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**FEDERAL-STATE COOPERATION IN MANAGING
DEEPWATER BOTTOMFISH IN HAWAII**

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Abstract

Scientific evidence shows that two species of the Hawaiian red snapper, onaga (*Etelis coruscans*) and ehu (*E. carbunculus*), have been recruitment overfished in the waters of the main Hawaiian Islands (MHI) for the past six years. As the decline of ehu and onaga first became apparent in the late 1980s, the Western Pacific Fishery Management Council (Council) began to take interest. Because approximately 80% of the ehu and onaga habitat (measured from the 100 fm contour--the typical depth of onaga and ehu habitat) lies within state jurisdiction (0-3 miles from shore), the Council chose not to take direct management action to begin restoring these stocks, but was compelled to request the State of Hawaii to initiate management action. Despite continuing encouragement from the Council, the State had been reluctant to act. This year, however, under new leadership, the State's principal fishery resource management agency is taking steps to produce a management plan. If appropriate, the Council may follow with complementary regulations for the US exclusive economic zone (EEZ) it regulates. This is one example of the Council's commitment to local, rather than centralized, fisheries management.

The success of local, or sub-regional, management depends heavily on public participation and communication with all involved parties (government agencies, recreational and commercial fishermen, members of related industries, scientists, conservationists, etc.). The Council could invoke centralized (federal) control of local fisheries if it can demonstrate that the local agencies are negligent, but centralized control is generally less attuned to local issues and needs, and as such, is less effective. Local control and co-management, including open communication with all involved groups, is a significant element of the Council's technique for managing fisheries around US western Pacific islands.

Western Pacific Regional Management Council

The Magnuson Fishery Conservation and Management Act of 1976 established US jurisdiction over fisheries in the US Exclusive Economic Zone (EEZ), and created eight quasi-federal regional councils to oversee fisheries in their respective areas. The Western Pacific Regional Fishery Management Council is the policy-making organization for the management of fisheries in the EEZ around American Samoa, Guam, Hawaii, the Northern Mariana Islands and other US possessions in the Pacific (Johnston, Kingman, Palmyra, Jarvis, Howland, Baker and Wake). This area encompasses nearly 1.5 million square miles, an area nearly equal to that of all other US EEZ waters combined. Parts of its jurisdiction lie within the areas of the Forum Fisheries Agency (FFA) and the South Pacific Commission (SPC).

The Council relies heavily on public participation in making management decisions. The Council itself, its fishing industry Advisory Panel, its Scientific and Statistical Committee (SSC—a group of scientists that advise the Council on technical matters), and its Plan Teams (groups of expert scientists and fishermen that report to the Council on the status of a particular fishery and give the Council management advice) are all direct efforts to increase participation. The Council also often holds public hearings to solicit input and opens all of its meetings, for all of its groups, to the public. This public process is not only required by law, but actively encouraged by the Council. The best solutions can be reached when the all interested parties (the user groups, scientific experts, industry representatives, environmentalists, etc.) are involved in the decision-making process.

The Council's jurisdiction is the waters from 3 to 200 nm miles from the coastline of each of these islands. The primary inshore fisheries around these islands are bottomfish, crustaceans and reef fish. The coral reef fishery, targeting the fish that live on the reefs, is near full exploitation in populated areas. There is also an inactive deep water precious corals fishery, which targets the coral itself. Management of the commercial lobster fishery in Hawaii is shared between the federal and the state governments. The bottomfish fishery is basically healthy throughout the Council's jurisdiction, but two deepwater snappers in the MHI, *Etelis coruscans* and *E. carbunculus*, the onaga and ehu, are currently recruitment overfished.

State of Hawaii

The State of Hawaii can establish fishing regulations in two ways: through legislative statute and administrative rule. The State has used these two methods to create the following regulations (which have also been initiated by the Council as federal regulations): commercial licensing and catch reporting requirements; one pound minimum size limits for sale of opakapaka, onaga, uku, ehu, and ulua; prohibited use of explosives, poisons, or electrical shocking devices; minimum fish trap size; and minimum mesh size on fish traps.

Bottomfish Ecology

Hawaiian deepwater bottomfish of the subfamily Etelinae (family Lutjanidae) are not associated with coral reef complexes, rather with deepwater slopes around the islands. The geography of the Hawaiian islands, a volcanic chain rising relatively abruptly out of the western central Pacific, provides suitable habitat for this subfamily which includes *Etelis carbunculus* (ehu) and *E. coruscans* (onaga). They coexist with five other Etelinae species: *Pristipomoides filamentosus* (opakapaka), *P. zonatus* (gindai), *P. seiboldii* (kalekale), *Aphareus rutilans* (kalekale), and *Aprion virescens* (uku). The banks and deep slopes that these deepwater snappers habitate have an area in Hawaii that is six times larger than the shallowwater reef complexes. Deepwater snappers are found grouped together, often in areas of high bottom relief. Their location may depend on currents striking locations with high relief that causes vertical water stirring and increased food availability. These red snappers feed on a wide variety of prey (including plankton and other fish), both near the bottom and in the water.¹

¹ For more information on deepwater snappers and their fishery in Hawaii, see "Biology and Management of Deepwater Snappers of the Hawaiian Archipelago," Haight, Wayne R., Donald R. Kobayashi, and Kurt E. Kawamoto. *Marine Fisheries Review*. Vol 55, No. 2. 1993.

The Hawaii bottomfish fishery uses handlines that are hauled either manually or mechanically. Depth finders are used to locate appropriate locations. Depth, along with other factors such as water temperature and current speed and direction, help determine where species may be located. Color video depth and fish echo sounders, satellite navigation receivers, and other modern technologies assist bottomfish fishermen in their quest to find fish. The typical bottomfish fishing gear includes a mainline with several long leaders. Each leader has a 2-4 kg weight, to drop the line to the desired depth, and at least six hooks. Multiple hooks are necessary to economize fishing effort over the long process of dropping and retrieving the line. The hooks are generally circle hooks attached to leaders at one meter intervals above the weight. In Hawaii, fishermen place chum (palu) bags above the baited hooks. The bag, full of a chumming mixture, stays shut until the sinker hits the ground. A hard upward yank on the line opens the bag and releases the chum. The greater availability of modern gear has improved the fishing prowess of bottomfish fishermen.

Recent Stock Statistics

In general, all fishing statistics indicative of the health of the MHI onaga and ehū stocks have been declining since the mid-1980s.

Landings

Bottomfish landings in the MHI have fluctuated around a half-million pounds in each of the last five years, reaching nearly 458,000 pounds in 1994. Prior to 1990, landings averaged much higher amounts, between 800,000 and one million pounds. The decrease in landings began in the late 1980s, after the peak year of 1987, when over one million pounds of MHI bottomfish were landed. Landings may be decreasing due to previous large landings and overcapitalization of the fishery in the late 1980s that produced a decline in the profitability of bottomfishing. More fishermen are turning to pelagic fishing.

Bottomfish Landings (lb.)

	1984-89 Avg.	1990-1994 Avg.	% Change	1994
MHI	889,000	520,000	-41.5	457,960

Vessels and Trips

Trends in landings generally follow trends in effort; and effort in the MHI bottomfish fishery have been decreasing during the 1990s, except in 1994 when the number of vessels fishing the MHI more than doubled.

Number of Vessels

	1984-89 Avg.	1990-1994 Avg.	% Change	1994
MHI	922	822	-11	1,242

Number of Trips

	1984-89 Avg.	1990-94 Avg.	% Change	1994
MHI	9,587	6,777	-29	5,907

Revenues

In 1993, 90% of all bottomfish landings in American-flag Pacific island (AFPI) areas were caught around the Hawaiian islands. These fish accounted for 96% of all the revenue generated from bottomfish sold commercially in the Council's region. Total revenue in the Hawaiian Islands was US\$2.3 million in 1993, down from a high of \$6.4 million in 1987 (an inflation-adjusted value). The revenues received by MHI bottomfish fishermen have dramatically declined since the late 1980s, paralleling the declines in catch and effort.

Revenue (inflation-adjusted US \$)

	1987	1993	% Change
MHI	3,212,000	1,146,000	-64

Catch and Effort

Bottomfish catch per unit of effort (CPUE, or the amount of fish caught by a standard amount of effort) has been steadily decreasing in the MHI over the last 40 years. MHI CPUE is about one-third of earlier CPUE values (from forty years ago), indicating that the fishery is stressed. The pounds per trip average is not flawless, due to the possible variance in the length of a "trip," but as long as the standard unit of effort has been stable over time, the statistics are still valuable. The exact numerical representation of that standard is less critical to quantify, because if it is used consistently, the CPUE measurements are sound. Rapid technological increases should have lead to an increase in CPUE due to increase in fishing power, but because this has not happened, it is clear the fishery is not as fertile as it once was. In any

case, as long as the measure of effort is in some sort of catch per standard unit of fishing effort, CPUE statistics are still dependable if the standard unit does not change over time.

CPUE (lb/trip)

	1948	1994	% Change
MHI	614	228	-63

Recreational Fishing Statistics

All of the above figures represent only commercial fishing, but the unreported catch by recreational fishermen in Hawaii is suspected to be as high. It is generally believed that the fish caught recreationally are smaller than those caught commercially, which suggests an even heavier stress on the stock. At present, however, there is no system for reporting recreational catch. In fact, there is not even a recreational licensing requirement. Complete and successful integration of the impacts of recreational bottomfish fishing to fisheries data bases would greatly improve all attempts at conservation and management measures.

Overfished Onaga and Ehu

Target CPUE values represent the CPUE of trips where at least 50% of the total catch by weight is the target species. Partial CPUE values come from all trips that had at least 90% of the catch by weight in bottomfish, calculated by weight per species. Comparing bottomfish CPUE values in the MHI for 1984-93 with the initial years the fishery (1948-57), onaga targeted CPUE values dropped to 40% of the original value, and ehu to 14%. When target CPUE values are less than 50% of original, it signifies a "yellow-light condition" in the fishery. There is clearly cause for concern over ehu's paltry value, which has been under the fifty percent level for decades. Not only have CPUE values been declining, but so have the size and age of fish being caught and sold. MHI onaga catch consistently has an age composition with over 50% immature fish, measured by weight.

MHI CPUE (lb/trip)

	1948 Targeted	1948 Partial	1994 Targeted	1994 Partial
Onaga	496	115	144	35
Ehu	581	172	39	9

A useful measure of a fish stock's health, and usually the federal value which determines overfishing, is the spawning potential ratio (SPR). The SPR is the ratio of the spawning stock biomass per recruit, at a current level of fishing, to the spawning stock biomass per recruit that would occur in the absence of fishing. A SPR value of below 20% is the critical level that indicates recruitment overfishing.

The MHI have a long history of commercial bottomfish fishing and high density of part-time commercial and recreational fishermen. The onaga had an SPR of 14% in the MHI in 1994, continuing its long stay below the 20% level for the past six years (a period when its average SPR was 14%).

Repairing the Stock

In April 1991, sparked by concern about the health of MHI opakapaka stocks, the Council held a series of meetings throughout Hawaii to discuss with fishermen alternative management measures for the MHI deepwater bottomfish fishery. Members of the Council and its advisory committees, National Marine Fisheries Service, and the Hawaii Department of Aquatic Resources led the discussions. Possible management actions discussed included closed seasons, minimum size restrictions, closed areas, and quotas. The public felt that closed seasons would hurt full-time fishermen, who would subsequently need government subsidy. Minimum size restrictions were discouraged due to the difficulty in avoiding catch of small fish and a strong consumer preference for plate-sized snappers between 1-3 pounds. Closed areas were viewed as the favorable action, if any action were to be taken. The prospect of a quota system was generally not well received.

By April 1993, the MHI onaga stock had experienced four consecutive years of overfishing (SPR below 20%). Ehu was also remaining in a very stressed condition. In February the Council held public hearings around the state on management of Hawaiian bottomfish and discussed the issue at its meeting in April 1993. Since less than 20% of ehu's and onaga's habitat is within the EEZ (3-200 miles from the coast), and most of it is within three miles where the State has authority, the Council voted to let the State of Hawaii have primary responsibility for managing MHI bottomfish. The Council's SSC recommended that it implement a three month closure for onaga fishing in the MHI as the most practical and effective management measure. The Council agreed with the suggestion, but faced the obstacle of obtaining concurrent regulatory participation by the State of Hawaii. In May of 1993, the Council relayed this information to the State Governor and the State Legislature, emphasizing that it was their responsibility to restore and protect the onaga and ehu stocks.

The HDAR replied to the Council in June 1993, indicating that, due to budget and labor constraints, they could not issue an administrative rule that would take measures to protect onaga. They also mentioned that it was likely that the state legislature would review appropriate legislation the next year. Unsatisfied, the Council continued to urge the State of Hawaii to assume their duty and manage MHI bottomfish more effectively. The Council staff met with the State House Ocean Recreation and Marine Resources (OMR) Committee and explained the situation and the need for action that the executive branch of state government was not providing. The Chairman of this Committee agreed, and expressed intent to address the issue during the next legislative session. Since that would not be until January 1994, the Council Chairman revisited the option of administrative action and reiterated to the Director of the Hawaii Department of Land and Natural Resources (DLNR) the Council's desire that the State responsibly manage MHI bottomfish. The DLNR replied by suggesting that more

research was needed to develop the best management approach. It also stated that budgeting constraints made it difficult for DLNR to undertake new management initiatives.

In January 1994, the OMR Chairman introduced a bill that would establish a closed season for onaga and ehu, but it did not pass. The Chairman continued his efforts and introduced a resolution in March 1994 to form a task force to develop management options for MHI bottomfish. The Director of DLNR did not support this resolution, citing budget constraints. The resolution eventually passed the House but not the Hawaii Senate, due to the high volume of bills competing for floor action.

The Council, however, was eager to generate some level of protection for onaga, and invited HDAR to participate in a mid-July meeting of the task force to develop recommendations to the legislature. The HDAR declined, explaining that a low budget and the non-concurrent resolution by the Senate would not allow them to participate. The task force did eventually meet in October 1994, discussed options, concluded that a serious overfishing problem with onaga existed, and recommended that a four-month closed season be instituted. The Council endorsed this recommendation at its meeting in November.

In January 1995, the House OMR Committee, with all new members, investigated the problem and accepted the task force recommendations and began preparing a bill to establish a closed season. The Council's Chairman and staff testified before the OMR Committee in support of a closed season at a public hearing in February 1995. Testimony was heard from both sides of the issue, and the new DLNR Chairman, recognizing the urgency of the issue, proposed to take management action to protect MHI bottomfish himself through DLNR administrative rule.

In February, a modified bill passed the OMR Committee, giving DLNR until July to draft comparable management measures (this bill eventually died due to time limitations; DLNR decided it would continue alone). The DLNR Chairman formed a Fisherman's Task Force which has since met several times. The Task Force is composed of scientists, fishermen from around the State, and representatives from the fishery-related industries. It is charged with studying the status of bottomfish resources in the MHI and assisting the DLNR with the development of a bottomfish management plan for the onaga and ehu. The DLNR expects to have a draft management plan prepared by late summer 1995 and hold public hearings later in the year.

Co-Management as Envisioned by the Council

The Council, as a quasi-federal agency, has jurisdiction within the US EEZ (3-200nm from shore). Coastal waters out to three miles are under State authority. As stated above, the habitat of the overfished onaga and ehu is primarily around the 100 fm contour, of which 80% lies within three miles of shore. Thus, if the Council chose to directly regulate the onaga and ehu fisheries, it would have control of only 20% of the fish's habitat and fishery. If the State fails to remedy the problem, one option is for the central arm of US fisheries to step in and manage the nearshore bottomfish fishery, due to negligent State management. Other options available to the Council include a petition for listing onaga or ehu as endangered

species (resulting in a centralized control similar to salmon in Pacific NW rivers), or complete long-term closure to bottomfish fishing of all federal waters of the MHI. Centralized control is, however, usually marked by cumbersome decisions arising from poorly informed managers that are located far from the actual fishery. The Council maintains that local, regional control is the most effective option. A decision on the local level may soon be reached that would restore and protect onaga, ehū, and the interests of local fishermen.

General Recommendation

Co-management can provide not only creative and effective management solutions, but also a healthy, stimulating decision-making atmosphere. It goes beyond formal meetings to casual and/or intermittent contact. Informal information exchange between State and Federal agencies, the industry and concerned public, with all users groups, is a good example of simple, everyday co-management. The process of continual combination of the most relevant and up to date information from all impacted groups creates an output that is effective and acceptable to interest users. This final element is the most important--the participation of those who use and depend on the resource. Their input is valuable and important as they will be most affected by the regulations in the short term. They also have practical, intimate knowledge that can only be derived from their collective experience at sea. If all relevant information is considered and solicited, especially from the user groups, then the resource has the best chance of protection for now and generations to come.

