

D R A F T

OREGON STATE OCEANOGRAPHY:

A CATALYST FOR CHANGE

(a contribution to "Oceans and Origins")

By

John V. Byrne

(January 24, 2012)

The Wilkes Expedition of the 1830s and 1840s, the mid-century work of Matthew Fontaine Maury, and the Challenger Expedition of the 1870s have all been regarded at one time or another as the beginning of modern "Oceanography." If any of these are truly the beginning, then the last half of the 20th century must be regarded as the "golden age" of scientific ocean discovery, at least to date. By today's standards and methods, the techniques used in the 1800s by oceanographers and the knowledge of the oceans were fundamental but primitive. At the end of World War II, mathematical calculations were made with the use of mechanical calculators or slide rules. The hand-held calculator, computers, the Internet and the World-Wide Web did not exist. Satellite navigation was a vision. There was no GPS. Satellites did not exist and TV itself was in its infancy. There was no deep sea drilling program and no theory of plate tectonics. Systematic measurements of residual magnetism (the Rosetta stone of plate tectonics) had not been made. The structure of the DNA molecule was unknown. Nonetheless, amazing progress in ocean science would be made during the last half of the 20th century. Some, if not much, of that progress was made at Oregon State University. The foundation for that progress was laid by many people working together, but one man, Wayne V. Burt, provided the vision, the determination and the persistence to make much of it possible.

Ocean-related activities appropriate for the state's land-grant institution, Oregon State College(OSC) (now Oregon State University), began to develop in the late 1930s. In 1937 the state Board of Higher Education transferred to Oregon State College the stewardship of the coastal marine biology program of the University of Oregon's Institute of Marine Biology at Charleston. Professor Ivan Pratt of the OSC Zoology Department was put in charge of the program. He administered the Institute's program, primarily a summer educational program, until World War II, when federal agencies took over the facility. After the end of World War II

the Institute was reactivated under OSC, which continued the operation until 1955, when the Institute was transferred back to the University of Oregon.

Two years later, in 1939, OSC opened an oyster and shell fish research laboratory at Yaquina, Oregon under the direction of Roland Dimick. Research on oysters and clams continued at this small laboratory on Yaquina Bay until the OSU Marine Science Center was opened in the mid-1960s.

The initiation of seafood research at the new OSC Seafood Laboratory in Astoria, Oregon occurred in 1940. This laboratory, operated by the OSC Department of Food Science and Technology was created specifically to support a successful tuna industry based in Astoria. It has subsequently been expanded and continues in operation today.

These ocean initiatives, all related to the living resources of the sea, were temporarily cut short by America's entry into World War II. During the war, the lack of knowledge about the oceans was brought home at the time of naval engagements; for scientific knowledge, the hand-writing was on the wall. The awakening of scientific research in the United States following World War II started with the establishment of the Office of Naval Research (ONR) in 1946, followed by creation of the National Science Foundation (NSF) in 1950. ONR took the lead in emphasizing the need for ocean research during the 1950s and began funding oceanographers at existing laboratories, notably Woods Hole, the Scripps Institution of Oceanography, and the University of Washington. In 1956 ONR asked the National Academy of Sciences (NAS) to create a Committee on Oceanography (NASCO) to study the needs of oceanography and identify the opportunities before it. The NASCO report called for a strong national commitment for ocean research.

During the fall of 1958 the geophysics branch of the Office of Naval Research proposed a ten-year program for an expansion of Navy-sponsored oceanographic research. It was called "Project TENOC: A Ten-Year Plan for Oceanography." The plan called for Navy support of at least ten institutions of oceanography throughout the United States over a ten year period. The primary objective would be to create knowledge relevant to naval operations through basic research. Wayne Burt, who had come to Oregon State College four years earlier, learned of that program and was excited by it. Louise Burt, in her comprehensive history of the first two decades of the School of Oceanography, recalls: "On the evening after learning of the TENOC proposal, Wayne came home and told me about its possibilities. Perhaps, even Oregon State would be one of the institutions selected. He had a restless night and the next morning at breakfast he asked me to look up a quote from Shakespeare's Julius Caesar. *"There is a tide in the affairs of men which taken at the flood leads on to fortune. Omitted, all the voyage of life is bound in shallows and in miseries. We must take the current when it serves, or lose the venture."* Wayne was bold enough to take the tide at its flood. It was the right thing to do at the right moment and before the century was over would result in OSU Oceanography becoming one of the top five or six oceanography programs in the United States.

Once the TENOC program was announced, Wayne Burt convinced colleagues in ONR that with ONR support he thought he could convince administrators in Oregon to create an Oceanography Department at Oregon State College. With an oral commitment from personnel in ONR for funds with which to construct a research vessel and the money to operate it, Wayne was able to convince the dean of the School of Science and the OSC president that an oceanography department would create new opportunities for OSC. The dean and the president of OSC took a proposal for an oceanography department at OSC to the Board of Higher Education. The Board concurred and on July 1, 1959 a new Oceanography Department was open for business. Wayne had come through and so had ONR, with funds for construction of the first new oceanographic research vessel built in the United States since the end of the war. On a cold, raw day in February 1961, the 80-foot ACONA slid down the ways into the flood-swollen Willamette River in Portland. The researchers of the new department would soon have the capability to conduct research in the near shore waters of the Pacific from their own vessel.

Starting in 1959 with a faculty of three, Wayne Burt, Bruce McAllister and Herb Frolander, a graduate degree program was underway. New faculty were added yearly and by the end of its first decade of existence there were thirty-one faculty in the department. The oceanography program continued to develop both in number and in quality.

Applications to federal funding agencies by Wayne Burt and the expanding faculty of the department resulted in new research programs and new facilities: in 1964, a new oceanography building, a replacement of the 80-foot ACONA by the 180-foot YAQUINA and a federally funded research budget exceeding one million dollars; 1965, new research projects in physical oceanography and marine geology and the addition of another faculty member; 1966, the addition of optical oceanography as a major research topic; 1967, the governor of Oregon calls on Oregon State oceanographers and engineers for technical support for the "Oregon Beach Bill" that legislates public ownership of the beaches from the water to sixteen vertical feet above low tide; 1968, the new 80-foot CAYUSE is commissioned, Oregon State is designated one of the first three Sea Grant Centers, OSU is recognized as a national and international leader in the development of oceanographic research equipment and John V. Byrne succeeds Wayne Burt as chairman of the Oceanography Department. Wayne Burt is named Associate Dean of Research for Oceanographic programs, a position from which he will continue to bring federal funds to Oregon State for programs and facilities. By this time, the Oceanography Department had a total staff of 122, 36 of whom are faculty, 108 graduate student majors and a research budget in excess of \$2.6 million. The national scene for oceanography is changing and Oregon State's ocean programs are more than keeping pace with the change.

In the early 1970s, two major changes at a national level affected the manner in which ocean research was conducted; OSU oceanographers were not exempt from the impact of those changes. In March, 1968, President Lyndon Johnson proposed an "International Decade of Ocean Exploration (IDOE) for the 1970s. IDOE was assigned to the National Science Foundation and supported a significant number of major multi-disciplinary, multi-institutional

programs. OSU oceanographers participated and provided leadership for many of the programs. The IDOE research projects included researchers from a number of institutions throughout the United States and overseas. The Coastal Upwelling Experiment (CUE) conducted off the Oregon coast addressed the physical aspects of coastal upwelling. Led by Bob Smith and James O'Brien of Florida State University, CUE included researchers from Florida State, Woods Hole, the University of Washington, the University of Chicago, and OSU. It was the precursor to the Coastal Upwelling Ecosystem Analysis (CUEA) project, which included investigators from ten U.S. institutions, including Oregon State, and from institutions in twelve other countries. The Seabed Assessment Program included the Nazca Plate project off South America, Vern Kulm was one of its co-leaders, and the Galapagos Rift study, during which hot vents and their unique faunal communities were discovered for the first time and by OSU scientists. Other IDOE projects that Oregon State researchers participated in included the Geochemical Ocean Sections (GEOSECS) program and the Climate Long-Range Investigations Mapping and Prediction program (CLIMAP). Big science had arrived at Oregon State. The decision to participate in the Nazca Plate part of the Seabed Assessment Program was not taken lightly; it would mean the YAQUINA would be operating off South America for months at a time, precluding its use at home. Participation in IDOE was indeed significant in elevating OSU's Oceanography program to a national level.

A second major change in the way oceanographic research was conducted resulted from the adoption of the University National Oceanography Laboratory System (UNOLS) in 1972. Prior to UNOLS, ships were operated by each oceanographic institution for its own scientists. After the adoption of UNOLS, all ship schedules were developed in a collaborative manner, resulting in a cooperative use of the nation's entire oceanographic fleet operated by academic institutions. The system made efficient use of vessels, standardized basic equipment and created uniform safety requirements. It often meant that OSU's vessels would operate without an OSU researcher aboard, or that OSU oceanographers would conduct their research from another institution's ship. The UNOLS concept was adopted following almost two years of vigorous debate between the laboratory directors and leadership at NSF; it has operated successfully since 1972. John Byrne was one of the five laboratory directors who drafted the original proposal; he served as the first chair of the UNOLS council, which monitored the program. Both IDOE and UNOLS fostered a cooperative approach to the conduct of ocean research to the benefit of all United States oceanographers. With participation in IDOE and UNOLS programs, the Oceanography program at Oregon State University became a major player in this nation's ocean research and education scene.

The maturing of OSU Oceanography was no doubt a significant factor in the genesis of other marine-related activities at OSU, in some cases as a direct participant, in others, as an entity that projected a marine aura for Oregon State University. To this author it is likely the success of the Department of Oceanography served as a catalyst for the creation and development of the

(* footnote: catalyst - a substance or entity that induces, modifies and increases the rate of a reaction without being consumed in the process.)

Hatfield Marine Science Center in Newport, Oregon, for the award of one of the first three grants of the Sea Grant College Program and shortly later acknowledgement as one of the nation's first Sea Grant Colleges. Further, without a strong oceanography presence at OSU, it is unlikely that O. H. Hinsdale would have turned to Oregon State University with its strong oceanography and engineering programs to test his company's method of creating wave-resistant structures. Nor would he have funded the construction of the major wave research facility that subsequently became a Navy-recognized Center of Excellence for wave research and later a center for Tsunami Research. Collaterally, OSU's engineering and biological and physical sciences departments found a welcoming environment for the addition of faculty with ocean interests.

When Wayne Burt came to Oregon State College in 1954 there was little marine-related activity other than the Seafood laboratory in Astoria and the small Biological Laboratory on Yaquina Bay. Wayne's actions significantly increased the rate of development of the ocean presence at Oregon State College: a new ship, the ACONA; a new campus building, now Burt-I; and an expanding faculty in oceanography. Wayne and the growing oceanography presence provided leadership for the establishment of the Marine Science Center in Newport, recognition as a Sea Grant College and the beginning of the O.H. Hinsdale Wave Research Laboratory.

Oregon State University today is vastly different today than it was in 1959 at the time of the creation of the Oceanography Department. Although a land-grant university with strengths in agriculture, engineering, forestry, health and human performance, Oregon State University in its entirety is known worldwide for its marine and environmental sciences programs. For much of this, Oceanography was, and likely will continue to be, a catalyst for change at Oregon State University.

(Addendum: a history of change) Note: if appropriate, the following section can be deleted.

Hatfield Marine Science Center

In 1963 or 1964 the Georgia Pacific paper and lumber mill in Toledo, Oregon laid off a significant number of its employees, leading to a local economic depression in Lincoln County

where Toledo and Newport are located. Lincoln County was then declared, presumably by the state economist, to be the number one depressed county in Oregon. During the early 1960s the federal government provided funds for the economic recovery of depressed areas through the Area Redevelopment Administration (ARA). Governor Hatfield learned of this and asked the chancellor of the State System of Higher Education, Roy Lieuellen, if there was anything higher education could do in Lincoln County to assist in the county's economic recovery and informed him of the possibility of funding from the ARA. The information was passed down the line, ultimately resulting in a proposal to the ARA, prepared by Wayne Burt and others at Oregon State University, to develop a facility on the site of the old ferry terminal on the south side of Yaquina Bay. The facility would include offices and laboratories, an aquarium and museum and a ship support building and dock for berthing research vessels. The ARA accepted the proposal and provided a grant of almost \$960,000 for the buildings and dock. The state provided funds for the ship support building and the National Science Foundation, funds for scientific equipment. The Center was designed to stimulate the local economy by providing jobs and attracting tourists. For the oceanographers, it would serve as "the port" for its research vessels and offices and laboratories for a number of scientists. Oceanography was a participant in the creation and development of the Center.

Sea Grant College Program

The National Sea Grant College Program Act was passed by the congress of the United States in 1966. The act was designed to provide support for people who made their livelihood largely from the sea, in much the way that the land-grant universities support those who made their living from the land. Funding was, and is, provided to develop education programs, support research and enable extension and outreach. With support from oceanography, engineering and the OSU extension service, OSU submitted a proposal to the Sea Grant office in Washington, D. C., resulting in a grant in 1968 establishing Oregon State University as one of the first three Sea Grant Centers in the United States. Subsequently, in 1971, OSU was recognized as one of the first four Sea Grant Colleges in America. Oceanography was a partner in bringing Sea Grant to OSU.

The O. H. Hinsdale Wave Research Laboratory

In the late 1960s and early 1970s the Atomic Energy Commission anticipated the construction of a number of artificial islands on the continental shelf off the east coast of the United States. These islands would be the sites of nuclear power plants. About that time, Umpqua Navigation Co, a subsidiary of Bohemia Lumber Co, was the major construction firm that built the jetties that protected the entrances to the bays along the Oregon coast. These jetties were constructed by carefully placing huge blocks of basalt in an interlocking fashion to form the jetty. O. Howard Hinsdale, the CEO of the Umpqua Navigation Company, was convinced the Umpqua method of constructing the jetties was superior to any other method of construction. He recognized there could be a great financial gain for his company if it could obtain the contract for the construction

of the offshore islands. First, he needed to convince others of the efficacy of the Umpqua method of construction. He approached the United States Corps of Engineers to conduct research tests of the Umpqua method in one of the Corp's wave research facilities.. The Corps declined to conduct the tests and there was no other adequate wave testing facility in the United States to do the tests. Hinsdale knew of the growing oceanography program at Oregon State University and also knew that the School of Engineering at OSU was the leading engineering institution in Oregon. The combination of Oceanography and engineering was attractive; he approached OSU requesting that OSU construct a wave tank and conduct the impartial tests he was convinced would show the Umpqua way was the best. OSU was fortunate to have two engineers, Jack Nath and Larry Slotta, who were confident they could design and build such a wave tank for research purposes. OSU agreed to build the tank and conduct the tests but insisted their tests would be unbiased and might demonstrate that the Umpqua way was not the best method of construction. Hinsdale was willing to take that risk. The result: a wave research flume 342 feet long, 12 feet wide and 15feet deep at its deepest point was constructed and the tests conducted. Unfortunately for Hinsdale the AEC decided not to build the islands; fortunate for OSU, it had a new wave research tank, the largest of its kind in North America. The aura of Oceanography at Oregon State had been important to the construction of the first tank of what would later become a full scale wave research facility.

Attracting Outstanding Faculty

As the Oceanography Department grew in size and sophistication, OSU was able to point to it as a pinnacle of excellence. The high quality of the oceanography faculty was important to OSU's ability to attract other high quality faculty both to positions within oceanography and in areas peripheral to oceanography. Such faculty have been members of the National Academy of Sciences and the National Science Board; others have taken leave from OSU to take positions of leadership in the federal government; a number of others have become leaders in their scientific fields.

Influencing the Organization of the University

Starting as one faculty member in the Department of General Science, the evolution of the oceanography effort has kept pace with societal needs for increasingly multi-disciplinary science and the needs of Oregon State University to make the best possible use of its faculty. In 1959 the oceanographic efforts of Wayne Burt were recognized by the OSU Administration with the creation of the Department of Oceanography. When it became clear in 1972 that oceanography could be most effective if given the opportunity to stand alone and be separated administratively from other science departments, the administration changed the Department of Oceanography to the School of Oceanography and then to the College of Oceanography in 1983. A decade later, in

1993, when the interconnectedness of ocean and atmosphere was well recognized as the major force affecting earth weather and climate, the Department of Atmospheric Sciences was transferred from the College of Science to the College of Oceanography to become the College of Oceanic and Atmospheric Sciences (COAS). Most recently, in 2011, the recognition of the systematic relationship of all earth sciences supported the administrative transfer of the Earth Science Department from the College of Science to COAS to form the College of Earth, Ocean and Atmospheric Sciences (CEOAS). Throughout this administrative evolution, oceanography served as the base.

Today marine or ocean-related activities are pervasive at Oregon State University. In addition to CEOAS other units and activities of the university include: the Oregon Sea Grant College program, the Seafood Laboratory at Astoria, the Coastal Oregon Marine Experiment Station (COMES) patterned after the agricultural experiment stations and centered at the Hatfield Marine Science Center, the Marine Mammal Institute (MMI), the Wave Energy Program of the College of Engineering, the O. H. Hinsdale Wave Research Laboratory, the Cooperative Institute for Marine Resources Studies (CIMRS) designed to foster collaborative research among the National Marine Fisheries Service and OSU in aquaculture, fisheries and oceanography. In addition to these recognized units within Oregon State University, there are numerous agreements between these and other parts of OSU with federal and state agencies. Recognition of the importance of the oceans to life in today's society has had a profound effect on the nature of Oregon State University. Oceanography has indeed been a catalyst for change.

Acknowledgements

Oceanography is a field in which teamwork is an essential way of operating. While individuals may take the lead, just as Wayne Burt did, support by others is necessary. So it is with the preparation of a paper like this one. During the preparation of a paper on the history of an institution, it is extremely helpful to have support from people who actually lived through part of the history. Such individuals provided information used in this paper. They are: George Boehlert for history of the Hatfield Marine Science; Chuck Sollitt, Dan Cox and Bill McDougal for information on the history of development and operation of the O.H. Hinsdale Wave Research Laboratory. Also of great value was the history of the early days of the oceanography program prepared by Louise Burt, Wayne Burt's wife, and Miriam Ludwig, 1998, "Oceanography at Oregon State University: the First Two Decades, 1954-1975." Special recognition to Carol Mason, who, through her keen editorial talent and the instinct of the general reader, made this paper eminently more readable than it otherwise would have been. Thank you all.

ADDENDUM: Since this paper was written, OSU has addressed the importance of oceanography and other marine related topics by initiating a university-wide "Marine Studies Initiative."