

MEMORANDUM

TO: Council, SSC and AP Members
FROM: Clarence G. Pautzke
Executive Director
DATE: September 17, 1993
SUBJECT: Full Utilization



ESTIMATED TIME 2 HOURS

ACTION REQUIRED

Discuss full utilization and discard and give staff direction on further work on this issue.

BACKGROUND

In June during Council consideration of Pacific cod allocations by gear type, a motion was made to adopt an Advisory Panel recommendation that stated:

"Prohibit the discard of cod in all BSAI groundfish fisheries including cod taken in the directed cod fisheries and cod taken as bycatch in other fisheries. Prohibit the discard of all groundfish species harvested by any gear type in the directed BSAI cod fisheries, excepting arrowtooth flounder, squid, and species in the "other species" category."

During discussion, the motion was expanded to include all groundfish fisheries in all areas. The Council requested a discussion paper for September to help in defining goals and alternatives. This action was timely on the part of the Council and its AP because bycatch, discard, waste, and full utilization have become watchwords of the 1990s and a rallying point for many interest groups concerned with the health and long term well-being of the ocean ecosystems. Waste and full utilization helped shape the pollock roe-stripping dispute that began with foreign joint ventures in the mid-1980s and continued through to the ban in 1990. Bleeding of excessively large tows also has been an issue off and on since first reported off Dutch Harbor in the mid-1980s. Waste and discard were central themes in the inshore-offshore allocation debates in 1991 and 1992. High seas driftnetting also has helped considerably to elevate waste and discard as public issues.

Regardless of which particular fishing practice was pivotal in raising public awareness, waste has become a public issue of major proportions, regionally, nationally, and internationally. The genie is out of the bottle; so to speak, and will not be reconfinde. We seem to have turned the page on a new chapter on waste, bycatch and full utilization that likely may be cast more in major biological, social and political dimensions, than in efficiency arguments structured simply around economic cost-benefit solutions. The following sections summarize current international and national views on waste and discards, then presents general estimates of discards in North Pacific groundfish fisheries, and ends with a discussion of possible alternatives and a schedule for decisionmaking.

International Initiatives

There have been the following recent conferences and agreements concerning high seas and fisheries within national boundaries:

May 1992	International Conference on Responsible Fishing Cancun, Mexico
June 1992	United Nations Conference on Environment and Development (UNCED Agenda 21) Rio de Janeiro
March 1993	FAO Committee on Fisheries Twentieth Session Rome
July 1993	United Nations Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks New York
July 1993	Inter-American Conference on Responsible Fishing Mexico City

Each forum expressed the need to address bycatch and waste. The Declaration of Cancun declared that nations ". . . should promote the development and use of selective fishing gear and practices that minimize waste of catch of target species and minimize bycatch of non-target species." UNCED adopted an objective to promote conservation and sustainable use of marine living resources, urging nations to ". . . take measures to increase the availability of marine living resources as human food by reducing wastage, post-harvest losses and discards, and improving techniques of processing, distribution and transportation."

The FAO Committee on Fisheries developed a draft International Code of Conduct for Responsible Fishing. Article 19 states:

"Following the responsibility of States as provided in the 1982 Convention on the Law of the Sea and, in particular, Articles 61, 62 and 119, guidelines would be developed with respect to:

- the restoration and proper maintenance of ecosystems;
- the maintenance of biodiversity;
- minimizing the risk of long-term or irreversible effects of fishing operations;
- ensuring that each fish population is harvested in areas and at the stage of its life cycle consistent with the basic principles for the sustainability of a renewable resource and with due regard to economic efficiency;
- avoiding wastage and incidental damage to the marine resource and environment."

At the July 1993 UN conference, the United States supported developing the code and suggested principles for responsible fishing such as minimizing bycatch and other forms of waste. And finally, the Communique of the Inter-American Conference in Mexico City, July 1993, suggested that the code should urge nations to promote the development of gears to permit greater selectivity in catches and establish criteria governing the use of all types of fishing gear considered destructive and

unsuitable. It was the consensus of that meeting that the United Nations should declare the 1990s the "Decade of Responsible Fishing."

NOAA/NMFS Perspectives

United States support for "responsible fishing" on the international front has been incorporated in policy statements by NOAA and NMFS for domestic fisheries. For example, in *Living Oceans - Report on the Status of U.S. Living Marine Resources*, 1992, NMFS has developed a Strategic Plan for the Conservation and Wise Use of America's Living Marine Resources which, among other things, calls for development of more selective fishing practices to reduce bycatch. Spotlight 2 of the report is titled "Bycatch Problems and Fishery Management" (see item C-8(a)).

NOAA has committed to promoting global stewardship by fulfilling UNCED commitments. In NOAA's 1995-2005 Strategic Plan (June 1, 1993 draft) is a Prospectus for the 21st Century - Vision for 2005, which has an Environmental Stewardship Program Portfolio. In that portfolio, one of the six key program elements for rebuilding U.S. fisheries is:

"Reducing Bycatch. This action addresses wasteful bycatch (of young or non-target species) which impedes rebuilding of many fisheries, and kills marine mammals and endangered species. NOAA will expand data collection to quantify the problem, take account of the effects of bycatch in fisheries management models, and work with the fishing industry to develop new technology and strategies to reduce bycatch." (see item C-8(b)).

Magnuson Act Reauthorization

During Magnuson Act reauthorization hearings in 1989, concerns were raised with bycatch and waste. The State of Alaska supported stronger conservation provisions to address waste and promote full utilization. Various industry members testified in support of cleaner fishing methods and incentives to minimize bycatch. Greenpeace proposed a new national standard to assess the extent and effect of discard mortality on fisheries management and the health of fish stocks. These efforts culminated in a 1990 amendment revising Magnuson Act policy to assure that the national fishery conservation and management program considers the effects of fishing on immature fish and encourages development of practical measures that avoid unnecessary waste of fish, and is workable and effective. Congress also banned pollock roe-stripping and discard of pollock flesh.

Following reauthorization, the pace of activity on discard and waste quickened. The Library of Congress Congressional Research Service published an extensive report (CRS Report For Congress 90-575 ENR, December 9, 1990) entitled "Waste from Fish Harvesting and Processing: Growing Environmental Concerns." The Audubon Wildlife Report for 1989 and 1990 included an article entitled "Discarded Catch in U.S. Commercial Marine Fisheries," and the cover of the U.S. News and World Report for June 22, 1992 featured the headlines: "The Rape of the Oceans: The growing threats to the nation's last frontier."

Bycatch and waste also are major issues for this year's reauthorization hearings. Most groups testifying before Senate and House committees spoke of the need for stronger measures to control bycatch and encourage full utilization. Suggestions include adding a new national policy or standard to reduce bycatch waste, a prohibition on wanton waste, a priority to clean gears, and a reduction in bycatch to zero.

National Industry Bycatch Coalition

Industry members from across the U.S. convened in Newport, Oregon for the National Industry Bycatch Workshop of February 4-6, 1992. It was an upbeat meeting that generated draft goals, objectives and terminology. Lee Alverson offered the following proposed national goals:

Conservation goals (Priority 1)

1. Minimize bycatch on threatened and/or endangered species (birds, turtles, marine mammals, etc.).
2. Minimize bycatch on over-fished species of fish and/or invertebrates, including undersized target species.

Economic and social goals (Priority 2)

3. Minimize catch on non-target species which have value to other sectors of the industry.
4. Minimize catch of undersize target species with the goal of later increasing their catch as adults in directed fisheries.

Full Use Goals (Priority 3)

5. Find and promote market opportunities for unused bycatch species.

The Workshop generally agreed with these goals, while opining that achieving zero bycatch is probably not possible, and that reducing bycatch to its lowest practical minimum must be approached with full consideration of the impacts on current participants in the fishing industry.

Subsequently, in Boston in July 1992, coalition representatives suggested the following mission statement and goals:

Industry Coalition Mission Statement:

To reduce bycatch, discarded catch and waste in the nation's fisheries in order to protect the ecosystem health and to increase long-term economic and social benefits from optimum use of U.S. living marine resources.

Five Industry Coalition Goals:

1. Plan, manage, and evaluate a coordinated industry-government bycatch discarded catch reduction program for the nation.
2. Provide scientific and socio-economic information on fishery resources and their harvesting sectors that is necessary for sound, timely, bycatch-related decisions.
3. Develop and transfer to industry the information and technology that will reduce, minimize discards, and utilize non-target fishery resources and presently unused catches.

4. Correct elements of the fishery management process that create bycatch, are ineffective in reducing bycatch, or that unnecessarily reduce economic and social benefits related to it.
5. Inform the fishing industry and the general public of activities that promote fishery resource conservation, reduce bycatch discards, minimize discards, and improve compliance with management regulations.

Though the National Industry Bycatch Workshop created considerable momentum to address waste and discard, the level of funding and support from both government and industry to keep that momentum have not materialized. It looks now as if bycatch will need to be addressed at the regional level by the concerned industries, and once again the fishing industry that works off Alaska will need to exhibit the leadership that it is known for in resolving sticky management issues.

North Pacific Council Activities

In 1984 the Council adopted Comprehensive Goals. Goal 5 states: "Minimize the catch, mortality, and waste of non-target species, and reduce the adverse impacts of one fishery on another."

Subsequently, the Council has banned pollock roe-stripping, issued a policy statement that the pollock harvest should be used for human consumption to the maximum extent possible, established an observer program that reports discards regularly, and taken many actions to control bycatch of prohibited species.

Our most recent round of considerations of waste and full utilization began in September 1990 when the Council received and reviewed many groundfish proposals, including several dealing with bycatch reduction and full utilization. One proposal, to prohibit discard of finfish for which a TAC exists, was not acted on, though the Plan Amendment Advisory Group (PAAG) noted that further consideration of the issue may be warranted, particularly because current management programs may promote discarding. The PAAG urged the Council to consider ways to reduce current levels of discards, perhaps using a phased approach that would ultimately lead to an overall prohibition.

In June 1992 the Council established a Discard Committee, Chaired by Rick Lauber and having Council members Larry Cotter and Wally Pereyra. They developed the following statement as the goal of discard management:

Discard Committee Goal:

"Increase the quantity and quality of food and byproducts produced from the fishery resources harvested in the BS/AI and GOA by reducing the amount of harvest discarded to the maximum extent practicable while recognizing the contributions of these fishery resources to our marine ecosystems and the economic and social realities of our fisheries."

The Council has not had an opportunity to consider the Discard Committee's recommendations because of the press of other business.

Scope of Discard Problem

Discard amounts vary by species and year. As shown in Table 1, sablefish has consistently low discard, pollock 9-10%, Pacific cod 7-17%, flatfish up to 54% overall, and 78-85% for other species. Over all species and areas combined, discards ranged from 15-18% of the annual harvest for 1991-1993. The 18% for 1993 is equivalent to almost 280,000 mt discarded through September 4.

The numbers shown in Table 1 give a general picture of the scope of discard. Table 2 gives additional detail that helps pinpoint where the actual discard problems are in the flatfish and rockfish categories. There it is shown that 92-94% of the arrowtooth flounder harvested is discarded in the BSAI and GOA, while 65-66% of BSAI rocksole and other flatfish are discarded. BSAI yellowfin sole and GOA shallow flatfish and flathead sole fall in the 31-33% discard range, though only yellowfin has any significant tonnage (18,231 mt discarded). For rockfish, the species with higher rates of discard and larger tonnages include Sharpchin/Northern rockfish in the GOA and POP and Other rockfish in the BSAI.

While the estimates of discards presented in Tables 1 and 2 give a general appreciation of the magnitude of the problem, potential solutions will require closer examination of the fisheries that generate the discards. Is it the directed fishery for a species that is responsible for most of the discards, or do other target fisheries take high bycatches that are not used?

Let's take a closer look at pollock in the BSAI. Detailed discard data by fishery for 1991 were provided by NMFS to our Discard Committee in June 1992 (item C-8(c)). They show that about 89,000 mt pollock was discarded in the BSAI in 1991. More importantly, they show that the following four directed fisheries (as defined by NMFS) accounted for 97% of the pollock discards:

Pacific cod fishery	21,944 mt	25% of total discards
Pollock fishery	40,476 mt	46%
Rocksole fishery	15,947 mt	18%
Yellowfin sole	7,197 mt	8%

Similarly, for Pacific cod, the following four fisheries accounted for roughly 95% of the Pacific cod discard, which totalled 8,692 mt in 1991:

Pacific cod fishery	1,739 mt	20%
Pollock fishery	3,917 mt	45%
Rocksole fishery	1,395 mt	16%
Yellowfin sole	1,202 mt	14%

These estimates show that the same four major fisheries contributed 95-97% of the "discard problem" for both pollock and cod, and that it is not just a simple matter of requiring the target cod and pollock fisheries to keep more of their fish. And as we know from past examination of this issue, and from considerable industry input over the years, there are many reasons why a portion of the catch is discarded. Discards result from a combination of disincentives to further process the catch. These may be regulatory in nature, such as limitations of directed fishing standards, or economic, such as small fish that cannot be processed through the machines, or the machines are set for processing another species, and not easily changed. Each one of these contributes to the overall problem.

Detailed information for 1992 and 1993 has been requested from NMFS and may be available this week. If not, we will need the discard information by fishery and species between now and December as we begin to look more closely at the discard problem.

Structuring the Alternatives

There are several different ways the Council could approach this issue. One course of action is to take no action to specifically mandate a reduction in discard. Indirect management tools could be used, such as mesh size regulations, that would reduce the amount of fish retained in the gear and

brought aboard, or seasons and time/area closures might lead to cleaner, more fully useable hauls. Then the Council could just wait and see if these changes effected any reduction in discard rates over the next two to three years. Also, we have the comprehensive plan which may be based on IFQs. If that comes on line sometime in or after 1996, presumably the industry would have greater incentive to use the catch more fully, as apparently has happened in the CDQ fisheries.

An alternative at the other extreme would be to mandate a large reduction in discards for all species for all areas in 1995. Some interest groups, such as the Center for Marine Conservation, have called for a reduction of bycatch to zero, though as I mentioned earlier, industry representatives at the National Workshop in Newport stated their belief that zero bycatch was not achievable. Such action would have high economic costs for the industry, and certainly would be far more stringent than, and well outside the bounds of, any of the goals recently established nationally or internationally for reducing bycatch as were reviewed earlier in this paper.

A more moderate middle ground may be to select four to five of the problem species and do some additional homework on them, in cooperation with industry, between now and the December or January Council meetings. Pacific cod is obviously one that needs further examination. It is the subject of allocational disputes, and contributed to the current momentum surrounding the discard issue. It also is highly valued and significant discard tonnages are involved (17%, or 37,600 mt).

Pollock also is a good candidate for further consideration. The overall discard rate is a relatively low 9-10%, but significant tonnages are involved and again, this is a highly sought after fish which has been the subject of very contentious allocational disputes.

Third, the Council may want to examine several flatfish species such as BSAI rocksole and yellowfin sole. Both fisheries contribute high tonnages of discards, and both fisheries contribute significantly to pollock and Pacific cod discards. Shallow flatfish in GOA also may need scrutiny.

Fourth, some of the rockfish species may warrant further examination. POP is a highly valued species and yet there is considerable discard, particularly in the GOA where the rate reached 80%. Apparently the late season opening of July 1 for GOA rockfish contributes significantly to discard. GOA Other Rockfish (59% discard rate) and BSAI sharpchin/northern complex (89%) may warrant examination also.

The Council also needs to consider whether the reduction in discards for a particular species or fishery should occur all at once, or over a two- to three-year period. Fuller utilization may have a large economic cost to it, and therefore spreading that cost over a number of years would be easier on industry.

In summary, here are some alternatives the Council could discuss at this meeting. They are listed in order from least burdensome to most burdensome on the industry.

Alternative 1: ... Status quo. Take no action now. Wait for comprehensive rationalization program to come on line and let the problem sort itself out then.

Alternative 2: Modified status quo. Use other management approaches such as gear restrictions and time-area closures to address problem, rather than mandating a specified reduction in discard.

Alternative 3:

Select several problem species for further consideration of a discard reduction schedule. Pollock, Pacific cod, rocksole, yellowfin sole, and one or two rockfish categories were mentioned above as starting points for discussion.

Suboptions include phasing in the reduction over several years or just in specific fisheries that contribute significantly to the discard problem. The Council would need to set the final goal and timetable of the program (e.g., a 75% reduction in Pacific cod discard by the end of 1997).

Alternative 4:

Prohibit all discard (above NMFS retention standards) in 1995 (or again, over some scheduled phase-in).

In cases where discard is primarily a result of current regulations such as the directed fishing standards, perhaps a critical review of existing regulations would be desirable under any of the above alternatives.

Amendment Schedule

Regardless of which set of the above alternatives that the Council chooses to consider further, the staffs of the Council and NMFS need to make available the detailed bycatch patterns for 1992 and 1993. With those in hand, I think we need to meet with industry in October and/or November and begin a serious dialogue to pinpoint the exact reasons that a particular fishery, fleet, vessel or company decides to either keep or discard the species of interest. Through this interaction, we may be able to come back to the Council in December or January with a slate of possible actions that the Council could take that would give us the most bang for the buck in addressing the discard problem.

The Council could then finalize its slate of alternatives in December or January, and the analysis would be presented initially to the Council in April 1994. Final review would occur in June 1994, concurrent with consideration of comprehensive rationalization. The approved alternative could be implemented beginning in 1995.

Table 1. Percentage discards of groundfish off Alaska in 1991-1993 and discard tonnages for 1993.

	<u>1991</u> ¹	<u>1992</u> ¹	<u>1993</u> ²	
Pollock	10%	10%	9%	(93,731 mt)
Sablefish	2	4	3	(827 mt)
Pacific cod	7	10	17	(36,025 mt)
Flatfish	48	49	54	(104,385 mt)
Rockfish	23	24	35	(10,575 mt)
A. Mackerel	12	17	20	(9,244 mt)
Other	85	83	78	(24,146 mt)
Overall	15%	17%	18%	(278,933 mt)

¹ Source: Table 20 of 1993 NMFS Economics Status of the Groundfish Fisheries off Alaska (Preliminary).

² Source: NMFS Bulletin Board through September 4, 1993.

Table 2. Flatfish and rockfish discards through September 4, 1993.
 (Source: NMFS Bulletin Board)

	<u>Catch</u> (mt)	<u>Discard</u> (mt)	<u>Percent</u>
FLATFISH			
<u>Bering Sea/Aleutian Islands</u>			
Arrowtooth	9014	8470	94
Greenland Turbot	8054	1409	18
Other Flats	23238	15414	66
Rocksole	62641	40916	65
Yellowfin sole	58114	18231	31
<u>Gulf of Alaska</u>			
Arrowtooth	17860	16454	92
Deep flatfish	6348	1088	17
Shallow flats	5095	1611	32
Flathead sole	2400	792	33
ROCKFISH			
<u>Bering Sea/Aleutian Islands</u>			
Other Rockfish	655	207	32
POP	16526	2580	16
Other Red Rockfish	639	137	21
Sharpchin/Northern	2125	1899	89
Shortraker/rougheye	1135	398	35
<u>Gulf of Alaska</u>			
Pelagic Shelf	3070	283	9
POP	2219	1772	80
Shortraker/rougheye	1832	421	23
Other rockfish	3391	2012	59
N. Rockfish	4692	773	16
Demersal Shelf	421	74	18
Thornyhead	1379	483	35



OUR LIVING OCEANS

REPORT ON
THE STATUS
OF U.S. LIVING
MARINE
RESOURCES,
1992

December 1992
NOAA Tech. Memo. NMFS-F/SP0-2



**U.S. DEPARTMENT
OF COMMERCE**

**NATIONAL OCEANIC
AND ATMOSPHERIC
ADMINISTRATION**

**NATIONAL MARINE
FISHERIES SERVICE**

Barbara Hackman Franklin
Secretary

John A. Knauss
Under Secretary for Oceans
and Atmosphere

William W. Fox, Jr.
Assistant Administrator
for Fisheries

INTRODUCTION

When fishermen go fishing, they usually target a particular species or group: Salmon fishermen go after salmon, halibut fishermen halibut, shrimp fishermen target shrimp, etc. Unfortunately, they often catch other fish that are either unwanted or unusable owing to poor market value or regulatory restrictions, such as seasonal closures or size limits. These unwanted, untargeted, accidentally caught fish are called the "bycatch" or the "incidental" catch.

Depending on the number of incidentally caught fish, this bycatch may not be a big problem. But, sometimes the number taken is so great, or the species is so rare, that the productivity of that species may be undermined. In other cases, it is simply a matter of wasting valuable resources to harvest fish when they are too small or otherwise unusable, rather than to let them grow, mature, and so gain value.

To prevent bycatch of certain species, management may impose gear, season, area, or other restrictions on fishermen. For example, in the tuna fishery of the eastern Tropical Pacific (Unit 18), American tuna fishermen dramatically changed

fishing methods and reduced their bycatch of marine mammals to comply with the requirements of the Marine Mammal Protection Act (MMPA).

Concern about the bycatch in many other domestic and foreign fisheries has grown dramatically in recent years. Resolving these problems in a number of fisheries will require general agreement on definitions of the different types of bycatch and their impacts. Furthermore, the potential solutions to bycatch problems depend on current national policy as embodied in such key legislation, as the Magnuson Fishery Conservation and Management Act (MFCMA), the Endangered Species Act (ESA), and the MMPA. As policy evolves, research must continue in such areas as the magnitude and impact of bycatch in individual fisheries, and gear and management measures that may reduce or end the problems.

Defining bycatch problems is crucial to identifying information needs and possible solutions, and to constructive discussion about this complex and volatile issue. ... this article two basic bycatch problems are discussed: Allocation and conservation.

TYPES OF BYCATCH PROBLEMS
Allocation Problems

Capture of nontarget (unwanted) species in one fishery may have economic effects on other fisheries result in fishing restrictions. For instance, Bering Sea trawlers targeting walleye pollock and yellowfin sole (Unit 19) capture other species such as Pacific halibut, sablefish, salmon, and king and tanner crabs that are sought by other fishermen. Regulations aimed at reducing those bycatch effects on the other fisheries require the pollock/sole trawlers

to discard large quantities of the other valuable finfish and shellfish. Limits on the catch of nontarget species by Bering Sea trawlers also reduce harvest levels of the targeted pollock and sole below their potential yield. Similar new allocation problems can arise as new markets and fisheries develop for previously undesired fish that are incidentally captured in nontarget fisheries.

Conservation Problems

Bycatch may cause excessive fishing mortality on nontarget species. This occurs in two different circumstances: When target species are overexploited or when different species have a life history mismatch.

Target Species Overexploited: When there is a high level of fishing activity in an area, even species that are not directly targeted may suffer a high mortality. Fishing effort for shrimp in the Gulf of Mexico (Unit 11) is much higher than necessary to harvest the resource. As a consequence, shrimp trawl bycatch has had very dra-

matic effects on some finfish stocks. In the northern Gulf of Mexico, for instance, croaker were once very abundant, but they have declined since the 1950's (Unit 9); in 1991, the average croaker catch consisted of a single year class of very small fish, whereas croaker catches in the 1950's contained several year classes of much larger fish. If shrimp fishing effort were reduced, the finfish bycatch could be substantially reduced with no reduction in overall shrimp yield.

Life History Mismatch: Some fisheries

... Bycatch Problems and Fishery Management

30

... Conservation Problems

generate excessive fishing mortality on nontarget species even though the target species is not overutilized. This occurs when the bycatch species is slower growing and longer lived than the target species and is therefore less tolerant of a high rate of fishing. For example, the optimal level of shrimp fishing in the Gulf of Mexico

might still be excessive for the incidentally captured finfishes that mature more slowly. Reducing the take of a bycatch species through gear restrictions or modifications or area and season closures, for instance, can help solve this type of bycatch problem.

LEGISLATIVE BACKGROUND

Congress has addressed bycatch problems in commercial fisheries by amending several laws, most recently through the 1990 amendments to the MFCMA. The MFCMA encourages measures to avoid unnecessary waste of fish, the development of research programs that address bycatch and methods for its reduction, and the establishment of an observer program in the North Pacific to monitor existing bycatch measures. The 1990 amendments to the Act also mandated a research program on the impact of incidental harvest in the southeastern U.S. shrimp trawl fishery and prohibited any measures to mitigate this bycatch until 1 January 1994.

The Marine Mammal Protection Act of 1972 imposed a moratorium on the kill of marine mammals, including their incidental capture in fisheries. The 1988 amendments to the MMPA provided most commercial fisheries with a 5-year exemption from the prohibition on capture of mammals, while information on the levels

and impacts of these kills is collected and analyzed. A permanent legislative approach to the capture of marine mammals in commercial fisheries is being developed for congressional consideration in the reauthorization of the MMPA in 1993.

Finally, the ESA prohibits the incidental killing of species listed as endangered and allows such prohibitions or other conditions to be placed on the kill of threatened species. The ESA does allow the incidental capture of endangered species under limited circumstances, provided that the bycatch neither violates the incidental take provisions of the Act nor jeopardizes the continued existence of the species. The 1988 amendments to the ESA also required some South Atlantic and Gulf of Mexico shrimp fishermen to use Turtle Excluder Devices (TED's) during certain times of the year to avoid incidental capture of endangered and threatened sea turtles.

INFORMATION NEEDS

Effective bycatch management requires data on the magnitude, distribution, and species composition of the bycatch in a fishery. Such information generally requires observers on fishing vessels. Multi-year observer programs are needed to reflect interannual variation in the abundance of target and nontarget species to determine the magnitude of bycatch and its effects.

However, observer programs have several drawbacks. Placing observers on fishing vessels can be expensive for both vessel owners (because valuable bunk and working space is lost) and for fishery management agencies. The number of

observations made may be small because of budget constraints and may not give an accurate picture of the incidental catch. The presence of an observer can also influence the fishing methods employed by a fisherman, either to avoid or to seek bycatch species. In addition, it may take several years before data from observer programs become useful in assessing the status of fish resources and the magnitude of bycatch effects, while pressure to address the problems increases and calls for more immediate action.

Where one fishery incidentally captures fish that are of economic value to other fisheries, calculating the foregone present

National Oceanic and Atmospheric Administration

1995 - 2005 STRATEGIC PLAN

Summary



June 1, 1993

DRAFT

3.5 REDUCING BYCATCH

Heavy bycatches of non-target resources are a major impediment to increased fishery yields and substantial economic gains. Most fisheries are managed on the basis of size and seasonal availability. Regulations on mesh sizes of fishing nets determines the size of individuals that escape. Similarly, hook size can be specified in order to regulate size of fishes caught. Still, non-targeted animals commonly appear as bycatch. Many methods of fishing are nonselective, and this results in bycatch of some species, including marine mammals and endangered or threatened species, while fishing for other species, as well as the capture of undesired sizes (e.g., juveniles) of some target species. The inadvertent capture of juveniles or "brood stock" of highly exploited species can make restoration of such species more difficult. Bycatch sometimes results in at-sea discarding of a large portion of the catch, although the extent of this practice is poorly known in many fisheries. Most discards do not survive.

Bycatch also causes significant loss of potential economic benefits when directed fisheries are closed because of heavy "prohibited species" bycatch. (Table 2 is a partial list of bycatch-related closures in the North Pacific in FY 1990-1991.). Also, the general public is becoming increasingly aware and critical of the waste of hugh quantities of bycatch. In some cases, the bycatch problem contributes to overfishing itself, and may jeopardize recovery of a depleted stock. Gulf of Mexico juvenile red snapper caught in the shrimp trawl fishery is an example.

Bycatch also causes significant loss of potential economic benefits when directed fisheries are closed because of heavy "prohibited species" bycatch. This problem is illustrated in the

following table which lists some of the bycatch-related closures in the North Pacific in FY 1990-1991.

NORTH PACIFIC BY-CATCH RELATED FISHERY CLOSURES

<u>FISHERY</u>	<u>AREA CLOSED</u>	<u>PERIOD</u>	<u>REASON</u>
FLATFISH	BERING SEA/ ALEUTIANS ZONES 1, 2H	2/27 - 12/31	HALIBUT BYCATCH ALLOWANCE REACHED
	ENTIRE BERING SEA/ ALEUTIANS	3/15 - 12/31	HALIBUT BYCATCH ALLOWANCE REACHED
GROUNDFISH: TRAWL, LONGLINE	ENTIRE BERING SEA/ ALEUTIANS	5/29 - 6/30	QUARTERLY HALIBUT BYCATCH ALLOWANCE REACHED
RED KING CRAB	BERING SEA/ ALEUTIANS ZONE 1	1/25 - 12/31	FLATFISH BYCATCH ALLOWANCE OF RED KING CRAB REACHED
COD/POLLOCK	BERING SEA/ ALEUTIANS ZONES 1, 2H	5/30 - 12/31	HALIBUT BYCATCH ALLOWANCE REACHED

If bycatch is a problem, fishing technologies and/or practices may need to be modified. But in some cases, the use of observers to detect actual bycatch levels may result in avoiding closure of a fishery before it has caught the allowable amount. Failure to reduce bycatch in U.S. fisheries will result in continued resource depletion and loss of economic benefits for both directed and non-target species.

The major components of this action are:

- (a) quantifying bycatch, and
- (b) advancing conservation engineering.

A. Quantifying and analyzing bycatch

The magnitude of bycatch in most of the nation's fisheries is unknown, but is thought to be a major problem in many fisheries. Since bycatch is generally discarded at sea, the only feasible approach to assessing its impact is through trained onboard observers. In addition to recording the amounts and species composition of the entire catch, observers frequently sample both directed and incidental catches for size, sex and other important biological information. All this data must then be incorporated into the stock assessments that are the basis of fishery management decisions.

At-sea observers are required for both domestic fisheries, operating under fishery management plans, and international fisheries, under negotiated agreements to monitor incidental take. NOAA proposes to:

1. Train and deploy observers for major fisheries where bycatch is known to be a significant barrier to achieving full economic benefits.
2. Incorporate observer information into data bases used by fishery scientists and managers, and by industry parties seeking to reduce bycatch levels.
3. Use observer data in the production of stock assessments, and in the recommendation of regulatory measures to protect prohibited species and conserve other non-target fishery resources.
4. Determine the impact of bycatch on targeted species and populations and subsequent recruitment to the fishery.
5. Determine the cost of reducing bycatch while maintaining a targeted fishery.

B. Advancing conservation engineering

The Magnuson Fishery Conservation and Management Act, as amended in 1990, specifically directed the Department of Commerce to conduct research in the field known as "conservation engineering". Some conservation engineering activities to develop highly selective harvesting gear are well known; for example, the development and application of devices to exclude protected species from fishing gear (e.g., turtle excluder devices, or TEDs, in shrimp trawl nets). Development of gear that will not catch non-target species is needed for some fisheries (e.g., Pacific halibut in Alaska trawl fisheries), while in others, gear must be developed that will permit non-target organisms, such as undersize swordfish taken on longline, to escape unharmed even if captured.

Another way of reducing bycatch is by controlling fishing practices --- how, when and where fishing takes place. Examples include the redirection of tuna fishing away from areas with high numbers of porpoises, and prohibition of certain types of gear (e.g., gillnets) in nearshore areas. Very careful studies and tests must be performed to ensure that recommended practices or gears will reduce bycatch significantly but with minimal economic loss to the industry.

Development of conservation gear by the private sector will be actively encouraged, but it is expected that NOAA will continue to have a primary role in certifying the efficacy of devices and practices designed to conserve protected species. As conservation practices and gears become legislatively mandated for Federal waters or interjurisdictional species, NOAA will be required to verify their success and minimize disruption among users. Additionally, it is NOAA's responsibility to develop methodologies for accurately assessing the extent and composition of bycatch for application to the generation of stock assessments and regulatory measures. NOAA proposes to:

1. Develop and test prototype finfish excluder devices for application in trawl fisheries.

2. **Develop prototype gear to permit the escape of undersize pelagic fishes in longline fisheries.**
3. **Conduct studies of survivorship of bycatch in reef fish, coastal migratory and other fisheries.**
4. **Evaluate fishing practices (e.g., area, time of day, "soak time", etc.) in major U.S. fisheries to develop recommendations for reducing mortality of non-target and undersized catches.**
5. **Develop harvesting gear and methods that avoid damage to habitat.**

1991 Retained / Discarded Groundfish

BY AREA & TARGET

left(key,7)	tons	amck	amck_disc	arth	arth_disc	deml	deml_disc	dfl1	dfl1_disc	flou	flou_disc	fsol	fsol_disc	grtb	grtb_disc
5 AMCK	27916.15	21886.08	1468.18	5.40	166.79	0.00	0.00	0.00	0.00	9.23	85.59	0.00	0.00	29.62	1.55
5 ARTH	2174.75	0.00	0.00	1183.52	102.95	0.00	0.00	0.00	0.00	78.59	1.67	0.00	0.00	128.45	139.36
5 FLOU	4629.48	0.00	0.00	6.51	476.22	0.00	0.00	0.00	0.00	1442.82	521.32	0.00	0.00	0.80	6.70
5 GTRB	8800.14	0.00	56.74	411.94	1231.38	0.00	0.00	0.00	0.00	112.61	77.99	0.00	0.00	5030.84	62.20
5 NULL	881.66	0.00	60.30	0.00	68.96	0.00	0.00	0.00	0.00	0.00	34.60	0.00	0.00	0.00	15.99
5 PCOD	202515.87	65.64	704.78	223.21	3775.16	0.00	0.09	0.00	4.32	668.82	3298.87	0.00	0.00	43.89	504.84
5 PLCK	1334824.4	152.30	9.77	46.76	3501.29	0.00	0.00	0.00	0.00	687.06	3565.69	0.00	0.65	1.63	123.03
5 POPA	6773.25	3.92	114.60	17.94	806.51	0.00	0.00	0.00	0.00	77.71	244.36	0.00	0.00	42.56	16.66
5 ROCK	305.75	0.00	0.00	0.00	107.90	0.00	0.00	0.00	0.00	0.02	48.30	0.00	0.00	0.00	0.06
5 RSOL	64841.31	0.00	0.00	27.95	988.64	0.00	0.00	0.00	0.00	675.36	5031.40	0.00	0.00	10.87	0.33
5 SABL	5319.85	0.00	0.00	17.99	266.73	0.00	0.00	0.00	0.00	9.61	32.27	0.00	0.00	93.63	663.59
5 SRSN	1342.01	0.00	0.00	110.31	326.28	0.00	0.00	0.00	0.00	15.71	0.55	0.00	0.00	0.22	47.99
5 YSOL	129221.67	0.00	1.01	2.12	209.65	0.00	0.00	0.00	0.00	3269.01	10467.50	0.00	0.00	0.00	19.10
6 AMCK	3654.63	3087.10	52.74	1.75	6.39	0.00	2.90	0.14	1.60	0.00	0.00	0.00	0.50	0.00	0.00
6 ARTH	3078.41	0.00	0.00	793.38	467.93	0.04	0.00	218.16	93.01	0.00	0.00	7.66	1.50	0.00	0.00
6 DEM1	444.21	0.00	0.00	0.20	0.00	350.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6 DFL1	22444.73	0.00	0.00	92.20	8799.82	20.90	13.13	6401.11	773.78	0.00	0.00	358.90	37.34	0.00	0.00
6 FSOL	472.99	0.00	0.00	0.00	89.17	0.00	0.00	24.39	3.11	0.00	0.00	145.47	19.01	0.00	0.00
6 GTRB	33.19	0.00	0.00	0.00	18.90	0.00	0.00	0.00	0.00	0.00	2.30	0.00	0.00	6.29	0.00
6 NULL	151.10	0.00	0.00	0.00	6.29	0.00	0.00	0.00	0.68	0.00	0.00	0.00	0.00	0.00	0.00
6 PCOD	77885.91	1.02	53.85	40.56	1323.78	61.40	7.95	1123.40	270.20	0.00	1.10	128.08	115.53	0.00	0.00
6 PELS	2155.97	0.00	0.00	15.95	36.30	35.10	14.80	5.47	26.90	0.00	0.00	0.03	0.00	0.00	0.00
6 PLCK	90130.00	0.00	0.25	116.66	518.17	0.00	0.20	280.70	62.38	0.00	0.00	63.98	27.90	0.00	0.46
6 POPA	8383.34	17.88	20.00	139.82	1053.04	13.74	12.50	70.43	160.06	0.00	8.80	6.19	1.20	0.00	0.00
6 ROCK	289.20	0.00	0.00	0.00	41.99	0.22	0.00	6.60	11.23	0.00	0.00	3.21	0.00	0.00	0.00
6 SABL	22206.92	0.00	0.02	44.34	274.04	146.84	9.31	36.77	108.92	0.00	0.43	5.23	3.40	0.00	0.20
6 SFL1	1609.15	0.00	0.00	11.68	266.67	0.00	0.00	265.34	17.16	0.00	0.00	39.66	14.11	0.00	0.00
6 SLR1	8645.85	15.60	10.06	167.66	1293.10	8.10	1.00	95.04	109.24	0.00	0.00	10.74	0.00	0.15	0.00
6 SRRE	714.00	0.00	0.00	8.90	162.11	12.64	0.30	13.49	22.74	0.00	0.00	0.11	0.00	0.00	0.00
6 THDS	173.44	0.00	0.00	19.01	28.14	0.84	0.00	2.19	4.56	0.00	0.00	0.11	0.00	0.00	0.00
N NULL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N PCOD	201.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

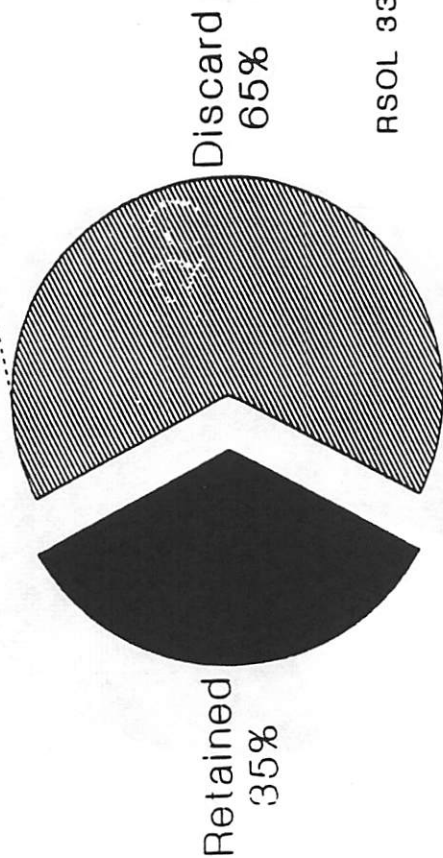
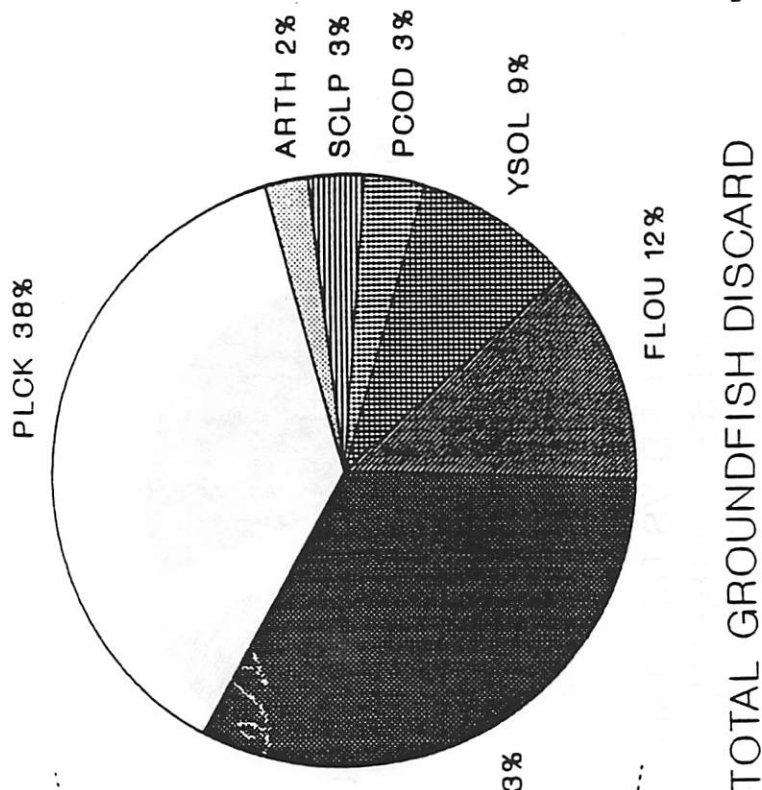
1 - Minimum retained target size

S = BSAI

G = GOA

Source: Weekly Production Report Database, NMFS ALASKA REGION

1991 GROUNDFISH DISCARD, RSOL FISHERY BERING SEA/ALEUTIAN ISLANDS, ALL GEAR

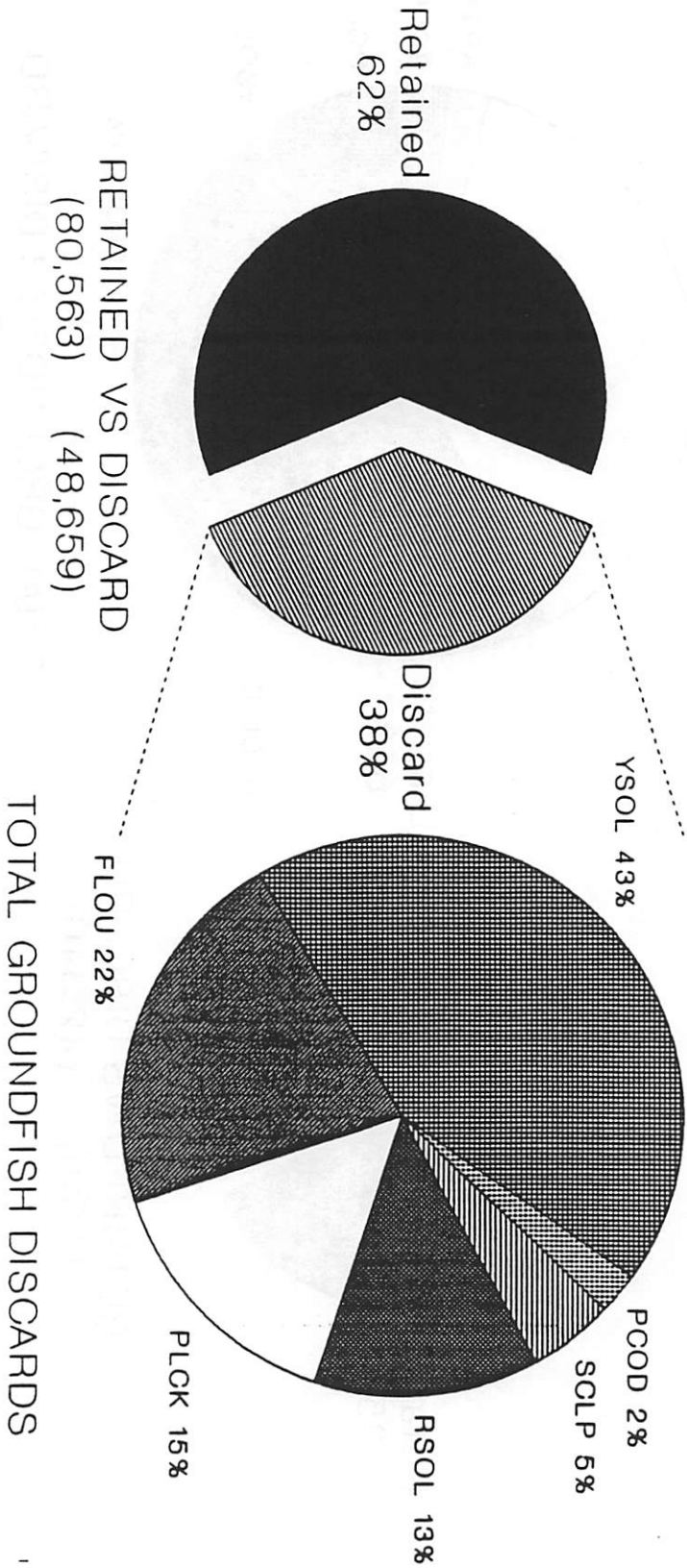


RETAINED VS DISCARD
(22,501) (42,340)

PLCK -- pollock
 RSOL -- rocksole
 ARTH -- arrowtooth flounder
 PCOD -- Pacific cod
 FLOU -- flounder (flatfishes)
 YSOL -- yellowfin sole
 SCLP -- sculpins

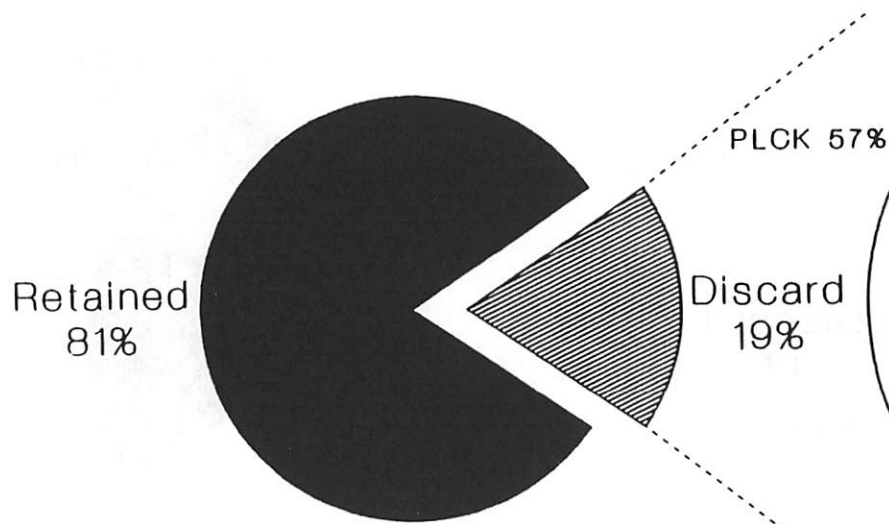
5/28/92

1991 GROUND FISH DISCARD, YSOL FISHERY BERING SEA/ALEUTIAN ISLANDS, ALL GEAR

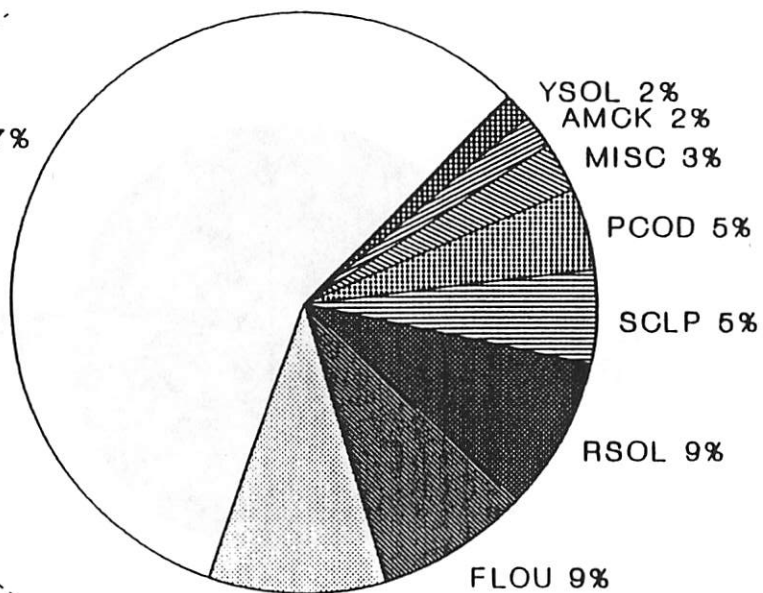


5/28/92

1991 GROUND FISH DISCARD, PCOD FISHERY BERING SEA/ALEUTIAN ISLANDS, ALL GEAR

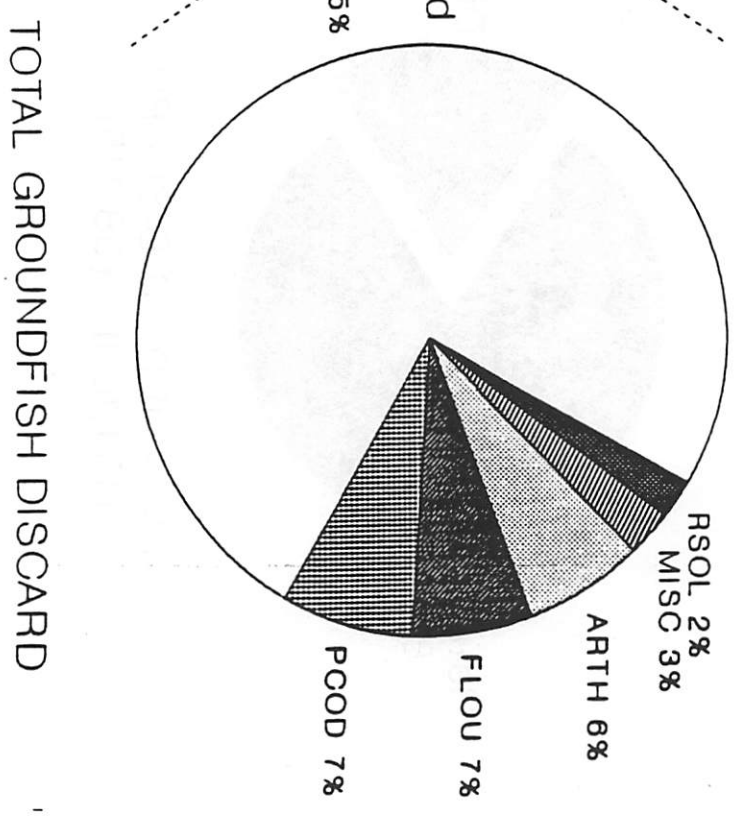
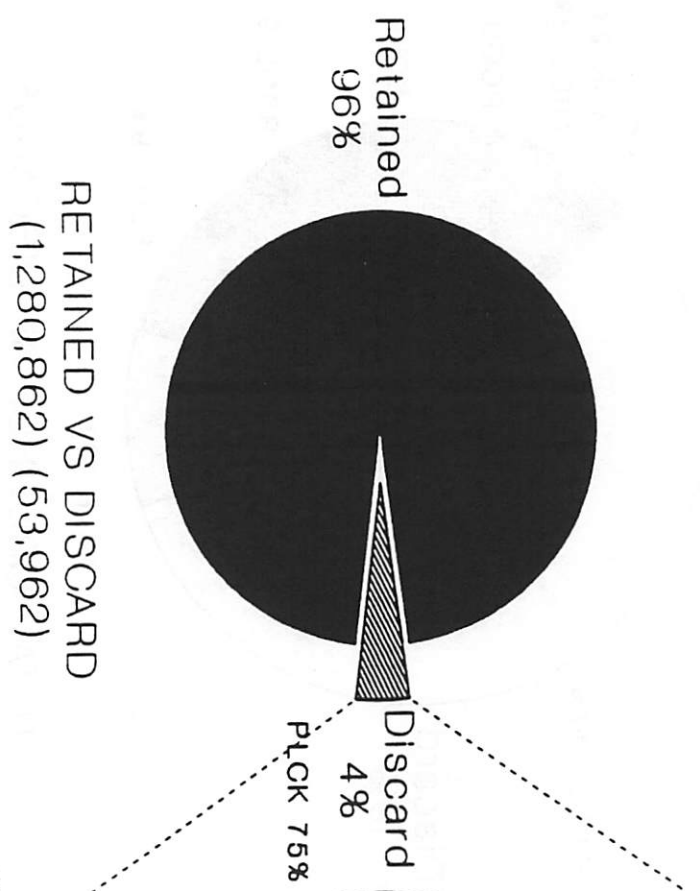


RETAINED VS DISCARD
(164,100) (38,415)



TOTAL GROUND FISH DISCARDS

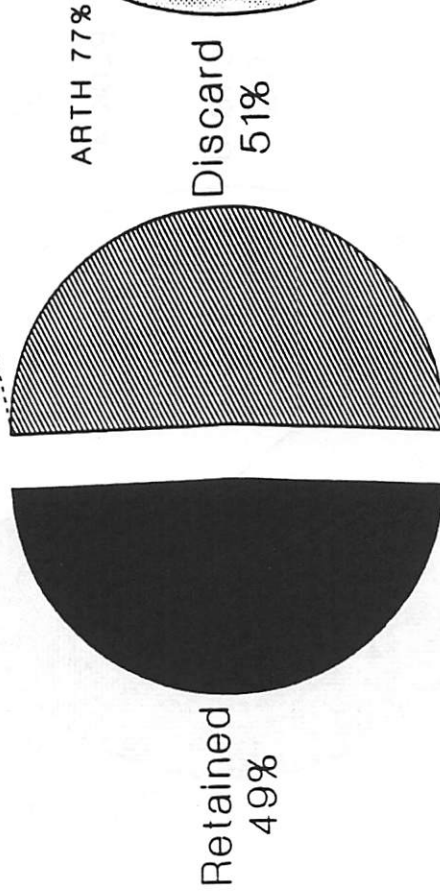
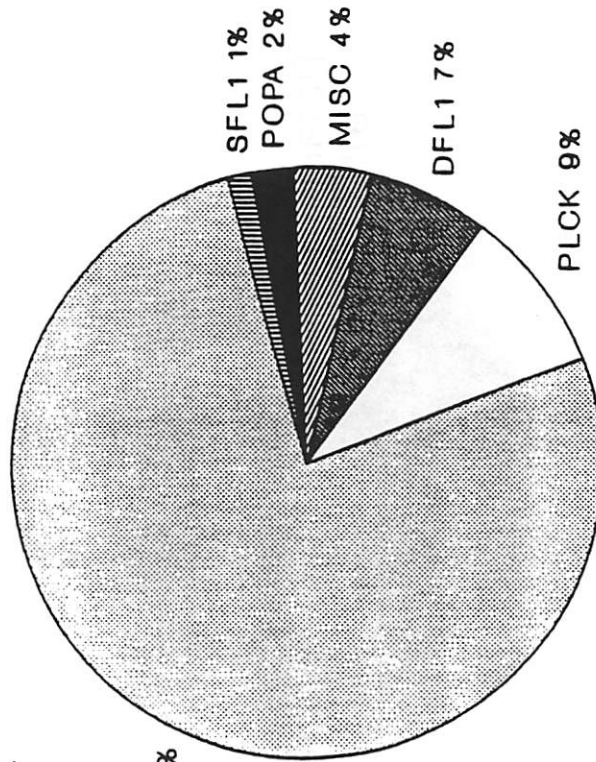
1991 GROUNDFISH DISCARD, POLLOCK FISHERY BERING SEA/ALEUTIAN ISLANDS, ALL GEAR



5/28/92

PLCK -- pollock
 RSOL -- rocksole
 ARTH -- arrowtooth flounder
 FLOU -- flounder (flatfishes)
 PCOD -- Pacific cod

1991 GROUND FISH DISCARD, DFL1 FISHERY GULF OF ALASKA, ALL GEAR

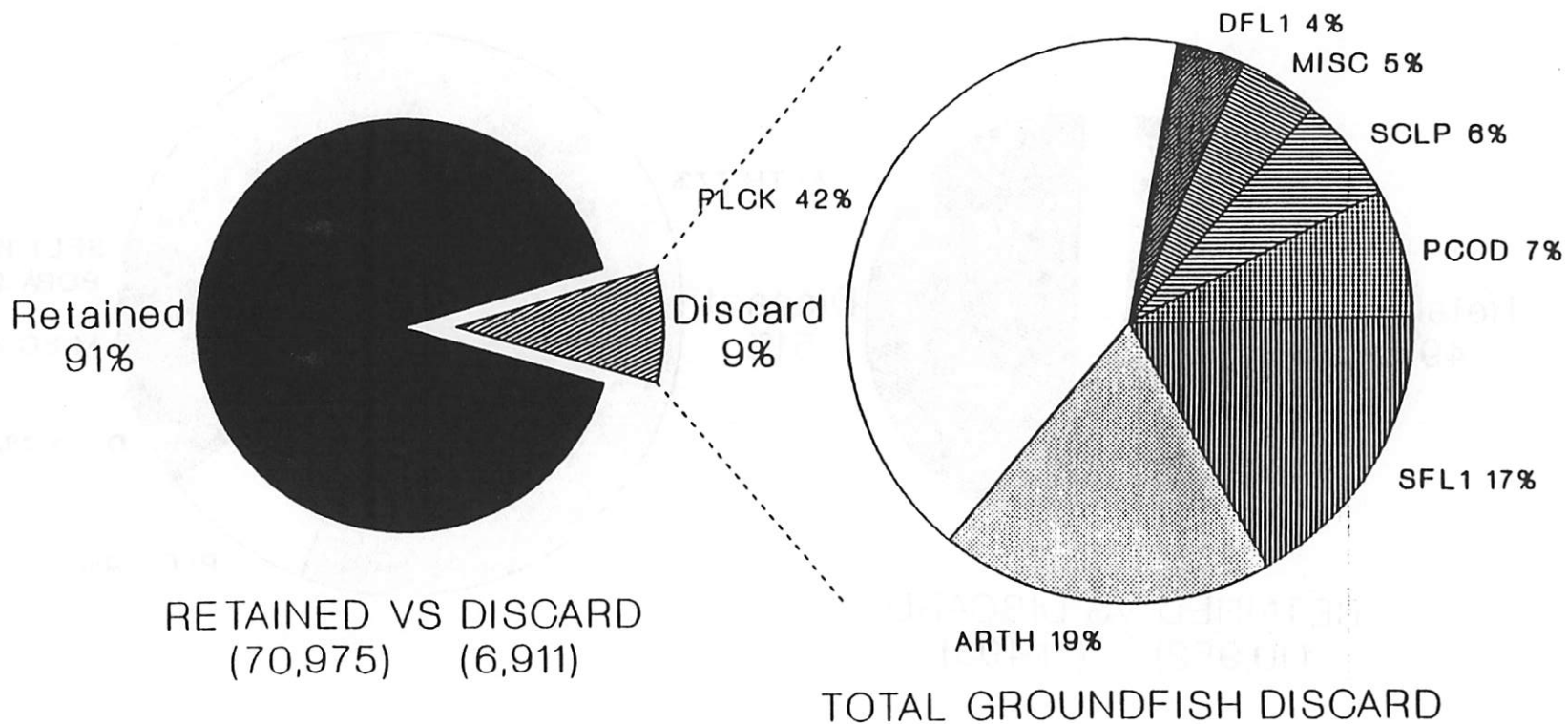


RETAINED VS DISCARD
(10,952) (11,493)

- PLCK -- pollock
- DFL1 -- deep water flatfish
- SFL1 -- shallow water flatfish
- ARTH -- arrowtooth flounder
- PCOD -- Pacific cod
- MISC -- miscellaneous
- POPA -- Pacific ocean perch

5/28/92

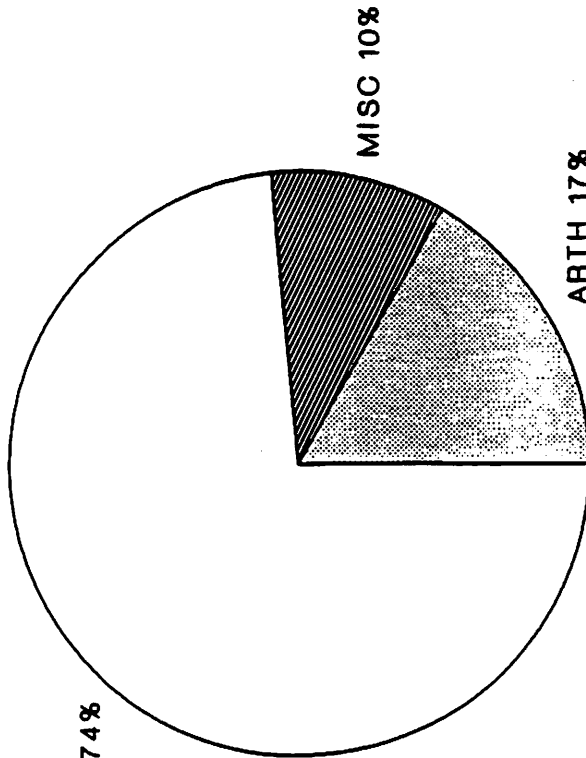
1991 GROUND FISH DISCARD, PCOD FISHERY GULF OF ALASKA, ALL GEAR



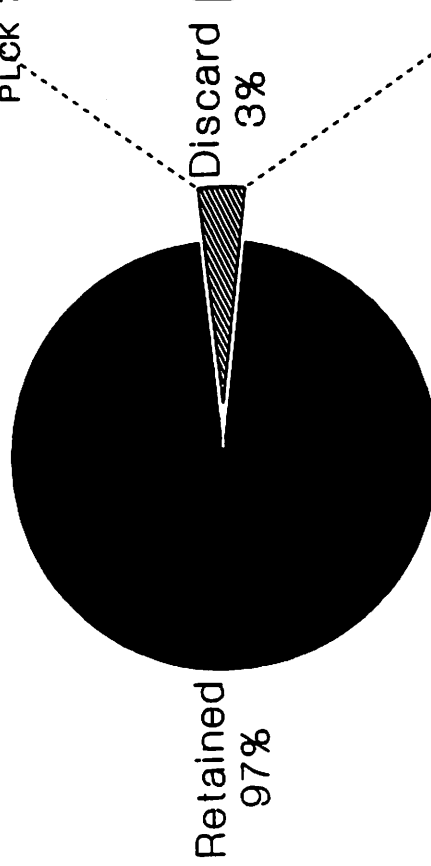
PLCK -- pollock
 DFL1 -- deep water flatfish
 SFL1 -- shallow water flatfish
 ARTH -- arrowtooth flounder
 PCOD -- Pacific cod
 MISC -- miscellaneous

5/28/92

1991 GROUNDFISH DISCARD, PLCK FISHERY GULF OF ALASKA, ALL GEAR



TOTAL GROUNDFISH DISCARDS



RETAINED VS DISCARD
(87,041) (3,089)