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November 7, 1979
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Raymond S. Tabata, Editor

WORKING PAPER NO. 46

July 1981

SEA GRANT COLLEGE PROGRAM

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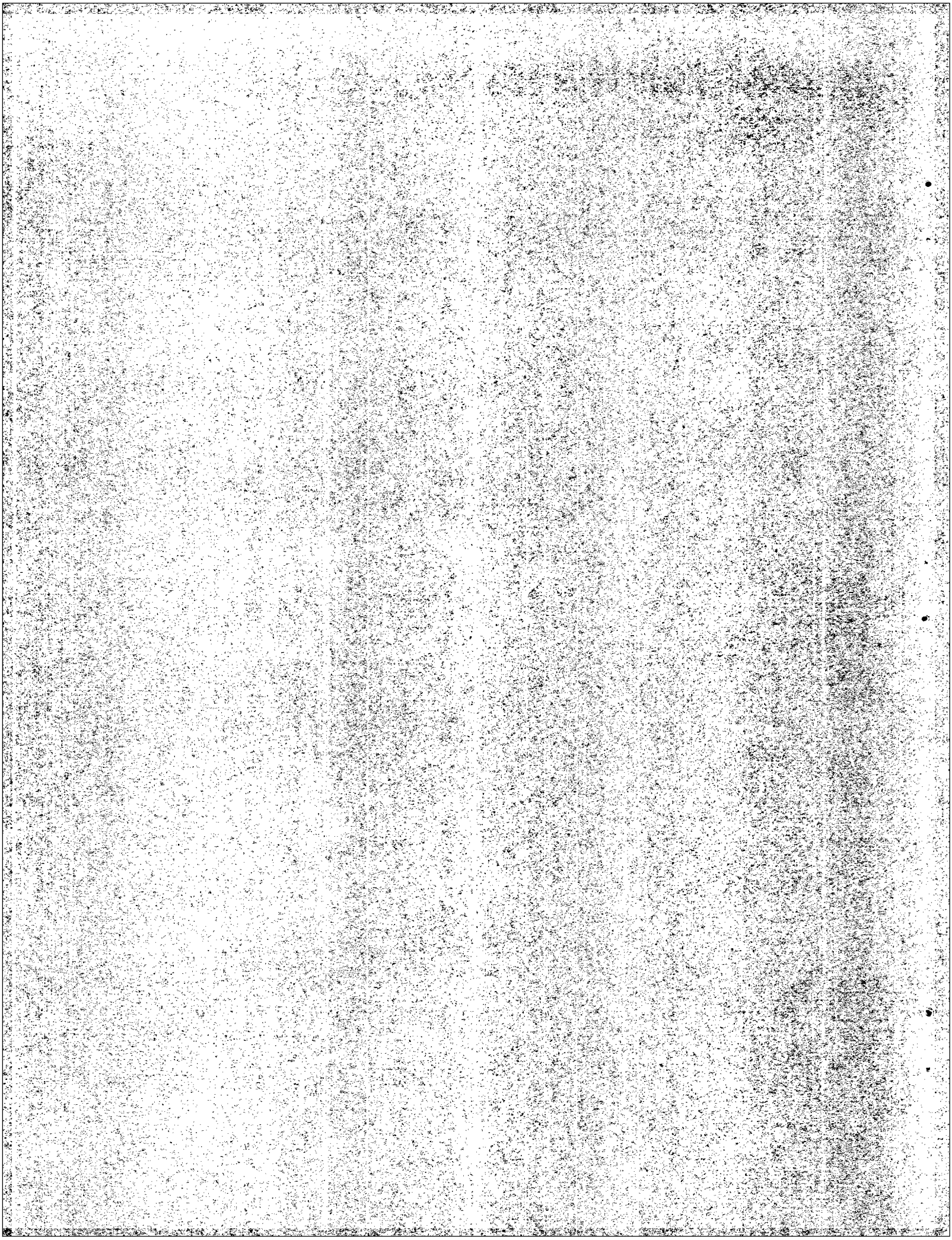

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PREFACE

This working paper presents transcriptions of a workshop held November 7, 1979, titled "Taape: What Needs to be Done?" The workshop was sponsored by the University of Hawaii Sea Grant College Marine Advisory Program and the Office of the Marine Affairs Coordinator, State of Hawaii.

The purpose of the workshop was to learn what needed to be done about taape (*Lutjanus kasmira*), a colorful snapper introduced to Hawaiian waters in the late 50s and early 60s as a game fish. Taape had gained some notoriety among local fishermen who alleged that it was displacing popular food fish such as weke, *Mulloidichthys spp.* Commercial fishermen were dismayed by the low market prices commanded by taape, which in turn, were blamed for out-biting more valuable fishes.

Resource people from the University of Hawaii, government agencies, industry, and fishing community were asked to share information on what was known about taape biology, distribution, abundance, behavior, and the fishery--as well as suggest ideas for dealing with the apparently increasing population of taape. The transcripts, as much as possible, is a verbatim account of presentations and discussions at the workshop, except for inaudible portions which were deleted. When necessary for clarity or consistency, minor editing was exercised without changing the substance of what was said.

The cooperation and kokua of all the speakers is gratefully acknowledged: Dr. John Randall, Dennis Oda (for Dr. James Parrish), Dr. Richard Grigg (for Steve Ralston), Henry Sakuda, Frank Farm, Clayton Yamada, Stan Swerdloff, Brooks Takenaka, and Howard Co. A special thanks to Alvin Tachibana of the Breadline Restaurant for generously helping prepare taape recipes for a tasting session at the end of the workshop. Mahalo also to all the individuals who initially helped plan the workshop in August 1979 and to members of the Oahu Marine Advisory Council who provided suggestions. A special thanks to Chuck Johnston of *Hawaii Fishing News* who helped publicize the workshop with a feature article and notice. From the Marine Advisory Program, the valuable assistance of Karynne Chong, Marsha Iyomasa, and Robert Hill are specially acknowledged. Finally, support from the Office of the Marine Affairs Coordinator is greatly appreciated for making possible the participation of several neighbor island representatives. Finally, many thanks to Carol Nakao and Lori Oshiro for their patient help in transcribing, typing, and proofing the manuscript.

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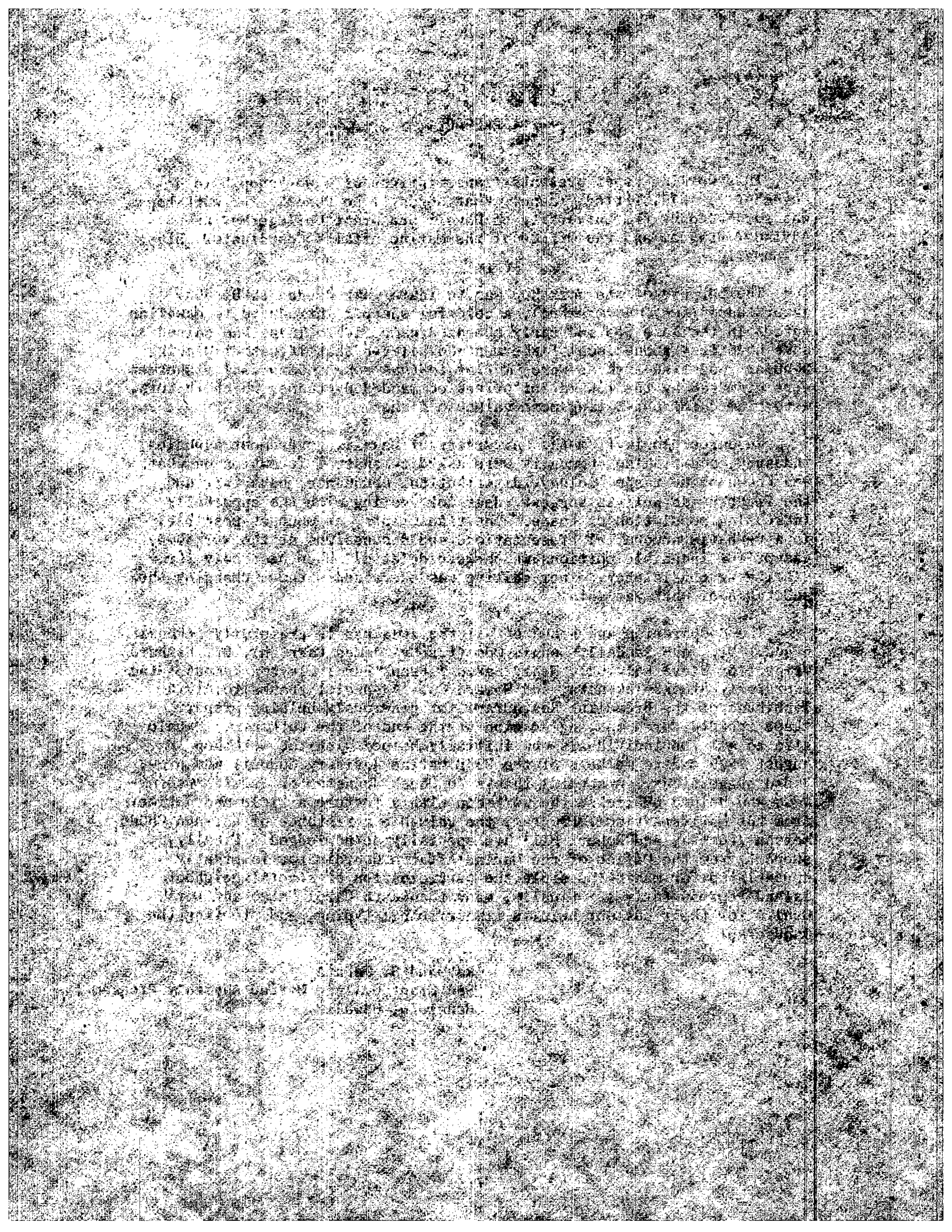
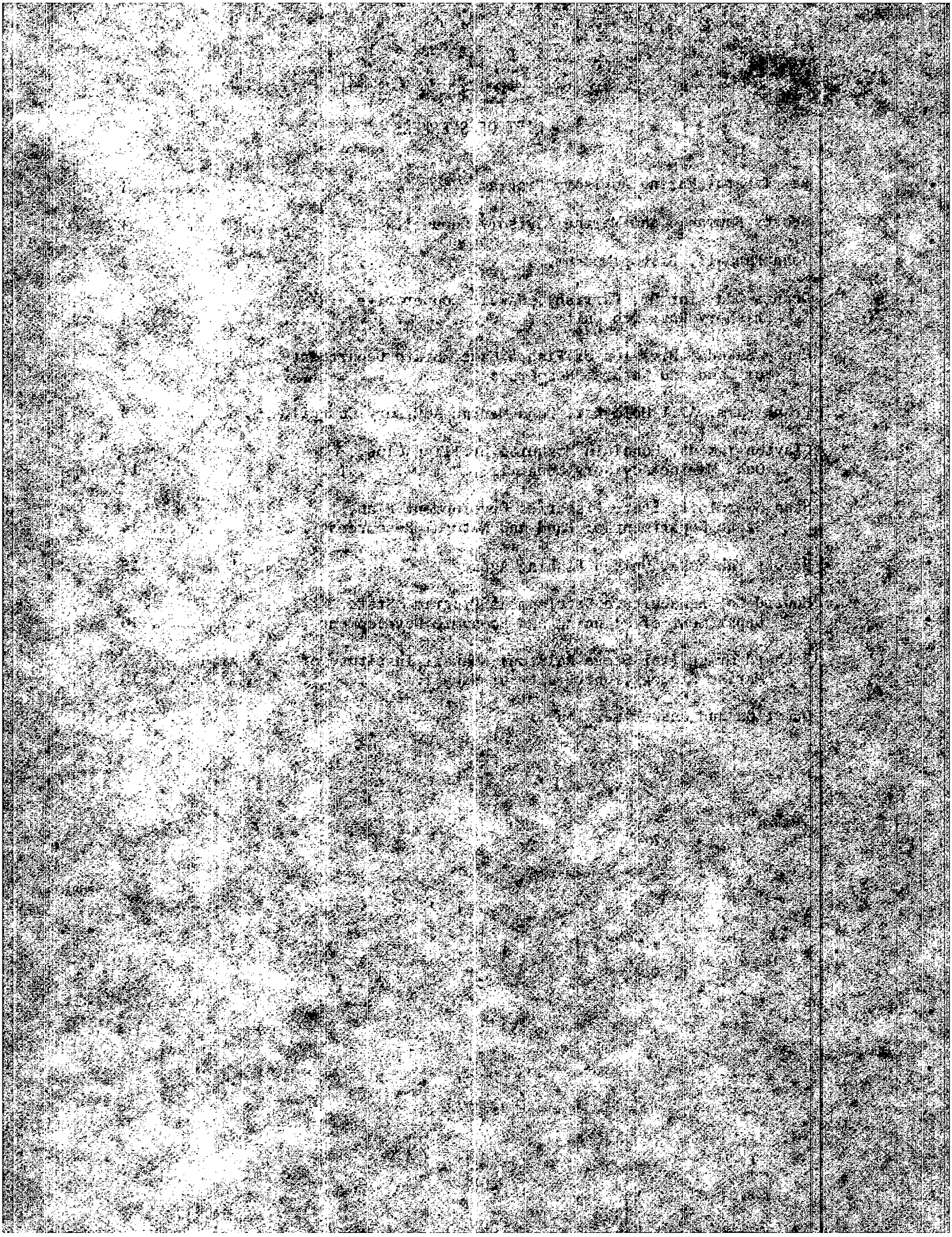


LIST OF SPEAKERS



TAAPE WORKSHOP

November 7, 1979

Ray Tabata: The purpose of this workshop is to find out what is presently known about taape in Hawaii, and maybe more importantly, what needs to be done in terms of research and public education. Sea Grant at the University of Hawaii has three main areas: research, education, and extension. This program is being sponsored by the Marine Advisory Program, which is the extension part of Sea Grant. I would like to introduce quickly two people from our program, the Sea Grant program: Jack Davidson, our director; and Alf Pratte, the coordinator of the Marine Advisory Program.

I'd like to acknowledge some of the people who were instrumental in getting this workshop off the ground. First, the Oahu Marine Advisory Council; you'll be hearing from the interim chairman in a couple of minutes. The Advisory Council provides us recommendations with some of the high priority areas that we should work in. Also, we had a taape workshop planning committee which met once back in July or August, and they provided a lot of good suggestions on who should be speakers, what kind of topics should be presented, and general format. So I thank the committee for all their work. Also the Marine Affairs Coordinator's Office which provided funds for this workshop; most of it was used for bringing neighbor island representatives. Hopefully, we'll get some input from them as to what their observations are, and maybe they'll have some suggestions. I'd also like to thank *Hawaii Fishing News* who ran a big article for us, partly to inform its readers about what the present situation is, and also to publicize the workshop. I'd like to thank all the panelists who've spent a lot of time getting ready for this workshop. And later on, you'll get to meet Al Tachibana, the chef at Breadline. He has worked pretty hard to get some nice, tasty recipes together. And finally, some of the staff people who worked hard to get this workshop together, like Karynne Chong; she's been working for a couple of months on this project, and Marsha Iyomasa, who helped get some of the seafood recipes together.

I'd like to quickly introduce the neighbor island representatives: Kauai, Mike Masaki; Maui, Ed Yoshitake; Lanai, Pete Connolly; Molokai, Fred Bicoy; and Big Island, Fern Kealoha. I'd like to introduce Scotty Bowman, interim chairman of our Oahu Marine Advisory Council, who'll say a few words.

Scotty Bowman: I was asked this evening to explain a little about the Advisory Council and how it functions. I and 17 others were appointed on March 7th of this year by the Acting Chancellor of the University of Hawaii to serve on the Council. Our Council represents a cross-section of marine activities. I am a certified scuba diver, and past-president of Alii Holo Kai and the Hawaii Council of Dive Clubs. I also served as chairman of the Oahu Citizens Advisory Committee for Coastal Zone Management. Other members of the Council bring expertise in fishing, boating, conservation, swimming, education, safety, and publication. Meetings are

held on the second Thursday of each month, at 7:00 p.m., Aloha Tower, 9th floor. Guests are welcome to the meetings, and anyone who wants to come, contact the Sea Grant Advisory Program office and let us know that you would like to come to the meeting. Our responsibility is to provide the University with advice regarding marine problems and concerns, suggestions for projects such as workshops like this, publications, slide shows, radio and T.V. programs--recommendations for new research which might help solve some of the problems that we encounter, or are aware of. In short, the Council serves as an interface between the University's Marine Advisory Program and the citizens of Hawaii. We assist the public by providing information on the wise use and conservation of marine resources and foster increased community awareness of marine issues and concerns through many different methods and ways. And we also provide citizen input and direction for the Sea Grant program or Sea Grant projects. And that, in a nutshell, is what the Council is all about.

Tabata: Thank you, Scotty. To start off the evening's program, we'll start with the beginning. We have Dr. John Randall, from the Bishop Museum, a noted ichthyologist, to talk about the history of the taape introduction. This will give us some background for the rest of the discussion.

John Randall: Back in 1955, the late Vernon Brock, who was then the Director of the Division of Fish and Game, informed me that he was contemplating introducing some of the groupers and snappers from French Polynesia into Hawaiian waters. If you stop and think, what do we have in the way of native groupers and snappers in Hawaii, which are such valuable food and game fishes in other parts of Oceania? Well, there are very few. Among the groupers, we have only a very large species; I've never seen a specimen of it and I'm not sure what it is. If anybody ever catches a really big fish, please let me know. There's something around here, of truly giant size, but we have no specimens in the Bishop Museum. There's a deep water *Epinephelus* as well, the one that you see only occasionally as a young specimen in the shallows. And among the snappers, the big genus, *Lutjanus*, of which the taape is a representative, is not known at all in Hawaiian waters. We have only some deep water snappers like the opakapaka, of another genus, and we have *Aprion*, which gets into the shallow water and *Aphareus furcatus*, another snapper, but, these two major groups of snappers and the groupers are such dominant food fishes elsewhere in the Pacific, that it was thought it would be a good idea to bring them into Hawaii.

In talking with Vernon, I said, "How are you going to decide what fish to bring in? Wouldn't it be a good idea to find out something about their biology? What if, for example, one of the fish you bring in feeds heavily on baby spiny lobsters? This wouldn't be very good, would it?" And actually, I was looking for an excuse to take my little sailboat down to Tahiti, so I applied for it. Vernon agreed with me that this would be a good study to make, so I applied for a grant through the Bishop Museum and Yale University; at that time, two scholarships were offered--one in Botany, one in Zoology--for something in the Pacific area, and I was able to get the one for Zoology for the year 1956. So I sailed my little ketch down to Tahiti and I actually spent a year and a half there. I looked into the biology, primarily the food habits of the various groupers and snappers

that were important food fishes in Tahiti. Taape was one of them, but it's not the one I studied very much, because I never thought it would be introduced to Hawaii; it was rather small. As this little introductory article that Ray has put forth (says), I only looked at 17 stomachs of taape, but hundreds of the toau and hundreds of some of the *Epinephelus*.

At any rate, during my study, Vernon Brock did come down and we discussed some of the things about the possible introduction. One very good decision was made, and that was, let's not bring in any of the larger groupers and snappers that can cause ciguatera. I think most of you know ciguatera is a type of fish poisoning that, it's so unpredictable, we have problems here and there in Hawaii, but it's not so serious in Hawaii as it is in most of the rest of Oceania. And the large red snapper, *Lutjanus bohar*, and the large grouper, *Plectropomus leopardus* (tonu) in Tahiti, and another snapper *Lutjanus monostigmus*, all rather big fish, and they are very bad offenders. And although they're nice fish as game fish, perhaps, it was decided not to bring those in. At any rate, when I came back and discussed it with Vernon, I thought that there really wasn't that much in Tahiti that seemed good. I said that if I were bringing in a fish, I think I would choose a Nassau Grouper from the Caribbean area. A Nassau Grouper gets big, it has very low incidence of ciguatera, it's abundant, it's the dominant food fish in the Bahamas, more important than any other marine product except for the spiny lobster. Vernon said, "Well, that would be so expensive, so difficult to bring them from there."

Well, anyway, as you know, a number of groupers and snappers were introduced from Moorea initially in 1956 or 1957, and, at that time, there were no taape brought in. I didn't even know until I read this evening that there were a few taape introduced back in 1955. But obviously at that time, there weren't enough. After I was in the Caribbean area myself in 1958, over 2,400 taape were brought in from the Marquesas. And they were brought to Kaneohe Bay, and released there, and 19 days later one of them was found 53 miles away. In other words, the snappers were very prone to move when they were first introduced, whereas the groupers tended to stay where they were found. But none of these fishes, we were pretty sure of this (they're all reef and shore fishes), would ever move to the next island. Well, in August of 1960, an 8-1/4 inch taape was caught on the Big Island. We knew at that point that the taape had successfully reproduced in the islands, because it was too small to have been one of the original transplants. It certainly wouldn't have swum from Kaneohe Bay across to the Big Island. I think Henry Sakuda will tell us more about what has happened in Hawaii after the introduction.

I just want to touch a minute on another introduction that happened even before the taape, because there are some problems here, and some of us have already been asking questions about this earlier this evening. In 1955 the Marquesan sardine was introduced to Hawaii from the Marquesas. At that time, it was thought to be *Harengula vittata*. Later, after it was introduced to Hawaii, it was described as a new species, *Sardinella marquesensis*. It was brought in as a tuna baitfish and it didn't take; it established, but it didn't become very abundant until recent years, and now it's beginning to be important as a baitfish, so I am told, but we've had one death on the island of Kauai from eating this sardine. If you

ever catch any sardines, don't eat the viscera, because this is where the toxin lies. This is a type of fish poisoning called clupeoid poisoning. We're hoping to get more toxic sardines. I've just sent some frozen to Japan to try and see if it might be saxitoxin; this is the same toxin that causes paralytic shellfish poisoning, and there are only three of quite a few sardines that were a little bit toxic, and the toxin was not the one that would cause the clupeoid poisoning. Nevertheless, if any of you catch some sardines that you think might be toxic, I'd like to see them frozen and we'll send more on to the Laboratory of Marine Biochemistry at the University of Tokyo. When the Marquesan sardine was brought in, it was in a baitwell of the National Marine Fisheries Service, and there were others back in 1955; other fishes were in that same baitwell. There were three jacks, which were already in Hawaii; there was a bonefish, which we all used to call *Albula vulpes*, and I see Jim Shaklee here this evening who could tell you quite a story about the bonefish, about five or six different fishes have been called *Albula vulpes* in the world, so I'm not too sure which one it was now, from the Marquesas; there was a goatfish *Upeneus vittatus*, and there was a small mullet called *Chelon engeli*. In 1966 when I was back in Hawaii, and at that time the director of the Oceanic Institute, Ken Norris, brought a small mullet to me and he said, "This looks a little different from the usual mullet. What is this?" I didn't recognize it, and I checked the literature and found out it was a *Chelon engeli*; I didn't know about the introduction, which was accidental, you might say, or incidental introduction; I looked it up and it was the first record from Hawaii, and I said, "Well, you know, after all every fish that came to Hawaii had to come in here, drift in; every reef fish will say, drift in as a larval form and establish, and it's a long way. We must just be at that moment in time when the *Chelon engeli* has arrived. Later I saw the report from the Fish and Game, that the *Chelon engeli* were among those fishes that were liberated in the waters in Hawaii with the Marquesan sardines. *Chelon engeli* has become quite abundant. I think it's making inroads into the population of our valuable commercial mullet, *Mugil cephalus*. If you go to seine little baby mullets to put in your mullet pond, you have to get as many or more of the *Chelon engeli*. *Chelon engeli* only gets about 5 or 6 inches long. So here's another example of a miscue, of an introduction that we're going to regret, that we are already regretting. Thank you.

Tabata: Thank you. We'll move on to some of the current research going on right now. Dr. Jim Parrish and Dennis Oda of the Cooperative Fisheries Unit will talk about the present research that is being done on the feeding habits of the taape.

Dennis Oda (for Dr. Parrish): What I'm going to talk about is the natural history and ecology of taape, but unfortunately, not much has really been done specifically with taape. So I'm just going to try to summarize some of the work that's previously been done, and then give some results of what we found when we collected taape. As Dr. Randall said the first major transplant was in 1958 at Kaneohe Bay. At this first location, it was observed that the snappers were the most abundant group of fish with the taape being the dominant species there. And it was also observed that they were never found in flat, sandy bottom areas,

but were concentrated in places where there was an abundance of natural shelters. Right after the release in Kaneohe Bay, we see a rapid dispersal and 31 days later they're trapped off Barber's Point. In 1960, it was trapped off the Big Island. I mean, this is significant because it represents the first evidence of spawning. It's unlikely that the adult taape would swim across open water from Oahu to the Big Island. More probably the eggs or larvae were transported by ocean currents. Since then, there's been, in 1964, sightings off Maui and Molokai, and this seemed to prove that the taape were on the road to establishing themselves. So that by October 1966 the taape were open to public fishing. Since then, as you all know, the catches have dramatically increased and last year (1978) there was over 89,000 pounds of taape landed. So as far as their propagation, the taape recently have been reported as far as French Frigate (Shoals) and Laysan. So they're really spreading themselves out.

All of this shows that the taape has successfully colonized the Hawaiian Islands and there have been few ecological studies done on taape to give us an insight on how they've been able to successfully colonize here. As Dr. Randall said, he did some preliminary gut analysis of taape, and he found them feeding on just crustaceans or fish. Snappers on the whole are generally considered nocturnally active carnivores, as other people have found in their studies. But not much has been specifically done on taape. The work that Dr. Parrish and I are doing is about the first detailed study that has been actually done on taape here. This started out last summer when Dr. Parrish, Dr. Kefford, and myself started collecting taape from four different locations off of Leeward Oahu: Barber's Point, Reef Runway, Waikiki, and Diamond Head. Except that from Diamond Head, all of our locations were in about 70 to 80 feet of water and this was from about 7 to 8 in the morning. We found that if we'd done our collections in the afternoons, the (gut contents) were too highly digested to quantify or to identify, even. Our samples off of Diamond Head proved to be not too significant in anything since most of our gut samples were empty. Since our gut samples that we did collect in the afternoon were highly digested, this in itself suggested feeding was not during the late morning hours, but very early in the morning, or possibly at night. Taape were observed to form schools over the reef, spatially displacing other fish. Any attempts to chase them off the reef into the sandy areas failed. But we used this to our advantage when we were catching the taape by resetting out nets around the outer perimeter of the reef and just chased a whole school right into it and gill them. At all of our locations, when we looked at our gut samples from the different locations, small fish constituted the majority of the diet and of the fish that I could identify, there were postlarval squirrelfish. Some examples are, let's see, 100 and some fish fragments that I could identify. And these other fish, there was a small blennie. The crabs and stomatopods (little crustaceans, shrimp-like) were the next most frequently eaten at Reef Runway and Barber's Point while larval crabs and small adult crabs were the next most frequently eaten off of Waikiki. At all locations shrimp, cephalopods (octopus and squid), certain shellfish, and planktonic crustaceans were found most or in all. These constituted maybe around 2% of the diets, and they were insignificant compared to the fish and the small adult crabs. Along with the taape, we collected some menpachi

because when we were herding the taape into the net, we'd catch incidentally, other fish, although not too many compared to the amount of taape that we caught. So far we've looked at 15 to 20 menpachi and quantified the results, which isn't that much data to conclusively prove anything, but it gives us something to look at. What I found so far is that menpachi diet consists mainly of these little larval crabs and small planktonic crustaceans. Since then, I've looked at another 20 menpachi stomachs. It seems to be the trend. And other studies I've done on menpachi also agree. So if we compare this to the taape's diet, the taape eats fish and larger sized crustaceans, essentially, so it doesn't appear to be that much of an overlapping diet. Right now, we're trying to get some weke-ula. We do have some stomachs but we haven't actually quantified any of our results. According to other studies, specifically by Hobson off Kona, Hawaii, he found that the weke eat mainly megalop crabs or larval crabs, planktonic crustaceans and small decapods. So, in summary, the taape seem to be a generalized predator, eating opportunistically on whatever's available out there. If there are any questions, I hope to entertain them.

Q: Of the postlarval squirrelfish, are any of them menpachi?

Oda: I can't say, I really don't know. Hopefully, when somebody else who's more acquainted with that might look at it and be able to identify it, but for sure there's postlarval squirrelfish that have at least two preopercular spines and I found some also at the UH aquarium collection that look identical to them.

Q: Are there any inferences, during what portions of the night do the taape feed? Is it continuous, is it for the first three hours after sunset, with some gap in between and perhaps a little bit before breakfast, before the sun comes up, or, anybody have any idea yet?

Oda: As far as my results show, it doesn't show anything conclusive about when they're feeding. I've done no night dives to actually observe the fish; I was just talking to fishermen out there and it seems to be that you could go out there in the late afternoon and they'll be biting like crazy and then all of a sudden, they'll just stop around sunset. So, as far as night time goes, I really don't know about taape specifically. I would imagine that there is some feeding at night, and especially early morning.

Q: The few observations I have just watching shoreline fishing off some cliff areas using aku belly. They would be casting out maybe an hour before the sun goes down, and not too much action, maybe just eel, or something like that, but 10 minutes or so before the sun gets down and let's say, an extra hour just watching them, to see what it would be, virtually every cast in, within 2 to 3 minutes, they'd have a taape on it. And I'd dive the spot occasionally, I see some taape during the day, it doesn't seem like they're feeding, they're sort of in aggregations, just swimming around. At that spot it seems like evening would bring out their hunger pangs or something, I don't know.

Oda: There's been other studies that have indicated that there's a massive feeding behavior at that certain transition period between daylight and nighttime. So I wouldn't be surprised.

Audience: I can tell you about night feeding. The moment the sun goes down until the sun comes up, they bite. Continuously. I go twice a week, I should know. I bet a lot of people agree with me. They bite right through the night. Anything.

Oda: Yeah, that's the general impression I got...

Audience: You see, when they come up they throw up fish and crab. You put the crab and the fish on the hook and drop it and you'll catch another one.

Oda: Yeah. That's one of the main things that I've gotten out of this is that they are opportunistic feeders.

Audience: I've seen about 2-1/2 inches of moano in their bellies. Everything. Anything.

Oda: They haven't got enough data right now to prove anything. At one location, there was a lot of these small type of crab and fish, and we did find a greater majority of fish in their stomachs. Another location, we found a lot of larval crabs like off of Waikiki I guess they call it "100 foot hole" or something where there's this big rock outcrop surrounded by sand flats and 70 feet of water; possibly the reason why there's a lot of crab larvae in this area, is the sand around there.

Audience: That's anti-whitewash fish. Guaranteed to catch.

Tabata: Why don't we take one more question, if there is one, but I wanted to move on, because there's a whole list of people that have something to say, also. Why don't we take one more question from the back.

Q: At what depth have they been found?

Oda: In my own experience, we've only dived to about 70 to 80 feet, but I know they are deepwater fish, and they really must go pretty deep, because local fishermen probably bring them up in the traps that you set. So, I guess when they were first introduced, they were considered more deeper water fish. But according to reports, you know, they've been reported pretty shallow. I've seen them in about 30 feet of water, or so.

Tabata: I would like to now introduce the panel members. First Henry Sakuda from the State Division of Fish and Game. He'll speak on the establishment of the commercial fishery in Hawaii. Frank Farm, from Alii Holo Kai and he's also a member of the Oahu Advisory Council. Clayton Yamada, with the Honolulu Mosquito Trolling Club, and he's also a member of our council. Frank will talk about the commercial fishing perspective and Clayton will talk about our recreational fishermen. Stan Swerdloff

from the State Fisheries Development Plan who'll address the potential of the commercial fishery for taape. Brooks Takenaka is with the United Fishing Agency and he will talk about the taape in the marketplace. And we have Howard Co who is with the Department of Planning and Economic Development, Aquaculture Development Program. He will talk to us about developing a potential market. And finally, Richard Grigg, with the Hawaii Institute of Marine Biology; he also heads up the Northwestern Hawaiian Islands Fishery Investigation study. And he'll talk about management approaches concerning taape. I'd like to reintroduce Dr. John Randall who'll be moderator for this panel discussion. We will have a question and answer period after this, so there'll be plenty of time to ask all the questions you want.

Randall: I think you're first, Henry?

Henry Sakuda: We have already mentioned the significance of its very rapid dispersal throughout the state. As mentioned by Dr. Randall, one was recovered off Wailupe about 27 miles from Kaneohe Bay in 18 days. Two were caught off Makua about 53 miles in 19 days, 2 were caught off Barber's Point 51 miles after 31 days. There's a possibility that these recoveries may have originated from the five taape that were released off Barber's Point in 1955, but we feel that the insignificant number of the original released at Barber's Point suggest that since there were no recoveries between 1955 and 1958, we think that these were probably from the batch that were released off Kaneohe Bay. The first taape recovery from an outer island was made in 1960 when one was hooked on the Big Island. In 1961, a taape was caught on Penguin Banks; in 1964 our divers made sightings of taape on Maui. The taape were not reported from Lanai until 1968, and from Kauai until 1972. The Division of Fish and Game, after introducing the taape, along with other species from the Pacific Islands, established Regulation 17 in January 1958 to protect the taape, along with the others, to allow them sufficient time to establish themselves, which was the purpose of the introduction. We've already previously discussed the rapid and efficient distribution of the taape throughout the island waters, and by 1966 it was apparent that the species no longer required protection from recreational and commercial taking. All along the time after it was released until 1966, we were receiving reports of taape sightings, people catching them accidentally, wondering what kind of fish they were, reporting them to our wardens of the various islands, some even calling us up and delivering the fish to us to confirm that it was taape. So thereby we do have records of these sightings.

The next logical step, then, was to lift the restriction on taking of the taape, especially for commercial purposes. Therefore, after due public hearing procedures and the regular administrative procedures, the Division of Fish and Game amended Regulation 17 in October of 1966, opening the taape, toau, the roi, and several other species to fishing. Therefore, if you check our records, the taape is shown to begin appearing in our commercial fish catch reports from about October 1966. Now, commercial fishing for taape, by island, from our commercial fishing catch reports, shows that Oahu is the greatest producer, as it's about 38% to 39% of the total state catch. Kauai and Niihau is second with about 27%. The Big Island follows with 23%, and Maui, Molokai, Lanai, Kahoolawe put together has a mixed type of fishing with 11%. Now, the types of gear used by

commercial fishermen to take taape is, from our records, indicates that handlines, traps, and nets (gill nets, surround nets) are the main types of gear used. Handline, mostly on the Big Island, although it is used on all the islands, is the second largest harvesting method. Traps, mostly on Oahu, off the Waianae coast, it the third producer. The gill net mostly on Oahu and Kauai, is the largest producing method. This, I imagine, is very logical because the taape, being a species that stays in very tight schools, is very vulnerable to gill netting. Now the primary producer value, (this is the fishermen's price), in 1970 was about 31¢. It's presently about 62¢ per pound to the fishermen, ranging from about 40¢ to 73¢ per pound. The total annual value for taape harvested by the fishermen range from back in 1970, originally reported at some $341; it is now in excess of $30,000 in 1978. Pounds of taape sold, production-wise, has risen very dramatically from the small 1,000 pounds roughly in 1970, to some 59,000 pounds in eight years to 1978. Relative to abundance, we have looked at the average pounds per trip for the early years--for handline fishing and trap fishing on Oahu. There does not seem to be any apparent trend in seasonal abundance at this time; this is looking at the average pounds per trip. Probably the same way with net fishing; there is no apparent decrease in the average pounds per trip, also. This indicates that although the pounds of taape caught has increased very dramatically, there does not seem to be a decrease in the supply of taape. Naturally, there is need for further detailed examination of the commercial fishery catch records, especially in determining the many variables that affect the taape catches and what we need to do is to make the required adjustments to these catch data for the analysis. We feel that the taape is a very good, potential commercial species. You'll hear more about their commercial potentials and how they can be used more effectively by the members to follow. Thank you.

Frank Farm: I've been asked to present a viewpoint as seen by the commercial fishermen; although I do hold a commercial fishing license and fish commercially at times, maybe I should qualify that and say I'll give the viewpoint of some of the commercial fishermen because obviously I cannot say what all the commercial fishermen think. But I think one thing that's in general agreement amongst the commercial fishermen, is that the taape is thriving, and found in more and more of the fishing areas in the state of Hawaii. The hook fishermen are catching a lot more taape, sometimes more than they wish to catch, the trap fishermen are catching more, the net fishermen are catching more, and the divers not only catch more, but see an awful lot of taape in the ocean bottom. If this is true, some people will obviously say, why not have the commercial fishermen take advantage of this and make a profit from them? There are problems that face the commercial fisherman as far as the taape go. First of all, there's the price. And it's a matter of economics when you're out fishing and trying to make some money by catching fish and the taape commands a very low price as compared to the paka, or the kumu, or the other type species of fish. It is not one, or the mostly sought after fish by the commercial fishermen. The trap fisherman will accept the taape as a bonus because he'll take almost anything that goes in his trap, so if the taape goes into his trap, well, he'll just accept it. But the hook fisherman, especially the deeper water hook fisherman, is not likely to accept the taape. In some cases, they consider the taape a nuisance, and the obvious question is, why do they hook it. Well, you

can't control what bites your fish, normally. The more expert commercial fishermen have tried different ways to avoid the taape. You cannot just change the size of the hook, or the type of bait, because the taape will steal any bait that you put down when they're biting, and even the smallest of the taape, about this size, will take on the hook that you set for onaga or paka. So there's very limited ways of controlling the hook fishermen's ability to catch a smaller, non-marketable, low-priced taape. The divers, they normally will not catch taape because of the low price that it commands. So, we have the problem of size to the hook fishermen and the trap fishermen will accept it as a bonus. The gill net fishermen, or the surround net fishermen normally will catch this fish if he feels that the market has a demand for the fish. In other words, if he thinks the price is right. Or, if, because, during his day's outing, his day's fishing, he has not done well, this is the fallback position of the net fisherman. "Now, we didn't have a good day, gang, we have to make our expenses, let's go to the hole, wherever it is, and pick up the taape, and we'll at least recover." But you can see the priority is very low for the taape with all types of fishermen. The taape, in some ways, is not a very smart fish. And this is experienced by observations both underwater and above water. Especially underwater. Taape, I might clarify, are displacing fish such as the kumu, the weke, and other type of fish that frequent a certain area, as fishermen refer to a fishing hole, which may be the size of this building or a block, or something like that. And they will generally stay in this area. Just as the weke used to, or the kumu used to. The areas such as this that I mentioned that were very plentiful with weke and kumu and other types of fishes, for the most part are overrun by taape. Very few weke and kumu exist in the areas. And when I say the taape is not the smartest fish, at your first attempt of trapping in the area, you lay the trap down, you'll catch a lot of taape. Certain areas, however, you can put the trap down and you'll catch a lot of taape, but talking to a trap fisherman that I know well, has caught, even in the deeper waters (and I'm talking about 140, 160 feet), they go down and observe the fish and set the trap. In setting the trap down, it has to be in a certain angle as to how the fish will run and you can come back in the next three or four days and the trap is full. There is still maybe 5,000 or 6,000 pounds of taape swimming around in that general area. Reset that trap, come back in the next three days, the normal pattern, and you might have 15 taape. So in one sense, they're not too smart, in the other sense, they're pretty shrewd. They won't reenter in a close follow-up situation. The same holds true for certain areas of net fishing. The first surround, if you're not gilling them, you usually can surround them and pocket the fish and bring them up. But if you manage to scare the fish, and have a lot of them hit the side of the fenced lines and, depending on the area, in some cases, if you come back the next day for the other few thousand pounds that are down there, they refuse to follow the same pattern where you can herd them into the nets. But rest the area for a couple of months, and come back, and they're not too smart again and you can catch them.

So the state has brought in a very good fish, a very smart fish, in some cases, and a very stupid fish in some cases. It's actually true by observation, if you know the size of the opening of the trap mouth, normally about "yeh" big so that the ulua and other fish can go in. And on a

dive it was observed that about 15 or 20 taape in the trap and three minutes later looking back, they managed to come through that hole and come out and escape. Okay, so somehow, that fish is a very shrewd fish. And this isn't fantasy, this is actual fact that we know by observation. So the hook fisherman, I think is at the largest disadvantage because he's trying to hook for his paka or other types of fish and the taape will normally steal his bait if they are in the area and there is very little he can do except try some of the tricks of the trade, which some of the other people do to catch fish.

Earlier, it was mentioned that this was primarily a shallow water fish, but for the fishermen that fish Penguin Banks and other areas, it is known that the taape is in excess of 300 to 400 feet of water out there. And they bite very frequently too. As I said earlier, the taape appears to be displacing the other fish in the grounds and what has been noticed by the net and trap fishermen is that the taape, as Mr. Oda mentioned earlier, is a predator. He has no special diet. We have found in the fish boxes of the catches of taape that you could see any type of fish including Kona crabs and I'm talking about the smaller Kona crabs, the small kumu, the small weke, oama, and things like that. He eats anything that is around and handy.

I think statistics show that the taape is not being caught too plentiful in Penguin Banks. I think that this may not be as accurate as the records show. I think that is because the commercial fishermen do not report taape catches from Penguin Banks or the deeper waters. Normally, they try to avoid this fish and if they catch a lot of the smaller ones they do not take these to market because of the low price. If they take in taape mixed with paka and other fish, they will have an effect on the paka and the other fish. Consequently, a lot of commercial fishermen, if he just has 40 or 50 pounds of taape and if it's not of good quality or size, he will either give this to his neighbors as cat food or something else because it would affect his price overall. Consequently, I think that there should be a "Jesus factor" put on to these figures because there is a lot more taape being caught than indicated and there's a lot more taape in the ocean bottom than the people can dream of. I think that the best people that can tell you about taape are the divers in the state because the taape are seen in shallow water and even on dives just under 200 feet, great schools of taape have been seen. What can be done? I think that is why we are here to try to bring out as much information as we can about the taape and hope that it can become a marketable and profitable fish. Unfortunately, the people of Hawaii like red fish and other fish, it's just very unfortunate that the taape is yellow. The meat in itself has very good texture although it may not taste as good as the other fish that we have. However, on the positive side, everybody in the state of Hawaii--commercial, recreational fishermen, and the consumers themselves--should realize that taape is being caught, commercially and recreationally, and it is an addition to other fish being caught. It should be a good source of food. And if all else fails, I keep saying we should dye it red and command a good price.

Clayton Yamada: I am supposed to give you an opinion of the recreational fishermen. Recreation by definition is amusement that revitalizes

and refreshes a person. So, how come everyone's mad about catching taape? Now, the recreational fisherman is basically just a guy who cannot go out to catch fish, make a living, and support his wife and four kids. What does he do to get away from home on weekends? He goes out fishing, right? Now, to find out how the sportsmen felt about the taape problem, I simply went and surveyed the fishermen and though I might joke about what I did gather, if you ask any offshore bottom fisherman, the taape is a problem. Now in my survey, I sent questionnaires to the hundred members in my fishing club and I received 40% response. This is just an informal survey of the club members and doesn't represent any hard specific or serious facts.

It should be given due consideration as to what a group of anglers think about the taape. First off, the survey shows that the taape was not one of the more desirable species of fish and in fact, very few anglers specifically go out to catch the taape. The taape that was caught by these recreational anglers was the by-product of fishing for other fish and more desirable species like the opakapaka, uku, akule, and menpachi. Most of the anglers stated that they did not want to catch the taape, and even made attempts to avoid catching them by changing their fishing spots once the taape started biting. So in a night's fishing, a boat would be forced to move several times to avoid the location where the taape was the most predominant fish. Now, while anglers did not consider the taape a rubbish fish, they did not rate it with the better eating of the fishes. Many felt that the lack of popularity was due to the fact that the taape wasn't a good looking fish. In other words, its color and shape. Food must feed the eyes as well as the stomach to be appetizing, and the taape was not one of the more appetizing fish. Now, this drawback, plus the fact that many people are reluctant to try new species of fish for food, are probably the two prime reasons for the low taape consumption. Nearly all of the anglers felt that more should be done to publicize the taape as food. They also indicated, contrarywise that they would like to learn more about catching taape and preparing it for food. So the first fact becomes evident: the taape is not a popular fish for food, and most anglers avoid catching the taape. It's like having an ugly girl with body odor that nobody wants to date.

When asked if the taape was a benefit or a detriment, most anglers said they did not feel that the introduction of taape was beneficial to all. In fact, they felt that the taape was preying on the juveniles of the more desirable species, such as the paka, uku, goatfishes, and crab, and they should be controlled. While no taape was found in the stomachs of other fish, the stomach contents of many taape were found to have in them crabs, other shellfish, small or young fish, and cuttlefish. And not being biologists, most of the species contained in the stomachs of the taape were not identified by the anglers, but it was indicated that in the areas where the taape were caught in abundance, the catch declined for the desirable paka, uku, weke-ula, menpachi, and crab. It must be assumed, here, that either there was an overabundance of taape and they were not allowing the other species to have their turn at the baited hooks, or the other species were being preyed upon by the taape and forced out of their normal locations. So fact number two arises: there is a decline in the better species of fish in certain areas, with an increase

in the taape being caught in those same areas, and something must be done about it. Again, a comparison. It seems like this ugly girl has a lot of sisters, and they're moving into your neighborhood, so you've got to do something.

Now, evidently, the taape are migratory to some extent, for large schools of them were reported in certain areas and these schools seem to come and go through the year. Most of the anglers surveyed caught the taape at night in waters from 90 to 200 feet, and little could be said about the conditions of the ocean floor at that depth. Very few anglers indicated that they caught the taape in water less than 90 feet, but this may be interpreted to show that the anglers themselves prefer the deeper waters. Offshore fishing at night is not very advisable close to shore, right? Many taape were also shown to have been caught in waters over 200 feet. In fact, some of the people who did respond to the questionnaire said they caught taape in more than 400 feet of water. This indicates that this so-called shallow water fish, suddenly spread out, not only laterally through the Hawaiian chain, but also vertically from the reefs to the deep island channels and undersea plateaus. The most productive areas reported for the taape (for the recreational fishermen) were the Banks, Portlock, Makapuu, Kaena and Barber's Points, and being sports fishermen, hand-line and rod and reel were the most popular ways of fishing. While the anglers did not specifically go out for taape, they did consider using hooks small enough to catch the taape, which again, is slightly better than coming home white-washed. Most common were the oio, or ulua style hook, of either size 22 or 24, and most of the anglers used 40 or 50 pound leaders, with an 80 pound main line. Usually, aku belly or ika (squid or cuttlefish) was used for bait. And remember, now, these fishermen were out to catch other species of fish and that same large expensive piece of bait caught the taape. The bait that caught the taape was actually meant for some more desirable fish that was better table fare. The anglers also indicated that nearly 50% of their bottomfishing catch was taape. And this alone averaged out to about 45 pounds per trip. A 5-pound opakapaka is a very desirable catch for anybody's dinner, but when the taape averages 7 to 8 inches and half a pound per fish, you can see why the anglers prefer not to catch the taape. The largest taape the anglers said they caught averaged about 12 inches and about 1 pound in weight. And the larger fish were generally caught in areas of Penguin Banks and Barber's Point, but no exact location was given, and no fisherman would probably do that anyway. It should be pointed out here that our club is made up of members who reside mainly or mostly on the windward side of Oahu, and this survey reflects their experiences. But now we have fact number three: the taape are small fish with big appetites who are everywhere around the islands in abundance. So now the ugly girl is a midget with a big mouth and can be found at every McDonald's and Burger King in town.

Who eats the taape? Well, our survey showed that most of the anglers felt that people of oriental or polynesian extraction were the prime consumers of the taape. Again, this can be construed in many ways--that the ancestors of these races are dependent upon the ocean for much

of their foods and a fish is a fish to them, or these races have a variety of exotic foods and trying a new species of fish for food does not seem to affect them psychologically as many other races, or it may be a socio-economic reason, or maybe they just know something good when they see it. After all, once a tourist starts eating anything, the prices go up, so maybe it's better not to say anything about it. When asked if their relatives and friends appreciated gifts of taape, the anglers said most recipients were thankful for the fish, but many of the anglers did indicate that they thought the taape was accepted in hopes of receiving something better next time. Well, who knows? The next time it may be menpachi, or uku or opakapaka, and anybody who turns a gift away may not have the opportunity to do so next time. Now, it's like the Orientals and the Hawaiians are taking out the ugly girl and every now and then she's bringing along her good looking friend so somebody scores, right? So, fact number four: certain races seem to eat more taape than others, but why is not known, and one should not refuse gifts of taape. That's why when we have the taape sampling tonight, you better eat some. Because next time we may be doing a workshop on caviar and you want to be included, right? Thank you.

Randall: Thank you, Clayton. Stan Swerdloff?

Stan Swerdloff: I've been asked to address the question of the commercial fishery potential of taape and this is really a paradoxical question. This is basically the situation as we understand it now. The taape has been recently introduced; the population is expanding; it has not yet reached its maximum biological potential. We see that from the spottiness of the population, as compared to its native areas like Samoa, Tahiti, where taape has spread out continuously over reefs. The population is growing; the demand has not been there. Now, basically, what we have is demand, low prices, and an expanding population, and you can expect that population to continue to expand until the market situation changes. And it's going to. As taape becomes more and more visible on the marketplace, the price will continue to go up. It'll never be as appealing as paka or onaga, but price will continue to go up. It will finally reach the level where it's profitable for the fishermen to catch it; it'll be worth his time--more demand, more effort, the landings will go up considerably, and then the population will start to decline. That's a paradoxical situation. If we never reach that point where the price exceeds what the fisherman is looking for, then you're going to have low effort and high populations. So, basically when you get down to the bottom line, you cannot predict what the commercial potential is going to be for this species. You have to look at it in a time continuum. If it takes a longer period of time for the demand to increase and the price to go up, then the taape is going to become more and more established, the populations will be larger, and then you will have a larger base to draw from when the taape does become popular. Now, if the taape were to become popular overnight, say the price went up to $1.50, $2.00 a pound, just overnight, you better believe the commercial fishermen will be out there displaying effort. And you will see a drop in population. No question.

Now, Brooks is going to address the local marketing situation, but I kind of want to preempt him a little bit by commenting on the market situation in American Samoa as I was there for a number of years developing a commercial fishery in that area. When I first arrived in Samoa, we had absolutely zero landings appearing on the commercial markets. Over the number of years as the fishery developed, the catch of taape, which in Samoa is called savongi, went up to 150,000 pounds a year. And it was the most popular fish on the market in Samoa, had the highest demand, prices averaged about $1.25 a pound on the retail market, and you have to consider that the Samoans' average wage was $1.25 an hour. And so, the demand was there, the market was there, it was a sought after fish by the commercial fishermen. Now, Samoa does not have the same amount of bank area that we find in the Hawaiian islands, but we did note that you know, making comparisons, diving and so forth, that the populations in Samoa were much denser than they are here. This is an indication that the taape has not yet reached its maximum. But, in a number of years, with the effort increasing, the population of taape decreased significantly; the landings went down significantly. Catch per unit effort dropped from maybe, 120, 150 pounds a night, down to less than 20 pounds a night. So it can be fished out. So, basically, you get back to the bottom line, the question of what is the potential; well, it all depends on the market demand. If that market demand develops overnight, then I don't think you will have to consider taape to be really in any more than an explosive phase. Now whether you'll ever see the paka and menpachi and whatever else you're worried about coming back in prior numbers, that's another question altogether, and it's a situation that I don't think we're going to really see. Thank you.

Brooks Takenaka: I've been asked to address the question of the position of the taape as far as marketing is concerned. Actually, the previous panelist has brought out most of the points that I was going to present. There really isn't too much for me to cover, but I'll go over them briefly. I'd like to add that in favor of the consumer, I'd say that the present situation, as far as the price for the taape, is such that it's in favor of the consumer at this point in time because my understanding, after discussions with the retailers in Honolulu, is when there isn't much fish available in general, the prices tend to be rather high. At this point, people are buying more taape. I've seen an increase in price at the retail level from about 75¢ to $1.00, to maybe $1.50, $1.75 for the larger, and that's about 6 inches and larger. We're looking at approximately 100,000 to 120,000 pounds being sold commercially this year, and that represents a value of about $60,000 to $70,000 this year.

As Mr. Farm pointed out, for the fishermen, the difficulty lies in the fact that taape tend to compete in the marketplace with other species. I think what you'll find, if one were to do a survey of the movement of taape in the marketplace, is that taape tend to compete a little more closely with opelu and akule rather than the other species. All the species tend to compete, and of course there are species that people prefer, but according to the wholesalers and retailers, watch the akule and opelu prices, and there'll be a subsequent increase or decrease in the price of taape. Another thing, as Frank mentioned, the local

people (at least, most of the orientals) tend to prefer the red fish because of its color; a lot of people have said that because of its color, they think that it's not going to be a very good eating fish. And to solve this problem, I think maybe more consumer education type of workshops like Sea Grant has had in the past might be useful. At the present time, taape are being sold in category size lots; the large, as I mentioned earlier, about 6 inches and larger, I think, usually go from about $1.50 to about $1.75, and medium ones from about 4 to 5 inches are about $1.25 to $1.50, and the smaller ones are usually sold as say, 3 pounds for about $2.00, or something like that. According to the dealers, what you'll find at the end of a given day, is that people prefer the larger stuff and they're always stuck with the smaller stuff; for the dealer, normally what happens is that they've already paid the fishermen for that portion of the taape catch, and oftentimes they get stuck with the small ones and they have to figure out something, what they're going to do with it. I would have to agree with Stan that if this type of situation--as far as what's happening now in the marketplace, with the availability of fish and everything--if this continues very much longer, it would probably help the taape fishermen, because I think more and more people would begin to buy this. Now, according to the dealers, this is beginning to happen. Early on, it was mostly the Polynesian people that were buying the taape, and the dealers have said that more and more Oriental people have been purchasing taape, so we're looking forward to more taape sales.

Howard Co: I came from Hong Kong, and right now I am with the State Aquaculture Development Program. I didn't mean to introduce myself and my name and history and background, but the reason I wanted to say that is because I'm an Oriental, I'm Chinese. Almost every week, or every two weeks, I go to Chinatown to buy fish. And I went to several fish stores and in fact, only recently, I noticed taape. Before I never knew what they looked like, what color it is, and later on, thanks to John Corbin's nice picture in his office, it's yellow and with four stripes of blue, beautiful looking, it looks like an aquarium fish. Who wants to eat that kind of fish? You're right. It's a pet fish. That's one very important, yet it's a unique drawback to market that particular species. Now, as I understand, the taape industry is facing a few, I would say, minor problems. One of them is that, which nobody can really do about it, which is saying the taape, is displacing some other fish species, which might be true, which might not be true. However, a good omen is that the taape production is increasing, and prices are going up almost automatically, maybe due to inflation, which I don't really know. Going up slightly from 75¢ a pound to about $1.50 a pound; and in fact, I just bought some taape with some other fish species. Because of my side job, I'm involved in a restaurant, so I tried to experiment, and right in front of me, is some kind of a fish with some kind of sauce over here--sweet sour, of course, and I don't mean to serve it now because it's cold already. I prepared it about two and a half hours ago and everybody is getting hungry to want to try Alvin Tachibana's fish, not my fish. However, I want you to look at those fish. I asked the fish store to give me. I said, "Choose me the three largest ones." And that's about it...it's battered already, you know. The color is yellow. Of course, any batter you want to use some egg in it, or maybe a yellow

color, to make it look rich, and then after that, you put in the sweet-sour sauce with red carrots, and black fungus and green bellpeppers, you have a sweet-sour gourmet fish which in fact, it might be taape, or some other species which I want you to try later on, if Alvin has cooking utilities. But, the reason that I said this is that one way to market this is proper education. For instance, I never saw that species until about a month and a half ago; even though I saw it, I would never buy it because of the color--it looks like a pet fish. But what if I prepare the fish like the way it is, and then ask you to sample it without telling you what the fish's name is, even the color of the fish. What I did is, I filleted the fish, and again, battered it. So this one looks like fried chicken, you know, a piece of fried chicken; bet you fellows like fish tempura. And this is only one side. Out of the fish I can make two nice fillets, very easy, because of the nature of the fish. I don't have to clean the guts. All I have to do is take one knife, and one cut and take two sides of the meat off, and batter it, and deep fry it.

They can easily be marketed as, for instance, like, fish fillets or fish tempura. And I still remember, not too long ago, I went to Orson's--oh, I'm sorry, anybody from Orson's market here?--and I ordered a fish. Of course, what they can do, maybe just batter it and make another new item on the menu, and the cost to them, I believe, is very, very cheap. It would be very, very cheap because of the low price of the fish right now. I'm not too sure whether the fishermen are really satisfied with the low price. We do think they are not satisfied. They would rather demand higher prices. As the marketing people try to push the demand up, normally, it would be advisable to use kind of a two-prong approach. That is, a push and pull approach. First of all, you can set up an in-store sampling and have a beautiful girl maybe dressed in a bikini if you want, and just pass samples out, whatever flavor you want in the supermarkets, without telling them that it is taape. Maybe later on you can tell them. I was told the quality was excellent, except for the skin, however, you can easily fillet it and even take the skin off, and make small fish cubes and let them try it. Once they like the flavor, like the texture, the don't really care about the color. When I say they don't really care about the color, it is the so-called psychological approach. In Chinese restaurants, in my restaurant, any fish we would like to buy, we can use, because of the cooking technique, we disguise it, we put a lot of color over it, and we make a black bean sauce. It looks so black that you don't know what you're eating anyway. But it tastes good. But the main point is that it tastes good. They come back and demand some more. The reason I say this is because I have been marketing, or promoting these Hawaiian prawns in my restaurant. At first people, some even tourists, come to a restaurant and they want to order that, and they look at it; it's a whole animal with eyes staring at them; they tend to get discouraged. But what you do is they trim off the nostrum which is a point around the "nose", and you take off the eyes. Trim the eyes out, leave the head on. So it looks better on the plate when the head is on, because you can put four pieces of prawn, if split open, it becomes eight pieces, and with the head on, it fills up the whole plate! But there're only four pieces. You see, saying you do like this, fish filleting, instead you give them all fish fillet

cubes, you can put in some other so-called garnishes to make it look presentable, so psychologically, they feel much better, and they will try it.

So, all the fishermen, don't be discouraged and say, "Again, I get this trash fish!" Try to even set up some kind of an organization to promote this fish in-store sampling, and even say like in the Chinatown fish markets, at one corner, like some mornings, it's especially busy, I know, sometimes you go too late and no fish, no nothing, almost. That's the time when you can really sample, let people try, get the people to try and taste those fish. Tonight, about 5:30, I tried the fish, not the steamed fish, the Chinese way, in the ginger/onion sauce; it tastes just great. The texture is great, and of course, after the Chinese touch, the original fish flavor is gone, so, you know, it tastes great. The reason it tastes great, you know, is the sauce, in fact; it's not the fish. And of course Alvin will be pretty soon preparing some of his favorite recipes and I don't mean to discourage you not to eat fish, but try the gravy only.

And also there's another way we can promote this. We should go to the chefs, especially like Oriental restaurants. And because of the low price right now, I think the chefs, if you present them in the right way, right manner, first of course, you have to give five to ten pounds free, as is usual practice--let them try, and then, you know, it's so easy to prepare, to fillet them, or to saute them in soy sauce in the Japanese restaurant, lot of sugar, lot of soy sauce, and the color, it won't really show, I bet you, because you put a lot of shoyu, the color won't show, you put in some green onion, chopped and diced, and it won't show, the yellow color.

And also you can go even approach the so-called tourist restaurants. Again, give them samples free, even fillet them for them, because it's so simple to fillet the fish; you just cut them up, and let them try it. Give them free so let them try it on the employee's menu and letting them try it is one way to encourage the chefs to start demanding that particular beautiful fish, taape. And they can easily also call it a fresh island catch, by using that kind of magic phrase, to attract the tourists' attention, because tourists, they are here and some of them, they come to my restaurant, they say, "Oh, your fish is just beautiful, great. It's better than the San Francisco fish." But then I tell them, "I'm sorry, I import most of my fish from San Francisco." And I say, "It's a fresh-frozen fish." You see, so, it's really how you prepare the fish. That's, I think, one of the keys to readily pull the demand up. And when you have the consumer to help push the demand, taape pretty soon would become one of the best sellers in Honolulu. So, Alvin, I think, has the problem pretty well solved, so I'll let Alvin continue. I hope he has some cooking utilities and we can heat this up--let you folks try this fish.

Takenaka: Howard, you sound like you could make tilapia taste good.

Randall: Dr. Richard Grigg, Hawaii Institute of Marine Biology.

Richard Grigg: Basically, what I wanted to indicate (on graph) is the catch records of taape since 1969 and the present time. Of course, we've heard tonight that the landings have gone up to more like 60,000 pounds per year, and this escape phase on the curve is very typical of the species which have been introduced in various places, like in the Great Lakes, or when the Suez Canal was connected between the Red Sea and the Mediterranean. Introductions of this kind often take about 20 years before taking off, and by taking off, I mean, what you're looking at in this figure--rapid increase which is exponential in character and of course, we don't know when it's going to stop, as Stan Swerdloff indicated. I put this up because it's hard for us to digest numbers as we hear them up here, so it's very visual as to what's happening. So we've got a problem here. We've got a problem of a pest fish, it appears, with very low price, there's too many of them, and what are we going to do about them? What needs to be done? Well, I've been asked to talk about research and management approaches to this whole problem of taape. Originally, Steve Ralston also of the University, was to talk on this subject, but unfortunately there was a death in his family; he just returned from the Northwestern Hawaiian Islands where he was doing research on snappers and groupers, and he couldn't be with us tonight. So, I was asked to pinch hit for him and so I'll do my best. I planned to rather wing it because I'm not prepared to talk beforehand about what needs to be done. I'd like to emphasize, what really the purpose of these meetings are. Basically, the Sea Grant program, through its research, education, and advisory services, is up there to generate information, to disseminate information, and to find out what the problems are in the community. And that's what we're doing tonight. We're finding out what the problems are in the community, we're learning what you know, and we're trying to translate those questions into solutions by taking the problem back to the University and doing research. And so, hopefully, the transcript, which I think contains more information on taape than any one of us had in their brain before coming here; certainly I knew very little about the problem. I dive, of course, and I see the fish becoming more and more abundant and I watch. I see what it's competing with, but I've learned more sitting here the last hour than I've known in the last five years diving just watching the fish. So I think the idea here is to take the body of information that is being generated to try and identify what the problems are, take those problems back to the University and I'm not so sure the University is the only place; in fact, our friend Howard Co here seems to have so many good ideas, perhaps we ought to recruit you to do some of our advisory and consumer education work at the University of Hawaii. I was very amazed at some of your innovative suggestions as to how to market this fish.

There are about four steps that need to be done. First of all, you need to identify the problem. Second you need to gather information, or at least identify information gaps. We need to do research, develop research programs at the University, within the community, what have you, and then, finally, implement the recommendations of the research efforts and whether they are actually scientific studies with biology and ecology, or whether they are economic studies, or whether they are consumer education studies, the problem is disseminating the information to the consumer.

Basically, educating the consumers so he and she appreciate the value of this fish.

I've been eating taape for 15 years and love it. It's absolutely terrific, and I think we'll find that out, I hope we will; I hope you all agree when we taste a little bit later. But, getting into the meat of what the problem is here, we've heard that the price is too low. So how do you get the price up? This is consumer education, clearly. Perhaps we can dye the fish, or disguise the fish, we can do something, but we've got to do something about price, and this suggests an information gap on the economics. So an economics study is clearly suggested by one of the major problems. Another problem is that we have heard it's a pest fish, it gets in the way of catching opakapaka, kumu, or what have you; there's too many fish, so we need to do research on the population dynamics of the fish, and this includes studies of predator-prey (relationship); we've heard a little bit about what this fish eats, but it strikes me as almost appalling how little we do know. I think the fishermen, the fellow who's out there in the ocean and who's catching the fish often, in fact, know more about these problems than scientists do at the University. What we need to do is take the information at hand, the observations of fishermen, utilize that information, design the research, and find out what the behavior patterns of the predator-prey dynamics of the fish are. Another thing we need to do is study the growth, recruitment, and mortality of these fishes. Now, Swerdloff indicated we don't know what the ceiling, the maximum sustained yield, what the upper limit on this curve is. The way to find out is to estimate growth, mortality, and recruitment. Now, the most difficult thing here is recruitment. These things continue to increase, and we can go out and measure growth and calculate if we know, for example, the size of the population. We can calculate the maximum yield as a function of age of the fish, if we can calculate growth and mortality. But before we could tell how much fish in total we can take out of the population, we have to know recruitment. So recruitment is an extremely important parameter to know. And of course, I mentioned we need to know growth and mortality. The other way to manage a fishery classically in marine biology is to look at the relationship between catch and effort. And that, interestingly enough, produces a very similar shaped curve. If you plot catch as a function of how hard you try to catch the fish, we'll call that effort, you get the similar kind of curve. Over here where you're not catching any fish because you're not trying, that is, effort is zero, so catch is zero, that defines this point on the curve. Whereas over here, you're trying so hard you've caught every fish in the ocean so the catch is going to be zero there too. This kind of relationship between catch and effort therefore defines the point on this curve where maximum sustained yield occurs. So as far as biology goes, if we study recruitment, growth, mortality, catch, and effort, as well as the predator-prey relationships (the feeding behavior of these species) we can begin to get a handle on what to do as far as management. But this gets back to the problem of too many fish.

Once we've got all this information, what do you do? Well, it looks as though we want to catch them. We want to get out there and eradicate

them not with poisons like you do with mongoose or mosquitoes because these are valuable fish. This is a commodity that's useful to the consumer so we want to generate a fishery. That takes us back to this problem, low price and therefore the need for the economic study. This is basically what I've been able to get out of this discussion tonight. It's just my view and as I indicated, at the beginning, the purpose of these meetings is to get your ideas. To hear what you think we ought to do and from that we can build research programs that will better solve problems that are relevant to the state. We are trying to do this now on the Northwestern Hawaiian Islands. We are studying turtles, monk seals, birds, and taape that we found all the way up to Laysan Islands, which is two-thirds of the way to Kure, the last island in the archipelago. But we have a lot of work to do and clearly the taape problem is part of that. I'd like to sit down now and open the discussion to the next section of this workshop which is basically what you think. Thank you.

Randall: Thank you, Rick. Are there any questions from the audience?

QUESTION AND ANSWER SESSION

Q: Possibly, an indirect way of trying to see whether there is competition or displacement of taape vis-a-vis the other species is that we assume that fishery effort remains constant. With the taape catch increase we'd expect that catches of opakapaka, kumu, and onaga would decline over time. That may not be the situation because the fishermen might try a little harder or fish longer so that they get their average amount of opakapaka or onaga by increasing their efforts. And if the effort was constant over a sufficient period of time, you might get some indication whether there is a displacement effect by taape or not. The model could get a little complicated because there possibly could be a niche that was never filled. It could be no competition of this source, but I rather doubt that happens. And it could be even more complicated because taape I heard eat fishes and crustaceans. You got so many fishes that have commonalities in their food sources, so perhaps if taape is competing with opakapaka or kumu, we might have some sort of a known effect on papio or uku. But generally, I think if fishing ever stays constant, we can make that assumption and if you didn't see any decline in respective catches of species that people think are being displaced, then the hypothesis of a filled niche may have some validity.

Randall: Thank you. I just want to make a couple of comments here. I rather doubt that taape are filling a niche that existed or hasn't been filled till they arrived. But I think especially from the comments we heard this evening from fishermen and so on that it is making inroads into the population of other fishes. Just which ones and to what extent, it's very, very difficult to know and it will always be difficult. One thing I want to point out is that the taape is a carnivore; so before it was introduced here, one of our dominant carnivores on the reef were moray eels. Hawaii has, I think, more

than 40 to 50 species of moray eels. They are certainly not considered good fare on the table. They are difficult to catch and fishermen sometimes cut their line and let them go free rather than bring them into the boat. If the taape has replaced the moray eel, I'll say we are ahead on that game. On the other hand of course, there are things like the kumu and the opakapaka which is the other way around. How can we get at this? Well, I'm going to address a question now to Henry Sakuda on this. The Division of Fish and Game has made transects at various locations around the islands of the fish population's actual counts. I wonder if Henry can tell us whether he has seen an increase in the taape coincident with a decrease in some other fishes like the kumu. Henry?

Sakuda: We have conducted quite a number of transects around the islands of the state and up in the Leeward chain. Actually, we've seen an increase in sightings of taape throughout the islands and increase in the abundance of taape noticed around the islands and around inshore reefs where we dive. But we have never been able to actually compare and come up with factual statistics on any reduction of other types of fishes like kumu. The kumu is always there at certain places that are commonly used by other divers. The fish is there or it is not there because other divers have beat us to it. It's there again when we go later on, maybe several months later. I can't say right now whether there has been a decrease in the other fishes from our transect information. If I may, Jack, may I introduce another question here in that we have been discussing this evening about the problem of this taape. We've identified two problems on the board there, low price to the commercial fishermen and too many taape on our reefs. Perhaps we should look at the problem in a little different light in that maybe the problem is to reduce the problem to the fishermen--that is, what is the fisherman's problem when he's out there fishing with taape. With taape the problem is that taape takes the line in place of a more desirable higher priced fish. Evidently, he can't use the fish--that is he wants a higher price, he wants more money for taape. Why raise the price up? Why don't we let him take more? The reason why I say why raise the price up is that to the consumer, you raise the price up it gets out of hand and he can't buy the fish then. You need a low-priced fish for people to buy. Again this is psychological, I think there's a lot to do with Mr. Co's strategy in psychological marketing practices. What we need to do is to satisfy both parties. We need to keep the price down for the housewife or the person that goes out and buy the fish so that it's reasonable. We don't want a fish that costs $10 a pound like we foolishly buy sashimi for during the holidays, but what we want to do is to be able to buy fish at a reasonable price. A fish that we want to buy not because it's there, not because it's left over and nobody else wants it. This is all psychological again and I agree very heartily with Mr. Co that it is psychological. There is a need for a marketing study for ways of presenting taape, diversification of use of taape, increasing the familiarity of taape and making it more a local fish. If you tell people that it is a good fish, that it tastes good, that it is accepted by everybody, they might start believing it. We gotta keep the price down though. Generally, sell more and increase the demand is what we need

to do. I do personally question the part where we should raise the price of fish per pound. This actually takes it out of the consumer's hands. In this day and age, maybe it will be an unusual fish to be so reasonable in price. We used to buy fish pretty cheap, but now pretty hard. Thank you.

Randall: Any questions?

Audience: I'm a deep sea bottom fisherman. We used to catch 300 or 400 pounds of taape a night with maybe 100 opaka and uku. When we didn't have the taape to contend with, our catches were much higher with the fish. Now higher priced, our regular catch goes down and the taape catch comes up. And when you bring taape in, you get 25¢ to 30¢ a pound for 300 pounds of fish. You can't live. You say keep the price down, how can we keep it down when you have to work for it. It doesn't make sense really.

Audience: It's not going to do you one bit of good if there's no demand. And to get the demand, we have to get to the public. One of the ways is through the newspaper. If you print how to use the fish, how to prepare it, and because of its low price, you'll spark an interest in the average consumer. That's when you can go out and worry about flooding the market or getting a higher price. Educate the public first. You just can't flood the market with an unknown quantity.

Randall: I'd just like to comment on the way a fishery was born many years ago when the fresh-frozen fish fillet situation came into being. In the New England area, there's a very ugly scorpion fish, which if you put it on the market, no housewife would think twice about buying it. It's just a terribly ugly spined fish. When they called it the rose fish and they cut fillets from it, overnight there was a fishery for this fish. One little trick like that can often make a big difference.

Audience: I'd like to get back to Frank's comments. I'm also a diver who is not a fisherman; I also see taape exploding in certain areas or I used to see a lot of other fish. But I also see certain areas where there are still good distribution of kumus, wekes, and little pockets of taapes there for three or four years and they have not exploded. So I'm wondering why they explode in certain areas and don't explode in other areas.

I read a book on Tahitian fishes which (taape) are related to; they also have weke, they also have kumu, and they also have papio, virtually the same species that they have here with some minor differences. Perhaps we can gain some inferences as to what could happen in Hawaii by studying Tahiti or the Marquesas. Where is that balance?

Randall: I just want to mention that 30% of the reef and shore fishes of Hawaii are found nowhere else in the world. So they are a bit different from Tahiti. Question in the back?

Audience: I think the purpose of this workshop is to hear experiences that they have had and what we're going to do--what needs to be done. It seems to me that what we can do is come to some positive action. I think Division of Fish and Game doesn't have an education program and I have been in contact with Kenji Ego. Let me give you an example. Several years ago, there were quite a few people into catching crab. The first time they caught 63 crabs, 27 of them were hapai (berried). I told them "this is not the kind to catch." And then the next day they went by themselves and they caught 57 crabs. None of them was hapai. The point I'm trying to make is that education is important. Also, several years ago pineapple was going to phase out but because they taught the Japanese how to eat fresh fruit, the companies are booming and they are sending fresh fruit. So what I'm saying is the introduction of the taape was done by government. It is the responsibility of the government to see how you can educate people. But one thing you could do is to introduce a law or bill so that the Division of Fish and Game has the money for educational purposes. According to Kenji Ego, who is now the head--at the time when he was handling the Division of Fish and Game, the exact words that he used, was that he had to "cockroach" money here and there to be able to bring a group of people to research a problem. And the government has a responsibility in having an educational program in Division of Fish and Game. Now you use Sea Grant and Marine Option Program and many of the other programs to educate people concerning taape. Now some basic things that we can do, we don't even have to get sent any money for it, is to have what the senior citizens did in the Big Island--on "Let's Go Fishing"; people went out, catch fish and they had a cook out. The point I'm trying to make is that if you have a cook-out and let the people taste and see how it's like I think that it will have a definite effect to introduce people to different kinds of fish. Those of you who have never been to Molokai you should go to Midnite Inn; if you have been to Midnite Inn you know that you can cook manini even with guts. I've even seen tourist people eating manini with guts inside. As far as the taape is concerned, if you are going to raise the price so that you can get better money to the fisherman and ultimately to the consumer group. I know what I'm talkin' when I'm talking about fishing. We know what it's like when ulua was 10¢ per pound and weke was 15¢ per pound. But weke was easy to catch; the idea was to dry it and make it with sesame seed appear to be something else and they have all different kinds of taste. So maybe we can do something else for the taape. I think that there are various groups in the community, fishing clubs, and government if they have a responsibility and I always feel that those of you who have introduced taape--like the tilapia and the topminnows in Maui. I think that the point I'm trying to make now is that the taape has to do something positive. The positive thing that we can do now is through having more funds to teach people.

Grigg: I'd like to comment by agreeing wholeheartedly with the last statement; I'm glad to hear that. I think that is the purpose of why we are here. What we want to hear is what you think. You've heard what we think and you've heard how little we know. So let's steer the conversation, the discussion on what you think needs to be done. Hopefully, out of this evening can come action. Whether it's an education program at

Fish and Game or whether its the Chinese touch that our friend Howard Co has so beautifully described. It's a new way to handle the problem and this is research and that's why we are here. Thank you.

Audience: I'd like to express two points of frustration regarding this issue. One thing I hear tonight is education and how to teach the consumer how to eat this junk fish. A couple of years ago, I remember hearing about too many sharks and we were going to have consumer workshops and everything was going to be rosy. I think that we should evaluate that consumer education program before we plug a lot of governmental funds into another consumer educational program. I don't even know for a fact if that education program even worked for shark, but it sounds similar in that shark is a pest and that here we have got another pest. Well it's a pest to the fishermen but it's a boon to the consumer. I don't even know if it's a problem. Another sense of frustration I deal with in being a fisherman and not a scientist is this idea of maximum sustained yield. It seems to me that it can be a situation where if we don't know the maximum sustained yield already of paka--if we do know that I stand corrected--but perhaps our paka is diminishing and this fish (taape) is moving in to fill a void. Maybe we should study the maximum sustained yield of paka first and get some hard data on this fish and tuna fish and our other real money fish. Do some really basic research on this. I don't know that any of this has been done.

Randall: I just want to comment on the complexity of working out for many valuable species of fishes that we have here, just the population dynamics that we are talking about. One little part that has not been mentioned here, we are talking about competition on the way for the existing species that we see, whether it be in 500 to 600 feet of opakapaka, or up in the shallows with kumu. All of these fishes, have a pelagic larva stage, it's planktons, it drifts off to the open sea, that's how they got here in the first place. Now there's competition out there too. You would never think, for example, that taape would be considered a competitor with surgeonfish (like the manini) or a fish called uku, because they are plant eaters, they're herbivores. And yet out in that open ocean, the larval surgeonfishes and larval fishes are carnivores, so they are eating the same thing as the larval taape. The things going on in that pelagic environment we can't even begin to guess. So, this is just a little insight into the problems of population dynamics when you have a very complex reef and shore fauna like we have here in Hawaii.

Yamada: You know, I think that part of the problem is right there. He (audience) said that they are junk fish. That's the problem, it's not a junk fish. It depends like Mr. Co said, how you cook that fish, it's delicious. If you cook that fish properly, it's a delicious fish. Now maybe the problem is--has any research been done on why people do not buy the fish and they don't want it, why there is no demand. I think that if you solve that problem of why, the demand will be there. That will be part of it, but it's a good eating fish. It depends how you cook the fish. The problem, see, we just last weekend had the fish dried like akule and it's delicious. I've got fellows back there, that

had it with me. It's good dried, it's just how you prepare that fish. It's still a good eating fish.

Co: I'd like to address the first question about the consumer education. I think it's very important. Taape is not a junk fish--it's a fish. Nothing's different except for the color; how can we disguise the color? When you say consumer education you maybe were thinking about a lot of government money going into a consumer education program. I think that there are very cheap ways of doing that; such as one gentleman mentioned Bruce Carter's "Let's Go Fishing." You can easily approach them and they can easily arrange a taape cookout, it can be done very cheaply. They also have an education section, where they will be glad to write some recipes and they also, you know, such as point of purchase brochure, a very simple one and they can also write some instruction sheets on how to prepare the fish to the various retailers who will be glad to pass them out.

Audience: I truly feel that the state has the responsibility, but there's no point in crying about spilled milk. We can have a positive action, let's do something that we can do. For example, those of us who are commercial fishermen, a certain percentage of what we make are put aside and let the government use it for advertisement. Four years ago, we never heard of President Carter, I'd never heard of him until he went on a very strong campaign and all of a sudden we voted for him. Now some of us realize we made a mistake. I still feel that education is the key.

Takenaka: One of the things that we can do is to work with the Sea Grant Program and approach organizations like the Honolulu Fish Dealers and see if we can work something out.

Audience: I've heard a lot of talk about consumers and stuff like that but, you know, I have been in business for a long time and I'm retired right now. But the first thing when we had a new product, we advertise so we can help to get the message across. Now the people don't know what the new product is and we have to tell them. In the case of taape, it's a very good eating fish, I eat it myself. Covered with mayonnaise, you don't know whether it's taape or opakapaka. It tastes better than opakapaka. Maybe I'm dragging it too long, but the price will come when the demand is great so the law of supply and demand will work right there. We have got to tell them. Advertise, where is the money coming from? Somebody has got to organize things--we can say "Fish of the month--Taape"--put that in the markets and all around. We have advertising agencies that can tell us what to do and I don't see anybody talking about pushing it like that. We have a new product and we have got to advertise, and we have to let the people know; if it doesn't take, too bad, but I'm sure it will take because this taape is a meaty fish. I don't fool around when I go fishing, I go for menpachi and taape at one time. If I catch menpachi, good, and if I catch taape, okay. I don't say taape is no good, I catch 'em. If they are about 6 inches or smaller, this is giveaway. Six inches or larger, I'll keep. You know that you can play a game like that and enjoy it. Fishing is to be enjoyed, we are recreational fishermen. So let's enjoy fishing and if

you commercial people have a problem, advertise and sell your product; otherwise suffer in silence.

Audience: I'm a fisherman myself, and I'm not a commercial fisherman but I'm proud to say that most of you are fishermen in here like I am. I'm not a youngster to begin with and I've come up in the years looking at fish in the markets. I have to buy fish only when I had to because most of the time I caught my own fish. You think of whatever fish you want and I could catch it. And I knew where they lived and where the holes were and I could still find them today if I wanted to because I'm not a deep sea diver and I don't go by the tons when I catch it. I catch enough for myself, for the family, and the kids. But look around when you go to the markets, all of you. How many of you noticed that in the many years past you could find opelu, akule--they were the cheapest fish in the market. Today you go in the market and you find manini, mamo, kole--the fish you used to catch 'em and throw them away, the white eel. You name it, even the most skinniest kind of fish... that yellow fish they sell for 85¢ per pound. And I often say, who in the hell buys this fish, it's so skinny and so thin that by the time that you scale them there isn't any more fish. But remember now, how did these things come to the counter? Now you don't see anything thrown away but someone said that the law of supply and demand is the thing, economics tells you that when there is a demand the price goes up. But how do you get demand? Well, take the fish when you catch 'um and bring them to the market, sell them, and make whatever you can off of them. We seem to show so much concern that this fish is taking away all of our little kumu babies, opakapaka babies, whatever you may think, the crab and lobster babies. And yet we feel that we don't feel that we have to go out and catch these guys and deplete or cut down the population of this fish. Who is going to do this? The University of Hawaii? I don't believe that they can do it. All the advertising in the world cannot do it. Let the taape live, give it 10 more years and you will find that the opakapaka, the kumu, and lobster you looking for--you will have none.

Audience: You have heard that the taape have a wide depth distribution--30 feet, perhaps up to 400 feet. Fishing pressure is one way to do it. Gill netting is quite efficient but you can only set gill nets to certain depths. Trapping is quite efficient but you can only work traps to certain depths. If you really concentrate fishing pressure on the near shores, the populations really put a heavy dent in that. What about the offshore components, do they mix? Do they seed in? Can we actually expect fishing pressure to reduce the population to tolerable levels? I have some questions in my own mind whether we can or not because of this wide distribution of where the thing lives.

Grigg: I'd like to comment on several points made about our increasing fishing effort. A gentleman over here asked about scientific research and so on, maximum sustained yield. It turns out that Steve Ralston, who I am speaking for tonight, has done some research on opakapaka and other snappers and he has found on this curve plotting catch against effort, that we are way over here. The catch is less, but the effort is high. It may be that the taape is interfering with the catch, but it may be that we are working harder to get the same catch. But it may also be

due to simply intensified fishing over a long period of time, which typically creates low catch per unit effort. So we are doing research and clearly more needs to be done. And I think generating a fishery is one form of research. The question is can we catch them, can we put a dent in the population, can we do it? Well, let's go out there and do it. At the same time, get the price up.

Audience: In Hawaii, can we realistically talk about yield component or catch component when we have three factors going into that. First, we have a commercial fishery, next we have a recreational fishery which is a question mark and there's natural mortality. And I think that that question mark is significant. Can we realistically talk about the yield or the catch of that fish.

Audience: He asked about fishing as a challenge to the population. There are a lot of old timers here and they have seen the taape a lot longer than I have, but a lot of people have told me that the taape move out deeper as they get older. But I haven't seen too many big ones in the shallow myself. Frank, what do you have to say about that? What is your opinion?

Farm: I think it's a matter of definition. How do you define shallow or deep before I answer you?

Audience: Okay. You are saying that you can set traps to a certain depth. I would say that since you can fish traps or nets more extensively than hooking by hand, that will be the definition of shallow.

Farm: Well, I know people who are trapping at 180 feet, so that's pretty deep. The same guy is also trapping at 40 feet, that's pretty shallow. But I'll try to answer your question. Eight feet or less, the taape size is smaller. The closer you get to shore, the smaller--it is a factor in certain months like when all the butterfly fishes come in and everything else close to shore. The small taapes run at that time. In certain areas like Barber's Point and the dead coral grounds, you will find a lot of the small ones like the oama, like the baby weke breed in that area and they are all about this size. Granted, you can still find some of the smaller ones in the deeper water but this is what the problem is for the hook fishermen, they cannot differentiate size when they are trying to hook a taape. I think that the net fisherman has a good advantage because--I'm talking about the net fisherman that dives when he nets, not the one that just lays them--he observes his catch before he catches them. Consequently he does not catch the smaller taapes, almost never because that is a non-feasible catch, as far as economics go for that particular person. But generally speaking, all taape in shallower water--correction the smaller taape--does not eliminate them from being in the deeper water. I guess what I am really saying is that you don't find bigger ones in shallow water but generally you can usually see the smaller ones in the shallow water.

Audience: What everybody is talking about is creating a demand. Would there be any kind of market for exporting outside of the states?

Audience: Stan could tell us to send them to Samoa.

Audience: I'd like to ask the audience. Is there really too many taape in Hawaii?

Farm: It's too many in the sense that if you bought too many or if you caught an abundant amount of taape and if you happen to coincide with other catches, taape has been sold to fishermen for 25¢ or less per pound. Now for the effort expended, yes, there are too many taape for that kind of situation. I agree with the other people that have their comments. Don't think that the people I am talking about are negative in this situation. The taape is here to stay, we acknowledge it as a commodity, we realize the basic things about advertising. We have tried this thing with cooking recipes. We went with Tamashiro Market and "Let's Go Fishing". It needs a wider scope for branching out. We have tried this in past years and it wasn't enough to do the job and the fishermen that I am talking about. They know that the taape is there and they want to catch it and we are not crying about the fact that it displaces the weke; we mention it for the scientists and research, for what value it is to these people. We know that it (weke) has been displaced and that's tough. But if it can help to mention that it has been displaced, then that is why we mention it. Accept this fact because it appears that there is nothing that we can do. We would like to market it and we feel that it is a great commodity. I like to eat taape, I eat it whenever I can get it. Okay? Rather than throw it away or anything else. It's an education program. We all realize the color is wrong, it's a beautiful fish but it needs something greater than us saying these basic things. We have said it five years ago, three years ago but we haven't taken the action that makes the difference and we hear the same things that we heard a couple of years ago. The commercial fishermen would not catch it, would not flood the market to get 25¢ per pound. That is like telling you to go to work tomorrow for a half or a quarter of what they are making now and it doesn't make sense for them to do it. So the fishermen, don't look at them negatively, they know this commodity is there. They are very interested in making it a worthwhile commodity to feed the public in the state of Hawaii good nutritious food. And this is the whole gist of why we are here and we can add to it.

Randall: The comment that was made about why not consider exporting. That idea is not farfetched; that is something that we should think a little more about. In the San Francisco Bay area, there is an abundance of small sharks that are virtually worthless but they make good money shipping them all the way to England. Here in Hawaii, we know that we import a lot of mahimahi from Taiwan. So you see, there is a great differential in quality and taste and so on. Cultural differences in different parts of the world. Sometimes export is the answer.

Audience: I think promotion is the name of the game, so to speak. Malaysian prawns become Hawaiian prawns, then somebody said Royal Hawaiian prawns. Through advertising leaflets and supermarkets a demand was created. Now, I'm wondering about the Samoan experience. Now, I presume the taape is native to Samoa and has been in Samoa. It hasn't been on the market. How did Samoans get interested in eating taape?

It's so prolific in terms of being able to catch so much of it, presumably they're catching so much of it in Samoa. How did they start marketing it in terms of educating people to eat Samoan taape? Maybe we can learn something.

Randall: In California, there is a fish that is a relative of the akule. The official common name was horse mackeral and nobody wanted to buy anything called the horse mackeral. They changed the name to the jack mackeral and this took off over night and it became a major fishery. Any other questions or comments?

Audience: I'm wondering whether or not taape is served with a psychological approach in the school lunch program or any of the institutions or the senior citizens program.

Randall: That is an excellent idea. Does anybody want to comment on that?

Audience: That is the best thing that I've heard tonight.

Sakuda: I'd like to clarify one point. I am not asking the fishermen to work harder or catch more taape purposely. Because you only have enough room in your icebox and it's foolish to put taape in place of opaka or onaga, and that's ridiculous. It seems the resolution to this thing is more demand, the demand that would bring use for the fish. It's not where you go out and fish this. We all agreed that we have no influence in what takes your line down there, what takes the hook or the bait. You bring the fish up and you keep 'em. After all, it's hard work. We want to keep a steady supply in order to keep the demand there but we should at the same time try to keep the prices reasonable.

Farm: Over the past 25 or 30 years I've been catching weke, kumu, and other fish from certain grounds--and I see some familiar faces in this audience that I know as net fishermen and trap fishermen. The holes for these fish are the same types of grounds that the taape loves--the ledges, in the sand, and other types of places that the menpachi hangs around and everything else. Sure the papios come around and they want to eat the weke. However, we were able to catch and I can stand here and say that I was able to catch fish from these holes consistently, year after year and they would replenish. I know holes or areas I have in my so-called fish book that I only tell my son today that it's a story: "There is where in 1950 something, your father and a couple of others caught so many pounds of weke, so many thousand pounds of weke--8 or 11 months later and did the same thing and this repeated itself as history. To me this is factual evidence that where the taape now exists in great abundance that's how the weke schools used to exist in great abundance. Then I think that maybe the scientific community better accept it as fact that the taape does displace or replace these other species of fish. There are any number of people that can testify to these same findings that year after year prior to the introduction of the taape in the state of Hawaii the weke and kumu population was consistent and giving allowance for fishing pressure and fishing effort; you can't compete with the taape. You would expect a little reduction, little

better methods, a little more sophisticated methods of netting, and trapping with the aqualung, sure. But there are areas that very few fishermen can venture to except the more proficient commercial fishermen. These are in the deeper waters, and these guys explore these areas and fishing pressure isn't as great as it used to be 30 years ago in these deeper waters, but the taape is there. The taape does in fact displace or replace, whatever you want to call it, they are the new tenants of these areas in the greater majority. I think that fact has to be accepted and worked from to try to improve the situation. I know people in this room that could flood the market; they can bring in 20,000 pounds tomorrow and the next day, if people would pay the right price for taape.

Audience: What has been done to educate the public about taape?

Takenaka: An effort was made by the Sea Grant Marine Advisory Program a few years ago. What they did was they had a recipe contest. As it turned out, taape dishes took the first three places. Another interesting point is that the first three places were dishes prepared by some students from a home economics course at the University of Hawaii in food preparation.

Audience: Frank (Farm) was saying that they've tried those kinds of things in the past five years but my father-in-law watches T.V. a lot and he noticed that the sale of a lot of products is directly proportional to how much they can advertise. Whether the product is good or not--especially like cereals and things like that where they have an effect on kids--the advertisement really makes it. Maybe advertisement (for taape) hasn't been done in big enough ways.

Takenaka: That could be true. I think we have to be a little more aggressive in our efforts.

Co: I just have a few comments. I think in light of the seriousness of this "problem", I think something definitely positive should be done. As in the situation with the gentleman in the back with his sad story, there might be more and more sad stories if nothing is done soon.

Grigg: In the case of the Kauai fishermen with catches to 100,000 pounds, this sounds like a lot of money could be made. Obviously the prices wouldn't hold up if you dump that kind of poundage on the market. So it clearly indicates a need to look at the economics of what dumping large loads on the market does to the price and also suggests the need for looking at the potential of freezing, or fillets, or exporting the product. I think tonight you've given us a lot of ideas on what needs to be done. You've helped us identify the problem and hopefully, we--meaning all of us--can turn this around into some action and provide some solutions.