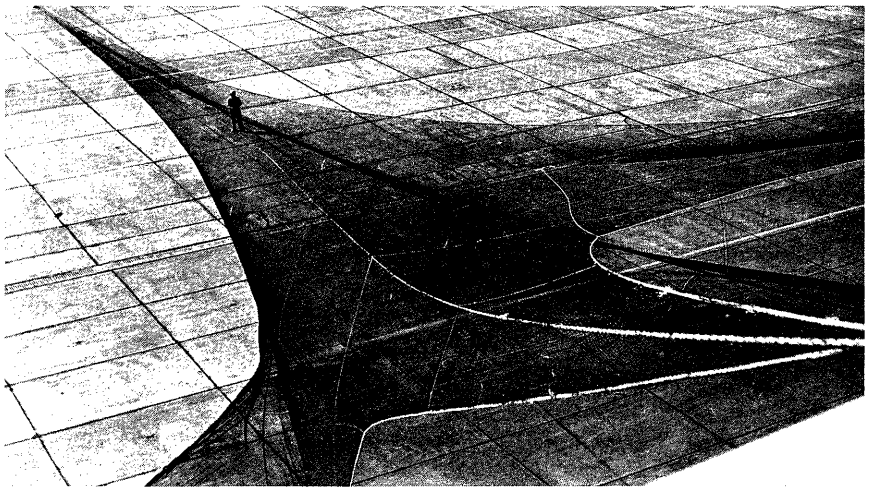
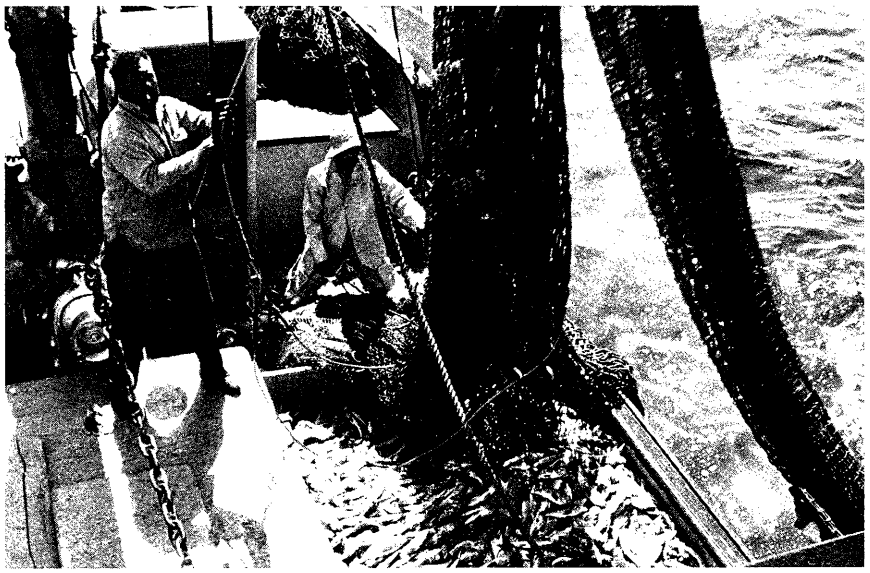
Exploratory Fishing and Gear Development

Melvin R. Greenwood [1]



Original Cobb pelagic trawl spread out on the parking apron at Sandpoint Naval Air Station, Seattle, about 1960.



Tordenskjold catch of Pacific ocean perch off southeastern Alaska in 1957. Captain Carl Serwold is standing on hatchcover.

Explorations to evaluate the commercial potential of latent fish stocks and/or fishing grounds, along with studies of fishing methods and equipment, were formally established as a separate activity of the Federal Government in 1949. With the objective to develop information needed by segments of the fishing industry interested in expanding or diversifying to new fishing areas and/or new stocks of fish, the special unit was designed to bridge an information gap inhibiting fishery development. To obtain practical (commercially significant) catch-rate and catch-composition data, commercial scale fishing systems were

1/ Former Deputy Director, Resource Assessment and Conservation Engineering Division, Northwest and Alaska Fisheries Center; present address: 8620 142nd N.E., Redmond, Wa 98052.

operated by experienced commercial fishermen on chartered commercial fishing vessels or research vessels built expecially for this unique purpose. Pre-1949 U.S. Fish and Wildlife Service (USFWS) exploratory fishing and gear research (EF&GR) activities in the northeastern Pacific Ocean and eastern Bering Sea were conducted by the Seattle Technological Laboratory as elements of processing and preservation studies or multi-disciplinary efforts designed to help industry utilize additional fisheries resources.

Information about potential commercial fish stocks not being utilized in this area began accumulating at least as far back as the 1888-90 surveys of the U.S. Fish Commission research vessel, Albatross, in waters off the territories of Oregon and Alaska. Although these early studies were basically for biological inventory and not intended to determine commercial production potential, the systematic coverage, which included documentation of habitat along with distribution and relative abundance by species, provided solid background for ensuing explorations. Additional information came from monitoring Japanese Bering Sea fisheries as well as from incidental catch data on observations of domestic commercial fisheries. The first major exploratory fishing expedition, the Alaskan king crab investigation of 1940-41, was an effort to study the resource and demonstrate feasibility for a domestic king crab fishery in the Bering Sea where Japanese floating canneries and fishing vessels had operated since about 1930. The following paragraph from the investigative report illustrates the level of concern at that time and sets forth initial reasoning for involving national government in such work:

"Increasing (exploitation) of a crab fishery by foreign nationals in water immediately adjacent to United States territory for subsequent export to the United States, raised serious question as to whether American interests were making adequate use of domestic fishery resources. Accordingly, early in 1940, the President requested the Secretary of the Interior to investigate the practicability of establishing an American king crab canning industry in Alaska. Initial inquiry indicated that lack of information regarding areas of abundance, methods for taking and canning king crab, and a general fear of not being able to compete with the imported product on a cost basis were the primary obstacles retarding domestic development. Since the cost of necessary exploratory work would be prohibitive for private enterprise under conditions then prevailing, the Congress authorized the Fish and Wildlife Service to make the study."

Roger Harrison, then in charge of the Seattle Technological Laboratory, USFWS, was overall supervisor of the investigation. Carl Carlson, Fishery Engineer, took leadership and documentatian roles in regard to vessels, on-board processing and fishing systems, and exploratory fishing. Carlson thus became the first USFWS exploratory fishing and gear specialist. He served in a similar capacity with several subsequent expeditions during the 1940s. Other investigative staff members included four fishery biologists--Arthur Hvatum, Camile Pertuit, Waldo Schmitt, and Marvin Wallace; a fishery economist--Leroy Christey; and a fishery technologist--Joseph Puncochar. Schmitt was on detail from the Smithsonian Institution where he was Curator of Marine Invertebrates. The expeditionary fleet included the cannery vessel, Tondeleyo (Capt. Arthur

Nelsen), the first year only; the fishing vessel, Dorothy (Capt. Ellsworth Trafton), both years; and the fishing vessels, Locks (Capt. Harry Guffey) and Champion (Capt. Anders Nilsen), the second year only.

The survey spanned thousands of miles, all the way from southeastern Alaska, around the perimeter of the Gulf of Alaska, through the Bering Sea, "to within sight of Siberia" (near St. Lawrence Island). A large king crab population was described in the Bering Sea near Alaska Peninsula, while smaller but substantial concentrations were noted in Pavlof Bay and Canoe Bay on the south side of the peninsula, around Kodiak Island, and in lower Cook Inlet. A comprehensive report was published as a Special Number Supplement to Fishery Market News in May 1942, just 8 months after completion of field work. The report was enhanced by four detailed appendices: 1) log of fishing operations, 2) fishing gear specifications, 3) description of canning operations, and 4) review of Japanese Bering Sea king crab fishery. The timeliness of publication plus the fishing log and fishing gear specifications became continuing features of EF&GR reporting. Since commercial type and scale otter trawls were the chief survey gear, a wealth of information on groundfish potential availability was collected. The report calls attention to "...an enormous reserve of edible fish--notably sole and pollock--which is at present wholly unutilized."

In 1945 with the above findings in mind, the War Food Administration recommended conversion of an ocean-going vessel into a factory ship and construction of five combination fishing vessels to supply it with otherwise unutilized raw materials needed to help overcome the wartime shortage of meat protein. At the end of World War II that same year, a decision was made by the Director, the War Mobilization and Reconversion Board, to complete conversion of the 410 ft. long cargo/factory/mother-ship, Pacific Explorer, and construction of four of the fishing vessels: Alaska, California, Oregon, and Washington. The work was funded under the Reconstruction Finance Corporation (RFC) which designated the Pacific Exploration Company (PEC) as its agent for construction and operation of the fleet. The vessels were leased to PEC at $50,000 per year plus 55% of the profits. To assure maximum economic, technical, and scientific benefits to the Government and the domestic fishing industry--provision was made for Government representatives to accompany the vessels and publish reports on their observations. The first of the PEC vessels to engage in a combination production/exploration/research operation in the northeast Pacific and Bering Sea was the Alaska in 1947 with Joseph King, Aquatic Biologist, Branch of Fishery Biology, USFWS, on board to observe and record operations. After a shakedown cruise as a tuna receiving ship off Costa Rica in 1947, the SS Pacific Explorer (along with 10 chartered catcher vessels: Bear, Borris, Dorothy, Foremost, Jeannette F., Kiska, Mars, Pearl Harbor, Sunbeam, and Tordenskjold) processed and packed king crab and groundfish in the spring of 1948. Norman Wigutoff, Fishery Marketing Specialist at the Ketchikan Fishery Products Laboratory, and Carlson, then Chief, Section of Exploratory Fishing, Pacific Ocean Fishery Investigations (POFI) at Honolulu, participated in and reported on operations. The Alaska and Oregon, respectively, rigged for purse-seine and live-bait fishing, prospected for western Pacific tuna in 1948 with O. R.

Smith and M. B. Schaefer of POFI on board as observers.

Studies relevant to the northeast Pacific Ocean and Bering Sea fisheries development, in addition to king crab-groundfish investigations occurring prior to initiation of Exploratory Fishing and Gear Development Section operations in 1948, included shrimp explorations sponsored by the Alaska Fisheries Experimental Commission (AFEC) in 1944 to determine "...commercial possibilities of shrimp resources in certain southeastern Alaska areas..." and in 1945 a shoreside survey to acquire input from local residents regarding possibilities for fisheries development in the Nome area. A similar shoreside survey in 1949 covered the rest of Seward Peninsula plus other areas around Kotzebue Sound as well as certain rivers and lakes in western Alaska. The AFEC was created by the Territory of Alaska "...to perform technological research and conduct studies to develop the fisheries of Alaska." The Ketchikan Fishery Products Laboratory was jointly supported and shared by AFEC and USFWS. Commission members in 1944 were Governor Ernest Gruening, Chairman; John Mendenhall, Secretary; and Lyle Anderson, Technologist in Charge, Fishery Products Laboratory. The 1944 shrimp survey was directed by Carlson, Fishery Engineer, on detail from the Seattle Fishery Technological Laboratory. Carlson and A. W. Anderson, Chief of the Branch of Commercial Fisheries at the time, did the 1945 personal-contact survey in the Nome area--while Wigutoff and Clarence Carlson, USFWS, Fishery Marketing Specialist, and AFEC Chemist, respectively, at the Ketchikan Fishery Products Laboratory, made the more extensive western Alaska shoreside-interview survey in 1949.

NORTH PACIFIC EF&GR, 1948-60

By 1947 it was apparent that an exploratory fishing and gear development unit was to be set up shortly. During 1948, exploratory fishing and gear development activities were initiated within the Seattle Technological Laboratory under Maurice Stansby. The aim was to organize a working group that would be ready to operate on the Pacific Coast as soon as the new activity could be developed. Funds totaling $92,680 were made available to the Laboratory for exploratory fishing operations on 1 July 1948.

The Washington, one of the PEC catcher vessels, was transferred to the Seattle Laboratory in July 1948 to be used in the new exploratory fishing project. The Washington made a 2-month trip to the Bering Sea, leaving Seattle on 23 August. Aboard on this trip--later designated as Exploratory Cruise (Expl. Cr.) No. 1, North Pacific Fisheries Exploration and Gear Research--were Joseph Ellson, fishery engineer, later named Project Leader for the new Exploratory Fishing Project at Seattle; Boris Knake, fishery engineer, temporarily detailed to Seattle from the Bureau's program in Boston; John Dassow, chemist, Seattle Technological Laboratory; and the vessel crew under Capt. Edwin Hansen. Late in 1948 it was decided that the Washington was not suitable for the kind of work needed and was sold for $150,000. This money was applied towards construction of a new research vessel, the John N. Cobb.

Although construction planning for the John N. Cobb consumed considerable staff time, two more exploratory fishing cruises were completed in 1949--Expl. Cr. No. 2, a Bering Sea king crab and groundfish survey, was

conducted aboard the 140-ft charter vessel, Deep Sea. The Deep Sea, designed especially for king crab fishing and processing, was built and operated under terms of the RFC. She was operated by Wakefield Fisheries, a pioneer large-scale king crab producer in western Gulf of Alaska and the Bering Sea. The vessel's crew included Capt. William Blackford and Mate-Fisherman Jose Franco. Franco also later served as Mate-Fisherman and Captain of the John N. Cobb. Ellson, Donald Powell (Seattle-based fishery engineer) and Henry Hildebrand (fishery research biologist, Branch of Fishery Biology) were aboard to direct and document operations. Expl. Cr. No. 3, with the former PEC vessel, Oregon, was designed to determine distribution of albacore tuna during its summer migration off Oregon, Washington, and British Columbia with Powell and Hildebrand aboard.

The Oregon later became the service's exploratory fishing and gear research vessel in the Gulf of Mexico and western Atlantic Ocean, operating out of Pascagoula, Mississippi. After being replaced by the new and larger Oregon II in the mid 1960s, the Oregon was returned to the Northwest in 1969 where she participated in Gulf of Alaska and Bering Sea explorations and resource assessment operations until finally being decommissioned in 1980.

During 1949, work was also underway in Seattle to develop an Exploratory Fishing Unit for a new laboratory in Honolulu, which was to conduct a program then known as the Pacific Oceanic Fishery Investigation (POFI). Carlson and another fishery engineer, Thomas Roseberry, were stationed in Seattle during 1948 making preparations for fishery engineering work in the POFI program as soon as the Honolulu laboratory building was completed. The exploratory fishing program operated there for only about 2 years, however, before being discontinued.

Late in 1949 the Seattle Exploratory Fishing Project was officially transferred from the Technological Laboratory to function as a separate entity. It remained under the local supervision of Ellson, who reported to the Section of Exploratory Fishing, under Richard Whiteleather, in the Washington, D.C., office.

Individuals serving as Chief, North Pacific Fisheries Exploration and Gear Research, 1949-71, were as follows:

1949 to 1950....Joseph Ellson
1950 to 1951....Donald Powell
1951 to 1955....Joseph Ellson
1955 to 1958....Donald Powell
1958 to 1968....Dayton Alverson
1969 to 1971....A. T. Pruter

Activities, 1948-60

Thanks to the anticipatory actions, the Seattle exploratory fishing program was in full swing with three cruises completed by its official starting date in 1949. The John N. Cobb, designed specifically for exploratory fishing and gear development, was under construction and nearly complete. After it was commissioned in February 1950, full operations were possible with the vessel's shakedown cruise to southeastern Alaska for shellfish explorations in March and April, designated Expl. Cr. No. 4.

The North Pacific Fisheries Exploration and Gear Research Program developed information on resource distribution, abundance, and catchability of latent fish stocks. Segments of the fishing industry considering expansion or diversification expressed need for such

information and their recommendations helped establish goals, priorities, and schedules. Significant contributions through the 1950s led directly to new or expanded fisheries on continental shelf-slope stocks of groundfish, crab, and shrimp from waters off Oregon and Washington, around the Gulf of Alaska, and into the Bering Sea.

Fishing methods and equipment were often designed, fabricated, modified, tested, and/or evaluated in conjunction with exploratory fishing operations. Significant improvements introduced in early years included a power roller to haul tangle nets; a tension block to dampen the shock of albacore hitting fast trolled lures; floating traps, gillnets, and longlines for high-seas salmon assessment; tags for tuna, salmon, and other fish; migration studies; and Gulf of Mexico-type shrimp trawls. Eleven of the John N. Cobb's first 41 cruises were devoted to studies of fishing methods and equipment--seven to midwater trawling, two to a fish pump device, and two to bottom and shrimp trawling.

Midwater trawling was emphasized because of the mounting evidence of large unused pelagic fish stocks such as northern anchovy, Pacific herring, Pacific saury, walleye pollock, Pacific whiting (hake), and various rockfish that were not available to conventional fishing systems. Aimed trawling was considered necessary to effectively assess and economically harvest such resources. The high-volume Pacific whiting and walleye pollock fisheries which have developed in the northeast Pacific and Bering Sea since the late 1950s proved these projections to be correct.

Groundfish Explorations

Explorations, led by Dayton Alverson along the continental shelf and slope off Oregon and Washington, located previously unknown trawling areas and concentrations of rockfish, "soles," and sablefish (black cod) during 1951-52. Other significant groundfish explorations took place in the 1950s on the continental shelf around the perimeter of the Gulf of Alaska from Dixon Entrance to Unimak Pass. Led alternately by Ellson, Edward Schaefers, Keith Smith, Melvin Greenwood, and Harold Johnson, about 10 cruises involving groundfish revealed extensive trawlable areas and latent stocks of fish--mainly rockfish and walleye pollock. At that time, domestic fisheries were not able to utilize these limited-value species from such remote grounds, but near the end of the decade large Soviet and Japanese trawl fleets appeared and fished them heavily for nearly 20 years. Only recently, thanks to the Magnuson Fishery Conservation and Management Act (FCMA) of 1976 and availability of the large combination crabber-trawler vessels, domestic fisherman have entered joint-venture operations to produce these fish in huge quantities for processing at sea aboard foreign factory ships.

Shrimp Explorations

Incidental-catch and stomach-content data consistently pointed to a bigger shrimp resource than was evidenced by production results through the mid 1950s. Researchers and fish producers agreed to the importance of shrimp explorations, and 11 of the John N. Cobb's first 23 cruises during 1950-56 included major efforts to locate commercially significant concentrations of shrimp. Most of these cruises,

including her first cruise, were headed by Schaefers with support from Ellson, Robert Livingston, Smith, Greenwood, and Johnson. A breakthrough which occurred in 1956 was the introduction of a Gulf of Mexico-type shrimp trawl which proved far more effective for taking the relatively small pandalid pink shrimp found in the northeastern Pacific Ocean and Bering Sea than were the beam trawls and small-mesh otter trawls used previously for research and commercial production. Catches of about 1,000 lb per 30-minute trawl off the Washington coast stimulated high interest in establishing a new industry in the Grays Harbor and Willapa Bay areas.

Following a successful experiment on processing shrimp from Washington at a Gulf of Mexico plant (arranged by the Seattle and Pascagoula, Mississippi, Technology Laboratories), shrimp peeling machines were introducted to the Pacific coast in 1956. These were capable of handling the very small shrimp (100 to 200 heads-on count) in profitable quantities. Unfortunately an economic boom-and-bust developed in the Grays Harbor-Willapa Bay area and ran its course over a 2 year period. With more than 20 peeling machines operating, fishermen quickly reduced the shrimp population until catch rates fell to unprofitable levels for both vessels and plants.

In the interim, however, shrimp surveyors with the Gulf trawls off the south shore of Alaska Peninsula and in the Cook Inlet-Kodiak Island area located even heavier and more extensive concentrations. In 1957, average catch rates by the charter trawler Tordenskjold in five separate areas around the Shumagin Islands ranged from 1,100 to 5,900 lb per hour. In 1958, catches of 900 to 3,500 lb per hour were taken by the John N. Cobb in the lower Cook Inlet and Kenai Peninsula areas; during the same cruise, catch rates frequently exceeded 2,000 lb per hour in the Kodiak Island-Shelikof Strait area. Shrimp processing facilities were soon set up in Seldovia, Kodiak, and Sand Point where some of the excess Grays Harbor machinery was used. Four cruises off Washington and Oregon in 1958 found new concentrations of shrimp which helped stabilize commercial endeavors based at Grays Harbor and Willapa Bay, Washington, and Warrington, Oregon. The 1957-58 Alaska and Washington-Oregon surveys were led alternately by Alverson, Greenwood, Johnson, and Fred Wathne.

Shrimp production in Washington and Oregon increased from nearly zero in 1956 to about 3 million lb in 1957 and more than 9 million lb in 1958. In Alaska production rose from a maximum of about 2 1/2 million lb per year through 1957 to 8 and 13 million lb in 1958 and 1959, respectively. Alaska shrimp production climbed steadily to about 48 million lb in 1969 and 128 million lb in 1976. Washington-Oregon production ranged from 2 to 35 million lb per year during the 1960s and 1970s.

Alaska Crab Explorations

Although no cruises were dedicated exclusively to crab explorations in the 1950s, king crab and snow (Tanner) crab were caught regularly in commercially significant quantities in the bottom trawls, shrimp trawls, and crab pots fished in 1954 and during 1956-59. Gulf of Alaska explorations were carried out from the John N. Cobb and the Tordenskjold. This information along with that obtained during the original king crab expeditions provided basic distribution data that helped the fishery develop. Prior to 1950,

domestic Alaska king crab production had never exceeded 1 1/2 million lb. The yield passed 5 million lb in 1957, 10 million in 1958, 25 million in 1960, and a peak of 159 million in 1966. Snow crab production, virtually non-existent through 1961, reached 61 million lb in 1973.

Albacore Tuna Explorations

The summertime abundance, distribution, and availability of albacore tuna from off Northern California to off southeastern Alaska was studied annually during 1949-52 and in 1956. The purpose was to find reasons for variations affecting year-to-year productivity of commercial fishing. Under Powell and/or Schaefers, an area up to 800 mi offshore was covered with various fishing and environmental monitoring systems. When conventional tags (used for migration studies) appeared unsuited to the fast swimming tuna, Alverson conducted tests in the University of Washington hydraulics laboratory where ribbon-like streamer tags were found to last longer at selected rates of flow. Specific reasons for year-to-year changes in abundance and distribution were not pinpointed. The only consistent environmental factor was that no albacore were found in waters colder than 57°F. Since no way was found to predict the probability of commercially significant concentrations of fish in advance, fishermen armed only with the 57°F minimum temperature information became accustomed to prospecting each year.

Cobb Seamount

In 1950, during the John N. Cobb's second cruise, a previously uncharted sea mount was located 270 miles west of Willapa Bay. Subsequenty named Cobb Seamount, it rises from the 1600-fm deep-ocean floor to within 22 fm of the surface.

High-Seas Salmon Assessment Survey and Gear Development

In connection with missions of the International Convention for High Seas Fisheries of the North Pacific Ocean and its successor agency, the International North Pacific Fisheries Commission, EF&GR personnel participated in a high-seas salmon survey off both sides of the Aleutian Islands in 1953, in the Gulf of Alaska in 1955, and south of the Gulf in 1956. The John N. Cobb, operating alone in 1953, fished experimental gillnets, longlines, and a floating trap to compare effectiveness and selectivity for taking the five northeast Pacific salmon species and steelhead trout. In 1955 she was one of three vessels fishing standardized gillnets and longline gear and took salmon as far as 400 miles offshore. This vessel also took part in a multi-vessel operation in 1956 where her assigned area included the previously explored summer albacore grounds off northern California, Oregon, Washington, and British Columbia. Both salmon and albacore were taken but never at the same location. Schaefers and Francis Fukuhara of the Branch of Fisheries Biology shared leadership in 1953, and Schaefers and Powell alternated as Field Party Chief in 1955 and 1956.

Chukchi Sea Baseline Study

In connection with the Atomic Energy Commission's Project Chariot (a proposal to use nuclear force to create a harbor near Point Hope), an expedition headed by Alverson aboard

the John N. Cobb inventoried marine organisms in southeast Chukchi Sea in 1959. Richard McNeely was also on board, as were Albert Sparks, Walter Pereyra, and other scientists from the University of Washington.

Miscellaneous Explorations

Other explorations during the 1950s involved abalone, herring, and scallop in Alaska. Livingston investigated the commercial potential of abalone in the lower outer islands of southeastern Alaska in 1951. The maximum of only 40 lb found by the hired professional hard-hat Alaska salmon trap diver was considered insufficient to be of commercial interest.

Two John N. Cobb cruises led by Lawrence Kolloen, Branch of Fishery Biology, and Smith were designed to determine the availability of herring in late fall and winter; these were conducted in southeastern Alaska in 1952 and in Prince William Sound in 1953. Neither endeavor produced commercially significant catches, but they did provide valuable life history information. A scallop dredge was operated during one cruise off Washington and portions of other cruises in the Gulf of Alaska during the 1950s without finding concentrations large enough to sustain commercial operations.

Fish Pump Experiments

Initial dedicated gear research work began in 1952 with the first of two efforts to develop a system to attract and pump fish such as herring directly from the sea onboard fishing vessels. Ellson was in charge of the first trials. In 1954 the second effort was led by Smith, who added a pulsed electric field to the light attraction/pumping system. This was moderately successful with average catch rates of more than 40,000 small herring per hour. However, this work was never pursued because other systems, such as seines and traps, proved to be more efficient for herring.

Midwater Trawl Development

Starting in 1954 with testing of the Swedish Phantom Trawl, the base became intensely involved with midwater trawl (MWT) development and evaluation. These tests demonstrated the need for accurate net depth monitoring. Cable length-cable angle tables provided with the Phantom Trawl provided only rough estimates in shallow sets and were virtually useless in deeper sets. Two years later, in 1956, Reidar Sands and McNeely from the BCF Gear Research Station at Coral Gables, Florida, participated in the second MWT development cruise. The acoustic-link depth telemeter developed at Coral Gables was used successfully to monitor net depths. McNeely was transferred to Seattle later that year to head up the MWT development effort. By 1960, the acoustic-link telemeter had given way to a direct-wire system (through the trawl cable). Both systems employed pressure potentiometers to indicated depth. Several MWT nets tried during the late 1950s produced large catches (mainly Pacific whiting and rockfish) infrequently.

SCUBA Diving Team

The Base acquired its first SCUBA (Self-Contained Underwater Breathing Apparatus) diving team in early 1959. Greenwood, Peter Larsen (Mate/Fisherman aboard the John N. Cobb at that time),

McNeely, and Wathne were trained by the diving unit at the U.S. Navy's (USN) Freeport Torpedo Station. Several of the Navy divers, including their leader Chief Robert Sheats, later participated in fishing gear research operations. During 1959 and 1960, the diving team became familiar with performance characteristics of groundfish trawls, shrimp trawls, and midwater trawls through direct observations from a towed diving sled or while swimming free and hanging on to various parts of the nets. As a matter of interest, in the spring of 1959, Reader's Digest published an account of how Chief Sheats and other USN divers, who while prisoners during WWII, managed to delude their captors about the location of the Philippine's silver treasure which had been scuttled in Manila Bay for safekeeping during the Japanese occupation.

U.N. Fishing Gear Congress

Sponsored by United Nations' Food and Agriculture Organization, the first International Fishing Gear Congress was held in Hamburg, Germany, in October 1957. Two papers by Base personnel were presented--"A Practical Depth Telemeter for Midwater Trawls," by McNeely and "Correlation of Midwater Trawl Catches with Echo Recordings from the Northeast Pacific," by Schaefers and Powell. Alverson, with the Washington Department of Fisheries at this time, also presented a paper entitled "Trends in Trawling Methods and Gear on the West Coast of the U.S."

During the first half dozen years or so, Seattle exploratory fishing and gear specialists continued with the designation Fishery Engineer. In the mid 1950s this was changed to Fishery Methods and Equipment Specialist for virtually everyone. Not until the early 1960s did position titles reflect the nature of work performed and responsibilities, such as: Electrical Engineer, Electronic Scientist, Fishery Biologist (Research), Fishery Biologist (Supervisor), etc.

Notes on Departing Personnel, 1948-60

Scientific and technical personnel employed at the Seattle EF&GR Base, 1948-60, are listed in the accompanying tables. Following are brief accounts of those leaving federal service or transferring to other positions.

Ellson, the first Base Director, went to Washington, D.C., for about 1 year (1950-51) as Chief of the Exploratory Fishing Section. Upon returning to Seattle, he assumed the position of Base Director another 4 years before leaving federal service to work in the Alaska salmon industry.

Powell spent 4 years (1951-55) in Washington, D.C., first as Assistant Chief and then as Chief of the Exploratory Fishing Section. In 1958, after 3 years as Base Director, he was promoted to Deputy Director, Northwest Region, BCF. To the dismay of his many friends, Powell succumbed to cancer just a few years later.

Alverson left the Base in 1952 for about 6 years to direct groundfish research in the Washington State Department of Fisheries. He returned to take over as Director of the Base in 1958.

Schaefers was promoted to Deputy Chief, Branch of Exploratory Fishing, BCF headquarters, in 1958. During 13 years in the central office before returning to NWAFC, he held increasingly responsible positions in the Branch, Division, and Director's offices

including: Acting Chief of Exploratory Fishing Branch; Deputy Assistant Director, Division of Industrial Research and Services; Deputy Assistant Director for Utilization and Engineering; and Special Assistant to Associate Director for Fisheries. Responsibilities beyond program management included leadership in the design and construction of the BCF research vessels: the Miller Freeman, Albatross IV, David Starr Jordan, Oregon II, Townsend Cromwell, Delaware II, and Kaho plus conversions of several Navy ships. Schaefers served on the U.S. Coast Guard Industry Advisory Committee on Rules of the Road; and on the Fishing Vessel Safety Sub-Committee, Department of State Shipping Coordinating Committee, for the Safety of Life at Sea Convention, Intergovernmental Maritime Consultative Organization (IMCO), United Nations. During his second tour of duty at NWAFC, 1971-81, he was Special Assistant to the Director and Deputy Director.

Livingston transferred to the groundfish research program at the BCF Fisheries Laboratory in Woods Hole, Massachusetts, in 1951.

Smith was promoted in 1955 to Chief, EF&GR Station, Boothbay Harbor, Maine, a subsidiary of North Atlantic Fisheries Exploration and Gear Research, Boston, Massachusetts. He later became Director, EF&GR Base, Northeast Region, when it was consolidated and moved to Gloucester, Massachusetts. After the national reorganization in 1969, Smith held several positions including Fishery Management Council liaison at Woods Hole until his retirement in 1980. In addition to his contributions at Seattle, he led fishing system R&D as related to groundfish electro-trawl, Maine sardine air-curtain, and pot gear for deepwater lobster and red crabs. The 156 ft Delaware II was designed and built while Smith was Base Director.

Greenwood was promoted to Director, EF&GR Base, Great Lakes and Inland Region, in 1960. Headquartered in Ann Arbor, Michigan, the Base included field stations at Erie, Pennsylvania; Sangatuck, Michigan; Mobridge, South Dakota; and Kelso, Arkansas. Under Greenwood's direction for 10 years, the unit was involved in assessment of latent fish stocks of the Great Lakes and the large reservoirs of the Mississippi, Missouri, and Ohio river systems. The proof of availability of latent fish stocks for lengthy periods to one or a combination of fishing methods helped the Great Lakes industry adjust to the violent changes in species composition triggered by the sea lamprey invasion and facilitated introduction of new fisheries in several reservoirs. A unique fishing gear research and development program helped the new farm pond channel catfish industry eliminate prohibitive harvesting costs. This industry and the Lake Michigan alewife fishery have each produced about 50 million pounds of fish annually since the late 1960s.

In 1970, Greenwood transferred to Washington, D.C., where he held positions as Acting Chief, Division of Exploratory Fishing; Chief, Division of Resource Technology; and Assistant for NMFS Support to Associate Director for Fleet Operations, National Ocean Survey, before being transferred back to NWAFC in 1976. He, too, served on the U.S. Coast Guard Industry Advisory Committee on Rules of the Road and the IMCO Fishing Vessel Safety Sub-Committee, plus the Environmental Sciences Advisory Committee of the Washington (D.C.) Technical Institute.

Wathne transferred to the BCF Gear

Research Station at Panama City, Florida, in 1960, where he participated in research on an electro-fishing system for shrimp before transferring to the central office of exploratory fishing in 1965. In 1967, he left federal service for 5 years to work for the Fishery Development Unit of the United Nations' Food and Agriculture Organization (FAO). Upon completion of that assignment, he returned to NWAFC in 1972.

Through 1958, all administrative, secretarial, and other support services were provided by the able group headed by Patricia Terao, which served both the technology and exploratory fishing units. In 1959, Wilma Abbey became the first secretary to work exclusively for exploratory fishing.

NORTH PACIFIC EF&GR, 1960-70

During the 1960s, the program was adjusted to meet the requirements of an agency reorganization, the state of our knowledge of latent resources, and new political-social-scientific-economic situations. The name of the unit became Exploratory Fishing and Gear Research (EF&GR) Base, Northwest Region, subsequent to the Fish and Wildlife Reorganization Act of 1958. Through the 1960s, a major part of operations, in addition to general exploratory fishing, concerned a study of the effects of changing environment upon fish, especially as related to atomic energy activities. Also, new technology led to world-wide efforts to develop electronic counting systems for pelagic and near-bottom fish. Explorations during the 1960s were often combined with gear development work, especially on MWTs for Pacific whiting and other off-bottom species and on fish traps for sablefish.

Bioenvironmental Baseline Studies

The Atomic Energy Commission (AEC) funded studies designed to measure the effects of their projects on the marine environment and organisms, including fish. Following Project Chariot in the Chukchi Sea, AEC funded a study near the mouth of the Columbia River to determine potential changes in fish populations caused by discharge into the ocean of water containing trace amounts of radionuclides. These substances originated from cooling water systems used by nuclear plants at Hanford, Washington. A monitoring program was continued throughout the 1960s until most of the reactors were shut down. Many Base staff members, led alternately by Hiromu Heyamoto, Pruter, and Pereyra, participated in the study, which required surveys with bottom trawls and other sampling equipment several times a year.

The only operations conducted by the Seattle base north of British Columbia in the 1960s were two groundfish surveys by the John N. Cobb in 1961-62 between Cape St. Elias and Kodiak Island. Robert Hitz, Johnson, and Pruter led these expeditions. In 1963 an exploratory fishing and gear research base was established at Juneau to serve the Alaska Region.

Groundfish Explorations

More than 10 groundfish surveys along the Pacific coast, plus the AEC related work off the Columbia River, succeeded in 1) locating clear trawling areas on grounds previously avoided by commercial fishermen, 2) finding fishable concentrations of dover and petrale sole plus Pacific ocean perch

and other rockfish, and 3) defining the bathymetric distribution of sablefish. This work was led at various times by Pruter, Heyamoto, Johnson, Hitz, and Lael Ronholt.

Pelagic Explorations and Fishing Gear

Refined definition of the large Pacific whiting resource, improvements in midwater trawling systems, and growth of the Soviet trawl fishery off the West Coast in the mid 1960s created a dilemma regarding development of a domestic Pacific whiting fishery. Despite a substantial effort which included building a new fish meal plant in Aberdeen and operation of a 10-boat fishing fleet, a combination of low prices, the effect of the Soviet trawl fleet on fish distribution, and other more lucrative opportunities for vessels created an unprofitable situation. Since 1977, however, substantial domestic Pacific whiting production has been experienced thanks to the protective effect of the 200-mile fisheries conservation zone of FCMA plus the advent of joint-venture fisheries in which foreign factory ships are allowed to buy fish directly from U.S. fishermen at sea. McNeely, Leonard Johnson, Hitz, Miles Alton, and Martin Nelson all played important roles in this work.

The Base, in cooperation with the University of Washington, established national and international credibility in the field of electronic in situ fish counting using quantitative echo signal processing systems.

Pelagic species other than Pacific whiting, such as northern anchovies and Pacific saury, have been investigated for commercial potential. Under the direction of McNeely and many others, attracting lights, lampara seines, small mesh midwater trawls, and low-light-level image intensifiers were used with only moderate success.

By the end of the decade, Pacific whiting assessment was supplemented with special winter surveys of eggs, larvae, and juveniles off southern California and northern Mexico in cooperation with the NMFS Southwest Fisheries Center at La Jolla, California.

Shrimp Explorations and Gear

Few cruises during the 1960s were of an exploratory nature because more effort was being devoted to developing a system to reduce the incidental catch of small fish in shrimp catches. Elimination of on-deck sorting increases efficiency, especially with small catches which contain a higher percentage of fish. Jerry Jurkovich, Ian Ellis, William High, and others participated in this work.

A vertical shrimp sampler was designed and used with great success. These experiments verified the phototrophic effect of ambient light on shrimp. Not only do shrimp spread upward through the water column at night and concentrate near the bottom during daylight, but the distribution of shrimp in the water column is also affected by cloud density.

Relatively effective separator trawl nets were developed, but the industry was reluctant to use them due to complexities of rigging and operation of the gear.

Sablefish Explorations and Gear

Regular groundfish explorations and deepwater trawling during the AEC study

revealed a sizeable deepwater sablefish population off Washington, Oregon, and northern California. The largest and most abundant specimens were at depths beyond the capacity of most domestic trawlers. Since sablefish had been observed to readily enter king crab pots used in Alaskan waters, it was decided to try to develop a trapping system to effectively catch this species. This work was begun in the late 1960s by Fred Hipkins and Steven Hughes, but the bulk of the development of this fishery took place in the early 1970s.

Participation in International Decade of Ocean Exploration (IDOE)

The unit participated in two IDOE projects, funded by the National Science Foundation (NSF). In 1963, Pruter, Pereyra, Ivan Fjaerestad, and Arne Leren of the Seattle Base together with A. K. Larssen, a well known commercial fisherman and gear expert, participated in the International Indian Ocean Expedition. They were responsible for carrying out trawl surveys in the Bay of Bengal and Arabian Sea from the NSF research vessel Anton Bruun. Alton, Kenneth Waldron, and Ellis directed exploratory fishing operations with groundfish trawl, Blake trawl, and longline gear from the Hero for Antarctic Resources Investigation, under the auspices of the NSF.

Second World Fishing Gear Congress

The second fishing gear conference sponsored by the U.N. was held in London, England, in May 1963. Two papers by Seattle personnel included: "Development of Cobb Pelagic Trawl," by McNeely and "Prospective Developments in the Harvesting of Marine Fishes," by Alverson and Norman J. Wilimovsky.

ALASKA REGION EF&GR

Increasing need for information by the fishing industry in southeastern Alaska prompted the establishment of an EF&GR Base in Juneau, Alaska, in 1960. Although operated through the BCF Alaska Regional Office, close working associations were maintained between the Juneau EF&GR staff and their Seattle counterparts. Their mutual interests in developing Alaska fishery resources soon resulted in the continuation or expansion of exploratory activities started earlier by Seattle personnel and in joint Juneau-Seattle surveys.

Groundfish explorations

From 1960 to 1967, five exploratory surveys along the continental shelf off southeast Alaska succeeded in 1) finding sizable commercial concentrations of Pacific ocean perch and other rockfish, 2) locating trawlable bottom areas in offshore regions from Sitka to Cape Ommaney, and 3) exploring waters of the inside passage for sablefish. Charles Connelley, the first EF&GR Base Director, initially led this work. Other persons involved in groundfish exploratory surveys included Ronholt, Serge Astrahantseff, and Robert Wolotira. The latter two worked jointly with Hitz and Norman Parks of Seattle EF&GR in developing an extensive trawl survey atlas for Alaskan waters which incorporated information on catches, fishing locations, and bottom trawling success for BCF-NMFS exploratory surveys from 1948 through the 1970s.

Shrimp explorations

The 1960s was a pivotal time period for locating and developing new shrimp fishing grounds in Alaska. The Juneau EF&GR Base undertook six trawl surveys to locate potential shrimping grounds from Prince William Sound to the eastern Bering Sea. The most important regions identified for the shrimping industry included several areas off Kodiak Island, the Alaska Peninsula, and the Shumagin Islands. These locations were destined to soon produce a peak annual harvest of over 120 million lb of shrimp. These exploratory surveys were led by Warren Rathjen, Mitsuo Yesaki, and Ronholt. Shrimp gear development work (including studies of plumb staff beam trawls for small boats, shrimp fish separator trawls, and high opening shrimp trawls) were led by Yesaki and Larssen.

Extensive EF&GR work was also undertaken in locating stocks of prawns or spot shrimp in southeastern Alaska and developing effective shrimp pots. From 1965 to 1968, nearly every bay and passage from Dixon Entrance north to Glacier Bay was test fished and small commercial fisheries were developed out of Ketchikan, Sitka, and Wrangell. Ronholt and Doyne Kessler were substantially involved in this work.

Scallop explorations

In the early 1950s, shellfish surveys by the John N. Cobb, and other work by BCF and the International Pacific Halibut Commission, aroused interest in Alaska scallop resources. In 1963, Rathjen led an EF&GR survey aboard the John R. Manning in the eastern Gulf of Alaska near Yakutat Bay for an initial effort to delineate the extent of several scallop beds. When a downturn in the U.S. East Coast scallop industry occurred in the late 1960s, the John R. Manning survey took on renewed importance. In 1968 and 1969, EF&GR Juneau, in cooperation with the Alaska Department of Fish and Game (ADFG), performed extensive exploratory surveys of scallop stocks from Cape Spencer in southeast Alaska, around the entire rim of the Gulf of Alaska to Unimak Pass and the Aleutian Islands. Gerald Reid and Ronholt led this scallop work.

Personnel Notes, 1960-70

Scientific and technical personnel employed in the unit, 1960-70, are listed in a table. Connelley, the first person associated with the Juneau EF&GR Base, left the federal government in 1961 to work in private industry.

Rathjen left Juneau in 1964 to accept a series of assignments with the U.N. FAO in Barbados, British West Indies, and other Carribbean locations (1965-69), rejoined NMFS in Gloucester in 1969, and is now associated with fisheries development on the East Coast.

Benjamin Jones' background in the fishing industry assisted in the development of new fisheries in regions in and out of Alaska. In 1968, he was detailed to a U.S. State Department program to investigate the potential for developing sustained fisheries in numerous Third World countries in Africa, Southeast Asia, and South America. Jones joined the Juneau EF&GR Base in 1964 and departed in 1970 to join the FAO and direct their marine fisheries development program in Brazil. He was involved with South American fisheries programs until 1977 when he returned to the Center and joined the RACE Division staff.

Yesaki left the Juneau EF&GR staff in 1967 to pursue an extensive career in

fisheries development for the FAO. From 1968 to the present, he has been with fish and shellfish programs for developing nations around the world, from Central America to Brazil, to the Middle East, the Indian Ocean, and south China Sea.

RESOURCE ASSESSMENT AND CONSERVATION ENGINEERING DIVISION, KODIAK LABORATORY

The Center's Kodiak Facility was formed in 1970 when the Juneau EF&GR Base and Ketchikan Food Technology Laboratory were transferred to Kodiak under an Associate Regional Director for Fisheries. This change in location provided opportunities for closer contact between these two segments of BCF (NMFS) fisheries research and development and Alaska's seafood industry. Soon thereafter, the Kodiak facility formally became part of the NWAFC and the EF&GR Base staff became part of the Center's Division of Marine Fish and Shellfish (the forerunner of RACE). At that time, programs underway at Kodiak included Gulf of Alaska and Bering Sea groundfish work, Bering Sea crab assessment, and Gulf of Alaska shrimp assessment and gear development. By 1973, efforts were made to consolidate various aspects of the Center's resource assessment activities. This consolidation resulted in Kodiak's groundfish and gear development activities being transferred to Seattle and the establishment of Kodiak as the focal point of the Center's shellfish resource assessment mission.

During the 1970s, much of Kodiak's assessment effort concentrated on identifying the magnitude and geographic extent of shrimp stocks in the western Gulf of Alaska. Numerous surveys during 1970 through 1974 occurred from Prince William Sound to Castle Cape on the Alaska Peninsula with most efforts concentrated around Kodiak Island. This work was under the direction of Ronholt and included substantial cooperative efforts with the ADFG as well as some of the Center's earliest joint U.S.-U.S.S.R. scientific investigations.

The time period of the mid 1970s marked a shift in regional effort for shrimp assessment to the Alaska Peninsula and Shumagin Islands. Shortly after NMFS shrimp surveys were started in these regions, an extensive commercial fishery was established. By 1976 annual shrimp harvests for the Alaska Peninsula region approached 80 million lb--a phenomenal growth in production of 700% in only 5 years.

Current efforts concerning shrimp assessment focus on surveys in the eastern Aleutian Islands region and triennial investigations of areas in the eastern Bering Sea.

Principal participants in the Kodiak Facility's early shrimp work included Ronholt, Duane Petersen, and Perry Thompson, and more recently it includes Paul Anderson and Franklin Hartsock.

Crab Assessment

Crab stock assessments are the primary responsibility of the Kodiak Facility. Since the Facility was established, annual surveys in the eastern Bering Sea have remained the principal source of status-of-crab-stocks information for the U.S. fishing industry, resource managers, and international fishery negotiations. These Bering Sea surveys are a current version of surveys originally started by the Biological Laboratory in Seattle in the 1950s and

continued by the Auke Bay Laboratory in the 1960s. The Kodiak Facility crab program staff has provided significant contributions to the knowledge of king and snow crab biology and have played major roles in developing fishery management plans, monitoring harvests by foreign nationals, and conveying current and projected stock conditions to the fishing industry. The geographic center for crab assessment work continues to lie in the southeastern Bering Sea; however, segments of the work have stretched into several other regions of Alaska. Persons extensively involved in the crab assessment program include or have included Murray Hayes, Jerry Reid, Alan Beardsley, Jerry Reeves, Robert Otto, Jack McBride, and Richard MacIntosh.

Snail assessment

Another extensive Alaska shellfish resource that is investigated at the Kodiak Facility is marine snails. A commercial fishery by Japan has been underway in the eastern Bering Sea and there continues to exist a substantial potential for domestic fishery for this resource. Extensive investigations of the magnitude and geographic distribution of several species of marine snails was started during the Kodiak Facility's involvement with outer continental shelf environmental studies in the mid 1970s. MacIntosh has remained the person primarily involved with assessing snail resources. He has become one of our country's foremost gastropod experts on the west coast.

Personnel Notes, 1970-81

Scientific and technical personnel employed at the Kodiak Facility, 1970-81, are also listed. Several members of the Kodiak Facility staff have departed Kodiak but have remained with other segments of the Center. Some of those former staff members who are no longer associated with the Center, but have remained associated with Alaska and marine resources include Alan J. Beardsley--currently a successful businessman, elected Mayor of the City of Kodiak, and appointed to the U.S. Department of Commerce National Marine Affairs Advisory Committee; Robert Meyer--private consultant and owner/operator of several marine related businesses in Myers Chuck (a small community in southeastern Alaska); A. K. Larssen--Associate Editor for the Fishermen's News; Jerry Reid--environmental assessment expert for the Alaska Regional Office, U.S. Department of the Interior, U.S. Fish and Wildlife Service; Duane Petersen--Director, Southeast Alaska Office, Environmental Assessment Division, NMFS Alaska Regional Office; and Gale Hudkins--Director of the Alaska State Zoo in Anchorage, Alaska. Another staff member, Perry Thompson, left Alaska and now works at the NMFS Southeast Fisheries Center.

NORTH PACIFIC EF&GR, 1970-81

The exploratory fishing and gear research group remained a unit through the major reorganizations of the late 1960s and early 1970s. It emerged in 1975 as the Resource Assessment and Conservation Engineering (RACE) Division. Designed to play a primary role in the new Marine Resources Monitoring Assessment and Prediction (MARMAP) Program, RACE was supplemented with groundfish and king crab scientists from the former Biological Laboratory and organized to handle MARMAP II--groundfish and shellfish

stock surveys and analyses. During the interim period, 1971-75, the RACE group was one of two components of the Marine Fish and Shellfish (MFS) Division under the direction of Fukuhara. When the two groups were separated into divisions in 1975, Fukahara became Director of Resource Ecology and Fisheries Management Division. Pereyra was named Director of RACE Division. Greenwood transferred back to Seattle from the Office of Fleet Operations (National Ocean Survey, NOAA) to be Deputy Director of RACE Division in 1976. The Alaska Region EF&GR Base, including the Oregon, moved from Juneau to Kodiak in 1970 and became a component of the MFS-RACE activity in 1971.

Both the John N. Cobb and the Oregon were incorporated into the NOAA fleet in 1973 under jurisdiction of the Office of Fleet Operations, NOS, Rockville, Maryland, through the Pacific Marine Center in Seattle.

RACE Division's mission through most of this period corresponds to the present combination of tasks: 1) Shellfish Assessment Task--located in Kodiak, Alaska, and concentrating on Gulf of Alaska and Bering Sea crab and shrimp stocks; 2) Groundfish Assessment Task--with three subtasks handling groundfish stocks in Bering Sea, Gulf of Alaska, and Pacific coast (off Washington-Oregon-Northern California), respectively; 3) Latent Resources Task--concerned with sablefish assessment and other groundfish studies; 4) Pelagic Resource Assessment Task--responsible for acoustic system development and related research and for acoustic-midwater trawl surveys of semi-pelagic species, particularly walleye pollock and Pacific whiting; 5) Conservation Engineering Task--responsible for technical support (sampling gear) of other tasks with limited effort in field of fishing gear research and development; and 6) Foreign Cooperative Research Task--coordinating work of foreign research vessels with U.S. needs through planning and observers placed aboard the foreign vessels.

Murray Hayes has served as Director of RACE Division since Pereyra left the Center in 1977 to enter private enterprise. Jones became Deputy Director when Greenwood retired in 1980.

Special activities during the period included 1) participation in the two NOAA-sponsored underwater habitat experiments, 2) participation in the Bering Sea offshore surf clam joint venture investigation, 3) a survey of Bering Sea king crab with RUFAS (Remote Underwater Fisheries Assessment System) employing closed circuit television, and 4) a survey of Gulf of Alaska seamounts to explore commercial fishing potential.

Alaska Shellfish Assessment

RACE's Kodiak Laboratory each year monitors Bering Sea and Gulf of Alaska king crab, snow crab, and shrimp stocks with enough precision to allow management agencies to set realistic catch quotes. The Kodiak Laboratory has been led respectively by Hayes, Beardsley, and Wolotira from 1971 to date.

Groundfish Assessment

Surveillance of groundfish within the 200-mile fisheries conservation zone from off northern California, along the west coast, through the Gulf of Alaska, and into the Bering Sea is the responsibility of the Groundfish

Assessment Task. Miles Alton has led the task and its predecessor unit since 1973. Since the area is vast and shiptime is limited, the present practice is to survey each of three subareas once every 3 years. The subareas are 1) Bering Sea, 2) Gulf of Alaska, and 3) continental shelf and slope off Washington, Oregon, and northern California. Richard Bakkala, Ronholt, and Thomas Dark, respectively, are responsible for the three subareas. In addition to the triennial surveys, various smaller scale surveys are conducted annually.

Pelagic Resource Assessment

This Task is responsible for acoustic system development and related research studies. However, its primary responsibility is to conduct acoustic-midwater trawl surveys of walleye pollock (in the Bering Sea and Gulf of Alaska), Pacific whiting, and other semi-pelagic species of groundfish, particularly Pacific herring and certain species of rockfish. The Task works directly with each of the subtasks within the Groundfish Assessment Task. During 1974-76 the Task developed a van-contained computerized acoustic system which is now recognized as being unique in terms of its versatility, ease of calibration, history of use, and fish target strength (acoustic reflectivity) measurement capabilities. Nelson has led the Task since it was established in 1974.

Conservation Engineering

The fourth RACE task is Conservation Engineering. This task was directed respectively by McNeely, Greenwood, Jones, and Wathne from 1972 to date. A section of the group, which was under Jurkovich, procures and maintains survey gear and equipment for the whole division. They also design and fabricate special gear according to scientific needs.

Porpoise Mortality

Problems resulting from the tuna industry's practice of using porpoise as an indicator for setting huge seine nets on schools of tuna and subsequently catching porpoise along with the fish, became a sensitive environmental-ecological issue in the early 1970s. McNeely, head of the gear research unit, had become familiar with the tuna seine fishery some years earlier and was detailed to the NMFS Southwest Fisheries Center to lead efforts to solve the problem. McNeely, helped intermittently by other base personnel including William High, Jurkovich, and Daniel Twohig, succeeded in implementing changes in net design and operating procedure sufficient to reduce porpoise mortalities to virtually zero on boats using the system. McNeely received the Department of Commerce's highest award, the Gold Medal, for this achievement and was named the Cetacean Society's "Man of the Year" in 1978.

Research Vessels

Until the NOAA fleet concept was implemented in 1972, the exploratory fishing-RACE unit was involved with only three government vessels--John N. Cobb, Oregon, and John R. Manning. Much of the credit for conceptual thinking and mission accomplishment must go to the crews of these vessels. As shown in the accompanying partial crew lists, many of them served faithfully for years. Numerous charter fishing vessels were used over the

years, and we regret not having a listing of their names and crews.

Staff, Exploratory Fishing and Gear Research Base, Juneau, 1960–70

1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	
@	@										Charles F. Connelley, Jr...Base Director
		@	@	@							Warren F. Rathjen...Base Director
				@	@	@	@	@	@	@	Benjamin F. Jones...FM&ES, Base Director
								x	x		Victor L. Fortin...FB
					x	x	x	x	x	x	Lael L. Ronholt...FB, Deputy Base Director
			x	x	x	x					Mitsuo Yesaki...FM&ES, FB
			x	x	x		x	x	x		Stephen H. Rogers...FB, BT
					x	x	x	x	x	x	Doyne W. (Red) Kessler...FB
					x	x	x	x	x	x	A.K. Larssen...FM&ES
						x	x	x			Sergei N. Astrahantseff...FB
						x	x	x	x	x	Robert J. Wolotira, Jr...FM&ES, FB
								x	x	x	Gerald M. Reid...FB
								x	x	x	Robert M. Meyer, Jr...FB
									x	x	Harold A. (Skip) Zenger, Jr...ET, FB
				x	x						Beverly Eggan...Secretary
						x	x	x	x	x	Sara Anderson...Secretary

x = year present
@ = Base Director
x = Deputy Base Director
FB = Fishery Biologist
FM&ES = Fishery Methods and Equipment Specialist
BT = Biological Technician
FT = Fishery Technician
CS = Computer Specialist

Crew of fisheries research vessel *John N. Cobb*

	1979	1977	1972
Master	Thomas Dunator	Robert Larsen	Robert Larsen
First Officer	Perry A. Buholm	Thomas Dunator	Perry A. Buholm
Chief Engineer	Louis T. Radine	Leroy McDonald	Leroy McDonald
Asst. Engineer	Arthur R. Cooper	Arthur R. Cooper	Phillip Johnson
Lead Fisherman	Jonas O. Varnes	Jonas O. Varnes	Ory Helton
Skilled Fisherman	George W. Grant (Sr.)	Robert Mennucci	Richard Farrens
Skilled Fisherman	Karl R. Gustafson	Leo N. Gorn	Ivar E. Roeggen
Chief Steward	Robert Blanks	Ardan Brezh	Jim Geyen

Crew of fisheries vessel *Oregon*

(FRV *Oregon* transferred to State of South Carolina on 10/20/80

	1979	1977	1972
Master	Perry A. Buholm	Wendell F. Schneider	Wendell F. Schneider
First Officer	Walter E. Hamiester	Robert F. Eveland	Allan Z. Komedal
Chief Engineer	Robert T. Holden	Louis T. Radine	Louis T. Radine
Asst. Engineer	Michael Wesneski	Torval Steen	Torval Steen
Fisherman	Claude Pierce	Daniel Kulusich	Daniel Kulusich
Fisherman	Michael Gunderson	Frederick J. Bonde	Reuel M. Fleming
Fisherman	Don Hudson	Jeffrey E. Hanson	Henry L. Torgramson
Chief Steward	Dwyane Hunter	Robert T. Lyons	Arthur W. Ericson

Crew of fisheries research vessel *John N. Cobb*, Supporting Exploratory Fishing and Gear Research Base, Northwest Region, 1950–72 (selected years only)

FRV JOHN N. COBB						CREW
1954	1955	1958	1960	1963	1967	
@	@					Sheldon W. Johnson...Captain-Fisherman
x						Conrad M. Knutsen...Mate-Fisherman
	x	@				Jose Franco...Mate-F, Captain-F
	x	x	@	@	@	Robert P. (Pete) Larsen...MF, Mate-F, Captain-F
		x	x	x	x	Hans Jangard...MF, Mate-Fisherman
x	x	x	x	x		Hugh T. Tiura...Chief Engr.-Fisherman
x	x	x	x			H.G. (George) Wagner...First Asst. Engr.-F.
				x	x	L.C. (Bud) McDonald...First Asst. Engr.-F, Chief Engr.-F
					x	James R. Geyen...First Asst. Engr.-F
x	x					William L. Morgan...Cook-Fisherman
		x	x	x		Ivar M. Fjaerestad...Cook-Fisherman
x						Joseph T. Schleitweiler...Master Fisherman
x						Adolph S. (Curley) Peterson...Master Fisherman
x	x	x	x			Konrad S. Moen...Master Fisherman
	x					Gilbert L. Holland...Master Fisherman
	x					Edward H. Edland...Fisherman
		x	x	x		Arne Laren...Master Fisherman
		x	x			Joseph Donotov...Master Fisherman
				x	x	I.E. Roeggen...Master Fisherman
				x	x	P.L. Johnson...Master Fisherman
					x	P.A. Buholm...Master Fisherman

x = Year present
@ = Captain-fisherman
F = Fisherman
Engr. = Engineer
Asst. Engr. = Assistant Engineer

Crew of fisheries research vessels *John R. Manning* and *Oregon*, Supporting Exploratory Fishing and Gear Research Base, Alaska Region, 1963–72

FRV JOHN R. MANNING							FRV OREGON				CREW
1963	1964	1965	1966	1967	1968	1969	1969	1970	1971	1972	
@											Jewell Pinyon...Captain-F
@	@	@	@	@	@	@	@	@	@	@	Wendell F. Schneider...Mate-F, Captain-F
F											Earl Bryner...Mate-F
			x	x			x	x			Ruel Fleming...Mate-F
				x	x	x					Ken Junge...Mate-F
									x	x	Allan Z. Komedal...Mate-F
x	x	x									Allan Z. Komedal...Chief Engr.-F
x	x	x	x	x							Phil Johnson...First Asst. Engr.-F
		x	x	x	x	x	x	x	x	x	Louis T. Radine...First Asst. Engr.-F, Chief Engr.-F
				x	x	x					Torval Steen...First Asst. Engr.-F
x	x	x	x	x	x	x	x	x	x	x	Clifton Schille...Cook-Fisherman
x	x	x									Chet Raymer...Master Fisherman
x	x	x									Reg Sierenpiper...Master Fisherman
				x	x	x					Denis Heggewald...Master Fisherman
									x	x	Art Ericson...Master Fisherman
									x	x	Daniel Kulusich...Master Fisherman
										x	Ivar M. Fjaerestad...Master Fisherman
									x	x	Henry Torgramson...Master Fisherman
									x	x	Ruel Fleming...Master Fisherman

x = Year present
@ = Captain-fisherman
F = Fisherman
Engr. = Engineer
Asst. Engr. = Assistant Engineer

Staff, Resource Assessment and Conservation Engineering Division, Kodiak Laboratory, 1971–81

1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	
@	@	@									Murray L. Hayes...Laboratory Director
			@	@	@	@					Alan J. Beardsley...Laboratory Director
x	x	x				@	@	@	@	@	Robert J. Wolotira, Jr...FB, Laboratory Director
x	x	x									Phyllis A. Jackson...Secretary
		x	x	x	x	x					Marilyn Buker...Secretary
						x	x				Ruth W. Kiley...Secretary
								x	x		G. Gail Hudkins...BT, Secretary
									x	x	Deborah L. Greuling...Secretary
x	x	x	x								Lael L. Ronholt, FB
x	x	x	x	x	x	x	x	x	x	x	Doyne W. (Red) Kessler...FB
x	x	x	x	x	x	x	x	x	x	x	Jack McBride...BT, FB
x	x	x	x								Gerald M. Reid...FB
x											A.K. Larssen...FM&ES
x	x										Auggie Barcott...FM&ES
x											Perry A. Thompson, Jr...BT
x	x										Harold H. (Skip) Zenger, Jr...FB
x	x	x									Robert M. Meyer, Jr...FB
x	x	x	x								Duane H. Petersen...FB
	x	x	x	x	x	x	x	x	x	x	Paul J. Anderson...BT, FB
		x	x	x	x	x	x	x	x	x	Richard A. MacIntosh...BT, FB
			x	x	x	x	x	x	x	x	Franklin B. Hartsock...FB
				x	x	x					Jerome E. Reeves...FB
					x	x	x	x	x	x	Robert S. Otto...FB
						x	x	x	x	x	John H. Bowerman, Jr...FB
							x	x	x	x	Therese M. Armetta...BT, FB
					x	x	x	x			L.W. (Red) Schaeffer...Clerk-Typist/Receptionist
								x	x		Jeanne E. Evans...Clerk-Typist/Receptionist
									x	x	Denise A. Oest...Clerk-Typist/Receptionist
		x	x								Carolyn Bollman...Librarian
				x	x	x					Molly Endicott MacIntosh...Librarian
						x	x	x	x	x	Kathleen Beyett...Librarian
								x	x	x	J. Eric Munk...FB
							x	x			Allan K. Fukuyama...FB
									x	x	Kristin L. Stahl...FB
									x	x	W. Steven Meyers...BT, FB
							x		x	x	William D. Albers...FB
						x	x	x			Stephan B. Lazarus...BT, CS
								x	x		William F. Johnson...CS
					x	x	x	x	x	x	Genise L. Alterman...CS
									x	x	Stephen J. Wilson...CS
										x	William P. Osborne...BT
x	x	x	x	x							Jack Fredrickson, Maintenance
				x	x						J. Witlatch...Maintenance
						x	x	x	x	x	James E. (Pete) Harris, Maintenance

x = year present
@ = Laboratory Director
x = Assistant Laboratory Director
FB = Fishery Biologist
FM&ES = Fishery Methods and Equipment Specialist
BT = Biological Technician
CS = Computer Specialist