

REFLECTIONS:

**A Photographic History of Fisheries
and the American Fisheries Society
in North America**

REFLECTIONS:

A Photographic History of Fisheries and the American Fisheries Society in North America

by

Christine M. Moffitt

Department of Fish and Wildlife Resources

University of Idaho

with graphic design by

Tracy M. Akin

Department of Fish and Wildlife Resources

University of Idaho



American Fisheries Society

Bethesda, Maryland

REFLECTIONS:

A Photographic History of Fisheries and the
American Fisheries Society in North America

COPYRIGHT © 2001 AMERICAN FISHERIES SOCIETY

All rights reserved.

ISBN: 1-888569-32-8

Library of Congress CIP #:

5410 Grosvenor Lane, Suite 110
Bethesda, Maryland 20814

FIRST EDITION

Contents

| | |
|---|----|
| Preface | 1 |
| The North American Continent Before 1870 | 2 |
| Fisheries Harvest & Preservation Before 1870 | 4 |
| The Foundation of AFS in 1870 | 5 |
| Early Federal Governmental Institutions With Fisheries Missions | 6 |
| Major Capture Fisheries Late 19th & Early 20th Centuries | 8 |
| Development of Fish Culture Seen as the Solution to Depleted Stocks | 10 |
| Description & Natural History | 12 |
| AFS's Unique Position | 14 |
| Cross-Continent Rails Provide Access | 16 |
| Quantitative Fishery Science | 17 |
| Early Fisheries Management & Surveys | 18 |
| Emmeline Moore: First Woman To Lead AFS | 20 |
| AFS Develops a North American Fish Policy | 21 |
| World War II & AFS in Early Postwar North America | 24 |
| Environmental Awakening, Changing Values & Regulations | 27 |
| AFS Membership & Fisheries Science Expands | 30 |
| Native People & Their Fisheries Challenge The Status Quo | 36 |
| Challenges of the Present & Future: Thinking Beyond the Hook..... | 38 |

Preface

The 131-year history of the American Fisheries Society (AFS) reflects the changes in the social and geographical history of North America. To begin this journey, we explore the historical context at the time AFS began and then trace the changes, challenges, successes, and failures to the present time. In his presidential summary in 1948, John Van Oosten

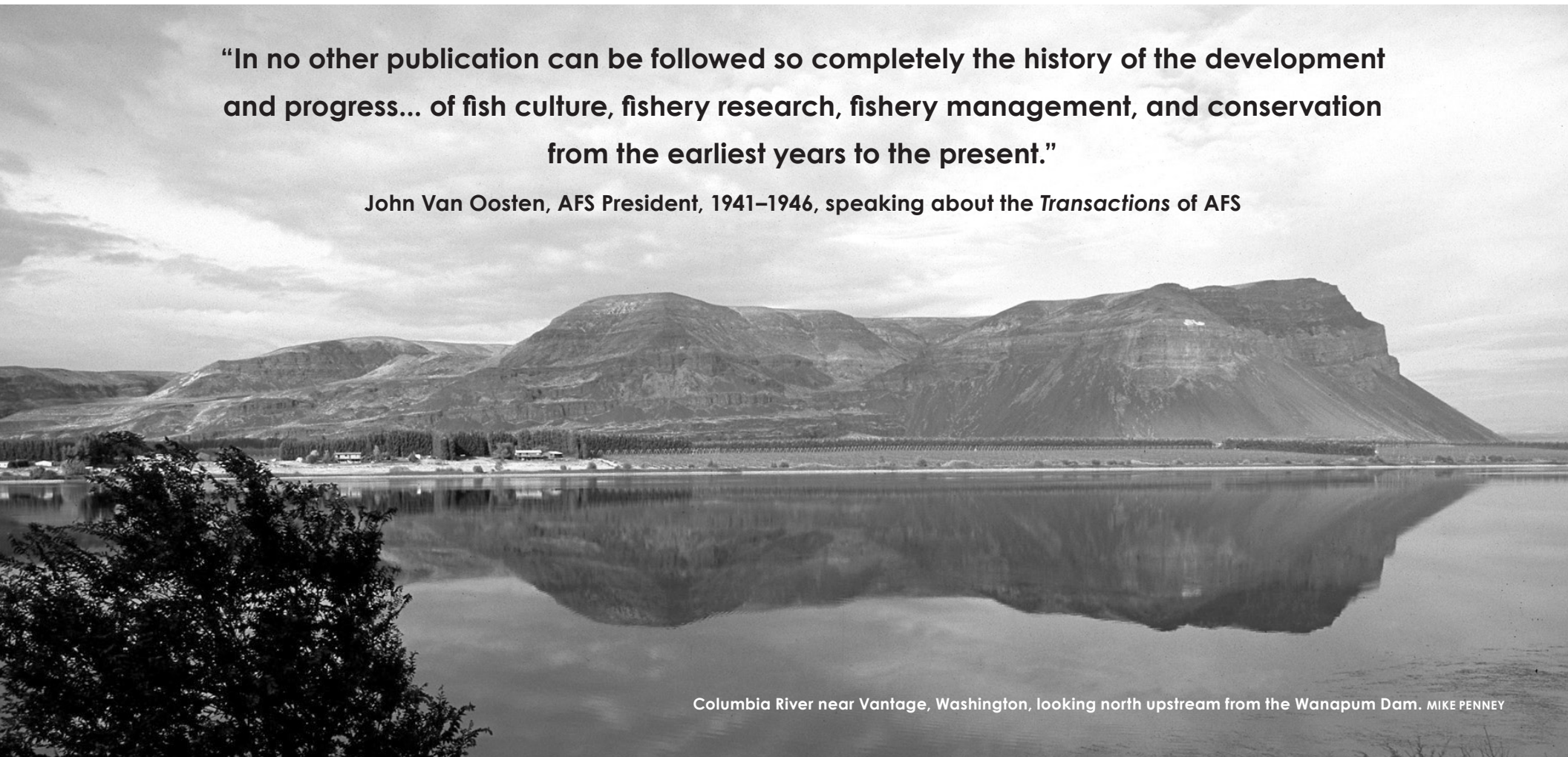
wrote of the *Transactions of the American Fisheries Society*, "In no other publication can be followed so completely the history of the development and progress in North America of fish culture, fishery research, fishery management, and conservation from the earliest years to the present." This historical photo-essay and compact disc provides a visual and audio

opportunity for you to explore the history of the AFS—to reflect on its past, to review its present activities, and to renew a vision for its future. The history is provided in a general narrative format with the details of source material (interviews, photographs, printed materials) provided at the end. Because of the scope of the project and the limited size of this presenta-

tion, many components of history could not be included. I apologize in advance to those whose valuable contributions are not mentioned. This history is dedicated to all AFS members in recognition of their many efforts and their sincere commitment to our fishery and aquatic resources. ←

"In no other publication can be followed so completely the history of the development and progress... of fish culture, fishery research, fishery management, and conservation from the earliest years to the present."

John Van Oosten, AFS President, 1941–1946, speaking about the *Transactions of AFS*



In the mid 1800s, an unprecedented expansion of human activities occurred across the North American continent driven in part by the opportunity to utilize its pristine natural resources. Often these resources were exploited, with little to no regulation, to be abandoned for new ones found further west. Mining for gold and pre-

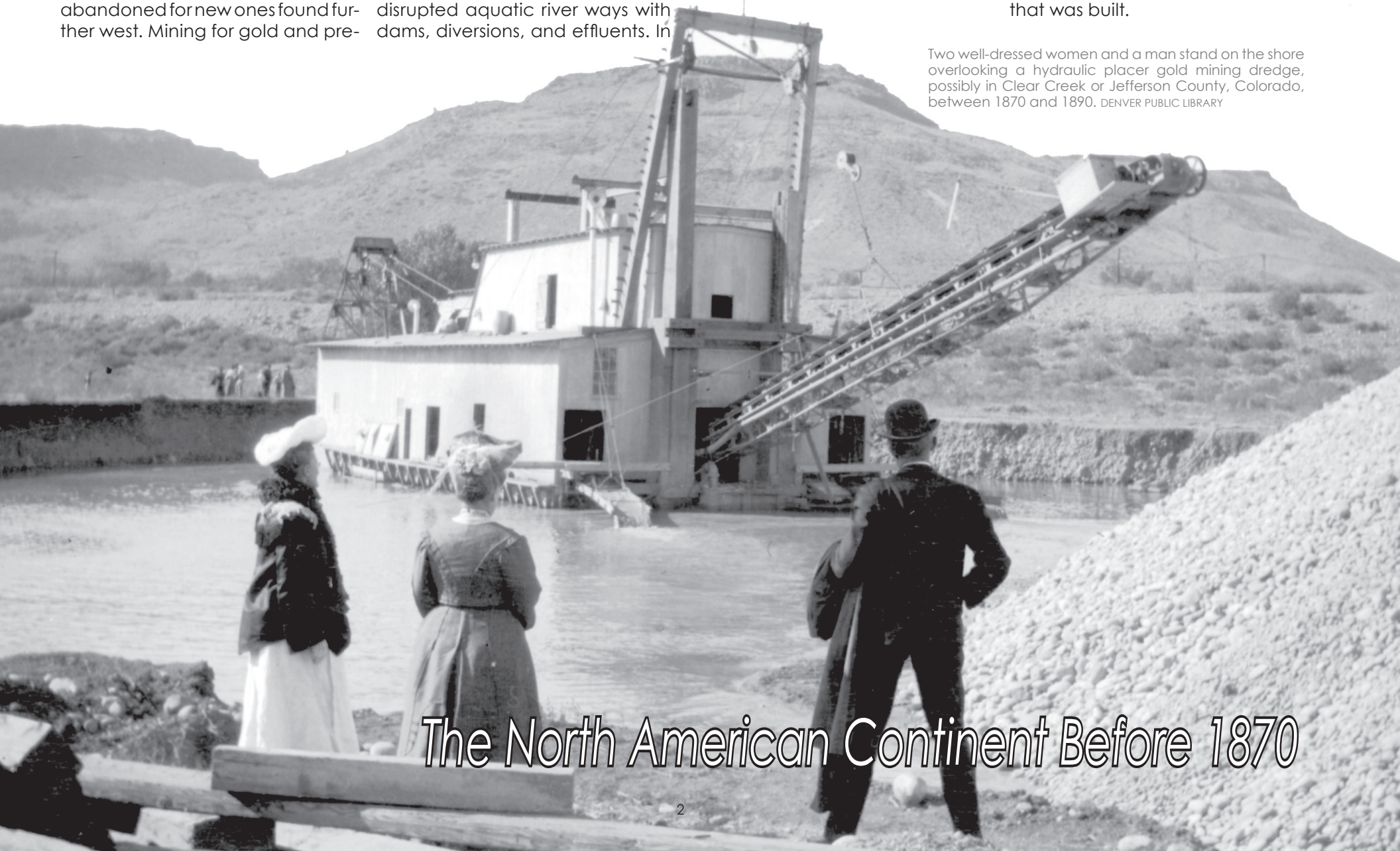
cious metals created boom and bust communities. The old-growth forests in the northern Midwest were cut in massive operations to fuel industry and build cities. The growth of industrial centers for the new expansion economy created point source pollution and disrupted aquatic river ways with dams, diversions, and effluents. In

these industries, human capital was also exploited without consideration for the plight of the workers.

The second half of the nineteenth century was the era of railroad land grants. Between 1850 and

1872, extensive tracks of public lands were ceded to states and to railroad companies to promote railroad construction. Usually, the companies received from the federal government, in twenty- or fifty-mile strips, alternate sections of public land for each mile of track that was built.

Two well-dressed women and a man stand on the shore overlooking a hydraulic placer gold mining dredge, possibly in Clear Creek or Jefferson County, Colorado, between 1870 and 1890. DENVER PUBLIC LIBRARY



The North American Continent Before 1870

By 1870, the United States had emerged from the effects of the Civil War, and there were 38 states in the Union. Canada was a newly formed Confederation and was gaining provinces from British North America. Maximilian had just been defeated and executed in Mexico, and U.S. business interests were soon to negotiate business oppor-

tunities, including building railroads in Mexico. The last of the native Indians were being run off their lands, and the battles of Little Bighorn and Big Hole had yet to be fought. The remaining buffalo herds were being slaughtered, and the yet-to-be famous western artist Charles Russell was still living in St. Louis. ←

Canada was a newly formed

confederation.

The last of the native indians

were being run off their lands.

The remaining buffalo herds

were being slaughtered.



Nez Perce Indian Chief Joseph (1832–1904).
UNIVERSITY OF IDAHO SPECIAL COLLECTIONS



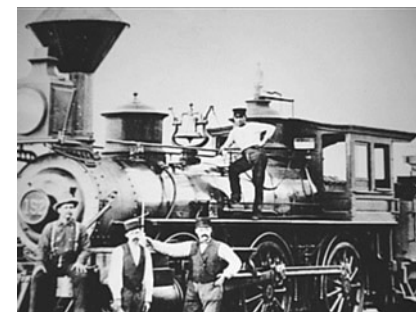
Settler with wagon camp set up circa 1850. JEFFERSON NATIONAL EXPANSION MUSEUM



"Wigwam," a Saulteaux man of mixed ancestry. Red River Settlement, Manitoba, 1858. NATIONAL ARCHIVES OF CANADA



Surviving warriors of the Six Nations Indians, 1812–1815, (left to right) John Smoke Johnson 90, John Tuttle 85, Young Warner 88 years of age. Taken July 1882. NATIONAL ARCHIVES OF CANADA



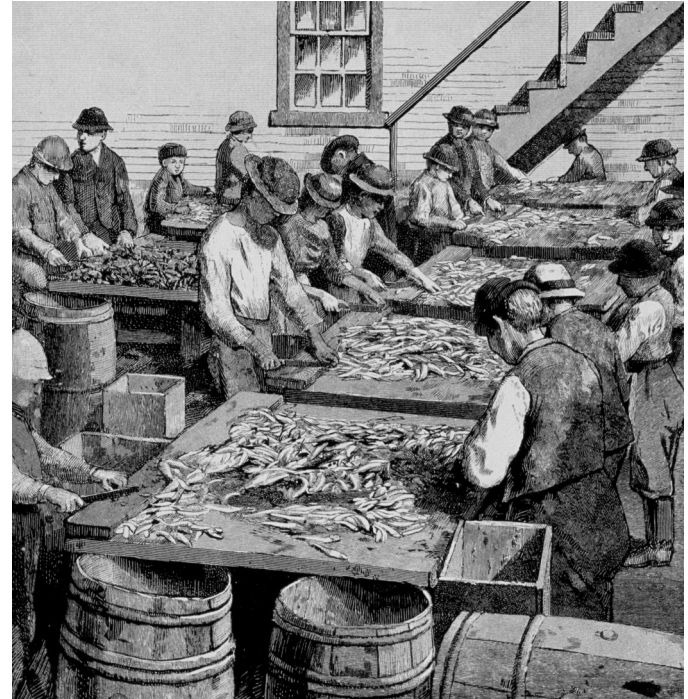
Engine car and four crew workers of steam locomotive. JEFFERSON NATIONAL EXPANSION MUSEUM

Fisheries Harvest & Preservation Before 1870

Before Europeans arrived in North America, many tribes of native peoples depended on fish as a protein source during part or most of the year. Europeans who settled in eastern North America generally preferred agriculture and meat. However, colonists soon learned how to harvest the abundant fish resources, and this activity evolved from subsistence food gathering to a profitable export market. Before the end of the seventeenth century, fishing was a primary industry of New England, and exports went to England, the Mediterranean, and the Caribbean. Trans-Atlantic trade routes developed for exchange of New England salt cod, Caribbean sugar cane used for rum, and African slaves.

Until the late 1860s, salting and drying fish for preservation were the major methods of fish storage. Because of limitations in processing and distribu-

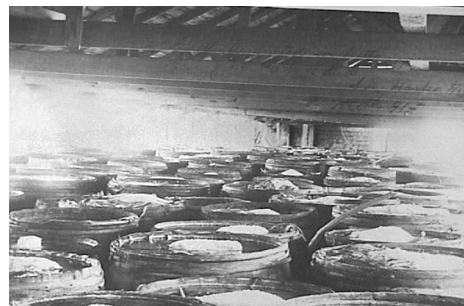
tion, there were limits to the market for preserved products, but early entrepreneurs utilized fish and shellfish from the oceans, lakes, and rivers of North America. The Hudson's Bay Company marketed salted fish in England. When canning technology was applied to preserve capture fisheries, the market changed dramatically. By the late 1860s, William Hume and his brothers George and John applied canning technology to salmon on the Pacific coast and soon canned salmon was shipped all over the world. By 1867, the first shrimp cannery was operating in Louisiana, and the industry expanded rapidly. Canned fish and shellfish became a meat source for people in industrial cities throughout the world. The demand for canned fish products spurred the development of fishing fleets to harvest more species, and new immigrants and young children were part of the workforce. ←



Children at sardine cannery cutting off the heads and tails of herring, and cleaning herring for canning. From a photograph by T. W. Smillie. NOAA NATIONAL MARINE FISHERIES SERVICE



Drying fish for export to China on San Francisco wharves circa 1880. NATIONAL ARCHIVES



Barrels of salted cod stored in a warehouse, 1891. NATIONAL ARCHIVES

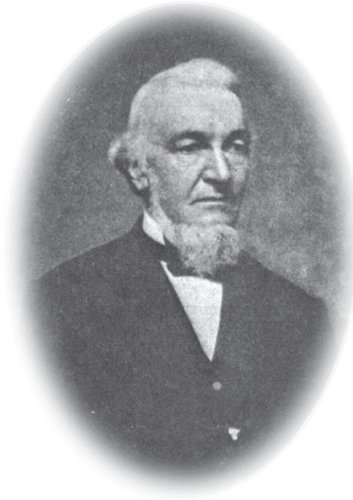


Mackerel packing on shipboard. Splitting, cleaning, and washing. NOAA NATIONAL MARINE FISHERIES SERVICE

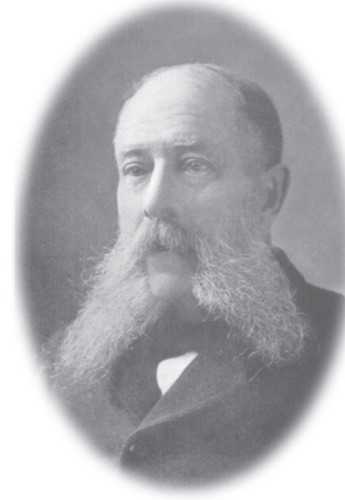
The Foundation of AFS in 1870



George Shepard Page, a member of the Society in 1872, vice-president, 1874–1881 and 1883–1884, and president, 1882–1883. A CENTURY OF FISHERIES IN NORTH AMERICA



William Cliff of Connecticut, Society President 1870–1874. AFS HISTORY SECTION



Livingstone Stone of New Hampshire, first Society secretary. TRANSACTIONS



Seth Green was a pioneer in fish culture and the first chairman of the Executive Committee in 1872. AFS

“...the society should broaden its purpose beyond fish culture and deal with fishery issues and problems, and work with Congress.”

George Shepard Page, 1870, first meeting of the American Fish Culturists Association

Fisheries science and the American Fisheries Society had their beginnings in northeastern North America in 1870, when a group of lay professionals from the U.S. and Canada, interested in fish culture and aquatic resources, convened to form the American Fish Culturists Association (later to become the American Fisheries Society). Among the founders, Reverend William Cliff became the first president and Livingstone Stone was the first secretary. The first meeting of the Society was held in New York City. In their first meetings, George S. Page suggested that the Society should broaden its purpose beyond fish culture to deal with fishery issues and problems and to work with the U.S. Congress. Attendees discussed the need for standardized common names for fishes, pursued opportunities in fish culture (particularly shipping salmon and trout eggs across the continent), and endorsed political support for formation of a U.S. federal agency with a focus on fish and fisheries. Their activities included discussion of the problems with migration barriers in rivers from the building of dams, and Secretary Livingstone Stone wrote a letter to the U.S. State Department and Canada regarding obstructions in the St. Lawrence River that prevented the migration of salmon. At this first meeting attendees were assigned topics to be reported on at the next meeting, including the culture of black bass, culture of shad, introduction of salmon into American rivers, landlocked salmon, fish in the north woods of New York, spawning races and impregnation of eggs, and the culture of trout. →

In 1871, following the urging of AFCA and others, the United States Congress authorized the United States Commission on Fish and Fisheries. The quest for the first federal agency was orchestrated by the exceptionally clever politician and scientist Spencer Baird, the assistant director of the Smithsonian. Baird made sure that the legislation to provide funding for the new federal fish agency required the director to be a fisheries knowledgeable federal employee. In addition, the new agency would have the right to collect specimens from all the states and thus help enlarge the collections of the Smithsonian. Among the tradeoffs used to gain approval for the Fish Commission as a federal agency in the United States

was an agreement to plant American shad in the Mississippi River drainages. Baird was nominated as one of the first honorary members of AFS in 1872. Baird became director of the Smithsonian Institution and head of the Fisheries Commission and was based in Woods Hole, Massachusetts. The first charge to the Fish Commission in 1871 was to study reasons for the decline in New England and lake fishes and to develop fish culture. Baird's assistant George Brown Goode promoted the use of fish culture to mitigate losses and to avoid restrictive laws. In 1879, the U.S. Fish Commission built the 156 foot *USS Fish Hawk*, which served as a floating hatchery and distribution system, capturing fish such

as shad, striped bass, and herring and distributing their spawn. Several other vessels were commissioned for research, including the *Albatross*. Launched in 1882, the *Albatross* was the first ship designed expressly for fisheries and oceanography and was capable of long cruises.

In the new Canadian Confederation the Federal Fisheries Act of 1868 created a Department of Marine and Fisheries. Canada's first Minister of Marine and Fisheries was Peter Mitchell. The first Commissioner of Fisheries was W. F. Whitcher. Fish culture was important to early Canadian fisheries management and in 1876, Samuel Wilmot was appointed the first Superintendent



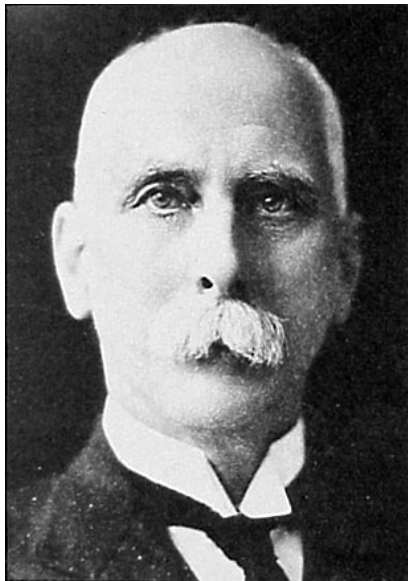
Spencer F. Baird, circa 1867.
NOAA NORTHEAST FISHERIES SCIENCE CENTER

Woods Hole looking northeast from fisheries laboratory - *Albatross* at wharf, circa 1891.
NOAA NORTHEAST FISHERIES SCIENCE CENTER



Early Federal Governmental Institutions With Fisheries Missions

In Canada, E. E. Prince strongly advocated research on natural history and pollution and worked to establish biological stations to study fish life.



E. E. Prince, member of the Board of Management of the Marine Biological Station 1898–1936, chairman 1898–1921, editor 1901–1918, and AFS officer. THE AQUATIC EXPLORERS



End view of the movable station, on scow beached at Canso, 1901–1902. Group of board members and research associates includes (L to R) G.A. Cornish, unknown, A.P. Knight, J. Stafford (curator 1901–1907), J. Fowler, C.M. Fraser, E.E. Prince, R.R. Wright, unknown, A.B. Macallum. THE AQUATIC EXPLORERS

of Fish Breeding in Canada. Wilmot was nominated one of the first honorary Society members along with Baird in 1872. In 1892, Edward E. Prince became the second Commissioner of Fisheries. Prince was a professor of zoology and anatomy in Glasgow before his appointment in Canada as Commissioner. He provided scientific information to make the implementation of fishery law more effective. Prince strongly advocated research on natural history and pollution and worked to establish biological stations to study fish life. A complete survey of fisheries of the boundary waters from the Bay of Fundy to Puget Sound was conducted during 1893-1896. The first marine biological research station began in New Brunswick at St. Andrews in 1899. The first component of the St. Andrews Station was a floating station. Gradually a land-based operation was constructed, and, in 1908, the Canadian government made the Atlantic Biological Station an official government station, along with its counterpart, the Pacific Biological Station in Nanaimo, British Columbia. For a short time, the federal government operated a station at

Georgian Bay on Lake Huron, but this station was later abandoned, partially because conflicts between provincial and federal authority for management. In 1912, the Biological Board of Canada was given control of all biological stations. They published the results of research conducted at all laboratories, including research from the Georgian Bay station about the many fish species of the Great Lakes.

Canadian and American governmental disputes regarding fishing have been long standing. In fact, the year AFS was formed, the Canadians had an order of Council that forbade foreign fishermen from fishing Canada's waters. The Washington Treaty in 1873 allowed American fishermen access to inshore waters of Canadian fisheries in return for similar Canadian access and free entry of Canadian fish to American markets. In the Great Lakes, there were conflicts regarding the harvest. The American markets were well established, and many Canadians had access to fish only after processing through American ports. ←

Major Capture Fisheries Late 19th & Early 20th Centuries



Men in wooden boat after fishing for cod, 1897.
UNIVERSITY OF WASHINGTON



Aboriginal fishers in front of drying fish in
Bristol Bay, Alaska. NATIONAL ARCHIVES

South side of T Wharf, the wholesale fresh fish center in Boston, circa 1898.
2000 AFS CALENDAR



In North America, major capture fisheries were established first in the Atlantic, then the Great Lakes, the Mississippi and Missouri rivers, portions of the Gulf coast, and finally along the Pacific coast. Most of these regions had aboriginal fisheries, but the new immigrants, particularly those from Portugal, Italy, Greece, the Scandinavian countries, and China, were especially influential in developing and changing the nature of the fisheries.

Atlantic fisheries began for cod in and around Newfoundland and the Gulf of St. Lawrence, and a cod fishery was developed in New England with Boston and nearby ports the center for landings. At first a byproduct of the cod fishery, halibut soon became a target species with the fishery centered in Gloucester. Shad or herring fisheries were developed all along the Atlantic coast. The shad fish-

ery began as a seine fishery but later gill and bow nets were used. Mackerel were important for the Chesapeake Bay and Gulf of St. Lawrence, as were the herring. Menhaden were used for oil and meal production, with factories from Maine to North Carolina. A major oyster fishery was centered in Chesapeake Bay, and other shellfish and crabs provided valuable catches. The wharves at Boston, Baltimore, Norfolk, and other coastal cities were replete with processors, and many coastal communities supported the boat and net-building industry. Eastport, Maine became the center of a sardine industry, and Atlantic sturgeon were important to the harvest in the mid-Atlantic.

Throughout the nineteenth century, the Great Lakes supported important commercial fishing industries. Many entrepreneurs used steamboats, and completed canals to connect systems of trade for fish products. Canal ports lead to rails that transported fish to major cities and associated markets. Harvesting, processing, and marketing were all components of this industry, and Great Lakes whitefish were exported to markets in England as well as to the industrial cities in North America. These fish served as important protein sources for the new immigrant work force.



Drying gill nets on Beaver Island, Lake Michigan, circa 1899.
COURTESY OF MICHIGAN MARITIME MUSEUM

The Mississippi River fisheries targeted catfish for food and river mussels for pearly shells from which to make buttons. A large button industry was linked to river dredging operations, and these buttons were shipped to the industrial centers like St. Louis for shoes and clothes. Midwest communities along the Missouri and Mississippi rivers supplied many goods for the western expansion, starting with the famous expedition of Lewis and Clark in the early 1800s that provisioned at St. Louis.

Fisheries in the Gulf of Mexico began as shellfish fisheries; shrimp were fished with trawls and oysters were dredged. Processing was centered in New Orleans. Initially the shrimp were sun dried for export to China, but later they were canned and shipped to many markets.

It was not until the late 1860s that the fishing industries on the Pacific coast were fully developed. San Francisco was the first major fishing center, and soon the industry spread southward to southern California and northward

to the Columbia River, Frazier River, and into Alaska. Pacific Ocean shrimp were fished and dried mostly for export to China until the 1930s. The abundant salmon runs in the late 1800s provided a unique and easy opportunity to capture large quantities of fresh fish for new business ventures. Fishers captured migrating salmon with blocking nets, fish wheels, and other devices. By 1896, 120 salmon canneries existed on the west coast. California sardines provided a major fishery, with ports from San Diego to San Francisco, as fishers followed the north-south migration of these sardines. A fishery in the north concentrated on Pacific herring, providing salted product and fishmeal and oil. Halibut were fished in the Puget Sound area initially, and later the fishery expanded into Canada and Alaska. Tuna fishery was high priority in the early 1900s. During World War I many of the fisheries were heavily exploited for food, and after the war ended few of the inland fisheries were ever again commercially viable. ←

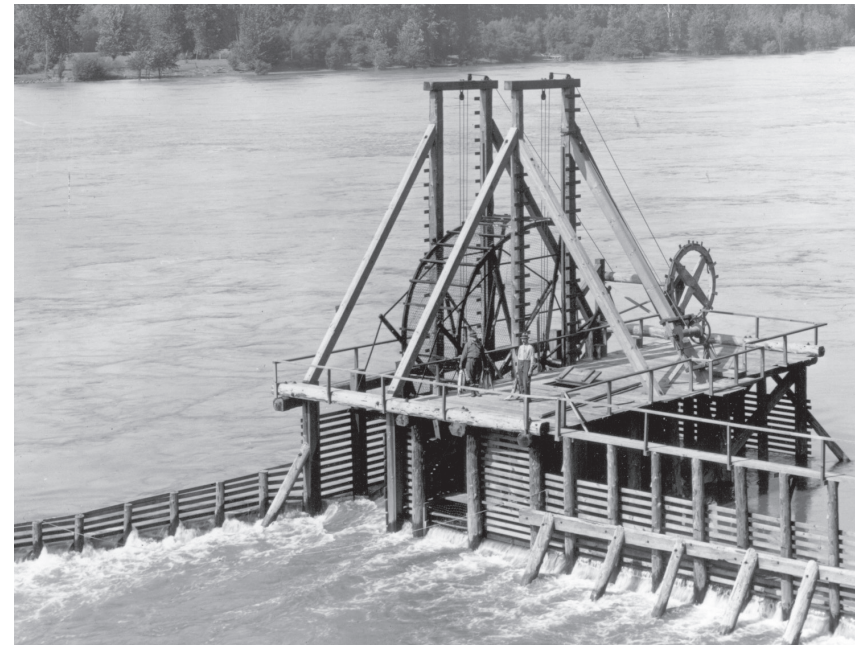


Mussel buttons at DC Booth National Fish Hatchery. C. M. MOFFITT



Mussel fishing through the ice on the Mississippi River near Princeton, Iowa (winter of 1898-1899). 2000 AFS CALENDAR

Moffett Creek Wheel on Moffett Creek Bar. Fishwheels were common on the east coast as early as 1829 for shad fisheries, and were introduced to the Columbia River in 1879. OREGON HISTORICAL SOCIETY



Within the first few years after founding the newly formed association voiced concern about water pollution and the destruction of natural resources. Fish culture was often used as a way to mitigate the negative effects of pollution or resource depletion. Early efforts were impressive, and the U.S. appropriations were much greater for the development of fish culture than for studies of natural history. Members urged the United States Congress to increase the appropriations for the establishment of at least two fish hatcheries in 1871.

The members' optimistic approach to aquatic natural resources was unabated for the next several decades. Livingston Stone, the first secretary of the Association, was a major pioneer and lobbyist for fish culture. He began his career in the northeastern United States and Canada, and in 1872, when he was deputy Commissioner of the U.S. Fish Commission, he was sent to California to obtain Pacific salmon eggs for shipment all over the world. The location of this historic egg-taking station was on the McCloud River, and Stone devel-

oped Baird Station on that site, with considerable help from the Native Americans of the McCloud Wintu tribe.

By 1878, the organization changed its name to the American Fish Cultural Association, and activities were carried out at an international fishery exhibition at Berlin in 1880, with prizes in fish culture. International expositions, largely sponsored by the U.S. Fish Commission, contained impressive displays that promoted fish culture and fish capture methods and spread the

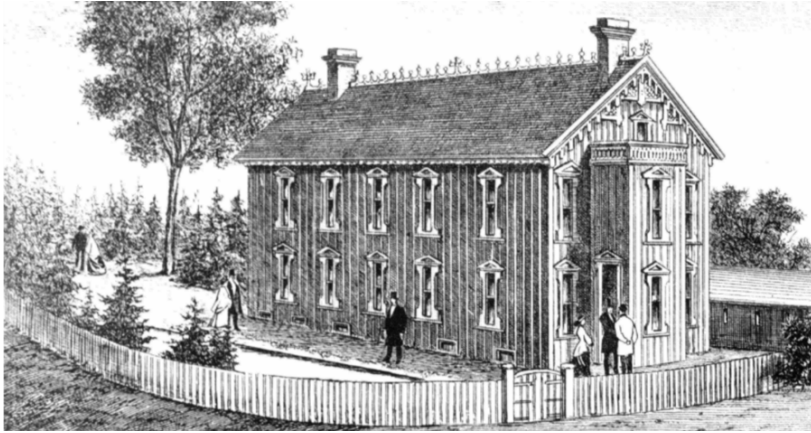
technology and vision of fisheries industries.

In 1885, the name was changed once more to the American Fisheries Society. The Society's objective was "to promote the cause of fish culture, gather and diffuse information bearing upon its practical successes, and upon all matters relating to the fisheries. The uniting and encouraging of the interests of fish culture and the fisheries, and treatment of all questions regarding fish of scientific and economic character."

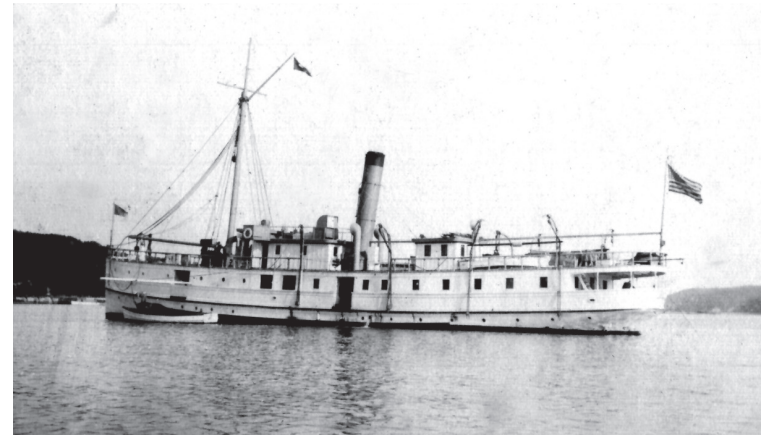
Specially designed railroad cars were used to transport fish eggs and fry across the continent in stocking programs conducted by the Bureau of Fisheries. The Bureau began in 1903 in the Department of Commerce & Labor, and in 1939 was transferred into the Department of Interior. NOAA NORTHEAST FISHERIES SCIENCE CENTER



Development of Fish Culture Seen as the Solution to Depleted Stocks



Main Newcastle Hatchery building at Wilmot Creek, Ontario (1876). The facility was used primarily to rear Atlantic salmon. E. J. CROSSMAN/2000 AFS CALENDAR



Research vessel *USS Fish Hawk* and small tender vessel, 1923, Woods Hole. NOAA NORTHEAST FISHERIES SCIENCE CENTER

In Canada, Samuel Wilmot pioneered interest in fish culture. Wilmot had no technical training, but had built a fish hatchery on his farm near Newcastle, Ontario. In 1868 he became an official of the new Federal Government, and by 1876 he was the first superintendent of fish breeding in Ottawa. Wilmot established hatcheries in Quebec, Ontario, and the Maritimes and was Chairman of the British Columbia Commission (1892) and the Great Lakes Commission.

Fish culture was not limited to salmonids; and technology for hatchery production was a challenge that many early scientists met with innovative solutions. McDonald hatching jars, developed at Woods Hole and named in honor of third Commissioner Marshall McDonald, were used aboard the *USS Fish Hawk*, a vessel of the U.S. Fish Commission. Starting in 1879, the ship cruised along the east-

ern seaboard distributing hatched-out embryos of shad, herring, and striped bass to reseed the waters.

The enthusiasm among the Society members, governmental institutions, and the public, for fish culture as the solution to depleted stocks of fish, was resounding. The optimism drove the political decisions. Government-sponsored fish planting occurred widely, and eggs were shipped all over the globe through international exchanges. The agrarian philosophy of planting continued, and fish were moved from culture ponds to natural waters throughout the continent by several means. The specially designed fish railcars were exceptionally effective in moving fish great distances. Special "fish treasures" such as paddlefish or other unique species were collected from locations across the country and shipped to the National Aquarium for display. ←



Cod hatching table at U.S. Fish Commission hatchery at Woods Hole Station. McDonald hatching tests. Marshall McDonald was president of AFS 1885–1886. Worth photo 1891. NOAA NORTHEAST FISHERIES SCIENCE CENTER

Descriptive biology and natural history surveys dominated studies of fisheries in the early years. Many of these studies were based at Woods Hole and at the Smithsonian. In addition, Swiss-born Louis Agassiz and his son Alexander curated many of the early fish collections in the United States through the Museum of Comparative Zoology (MCZ) at nearby Harvard University. Louis Agassiz's classic work on living and fossil fish are classic and elevated the status of descriptive science for Americans and for scientists throughout the world. Agassiz trained and influenced an entire generation of zoologists and paleontologists, among them David Starr Jordan, who became one of the most famous biologists of his time.

Spencer Baird helped organize the natural history component of several extensive surveys conducted in the 1850s and 1860s, for purposes such as the building of transcontinental railways and defining the boundaries of Mexico and British North America (Canada). These surveys provided important information on the natural history and distribution of the continent's inland fishes. Specimens were deposited within the Smithsonian and within the Philadelphia Academy of Science and the Museum of Comparative Zoology. *Girard's Fishes* (1858) is an account of the fishes collected during the Pacific Railroad Surveys (1853–1855). The report on fishes *Ichthyology of the Boundary* (1859) was also written by Charles Girard. *The Northwest*

Boundary Survey (1857–1861) was not so successful with publication of the results due to loss of specimens and lack of funding. In 1858 and 1861 George Suckley published descriptions of several new species of salmon and trout collected by his friend Caleb Kennerly, and Theodore Gill wrote a report on the nonsalmonid fishes.

The Bureau of Fisheries vessels provided the opportunity for scientists to collect fishes from North American marine environments. Among the most magnificent was the 234-foot *USS Albatross*, the first U.S. research vessel built for fisheries and oceanographic research. This twin-screw vessel was designed to conduct investigations in any part of the world's seas. The results of

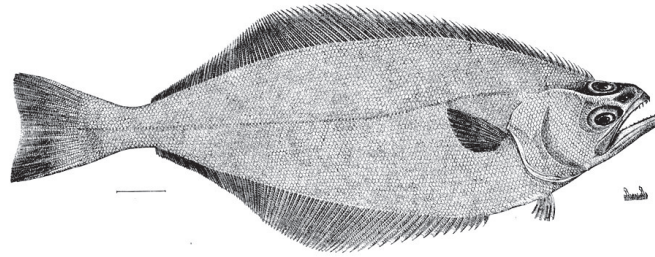
these cruises were published in the *Bulletin* of the U.S. Fish Commission, starting in 1881. In 1888, the *Albatross* sailed to the Pacific Ocean, where it was used for research and marine mammal law enforcement until 1914. The ship was used from 1915 to 1921, with an interruption in 1917 due to World War I, for research off Oregon, Washington, California, and into Baja California. The fisheries investigations off the coasts of California, Oregon, Washington, and Alaska provide important reference points in the natural history of the western North American Pacific fisheries and they are as impressive in their discovery of fishes and fisheries as those made by Darwin on the voyages of the *Beagle*.

Vessel *USS Albatross* at Washington navy yard.
NOAA NORTHEAST FISHERIES SCIENCE CENTER

Description & Natural History



Alexander Agassiz, son of Louis Agassiz and curator at the Marine Biological Laboratory, Woods Hole, Massachusetts.
NOAA NORTHEAST FISHERIES SCIENCE CENTER



THE ATHERESTES FLOUNDER
Atherestes sicimias, J. & G. (p. 88)
Drawn by H. L. Todd, from No. 27186, U.S. National Museum,
collected at Point Reyes, California 1880, by Jordan and Gilbert.
HISTORIC NMFS COLLECTION



Portrait of David Starr Jordan and his dog Jock.
INDIANA UNIVERSITY ARCHIVES

The Fish Commission published the extensive five-section, seven-volume review of the history and conditions of U.S. fisheries, edited by George Brown Goode, *The Fisheries and Fishery of the United States*. These volumes contain not only the descriptions of the fish species, but also extensive illustrations of the landscape and fisheries found during these natural history expeditions. Additionally, G. Brown Goode and Tarleton H. Bean published *Oceanic Ichthyology, a Treatise on the Deep-sea and Pelagic Fishes of the World*, based chiefly upon the collections made by the steamers *Blake*, *Albatross*, and *Fish Hawk* in the Northwestern Atlantic in 1896.

After training at Harvard, David Starr Jordan and Jordan's student Charles Henry Gilbert explored the streams and rivers of Indiana and the southeastern United States in the late 1870s, and described sev-

eral new fishes. Jordan began as Gilbert's high school teacher. Over time, both advanced in positions of science at academic institutions. In 1879, Spencer Baird asked Jordan and Gilbert to survey Pacific salmon. At that time, Gilbert was a Ph.D. student with Jordan in Indiana. Jordan took a leave from Indiana University to conduct the survey. By the time Gilbert received his Ph.D. degree at the age of 24, he was the author or coauthor of more than 80 scientific papers. Jordan returned to Indiana and was appointed president of Indiana University in 1885. He served there until he left to head Stanford University in 1890, at the request of its founder, Leland Stanford, a California businessman and governor made rich by founding the Central Pacific Railroad. Jordan brought Gilbert with him to join the faculty. Then Gilbert began a career at Stanford University that spanned nearly 37 years.

Gilbert's research concentrated on mostly marine Pacific fishes, and he is credited with describing alone or with others about 117 new genera and 620 species. He joined several expeditions aboard the *USS Albatross* to explore Alaska and the California coast and even traveled to the Hawaiian Islands and the Japanese Archipelago. In 1903, the U.S. Fish Commission and the Office of the Commissioner of Fish and Fisheries were placed in the Department of Commerce and Labor. David Starr Jordan was asked to head a committee appointed by U.S. President Theodore Roosevelt to investigate causes for the decline in salmon fisheries of Alaska. In 1909, Gilbert was put in charge of the Pacific Fishery Investigations, which were based at Stanford University until 1931, when they moved to Seattle, Washington. Gilbert was pivotal in determining the life histories of the Pacific salmon and conducted

research on these species from 1912 to 1927, when he worked in British Columbia and Alaska. Among his graduate students were William Francis Thompson and Carl Levitt Hubbs.

Other scientists provided important data on the distribution and natural history of the fishes of North America. Barton Warren Evermann participated in many fish and natural history surveys throughout North, Central, and South America, as well as on other continents. Evermann conducted the first limnological studies of Montana's streams and lakes, including the Clark Fork and Snake rivers west of the Continental Divide and the Jefferson, Madison, Gallatin, upper Missouri, and upper Yellowstone rivers east of the Divide. The studies included photographs and maps of the areas. ←

AFS's Unique Position

“Artificial breeding can do a great deal, and has done a great deal, but it cannot be relied upon for certainty.”

Livingstone Stone, TAFS 1892

The sponge auction wharf at Key West, Florida, 1900. NOAA FISHERIES COLLECTION



AFS was formed before other natural resource oriented professional societies began, and from its beginning, members of AFS were interested in public communications and policy and brought forth a diversity of approaches. During its first few years, highlights of AFS meetings were published in *Forest and Stream* magazine (before the papers appeared in *Transactions of the American Fisheries Society*). This continued until *Forest and Stream* moved to New York City in 1875, eventually to become *Field and Stream* magazine. AFS members promoted and encouraged opportunities for communications across national borders and disciplines, as well as outside of the members' individual institutions. Although travel outside of the continent was difficult, correspondence was coned out with members located throughout the world. In 1882, honorary members included Thomas H. Huxley of England and His Royal Highness Frederick William, the Crown Prince of Prussia and Germany.

Debates on management, policy issues, and appropriate practices were always part of meetings. In 1892, the Society was outspoken about the stocking of cacheable trout versus fry. One of the most interesting events occurred in the 1890s. Livingstone Stone called for the formation of a National Salmon Park, and in 1892, Afognak Island, Alaska, was set aside as a forest and fish cultural reserve. Stone said in the 1892 *Transactions*, “artificial breeding can do a great deal, and has done a great deal, but it cannot be relied upon for a certainty.”

In 1898, AFS members elected the

President of the United States and governors of several states to honorary membership and urged the U.S. Fish Commission to establish a Great Lakes Scientific Laboratory. In the same year, the U.S. Congress passed its first salmon protection law, due to commercial obstruction of Alaska's Karluck River.

Active debate among members occurred over the advantages of state and provincial control of resources versus the advantages of a federal approach with national regulations. The Society discussed the Sponge Act of 1906, the first assertion of U.S. federal authority to manage marine fisheries. The Act set conservation rules for taking sponges from the Gulf of Mexico and Straits of Florida. Topics in 1907 included the international problems of regulation of fisheries of the Great Lakes. The AFS members advocated regulation of take and promoted early partnership with anglers who promoted recreational fishing. Academic biologists as well as agency and other members of AFS joined in the debates. Their opinions were diverse and were sometimes in conflict with the philosophy in the Bureau of Commercial Fisheries which promoted commercial development. In 1912, Henry Ward, who became president of AFS in 1913–1914, discussed the advantages of creating refuges for fish and articulated that fishes deserved similar treatment as mammals and birds for which refuges were being established. Ward advised that river reaches or entire watersheds should be set aside, and he also expressed concern about the plight of the noncommercial native fishes.

Hugh M. Smith was U.S. Commissioner of Fisheries in 1913 when he presented to the AFS the idea of a national institute for technical instruction, similar to the land grant programs for agricultural colleges. The AFS members agreed that more formal training in fisheries was needed and recognized that programs within existing colleges and universities were not sufficiently comprehensive. The AFS members emphasized that governmental institutions could not handle all the training needs, and, very early on, several educational institutions provided assistance to the various state, national, and provincial agencies.

Before the end of the nineteenth century, scientists at the University of Michigan were conducting lake surveys and fishery investigations and working closely with the Michigan Department of Conservation. Formal university fishery programs did not begin until after the war when two schools, the University of Washington and Cornell University, provided the first programs. Because staff at the University of Washington lacked expertise in fish culture, Dr. Embury was brought for a brief time from Cornell to teach. In 1919, AFS members and the Committee on University Courses in Fish Culture resolved to promote education in fisheries and extended their appreciation to the two universities. This formalization of educational programs laid the framework for the technical training and development of the science within AFS that would follow. Scientists from several universities published in *Transactions*. The University of Toronto established the Ontario Fisheries Laboratory in

1920, where research was primarily conducted on basic limnology and aquatic biology, not fishery management. In 1922, the Massachusetts Institute of Technology instituted a course in fisheries engineering.

Although the majority of AFS members have resided in the U.S., Canadian members have always actively participated in the Society. Notable among early leaders was Edward E. Prince, the Canadian Commissioner of Fisheries, who served as Vice President in 1920 and served on the executive committee from 1921 to 1924. He wrote "Fifty Years of Fisheries Administration in Canada" to celebrate the 50th anniversary of *Transactions*, and the meeting in Ottawa, Canada.

The AFS meeting provided more opportunity for different points of view to be presented in debates than would be possible within any one geography or political entity. Members have debated public policies and the implications of management actions, and these activities have separated AFS from scientific organizations that do not consider management options, and from management agencies that may focus on one perspective. In a retrospective of the AFS, Norman Benson wrote in *A Century of Fisheries in North America*, "The Society can never assume that administrators of broad policy will take the time to review published technical knowledge. Rather the Society must have the administrative machinery to prepare [policy] statements that reflect sound scientific knowledge and include a broad analysis of problems." ➔



Comstock Hall, home of the Laboratory of Limnology and Fisheries at Cornell University, built in 1914. Photo taken in 1943. HOWARD SCHUCK

"The Society can never assume that administrators of broad policy will take the time to review published technical knowledge. Rather the Society must have the administrative machinery to prepare statements that reflect sound scientific knowledge and include a broad analysis of problems." Norman Benson, 1970

Cross-Continent Rails Provide Access

By the beginning of the twentieth century, rail systems had expanded to include more comfortable and inexpensive access for people to move about and enjoy unique natural landscapes. Eastern magazines, such as *Field and Stream*, and travel and fishing books promoted these recreational opportunities and explained the surroundings and opportunities available. President Theodore Roosevelt established the U.S. national park system, and other conservation initiatives provided opportunities for preservation and leisure. Roosevelt's Governors Conference, convened in 1908, was considered the beginning of the natural resource conservation movement in North America.

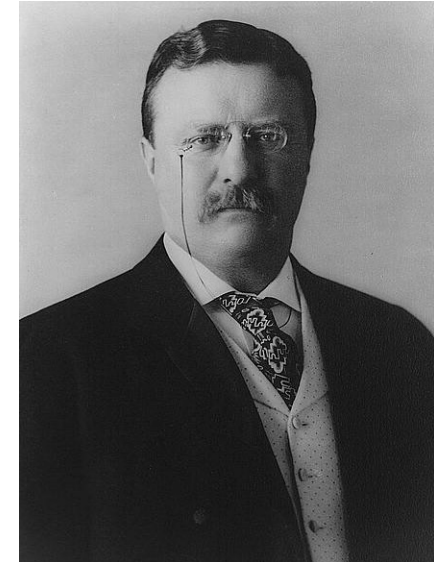
In 1912, AFS became loosely affiliated with the National Association of Game and Fish Wardens and Commissioners by holding overlapping meetings. The Society gradually increased interactions with the state and provincial commissions and agencies about their needs, as the greater recreational fishing

community emerged. The use of hatchery-reared fish to meet recreational fishing needs increased, as traveling to far away places to enjoy fishing, hunting, and natural resources became popular among more and more people.

The automobile increased access to recreation and natural areas beyond those provided by the rails. Industries developed that catered to the growing interest in recreational fishing. Some of the first American fishing reels were developed in the early 1800s, and at the Chicago World's Fair in 1893, American built and designed reels won the First Prize. Many entrepreneurs began designing lures and other fishing gear. In Michigan, Lou Eppinger began selling his lure called the "Osprey" in 1912; later, he changed the name to the Dardevle, named after the American Marlines. Tackle companies such as Wright and McGill formed in the 1920s in Denver to service this new interest in the outdoors and in fishing. ←



Tourists in Wind Cave, South Dakota, 350 feet below the surface at Odd Fellows' Hall. William Jennings Bryan and Governor Lee are in the center front of group. By W. R. Cross, circa 1897. NATIONAL ARCHIVES



Theodore Roosevelt.
LIBRARY OF CONGRESS

**Roosevelt's Governors
Conference, convened in
1908, was considered the
beginning of the natural
resource conservation
movement in North America.**

Quantitative Fishery Science

After the turn of the century, several groups of scientists moved fisheries science beyond simple descriptions of species by developing quantitative methods to help understand the abundance of fish stocks, and fish growth and diets. The science of oceanography, developing at Woods Hole and in Canada, began to consider more than single species. In 1912, Henry B. Bigelow began 16 years of research on oceanic fisheries in the Gulf of Maine, which was later developed into a key text. Attention to larval fishes at this time helped initiate thinking about

the distributions of stocks and their spawn. During the 1920s, studies of lake production began with Kemmerer in northwestern lakes. The international communications of scientists helped spread studies of physical and biological limnology.

Early in the 1900s, studies of age and growth of fish helped define the relationships between the growth of calcified hard parts of fishes and their environment. Among the first to recognize these relationships were German scientists Hintze and Hoffbauer. Scientists Knut Dahl and Einar Lea soon established relationships for trout, salmon, and herring populations

in Norway. As early as 1912, Gilbert applied the scale method to aging of Pacific salmon. In addition to aging, Gilbert pioneered ways to separate populations of one species by using scales. Reflecting on this early history, Ken Carlander speculated in 1987 that the lack of major fisheries for inland species likely limited the application and development of these techniques during the early years, since the emphasis in many inland fisheries remained on propagation and habitat maintenance rather than maximum-sustained yields. In 1929, J. Van Oosten provided a thorough review of methods of aging and



Henry Bryant Bigelow, on the deck of the *Grampus*, 1912.

NOAA NORTHEAST FISHERIES SCIENCE CENTER

proposed using projection equipment to aid in analysis.

Studies of food habits occupied many researchers, starting in the 1920s, and methods were developed to quantify these relationships to understand the associations among different species. In the Midwest, several research groups explored population dynamics. Out of these studies came R. W. Eschmeyer's influential publication "The Significance of Fish Population Studies in Lake Management" (*Transactions of the 3rd North American Wildlife Conference*, 1938). Zoe Sch-nabel published a method for estimating total fish populations using repeated recaptures in 1939. George Rounsefell published widely to help quantify the scientific details needed for accurate population assessments, including marking of fish. →



Collecting trip to Martha's Vineyard, Massachusetts conducted by H.M. Smith, 1923. (left to right) Chilchester, Galtsoff, Smith, unidentified, Bigelow. NOAA NORTHEAST FISHERIES SCIENCE CENTER

Early Fisheries Management & Surveys

The dominant philosophy that humans should and could control the landscape and that crops and agricultural manipulations were appropriate, was part of our culture by the mid-1800s. Early fishery management agencies in state, provincial, and federal governments gave priority to introduced species and were less likely to work with natural systems. Fish populations existed to provide food, economic value, and recreational yields, and the idea that natural resources could be managed and harvested evolved to become one of the major principles of natural resource management. It was not until later that the value of native species came into management decisions, although early on there were AFS members who questioned the unrestrained planting of fish. However, fish planting often provided a path of least resistance to minimize conflicts from other human activities, including overharvesting.

To manage a fishery, something

had to be known about species, water characteristics, and species life history requirements. Another component was to understand the harvest. Early managers preferred to manipulate the habitat and populations through removal of undesired fish populations and the planting of desired species.

For years, the U.S. federal government maintained a fish-rescue operation in the Mississippi River floodplain that was targeted at removing fish from temporary flood ponds and returning them to the nearby rivers or more distant locations. Game fishes were often kept for distribution into other waters. State fish rescue programs were also active; for example, Iowa reportedly began a program as early as 1876. Fish-rescue activities continued in many areas until 1940.

At the same time that managers were operating fish rescue and fish removal projects, the river land-



George Embody (upper right) and crew removing trout from the Cornell Experimental Hatchery near the water supply, 1938. HOWARD SCHUCK



Series of photos showing the process of fish rescue in the Mississippi River near LaCrosse, Wisconsin. BUREAU OF FISHERIES FILM, DC BOOTH HATCHERY

Fish-removal projects were often used to manage desired species combinations; unwanted species were removed with nets or with toxicants, such as rotenone, and desired species were restocked in the waters.



Pouring fish fry into a milk can for outplanting. DENVER PUBLIC LIBRARY



Milk cans were strapped to horses for planting fish. DC BOOTH NATIONAL FISH HATCHERY



Channel catfish broodpens. Tishomingo Fish Cultural Station, Oklahoma, May 1949. FISH AND WILDLIFE SERVICE PHOTO, DC BOOTH NATIONAL FISH HATCHERY

scapes being altered along flood channels and river courses, and dams were built for various purposes. Fish removal projects were often used to manage desired species combinations; unwanted species were removed with nets or with toxicants, such as rotenone, and desired species were restocked in the waters. Stocking of fish was accomplished by means of a variety of vehicles and devices, including rail cars, horseback pack, airplanes and trucks, and backpacks. The science of what species to use, and how many fish to put in, was worked out through experiments and trial and error. In New York, George Embury published guidelines for trout-stocking densities based on stream characteristics, and use of larger-sized fish at stocking became more acceptable.

Homer Swingle and his students and colleagues in the southeastern U.S., pioneered an approach to testing population dynamics in farm ponds to determine appropriate species combinations and densities to sustain a desired balance and yield. Throughout interior North America, this concept was adapted to farm ponds that were created and promoted by land and agriculture managers, especially during the 1930s, to help restore farm productivity. These tests, which began in the 1930s and continued for more than 40 years, resulting in farm pond fertilization as an established practice throughout the southern states and into the North and parts of the West. Commercial pond production did not begin until the 1960s. ➔

Emmeline Moore: First Woman to Lead AFS



Emmeline Moore at her desk, 1963. NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, THE CONSERVATIONIST.



Ellen Edmonson illustrating a fish. NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION



Emmeline Moore provided early leadership that emphasized the importance of good monitoring programs for fishery and aquatic habitat management. Moore was the first woman to lead AFS, elected president in 1927, just seven years after women obtained the vote in the United States. She received her AB from Cornell, her masters from Wellesley College, and then, after a brief exchange as a professor in South Africa, returned to study for a Ph.D. at Cornell with George Embody. She got her professional start during World War I, when a severe shortage of men provided Moore with a job on a federal government project of food relations of fish. In 1920, she became an investigator in fish culture for the New York State Conservation Department. A strong advocate of research, her early studies were in fish health. Moore published a number of articles on fish health in *Transactions*, including a description of *Octomitus salmonis*, a new species of intestinal parasites in trout in 1922. As time passed, Moore promoted research as a critical link for proper management. From 1926 to 1932, she headed New York State's Biological Survey. Surveys were con-

ducted watershed by watershed, one each summer from 1926 to 1939, and provided the inventory of New York's streams, lakes, and aquatic resources. These biological surveys were the first, and remain the most comprehensive, scientific examinations of any state's water resources ever conducted. The standardized survey methodologies were probably developed from Embody's work. Moore even commissioned artists to illustrate the many fishes that were found in the survey. Two people were responsible for most of the works: Ellen Edmonson rendered the majority of the illustrations, and artist Hugh P. Crisp provided a number of others. Moore understood the importance of communicating the significance of these fishes to the public, and high quality illustrations were critical to making those links. In addition, Moore demonstrated valuable leadership in the Department of Conservation, arguing that knowledge of non-game components of a stream system were equal in importance to those of game species. Then, from 1932 to 1944 she was the Chief Aquatic Biologist for the state, and in 1944, she joined the Bingham Oceanographic Laboratory at Yale. ➔

New York State's Experimental Trout Stream, Crystal Creek, Adirondacks, New York. Field personnel (left to right) S. Lee Crump, Robert Zilliox, Howard Schuck, Arch Petty, Donald Pasko. HOWARD SCHUCK

AFS Develops a North American Fish Policy

AFS members often passed resolutions on a variety of topics of concern. However, many of these items were ephemeral and little follow-up activity was involved, although they were meritorious plans. Examples of resolutions and debates are contained in the transactions for each annual meeting. For example, in the 1920s, the Society passed resolutions on Alaskan Salmon Fisheries, endorsing creation of emergency reservations for fisheries in central and south-east Alaska. They voted to endorse the National Coast Anti Pollution League to end pollution of coastal waters by oil. AFS resolved itself firmly opposed to projects of diking and draining of Upper Mississippi River bottomlands, including the Winnesheik project. They voted to endorse the work of the Isaac Walton League of America.

In the 1930s, the Society began an effort to develop longer and more thoughtful policy analyses to pro-

vide a framework for fisheries management and research in North America (U.S. and Canada). This effort was influenced by the drought and economic depression and by the many public works projects and the legislation of the 1930s. Many water projects had profound effects on the aquatic environment. The U.S. Congress passed the Fish & Wildlife Coordination Act of 1934 that authorized cooperation between state and federal agencies to study domestic and industrial pollution, to use impounded waters for fish culture stations, and to mitigate or provide for fish passage at dams. The Soil Conservation Service was founded in 1935 and used scientific practices to reduce erosion of agricultural lands. In 1937, the Pittman-Robertson Federal Aid for Wildlife Act was passed, and the Tennessee Valley Authority was established to erect dams and generate electricity.



Construction of Grand Coulee Dam, Columbia River Basin, 1936.
NATIONAL ARCHIVES

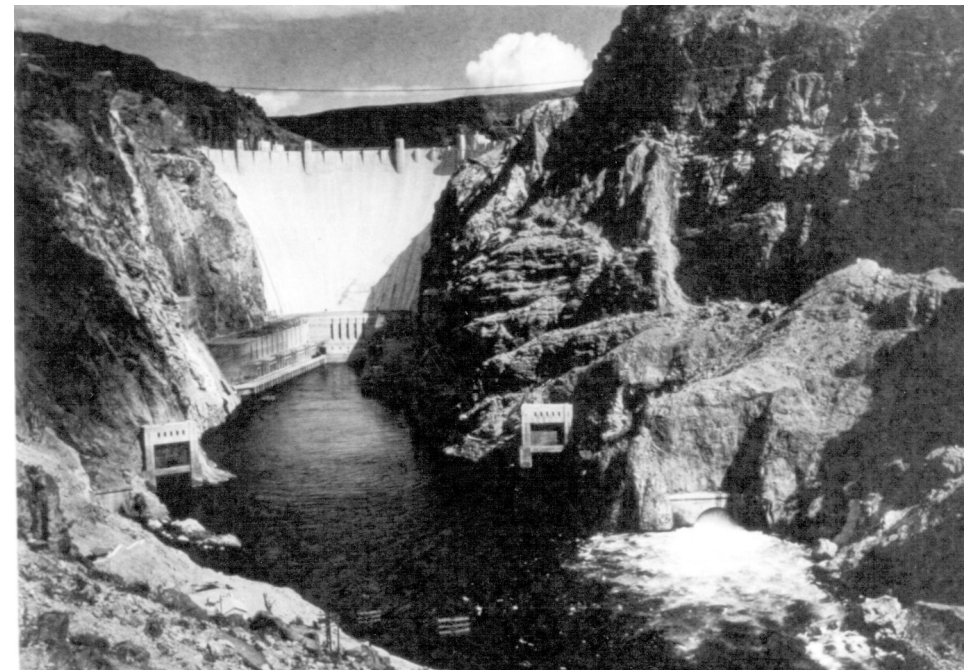


Drought relief workers. HARGRETT RARE BOOK & MANUSCRIPT LIBRARY/UNIVERSITY OF GEORGIA LIBRARY

“The fish resources of the continent have often been regrettably depleted in the wasteful exploitation of our natural resources, and in the despoliation and elimination of many waters.”

Introduction, AFS North American Fish Policy, 1938

Looking across water to Boulder Dam, in Arizona/Nevada, 1941. NATIONAL ARCHIVES



The first North American Fish Policy was adopted in June of 1938 and served as an important first guide for state, provincial, and federal fishery regulations and programs and as definition of the intellectual and institutional framework of the value of fish and fisheries.

The committee members were from Canada and the United States and included: J. D. Chalk, H. S. Davis, G. Embody, F. J. Foster, C. A. French, S. Gordon, W. J. K. Harkness, A. S. Hazzard, C. L. Hubbs, A. G. Huntsman, S. B. Locke, J. A.

Rodd, J. Van Oosten, and G. C. Warren, Jr.

Noteworthy in this policy was the admission that there would be a need for revision of attitudes as well as practices. The original policy states: "That often there will be need for drastic revision in practices. The practices now current in most progressive circles are bound to become obsolete within a few years, and there will be a need to revise attitudes as well as practices ... even such general policies as the ones here presented will need revision."

The first version detailed the benefits of fish as aquatic resources of North America and acknowledged the regrettable depletion of these resources in the "wasteful exploitation of our natural resources, and in the despoliation and elimination of many waters." One of the premises of the introduction was "that fish are crops, capable of being conserved, restored and increased through sound management practices."

The document contained sections on the management, jurisdiction, and roles for states, provinces,

and federal fishery entities. Several sections contained guidelines for rights of the fish and fisheries. The policy stated, "fishery resources were important elements of national wealth and not a minor incident in the development of power, flood control, drainage, irrigation, reclamation, and recreational projects, as has been done in the past." The policy stated, "Only when a proposed water development exceeds in public value the fisheries resource should the latter be sacrificed, in which case the fishery interests should be compensated fully for

Photo of attendees at the 60th Annual AFS meeting in Toronto, 1930. FRONT ROW- (left to right) Dell Brown, Arkansas; P.G. Needham, New York; Unknown; A.P. Miller, New York; G.C. Embody, New York; Unknown; J.P. Snyder, New York; Mrs. Eugene Surber, Minnesota; Miss Margaret Wilton, Ontario; John W. Titcomb, Connecticut; N.R. Buller, Pittsburg; Dr. Emmeline Moore, New York; David L. Belding; John Van Oosten, Michigan; Walter Shirts, Indiana; J.O. Detwiler, Ontario; W.H.R. Werner, Ontario; Miss Devlin, Quebec; C.O. Hayford, New Jersey; H.C. White, New Brunswick; Lee Miles, Arkansas; F.A. Westerman, Michigan; A.B. Cook Jr., Michigan; George J. Berg, Indiana; B.V. Taylor, Quebec. MIDDLE ROW-Standing (left to right) Eugene W. Surber, Minnesota; Louis Trillion, Quebec; Henry A. Schuil, Michigan; J.P. Marks, Michigan; G.W. Hoofnagle, Michigan; James Catt New Brunswick; Carl L. Hubbs, Michigan; Unknown; H.S. Davis, Washington, D.C.; George W. Field, Sharon, Massachusetts; J.A. Laird, New York; L.H. Spragle, Pennsylvania; C.N. Candee, Ontario; D. McDonald, Ontario; J.R. Dymond, Ontario; A.L. Tester, Ontario; J.L. Wicks, Minnesota; T. Surber, Minnesota; Seth E. Gordon; J.A. Rodd, Ottawa; J.A. Bellisle, Quebec; A.G. Huntsman, Ontario; Mr. James; Frank L. Snipes, Michigan; C.F. Fuller, Wisconsin; A.F. Byers, Quebec; Mr. Heinzerling, Indiana; F.M. Gilbaut; R.C. Lindsay, Quebec. BACK ROW- Standing (left to right) E.W. Cobb, Connecticut; A. Wiebe, Iowa; H.F. Lord, Vermont; H.H. MacKay, Ontario; G. Bell, Ontario; F. P. Ide, Ontario; M.C. James, Washington, D.C.; W.J.K. Harkness, Ontario; E.S. Pentland, Ontario; W.E. Ricker, Ontario. AFS



their losses. The fisheries should be given equality of representation on all planning agencies at all times and should be represented by qualified persons from the state, provincial, and federal agencies involved."

The policy had guidelines for professional training, a section on public ownership and fishing rights, and a section on political interference that promoted fisheries administered on a nonpolitical basis by trained professionals. This section was adapted from a similar document that was adopted

by the International Association of Game and Fish and Conservation Commissioners in 1934.

A major component of the first document was the Objective of Fisheries Research in which 14 points were articulated. These included guidelines for lake and stream surveys and improvements, fishways and screens, fishery statistics, improvements in fish cultural methods, and fish stocking policies and standards. Within the fish stocking section was the guideline, "no introduction of exotic species of fish should be made in the waters

that now contain only native species which provide good fishing." The policy contained a section on natural and artificial propagation, nurseries and refuges, life and natural history, and predator control. In discussing predator control, the policy stated that the wholesale slaughter of fish predators was not to be tolerated. The last topics included the need for more understanding of parasites and diseases, forage fishes, non-fish aquatic resources such as mussels, oysters, and sponges, a section on the needs for commercial fisheries gear and products, and finally a

section on publications. In discussing the needs for timely publications, the framers of the document acknowledged that "the value of many excellent and costly researchers and surveys has been lost and duplication of effort resulted because funds were not available for publication."

The policy has been revised in 1954, 1964, 1972, and 1990, and remains an important document that addresses fisheries resources in North America. ←



World War II & AFS in Early Postwar North America



The War Manpower Commission encouraged fishing jobs for women, particularly in plants. Removing parasitic sores from and packaging redfish, Gloucester, Massachusetts, Cape Ann fisheries.

NOAA NORTHEAST FISHERIES SCIENCE CENTER

During the war, restrictions on fishing were lifted, as in WWI, in an effort to provide protein for use in the war effort. Women replaced men workers in fish processing industries, and the government promoted fish as an alternative to meat. For AFS, the annual meetings of the Society were cancelled in 1942 and were not held in 1943 through 1945, although they were still officially counted; therefore, the 72nd to 75th annual meetings never actually occurred. *Transactions* was backlogged, and the war volumes were published later that decade.

Several international conventions occurred during the late 1940s and

early 1950s, to address the problems of overfishing. A convention in 1948 formed the International Commission for the Northwest Atlantic Fisheries (ICNAF) to govern fishing in international waters of the North Atlantic. The treaty was ratified in 1950 to study fisheries in two million square miles of ocean outside the territorial waters of nations rimming the northwest Atlantic. Even through these treaties, member countries had difficulty regulating overharvesting. The International Convention for the High Seas Fisheries of the North Pacific Ocean was formed in 1952 and established the International North Pacific Fisheries Commission (INPFC) with Canada, Japan,

and the United States of America. The data collected through INPFC contributed to the understanding of the life history and distribution of anadromous species, groundfish, crabs, and marine mammals in the northern Pacific Ocean and Bering Sea. In 1993, the INPFC was dissolved to re-form as the Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean, which included the Russian Federation.

After the war, publications containing important syntheses in quantitative fisheries science and management appeared. One famous biologist, William E. Ricker, had worked for many years to

Annual meetings of the Society were cancelled in 1942, and were not held in 1943 through 1945. *Transactions* was backlogged, and the war volumes were published later that decade.



International Commission for Northwest Atlantic Fisheries plenary session--U.S. Department of State, Washington, D.C. April 2, 1951. HOWARD SCHUCK

develop theories of population dynamics and fishing rate of exploitation in fish populations. Ricker drew heavily from the works of the Russian scientist T. I. Baranoff, and he studied Russian so he could translate Baranoff's works into English. Ricker eventually published a summary of the ways to estimate mortality, recruitment, production, and other relationships in his famous "Green Book" *Methods of Estimating Vital Statistics of Fish Populations*, published first by Indiana University in 1948. These methods provided ways to manage populations for maximum yield, but did not consider the effects of the entire system or stochastic processes.

The funding of educational programs for returning soldiers had positive impacts on higher education and also provided opportunities for the profession, formal programs in fishery biology began at many universities centered on training undergraduates. Kenneth Carlander published his first edition of the *Handbook of Freshwater Fishery Biology* in 1950. This book provided the database from which managers could compare fish growth in different environments and begin comparison studies of populations in different waterways. Carl Lagler published his first edition of *Freshwater Fishery Biology* in 1952. This volume was to serve as the major source book for the newly developed university fisher-

ies programs, with chapters on the identification of fishes north of Mexico, fish anatomy and embryology, food, age and growth, population dynamics, fish pathology, survey methods and stream improvements, laws, culture, and commercial and recreational fishing. Lagler's book was soon followed by a text by George A. Rounsefell and W. Harry Everhart in 1953, *Fishery Science: Its Methods and Applications*.

The new college graduates found jobs funded by the Federal Aid in Sport Fish Restoration Act (Dingell-Johnson) of 1950. This federal aid program was patterned after a similar initiative for wildlife, the Pitman-Robertson Act, passed before the

war in 1937. Dingell-Johnson funding provided capital necessary for states to develop fisheries programs. These funds came from taxes collected on fishing rods, reels, creels, artificial lures, baits, and flies that were directed from general funds to sport fish restoration. Within a few years, the staff of agencies increased from just a few hatchery workers to include fishery managers and researchers with abundant opportunities for study. These funds did not support marine programs at first, but governmental cost-sharing programs, such as the Saltonstall-Kennedy Act 1954, increased the participation in marine fisheries research for commercial or recreational product, market, or other infrastructure needs.



William E. Ricker. William Ricker joined AFS in 1930 and received the first AFS Award of Excellence for his lifelong contributions to understanding fishery science in 1969. Ricker's "Green Book" and later versions became required study for fishery students. THE AQUATIC EXPLORERS. A HISTORY OF THE FISHERIES RESEARCH BOARD OF CANADA, FISHERIES AND OCEANS CANADA

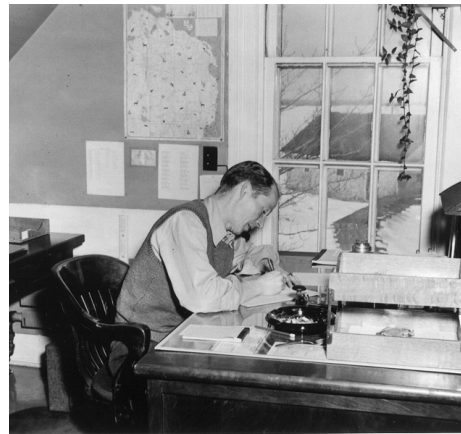


Ken Carlander and graduate students, Fred Meyer, Jim McCann, and Jim Schmolbach (1958). KEN CARLANDER



Fred Westerman (left), Fisheries Chief, Michigan Department of Conservation (AFS President 1933–1994) and John Van Oosten, Director, Great Lakes Fisheries, U.S. Bureau of Fisheries (AFS President 1941–1946).

CARLOS FETTEROLF



Vernon Applegate, Hammond Bay Biological Station, USFWS. LUDINGTON BIOLOGICAL STATION, USFWS



Carlos Fetterolf, Executive Secretary, Canada/U.S. Great Lakes Fishery Commission 1975–1992, (AFS President 1992–1993). CARLOS FETTEROLF



The Northeastern Division officers 1969–1970. (left to right) David Robinson (Past President), Roger Schoumacher (Secretary-Treasurer), Dwight Webster (President), Frank Grice (President-elect). AFS



Petromyzon marinus, sea lamprey. Drawing by Ellen Edmonson. NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION.

The Great Lakes provided a new challenge for fisheries management on a large scale. The first treaty between Canada and the United States regarding the Great Lakes was ratified in 1909 by President Theodore Roosevelt, as the Great Lakes International Joint Commission. Under this agreement, both governments made efforts to control water pollution with moderate success. In the 1950s, however, the international challenge was to find a solution for the serious lamprey invasion. These marine fish had entered the Great Lakes through the ship canals and, by the mid-century, had seriously decimated the populations of whitefish and lake trout. A major research and management effort started with the 1954 Convention on Great Lakes Fisher-

ies, signed in 1954 and ratified in 1955 to form the Great Lakes Fishery Commission, a binational agency to coordinate fishery research programs, advise governments, develop measures and implement programs to control the sea lamprey. The invasive species issues concerned more complex than one exotic species, however, since other exotic-species introductions, overfishing, and water pollution had changed the entire trophic dynamics of the lakes. By 1960, progress in lamprey control occurred in large part due to the efforts of Vernon Applegate, leader of a small research team effort that tested over 6,000 chemicals as potential controls for the early life history stage of lamprey and found one TFM (3-trifluoromethyl-4-nitrophenol) that worked

successfully and selectively on the larval lampreys. Lamprey control and other fisheries management changes including other introduced species complexes accompanied a shift from commercially based fisheries to recreational fisheries in the Great Lakes.

In the large rivers of North America, dams and water projects continued to challenge the biologists with managing fish populations in altered habitats, flow regimes, blocked fish passage, and competing purposes. Fish passage research was actively pursued in the Columbia River basin in the 1950s, and researchers in this region have continued to advance the science of engineering for fish migration.

During the 1950s, annual meetings began to have regular plenary and technical sessions. There was open debate in the Society regarding the benefits of establishing informal or formal groups of regionally based scientists that could discuss more local issues. The Western Division was the first division established in 1948; then, the Northeast Division was established in 1951; the Southern Division in 1952, and the North Central Division was established in 1955. These new organizational components catalyzed leadership activities and likely brought more students into the organization, as travel to regional meetings was less expensive. ➔

Environmental Awakening, Changing Values & Regulations

In the 1960s, pivotal events outside of AFS occurred that catalyzed new activity and interest by citizens in the planet, its resources, and its people.

In the United States, the formation of the Peace Corps by President John F. Kennedy promoted an optimistic, personal, and international approach to world peace through individual efforts.

“An even more valuable national asset is our reservoir of dedicated men and women — not only on our college campuses but in every age group — who have indicated their desire to contribute their skills, their efforts, and a part of their lives to the fight for world order. We can mobilize this talent through the formation of a National Peace Corps, enlisting the services of all those with the desire and capacity to help foreign lands meet their urgent needs for trained personnel.” The State of the Union Address, January 30, 1961

“The benefits of the Peace Corps will not be limited to the countries in which it serves. Our own young men and women will be

enriched by the experience of living and working in foreign lands. They will return better able to assume the responsibilities of American citizenship and with greater understanding of our global responsibilities.”

Message to Congress on the Peace Corps, 1 March 1961

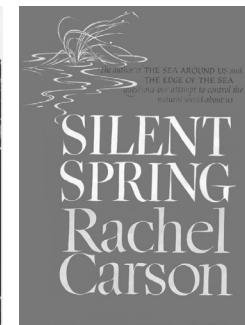
In 1962, the publication of *Silent Spring* by Pennsylvania-born Rachel Carson raised the consciousness of many. Carson had a Master's degree in marine zoology from Johns Hopkins University and became chief editor of the U.S. Fish and Wildlife Service. She spent summers at Woods Hole, and later in Maine, associating with the marine resources and marine scientists. She wrote several books on the oceans in the 1940s and 1950s: *Under the Sea Wind*, *The Sea Around Us*, and *The Edge of the Sea*. Carson's *Silent Spring* was first published as a serial in the *New Yorker Magazine*, and it is most often credited as the beginning of the modern environmental movement. This book explains how pesticides cause serious pollution through the food chain. When President Robert F. Kennedy read the book, he vowed to do something about pesticides.

“They will have acquired new skills and experience which will aid them in their future careers and add to our own country's supply of trained personnel and teachers. They will return better able to assume the responsibilities of American citizenship and with greater understanding of our global responsibilities.”

J. F. K., Message to Congress on the Peace Corps, March 1, 1961



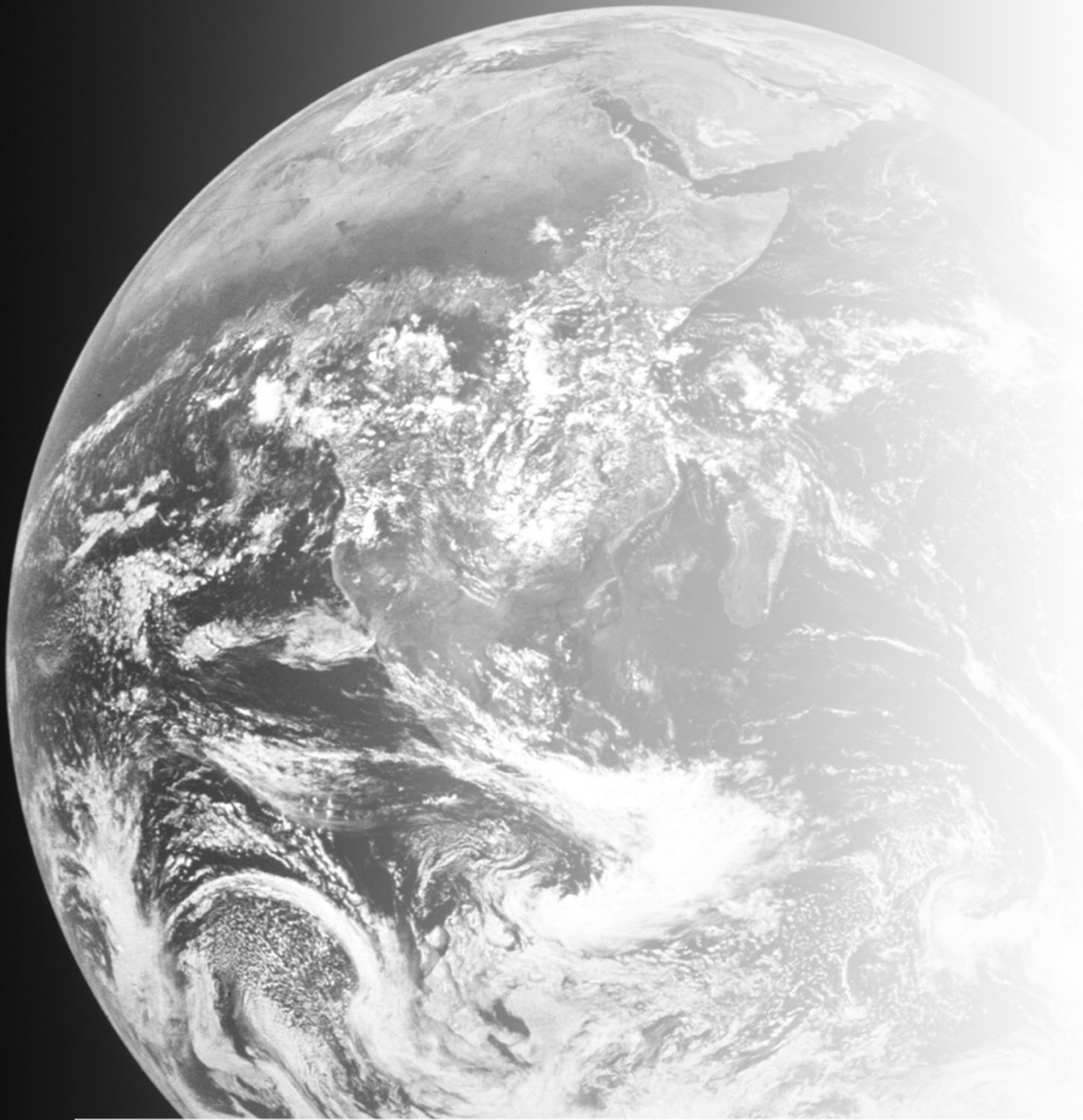
U.S. President John F. Kennedy greets Peace Corps Volunteers. White House, South Lawn. August 9, 1962. JOHN FITZGERALD KENNEDY LIBRARY



Cover of Rachel Carson's book *Silent Spring*. HOUGHTON MIFFLIN COMPANY



Rachel Carson looking into a microscope. BROOKS STUDIO



Astronaut Edwin E. Aldrin Jr., lunar module pilot, poses for a photograph beside the deployed United States flag during Apollo 11 extravehicular activity on the lunar surface. NASA

In 1969, the Apollo mission to the moon by Neil Armstrong, “Buzz” Edwin E. Aldrin, Jr., and Michael Collins allowed Earth residents to comment for the first time about the fragile blue planet. The lunar landing and Armstrong’s famous words “That’s one small step for man . . . one giant leap for mankind” had a tremendous impact.

Legislation in the late 1960s and in decades following elevated natural resource issues, in nearly exponential fashion, for fish and water issues in North America. These changes created a demand for scientific studies to determine the impacts and potential mitigation of projects and management decisions. To meet these increased needs, trained aquatic habitat professionals were needed within the respective new or enhanced governmental organizations, and increasingly in the private sector. Laws affecting fisheries and aquatic issues were

View of the Earth as seen by the Apollo 17 crew traveling toward the moon. This translunar coast photograph extends from the Mediterranean Sea area to the Antarctica south polar ice cap. This is the first time the Apollo trajectory made it possible to photograph the south polar ice cap. Note the heavy cloud cover in the southern hemisphere. Almost the entire coastline of Africa is clearly visible. The Arabian Peninsula can be seen at the northeastern edge of Africa. The large island off the coast of Africa is the Malagasy Republic. The Asian mainland is on the horizon toward the northeast. NASA

passed, including, for example, in the United States, the National Environmental Policy Act of 1969, the Federal Water Pollution Control Act of 1972 (modified to the Clean Water Act of 1977), and the Endangered Species Act of 1973. These regulatory requirements established infrastructures and increased the demand for an emerging field of environmental assessment biology, and as a consequence, private consulting groups of biologists were organized to help private and public interests meet these regulatory demands. Throughout the 1970s, the proliferation of different agencies and specialty interests increased. The Bureau of Commercial Fisheries was moved by executive order from the Department of Interior, renamed the National Marine Fisheries Service, and placed in the Department

of Commerce under the newly established National Oceanic and Atmospheric Administration.

Although, in the United States, President Truman had declared the rights to manage fisheries in the continental shelf in the late 1940s, treaties and international laws were not providing adequate protection for fish stocks. The Cold War conflicts and lack of adequate marine fisheries regulation through the 1960s led to significant overcapitalization of marine fishing fleets, and the unbridled determination of many nations contributed to overharvest of many stocks. The Magnuson Fishery Conservation and Management Act of 1976 established authority for the National Marine Fisheries Service to manage the extended 200-mile jurisdiction in the Exclusive Economic Zone (EEZ).

Members of AFS provided important testimony to support this legislation and to accept optimum yield in place of maximum yield as desired objectives of management. This act was later renamed the Magnuson-Stevens Fishery Conservation and Management Act. Similar unilateral declaration of jurisdictions occurred in Canada in 1977, in accordance with developments at the United Nations Law of the Sea Conference. However, the 200-mile zone did not encompass the entire Grand Bank, which extended off the southeast coast of Newfoundland. The Northwest Atlantic Fisheries Organization (NAFO) was founded in 1978, following the extension of Canada's jurisdiction to 200 miles, as a successor to the International Commission for the Northwest Atlantic Fisheries (ICNAF). The 17 Contract-

ing Parties belonging to NAFO are Bulgaria, Canada, Cuba, Denmark (on behalf of the Faroe Islands and Greenland), France (on behalf of St. Pierre et Miquelon), the European Union (EU), Iceland, Japan, Korea, Norway, Poland, Romania, Russia, Estonia, Latvia, Lithuania, and the United States of America.

Efforts to regulate fisheries for pelagic species were even more difficult. The International Commission for the Conservation of Atlantic Tunas (ICCAT) was finally established in 1969 and continues to be responsible for the conservation of tunas and tuna-like species in the Atlantic Ocean and adjacent seas. The original document was signed in Rio de Janeiro, Brazil in 1966. The official languages of ICCAT are English, French, and Spanish. ←

It is not as simple as it used to be... now each agency has its own professional staff, all [of these agencies] with somewhat different mandates.

Ron Goede, Utah Department of Wildlife, retired



1000 pound tuna, Cape Cod Bay, Barnstable, Massachusetts, John Vettorino, Trap Operator, 1950. HOWARD SCHUCK



AFS Membership & Fisheries Science Expands

A parallel growth in AFS membership followed this increased interest and funding in aquatic resources and new resolve to improve environmental quality. In the 1960s, the Society added chapters to the organizational structure to accommodate more members and to better represent the smaller regional-based interests and activities through meetings. Each chapter was a self-governing body that could participate locally but also be connected to the larger group.

With the diversification and compartmentalization of institutions and interests, need for synthesized

information increased. AFS had always conducted focused topical discussions, and, by the late 1960s, these discussions increased in frequency and number. In an effort to provide a topical collection, the Society began plans for special sessions or meetings to collect and synthesize information for more effective use and to aid in defining future research and policy needs. These workshops helped scientists and managers communicate their findings and publish the results of studies. The Special Publications Series, which began with the publication of *A List of Common and Scientific Names of Fishes from the United*

States and Canada first in 1948, and again in 1960 and 1970, was expanded to include other topics in the 1960s and 1970s:

- Estuarine Fisheries (1966)
- Water Quality Criteria to Protect Aquatic Life (1967)
- Reservoir Fishes and Limnology (1971)
- Black Bass Symposium (1975).
- The National Symposium Catch and Release (1975)
- Symposium on Selected Coolwater Fishes (1978)

Women became more active in AFS. Emmeline Moore was the first woman to publish in fish health in North America, and first woman

president of AFS. However, in the years immediately after her presidency, few women were active in the Society. J. Frances Allen, another New Yorker, was first appointed to the Resolutions Committee by W. Mason Lawrence, incoming President in 1958. Lawrence told Allen that he believed that women deserved an opportunity to participate in the Society's activities. Allen served on the Resolutions Committee until 1962, when she was appointed chair. She remained active in Society affairs, and President-elect George Eicher appointed her as chair of the New Professional Standards Committee in 1966. Working



California-Nevada chapter officers 1964-1965. (left to right) George McCannon (Vice President), Pete Chadwick (President), John Skinner (Secretary-Treasurer). AFS



I. B. Byrd receiving the presidential gavel from outgoing president George Eicher at the AFS Annual Meeting in Portland, Oregon 1965. AFS



Joe Dillard, AFS President 1989-1990, seining one of the 300,000 farm ponds in Missouri on his first project as an employee of Missouri Department of Conservation, 1965. JOE DILLARD



C. J. D. Brown fishing in Montana. AFS President (1969-1970). 2000 AFS CALENDAR

with this committee, they developed the guidelines for qualifying as a Certified Fisheries Scientist. With this new program was the need of a review board that would examine the qualifications of the applicants. Allen was appointed by President F. E. J. Fry as chair of this first Board of Professional Certification in 1967. Allen's contributions continued through her many professional activities at the National Science Foundation, Federal Water Pollution Control Administration, EPA, Sport Fishery Research Foundation, AFS, American Association for Advancement of Science, and numerous others. Starting in 1987, AFS has awarded an annual scholarship for women Ph.D. students in the name of J. Frances Allen.

In 1970, the AFS celebrated its

centennial. The U.S. Mint struck a commemorative medallion. Three books were published in 1970 as AFS Special Publications. The Centennial Meeting of the Society was held in New York, but at the Waldorf Astoria, not at the Fulton Fish Market where AFS began.

Major achievement in fish health management culminated in 1970 with *Diseases of Fishes and Shellfishes Special Publication 5*. The development of the science of modern fish health management evolved within AFS, and scientists were involved in the U.S. Federal Title 50 amendments regarding the importation on salmonids or their eggs, adopted by Congress in 1967. The general philosophy of these regulations, which have been amended several times since, was that certain pathogens were to

be prohibited. In 1967, two were: *Myxobolus cerebralis* (then called *Myxosoma cerebralis*), the cause of salmonid whirling disease, and viral hemorrhagic septicemia. AFS convened a major symposium "Diseases of Fishes and Shellfishes," chaired by Stanislas F. Snieszko to summarize the state of the knowledge, at the request of AFS President Lloyd Smith in 1967. Carl Sindermann assisted as a cochair of the conference, which convened in 1969 and was published in 1970. Snieszko was awarded the Society's highest award, the Award of Excellence, for his contributions to Fish Health in 1970.

A Century of Fisheries in North America, a 330-page volume edited by Norman Benson, provided a thorough and detailed assessment of the society's history and the history

of fisheries science and management. Within the volume, special chapters by contributing authors were devoted to the history of fisheries research, fisheries education, and specialty topics, such as warm-water pond culture, the Great Lakes, glacial and natural lakes, reservoirs, warm water streams, trout streams, fish passage, Pacific sardine, herring, halibut, Pacific salmon, American Pacific Tuna, groundfish of the northwest Atlantic, and oyster and clam management. A chapter by Richard Stroud speculated on the future of fisheries management in North America.

Within AFS, members used committees to organize discussions around specific interests, and as these groups grew in size they organized into Sections within the



AFS Executive Committee, Annual Meeting 1968–1969, Tuscon, Arizona. At end of table: President E. A. "Woody" Seaman. left to right: C. J. D. Brown, Robert Jenkins, J. Frances Allen, Dwight Webster, William Massman, the four men with their backs to the camera are unidentified, the two on the end are Albert Schwartz and Reeve Bailey. J. FRANCES ALLEN



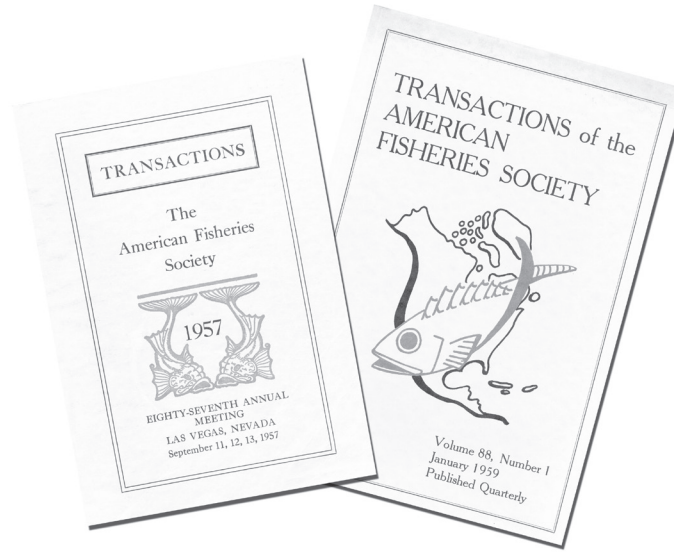
Homer Swingle and Stan Snieszko, AFS leaders in fish culture and fish health. AFS



After the 1975 Missouri AFS meeting—Lee C. Redmond (elected Secretary-Treasurer), Charles K. Phenicie (elected President-elect, but was replaced before he had a chance to serve because he was promoted to Washington D.C.), Joe G. Dillard (elected President). AFS



Portrait of John B. Moyle ca. 1970. Moyle served as first paid part-time editor for *Transactions* 1957–1959. PETER MOYLE



In 1958, the AFS Executive Committee voted to change *Transactions* from an annual publication to a quarterly journal. Moyle designed the cover and format, starting with volume 88. The journal had previously published quarterly from 1914–1920. AFS



Johanna Reinhart served as editor of *Transactions* 1971–1974 and as AFS president in 1985–1986. AFS

Society, each with its own self-governance. The first section to form was the Fish Health Section in 1972. Other sections followed in the ensuing years.

With the rapid increase in fishery-related activity, needs for information transfer increased proportionately. For AFS, a Monograph Series provided yet another outlet for focused issue-related science, with the publication in 1976 of *The Connecticut River Ecological Study: The Impact Of A Nuclear Power Plant*, edited by Daniel Meriman and Lyle Thorpe.

To deal with increased publications and communications, changes occurred in *Transactions*. Until the mid-1950s, editors were volunteer. The first paid editor for *Transactions* was John Moyle. For the next 15

years, the position was part-time and generally handled at the private home or work office of the mostly volunteer editors. In 1971, Johanna Reinhart was hired as the full-time editor for *Transactions*, until she moved to a position with the Canadian government with soon-to-become AFS President Cam Stevenson. Bob Kendall joined the AFS staff as full-time editor for *Transactions* in 1974 but worked in the basement of his house in Columbia, Maryland, from 1974 until 1988. Kendall became AFS Director of Publications in 1985, and in the 15 years since, the editors of *Transactions* have included Victor Kennedy, Thomas Wissing, Chuck Coutant (AFS President 1996–1997), Thomas Edsall, Fred Utter, Leslie Holland-Bartels, Dennis DeVries, and David Conover.



Robert L. Kendall at his retirement from AFS. Kendall was *Transactions* editor from 1974 to 1986, and AFS Director of Publications from 1983 to 1999. AFS

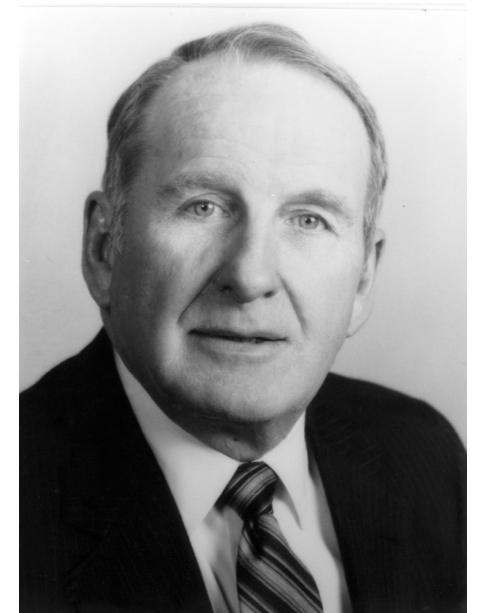
To handle the affairs of this growing Society, AFS opened its first permanent office in Washington, D.C., in 1962 with a staff of one, Mary Frye, supervised by Elwood "Woody" Seaman (AFS President 1968–1969), the AFS secretary-treasurer at the time. In 1965, AFS hired a full-time salaried executive secretary, Robert Hutton, who served until 1972. By 1969, the Society had a four-room office in Washington, D.C. In 1972, the position was renamed Executive Director and filled by Richard Wade. During his tenure, the AFS office was moved to the American Forestry Association's building in Washington, D.C. At this time, a group of natural resource professional societies began to plan coordinated activi-



Robert Hutton, Executive Director 1965–1972.
AFS



Richard Wade, Executive Director 1972–1975.
AFS



Carl Sullivan, Executive Director 1975–1991.
AFS

ties and a common office setting. They established a Renewable Natural Resources Foundation (RNRF), led by Hardy Glascock of the Society of American Foresters, who persuaded his organization to put up \$1,000,000 to purchase the mansion, carriage house, and caretaker's house on several acres owned by the Grosvenor family (National Geographic) in Bethesda, Maryland. The Foundation raised the rest of the money through bank loans, and renovations to the property were underway by 1974. In 1975, AFS moved its headquarters to the renovated carriage house and assumed the address of 5410 Grosvenor Lane, Bethesda, Maryland. Later that same year, Carl

Sullivan joined AFS as its third executive director. Sullivan began building infrastructure within AFS staff to increase the activity. In 1976, *Transactions* moved from a quarterly to bimonthly publication. With a full-time editor, the number of Special Publications increased, and a Monograph series was begun. In 1976, the magazine *Fisheries* began with Carl Sullivan serving as editor. The vision for *Fisheries* was profound. It was to be a glossy cover magazine to go to all members and was designed to improve visibility of fisheries issues among all members and publicize the news of the Society. AFS leaders have always recognized the importance of providing good informa-

tion for the public for the success of any solution. This was well-articulated by AFS golden member, Art Hale.

"As we lose public ownership we lose a lot of control. Therefore I think we have to switch to public awareness so that the public will be in step with us on what we can do to improve fish and wildlife habitat." Art Hale, USFWS retired.

After more than 110 years, AFS moved into its first society-owned home in the Glascock Building, in the summer of 1981. At this time, the Society leaders worked to increase the number of jour-



AFS President Carlos Fetterolf congratulates Mary Frye at her retirement party in 1993. AFS



Mercer Patriarche, first editor of the *North American Journal of Fisheries Management*. AFS

nals and books to accommodate growing interest and need for more specialized information. For years, the only outlet was through *Transactions* or the Special Publication Series, or at times a division of AFS handled the publication, but access to these publications was often limited.

The *North American Journal of Fisheries Management* began in 1981, to provide relevant information for managers. The first editor was Mercer Patriarche. The vision for this new publication was to provide an outlet for management-oriented manuscripts from the wealth of studies conducted by management agencies or by others addressing fish management objectives. Editors of this journal have included Bob Carline, Bill Shelton, Phyllis Cahn, Doug Jester, Steve Miranda, Wayne Hubert, Bob White (AFS President 1988–1989), Jack McIntyre, Carolyn Griswold, Mike Hansen, and Mike Young.

The U.S. Fish and Wildlife Service published the *Progressive Fish Culturist* until 1984, when AFS joined as a copublisher. Mary Lewis (Nickum) edited the journal from 1984 through 1985, and in 1986, Bob Piper retired from the Fish and Wildlife Service to become editor through 1995. In 1994, the Society took sole responsibility for this publication, and in 1999, it was renamed the *North American Journal of Aquaculture*. Bill Shelton became coeditor with Piper in 1995 and then served alone after Piper's retirement. Bruce Barton joined Sheldon as coeditor in January 2000.

Through diligent efforts of many people and nongovernmental organizations, U.S. Congress passed the Dingle-Johnson expansion, or the Wallop Breaux Act, in 1984, which expanded the federal aid tax base for use in fisheries, to include all fishing tackle and motor boat fuel. Several individuals in the fishing community played important roles in establishing the vision and consensus building; among them Carl Sullivan (Sully) was exceptionally effective. Sullivan's contagious enthusiasm, knowledge, and extensive network provided the necessary credibility for the effort, and Sully

became the "AFS Ambassador" to Congress. As a result of these efforts, the fishing and boating interests formed alliances, and the American League of Anglers and Boaters was formed. The additional elements of the Dingle-Johnson expansion included funding for boating access, aquatic resources education, and equitable expenditures for saltwater and freshwater activities. The sportfish restoration user taxation model is viewed as a potential model for other nations with interest in improving fishing and aquatic resources.



The Glascock building became home for AFS in 1981. AFS

A Symposium Series was added to the AFS publications in 1987, with the publication of *Common Strategies of Anadromous and Catadromous Fishes*. To handle this increased activity, AFS expanded its office operations in 1988 to occupy a second new building at the RNRC. At this time, Bob and Sally Kendall and the editorial functions of AFS joined the rest of the staff in one location. The new building at the RNRC was dedicated in 1990 as the Sullivan Building in honor of Executive Director Carl Sullivan.

In 1989, with assistance from the Fish Health Section, the Society successfully launched the *Journal of Aquatic Animal Health*, as the first North American-based



AFS Staff. (1999).AFS

fish health journal. The first editors were from Auburn University: John Plumb, John Grizzle, and Wilmer "Bill" Rogers. Since its founding, journal editors have included Margaret Ewing, Ron Hedrick, and Steve Kaattari.

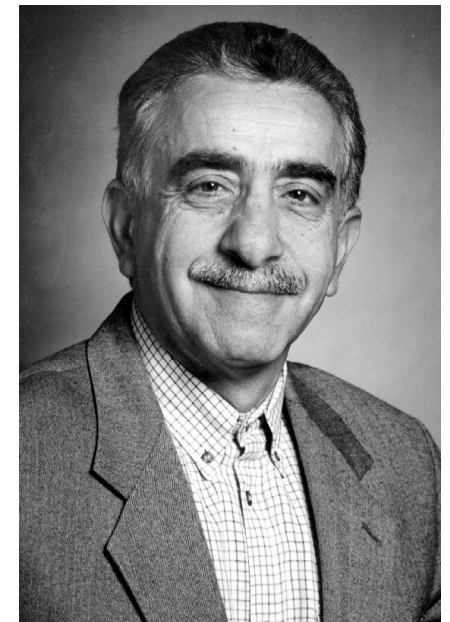
Paul Brouha became Deputy Director of AFS in 1986 and was hired as Executive Director in March, 1991, at the time of Carl Sullivan's retirement. Under Brouha's direction, the number of AFS activities expanded, particularly with special projects funded from outside sources, including U.S. agency funding and foundation funding. AFS began actively raising funds for programs that would increase the visibility and effectiveness of AFS in the public and policy arena. Brouha promoted many coop-

erative projects through partnerships with agencies and with recreational and industry groups. Another small office expansion to house staff occurred in 1994, with additional office space purchased from the American Water Resources Association.

In 1999, the fifth chief executive, Ghassam Rassam, was hired as the first business-oriented executive, rather than a fisheries biologist. Members were unsure of this new direction, but leaders recognized the need for a trained business professional, since competition with other professional societies and with the private sector and for-profit publishing companies were serious threats to the financial security and future of the Society. ←



Paul Brouha, Executive Director 1991-1998.
AFS



Ghassam Rassam, Executive Director 1999.
AFS



Native American child with a salmon. COLUMBIA RIVER INTER-TRIBAL FISH COMMISSION



Tommy, Flora, and Linda Thompson at Celilo Falls. OREGON HISTORICAL SOCIETY

Native People & Their Fisheries

Challenge the Status Quo

For years following the signing of treaties in the 1800s, Indian and aboriginal fishing rights in North America were subjugated and largely ignored. Native peoples' view of the role of natural resources in human lives was also ignored as Western European values prevailed.

Chief Seattle expressed the views of Indian peoples toward natural resources in his famous speech during treaty negotiations in 1854.

"Every part of this country is sacred to my people. Every hillside, every valley, every plain and grove has been hallowed by some fond memory or some sad experience of my tribe. Even the rocks, which seem to lie dumb as they swelter in the sun along the silent shore in solemn grandeur thrill with memories of past events connected with the fate of my people, the very dust under your feet responds more lovingly to our footsteps than to yours, because it is the ashes of our ancestors and our bare feet are conscious of the sympathetic touch for the soil is rich with the life of our kindred."

Chief Seattle, leader of the Suquamish Tribe (1786–1866) from a speech he recited during treaty negotiations in 1854.

During the past 30 to 40 years, Indigenous peoples' move to self-governance and political influence in North America has been profound and has occurred through a slow, plodding effort across Canada and the United States. Native American tribes or First Nations are now reasserting treaty rights, including their rights to co-manage resources. Northwestern Native American tribes pursued their fishing rights in the late 1960s and early 1970s. Among the most famous cases was the United States vs. Washington, brought forth by several western Washington tribes against the State of Washington. In 1974, U.S. District Court Judge George Boldt ruled the tribes reserved the right to half of the harvestable salmon and steelhead in western Washington. In 1979, the Supreme Court upheld the Boldt Decision, as it

has become known, and tribes became comanagers of salmon and steelhead. In a case brought by the Columbia River Stevens Treaty Tribes, District Court Judge Robert Belloni held that the states of Oregon and Washington must afford the tribes an opportunity to take a fair and equitable share of all fish the states permit to be taken from any given run and adopted the 50% share rule.

Shellfish were not included in these early historic decisions, but recently the Puget Sound tribes pursued their rights to harvest shellfish in the courts, and in 1994, the District Court Judge Edward Rafeedie ruled and the U.S. Supreme Court upheld in 1999 that public and private tidelands were subject to treaty harvest, except for shellfish contained in artificial beds, and the tribes

have since participated in management and monitoring of these resources.

In Canada, the Constitution Act of 1982 included a Charter of Rights and Freedoms that for the first time provided official constitutional recognition to Aboriginal and treaty rights. In 1990, the Canadian Supreme Court issued a ruling, called the Sparrow Decision, that outlined aboriginal people's right to fish for food, social, and ceremonial purposes that can take priority over all other uses.

In addition to issues of simple rights, recent evidence about the importance of fish for human health has provided additional impetus for tribes to restore fisheries and exercise these rights.

"We need these fish for our sustenance and survival: the mission we have is one of survivability... Next to the Tohono O'odham of Arizona, the Nez Perce have the second highest ambulatory incidence of diabetes.... We are still reliant on natural foods, native food, to allow us to adapt to the new millennium."

Silas Whitman, Nez Perce Tribe, 2000.

The result of these court rulings has been to provide the basis for Aboriginal or Native Peoples to become partners in management of fishery resources. Many



"We need these fish for our sustenance and survival: the mission we have is one of survivability."

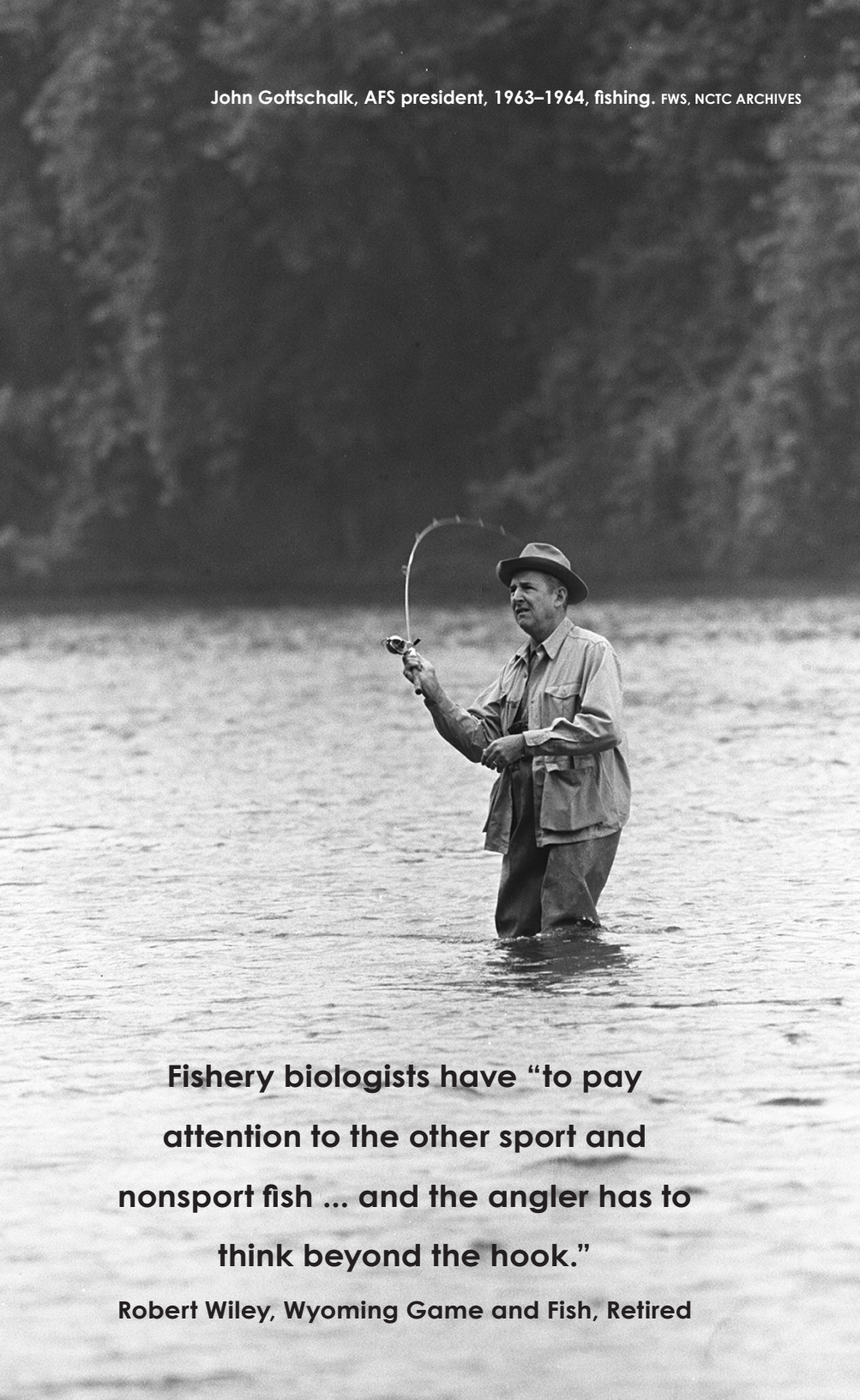
Silas Whitman, Nez Perce Tribe, 2000

tribes have built their own fishery management and research programs and have become active participants in federal, state, and provincial fish restoration, harvest, and management programs. This participation has changed the dynamics of decisions and fostered a diversity of attitudes toward aquatic resources.

Today in the United States, federally recognized Native American tribes have jurisdiction over a reservation land base of nearly 100 million acres. This figure represents a small fraction of the area they used for fishing and hunting before white settlement. Tribal members established the Native American Fish and Wildlife Association as a forum for annual gatherings and professional development. ➔



Don Sampson, Executive Director of the Columbia River Inter-Tribal Fisheries Commission, accepts the President's Fishery Conservation Award from Christine Moffitt for leadership in elevating the importance of fishery resources to native peoples of the Pacific Northwest. AFS



Fishery biologists have “to pay attention to the other sport and nonsport fish ... and the angler has to think beyond the hook.”

Robert Wiley, Wyoming Game and Fish, Retired

Challenges of the Present & Future

Thinking Beyond the Hook

The conflicts of user groups and difficulties in defining appropriate regulations for aquatic resources have not abated and will continue, with the pressures and demands of development and human population growth. Marine and freshwater fishery closures have challenged resource managers and fishery communities. Among these was Canada's Atlantic Groundfish Management Plan of 1994 that declared all the major cod fisheries inside the Canadian zone closed and severely reduced quotas for most other groundfish species. The Canadian government committed more than \$1.9 billion over five years to provide income replacement and occupational retraining for fishermen and plant workers in Atlantic Canada and Quebec, and to relieve the social and economic consequences of this closure.

Within traditional recreational-based fishing communities, the increased public demands and legal implications of endangered species management required to meet the needs of nongame species often provide conflicts in management objectives. In some locations, promotion of fishing opportunities for one species can lead to conflicts within sectors of

the same management agency. The infrastructure of traditional state and provincial fish and game agencies, partially or wholly funded by fishing license revenue, has serious challenges to meet these new demands.

Robert Wiley, Fisheries Management Section leader and retired manager from Wyoming Game and Fish remarked in an interview regarding the future challenges in fisheries in May 2000:

“Fishery biologists have to realize that there is more to fisheries biology than just selling a fishing license that brings in money. You have got to pay attention to the other sport and non sport fish ... and the angler has got to realize this and think beyond the hook.”

Although many members consider AFS to be centered in North America, only a handful of members are from Mexico. In 1937, the annual meeting of the society was held in Mexico City, shortly after the Pan American Highway was completed. In 1978, the mid year Executive Committee meeting was held in Mexico City and included a day long retreat of exchange with Mexican fisheries administrators. The revisions of the North American

Fisheries Policy have not included Mexican issues. The International Fisheries Section has conducted some outreach with Mexican scientists, and the Names of Fishes Committee has recently recruited Mexican members and will include Mexico's fishes in the new revision. A significant challenge for the future is how to open our doors and educate AFS membership about the fishery and aquatic issues of resources south of the U.S. border.

With less expensive international travel, face-to-face communications between fisheries societies are more common. AFS has sponsored international efforts, but not in a consistent fashion and without a cohesive plan. Some members have undertaken considerable individual activities abroad, either on exchanges or through consulting. Our Society presidents have regular exchanges with the Fisheries Society of the British Isles. We have an International Fisheries Sec-

tion, and other sections have been successful in developing international conferences. The Fish Physiology Section has hosted several international conferences, including the highly successful International Congress on the Biology of Fishes. The Fish Health Section has held highly successful International Fish Health Symposia and the Fish Culture Section routinely cosponsors the World Aquaculture conferences that bring scientists together from all over the globe to discuss fish culture. AFS members helped organize the first World Fisheries Congress, held in Greece in 1992, and members have remained active in the planning of the subsequent congresses. The Third World Fisheries Congress held in Beijing in 2000 provided the first ever forum within the Asian community with a theme, "Feeding the World with Fish in the Next Millennium — the Balance Between Production And Environment." The Fourth Congress will be hosted in North America in Vancouver, B.C. in 2004.

The challenges to global ecosystems from human activity and pressures for food and resources are enormous. The business and cultural world is experiencing globalization, as old cultural patterns are being lost and thinking and ways of life are becoming more urban, more cosmopolitan, and less diverse.

We have already altered most aquatic systems through the many planted fish species and habitat changes that disrupt naturally adapted systems. Mitten crab and zebra mussel invasions are just small examples of introduced aquatic species that pose threats to North American ecosystems. Scientists are just beginning to understand how entire terrestrial nutrient cycles in the Pacific Northwest are linked to salmon runs. But, how can we deal with increased pressure from global cultures without losing the integrity of natural ecosystems?

When the American Fisheries Society was founded, there were few other scientific associations. In the years since, other scientific societies have emerged that offer opportunities for exchanges and for publication. Increased cooperation among members and leaders of other professional societies with similar interests will continue to increase. As a mature organization, AFS members and staff continue to make the Society relevant to its members and their needs. The organization has moved from a society of fish culturists in north-



Zebra mussels. U. S. FISH AND WILDLIFE SERVICE, ALPENA FISHERY RESOURCES OFFICE.

eastern United States and Canada to one of diverse geography, with a rich development of scientific principles and knowledge. The AFS mission includes the promotion of conservation, development and wise use of fisheries, development of the science, dissemination of information, and teaching of fisheries science. Increased demands for rapid access to information and increased ease of communication have motivated leaders to use strategic planning tools for AFS, so that it can continue to meet these objectives.

Long range planning efforts in AFS that began in the 1980s under the leadership of AFS President Johanna Reinhart have become a continuous process within the Society. The most recent plan, approved by the membership in 1999, contains three major areas of focus: information transfer and outreach, member services, and aquatic stewardship. Our revised strategic plan acknowledges that demands for fisheries resources and conflicts within marine and freshwater systems will increase



Ghassan Rassam at the Third World Fisheries Congress in China, 2000.
C. M. MOFFITT



Tu Fengjun, President of the China Society of Fisheries at the Third World Fisheries Congress, Beijing Nov. 2000.
C. M. MOFFITT

and constituents are becoming more diverse. To make a difference we need to communicate outside our region, outside our country, and likely outside our traditional disciplines. Increased opportunities to make AFS more global and diverse in membership, services, and products are likely through electronic media that permit global information marketing and the creation of knowledge networks.

According to United Nations sources, only one-tenth the \$470 billion invested in R&D in 1996 was spent by the developing world where 80% of the population resides. The focus has changed from international development agency support of traditional public works projects toward helping developing nations acquire the knowledge they need to grow. In Central and Eastern Europe, and the ex-Soviet republics, scientific output has lost ground in the past ten years. According to Mohamed Hassan, executive director of the Third World Academy of Sciences, science has advanced so fast and costs risen so rapidly that the gap between third world and developed countries is widening. In 1999, Bruce Alberts, president of the U.S. National Academy of Sciences expressed a desire to see the world's major scientific organizations develop programs aimed at connecting all scientists to the World Wide Web, and then to develop knowledge resources that would be made available through the Internet to all scientists.

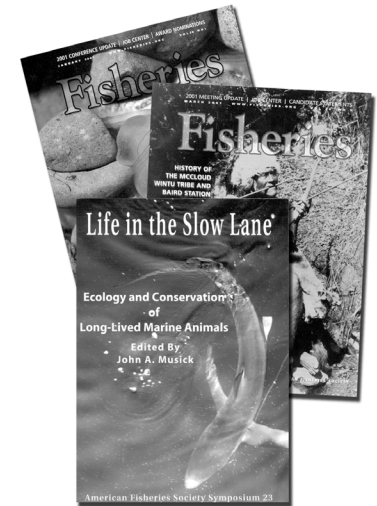
Although the use is limited in developing countries, the Internet is likely the only way to provide information in any meaningful fashion.

Since 1998, the four AFS journals have been available in electronic format, and plans are underway to provide the entire library of journals and books electronically. In the late 1990s, with help from key members of the marine fisheries section and additional funding from some key foundations, the first-ever list of marine fish stocks and species at risk of extinction identified 82 species or populations vulnerable, threatened, or endangered in North American waters. The group applied risk criteria developed from a compilation of peer-reviewed data sets to achieve this list. Most of these marine stocks faced more than one risk factor, but low or very low reproductive capacity was the most important criteria. Habitat degradation was the second most important risk factor. The information was made available as a digital book available to the public and to the scientific community, to increase the knowledge base.

The activity in marine fisheries is only a portion of all activity within the Society. AFS contains more than 20 self-governing Sections, representing specific disciplines from fish health and fish culture to bioengineering, equal opportunity, and socioeconomics, and more than 50 chapters representing states and provinces. Student subunits are organized as independent



Papers in the AFS journals have been available electronically since 1998.



Information from AFS publications such as Fisheries and selected books is now available electronically on the webpage.

groups or within chapters. Hundreds of members serve on Society-wide committees and task forces, and several dozen members serve on editorial boards of the four journals and Fisheries. This multidisciplinary membership approach to fisheries issues provides a unique strength, as Pam Haverland, Past-President of the North Central Division, expressed during an interview in 1999:

"The thing about AFS is the inclusiveness of it. The people that are members of AFS come from all walks of life. You have lawyers, computer

experts, hydrologists, as well as fisheries biologists, and ecologists, aquaculturists... and we all come together to solve issues and problems."

Through the careful evaluation of the outcome of biological changes driven by human alterations, we have the opportunity to provide greater society with the opportunity to reevaluate the value of various components of natural resources. These value changes will provide additional challenges to fisheries. The consequences of past management practices must be dealt with,

as fish biologists and managers actively placed many fish species and stocks throughout the continent. More than 130 years later, we are still working to understand the ecological implications and common principles of introduced species or stocks within aquatic ecosystems from intentional or unintentional introductions. Today, many of our waters contain exotic fish and other aquatic vertebrate species, invertebrates, and exotic fish patho-

gens. These introductions provide a serious challenge to all resource managers and to the nature of the aquatic communities. In addition to these problems, the details of the limits and the changing distributions of ocean productivity, of human-induced global climate change, and of the changes from fishing activity, either through environmental damage or changes in the food web and nutrient dynamics, are all active research areas

and topics for debate in scientific literature and the public arena. Providing the science-based analysis to detail the implications of and methods for removing dams, planting fish, and ways to make watershed-based approaches work in management are among the many challenges.

"The strength of our Society is that we have always advocated for making decisions

based on good science information"

Joe Dillard, Missouri Department of Conservation, retired.

No longer can any biologist or manager concentrate on a single species or even a single habitat issue. The annual AFS meetings, the special symposia, and the variety of publications attest to these many challenges for the profession

and for aquatic resources. The rich history of information on the mistakes and successes of our endeavors provides the opportunity for AFS members to address the new challenges in collaborative interactions with others. The opportunity is ours, and AFS members must work with other professional societies and the public for collaborative visions and goals. In the future, our members can reflect on our success and failures. ←

