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Northwestern Hawaiian Islands Lobster Fishery

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Acronyms

CPUE	catch per unit effort
CRE FMP	Coral Reef Ecosystem Fishery Management Plan
CRER	Coral Reef Ecosystem Reserve
EEZ	exclusive economic zone
ESA	Endangered Species Act
FMP	Fishery Management Plan
MSA	Magnuson-Stevens Fishery Conservation and Management Act
nm	nautical mile
NMFS	National Marine Fisheries Service
NWHI	Northwestern Hawaiian Islands
PMNM	Papahanaumokuakea Marine National Monument
RFID	radio frequency identification
SPR	spawning potential ratio
SSC	Scientific and Statistical Committee
USFWS	U.S. Fish and Wildlife Service

INTRODUCTION

In October 1976, the NOAA research vessel *Townsend Cromwell* made a novel discovery with far reaching consequences. Exploratory voyages of the NOAA research vessels *David Starr Jordan* (1973) and *Townsend Cromwell* (1975) had reported small clusters of lobsters located in the shallow banks and small islands of the Northwestern Hawaiian Islands (NWHI) (Uchida and Uchiyama 1986). When scientists aboard the *Townsend Cromwell* laid lobster and fish traps in 1976, they found unusually dense concentrations of endemic red spiny lobster (*Panulirus marginatus*) and common slipper lobster (*Scyllarides squammosus*). Up to 13 and 25 lobsters were caught in a single wire lobster trap and fish trap, respectively, in waters off Necker Island (Uchida and Tagami 1984). When fishermen and Hawai‘i State policymakers heard about the valuable catch only two days transit from Honolulu, they began to envision the revival of the Hawai‘i’s then dormant fishing industry.

Spiny lobsters, or rock lobsters, have meat only in their tails. By contrast, Maine lobsters (*Homarus americanus*, also known as Atlantic lobster, Canadian lobster, true lobster or northern lobster) have meat in their claws as well as tails. Rock lobsters do not have the same market share as Maine lobsters, but in the 1970s they became preferred by some restaurant owners. In 1976, the surf and turf entrée represented a relatively recent phenomenon. For nearly 50 years prior to this, Maine lobsters had been considered a seafood delicacy, equivalent to caviar and steak in upscale restaurants out of the reach of most Americans. During the 1960s, the appearance of South African frozen rock lobster tails on the world seafood markets at prices far below Maine lobsters created a new opportunity for restaurant owners and chefs. Rather than serving the smaller lobsters alone, they paired them with filet mignon and covered the two dissimilar foods with garlic butter sauce and called it “surf and turf” (Gillman 2018). This new dish—one of the word’s first successful combination platters—



Fig. 1. NOAA R/V *Townsend Cromwell*. Photo: NOAA.



Fig. 2. The red spiny lobster (*Panulirus marginatus*, or banded spiny lobster) is endemic to Hawai‘i. Photo: Bruce Mundy.



Fig. 3. Slipper lobster (*Scyllarides squammosus*). Photo: Bruce Mundy.



Fig. 4. Lobster in the main Hawaiian Islands were caught mostly in near shore coastal waters and consisted of green spiny lobster (*P. penicillatus*). Photo: Bruce Mundy.

was instantly popular because people reluctant to spend money for a stand alone expensive lobster dish felt they were getting a bargain when it was paired with steak (Lansdale 2018). This marketing ploy made luxury dining accessible to America's status-conscious rising middle class (Lewis 1989). Although the dish was derided by food critics, it soon became a mainstay at American steak houses, hotel chains and resorts because of its popularity and significant profit margin. The new demand encouraged the growth of the rock lobster market in the United States, Australia, Canada and the United Kingdom. It was this new demand that stimulated interest in the Hawai'i rock lobster fishery.

A small artisanal fishery for lobster had long operated in the main Hawaiian Islands (Hawai'i, Maui, Kaho'olawe, Lana'i, Moloka'i, O'ahu, Kaua'i and Ni'ihau). Divers caught spiny (mostly *P. penicillatus*, or green spiny lobster, because fishing was confined to coastal waters) and slipper lobsters by hand, spear and tangle net. The catches were mostly around O'ahu, where Chinese restaurants and the tourism industry provided a limited market for lobsters. Fishermen received the highest price for live lobsters.

In 1901, the recorded amount of lobster caught and sold in local fish markets was 131,200 pounds (Cobb 1902). As the population of Hawai'i grew, catches of lobster around the main Hawaiian Islands plummeted and the catch rate dropped steadily. By the early 1950s, the commercial catch of *P. penicillatus* around the main Hawaiian Islands had dropped by 75% to 85% (Shomura 1987). Between 1948 and 1965, the landings of main Hawaiian Islands lobster dropped to approximately 20% of the peak, from nearly 45,000 pounds to approximately 8,000 pounds per year, and landings fluctuated at around 2 to 4 metric tons (4,000 to 9,000 pounds) between 1966 and 1977 (Kelly and Messer 2005; WPRFMC 1981a). This indicated to researchers that local fishermen had placed too much pressure on the limited resource within the main Hawaiian Islands and that fishing activities for lobster had to be carefully monitored to preserve the

Table 1: Commercial Catch of Spiny Lobster

State of Hawai'i Division of Fish and Game

(Source: WPRFMC 1981a)

Year	Pounds Caught	Value
1948	42,370	27,848
1949	43,632	26,869
1950	34,012	17,770
1951	17,230	10,149
1952	18,052	11,088
1953	17,938	11,230
1954	14,999	8,369
1955	16,136	10,677
1956	12,732	7,371
1957	14,392	8,966
1958	9,192	5,964
1959	12,339	7,975
1960	10,473	7,049
1961	12,642	8,542
1962	7,890	5,232
1963	10,277	7,834
1964	9,846	7,895
1965	8,158	6,639
1966	5,481	4,397
1967	4,415	3,676
1968	4,751	4,296
1969	9,250	9,678
1970	5,398	6,205
1971	6,140	7,893
1972	5,349	8,153
1973	5,577	8,229
1974	4,467	7,415
1975	-	-
1976	6,317	11,357
1977	85,839	199,065
1978	33,719	99,087

stocks. Recreational fishermen didn't have to report their catches, so the true take could not be known.

The State regulations regarding the taking of lobsters in the main Hawaiian Islands included a minimum carapace size of 8.25 centimeters for retention, a requirement to land lobsters whole and a closed season. However, fishing controls had little impact on recovery of the small artisanal fishery. In 1969, under the leadership of Gov. John Burns (1962-1974), the Governor's Task Force on Oceanography, State of Hawai'i, recognized that the fishery resources of the main Hawaiian Islands were subject to considerable fishing pressure and recommended exploration and development of the new and virtually untouched marine resources in the NWHI (Uchida and Uchiyama 1986). The Governor's Advisory Committee on Science and Technology recommended that State, federal and academic researchers cooperate to investigate the NWHI waters. The 1973 and 1975 cruises that first located the lobsters in the NWHI were in response to that recommendation.

During the 1970s, sugar and pineapple plantations, which had been a mainstay of Hawai'i's economy for a century, were in decline. Gov. George Ariyoshi (1974-1986) looked for new business alternatives to support a more diverse economy (Grigg and Pfund 1980). In 1978, the Hawai'i State Plan recognized the need for economic diversification and prudent use of the natural resources, particularly those of the marine environment (State of Hawai'i 1979). The same year, the State Legislature, with the governor's strong concurrence, requested the development of a fisheries development master plan (*ibid.*). Economist Sam Pooley and project manager Stanley Swerdlow worked on the State of Hawai'i Department of Land and Natural Resources' plan to help boost the local fishing industry. Pooley, whose role in the fishery would evolve from analyst and Council staff to director of NOAA's Honolulu Laboratory, recalled the initial development plan as a "relatively low cost approach using existing studies with ... in house projections" (Pooley

2019). He added that "much of the NWHI projection [in the State's plan] was based on Honolulu Laboratory exploratory surveys extrapolated by estimates of habitat."

The plan noted that the harvest of spiny lobster in the main Hawaiian Islands appeared to be close to the sustainable maximum and that the stocks in the Leeward Islands were "capable of increased utilization" and "the object of

a budding commercial fishery," which would be managed by the Western Pacific Regional Fishery Management Council (State of Hawai'i 1979).

The possibility of expanding the Hawai'i lobster fishery on a much larger commercial scale generated excitement in the state, and many newspaper articles were written about the potential of developing fisheries in the NWHI.

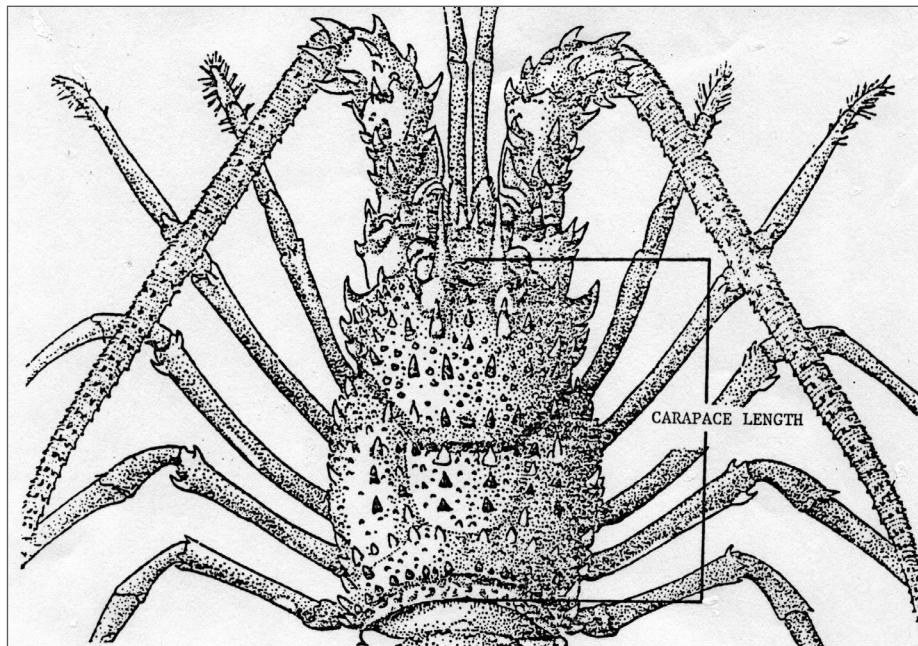


Fig. 5. Carapace length.



Fig. 6. NOAA Honolulu Laboratory, part of the Southwest Fisheries Science Center (prior to establishment of the Pacific Islands Fisheries Science Center), was located adjacent to the University of Hawai'i at Manoa campus. Photo: NOAA.

NORTHWESTERN HAWAIIAN ISLANDS

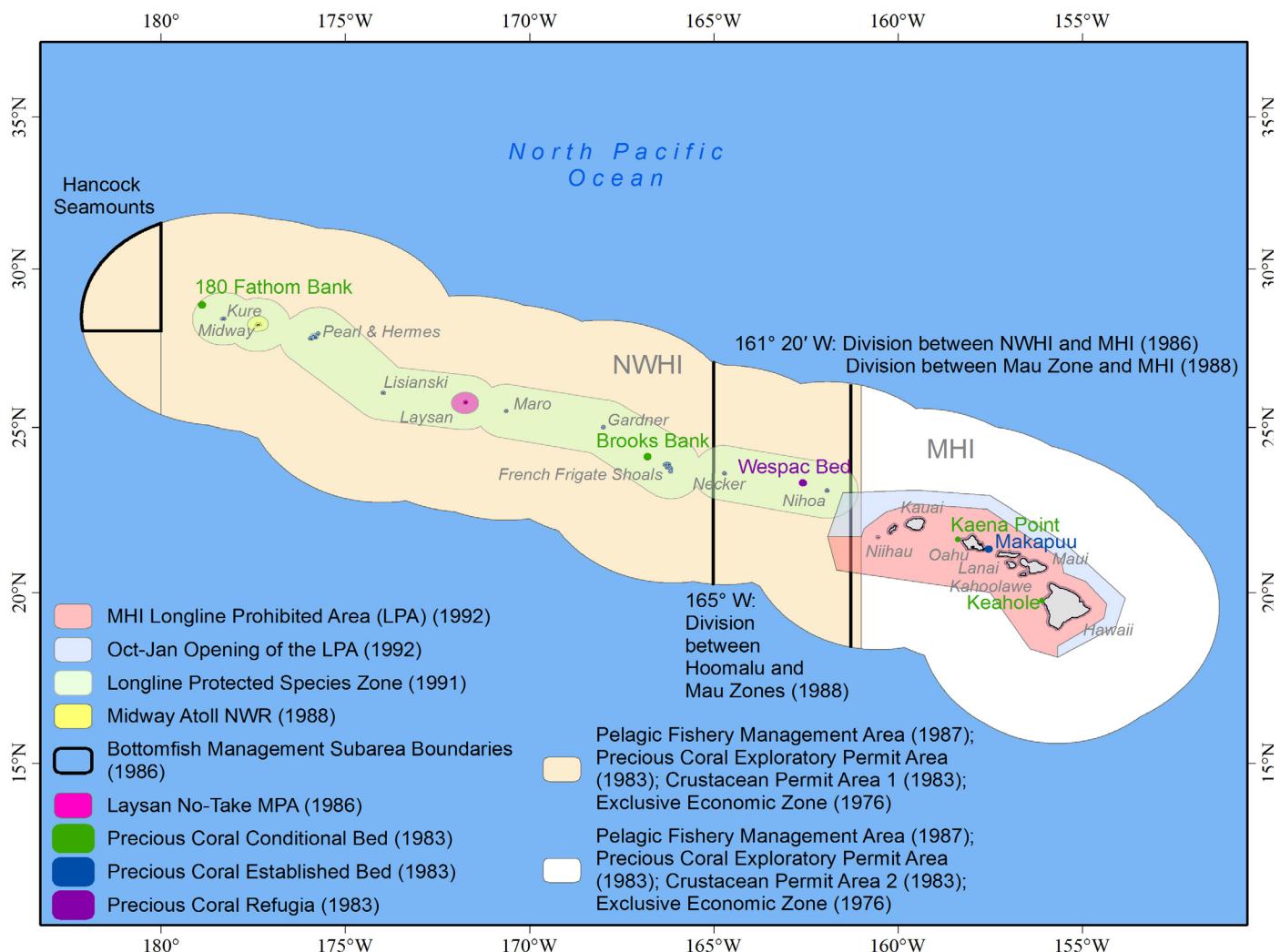


Fig. 7. Hawai‘i Archipelago including the main and Northwestern Hawaiian Islands (circa 1992). Source: WPRFMC.

The NWHI, also known as the Leeward Islands, are under the jurisdiction of the City and County of Honolulu and considered “ceded lands.” These former crown lands once belonged to the Hawaiian monarchy but were taken by the Republic of Hawai‘i after the overthrow of the Kingdom of Hawai‘i in 1893. The lands, including submerged lands, were then “ceded” to the U.S. government upon annexation in 1898. In 1909, President Theodore Roosevelt through Executive Order 1019 designated the islets and reef of the NWHI as the Hawaiian Islands Reservation to protect seabirds. The area was eventually transferred to the Interior Department and designated the Hawaiian Islands National Wildlife Refuge.

The United States returned the NWHI to Hawai‘i when it became the nation’s 50th state in 1959. The ceded lands were to be held in trust for the benefit of the Native Hawaiian people. In 1976, the NWHI represented a new frontier for the economic growth of the then young State.

The NWHI chain begins at the island of Nihoa, 286 miles from Honolulu Harbor, and continues 1,500 miles northwestward to Kure Atoll. The hundreds of atolls, islets, shoals, banks, reefs and seamounts of the NWHI were well known to ancient Hawaiians. Ancient relics indicate bottomfish fishing



Fig. 8. Nihoa. Photo: Chris Farmer, American Bird Conservancy; public domain.

occurred before Western contact at Nihoa (Moku Manu) and Necker Island (Moku Manamana). Native Hawaiians also made regular trips to the NWHI in the 1700s-1800s for turtles, seabirds and bottomfish.

In modern times, Western sailing ships exploited the area for seals, whales, reef fish, turtles, sharks, birds, pearl oysters and sea cucumbers. Commercial harvest of near-shore resources by local fishermen from Hawai‘i in the NWHI took place as early as the 1917 (Honolulu Star-Bulletin 1917). Target species included turtles, pearl oysters, mullet, weke, akule, ulua and ula (spiny lobster) and deep-water onaga, uku, ehu, ula ula, opakapaka and hapu‘upu‘u (Shinsato 1973). Beginning in the 1960s, documented foreign fleets in the NWHI included Japanese longline and pole-and-line operations targeting tuna and Japanese and Soviet trawlers targeting groundfish (WPRFMC 2003). The area was also known to Taiwanese and Japanese fishermen who were said to regularly visit the area in pursuit of precious corals (Grigg 2010).

While U.S. Coast Guard ships and airplanes intermittently patrolled the NWHI, the fishing that took place there during this period was largely unregulated. State of Hawai‘i and locally based federal management agencies

sought to more effectively manage the fish and undersea resources of this area; however, they had few resources at their disposal to do so.

That changed after Congress passed the Fisheries Conservation and Management Act of 1976. Known today as the Magnuson-Stevens Act (MSA), it created eight regional fishery management councils in the nation and declared waters seaward of state waters (generally, 0 to 3 nautical miles (nm) from shore) out to 200 nm from shore as the U.S. Fishery Conservation Zone (which would later become the U.S. Exclusive Economic Zone, or EEZ). Through the MSA, the United States sought to support and develop its domestic fisheries and to permit foreign fishing within the U.S. waters only for the amount of the optimum yield that the domestic fisheries could not harvest.

Declaration of the U.S. zone stimulated ongoing discussions by the National Marine Fisheries Service (NMFS) Southwest Fisheries Center’s Honolulu Laboratory, the Interior Department’s U.S. Fish and Wildlife Service (USFWS) and the State of Hawai‘i to research the then largely unknown marine resources of the NWHI (Uchida and Uchiyama 1986). The ensuing five-year Tripartite Cooperative Agreement slowed down mounting tension between

the development aspirations of the State of Hawai‘i and local fishermen and the environmental protection concerns of federal managers of the Hawaiian Islands National Wildlife Refuge who sought to prohibit fishing around the islands to protect resident birds, monk seals and green sea turtles (State of Hawai‘i 1979).

Under the MSA, the Western Pacific Regional Fishery Management Council was given authority over federally managed fisheries in the Central and Western Pacific. It was tasked with developing, monitoring and amending fishery management plans (FMPs) for Hawai‘i, American Samoa and Guam and eventually also the U.S. Pacific remote islands and the Commonwealth of the Northern Mariana Islands. In 1977, the new Council set to work almost immediately on the FMP for the Spiny Lobster Fisheries of the Western Pacific Region. Under the chairmanship of Hawai‘i Senator Wadsworth Yee, the Council felt a sense of urgency to manage the fishery.

“We knew we had to do something because people were already going up there [to harvest lobsters],” Yee recalled (2007).

What the Council did not anticipate was the pace at which the NWHI lobster fishery would expand.

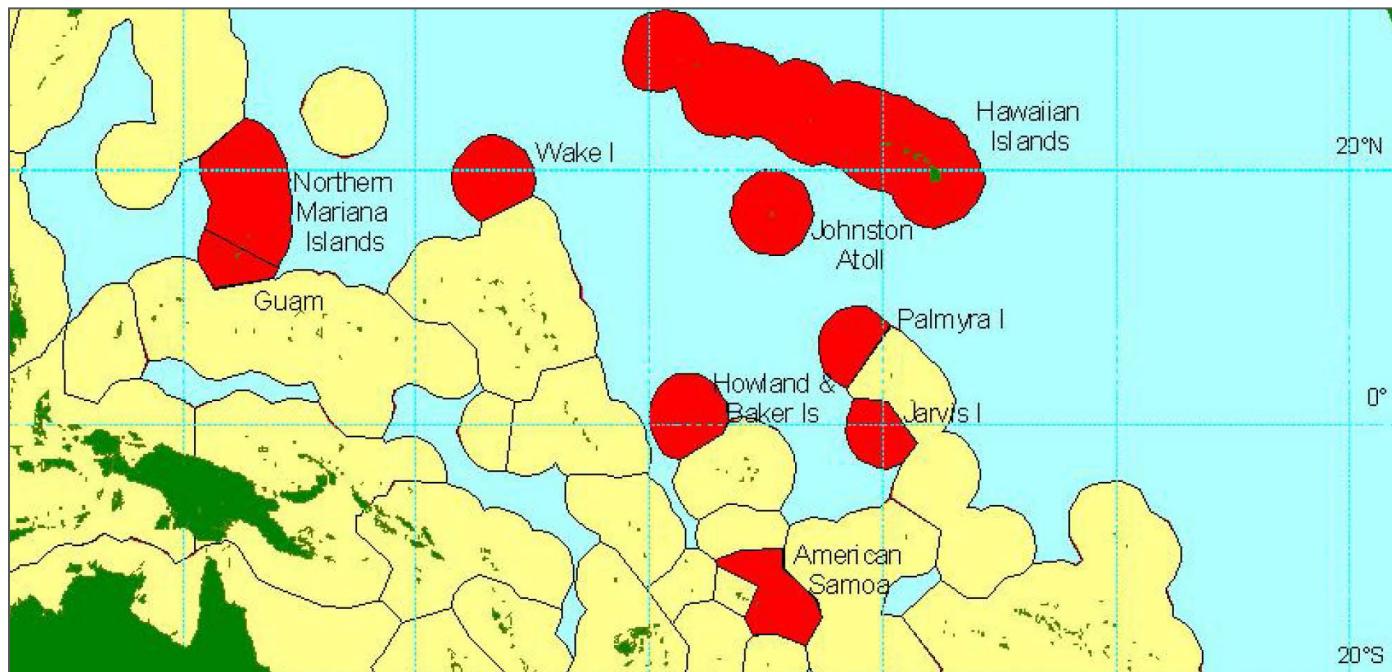


Fig. 9. U.S. exclusive economic zone in the Western Pacific Region. Source: WPRFMC.

FISHERY BEGINNINGS

While news of the potential for a commercial NWHI lobster fishery became publicly known after the NOAA 1976 research cruise, some fishing vessels discovered the rich grounds on their own. According to at least one source, Capt. Skip Naftel of the *Easy Rider* accidentally discovered the grounds at Necker Island when his deep-sea fish traps blew inshore during a storm. When Naftel pulled the traps up from the 20-fathom line where they had lodged, they were full of “bugs.” According to this source, two boats harvested about 5,000 lobsters per trip from 1974 to 1977 (Rauzon 2001).

Most sources give 1976 or 1977 as the start of the commercial lobster fishery in the NWHI. Uchida and Tagami (1984) reported that one vessel commercially harvested spiny lobster in the NWHI in 1976 and five participated in the fishery in 1977, increasing the spiny lobster catch for the Hawai‘i archipelago from 3 metric tons to more than 37.5 metric tons, of which 31.5 metric tons came from the NWHI. The State of Hawai‘i reported that in 1977 four vessels were landing fresh and frozen lobster from the NWHI (WPRFMC 1977a) and 70,000 lobsters were taken (State of Hawai‘i 1979). Ex-vessel prices averaged \$2.09/pound, worth \$240,600 to the fishermen (Uchida and Tagami 1984).

As there was no management plan and reporting requirements for NWHI lobsters during the early years of the fishery, many catches went unreported. At the time, Hawai‘i State permits covered only NWHI vessels fishing inside the 3-mile line from French Frigate Shoals to Kure Island. Fishing at Necker, which had the heaviest concentrations of spiny lobsters, was believed to be outside State jurisdiction. During the closed season for lobster in the main Hawaiian Islands, the State required catch reports for lobster landed anywhere in Hawai‘i. Tailing was prohibited, and vessels were required to land the lobsters whole. Vessels fishing the NWHI were given the State reporting form as well as fishing logs developed by NMFS Honolulu Laboratory. This



Fig. 10. Honolulu-based *Katy Mary* participated in the NWHI lobster fishery and was chartered to assist in tagging studies for the fishery. Photo: John Kaneko.



Fig. 11. Leo Ohai, a Native Hawaiian fisherman, used his multi-purpose vessel the *Libra* to participate in the NWHI lobster fishery. Photo: Sylvia Spalding, WPRFMC.

led to some confusion and incomplete reporting (WPRFMC 1977a).

Seafood vendors and fishermen experienced the growing pains of the new fishery. The market structure was disorganized and unable to absorb the influx of 13 times more live lobsters. Captains unfamiliar with transporting large number of live lobsters over long distances experienced the loss of entire loads due to overcrowding and poor water circulation in the bait wells. By the end of the 1977 season, some of the NWHI lobster fishermen switched to catching bottomfish.

There were other problems too that would have lasting impacts on the management of the fishery. Initially the Council’s Plan Team members did not differentiate among the slipper and spiny lobsters in the new fishery. Instead, as



Fig. 12. The NWHI frozen lobster fishery began in 1978. Photo: NOAA.

Pooley (2019) recalled, they simply noted “lobsters” when writing about the new NWHI catch. It would be several years before the most common types of lobsters were differentiated in catch

reports. Pooley explained, “I don’t think people realized there was a significant biomass of slippers until the NWHI fishery really got going; the amount of slipper lobsters caught early on was small and accounted for by Honolulu Lab staff recording landings by meeting each boat. Ultimately the logbooks were changed.”

NWHI lobster fisherman Jorge Morgan (2020) said he initially considered slipper lobster a bycatch of the spiny lobster fishery because only a few were caught in shallow waters where the spiny lobster lived. It wasn’t until he started fishing in deeper waters (30-120 fathoms) that he caught slipper lobsters in numbers that caused him to realize that slipper lobster was potentially a completely separate fishery.

According to fisherman Jerry Ray (2019), differentiating the species in the logbooks would ultimately make a difference because without species-specific regulations, fishermen fished hardest for spiny lobsters as they consistently brought the highest return.

Only two vessels remained in the fishery in 1978, and the ex-vessel price rose to \$3/pound, worth \$82,100 to the fishermen (Uchdia and Tagami 1984). The NWHI catch dropped to 31,000 lobsters, and the first NWHI operations for frozen lobster tails began with a local company leasing a modern vessel from the U.S. mainland (State of Hawai‘i 1979).

The *Easy Rider Too*, with the capability of both catching and fully processing fish at sea, arrived in Honolulu to enter the NWHI lobster fishery in 1980. Lobster could be delivered to the dock in Honolulu cleaned, tailed, blast frozen, wrapped in plastic and boxed. Gary “Skip” Naftel with the backing of a 17-member hui (partnership), including a number of Kaiser hospital doctors, had the 126-foot vessel built in New Orleans with the support of \$1.7 million from a long-term direct government loan program for fishery activities (Hastings 1980).

The next year (1979) did not look appreciably better for the nascent fishery. The State of Hawai‘i reported two to three vessels were fishing intermittently for lobsters in the NWHI area nearest to the main Hawaiian Islands.

Then an unexpected event happened—the Sandinista National Liberation Front overthrew the Somoza dictatorship in Nicaragua in 1979-80. At that time, the Miskito Coast of Nicaragua was one of the Caribbean’s leading sources of frozen rock lobster tails. The Miskito, the indigenous ethnic group from that area, considered the lobster reefs off the Caribbean coast as communally owned by their tribe. The new Sandinista government of Nicaragua was Marxist and exercised state control over the lobster beds. Uncertain where they would sell their lobster, the divers, who were primarily Miskito Indians, stopped fishing. Production by Miskito Indians fell from 1,636,100 lobsters in 1980 to 991,000 lobsters in 1981 and then continued to fall ultimately reducing the number of rock lobsters on the world market by one million or more (Martinez 2001). The number may be greater because the reporting of the catch was said to be often undercounted.

The fall in the Nicaraguan supply of rock lobsters lasted nearly eight years and coincided with the rise in the world economy and increases in demand for rock lobsters for surf and turf dishes on the U.S. mainland, Japan and Taiwan. As international supplies diminished and prices rose, international buyers converged on Hawai‘i to make up the difference.

In 1981 it was estimated that the world price of frozen lobster tails increased by an estimated 18% per year. The fish buyers could sell as many as the fishermen produced. The number of traps and the combined freezer capacity increased.

The NWHI lobster fishery was spurred on by a steady increase in the price of frozen lobster to \$3.50/pound in 1981. The fleet increased to 10 vessels, landing 780,877 pounds worth \$2.7 million (Uchida and Tagami 1984). Among the vessels were *Lusty* bringing back live lobsters and *Magic Dragon* and *Bounty* landing frozen tails (Morgan 2020). The fishery employed 50 workers with an additional 10 to 15 people working on shore to handle and market them (WPRFMC 1981a).

To better understand the market for lobster tails, Pooley, who was now

working for the NMFS Honolulu Laboratory, was sent to the Fulton Fish market in New York, the largest fish market on the Atlantic Seaboard, to interview lobster dealers.

“I went to the market in 1982 or 83,” Pooley (2019) recalled. “At that time all spiny lobsters were imported from the Caribbean, mostly as frozen tails. Fulton Street handled some of this product.” He viewed how U.S. mainland fish processors handled lobster and fish. The trip connected him and his Honolulu Laboratory associate Ray Clarke to lobster marketing specialists who provided insight on the rapidly growing frozen spiny lobster tail market. High-end, high-priced fishery products, such as frozen lobster tails, were profitable in many ways, but not all of the participants received the most profits. “Recovery yields and labor costs weighed heavily in that calculation,” Pooley recalled.

Along with market changes, the early 1980s saw significant development in fishing gear and methods. In the 1970s, the NWHI lobster fishermen primarily used the California-style lobster traps constructed of wood and steel mesh. These traps were bulky to carry, slow and difficult to haul and a chore to clean. The number of these that could be safely stacked and lashed on deck was limited.

The California traps were effective at catching spiny lobsters, relatively ineffective at catching slipper lobster and typically fished in a string of between 75 and 150 traps. Each vessel would haul, bait and reset 400 traps daily on average (DiNardo and Marshall 2001).

In 1982, John Tarantino, owner of the California manufacturing company Fathoms Plus, began marketing a unique plastic lobster trap that he had invented. Hundreds of the black traps could be connected with ropes, baited and deployed. A practiced crew in assembly-line fashion could haul, clean, bait and prepare a trap for deployment in 8 seconds (Ray 2019). Tarantino was soon selling thousands of traps.

The Tarantino-patented traps could be opened quickly into identical halves for easy stacking, allowing many more traps to be stored on deck and increasing the trap capacity of the vessels. With



Fig. 13. The new plastic lobster traps could be deployed in strings of a hundred.
Photo: NOAA.



Fig. 14. The plastic traps opened quickly into identical halves for easy stacking, allowing many traps to be stored on deck.
Photo: NOAA.

Table 2: Annual landings of spiny and slipper lobsters (in 1,000s), trapping effort (in 1,000s trap-hauls), CPUE and the percentage of spiny lobster in the landings, 1983-1991.

Source: Polovina 1993.

Year	Spiny lobster	Slipper lobster	Total lobsters	Trapping effort	CPUE	Spiny lobster %
1983 ²	158	18	176	64	2.75	90
1984	677	207	884	371	2.38	78
1985	1022	900	1922	1041	1.83	53
1986	843	851	1694	1293	1.31	50
1987	393	352	745	806	0.92	53
1988	888	174	1062	840	1.26	84
1989	944	222	1166	1069	1.09	81
1990	591	187	778	1182	0.66	76
1991 ³	131	35	166	292	0.56	79

¹Data were provided to the Honolulu Laboratory, NMFS, as required by the Crustacean FMP of the WPRFMC.

²April-December 1983. ³January-May, November-December 1991.

the limitation on the number of traps reduced, fishermen could deploy nearly a thousand traps at a time and could catch 3,500 slipper and 2,200 spiny lobsters at Necker Island on a good day (*ibid.*).

After the plastic traps were introduced, the number of lobsters caught increased from 884,000 in 1984 to 1,922,000 in 1985 (see Table 2) (Polovina 1993).

The market was booming, but having fishing knowledge was not enough for fishermen to succeed financially. Jerry Ray, an albacore fisherman who entered the NWHI lobster fishery, said one also had to know how to market one's business and how to correctly process

and package the lobster tails so they were exactly in the form international fish buyers needed. At first Ray struggled to make money with the lobsters he caught. His business prospered only after a fellow fisherman, Bruce Mounier, who came to Hawai'i from Florida, taught Ray the right techniques. Mounier loaned Ray the money to buy an on-board flash freezer and taught him the proper method of processing: detaching the tails, putting them in plastic bags and then flash freezing them. Without these steps, it was impossible to find a seafood dealer interested in buying and distributing the lobsters. Ray expressed his gratitude for the lesson Mounier passed

on to him—that successful commercial fishing requires not only access to fishing grounds and technical fishing skills but also business savvy, access to capital, marketing acumen and the ability to consistently supply seafood customers with a high quality product.

Ray said putting down the new traps was like “vacuuming the bottom.” As prices rose quickly, he and others began making record profits. After one 70-day trip, he sold a container of lobsters for \$350,000. He and others in the fishery knew that they were on to a good thing. But being experienced fishermen, they wondered how much longer it could last without greater regulation.

MANAGING THE FISHERY

Under the nation's new fishery policy set forth in the MSA, regional fishery management councils were to manage a stock sustainably within the context of an economically profitable fishery. In its first decade of existence, the Western Pacific Council worked with NMFS on the temporary Preliminary Management Plans to address foreign fishing in the EEZ waters around Hawai'i, American Samoa and Guam. The Council also worked to develop more permanent FMPs to manage both foreign fishing within the EEZ and regional domestic fisheries seaward of state and territorial waters. The Council began with FMPs for the fisheries most in need of conservation and management. The first was the FMP for Spiny Lobster Fisheries, later renamed the Crustacean FMP.

The key question posed to the Western Pacific Council was the number of spiny lobsters that could be removed from the NWHI without

damaging the stocks' ability to sustain their populations. Unlike the managers of New England's commercial fishery for Maine lobsters, who could draw on more than a hundred years of experience, the Western Pacific Council had only the most basic knowledge of the history of the local spiny and slipper lobster resources on which to base its decisions. Knowledge of the biology from the Hawai'i subtropical rock lobsters was so limited in 1976 that no one knew their life cycles.

Council members early on expressed concern about the potential to overexploit the fishery before adequate data could be acquired to manage it. At the second Council meeting in December 1976, Michio Takata, director of the Hawai'i Department of Fish and Game, said that creating a management plan for crustaceans should be a priority for the new Council. He warned that the lobster stocks needed to be regulated or they

would be quickly depleted (WPRFMC 1976). Council member Buzzy Agard, a local commercial fisherman, echoed this concern at the fifth Council meeting in June 1977.

Council Chair Yee suggested imposing a moratorium on the fishery under the emergency powers of the Secretary of Commerce. However, Honolulu Lab Director Richard Shomura, who served as deputy chair of the Council's Scientific and Statistical Committee (SSC), said fishing was needed to generate data on the stock. Martin Hochman, General Counsel for the NOAA Southwest Region, also spoke against the moratorium, noting that a plan had to be in effect in order to impose restrictions on the fishery and that the Commerce Secretary was reluctant to take emergency actions unless it was to save a resource from imminent disaster (WPRFMC 1977a).



Fig. 15. The inaugural members of the Western Pacific Regional Fishery Management Council (circa 1977) surround the Council chair, Hawai'i Senator Wadsworth Yee (seated front center). Photo: WPRFMC.

To deal with these concerns and help develop policy recommendations regarding spiny and slipper lobster harvesting, the Council created a Spiny Lobster Plan Team under the direction of Tim Smith from NMFS. The Council funded two consultants, Paul Struhsaker and then-graduate student Craig McDonald to assist the team. The NMFS Honolulu Laboratory assigned its economist, Michael Adams, to assist as well. (WPRFMC 1977a)

In lobster fisheries such as Maine, there was a long time practice of keeping the carapace size long so as to assure the protection of the “breeders,” the older female lobsters that bore most of the eggs. But some in Hawai‘i felt such safeguards were not necessary for the NWHI because relatively few lobster fishermen were operating in a vast untapped area.

Among the suggestions was to allow the taking of NWHI lobsters smaller than those permitted by law in the main Hawaiian Islands. The rational was it would enable fishermen to catch more lobsters per voyage thus helping to ensure profitable operations. The proponents also thought that the NWHI lobsters lived in such dense clusters that removing some larger lobsters would enable younger lobsters to grow and breed at a faster rate.

The Plan Team shared concerns that the lobster fishery could be easily overexploited. Intense discussion took place between the Plan Team and the SSC over how to set rules that would protect the lobsters from overexploitation while ensuring the optimum yield would be reached. Since little about the biology of the local spiny lobsters was understood, the maximum sustainable yields could not be quantified with much confidence.

Smith presented the Plan Team’s recommendations for a draft Lobster FMP in September 1977, during the seventh meeting of the Council (WPRFMC 1977b).

The recommendations did not include provisions to limit the fishery, prompting Council member Frank Goto to ask why such provisions were not proposed. Yee argued that limiting the number of boats or traps in the fishery would be prudent, given

the paucity of the information about the resource. Shomura rebutted, indicating that size limits and banning the take of females bearing eggs would limit depletion. He said it was premature to

MAXIMUM SUSTAINABLE YIELD is the largest average catch that can be harvested from a stock under existing environmental conditions to keep the population at some intermediate abundance with a maximum replacement rate.

OPTIMUM YIELD is the amount of fish harvested that (a) will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems; (b) is prescribed as such on the basis of the maximum sustainable yield from the fishery, as reduced by any relevant economic, social or ecological factors; and (c) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery.

limit the entry and doing so might bog the management effort in legal problems. At the time, two to three boats were operating in the fishery. Adams said information was insufficient to limit entry for economic reasons.

After reviewing the recommendations, the Council decided on the preliminary

measures to be incorporated into what would become the FMP of the Spiny Lobster Fisheries of the Western Pacific Region. Several of the measures focused on protecting the endangered Hawaiian monk seals (*Neomonachus schauinslandi*), which inhabited the NWHI, as well as lobster spawners and providing a baseline for study on the effects of fishing on both species. The preliminary measures included the following:

- A ban on lobster fishing within the 10-fathom contour around the islands except Midway and Kure Islands, to allow for recreational catch by Navy and Coast Guard personnel stationed there.
- A 20-mile refuge around Laysan Island.
- Gear restrictions that banned the use of tangle nets and allowed taking by hand and that required the use of traps designed to release undersized lobsters and mitigate incidental capture of monk seals.
- Requirements to have permits, to carry an observer if requested and to complete and return standard logbooks.
- Required submission of catches for inspection at designated ports.
- Spiny lobster minimum carapace lengths of 8.5 centimeter for males and 9 centimeters for females. It was noted that average size of first spawning was 7.5 centimeters and maximum spawning occurred at 10 centimeters. Undersized lobsters were to be returned alive to the sea as soon as possible. Lobster tails could be landed provided the swimmerets were left intact. Tail size limits corresponding to the carapace lengths would be provided.
- Requirement to immediately return berried lobsters to the sea.
- Annual review of the status of the fishery and effectiveness of the management measures.

A year later, at the 12th meeting of the Council in August 1978, the Council questioned Smith, the Plan Team chair, on the progress of the FMP. There was particular concern that the Plan Team had not adequately consulted with the Council’s Advisory Panel members,

comprised mainly of fishermen. It was noted that fishermen from two vessels (one new to the fishery, the *Keola*, the first to produce frozen tails in the region) had concerns about the proposed minimum size. Council member Peter Fithian, founder of the Hawaiian International Billfish Tournament, said it appeared to him that the scientists wanted to present the advisers with a *fait accompli*. Ego, from the Hawai‘i Division of Fish and Game, also noted the discrepancies in the management measures recommended by the draft FMP and the State’s laws, which had a minimum carapace size of 8.25 centimeters and required lobsters to be landed whole. The new NWHI lobster fisherman said the minimum size approved by the SSC and Council would bring economic disaster by lowering the catch rate and reducing the price at market. Smith said the Plan Team believed the use of the State’s minimum size would cause a continuing decline in the catch rate, but data needed for the analysis was hard to come by as the operators considered them proprietary. The Council chair viewed lobster management as the Council’s top priority and directed the Smith to have the Plan Team meet with the Hawai‘i Advisory sub-Panel.

At the Council’s next (13th) meeting in November 1978, Smith reported that, based on new data, the Council’s previously proposed minimum carapace lengths (8.5 centimeter for males and 9 centimeters for females) would indeed be economically detrimental to the industry. The Team was prepared to lower the minimum carapace length to the State’s regulations (8.25 centimeters) and to consider other management policies to reduce risk to the stock. Discussed measures included island by island closures based on catch rates, change in size composition or catch quotas; closed season during peak spawning; pulse fishing scheduled island by island; and/or a maximum carapace length to protect large spawners. Chair Yee noted that the Council seemed to be facing an obligation to reconcile the economic needs of the industry with the conservation requirements of the resource.

Effort on the draft FMP continued in 1979 and 1980. The SSC recommended a great deal of management flexibility to protect the stocks and the fishermen since the database was weak and the fishery small with some potential. Henry Sakuda, the new Plan Team chair, said the Team believed that the FMP should be implemented immediately. The

Council hired Pooley to expedite its completion. The Council also provided logistical funding for Jay Ginter, NMFS Southwest Region, to be in Honolulu to assist with the work.

Meanwhile, the Honolulu Laboratory and the fishermen were cooperating on the placement of observers on the vessels, which provided more data to inform the plan. At its 26th meeting in September 1980, the Council considered the SSC’s recommendation, based on the Honolulu Lab’s analysis of recent catch data (including observer data from a trip aboard the *Easy Rider Too*), to lower the minimum carapace length to 7.8 centimeters. It was noted that a substantial number of lobsters in the 7.8 to 8.25 centimeter size category was being caught in the NWHI and not very many in the 8.25 to 8.9 centimeter range. According to NMFS Honolulu Lab researchers Craig MacDonald and Jeffrey Polovina, a 7.8-centimeter carapace length would preserve 30% to 40% of the reproductive stock. Each 1/10th centimeter reduced reproductive potential by about 2%. The techniques used to model growth and catch were the best available at the time and similar to those used to manage other fisheries throughout the world. Council member John Eads (Guam)



Fig. 16. The Hawaiian monk seal inhabits the NWHI and is protected under the Endangered Species Act and Marine Mammal Protection Act. Photo: NOAA.

noted that the minimum carapace length was in addition to the fishing ban within the 10-fathom contour throughout the NWHI and the 20-mile reserve around Laysan. The Council voted 7 to 4 to lower the minimum carapace length to 7.7 centimeters.

The SSC and Council continued to struggle with determining the maximum sustainable yield due to a lack of understanding the available habitat for lobsters that could be harvested at a commercial level in the NWHI. Polovina and Darryl Tagami (1980) combined catch-per-unit-effort (CPUE) and other data from nine lobster research trips on the NMFS vessel *Townsend Cromwell* between 1976 and 1978 with commercial landings as well as information from MacDonald and others. Based on these data, Polovina and Tagami calculated a surplus production value of 10,000 to 21,000 legal-sized (minimum 8.25 centimeter carapace length) spiny lobsters per year from Necker Island. This was then expanded to include all NWHI lobster grounds under several scenarios to estimate maximum sustainable yield.

The Council also wrestled with the definition of optimum yield. It decided that regulations such as minimum sizes, no retention of berried females, closed areas, mandatory permit, inspection and reporting requirements would allow participants to safely optimize their activities.

After three years of preparation, the draft Spiny Lobster FMP was presented to the public for comment. During the public hearing held Dec. 8, 1980, in Honolulu, Leo Ammon Ohai, a Native Hawaiian fisherman with many years of experience in the NWHI and a member of the Council's Spiny Lobster Advisory Panel, warned against the idea of allowing fishermen to harvest smaller lobsters. He said that he went from catching close to 2,000 lobsters a night using 117 traps three years ago to catching 180 to 250 lobsters a night using 200 traps a year later. "That is the reason I, as a commercial fisherman, really don't agree to this lowering of the size of lobsters," he said (WPRFMC 1980b). Although his objections were dismissed at the time, later his caution would prove prophetic.

The Council approved the final draft FMP at its 29th meeting, March 31-April 1, 1981. It included the following changes, among others:

- Inclusion of slipper lobster as well as spiny lobster as management unit species.
- Maximum sustainable yield defined as 200,000 to 435,000 lobsters annually.
- Optimum yield defined as between 168,000 and 420,000 lobsters annually.

The Council also approved the following measures recommended by the SSC:

- Refinement of the 4.9 centimeter tail width (equivalent to a 7.7-centimeter carapace length) to include a tolerance level. [Amendment 3 to the FMP (1985) would require at least a 5.0 centimeter wide tail.]
- Retention of the 10-fathom depth restriction and the Laysan Island closures. [Amendment 4 to the FMP (1986) would apply these measures to slipper lobster as well as spiny lobster.]
- Gear restrictions as previously discussed.
- Ghost-trap research. [Parrish and Kazama (1992) would show no evidence that lost traps result in increased mortality.]
- Allowance for additional measures on the fishery under emergency conditions by the Regional Director.
- Prohibition against harming egg-

mass on berried lobsters and harming sublegal lobsters.

- Permit requirements for commercial vessels only and placement of mandatory observers at the Regional Director's discretion.

Following the Council's approval, the final draft was reviewed by the Plan Team and Hawai'i Advisory sub-Panel.

The Plan Team and SSC also reviewed the biological opinion prepared by NMFS for the fishery. The Endangered Species Act (ESA) requires a biological opinion for any federal action that may have an effect on ESA-listed species (in this case, the Hawaiian monk seal) to ensure that the proposed action will not reduce the likelihood of survival and recovery of that species. In response to the biological opinion, the Council agreed to revise the final draft FMP to include Monk Seal Protective Measures in the FMP (WPRFMC 1982a). The measures spelled out the procedures for investigating if a monk seal death may have been caused by the fishery and for implementing emergency protective measures, such as, change in gear/trap design and spatial/temporal closures.

The Spiny Lobster Fisheries FMP was finalized in May 1981, revised in February 1982 and approved for implementation in April 1982 by the Secretary of Commerce (WPRFMC 1982b). After Secretarial approval, the regulations were published on Feb. 7, 1983, and became effective on March 9, 1983.



Fig. 17. Laysan Island. Fishery management measures included a ban on fishing for spiny lobster within 20-nautical miles of the island and within the 10-fathom contour throughout the NWHI. Photo: USGS.

MANAGEMENT PLAN AMENDMENTS AND EMERGING PROBLEMS

Following implementation of the FMP, the Council adopted the State minimum carapace length of 8.25 centimeters for EEZ waters around the main Hawaiian Islands to facilitate enforcement (Amendment 1, 1983). The Council also modified the NWHI lobster trap opening dimensions to minimize risk of harm to monk seals (Amendment 2, 1983).

With these amendments completed, the Council organized field trials for the trap's escape vents so that undersized lobsters would not be taken. The trials (organized by Alan Everson, Robert Skillman and Jeffrey Polovina) were conducted on the commercial lobster vessel *Shaman*. They tested the difference between rectangular and circular vents in releasing sublegal lobsters. The research indicated that traps with circular vents caught 83% fewer sublegal spiny lobsters than non-vented traps while rectangular vents reduced the catch by 70%. The research resulted in the requirement that all traps used in the NWHI lobster fishery after Jan. 1, 1988, must be equipped with two 67-mm circular vents (Amendment 5, 1987), which reduced sublegal spiny lobster catches at Necker Island in 1988 by 38%. (Everson et al. 1992)

Meanwhile, word of the financially successful lobster fishery in Hawai‘i continued to spread. In addition to vessels from California, crab boats from Alaska began making their way to the islands. Between 1983 (nine months of data only) and 1984 (12 months of data), the annual catch of spiny lobsters grew fourfold from 157,000 lobsters to 667,000 lobsters and the catch of slipper lobsters grew exponentially from 26,000 to 285,000 lobsters (WPRFMC 1985). Nonetheless, the joint NMFS Southwest Region/Southwest Fisheries Center 1984 annual report on the fishery was positive, stating that the catch was sustainable because recruitment and catch rates did not show significant declines.

From 1983 to 1991, the fleet averaged 9 to 16 vessels of 49 to 115 feet length. Vessels averaged three trips per year, typically setting about 800 traps per day and remaining at sea nearly

two months per trip. Annual landings averaged 600 metric tons (1 million lobsters) worth about \$6 million ex-vessel, making the NWHI lobster fishery the most valuable demersal fishery in the state (Polovina 1993).

Looking at his fishery data, Polovina observed the spiny lobster CPUE declined after 1983 from 2.75 per trap haul to 0.92 in 1987 (*ibid.*). It was thought that the CPUE for a healthy fishery should be at least 1.0 per trap.

Fueled by high prices and seemingly unlimited demand for frozen lobster tails, fishermen took as many lobsters as was possible. Criticisms that the lobsters were being overfished soon followed (Markrich 1985).

The Council members and scientists were unprepared for this criticism because the fishery was being harvested faster than the scientists had anticipated. Some on the Council urged for steps to be taken to slow the harvest, such as a moratorium on new entrants to the fishery. However, under the terms of the MSA, the Council's authority was limited. The final authority was with NMFS, representing federal policymakers in Washington, DC.

Arguments grew in intensity as the CPUE declined. At the Council's 52nd meeting in March 1986, the NMFS regional administrator overruled the Council's attempt to develop an emergency moratorium on new entrants in the spiny lobster fishery and to restrict spiny lobster permit holders from fishing more than the number of traps shown on their permit applications.

Among the loudest voices asking for restrictions being placed on the fishery were those from the fishermen themselves. Mounier and Ray in 1986 were outspoken about the significant CPUE drops at Necker and Maro Reef from 2.05 spiny lobsters per trap in 1983 to 0.88 in 1985. They warned that at least a five-month closed season was needed. (WPRFMC 1986)

Clarice Mounier, Bruce's wife and one of a number of wives who fished with their husbands at sea, said that their vessel, the *Magic Dragon*, had

spent almost 700 days at sea, laying 250,000 traps and produced statistics that indicated that the NMFS scientists did not have a true picture of what was happening in the NWHI. She said that so many lobsters were being taken in traps that the deck of the vessel was covered in orange roe. She said 90% of the females tailed had orange roe inside. This meant to her that a disproportionate number of egg-bearing females were being taken from the fishery. She was concerned that the loss of so much potential spawning potential was placing the future of the fishery at risk. (*ibid.*)

This argument was countered by other fishermen who complained that the Mouniers wanted a closed season to protect their own interests. One fisherman said he felt that vessels from Washington State that wanted to enter the fishery were being excluded out of self-interest. Arguments were also made to disapprove or restrict the use of the Tarantino traps because they were simply too effective. But this effort was overruled as well.

Polovina was one of the scientists who believed that the future of the fishery was not at risk. The information he was receiving from fishermen indicated to him that, despite the falling CPUE, new lobster recruits were showing up. He believed that, if all things remained the same and his mathematical computations were correct, a new cohort of adult-sized lobster would grow and the CPUE, while fluctuating, would eventually return to the baseline of 1.0 lobster per trap that was deemed necessary to maintain the fishery.

Polovina's estimates were not made by chance. Prior to working for the Honolulu Laboratory he had worked at the Federal Reserve in San Francisco doing financial modeling. Adapting the calculations for finance to those in natural systems, he assigned mathematical values to critical stages in the growth of lobsters and other sea life and then adapted them to natural ocean, weather and environmental conditions, thus building the first comprehensive ocean modeling system, called Ecopath.

Its purpose was to forecast future events and help resource managers in planning.

The administration of President Ronald Reagan (1981-1989) was heavily influenced by the tuna industry in California. A policy priority was placed on the profitability of every U.S. fishery. As a consequence, when lobster fishermen like Ohai, Ray and Mounier pushed for precautionary policies in the form of limited entry or larger size carapace requirements, the regional representative often objected. The Hawai'i lobster fishing community and the Council sparred repeatedly with E. Charlie Fullerton, director of the NMFS Southwest Regional Office, who represented the official U.S. government view of the time, that the responsibility of the fishing fleet was to achieve optimal yield. Ironically, time and again it was the fishermen who called for limits and the NMFS representative who overruled them. In one instance, Fullerton refused to approve a moratorium suggested by fishermen and Council members to limit the number of new fishermen wanting to enter the lobster fishery. He said this was because the Council had not established

a limited entry system (WPRFMC 1986). When Council Chair Yee heard this, his response was that "this was news to me."

At this crucial phase in the fishery, Council members, scientists and fishermen expressed doubt and differed as to what was best. Ultimately, Council members were swayed by Polovina's confidence in his lobster modeling. They also felt that, as the federal policy at the time was to produce optimum yield, they had no choice but to continue the fishery.

In 1987 and 1988 research trips by the *Townsend Cromwell* indicated that declines in the CPUE test trappings were continuing. However, it was difficult for members of the Council's SSC and Plan Team to project that a downturn was imminent. In the interim, the Reagan-era fishery policies at NMFS continued.

With the coming of the administration of President George H. W. Bush (1989-1993) things changed. The Bush Administration took a different tone towards the management of commercial fisheries throughout the United States and promoted precautionary fishery management

policies within NMFS (Anderson 2014). Long deferred conservation measures were implemented. Ironically, commercial fishermen most familiar with the lobster fishery would later be blamed for overharvesting.

In keeping with precautionary-minded fishery policies of the new administration, overfishing in the lobster fishery was redefined as spawning stock biomass per recruit (Amendment 6 to the FMP). This was a significant change as researchers thought that heavy harvesting in places such as Necker (the NWHI lobster ground nearest to Honolulu) had depleted the overall number of spiny lobsters to the point where the biomass of spawning lobsters was affecting recruitment of new lobsters into the fishery.

Other conservation policies were implemented in 1992: a limited entry program (15 vessels), an adjustable harvest quota, a six-month closed season and trap limits (1,100/vessel), etc. (Amendment 7). Unfortunately, these measures came too late.



Fig. 18. Necker Island. Photo: NOAA

CASE STUDY

Fishermen John Myking (2019) entered the NWHI lobster fishery in the summer of 1989 and remained in it until 1997. He was fishing for albacore during the winter months and decided to start taking his 70-foot vessel the *Marie M* to Necker and Maro Reef. Myking worked in Honolulu Harbor to prepare the vessel for the lobster fishery. He welded pipes on the outside of his vessel to hold the traps, put in a special freezer and removed gear that would prevent his crew from preparing the lobster tails on

deck, i.e., trimming the tails and placing them in sealed plastic bags.

He recalled laying 1,100 traps per day with 120 to 125 traps on a string. Working with his crew of six, he caught seven to eight spiny lobsters per trap. The work was labor intensive as his crew would clean and prepare for freezing up to 1,200 lobster tails per day. It was a good fishery and provided half his revenue. A typical two-month trip would gross \$250,000. The crew after receiving advances from the captain would get

6% of the net revenue, about \$10,000 per crewman.

This was a highly profitable fishery. However, the profits came with considerable risk of death and lifelong injuries. Participation in U.S. fisheries is considered one of the most dangerous occupations in the nation (U.S. Bureau of Statistics 2018; Lincoln and Lucas 2010). Fishermen feared that their vessels, heavily weighted down with welded steel plates to hold lobster traps, were at risk of capsizing in heavy seas. There was also the danger of fishermen being caught in the trap lines. Myking recalled having to rescue a crew member who was pulled overboard into deep water when he became accidentally entangled in a fast moving lobster trap line.

Ray (2019) said that his crewmen faced other dangers. With gloves on they had to reach into the traps, to pull out not only lobsters but also eels and other fish and animals, remove the old bait and then rebait the traps. This could be extremely dangerous. One of Ray's crew had his hand poked by the spine of a scorpion fish that cut through his heavy work glove with the power of a hypodermic needle and pumped venom into his body. Ray recalled that, when this happened, his crewman dropped to the deck unconscious and had to be revived with an injection of epinephrine.

**Table 3: Estimated Expense for 60-Day NWHI Lobster Trip
(6/28/99-8/28/99)**

(Source: Anonymous NWHI lobster fisherman)

Fuel, oil filters	\$9,450
Bait	\$14,216
Gear	\$2,908
Banding material	\$983
Plastic bags	\$1249
Truck rental	\$600
Groceries	\$3,624
Trap loss	\$2,400
State general excise tax	\$641
Total expenses	\$36,070



Fig. 19. Fishing vessel *Marie M* at Honolulu Harbor (circa 2012). Photo: Joel Abroad (Flickr)

DRAMATIC CHANGE

In 1991, Myking (2019) noticed a dramatic fall in the number of lobsters in his traps. Instead of seven or eight lobsters per trap at Necker, he was catching one or two. Myking's experience was not unique. Ray (2019) soon found the same thing. The places that he had been accustomed to fishing were suddenly empty. In 1991, the fishery was closed for several months by emergency action after the dramatic decline in catch rates was observed. That year the CPUE fell to 0.56, the lowest in the history of the fishery (Polovina 1993).

In 1992, the fishery operated fully under new regulations implemented under Amendment 7 to the Lobster FMP (now called the Crustaceans FMP). Monk seals in the wild were found to be starving, and voices from the environmental community both within government and from professional environmental organizations held the Council responsible, accusing it of causing this by mismanaging the lobster fishery. They said the Plan Team researchers had been using faulty data and methods. Environmentalists organized a national media campaign that blamed the Council and NMFS employees for creating conditions that caused monk seals to starve. The lobster fishery and Council policies became targets. Conservation activists within and outside of government vocally demanded that the lobster fishery be curtailed immediately.

Polovina (1994) researched the situation and discovered that not only were monk seal weights down but so were the growth rates of seabirds, fish and other animals living in the NWHL. Ultimately he found that a periodic ecosystem regime shift in the North Pacific, related to temperature, affected nutrient levels in the ocean. When the nutrient levels went down so did the growth rate of all living things. What was occurring had happened periodically for thousands of years. It was suddenly now a crisis because it was linked to the economic collapse of the NWHL lobster fishery, which was publicly perceived as being a threat to monk seals.

Through affective media campaigns by environmental organizations, the monk seals came to symbolize all endangered species. Press coverage was highly critical, and lawsuits were threatened. Council members witnessed the imminent and unexpected collapse of a fishery that NMFS had told them was simply going through a periodic downswing.

It was then, in 1992, that Council Executive Director Kitty M. Simonds contacted Michael Sissenwine, NMFS senior scientist overseeing the Agency's scientific programs throughout the United States. He in turn contacted Andy Rosenberg, a highly regarded NMFS fisheries scientist who had the reputation in the Agency as a trouble shooter and was sent to fisheries throughout the nation that were experiencing problems.

When Rosenberg arrived on site, he understood immediately what needed to be done. The problems in Hawai'i were very similar to those he had encountered while working with Alaska crab and New England lobster fishermen. Rosenberg (2019) explained:

Everybody said it was a change in trap style. But the fundamental change was that everyone was setting a lot more gear so the effective effort had gone way up and that means you are putting the stock at a point where any little change, environmental or any other kind of change, could quickly tip it over an edge. So you are increasing risk dramatically. It is one of the battles that has gone on forever in the New England fishery. It is really that very rapid ramp up of effort in fisheries and then people say "I don't know what happened." ... It's a consistent pattern in fisheries development. ... The important thing in the Hawai'i case is that the Council did react. It did take some action. As opposed to them taking another five years arguing about it, asking "Is this real or is this not real?" And some of this was a testimony to Jeff [Polovina] being a credible voice, but a lot of it was a testimony to Kitty [Simonds] saying, "We need to do something!"

Rosenberg pulled together what he described as a risk assessment tool. Different scenarios were tested based on the amount of effort.

"Largely what you are trying to do is take the signals that are coming in and react in reasonable fashion and exercise some prudence so that things don't get worse while everybody is arguing over whether this change is real," Rosenberg said. "What we were trying to do was put in some rules so that we wouldn't be arguing for years and years and years over whether there was a decline or if in fact a decline had occurred. You could try to mitigate some of the impacts and that is what is meant by a risk assessment tool."

Rosenberg said that because of the relatively small number of boats in the fishery and the proactive measures taken by the Council, actions to protect the lobster fishery could be put rapidly in place. The pressure on the fishery was eased dramatically and quickly.

In 1993, NMFS scientists predicted that the July 1 lobster abundance would be too low to allow the fishery to maintain the minimum required CPUE of 1.0 during the season (Haight and Polovina 1993). NMFS issued a quota of zero; hence, there was no fishing in 1993.

In 1994, the fishery opened with a substantial initial quota, but catch rates in July were much lower than expected under Polovina's forecast. An adjusted quota was computed in August. But, by this time, the catch had exceeded the revised quota, so an emergency closure was invoked by NMFS.

After the 1994 closure, responsibility for lobster assessments was transferred to the Honolulu Laboratory's Pelagic Investigation led by Jerry Wetherall. He assigned Gerard DiNardo to head the lobster program. Concurrently, the Council convened an external panel of experts to critique the lobster management and research and provide guidance to the Council and NMFS. Chaired by Rosenberg, the panel influenced the development of a new harvest strategy and necessary research

The annual harvest guideline is divided among 4 management areas. The 1998 quota (in lobsters) is shown on the right as an example of the quota distribution.

AREA	GUIDELINE	CATCH
Necker Island	70,000	67,100
Gardner Pinnacles	20,000	20,200
Maro Reef	80,000	88,400
All other areas (combined)	116,000	46,650
TOTAL	286,000	222,350



Fig. 20. Map of 1998 bank-specific harvest guideline and catch. Source: WPRFMC.

to support the strategy (Wetherall et al. 1995).

In 1995, while research proceeded on new harvest guideline approaches, only one vessel was allowed to operate under an exploratory permit with an observer on board to get better information. A new approach was put in place by the Council in 1996 (Amendment 9 to the Crustaceans FMP). The revised annual harvest guidelines used a state-of-the-art risk-based management system, allowing no more than a 10% risk of overfishing, based on 13% of the estimated exploitable lobster population (i.e., those taken by traps) by bank. Season adjustments to quotas were eliminated, and minimum

size and condition restrictions were removed so fishermen would stop the practice of “high grading,” i.e., purposely discarding small lobsters. In addition, DiNardo developed an extended research program to learn more about the lobster population dynamics including surveys and tag-and-release studies.

One of the most interesting changes implemented in the fishery was the establishment of a satellite-based vessel monitoring system (VMS) and radio communications network that enabled fishermen to send their position and catch reports to the NMFS regional office in real time. The *Marie M*, for example, starting in 1992 called in reports at least

once Monday through Friday between 8 a.m. and 4 p.m. A typical report would list the area fished, e.g., Necker, and then provide the number of trap hauls and legal spiny and slipper lobsters caught.

The purpose was to allow NMFS in Honolulu to monitor cumulative catch against the quota set for the fishery and instantly curtail the harvest of lobster throughout the NWHI should the catch exceed the quota. Some questioned the effectiveness of this administrative procedure. For example, Ray (2019) did not think fishing could be controlled from a distance.

ENVIRONMENTAL ACTIVISM AND SCIENTIFIC UNCERTAINTY

From the earliest deliberations at the Council in 1977, one of the principal objectives of the new Lobster/Crustacean FMP had been to protect the monk seal population. Major policy changes, such as the type of trap permitted, were done in an effort to protect monk seals from harm. It was unknown at that time whether monk seals depended on lobsters for food. During the 1990s, due to the decline of monk seal pups, the Marine Mammal Commission requested that the federal government prohibit lobster fishing at all major monk seal breeding atolls. At the same time a Monk Seal Recovery Team was established to aggressively promote the survival of monk seal pups. Monk seal nurseries were established; breeding females were protected; and violently aggressive monk seal males were removed from populations in an effort to encourage the birth and rearing of monk seal pups.

The combined factors of slow lobster recruitment levels and perceived threat of the NWHI lobster fishery to monk seals led the Council's Crustaceans Advisory Panel to recommend that lobster fishing be suspended.

Following this, in the year 2000, the environmental advocacy group Earthjustice filed a federal lawsuit to shut down the NWHI lobster and bottomfish fisheries to protect monk seals. This was in response to claims by professional environmental advocacy groups that the lobster fishery was being overfished without regard to the consequences on the endangered monk seal population.

It had been scientifically established that monk seals (based on studies of their scat) depended for sustenance on a wide variety of reef fish and other prey foods rather than lobster (Goodman-Lowe 1998). Moreover, the 1999 informal ESA Section 7 consultation by NMFS on the fishery found "no evidence to suggest that the proposed 1999 harvest guideline for lobsters or establishment of permanent lobster fishing areas in the [NWHI] will likely adversely affect Hawaiian monk seals" and also concluded that the May 24, 1996, ESA

biological opinion on Amendment 9 to the Crustaceans FMP remained valid (McInnis 1999). However, the perceived threat to monk seals continued to be widely and skillfully promoted in a wide range of media by environmental activists, some of whom used this trope in fundraising.

Environmental activists also accused Council members of permitting fishermen to throw egg-bearing female lobsters into the sea to be eaten by large predators. According to Myking (2019) that practice occurred only occasionally as in many places no predators were seen and the berried females fell to the bottom.

Although the Council's SSC supported a recommendation from NMFS scientists that 130,000 lobsters could be sustainably taken by fishermen during the 2000 season, the Council at its Feb. 28-March 2 meeting voted 6 to 5 for a moratorium (WPRFMC

mortality or the retention of bearing females was significant.

NMFS (2000) in its June 26 notice explained that this emergency action was being taken due to concerns about the potential for overfishing. While calculating the year 2000 estimates of the exploitable population of lobsters utilizing the same analytical procedures that were used to estimate the exploitable populations in 1998 and 1999, NMFS scientists "expressed alarm at the increasing level of uncertainty in their computations. The scientists noted a lack of appreciable rebuilding of populations, despite significant reductions in fishing effort throughout the NWHI." In response to overwhelming criticism, NMFS reported a need to re-establish base lines for its lobster growth and reproduction calculations. NMFS wrote "Given the shortcomings in understanding the dynamics of the NWHI lobster populations, the increasing uncertainty in model parameter estimates and the lack of appreciable rebuilding of the lobster population," the NWHI lobster fishery was closed as a "precautionary measure." For this reason no annual harvest guidelines were issued for 2000.

NMFS scientists wrote that they would go back to basics, update the previous research, set new traps in the NWHI, track lobster movements and ultimately create new stock assessments.

The year 2000 is significant because it corresponds with President Bill Clinton's Executive Order 13178 in December, a month before leaving office, establishing the NWHI Coral Reef Ecosystem Reserve (CRER). The NWHI CRER was the culmination of work that began in 1994 when the United States established a Coral Reef Initiative to develop a strategy of integrated programs to strengthen coral reef protection and improve monitoring, research and management of coral reef ecosystems under U.S. jurisdiction. To aid in this initiative, the Western Pacific Regional Fishery Management Council, in 1995, commissioned a study to assess the need, value and feasibility of establishing an FMP to protect coral reef ecosystems in

OVERFISHING: A stock having a harvest rate higher than the rate that produces its MSY, i.e., more fish are being removed than is sustainable.

OVERFISHED: A stock having a population size so low that the stock's ability to produce its MSY is jeopardized.

2000). Council member Jim Cook noted that the lobster fishery has been placed in a situation where it is dependent on the NMFS budget to operate. Cook expressed discouragement that a \$43 million laboratory was being built when NMFS did not even have enough money to conduct the basic research to maintain the fishery. Council member Tom Webster noted that fishermen continued to discuss whether discard



Fig. 21. Ulua (giant trevally, or *Caranx ignobilis*) are large apex predators in the NWHI.



Fig. 22. At the NWHI Listening Session in Washington, DC., the White House Council on Environmental Quality prohibited presentation of the draft Coral Reef Ecosystem Fishery Management Plan.

the Western Pacific Region. A primary objective of this plan was to determine the extent of coral reef habitat in the region. The study (Hunter 1995) defined coral reef habitat as the substratum adjacent to coastlines (or on shoals) from depths of 0-100 meters (or 300 feet) that is primarily composed of hard-bottom and concluded that the Western Pacific Region contained approximately

15,852 km² of coral reef habitat. Since coral reefs are light dependent, 300 feet was defined as the lower depth limit of coral reef habitat. In 1998, other jurisdictions around the United States began to assess the extent of coral reef habitat in their area. However, methodologies were not consistent and some jurisdictions reported the extent of coral reef habitat while others reported

the extent of living coral. Regional and national studies began to compare these individual findings and concluded that Hawai'i contained 85% of the nation's coral reefs. More striking was the claim that the NWHI contained 70% of the nation's coral reef. Although highly inaccurate, this 70% statement has been made at all levels of government from local politicians to the Office of the President, including the 2000 NWHI CRER executive order. This percentage continues to be used, even though a 2005 study by scientists from NOAA and the University of Hawai'i estimated that the NWHI contains at most just 10% of the nation's potential shallow-water tropical and subtropical coral ecosystems. The study determined that the south Florida shelf contained the greatest percentage of the nation's shallow-water tropical and subtropical coral ecosystems, at 83% (Rohmann et al. 2005).

In 1998, the Council continued development of its Coral Reef Ecosystem FMP (CRE FMP). The same year, on June 11, President Clinton issued Executive Order 13089 on Coral Reef Protection, establishing the U.S. Coral Reef Tasks Force. The Council continued in late 1998 and throughout 1999 with drafting the environmental impact statement and holding public scoping meetings on the draft CRE FMP. In March 2000, the Council agreed to the preliminary preferred management measures for the Plan.

Then on May 26, 2000, work on the CRE FMP was thrown a curve ball when, with the announcement by President Clinton of his intention to provide "strong and lasting protection for the coral reef ecosystem of the NWHI." He directed the Secretaries of the Interior and Commerce, working cooperatively with the State of Hawai'i and consulting with the Council, to develop recommendations within 90 days for a new, coordinated management regime to increase protections of the ecosystem and provide for sustainable use. The Departments were also directed to conduct "visioning" sessions, which would provide opportunities for public comments to help shape the final recommendations. During July and August of 2000, seven public visioning

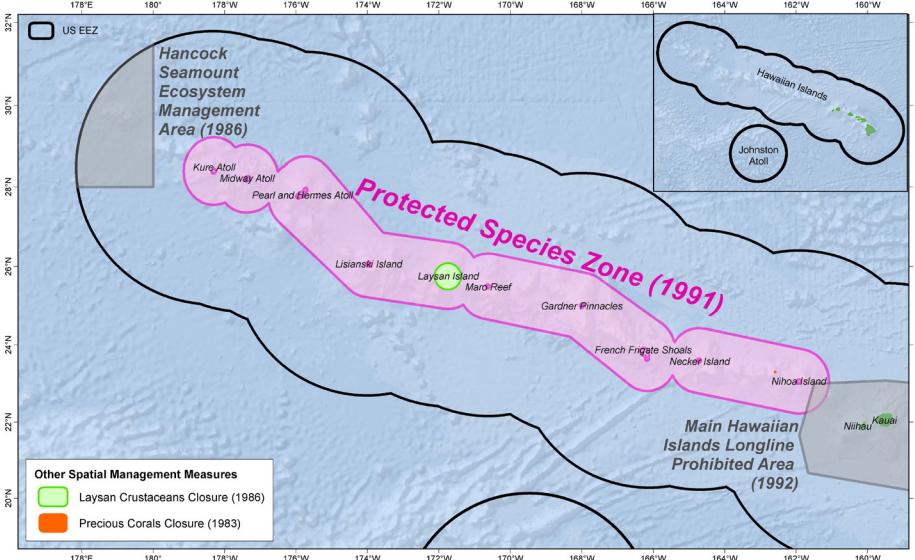


Fig. 23. Council spatial protections in the NWHI. The Protected Species Zone was established by the Council in 1991 under the Pelagic FMP to address potential interactions between the longline fishery and protected species, such as monk seals. The NWHI Coral Reef Ecosystem Reserve in 2000 and the NWHI Marine National Monument in 2006 were overlays of this area. Source: WPRFMC.



Fig. 24. Researchers place a passive integrated transponder tag on a NWHI lobster during a 2002 study.

sessions were conducted. At the first one, held in Washington, DC, on July 21, 2000, the Council was prevented from presenting on the draft CRE FMP by Ellen Athas, who served as the associate director for Oceans, Coasts and Environmental Policy for the White House's Council on Environmental Quality, because the plan was not finalized. (DeMello 2016)

U.S. Senator Ernest Frederik “Fritz” Hollings (D-SC), who long served as chair of the Senate Commerce Committee (1987-1995, 2001-2003), was another prominent figure in the story of the NWHI. Hollings co-sponsored the Sanctuaries Amendment Act introduced by Sen. Olympia Snowe (R-ME) that authorized the President, after

consultation with the Governor of the State of Hawai‘i, to initiate designation of the NWHI CRE as a National Marine Sanctuary. The Act authorized \$4 million for each fiscal year 2001 through 2005 to be appropriated to the Commerce Secretary to undertake the provisions of this section of the Act, which was implemented on Nov. 13, 2000.

The next day, on Nov. 14, 2000, Hawai‘i Gov. Ben Cayetano visited with President Clinton, who was in Hawai‘i. Cayetano persuaded the president to refrain from proclaiming the NWHI as a national monument, the designation for which environmental activists were lobbying (Pacific Islands Report 2000).

The NWHI CRER proclaimed by Clinton included in its preamble the wording from the draft CRE FMP, which the Western Pacific Regional Fishery Management Council was not allowed to present at the DC listening session. The NWHI CRER, furthermore, replicated the footprint of the NWHI Protected Species Zone that had been established by the Council nearly a decade earlier in 1991.

The NWHI Executive Order included provisions that capped the number of permits and the “annual aggregate take” for particular types of fishing in the Reserve based on historical levels of permit issuance and “take.”

The Executive Order also called for the Secretary of Commerce to initiate the process to designate the Reserve as a national marine sanctuary.

Each year, NMFS is required to publish by Feb. 28 the harvest guidelines for NWHI lobster. In 2001, NMFS acknowledged that the NWHI lobster fishery was not overfished. However, as a precautionary measure to prevent overfishing, for the next several years it would announce in the Federal Register that it would not issue harvest guidelines for the NWHI lobster fishery. According to NMFS, this decision was due to a U.S. District Court order (issued Nov. 15, 2000) to keep the fishery closed until an environmental impact statement and biological opinion were prepared. NMFS also mentioned a perceived interpretation of the executive order establishing the CRER as well as uncertainty in the module NMFS used to determine the exploitable population of the lobster stock. NMFS notices in the Federal Register from 2001 to 2006 also maintained NMFS intention “to conduct biological research on the status of the NWHI lobster resources and examine the resulting data for indications as to the appropriate direction for future management actions.” Lobster fishermen were hopeful that the fishery would eventually reopen (Dawson 2010).

A 2002 workshop on spatially structured population models for the NWHI lobster advanced the understanding of processes governing NWHI lobster dynamics, thus providing for a more robust and comprehensive research plan (Botsford et al. 2002). Treating the island lobster populations as separate (after settlement), yet connected through larval transport (defined in ecological terms as a metapopulation), was a defining moment, prompting the need for spatial management and spatially structured stock assessments. Starting in 2002, scientists with the NMFS lobster research program chartered commercial lobster boats to take them Necker Island and Maro Reef where there are large populations of spiny and slipper lobsters. After the fishermen captured the lobsters in cages, scientists placed “passive integrated transponder” tags on the back flippers and released them.

During the first three years of program, more than 41,000 spiny lobsters were tagged and released. Myking took NMFS scientists on these scientific charters through 2008.

The researchers initiated an intense population survey with the idea that the information they would derive from it would improve the mathematical certainty in lobster population models, monitor lobster stock dynamics and provide better information on the place of the lobsters in the local ecosystem. The radio frequency identification (RFID) transponder technology they used is so precise it enabled them to track the movement of individual lobsters from bank to bank in remote locations.

Other voices called for caution. Ray (2019) said that he was hired to help scientists catch the lobsters tag them and release them. He was convinced the RFID tags were harming the lobsters by weakening them.

In 2005, the Pew Charitable Trusts with assets of \$6.7 billion began an advocacy campaign to ensure that the NWHI would become a no-take marine reserve. For conservation organizations, like Pew, a sanctuary designation was problematic because the National Marine Sanctuaries Act exempts commercial and recreational fishermen from additional permits, leaving fishery management up to the MSA process (Chapman 2002). Pew hired multiple full-time professionals to coordinate efforts, lobby political leaders, develop a grass roots movement, conduct media outreach, investigate legal aspects of the fisheries and engage East Coast-based recreational fishing organizations, among other actions (Reichert 2006). In 2006, many anticipated release of the environmental impact statement for the proposed NWHI national marine sanctuary as directed by the Executive Order by President Clinton in 2000. Instead, the Council, NMFS and others were surprised by a proclamation issued by President George W. Bush under authority of the Antiquities Act of 1906 establishing the NWHI CRER as the NWHI Marine National Monument (later renamed Papahanaumokuakea Marine National Monument (PMNM)). This would be the first time that the Antiquities Act would

be used to establish a marine national monument. The PMNM is managed by co-trustees from the State of Hawai‘i, NMFS and the USFWS. Its regulations prohibit the unpermitted removal of monument resources. Since then to this day, NMFS announces annually in the Federal Register the establishment of the annual harvest guidelines of zero for the lobster fishery. In the Code of Federal Regulations, the fishery continues to be managed under the MSA through the Hawai‘i Archipelago Fishery Ecosystem Plan (FEP), which includes the former Lobster/Crustacean FMP.

In 2009, NMFS disbursed \$6 million (the annual ex-vessel harvest of the NWHI lobster fishery in its heyday) to buy out the permitted 15 lobster and seven bottomfish vessels in the NWHI limited entry programs.

The RFID trap system was continued to the year 2008 but was then discontinued, even though it would have provided vital data. According to Rosenberg (2019), this was an unusual situation:

In the Monument case it was a very specific issue of people feeling you should not be allowed to fish; you should not be allowed to do the science. It's pretty unusual, which is an unfortunate construct and was a political decision. That's pretty unusual. There are the monitoring techniques but it is pretty hard to know what is going on in them if you can't go up and sample.

Polovina, who has received international recognition for his pioneering Ecopath work with lobster, is convinced there is still a story to tell. He thinks that, due to climate change concerns, checking on the lobsters with the RFID tags to learn about their health and movements would be a good idea. He wrote (2018):

Unfortunately there haven't been any recent lobster trapping surveys, but based on fishery CPUEs at the end of the fishery plus a few research surveys after the closure, while there was no evidence of a significant rebound in the population, it appeared stable at a relatively low level. When I did a dive survey of the NWHI a few decades ago I observed

many large spinys in shallow waters in the northern atolls but I didn't survey the fishing grounds so this isn't comparable to earlier data. So we really don't know whether the population has rebounded or remains at a low level. What we can probably say is that spiny and slipper lobsters are not rare in the NWHI. Our understanding of the role of spiny and slipper lobsters in the ecosystem is that [they] are not central to its function. The myth that they are key to monk seal diets has been shown based on fatty acid work to be just a myth with no scientific validity. Our ecosystem models simulations suggest changes in abundance of +/-50% of lobster biomass have virtually no impact on other components of the ecosystem. However, changes in apex species (uluas, sharks) or changes in primary productivity do result in significant ecosystem impacts.

Myking (2019) has his own ideas on the subject. His boat was on charter to the NMFS researchers in 2008. He recalls that, as before, they were pulling up traps full of eight to 10 lobsters. This has led him to believe that there is not a problem. He said, "I think the lobsters up there are dying of old age."

"Restricting science in the NWHI resulting from establishment of the monument had far reaching impacts," notes DiNardo (2020). "One major issue was the end of a 25-year fishery-independent survey that documented lobster abundance and ecosystem change in the NWHI. At the time, this was the only fishery-independent survey conducted by the Honolulu Laboratory and later the Pacific Islands Fishery Science Center. What a shame as we were starting to see a rebuild of spiny lobsters at Necker Island."

Contrary to the intention of the original MSA to protect and manage marine life in order to support the economic life of coastal communities through activities like commercial fishing, the waters and submerged lands of the PMNM now serve different ends. Fishing jobs (an estimated 65 for the lobster fishery alone) have now been replaced by PMNM federal employees.

CONCLUSION

The New England lobster fishery has existed for 150 years. Like the Hawai‘i lobster fishery it has suffered increases and decreases in population as fishery managers learned how to sustainably manage the fishery. This process took time. As a consequence, generations of Maine and Massachusetts residents have been able to make a living from the lobster that is their natural resource (Pereira and Josupeit 2017).

The Hawai‘i community was never given that chance. Its lobster fishery was shut down due to political pressure from professional environmentalists and sympathetic government employees after only 20 years. In an effort to make certain that the lobster fishery would not be reopened they effectively banned fishing and fishery science from being done in the PMNM area.

Science is intended to inform and support management, and there was a vast amount conducted over the years to support decision-making (Appendix 2). Ironically, the NWHI lobster fishery managers were just learning how to effectively manage the resource for the future at the time the fishery was closed.

The risk assessment process inaugurated by the Council in 1996 was innovative at the time but is now widely used.

The experience in Hawai‘i of first having the NWHI lobster resources managed under federal policies that promoted virtually unlimited harvesting and then constrained by federal policy that restricted all harvesting has made it difficult to manage this resource in any meaningful way. It also raises the question as to what input the people of Hawai‘i will have for the future use of the submerged lands and waters of approximately 70% of their state’s archipelago.

Depending on who one talks to, the Hawai‘i lobster fishery was either a moral failure or a missed opportunity. According to some NWHI lobster fishermen, the difference between the point of view of fishermen and scientists is the fishermen had to be scientists as well as fishermen to ensure the viability of the resource; the scientists did not have to be fishermen to ensure their livelihood. To these fishermen, a lucrative and viable fishery was essentially closed based on inaccurate information (e.g., monk seals

are being deprived of a vital food source) and false, disparaging comments made against the participants, their practices and their motives. At the time, every boat had an observer on board and more data was being provided on the fishery than any other Hawai‘i fishery, but it didn’t seem like anyone knew how to interpret or analyze the data for future regulatory and sustainability purposes. The permit holders were universally committed to working cooperatively with the Council and NMFS to ensure the longevity of the fishery, but, to the fishermen, it didn’t seem like NMFS was interested in listening to what they had to say or their suggestions, based on their annual fishing experience, on how to prevent overfishing. (Morgan 2020)

COVID-19 has created a scarcity of food for the world once again. The question it raises is whether future generations will be able to afford to neglect the hard earned lessons of lobster management in the NWHI in a world that is becoming ever more desperate for food.

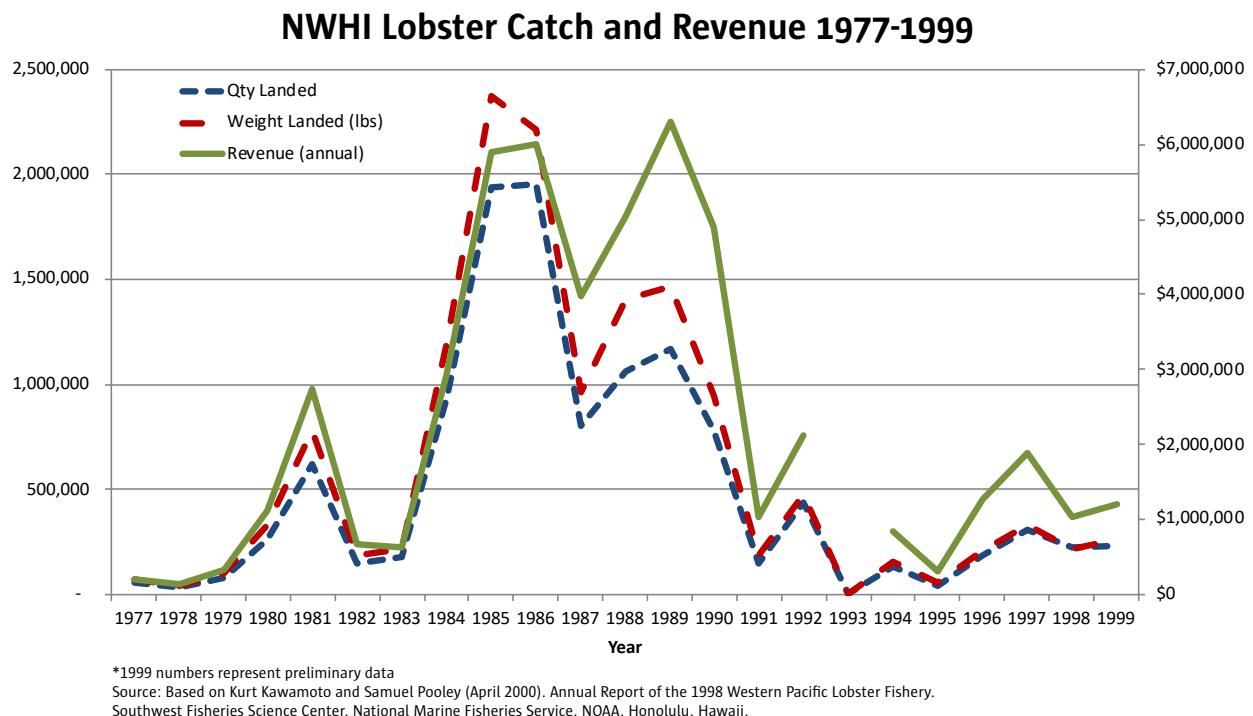


Fig. 25. Trends in the NWHI lobster fishery 1977-1999. Blue = quantity landed; red = weight landed (lbs); green = revenue (annual). Source: Max Markrich, based on Kawamoto and Pooley 2000.

EPILOGUE

Following establishment of the PMNM in 2006 as the nation's first marine national monument, Presidents George W. Bush and Barrack Obama used the Antiquities Act to establish and expand additional marine national monuments primarily in the U.S. Pacific Islands. Bush in 2009 created the Rose Atoll (American Samoa), Marianas Trench (Guam and Commonwealth of the Northern Mariana Islands) and Pacific Remote Islands Marine National Monuments. Obama in 2014 expanded the Pacific Remote Islands Marine National Monument to include the entire U.S. EEZ (0 to 200 miles offshore) around several of the islands. In 2016 he expanded the PMNM from 139,818 square miles (i.e., 0 to 50 nm from shore) to 582,578 square miles (the full extent of the U.S. EEZ, 0 to 200 nm from shore). This would place more than 51% of the entire U.S. EEZ in the U.S. Pacific Islands under marine national monument designation, displacing the operations of multiple U.S. fisheries.

The first and only marine national monument off the continental United States was proclaimed by Obama later in 2016. The Northeast Canyons and Seamounts Marine National Monument off the coast of New England encompasses approximately 4,913 square miles (i.e., less than 1% the size of the PMNM).

Federal policy took a swing back from staunch protectionism toward managed use of natural resources with the administration of President Donald Trump. In 2017, his Executive Order 13792 initiated a review of national monuments designated since 1996. The marine monuments in the Pacific accounted for 98% of the acres under the review criteria (WPRMC 2017).

In June 2020, Trump removed the restrictions on commercial fishing in the Northeast Canyons and Seamounts Marine National Monument to allow for well-regulated commercial fishing use. His executive order stated that the objects in the monument can be, and are currently, protected pursuant to carefully tailored regulation and management

under existing Federal law in accordance with MSA and other applicable laws, regulations and requirements.

Trump made the announcement in Bangor, Maine, at an event attended by lobster fishermen and crabbers, part of a \$1 billion industry in Maine, which had been impacted by the monument fishery closures. Fishermen and fishery managers took turns praising the president for

lifting the commercial fishing ban and for returning management of fisheries to the regional fishery management council process. (Fears and Eilperin 2020)

Days later, Trump would announce other trade and potential monetary actions to support the Maine lobster industry, noting that “[It] is a crown jewel of America’s seafood industry” (Chase 2020).

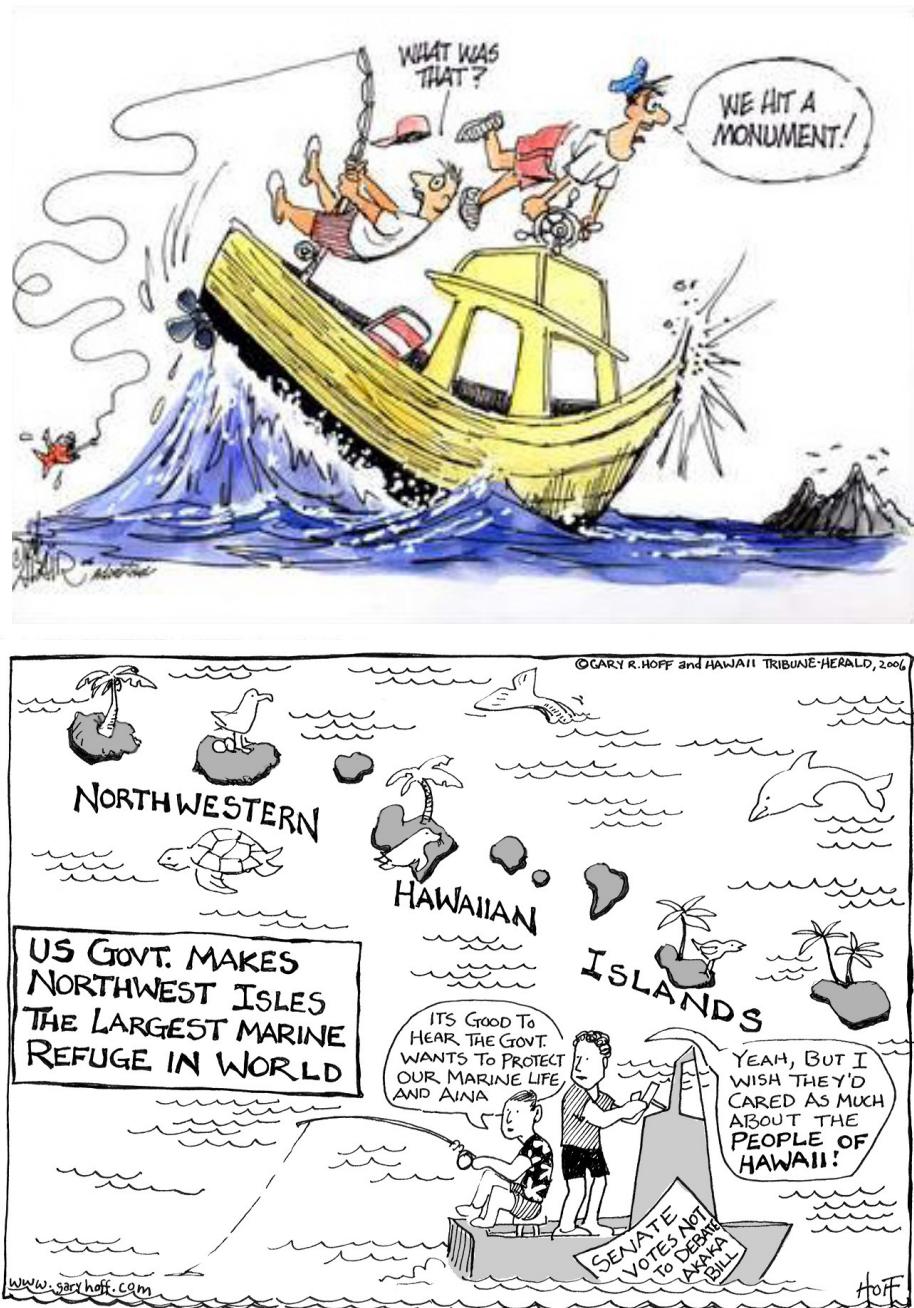


Fig. 26. During establishment of the NWHI marine national monument, political cartoons ran in several Hawai'i newspapers.

APPENDIX 1: CRUSTACEAN FMP AND AMENDMENTS (1983-2008)

The Crustaceans FMP, initially named “Spiny Lobster Fisheries of the Western Pacific Region,” went into effect March 9, 1983. The FMP measures for the NWHI management area included federal permit requirements; a minimum size limit for spiny lobsters; gear restrictions; a ban on the harvest of egg-bearing female spiny lobsters; closure to fishing for spiny lobsters in waters within 20 nm of Laysan Island, all NWHI waters shallower than 10 fathoms and all NWHI lagoons; a mandatory logbook program; and a requirement to carry a fishery observer if directed by NMFS. The FMP also implemented permit, data reporting and observer requirements within EEZ waters around the main Hawaiian Islands, American Samoa and Guam.

1983

AMENDMENT 1: Adopted the State of Hawai‘i’s lobster fishing regulations for the federal waters around the main Hawaiian Islands.

AMENDMENT 2: Modified the allowable trap opening dimensions with the intent of minimizing the risk of harm to the Hawaiian monk seal while allowing sufficient flexibility in trap design.

1985

AMENDMENT 3: Revised the minimum spiny lobster size specifications for the NWHI management area to a limit on tail width (5.0 centimeters).

1986

AMENDMENT 4: Applied existing NWHI closed areas to slipper lobsters.

1987

AMENDMENT 5: Implemented a minimum size for slipper lobster (5.6-centimeter tail width), required the release of egg-bearing female slipper lobsters, required escape vents in all lobster traps, and revised some of the permit application and reporting requirements. It also changed the name of the FMP from “Spiny Lobster Fisheries” to “Crustaceans Fisheries.”

1991

AMENDMENT 6: Defined recruitment overfishing for lobster stocks in terms of reference points expressed in terms of the spawning potential ratio (SPR). The SPR threshold, below which the stock would be considered recruitment overfished, is 20%.

1992

AMENDMENT 7: Established a NWHI limited access program, an adjustable fleet-wide NWHI annual harvest guideline, and a closed season (January through June) in the NWHI fishery. Participation was limited to 15 permits

(and vessels). Other measures include a maximum limit on the number of traps per vessel (1,100), revisions to reporting requirements, and other provisions

1994

AMENDMENT 8: Eliminated the NWHI minimum landings requirements for permit renewal, allowed the CPUE target that is used to set the harvest guideline to be changed through the framework process, and modified reporting requirements

1996

AMENDMENT 9 : Established a system by which the annual harvest guideline would be set based on a constant percent of the population (i.e., proportional to the estimated exploitable population size) based on a specified acceptable risk of overfishing. Amendment 9 set this risk level at 10% and specified that annual harvest guidelines be published by NMFS no later than Feb. 28 of each year. Earlier in-season adjustment procedures were eliminated. Earlier minimum size limits and prohibitions on harvesting of egg-bearing females were eliminated, and a mechanism was provided for certain regulatory adjustments to be made through framework procedures of the FMP.

1997

REGULATORY AMENDMENT 1: Implemented vessel monitoring system for the crustacean fishery in the NWHI.

1998

REGULATORY AMENDMENT 2: Allocated 1998 NWHI lobster harvest among three individual banks and a fourth combined area.

1999

AMENDMENT 10: Addressed new requirements under the 1996 Sustainable Fisheries Act. Portions of the amendment that were immediately approved included

designations of essential fish habitat and descriptions of bycatch and of some fishing communities. Those provisions became effective on Feb. 3, 1999. Remaining portions approved on Aug. 5, 2003, included provisions regarding Hawai‘i fishing communities, overfishing definitions and bycatch.

REGULATORY AMENDMENT 3: Divided the NWHI into four fishing grounds across which harvest is allocated. Allowed fishing vessels with NMFS-certified vessel monitoring system to be within those fishing grounds immediately after grounds closure provided that the vessel is steaming to port or other open fishing grounds.

2004

AMENDMENT 11: Prepared in parallel with the Coral Reef Ecosystems FMP. This amendment prohibits the harvest of crustacean management unit species in the no-take marine protected areas established under the Coral Reef Ecosystems FMP, including Rose Atoll in American Samoa, Kingman Reef, Jarvis Island, Howland Island and Baker Island. The final rule became effective on March 25, 2004.

2006

AMENDMENT 12: Included federal waters around the Commonwealth of the Northern Mariana Islands and the Pacific Remote Island Areas in the Crustaceans FMP and implemented federal permit and reporting requirements for vessels targeting crustacean management unit species in these areas.

2008

AMENDMENT 13: Included the deep-water shrimp genus *Heterocarpus* as management unit species within the Crustaceans FMP. Required federal permits and reporting for deep-water shrimp fishing in all federal waters of the Western Pacific Region.

APPENDIX 2: NORTHWESTERN HAWAIIAN LOBSTER RESEARCH

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