

Special Issue—Scripps Centennial

Scripps in the 1940s: The Sverdrup Era



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In the period 1936–1941, Scripps Institution of Oceanography was transforming from the earlier biological institute to a world-class oceanographic institution (Day, 1999). Harald Sverdrup (Figure 1) pulled the modern discipline of oceanography together with the book, *The Oceans, Their Physics, Chemistry, and General Biology*. Along with his coauthors, biologist Martin Johnson and chemist Richard Fleming, Sverdrup set an interdisciplinary pattern that would become the hallmark of the new field of oceanography. Although William E. Ritter, Scripps director from 1903 to 1923, believed in the inter-relatedness of all science (Mills, 1991), it was Sverdrup who set the institution on its modern track, designed the curriculum, and brought in the first graduate classes. Sverdrup came to Scripps as director in 1936, began writing *The Oceans* in 1938, and returned to Norway in 1948. It is appropriate to designate the decade of the 1940s as the “Sverdrup Era.”

The transition from tide-pool biology to the wider focus of oceanography began with limited resources. Because Scripps had no ships equipped for deep-ocean work, Sverdrup began ocean exploration in more limited waters. Two expeditions were carried out on the *E.W. Scripps* to the Gulf of California in 1939 and 1940. The first included an interdisciplinary group of scientists such as Richard Fleming (physical oceanography and chemistry), Martin Johnson (biology), Loye Miller (ornithology), Eric Moberg (biochemistry), Roger Revelle (geology), and several botany students from UCLA. Sverdrup joined the expedition for a week in March 1939. The second cruise in 1940 was led by Francis Shepard and Roger Revelle and completed the bathymetric profiling and sediment sampling begun during the first cruise. Cores of ocean-bottom sediment were obtained using a specially designed coring device (Raitt and Moulten, 1967).

I first met Roger Revelle when he spoke to our geology group at San Diego State University in 1940 following his Gulf of California expeditions. He was a major factor in my decision to enroll at Scripps after the war.

The War Years: 1941–1945

The 7 December 1941 Japanese attack on Pearl Harbor was a naval disaster for the United States, but it succeeded in uniting a divided country. College

classmates of mine who were potential “draft dodgers” on 6 December became enlistees on 8 December. This was a war with the total involvement of the American people. In our family of three, my sister joined the Army Nurse Corps; my mother, the widow of a Marine Corps officer, headed the forklift section at the North Island Naval Air Station loading planes and ships; and I went into the Marine Corps. Amphibious landings on the Palau Islands of the Pacific made me an early “expert” on beaches and coastal studies.

The University of California Division of War Research (UCDWR) was created in April 1941. The formation of government laboratories, one on the Pacific coast under the University of California and a companion laboratory on the Atlantic coast under Columbia University, was recommended in a study by Vannevar Bush, chairman of the National Defense Research Committee early in 1941 (UCDWR, 1946). These laboratories were to conduct comprehensive investigations of the methods for detecting a submerged or partially submerged submarine as well as the development of detection equipment. The Atlantic coast laboratory was to develop the equipment and final design of prototype gear, while the Pacific coast laboratory would concern itself primarily with fundamental investigations. These laboratories were funded, retroactively, to April 1941 by the Office of Scientific Research and Development under Vannevar Bush, and were transferred to the Department of the Navy, Bureau of Ships, in March 1945. The Pacific coast laboratory, UCDWR, was led by Vern O. Knudsen as director, succeeded in 1942 by Gaylord P. Harnwell. UCDWR was housed on Point Loma in San Diego and initially shared the building occupied by the U.S. Navy Radio and Sound Laboratory.

UCDWR drew scientists from throughout the United States and became a nucleus for a cadre of scientists and ship personnel that later aided in the development of oceanography. Scientists included Carl Eckart, Ken Emery, Dick Fleming, Martin Johnson, Walter Munk, Russ Raitt, Hunter Rouse, R. Dana Russell, Fran Shepard, and Parker Trask (UCDWR, 1945a; UCDWR, 1945b). Acousticians came from various universities, but those with the most practical experience came from Hollywood sound studios.

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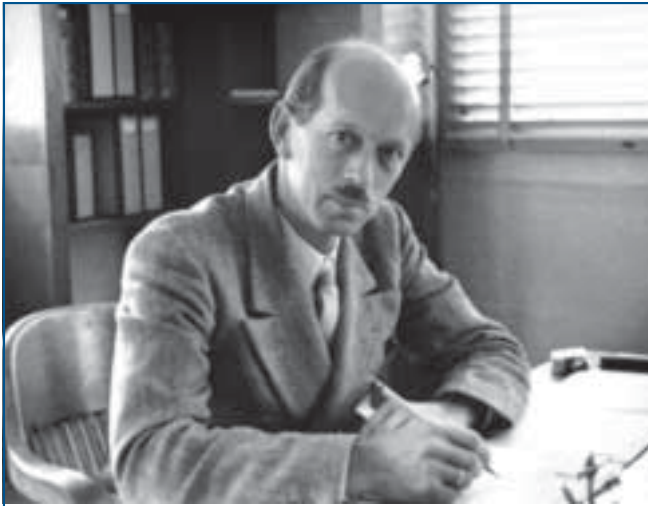


Figure 1. Director Harald Ulrik Sverdrup at the Scripps Institution of Oceanography (ca 1946).



Figure 2. Snapping shrimp, *Alpheus clamator*. Lockington, male, 35 mm long. Reprinted with permission of Stanford University Press.

UCDWR contributed to better underwater detection equipment and discovered the deep scattering layer. Initially, the deep scattering layer was known as the “ERC layer” after Eckart, Raitt, and R. J. Christianson, the scientists who discovered it. Additionally, it was UCDWR scientists who identified snapping shrimp as the major coastal noise source and cause of a serious problem for sonar. However, it was Johnson and other marine biologists who identified the rocky coast snapping shrimp, *Alpheus clamator* (formerly *Crangon dentipes*), as the species that made loud snapping sounds (Figure 2). However, the continuous noise of large numbers of shrimp and their geographic distribution was unknown. UCDWR scientists found that these shrimp occupy a shallow, rocky habitat throughout the temperate and tropical waters of all oceans. For these studies, the *E.W. Scripps* under sail provided an excellent, quiet platform for sonar measurements. Everest and Everest (1992) provided a delightful account of this research.

Sverdrup was initially a UCDWR scientist, but his security clearance was withdrawn in March 1942. The reason for this status change was not revealed to the public until several decades later: the unjustified concerns of three staff members (Munk and Day, 2002; Oreskes and Rainger, 2002). Despite the clearance withdrawal, Sverdrup was able to continue his work at Scripps. Had he continued at UCDWR, Sverdrup would likely have been involved in the acoustic research of submarine detection, where there were already an impressive group of physicists. On the Scripps campus, Sverdrup was able to address other equally important aspects of war time research: writing, perfecting his theory on wave forecasting, and teaching U.S. Navy and Air Force officers how to forecast waves for amphibious operations (Bates and Fuller, 1986; Levin, 1997; Sverdrup, 1942; Sverdrup et al., 1942; Sverdrup and Munk, 1947).

During the war years, six of the 11 faculty members from Scripps were on military leave, including Revelle, Johnson, Fleming, and Marston Sargent. For the war effort at Scripps, Sverdrup compiled charts of surface currents that were printed on cloth and became known as “waterproof handkerchiefs.” About 8 million were produced (Doll, 1988). The number of lives saved by these charts is not known, but their presence provided an important degree of hope for survival at sea. Sverdrup’s great work, *The Oceans: Their Physics, Chemistry, and General Biology*, was published in December 1942 and was restricted to U.S. distribution as it would otherwise “benefit” the enemy (Munk, 1992). Sverdrup’s companion book, *Oceanography for Meteorologists*, also came out in 1942 and was reprinted twice by February 1943.

Another major contribution was the surf and swell forecasting course taught by Sverdrup and Munk. The first class began in May 1943 when eight Army Air Force (AAF) weather officers arrived at Scripps (Bates and Fuller, 1986). After two three-month long AAF courses, the surf and swell forecasting classes were turned over to the Navy, which supported seven six-week courses. In all, about 200 weather officers were trained at Scripps. The AAF courses included Dale Leipper, Charles Bates, and Don Pritchard; the Navy courses included Bob Arthur, Wayne Burt, and Warren Thompson. Wave forecasting proved essential in North Africa, Operation Overlord in Normandy in June 1944, and numerous amphibious landings in the Pacific.

A Period of Transition: 1946–1950

World War II engendered a unifying, selfless spirit of endeavor unique to that time. The general attitude was that “we are all in this together, let’s get the job done and worry later about who gets the credit.” The Marshall Plan abroad and the G.I. Bill and the support of scientists by the Office of Naval Research (ONR) at home were results of this unique social dynamic.

Table 1.
Sverdrup curriculum for entering graduate class of 1946.

Fall Semester 1946		
110	Introduction to Physical Oceanography (3)	Mr. Sverdrup
111	Submarine Geology (3)	Mr. Shepard
112	Biology of the Sea (3)	Mr. Johnson
113	Chemistry of Sea Water (3)	Mr. Rakestraw
115	Applied Mathematics (2)	Mr. Munk
Spring Semester 1947		
210°	Physical Oceanography, General (3)	Mr. Sverdrup
211°	Waves (4)	Mr. Munk
212	Tides (3)	Mr. McEwen
118	Statistics (2)	Mr. McEwen
251	Seminar in Physical Oceanography (3)	Staff

Note. Data from University of California Register updated from Douglas L. Inman's class notes.
°Course numbers 210 and 211 and titles remain the same at Scripps today.

Table 2.
Oceanography at Scripps 1946–1947.

Teaching faculty

Harald Sverdrup	Dennis Fox
Walter Munk	Carl Hubbs
Martin Johnson	Marston Sargent
George McEwen	Roger Revelle
Francis Shepard	Norris Rakestraw
Claude ZoBell	

Preliminary requirements for a degree in oceanography:

- Completion of a baccalaureate major in one of the sciences upon which oceanography is based (viz, chemistry, geology, mathematics, meteorology, physics, or one of the biological sciences).
- Reading knowledge of German and French°

Note. Excerpts are from the University of California Register.

°In addition to language, there were other requirements for admission.

The first graduate class in oceanography entered Scripps Institution of Oceanography in the fall of 1946. The few degrees granted in oceanography prior to that time were in more specialized aspects of the field such as physical, biological, chemical, and geological oceanography (Knauss, 2003). However, Sverdrup believed that oceanography should unify these sub-disciplines. The “Sverdrup curriculum” required all entering graduate students to take basic courses in physical oceanography, chemistry of seawater, biology

of the sea, marine geology, and mathematics before proceeding to graduate studies (Table 1). In addition to completion of a baccalaureate in one of the sciences upon which oceanography is based, a graduate degree in oceanography also required a reading knowledge of French and German (Table 2). The German requirement delayed more doctorates in oceanography than any other requirement. Many of us wrote acceptable theses only to find we could not pass German. Sverdrup thought that this was not necessarily a bad situation. He recommended that we publish our initial research and continue our German studies, using subsequent research as a thesis. Sverdrup noted, “*This process produced a more mature Ph.D. with proven research ability, in the European tradition*” (Sverdrup, 1948).

I was an entering graduate student at the California Institute of Technology (Caltech) in Pasadena, California when I learned of the beginning class in oceanography at Scripps. I applied for admission to Scripps the next day. My fellow students and professors at Caltech thought I was crazy to give up a Caltech education and go to an unknown Scripps. However, it was the wisest career decision I ever made. This was a most unusual group of about 18 “gung-ho/can-do” graduate students beginning the first class in oceanography (Table 3). Many were graduates of the wartime surf and swell forecasting classes, and most had been officers with field commands overseas. Thirteen of them were supported by ONR research assistants.

These first classes and the new university curriculum guaranteed the continuous growth and transfer of knowledge in the new science of oceanography. Members of these first three classes went forth and established Sverdrup-type interdisciplinary curricula

Table 3.
Partial roster of students in the Sverdrup curriculum
for entering classes of 1946, 1947, and 1948.

1946 ^a	1947 ^b	1948 ^c
Ernest R. Anderson	Townsend Cromwell	Charles S. Cox
Robert S. Arthur	Palmer Osborne	Frank Howard
Wayne V. Burt	Frederick H. C. Taylor	Hugh J. McLellan
William M. Cameron	William G. Van Dorn	Kenneth R. Kvammen
John D. Cochrane	J. B. Wickham	Han-Lee Mao
B. King Couper	Warren S. Wooster	Thomas B. Scanland
Gifford C. Ewing		T. K. Treadwell
Theodore R. Folsom	Argentine Naval Officers	Joseph L. Reid
Howard R. Gould	Luis Capurro	
Paul L. Horrer	Hector Iglesias	
Douglas L. Inman	Hector Etchebehere	
Dale F. Leipper	Rodolfo Panzarini	
Robert O. Reid		
Donald W. Pritchard		
Jesse F. T. Saur		
Warren C. Thompson		

^aRecollection of Douglas L. Inman and Paul L. Horrer; Leipper (1999a).

^bRecollection of Warren S. Wooster.

^cRecollections of Charles Cox and Joseph L. Reid.

throughout the world (Figure 3), which led to the rapid spread and development of oceanography as a science.

Leipper, Pritchard, and Burt were particularly noteworthy as “apostles” of the Sverdrup curriculum (Table 4). Leipper began a Sverdrup curriculum at Texas A&M University in 1949 and then went on to establish another at Naval Postgraduate School in Monterey in 1969. Pritchard and Burt established the Chesapeake Bay Institute at Johns Hopkins University along the Sverdrup lines in 1949. Burt went on to the University of Washington in 1953 and began a Sverdrup-type program at Oregon State University, Corvallis, in 1954. John Knauss, who initiated an oceanographic curriculum at the University of Rhode Island in 1962, pointed out that “the hallmark of the apostles is the spread of the interdisciplinary curriculum started by Sverdrup in 1946” (Knauss, 2002).

Because of his extensive travels and appointments to oceanography posts around the world, we considered Warren Wooster to be our “Scripps statesman.” Following his studies at Scripps, Wooster and his family moved to Lima, Peru where he was the first director of investigations of the Peruvian Council of Hydrobiological Investigations (1957–1958), which later became the Instituto del Mar of Peru. From 1961 to 1963, Wooster served as the first secretary of the Intergovernmental Oceanographic Commission and

director of the UNESCO Office of Oceanography in Paris. From 1973–1976, he served as dean of the Rosenstiel School of Marine and Atmospheric Sciences at the University of Miami.

Carl Eckart was director of Scripps from 1948 to 1950, a temporary appointment while Revelle finished his service in Washington at ONR. Eckart was an orderly thinker and made significant contributions to science, particularly in physics and ocean waves. However, oceanography as a whole was much too messy for Eckart’s orderly mind. When asked by a visiting colleague of mine if a more rigorous statistical treatment would improve a sedimentological relation, Eckart replied, “No. If your basic assumptions are correct, the physics will come shining through.”

Revelle returned to Scripps in 1948 and was Sverdrup’s choice as a successor, but his youth (39 years old), exuberance, and disregard for protocol

were held against him by some of the senior faculty (Box 1). It was also thought that after Sverdrup, a physical oceanographer, it was time to have a biologist as director, to maintain the institutional balance. Some faculty saw Revelle as pushing the institution even further away from biological matters, but he was eventu-

Box 1.

Aphorisms commonly stated by Roger Revelle.

“Punctuality is the bane of science.”

“Fan the flames of controversy.”

“Oceanography is what oceanographers do.”

“Oceanography is fun!”

Note. Recollections of Douglas L. Inman.

ally appointed acting director in 1950 and director in 1951. Under Revelle’s direction the institution proceeded along the multidisciplinary lines established by Sverdrup, rather than returning to the prior biological focus as some might have preferred (Knudsen et al., 1950; Malone et al., 1998; Morgan and Morgan, 1996; Nierenberg, 1996; Reid, 1988).

Table 4.
Scripps apostles spreading the Sverdrup-type curricula—United States and Canada.

University/"Apostle"
University of British Columbia William Cameron, 1950
University of Rhode Island John Knauss, 1962
University of Washington Richard H. Fleming, 1951 Arthur Lockley, 1951 Wayne Burt, 1953 Don Pritchard, 1949
Oregon State University Wayne Burt, 1954 Paul Komar, 1970 Hans Klein, 1974
Monterey Naval Postgraduate School Warren Thompson, 1956 Jack Wickham, 1956 Dale Leipper, 1969
Johns Hopkins University/Chesapeake Bay Institute Donald W. Pritchard, 1949 Wayne Burt, 1949 Dave Carritt, 1950
Texas A&M University Dale Leipper, 1949 ^a Robert O. Reid, 1951 Edward L. Cochrane, 1959
Virginia Institute of Marine Science Lawrence McHugh, 1964

^aLeipper (1999b)

Research and Exploration

In the mid-1940s, the new science of oceanography was still in its early exploratory stage. Nevertheless, research during World War II had produced concepts and equipment that were now available for civilian needs. Foremost among the developments were radar, sonar, and the application of wave hindcast/forecast procedures to coastal morphology and engineering.

Operation Crossroads, the atomic bomb tests at Bikini Atoll in 1946, involved many Scripps scientists and emphasized the ongoing and necessary collaboration between government and universities.

Following World War II, Admiral Julius Furer, Revelle, and Captain Bob Conrad were instrumental in helping to guide the new Office of Naval Research to play a leading role in support of basic science (Table 5). Indeed, ONR became the first federal agency to sponsor basic scientific research. Rodolfo Panzarini, an Argentine naval officer in the entering class of 1947 at Scripps, observed, "ONR became the most unique military organization in history" (Panzarini, 1948).

When Revelle returned to Scripps in 1948, he was instrumental in diverting World War II naval vessels from potential mothballing to serve as university fleets to carry out investigations of the global ocean (Figure 4).

A tenet of the Sverdrup philosophy, strongly supported by Revelle, was that researchers had an obligation to address societal problems. In 1947, *SIO Wave Report 68* (Arthur et al., 1947) represented one of the first applications of wartime research on wave forecasting to civilian needs of the country (e.g. Sverdrup and Munk, 1947). This report gave hindcast data on wave height, period, and direction at five open-sea localities along the California coast. It was the first report to emphasize the importance of wave energy flux on beach processes. This marked the beginning of

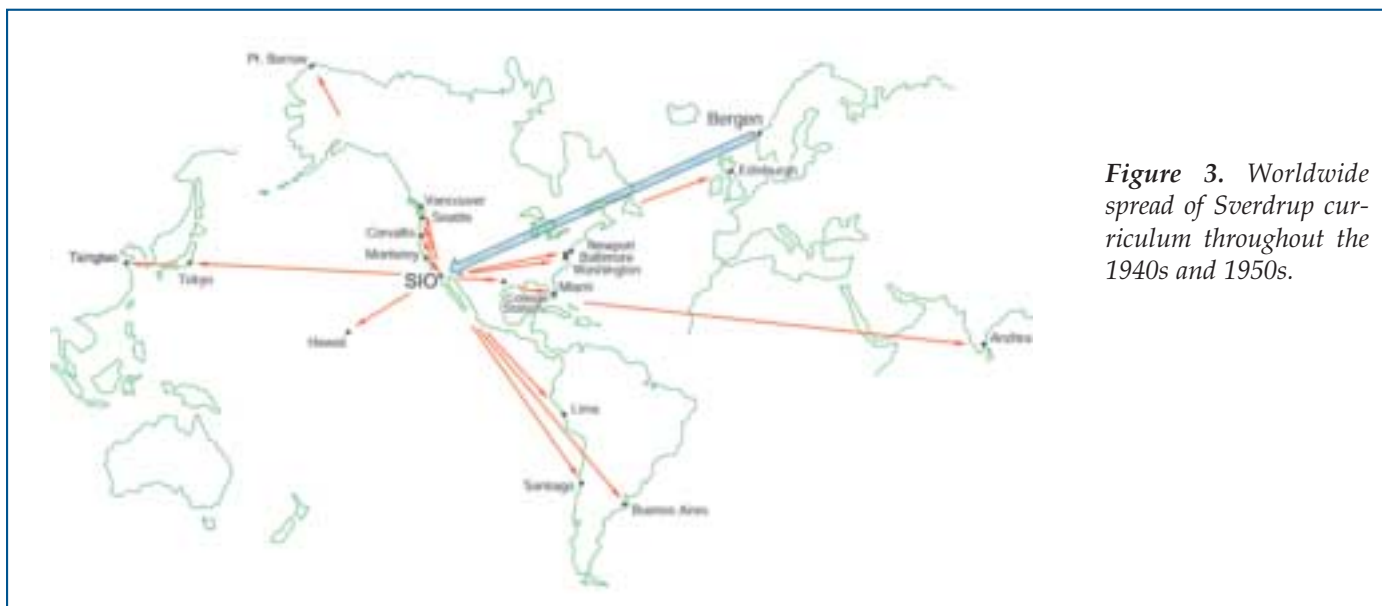


Figure 3. Worldwide spread of Sverdrup curriculum throughout the 1940s and 1950s.

Table 5.
Roger Revelle's guiding principles
for evaluating ONR research proposals.

- Emphasis should be on merit of scientific approach; Navy relevance will follow.
- If the proposal emphasizes Navy relevance, turn it down.
- If it is less than \$5,000, fund it.
- No peer review; it leads to the lowest common denominator. Rely on good program managers.
- Long-term individual/institutional support is essential if a field is to survive and grow.

Note. From notes of a meeting with Roger Revelle (23 April 1991) in preparation for authors luncheon address on University–Navy relevance at the NRC Symposium on Tactical Oceanography, Little Creek, VA, 30 April 91. Revelle died three months later on 15 July 1991. ONR = Office of Naval Research.



Figure 4. Roger Revelle (left) and Harald Sverdrup planning for ocean expeditions in 1948 before Sverdrup's return to Norway. Courtesy La Jolla Historical Society.

a long tradition of aiding and planning for civilian needs, leading to the first oceanographic study of sewage outfalls (Revelle and Wheelock, 1954), siting of the San Diego sewer outfall, and publication of *California and Use of the World Ocean* (Revelle, 1965), as well as *The Ocean Edge of San Diego* (Inman, 1969).

The application of oceanographic principles of ocean waves and currents spread rapidly throughout the world by the early formation of consulting groups on both coasts. Charlie Bates, then at the Navy Hydrographic Office, formed Bates & Glenn in Washington, DC in 1947 (later A. H. Glenn & Associates, Grand Isle, LA). Paul Horrer from the



Figure 5. E.W. Scripps off the *Hyperion Outfall*, Santa Monica Bay, 1954.

Scripps class of 1946 formed Marine Advisors in La Jolla, CA in 1955 (later Intersea Research Corporation).

In 1949, the California Cooperative Fisheries Investigation (CalCOFI) was established as a collaboration of Scripps, the California Academy of Science, the Hopkins Marine Station, and the U.S. Fish and Wildlife Service (later part of the National Oceanic and Atmospheric Administration) to investigate the 1947 collapse of the sardine fishery. Initially, ships, crews, and marine technicians for this innovative program were supported by ONR. Continuing to this day, CalCOFI is an ambitious program with about 560 stations along the coast of California and Baja California, Mexico, and about 120 stations in the Gulf of California. The Pacific grid extends from the California-Oregon border 2,700 km south to the tip of Baja California, and seaward from the coast about 500 to 1,000 km. Biological and oceanographic data (temperature, salinity, depth, oxygen, and nutrients) are collected at each station. The biological data include plankton tows and sightings of fish schools, mammals, and seabirds. Hewitt (1988) called this ecosystem approach of the CalCOFI program the “oceanographic approach to fisheries research.” In its 50 years of collaborative work, “CalCOFI has fielded over 300 coastal survey cruises, published over 6,000 documents and scholarly papers, spawned several new fields of research, and established benchmarks against which large-scale change may be evaluated” (Hemingway et al., 1999).

Campus, Ships, and Facilities

The Scripps fleet expanded from one coastal schooner, *E. W. Scripps* (Figure 5), in 1937 to *Horizon* and *Paolina-T* by 1948. *Horizon* was a former tug acquired by Scripps from the U.S. Navy, and *Paolina-T* was a purse seiner purchased with Navy funds. Both participated in the CalCOFI program (Shor, 1978). *E. W. Scripps* was a luxury yacht purchased, outfitted, and given to Scripps by Robert P. Scripps in 1937. The yacht was 30 m long with 27-m masts, and its diesel motor



Figure 6. Surveying beach profiles off Scripps Pier (a) with a World War II amphibious DUKW provided by the U.S. Army Corps of Engineers and (b) aqualung divers, Earl Murray (left) and Walter Scott, returning to DUKW. Note the “dry” suit on Walter Scott (ca. 1950).

had tanks for a range of 3700 km. *E. W. Scripps* was sold to the film industry in 1955 and appeared in two motion pictures: *Anna and the King of Siam* and *Around the World in 80 Days*. It was later sold for Tahitian island trading and burned at a dock in 1961. The Scripps fleet peaked at 11–14 ships of various types in the late 1960s.

The fledgling field of nearshore processes and coastal studies benefited from several innovations. The Aqua-Lung was brought to Scripps in 1948. Jacques Cousteau donated this predecessor of scuba to Fran Shepard’s research group (Figure 6b).

The institution also had three amphibious DUKWs (Figure 6a) that were used for coastal surveying and as diving platforms. Before UC Berkeley physicist Hugh Bradner invented the wet suit, scientists used the old “dry” suits, which were guaranteed to get divers wet and cold. The DUKW was a large “bathtub” with a motor and powerful water pumps. After a dive, we opened the engine hatch and huddled near the engine for warmth.

Postwar campus growth is illustrated by aerial photographs from 1946 (Figure 7) and 1956 (Figure 8). In 1946, there were about 25 Scripps staff and faculty. In the year 2000, there were 1,700 total staff. The entering class of 1946 doubled the academic population of

Scripps. Returning veterans and the resumption of a peacetime economy resulted in a severe housing shortage nationwide. Because most of the students were veterans, Scripps provided housing in the Torrey Pines Housing Project on the mesa above the institution. This housing project had been built during World War II to provide housing for families of officers at Camp Callen (U.S. Army) and Camp Matthews (U.S. Marine Corps), both near La Jolla. The exodus of military families associated with the decommissioning of Camp Callen was compensated by the large influx of students and expanding staff at Scripps. Leipper, an entering student in 1946 who had attended the U.S. Army Air Corps course in surf and swell forecasting at Scripps in 1943, was the liaison between Scripps and the housing project. This housing project provided essential housing for students between 1946 and 1948.

The expanding curriculum and research at Scripps resulted in some former students being retained as faculty and staff. From the first three entering classes, these included Arthur, Wooster, Joe Reid, Ted Folsom, Bill Van Dorn, Charles Cox, and myself.

By 1948, it was apparent that the Torrey Pines Housing Project would be decommissioned, resulting in a severe housing shortage for Scripps staff. Most land and all houses in the La Jolla area were beyond the means of junior faculty. However, the Scripps “can-do spirit” prevailed. In 1949 I formed a group at Scripps with the intention of leasing or purchasing land in La Jolla. The group was able to convince the city of San Diego to lease the “Pueblo Lands” area above La Jolla Shores to our group. Yet this effort was blocked by behind-the-scenes political pressure by a real estate interests, an early manifestation of “Not in My Backyard.”

This setback prompted Revelle—who had a vested interest in providing housing for “his” expanding institution—to use his influence in the community on our behalf. The nonprofit corporation Scripps Estates Associates (Knauss, 2001) was formed, purchasing property that at the time was owned by John H. Poole and was originally owned by the Scripps family. The Scripps Estates Associates land was surveyed and subdivided into lots, which were then sold back to us at cost (Figure 9). When the Scripps family donated land to found the institution in 1907, they offered to give an acre in the surrounding area to any Scripps faculty and staff who were interested. In honor of Ellen Browning Scripps’ vision for a Scripps community here, we named our neighborhood street Ellentown Road.

Summary

Sverdrup extended and refined William E. Ritter’s beliefs in the interrelatedness of all science and of science’s obligation to enlighten society, and *The Oceans* charted the way and was the model for the curriculum at Scripps, passing these precepts on to generations of students.



Figure 7. Scripps Institution of Oceanography and ocean pier (ca. 1946).



Figure 8. Scripps Institution of Oceanography and ocean pier (January 1956).



Figure 9. Ellentown Road (center, following contours of canyon rim) in Scripps Estates Associates subdivision in 1954 developed by Scripps personnel.

The esprit de corps of the small, vibrant, interdisciplinary Scripps in the last half of the '40s can never be fully recovered. Weekly seminars included the entire staff and student body in one small lecture hall in the Old Scripps Building. Our small academic community was surrounded by open fields, and many of us lived in the cottages on campus (see Figures 7 and 8). My family resided at 1 Discovery Way, along the ocean where Surf Side is now located, and one of the DUKWs (see Figure 6a) was often parked by our cottage. Academically we were part of UCLA, but sufficiently distant that we were unaware of it until we were required to submit our theses to the UCLA librarian.

If anyone would have asked, "Did you believe in the 1940s that you were making a science?" I'm sure that we would have replied that we knew we were—we certainly were not lacking for ego. Perhaps the best words to express the spirit of the institution throughout the 1940s are those of Roger Revelle's, "Oceanography is fun!" 🇺🇸

Acknowledgments

This paper is largely a personal account based on my recollections and those of my colleagues, as there is relatively little material in the Scripps Archives for the period. Deborah Day was most helpful in directing me to what is available. She and Naomi Oreskes made many topical suggestions. Betty Shor supplied the booklet, *Scripps Institution of Oceanography Alumni Biographies, 1903–1978*. I am indebted to fellow students Dale Leipper, Warren Wooster, Joe Reid, Chip Cox, John Knauss, Paul Horrer, and Francis Byrnes. I also thank my colleagues Walter Munk, Sam Hinton, Gene LaFond, and Charlie Bates. My wife, Patricia Masters, did her usual superb job of editing and rewriting. Finally, I am grateful to ONR for providing salary (1948–ca 1953) and research support during most of my tenure at Scripps (1946–present).

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