

*Bottomfish and Seamount Groundfish Fisheries of the Western
Pacific Region*

2001 Annual Report



*Western Pacific Regional
Fishery Management Council
1164 Bishop Street, Suite 1400
Honolulu, Hawaii 96813*

Cover photo: Onaga or the Queen of the Sea is a prize menu for the people of Guam.

These gracious Sea Queens are caught in deep black waters over a 1000 feet with a "kotdet" or wild hibiscus fibers once used as traditional fishing lines. These fish are known for their jubilant array of bright red and orangish colors, along with their long extended tail tips. These fish are easily caught without struggle as they are pulled up from these great depths.

Photo from <http://peskadot.web.gu/page3/>



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**Bottomfish and Seamount Groundfish Fisheries
of the Western Pacific Region**

2001 Annual Report

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Prepared by the Bottomfish Plan Team and Council Staff for the
Western Pacific Regional Fishery Management Council
1164 Bishop Street, Suite 1400, Honolulu, Hawaii 96813
Tel: (808) 522-8220, Fax: (808) 522-8226

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Bottomfish and Seamount Groundfish Fisheries of the Western Pacific

2000 Annual Report

1.0 Introduction

2001 annual report provides a set of descriptors and indicators of the bottomfish fisheries from American Samoa, Guam, Hawaii and the Northern Mariana Islands. The descriptors are designed to document recent trends in landings, effort, participation, revenue and prices. Should management action be recommended, descriptor information will aid in assessing potential impacts of the action on fishery participants. The indicators are quantifiable and measurable tools used to identify signs of stress in the stocks or the fishery. Based on changes over time in indicator levels, the Bottomfish Plan Team (BPT) may identify "yellow light" situations (i.e., where stress is first detected) and recommend that either management action or additional study be undertaken or "red light" situations where immediate management action is needed.

The annual report is organized as follows: The introduction section defines and briefly explains the descriptors and indicators. The next section briefly summarizes time trends in descriptor and indicator levels, through the current year, and recommends any areas of concern for each island area. Reports from each island area are appended. The introduction describes the history and present characteristics of the fishery. Results of the current year's descriptors and indicators are presented in detail, in relation to past temporal trends. Figures are supported with information on source of the data, methods of calculation, and data interpretation. Table 1 summarizes 2001 bottomfish statistics for the region. The appended report from each area includes a summary of the new area specific and region-wide recommendations. Finally, additional appendices contain information on NMFS 2001 administrative and enforcement activities, habitat conditions, protected species interactions, and 2001 BPT membership.

Table 2 lists scientific, common English and local/indigenous names for bottomfish management unit species (BMUS) for each area (American Samoa, Guam/Northern Marianas, and Hawaii).

1.1 Definition of Descriptors

The fishery descriptors are defined as follows:

1.1.1 Landings information

Time series information on aggregate catch for each island area shows recent trends in total bottomfish harvest. For American Samoa and Guam, estimates of both the commercial landings and the total landings (combined commercial, recreational and subsistence) are available. For Hawaii and the Northern Marianas, landings information represents only the commercial harvest.

Table 1. Regional Summary of 2001 Bottomfish Species

	AS	GU	NMI	Hawaii			
				All	MHI	Mau	Hoomalu
BMUS Landings (lb)	47,285	121,427	57,328	608,523	322,523	50,000	236,000
Revenue (\$)	79,193	89,844	175,345	2,151,000	1,266,000	141,000	744,000
No. Of Boats	18	337	75	---	379	6	5
No. Of Trips	331	7,820	834	---	2593	55	41
CPUE	15.2 lb/hr	3.8 lb/hr	69 lb/trip	---	184 lb/trip	916 lb/trip	5,757 lb/trip
SPR	---	---	---	0.20-0.64	note 1	note 2	note 2

Notes:

- 1) Species with Spawning Potential Ratio near or below threshold level of 0.20, indicating localized subarea depletion: MHI onaga (“targeted” SPR = 0.03);
MHI ehu (“targeted” SPR = 0.11)
- 2) Healthy (SPR > 0.20) for all species (Mau Zone=0.36, Hoomalu Zone=0.64)

Table 2. Bottomfish Management Unit Species (BMUS) Names

(Absence of an indigenous name implies no local name established or area is not within the species' geographic range.)

Scientific	English Common	American Samoa	Guam/CNMI	Hawaii
<i>Bottomfish:</i>				
<i>Aphareus rutilans</i>	red snapper/silvermouth	palu-gutusaliva	maraap tatoong	lehi
<i>Aprion virescens</i>	gray snapper/jobfish	asoama	tosan	uku
<i>Caranx ignobilis</i>	giant trevally/jack	sapoanae	tarakito	white ulua/pau'u
<i>C. lugubris</i>	black trevally/jack	tafauli	trankiton attilong	black ulua
<i>Epinephelus fasciatus</i>	blacktip grouper	fausi	gadao matai	
<i>E. quernus</i>	sea bass			hapu'upuu
<i>Etelis carbunculus</i>	red snapper	palu-malau	guihan boninas	ehu
<i>E. coruscans</i>	red snapper	palu-loa	onaga	onaga
<i>Lethrinus amboinensis</i>	ambon emperor	filoa-gutumumu	mafuti/lililok	
<i>L. rubrioperculatus</i>	redgill emperor	filoa-pa'o'omumu	mafuti tatdong	
<i>Lutjanus kasmira</i>	blueline snapper	savane	sas/funai	ta'ape
<i>Pristipomoides auricilla</i>	yellowtail snapper	palu-i'usama	guihan boninas	yellowtail kalekale
<i>P. filamentosus</i>	pink snapper	palu-'ena'ena	guihan boninas	opakapaka
<i>P. flavipinnis</i>	yelloweye snapper	palu-sina	guihan boninas	yelloweye opakapaka
<i>P. seiboldi</i>	pink snapper		guihan boninas	kalekale
<i>P. zonatus</i>	snapper	palu-sega	guihan boninas/gindai	gindai
<i>Pseudocaranx dentex</i>	thicklip trevally		terakito	butaguchi/pig ulua
<i>Seriola dumerili</i>	amberjack		guihan tatdong	kahala
<i>Variola louti</i>	lunartail grouper	papa	bueli	
<i>Seamount Groundfish:</i>				
<i>Beryx splendens</i>	alfonsin			kinmedai (Japanese)
<i>Hyperoglyphe japonica</i>	ratfish/butterfish			medai (Jap.)
<i>Pseudopentaceros richardsoni</i>	armorhead			kusakari tsubodai (Jap.)

Hawaii, changes in species catch composition are provided for the Main Hawaiian Islands (MHI) and the Northwestern Hawaiian Islands (NWHI). Statistical tests for consistency in catch composition over time and between areas are included. Where possible, descriptor information has been presented for each NWHI management zone: Hoomalu and Mau. For 2001, pounds landed by species are presented in tabular form for each area except Hawaii. For Hawaii, NWHI BMUS landings by species are provided for 1986 through 2001.

1.1.2 Effort information

Effort is measured in number of trips for Hawaii and the Northern Marianas, and in both hours fished and trips taken for American Samoa and Guam.

1.1.3 Participation information

Estimates of the number of vessels making bottomfish landings are provided for all areas.

1.1.4 Economic information

Trends in economic performance are characterized by plots of total ex-vessel revenue, aggregate average price levels, and for Hawaii, price trends over time for major species. In time-series of prices and revenues, it is appropriate to adjust value for the rate of inflation so that values throughout the time period are comparable (based on a consistent purchasing power for the dollar). Both the unadjusted and adjusted aggregate average price and aggregate revenues are plotted to clarify the relative change over time.

1.2 Definition of Indicators

Indicators were developed as tools for identifying signs of stress in the stocks or the fishery which deserve further investigation and/or a management response. Analyses consider how the indicators change over time. Indicators for Hawaii include 95% confidence intervals. To the degree possible, similar variance estimates are expected from the other areas in future annual reports. The indicators are defined as follows:

1.2.1 Aggregate Catch-Per-Unit-Effort

The current year's aggregate catch-per-unit-effort (CPUE) is less than 50% of the average aggregate CPUE for the first three years of available data, there may be cause for concern. CPUE information is available for all areas; research CPUE is available for SE Hancock Seamount for all years since 1985, except in 1992 and 1994-2001.

1.2.2 Mean Fish Size

ere has been a significant reduction in mean fish size for a species over time, the stock may be stressed by the fishery. Mean size information is provided for nine species in Hawaii. No mean size information was available at this time for American Samoa, Guam or the Northern Marianas.

1.2.3 Percent Immature

If over 50% of the catch for a species is below the size of first maturity, the stock may be stressed by the fishery. Information for this indicator by species is available only from Hawaii.

1.2.4 Spawning Potential Ratio

Spawning potential ratio (SPR) is the ratio of the spawning stock biomass per recruit, at the current level of fishing, to the spawning stock biomass per recruit that would occur in the absence of fishing. According to the overfishing definition contained in the Bottomfish FMP (Amendment 3, 1990), if SPR is less than or equal to 0.20, recruitment overfishing has occurred (i.e., spawners have been reduced to 20%, or less, of their unexploited stock level). Data to calculate SPR were not available from Guam or the Northern Marianas. An estimate of the "worst case" SPR was calculated for American Samoa's bottomfish complex using Dory Project data to estimate the virgin population CPUE and information on percent of immature fish from Hawaii. In Hawaii, SPR was calculated for five major species in the Hoomalu and Mau Zones, of the NWHI, and the MHI; some SPR values changed slightly from previous year's reports due to improvement in the calculations. SPR for armorhead was calculated annually since 1985, except for 1992 and 1994-2000.

1.2.5 Economic Indicators

Revenue per trip plots are presented for all areas except the MHI. A more valuable indicator for the commercial fisheries, which may be available in the future, would be net revenue (ex-vessel revenue minus costs per trip). Net revenue is available only from the Hoomalu Zone and Mau Zone in Hawaii.

2.0 AREA SUMMARIES

2.1 American Samoa

2.1.1 Descriptors

During 2001, a total of 18 local boats landed an estimated 47,285 pounds of bottomfish, (about 68.5% increase from last years landings) Revenues for the domestic commercial fishery this year was estimated around \$79,193 (a 43.4% increase from last year) with all the catch being sold locally. The CPUE for 2001 (15.2 lb/hr) was not less than 50% of the aggregate CPUE for the first 3 years of available data.. In 2001, effort (trips and hours) increased.

2.1.2 Indicators

CPUE (pounds per hour), though relatively stable (at about 10 lb/hr) in the early 1990's, increased in 1996 to 14.8 lb/hr, mainly due to improved sampling. CPUE declined by about 7% in 2001 to 10.2 lb/hr and but rebounded and increased in 2001 to 15.2 lb/hr, the highest CPUE since it was recorded in 1982. This level is not less than 50% of the average aggregate CPUE for the first three years of available data (9.7 lb/hr), indicating no cause for concern. Bottomfish revenue per trip (as opposed to total revenue) increased for the third straight year in 2001, after a three-year declining trend.

2.1.3 Recommendations

2001 Recommendations

A. DMWR should start preparing a sampling program for the Alias fishing out of Vatia and Anunuu (not included in the normal sampling area) to improve coverage of the fisheries.

2.2 Guam

2.2.1 Descriptors

The fairly large fluctuations over time in bottomfish landings in Guam appear to be due more to entry and exit patterns of fishermen, rather than changes in fish stocks. The number of highliners fishing in the area doubled from 1993 to 1994, increasing the total commercial BMUS harvest and revenue by nearly 300% during that year. In 2000, the total BMUS landings increased by 14%, making 2000 the second-highest BMUS landings in the 15 year data history and 57% above the 15-year average. 2001 landings decreased by 17% from 2000, but was still 23% above the 15-year average.

The decrease in total bottomfish and total BMUS in 2001 was due to historically annual fluctuations of bottomfish landings that is usually due to highliners entering or leaving the fishery during a given year. In 2001, an decrease in BMUS landings was due to decreases in landings of jacks, groupers, and snappers (26.1%, 9.5%, and 31.4% respectively). Emperor landings, however, increased by about 13%. Landings of all groups remained above the long-term average.

The harvest of total bottomfish and BMUS from the charter sector also decreased in 2001, 13% and 7% respectively. These boats tend to release a majority of their catch, although their catch tends to be juvenile goatfish and triggerfish.

The adjusted average price for bottomfish has not shown consistent marketing trends. This is believed to have resulted from the seasonal supply of pelagic fish and difficulties in developing a consistent market for locally caught fish. In addition, imported fish from other islands around the region have contributed to the continued marketing problem for local fishermen. The 2001 inflation-

adjusted average bottomfish price of \$3.28 continues a decrease from last year and is down 9% from 1999 (\$3.60). The 2001 average price was 23% below the long term average.

2.2.2 Indicators

al and BMUS bottomfish harvest decreased in 2001, except the charter component of the total bottomfish harvest. Total bottomfish landings decreased 17%, with the non-charter and charter components decreasing 18% and increasing 45% respectively. Total BMUS landings decreased 13%, with the non-charter and charter components decreasing 15% and 8% respectively. The non-charter components made up 98% of the total bottomfish and BMUS harvest. The CPUE for all bottomfish increased slightly, 3%, while the non-charter CPUE remained the same. The charter CPUE increased 23%. The commercial sales of BMUS species increased 16% in 2001, although a 10% decrease was observed with the commercial adjusted revenue. The number of boats engaging in bottomfishing, overall bottomfish trips, and total hours spent bottomfishing increased 8%, 9%, and 3% respectively.

2.2.3 Recommendations

2001 Recommendations

1. Integrating the offshore and inshore creel census data and the fine-tuning of the offshore expansion program is ongoing. Invaluable technical assistance from NMFS has enabled DAWR to move closer towards providing statistics of confidence, mean fish size, and separating the shallow and deepwater complexes. Inputting the remaining five years of offshore data should be completed in 2002, although the loss of staff and an increase in fisheries projects have made completion of this recommendation slow.
2. Completing the baseline biological survey of the red-gill emperor, *Lethrinus rubrioperculatus*, remains the single most important data deficiency for the shallow water bottomfish resource for the Mariana Islands. DAWR's fisheries staff has discussed making progress towards completing this study during 2002.
3. With additional funding from the WPacFIN program and technical assistance from NMFS, Guam's DAWR should establish mean fish size, percent immature, and SBB indicators for both deep and shallow water bottomfish complexes.

2.3 Hawaii

2.3.1 Descriptors

Main Hawaiian Islands: Only commercial data are available for both the MHI and NWHI fisheries, even though the MHI recreational/subsistence catch is estimated to be about equal that of commercial landings. In 1988, there was a dramatic increase in MHI bottomfish landings due to a bonanza uku (gray snapper) harvest. A steady decline in total landings occurred until 1993,

which was the lowest recorded annual value at the time. Landings increased 32% in 1994 and remained high through 1997, although CPUE was at a 12 year low in 1997. Participation and landings have declined over the past two years while CPUE has increased 29% in that same period. 2001 landings of 322,523 pounds are the lowest total landings in recent records and may be correlated to a 32% decrease in the total number of trips from 2000.

Total ex-vessel revenue from the MHI shows a general decline from 1988-1996 and has stabilized since. 2001 inflation adjusted revenue was the lowest since 1974, and 61% lower than 1988's value. Revenue decreased 23% in 2001, and remains lower than the long-term average.

NWHI Mau Zone: Mau Zone 2001 landings increased 7% from 2000 due to a 17% increase in number of trips from 47 in 2000 to 55 in 2001. Catch per trip decreased by 13% in this zone. The total number of boats remained stable at 6.

NWHI Hoomalu Zone: Hoomalu Zone 2001 landings increased 11% from 2000. Five boats fished in 2001, the same as in 2000. The number of trips increased by 14% from 36 to 41. Bottomfish landings per trip decreased by 9.7% based on NMFS CPUE.

Available revenue data are not separated by zone. Overall NWHI inflation adjusted revenue had been relatively stable. With the 20% decline in 2000 continuing to decrease in 2001 by 21%.

2.3.2 Indicators

Hawaii Archipelago-wide:

SPR values for the five major BMUS species in 2001 are all above the 20% critical threshold level, that defines recruitment overfishing under the FMP, when viewed on an archipelago-wide basis. Of these species, onaga is still the lowest with a 2001 value of 25%. Implementation of the state's management plan should help improve the condition of onaga in the MHI and continue to increase the archipelago-wide SPR.

SPR values are also presented on a management zone basis (MHI, Mau Zone, Hoomalu Zone) for the purpose of determining locally depleted resources.

MHI: CPUE in 2001 decreased slightly from 2000 but remained above 1997 and 1998 levels. Recent CPUE values are approximately one-fourth the early (baseline 1948-50) values, signifying local depletion in the MHI. Most of the more commercially important species in the MHI have had relatively stable mean weights since 1984. Hapuupuu's mean weight dropped sharply in 1993 and has continued to be low. The small number of fish upon which the annual estimates are based may bias the result. However, with so many years in a row recording low mean weights, it is likely that marketed fish size has actually declined for MHI hapuupuu. Such a decline in mean size indicates increased stress on the MHI hapuupuu resource. These values do not exhibit a continuing decline, in fact, the 1997-2000 values are slightly greater than the 1995

lowest value.

For the eighth year 95% confidence intervals were constructed based on “best” and “worst” case bounds of SPR components (CPUE and percent immature). For the sixth year SPR values were calculated using both aggregate CPUE, as in previous years, and targeted CPUE, which gives a more accurate picture for individual species. 2001 aggregate CPUE SPR values for all five major species declined but remained above the 20% critical level, except for onaga and opakapaka: onaga (0.04), opakapaka (0.19), hapuupuu (0.28), ehu (0.24), and uku (0.24). The use of targeted CPUE showed a different picture for the four species where targeted trips are available. Here, ehu SPR is much worse than indicated using aggregate CPUE (SPR = 0.08), whereas SPR values for opakapaka and uku are much higher than previously indicated (SPR = 0.35 and 0.33, respectively). Onaga’s SPR remains consistent when using targeted or aggregate CPUE and has now been below 0.20 for the past 10 years and ehu for all of the last 10 years (using targeted CPUE).

NWHI Mau Zone: The NMFS CPUE data are only available for the NWHI fishery as a whole since 1984 and by zone since 1988. The NWHI (combined Mau and Hoomalu Zones) NMFS CPUE steadily decreased from 1987 to 1992, rose in 1993, and then declined from 1994-96. CPUE rose in 1997 to the 1993-94 level, but dropped slightly in 1998. CPUE increased in 2000 at 513 lb/day and decreased in 2001 to 467 lbs/day. The Mau Zone NMFS CPUE had been steadily decreasing since 1989, but increased in 1993 and 1994. In 1997, NMFS CPUE rose 49%. The CPUE declined 15% in 1998 and 7% in 1999 to 337 lb/day. Mau Zone CPUE dropped to 260 lbs/day in 2000 to similar levels as in 1992 and 1993, but decreased by 9% in 2001. Mean weights of fish in the Mau Zone continue to exhibit year to year fluctuations, but are generally at much higher values than MHI mean weights. The percent of immature fish in the 2001 Mau Zone catch was just under 50% for all species evaluated.

SPR values in the Mau Zone have been decreasing since 1990 (mirroring the pattern in the HDAR CPUE), experienced a surprising rise in 1994, returned to lower levels in 1995, followed by a continued four year increase through 1999. All values are presently above well above the critical level of 0.20, except for onaga which dropped from 30% in 2000 to 27% in 2001. Notable decrease in 2001 onaga SPR values for the Mau Zone is due to increases in the percent of immature onaga in the catches of this zone. SPR values are higher in the NWHI than the MHI because most of the catch is mature fish.

NWHI Hoomalu Zone: The Hoomalu Zone NMFS CPUE has been on a downward trend from since data collection began in 1988. 2001 CPUE continued to decrease to 543 lb/day from a 6-year high in 2000. Pounds per trip decreased by 19% in 2001. Mean weights of fish in the Hoomalu Zone continued to exhibit year to year fluctuations, but are still at much higher values than MHI mean weights. The percent of immature fish in the 2000 catch was just under 50% for all species evaluated.

The SPR values in the Hoomalu Zone decreased for all species. The 2001 SPR levels range from 46% to 71%.

Seamount Groundfish (Armorhead): No fishing has been allowed on the armorhead stocks of the SE Hancock Seamount since the moratorium began in August, 1986. The 1993 CPUE, calculated from research longline catches, was more than double that of the last assessment (in 1991) and nearly as high as the highest CPUE recorded since surveying began in 1985. No research cruise occurred since 1993, and future research assessment cruises are unlikely.

No SPR values were available in 2001 as no research was undertaken. In 1993, SPR within the EEZ (SE Hancock Seamount) was above 0.02, the highest since 1986, but still far below (10% of) the threshold level for recruitment overfishing of 0.20. About 99% of the known armorhead seamount habitat occurs outside the U.S. EEZ, an area which had 0.06 SPR in 1993. During February and March 1997, an oceanic and larval armorhead survey over the seamounts outside the U.S. EEZ was conducted onboard the R/V Kaiyo Maru by the National Research Institute of Far Seas Fisheries Laboratory in Shimizu, Japan. Armorhead larvae were collected from surface waters around all seamounts except for Koko Seamount.

2.3.3 Recommendations

2001 Recommendations

- A. The Council should request the State of Hawaii to change the mandatory NWHI daily logbook format to include the disposition of catch, ie. live release or dead release, of the released fish.

2.4 Northern Mariana Islands

2.4.1 Descriptors

Data are available only on the commercial fishery. Landings of bottomfish seem to have significantly increased from last year (57.1% more pounds in 2001 than in 2000), to the highest level in 19 years. In 2000, bottomfish landings decreased significantly (18.2% less than 1999). This fishery continues to show a high turnover with changes in the high liners participating in the fishery, and an increased number of local fishermen focusing on reef fishes in preference to bottomfishes. In 2001, the number of vessels fishing increased to 75 following from 65 in 2000 and 51 in 1999. The number of trips more increased in 2001 to 834 which is the highest number of trips recorded.

Both the unadjusted and adjusted prices increased in 2001. The unadjusted price was the increased by 2.2% over 2000, and the adjusted price increased by 8.5% from 2000. The unadjusted price was higher than the long term average, but the adjusted price was 3% lower than the mean for the last 19 years. The total 2001 ex-vessel revenue increased steeply to \$175,345, the second-highest revenue in the last 19 years.

2.4.2 Indicators

The average bottomfish catch per trip increased from 57 lb/trip in 2000 to 69 lb/trip in 2001. Although the average catch per trip is not a very good measure of CPUE, because it is subject to significant biases (e.g., changes in trip length and relative amounts of bottom fishing compared to trolling or reef fishing); it is the only measure readily obtained from the commercial landings system. However, the smaller vessels commonly make mixed trips and the relative proportions of bottom fishes to pelagic and reef fishes seem to be changing. Between 1997 and 2001 the number of fishermen selling both pelagic fishes and bottom fishes decreased from 11.5 to 6.8%, the number selling both pelagic and reef fishes increased from 4.8 to 7.6%, and the number selling only reef fishes increased from 10.3 to 26.1%. Given that fishermen appear to be changing the focus of their trips to include more reef fishing and less bottom fishing, this measure is an increasingly inaccurate portrayal of the actual CPUE. It has been suggested that it may be possible to improve this measure of CPUE by using only those trips that landed bottomfish exclusively. However, in the past 5 years only 2 fishermen exclusively sold bottomfishes in 1997, 1 in 1998, none in 1999 and 1 in 2000, and 3 in 2001. These numbers are too low to be indicative of the entire fishery.

Revenues significantly increased (70.6% more than in 2000). The unadjusted revenue and inflation-adjusted revenue for 2001 is greater than the mean for the last 18 years, and is the second highest value of the whole 19 years. This is a result of the combined effect of greater pounds landed and a higher price per pound for almost all bottomfish species.

2.4.3 Recommendations

2001 Recommendations

- A. To request NMFS and the Council to assist DFW in identifying an expert who is capable of and willing to prepare otoliths of redgill emperor and then count daily growth rings.
- B. To request NMFS and the Council assist CNMI by contracting a specialist to map commercial fishing banks, particularly around Farallon de Medinilla, Marpi Reef, and the closest banks to Saipan, Tinian, and Rota.
- C. To request the Council merge the Bottomfish Plan Team (as well as the Crustaceans Plan Team) with the Coral Reef Ecosystem Plan Team.

2.5 Region-Wide Recommendations 2001

- A. Council should support development of a comprehensive model to assess the effects on MSY, CPUE, SPR, etc. due to the concentration of effort from the establishment of area closures and MPAs.