and locked away in the sediments. And other elements as well, pollutants of various kinds, and of course, carbon dioxide. So the whole notion, the models, our understanding of the carbon cycle had a lot to do with—our understanding of it was derived mainly from our knowledge of mixing and stirring, and residence time. So it's very much a combination of physics, chemistry, and biology, just like Sverdrup said thirty years earlier. Those are big transformative things. I think one of the most fundamental findings about the biology of the ocean is, first of all, is that it's the large-scale ecological events that are the most important, rather than the small-scale. Populations vary on all time-space scales, from minutes to centuries to millennia, and if you plot up the variants, the variability of populations versus time, you see that it's got wiggles at lots of different frequencies. But the biggest wiggles are at the longest frequencies, like glacial. So it's this time-space relationship in biology that's important, and those time-space relationships, at least at the most important scales, the big ones, the red spectrum part of it, match very well with physics. Physics runs the biology of the ocean: that kind of biology, the evolutionary time scale, the population dynamic time scale, not the individual physiology of nutrient uptake or enzyme substrate reaction rates that go on in the liver of a cod fish, or that sort of thing. But, it's how populations change in time and space. And as I said earlier, that's the stuff of evolution.

Harkewicz: Do you think that models could be made that could be sufficient enough to make projections so that you could make propositions that you wouldn't have to wait a hundred years in order to . . .

McGowan: Yeah. I hope so. I think to some extent they think they're doing that now. But you know, the models need validating. They still do. I'm not confident enough in them, especially these complicated ecological models that have lots of parts. And when there's lots of parts interacting there's always a chance, a good chance, for the interactions, for the trajectory to go off in a goofy direction.

Harkewicz: Unexpected?

McGowan: Totally unexpected, yeah. And some of the players in the models, some of the individual entities in the model, start out as being rather unimportant, and all of a sudden things will change so that they're major players now, and that's totally unanticipated. That happens a lot. And so it's still a, it's still a work in progress. Ecological modeling, predictive ecological modeling of systems, complex systems. The very notion of complexity itself is a hot topic, you know. And there's a lot of theoretical mathematics that say, "Give it up." If the system is that complicated, you're not ever going to predict.

Harkewicz: Yeah. Do you think that part of those, that uncertainty may be one of the reasons that some people don't like the ecological approach and they prefer the individual?

McGowan: Yeah. They think it's sloppy. Yeah. Well, it is, but so is nature.

Harkewicz: Then you don't see the models ever totally replacing going out into the ocean and doing sampling and things like that?

McGowan: Yeah. Certainly not for a long time, no. No.

Harkewicz: Well, I . . .

McGowan: We keep discovering new things. And, as we do these time series, you know, and it it's amazing what new and unanticipated results you get. Who would have thought, what modeler would have predicted that a eight-tenths of a degree change in the mixed layer of the California Current would result in a seventy percent decline in zooplankton. It's unthinkable. That's what happened. And it happened for reasons that they hadn't anticipated, this density change.

Harkewicz: And the only way of determining that was what you did: sampling in time in space?

McGowan: Well, I think so.

Harkewicz: Are you still going out on cruises?

McGowan: I haven't lately, no. I would like to, but I'm—. You know, I've got a whole file cabinet, computer file cabinet full of data that I should be writing up. And I'm very slow about it.

Harkewicz: Have any interesting cruise stories you'd like to share with us before we end our conversation?

McGowan: Oh, a lot of them. I've been on many cruises, and they're routine, most of them, but once in a while exciting stuff happens, interesting stuff, and funny stuff. I don't, you know, some of them won't bear repeating. *[Laugh]* Or, I don't want them repeated.

Harkewicz: Did you notice any changes, you know, in your research, or in oceanography in general, when, you know, women became more involved or other social movements affected it?

McGowan: That's certainly something I should have mentioned earlier. Yeah. It happened on my watch here at Scripps. When I was a student here, there were one or two female graduate students. June Patullo[40] and, I don't know, maybe one other. And that has changed enormously. So that now over fifty percent of our grad students are female. And they go to sea all the time, and they're scientific leaders of expeditions, and they get the money, and they publish papers, and they do all the stuff that's necessary, except some heavy weightlifting, which is required occasionally. Yeah, I think that some of our very best research is, has been, and is being done by females. Some of the worst too. *[Laugh]* It cuts both ways. I think in 1954, on a Transpac Expedition, Pooh Venrick[41] was one of the first females to go to sea, to really go to sea, as a scientist. A couple of wives of senior professors had gone out earlier and wrote little books about it,[42] but they had nothing to do with science. They weren't working as scientists. And now, it's common practice. And Pooh did a good job. I mean, she did a great job, worked hard, consistently, and regularly, and that was a rough trip. We started off in Adak, or was it Dutch Harbor? I guess it was Dutch Harbor. Yeah, it was Dutch Harbor. And, what did I say, '54? No. It was '64. Fifty-four was a different Alaska trip.[43] The weather was very rough the first week and she did it anyway. There were other females on board. She wasn't the only one. Two others, and she was doing her own thesis research and they also worked hard as scientific assistants, technicians.

---

[40] June Grace Patullo (1921 – 1972), Ph.D. 1957, assistant researcher in oceanography at SIO. Linda Lee Haithcock Pequegnat, M.S. 1957, and Marjorie Elise Worthington Enns, M.S. 1957, were the only other female graduate students enrolled at SIO at the same time as John McGowan.

[41] Elizabeth "Pooh" Venrick. See note 37.

[42] For example, see *Exploring the Deep Pacific* (http://repositories.cdlib.org/sio/arch/raitt-1956/) by Helen Hill Raitt (1906 – 1976), who was the wife of physical oceanographer Russell Watson Raitt (1907 – 1995). Although Raitt's book was not scientific, it was based on work she did as the keeper of the ship's log aboard the R/V *Spencer F. Baird* during the 1953 Capricorn Expedition. Raitt was the first woman to work aboard an extended scientific expedition. Raitt also founded Tofua Press, whose primary focus was on publishing works for, about, and by the people of Tonga.

[43] The Transpac Expedition was aboard the R/V *Spencer F. Baird* from July 23, 1953 to November 30, 1953. Elizabeth Venrick was not on this cruise. Venrick's first scientific cruise was the Ursa Major Expedition, which was a voyage aboard the SIO ship, R/V *Alexander Agassiz.* The Ursa Major Leg #1 was from San Diego, California to Kodiak, Alaska and took place from August 4 to August 20, 1964. Leg #2 of Ursa Major was from Kodiak, Alaska to Honolulu, Hawaii and took place from August 26 to August 31, 1964.

Harkewicz: Do you think having women has—obviously it's impacted oceanography, but didn't it, you know, can you see some big change, shift in just the emphasis or anything between, before?

McGowan: No.

Harkewicz: No?

McGowan: Oceanography has evolved. There's, there are changes, of course, but I can't see that—I don't make a connection between more females and these changes.

Harkewicz: It's kind of an awkward question, but . . .

McGowan: No. No. No. It's a valid question.

Harkewicz: To just wrap us up here, what do you think has been most important to Scripps' success?

McGowan: It involves what we were talking about earlier, the fact that we've emphasized, over the years, basic understanding of the ocean, and that there's been an attempt, a serious attempt, not always successful, to introduce a high degree of quality control on the research, and on the people we hire to do the research. That has not always been successful. But I guess it's been less successful other places because we do pretty well. And it's this, and this strong emphasis on the basic science of trying to understand the ocean and to do a very, very good job of it. The other thing that's very important is our nonacademic staff of technicians, lab assistants, seamen janitors, people that are totally and utterly dedicated to the institution, and what it's doing, because they think highly of it. Many of them, or most of them, I'm sure could get better jobs outside, and but they're devoted to the place, and they, most of them will, are giving their best. And that has made a—I'm really impressed over the years how many people, such people there are, and many of them have been here for as long as I have, or more. There's not a big turnover here.

Harkewicz: Where do you think that loyalty comes from?

McGowan: Propaganda, I guess. *[Laugh]* I don't know. I don't know. But, loyalty is the word for it. Yeah. And, competence.

Harkewicz: You don't think that Scripps is a particularly better place for people to work then?

McGowan: Oh, it's, yeah, sure. It is a good place to work. There's not a lot of onerous oversight, or timecard punching.

Harkewicz: It certainly has an ideal location?

McGowan: And it has a beautiful location, that's right.

Harkewicz: And so what—then the other side of the coin is: what do you think has threatened Scripps' success?

McGowan: Bad science.

Harkewicz: Can you explain that a little bit more?

McGowan: Uhm, well there are bad sciences and exaggerations, mediocre hackwork. And there are people that are—find it necessary to crank out a lot of not-so-interesting products, whatever they're doing. There are ad hoc committees, search committees, for new hires that just want to get the job done. "Well, let's just hire this guy," you know. "It doesn't make any difference. Maybe we can find somebody better but I'm, you know, I got to get back to the lab." And, there have been a lot of miss-hires, mediocrities, people who lack what I can only call a creative spark that do derivative science and stuff that's temporarily fashionable.

Harkewicz: Can a good scientist do bad science?

McGowan: Yeah. Some of them have. I think I have on occasion, and I think I'm a good scientist.

Harkewicz: Do you think that the idea of people just hiring someone to get the job done, do you think there needs to be a concerted or a overall plan for the institution, somehow or other?

McGowan: Yeah.

Harkewicz: I mean, has there been?

McGowan: You know, it's hard to detect. There was, I think, at one time, and it was by consensus, rather than mandate. But yeah, I think we ought to study the ocean.

Harkewicz: And is that, do you think that's being done now?

McGowan: In a lot of cases, no. As I say there are people that study organisms that just have happened to live in seawater, but they're used as models for some other thing they're interested in. And, oh, I keep picking on the marine biologists because they're the easy target, but there's others, too,

that are outside of biology. I don't know why the hell they're here. They could be doing their work in Kansas. *[Laugh]*

Harkewicz: How important is it . . .

McGowan: I think they should be.

Harkewicz: ` How important is the director to the direction of the institution?

McGowan: Well, I've served under a number of directors.

Harkewicz: So, how has it changed under?

McGowan: Well, that's changed a lot. Yeah. And, you know, Revelle was an awfully hard act to follow. He, for one thing, knew what the hell was going on at Scripps. He was, they say, a very poor administrator, but so what. I think that's a hokey criticism. He knew his science and he knew it very well, and he influenced science strongly at Scripps. He was critical in a very positive sense. He used to go to, dropped in on seminars all over the place. You'd never see directors doing that now, or if they do it's kind of a formalized thing. Subsequent to him, the directors all had their eyeballs on, fixed on oceanography, but they weren't as charismatic, I guess the word is, as that guy. And lately they've been physicists who are nice enough guys, and honest enough, and sincere enough, but they simply don't understand environmental science. They just don't have it in their bones. And especially, biology. They're just totally, utterly clueless. And, they can be easily hoodwinked by fads, and temporary, you know, enthusiasms in the field. Buzz words.

Harkewicz: In oceanography . . .

McGowan: Taken in.

Harkewicz: In oceanography, in general, or in biological oceanography?

McGowan: In biological oceanography, especially. I think the physical oceanographers have pretty much kept to studying the ocean, yeah. That's not true in geology and geophysics. I'm not sure about geochemistry. Yeah, the geochemists do pretty well. The physical oceanographers still have a strong group that go out and measure the ocean. But apart from CalCOFI, biologists have run no expeditions to measure anything. We used to. They don't do it anymore.

Harkewicz: Do you think that's due to the directorship?

McGowan: In part, yes. Uhm-hmm. Sure. Reverting to the pre-Sverdrup stage.

Harkewicz: Really?

McGowan: Read my paper about Sverdrup in *Oceanography* magazine.[44]

Harkewicz: Okay. I will.

McGowan: Is that it?

Harkewicz: I will stop for now. Thank you very much for your time.

McGowan: Okay. ##

[44] John A. McGowan, "Sverdrup's Biology." *Oceanography* 17.2 (June 2004): 106 – 112. Available at http://www.tos.org/oceanography/issues/issue_archive/17_2.html .

TAPE GUIDE