


MEMORANDUM

TO: Council, SSC and AP Members

FROM: Clarence G. Pautzke
Executive Director 

DATE: May 30, 1995

SUBJECT: Bristol Bay Crab Protection Areas

ESTIMATED TIME
3 Hours

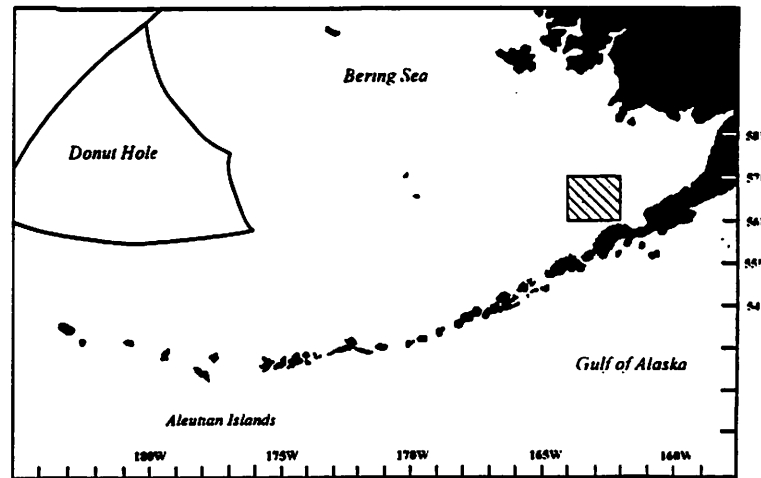
ACTION REQUIRED

Initial review of analysis of Bristol Bay red king crab protection area. Update on crab rebuilding efforts.

BACKGROUND

Bristol Bay Red King Crab Closure Area

On January 26, 1995, based on a Council recommendation from November 1994, NMFS closed trawling, by emergency rule, in a portion of Bristol Bay to protect red king crabs. The closed area encompasses 162° to 164°W longitude, 56° to 57°N latitude. The rule also required observers on trawl vessels targeting flatfish in Zone 1 outside the closed area, and allowed pelagic trawling for pollock within the closed area, but with 100% observer coverage. At the January meeting, the Council reviewed the emergency action and recommended six alternatives for analysis as a follow-on plan amendment.



All six alternatives to the status quo have an eastern border along Area 512, which is permanently closed to all trawling, and east and west boundaries at 162°W longitude and 164°W longitude. Southern and northern boundaries of each alternative are:

- Alternative 1. status quo.
- Alternative 2. 56° 10' to 57°N latitude.
- Alternative 3. 56° 00' to 57°N latitude (same as emergency rule).
- Alternative 4. 55° 45' to 57°N latitude.
- Alternative 5. 56° 10' to 58°N latitude.
- Alternative 6. 56° 00' to 58°N latitude.
- Alternative 7. 56° 45' to 58°N latitude.

The AP and SSC reviewed a draft environmental assessment of the alternatives in April, but there were no economic data. Their comments and an executive summary of the April 7 analysis are under item D-2(b)(1). The Council did not have time to consider the analysis in April.

We were scheduled to review the economic impact analysis at this meeting but the data necessary for the analysis are not yet available. Therefore we do not have any new information for review at this meeting, but we still need to send the study out to public comment this summer. A way to do this would be to have the SSC or a SSC subcommittee review the document once it is complete and approve it for public comment. Then we could take final action in September.

An alternative, which is much less attractive, is to wait to send the study out after the September meeting and take final action in December. The only reason I reluctantly suggest this is that, even if we give final approval in September, it may be a real stretch for NMFS to approve and implement a plan amendment by the January 1996 opening of the rocksole fishery. If we miss that early 1996 fishery, then we probably do not need the closed area again until early 1997, and we might as well wait for the study to be completed over the summer and initially review it in September, or even wrap it in with the northern Bristol Bay closure analysis.

UPDATE: Crab Rebuilding Committee

In January, the Council requested member Dr. David Fluharty to chair a committee composed of members of the BSAI groundfish and crab plan teams to develop a rebuilding plan for the Bering Sea crab stocks. The teams met jointly on March 21-22 in Seattle. The goal of the meeting was to synthesize available information on sources and magnitude of crab mortality and ecosystem relationships and to identify alternative strategies the Council might use to enhance the survival of crab stocks and thus promote rebuilding. Minutes of the meeting were distributed in April.

Two major components of a rebuilding plan were suggested by the Committee and by the industry at a feedback session in April:

- (1) The first component would be to protect juvenile red king crab habitat by closing areas to all fishing. The Committee agreed that it was important to retain a minimum spawning stock and provide adequate habitat and protection for juvenile red king crab. Juvenile red king crab have been found to occupy nearshore areas of Bristol Bay, and require living substrate (such as bryozoans and stalked ascidians) for predator protection. A subsection of this area would include the northern Bristol Bay closure that the Council approved for analysis in January.
- (2) The second component would be to examine ways to reduce competition and predation by groundfish on Tanner and snow crab. Stomach samples indicate that Pacific cod, yellowfin sole, flathead sole, and rock sole may consume a very large proportion of young Tanner and snow crab. Individual bycatch quotas (IBQs) have been suggested as a means to increase the catch of these groundfish without impacting more crab.

Council staff, working with the Crab Rebuilding Committee, will prepare a discussion paper exploring these rebuilding options and report at the September Council meeting.

DRAFT FOR COUNCIL REVIEW

Environmental Assessment/Regulatory Impact Review/Initial
Regulatory Flexibility Analysis

of

RED KING CRAB BYCATCH

IN THE BERING SEA TRAWL FISHERIES:

ALTERNATIVES FOR

CLOSURE AREAS

Prepared by

Alaska Department of Fish and Game
North Pacific Fishery Management Council

April 7, 1995

EXECUTIVE SUMMARY

Results from the 1994 NMFS summer trawl survey indicated that red king crab stocks in the Bristol Bay area were at continuing low levels, and that the estimated abundance of mature female king crab of 7.5 million individuals was below the threshold level set in the State of Alaska management plan for king crabs in the Bering Sea and Aleutian Islands of 8.4 million crab. Because of this low abundance of mature female crab, the 1994 directed fishery for red king crab was closed in Bristol Bay, and the directed fishery for Tanner crab was closed in Zone 1 east of 163° W. longitude due to bycatch concerns. Because trawl fisheries had experienced high king crab bycatch, especially in the first months of the rock sole fishery in the same area, the Council took emergency action to close a designated four block area to trawling for the duration of the emergency order (120 days). During the January 1995 meeting, the Council directed staff to analyze 6 alternatives for closure to bottom trawling and to present the results for initial Council review at the April Council meeting. Due to the possible economic impact any closure might have on the rock sole fishery in particular, the Council, AP and SSC all recommended that the analysis include output from the Bering Sea bycatch model as a means of weighing alternatives in light of the myriad of existing and potential closures that impact fisheries.

The six alternatives in addition to status quo are in an area which has experienced high king crab bycatch but has also sustained a roe fishery for rock sole. The alternatives represent closures of varying size, all with an eastern border along Area 512, permanently closed to all trawling. The alternatives are indicated in Figure 1. All six alternatives have longitudinal boundaries of 162° West longitude and 164° West longitude and have northern and southern boundaries as follows:

- 1) Status Quo - no new closure;
- 2) Northern boundary of 57° North latitude and southern boundary of 56° 10' North latitude;
- 3) Northern boundary of 57° North latitude and southern boundary of 56° North latitude;
- 4) Northern boundary of 57° North latitude and southern boundary of 55° 45 ' North latitude;
- 5) Northern boundary of 58° North latitude and southern boundary of 56° 10' North latitude;
- 6) Northern boundary of 58° North latitude and southern boundary of 56° North latitude;
- 7) Northern boundary of 58° North latitude and southern boundary of 55° 45 ' North latitude.

The alternative recommended by the Council during a teleconference in November 1994 was Alternative 4, and the alternative subsequently enacted by NMFS was Alternative 3. The closure had a dramatic effect on reductions in king crab bycatch. In 1992, this fishery bycaught approximately 59,000 red king crab, in 1993 the rock sole fishery took 166,154 red king crab and in 1994 the fishery took 216,821 crab. The rock sole fishery exceeded its red king crab PSC cap in both 1993 and 1994. In 1995 through the month of March, the rock sole fishery took only 19,000 red king crab. It is unlikely that crab bycatch numbers in the rock sole fishery will increase substantially in the coming months because red king crab have primarily been taken during the first few months of the year.

The success of this closure in protecting red king crab is however diminished by the impacts it had on the rock sole fishery. Data from the 1995 fishery were unavailable for this document, but since the fishery has had a high reliance on the closed area for obtaining spawning rock sole for roe, the closure is expected to have had economic consequences. Whereas the majority (in 1990, 89%; in 1991, 65%; in 1992 95%; in 1993, 90%; and in 1994 84% of the fishery total Zone 1 bycatch of red king crab) of the red king crab historically taken in the rock sole fishery were within the area (Alternative 3) designated for emergency closure, this area has also provided a significant percentage of groundfish catch (in 1990, 40%; in 1991, 28%; in 1992, 54%; in 1993, 50%; and in 1994, 58% of the fishery Zone 1 groundfish catch). The impacts of the closure are made more significant because of the recent Pribilof Islands closure which had historically been important to the rock sole fishery as well. However, much of the rock sole effort in the Pribilof Islands area and along the Alaska Peninsula did not occur simultaneously in the first few months of the year.

In summary, the rock sole fishery has bycaught the majority of red king crab during the January - March fishery for rock sole roe. The major savings to red king crab are found in Alternative 3 with a southern boundary of 56° North latitude. A subsection of this area between 56° North latitude and 56° 10' North latitude is productive to the rocksole fishery. In 1990, 15%; in 1991, 13%; in 1992, 35%; in 1993, 26%; and in 1994, 18% of the fishery's Zone 1 groundfish catch came from this area. However, this area has also had high king crab bycatch rates, and in 1990, 12%; in 1991, 32%; in 1992, 47%; in 1993, 31% and in 1994, 20% of the Zone 1 bycatch of king crab came from this area.

The bycatch and economic tradeoffs and implications that such a closure will have on various fisheries require that a model-based economic analysis be performed. The results of the Bering Sea bycatch model are not yet available because of the magnitude of the changes in the data structure, regulations, and in the model itself since it was last used in 1992. Data management and analysis will be completed in the coming weeks.

D-2(b) Crab Bycatch Management and Rebuilding

David Ackley (ADF&G) provided an overview of the draft EA/RIR document for Bering Sea trawl closure alternatives. He also summarized the report prepared by the Fluharty Committee resulting from a joint meeting of members of the crab and BSAI groundfish plan teams. John Gauvin and Jon Henderschedt demonstrated the "Sea-state" program which was used by industry to monitor bycatch rates during the 1995 rock sole fishery and helped fishermen avoid areas with high crab and halibut bycatches. Additional public testimony was provided by Arni Thompson and Lisa Bullitto.

The SSC applauds the efforts of the Fluharty Committee to broaden the discussion of crab status and rebuilding to embrace more comprehensive causes of mortality and limiting factors. This is a significant step on the road to more comprehensive bycatch management.

The SSC also appreciates the staff's preparation of a document describing all groundfish and closure areas in the Bering Sea and Aleutian Islands. The immediate question before the Council is whether to send the draft EA/RIR for additional Bering Sea trawl fishery closure areas out for public review. The document is currently incomplete in that it lacks a discussion of economic costs of the potential measures. Despite the limitations of the analytic and predictive power of the Bering Sea Bycatch model (see distribution under D-2(a)), the SSC feels that the insights it provides are useful. The SSC also recommends that a qualitative discussion of the economic impacts of the contemplated measures be included in the document. This qualitative analyses should include a discussion of the potential effects of bycatch constraints in other trawl fisheries (e.g. cod) resulting from re-directed effort. These elements should be incorporated before the document is released for public review and comment.

The SSC notes that the Fluharty Committee recommended that any approved time-area closure for king crab, sunset after a period of time as broader bycatch management measures are developed. The SSC agrees that closure measures should be considered short-term measures.

The SSC continues to believe that it is important to address the cumulative effects of bycatch management measures in a more comprehensive fashion. Bycatch management to date has been based on partial analyses, the cumulative effect of which do not necessarily result in an optimization of Bering Sea fisheries as a whole. Significant limits on our efforts to understand the broader picture are (1) the existing bycatch model is an accounting model ill suited to predicting how fishing effort will be re-allocated based on closure, and (2) our estimates of economic impacts are currently limited to gross revenues; evaluation based on costs and net revenues are necessary.

Comprehensive bycatch management will require significant effort which the Council and cooperating agencies cannot afford at this time. The SSC will appoint a sub-committee chaired by Rich Marasco, to examine information needs for economic impact assessments. This sub-committee will report to the SSC in September.

D-2(b) Crab Bycatch Management and Rebuilding

The AP recommends that the draft EA/RIR for Red King Crab Bycatch in the Bering Sea Trawl Fisheries: Alternatives for Closure Areas" be held until the following deficiencies can be corrected:

1. the bycatch simulation model is completed (documented and software made available to the public) and included in the document,
2. that bycatch rates and numbers and effort be contoured and included, and
3. the domino impacts on other fisheries be documented and incorporated including the direct impacts of the closure area on the yellowfin sole fishery — in narrative if 1995 catch data is available.

Motion passes 10/0/1 abstention

The AP recommends that the Council not renew the emergency rule. The AP feels that the conditions warranting the emergency rule closure of the red king crab savings area no longer exists given that the rocksole, yellowfin sole, Pacific cod, and other flatfish trawl fisheries are closed in Zone 1. As a result, no reason exists to extend the emergency rule for an additional 90-day period. Motion carries 9/0/2 abstentions.

The AP concurs with the Regional Director's suggestion that individual vessel accountability must be pursued. To that end, the AP asks that an IBA discussion paper for the bottom trawl fishery be developed. Motion passes 8/2.

DAVID HILLSTRAND
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HOMER AK 99603
(907) 235-8706



PG#1

Agenda D-2(b)
June 1995
Supplemental

D-2(b) CRAB BYCATCH

1. BY CLOSING THE AREA IN BRISTOL BAY YOU HAVE DECREASED RED CRAB BYCATCH.

A. 1994 217,000 CRAB \times 7 LBS = 1,519,000 MILLION POUNDS

$\times 7^{\text{th}} = \$10,633,000^{\text{th}}$

B. 1995 19,000 CRAB \times 7 LBS = 133,000 POUNDS $\times 7^{\text{th}} = \$931,000^{\text{th}}$

2. YOU NEED TO CLOSE DOWN AN AREA DOWN IN THE UNIMAK BIGHT.

A. 1977-1980 WHEN TRAWLING WAS CURTAILED FROM AND PRIOR TO FOREIGN DRAGGING THE QUOTA WAS CONSISTANT AND REACHED 66,648,954 LBS.

B. TODAY AFTER TRAWLING WAS ALLOWED WE HAVE REACHED A ALL TIME LOW.

C. IF YOU PROTECT THIS STOCK I BELIEVE THE BIOMASS WILL INCREASE BACK TO ~~75~~ 75 MILLION POUNDS.

3. HABITAT; TRAWLING HAS MANY UNKNOWN AFFECTS.

1. SEDIMENT STIRS UP AND RESETTLES UPON VEGETATION, CORALS. COVERI FEED.

2. CRAB WILL BURY THEM SELVES IN MUD; IF A TRAWL IS DRUG OVER THEM THEY ARE DAMAGED. WITH OUT KNOWING THE EFFECTS.

3. BOB OTTO IN KODIAK HAS SAID "FEMALES ARE NOT EASILY TRAWLED"; THEIR EGG CLUSTERS CAUSE THEM TO ROLL, THEY ARE UNABLE TO SWIM UP INTO THE NET.

4. THERE IS TALK ABOUT ROCK AND YELLOW FIN SOLE PREYING UPON RED CRAB SO LETS REMOVE THEM. BOB OTTO HAS SAID "THEY ESCAPE BEING PREY AFTER AGE 2".

5. AFTER LARGE RED CRAB HARVESTS; WHICH EXCEEDED WHAT A HEALTHY BIOMASS OR THRESHOLD COULD HANDLE FOR REPOPULATION. THE ROCK SOLE INCREASE IN NUMBER, IT IS STILL INCREASING.

A. CONTINUE \rightarrow

A handwritten signature in cursive script that reads "David Hillstrand".

D-2 (b) CRAB BYCATCH

Hilton

5.

A. I BELIEVE THE TWO POPULATIONS PREY UPON EACH OTHER. THAT THEY KEEP EACH OTHER IN A BALANCE, THE STOCKS IN CRAB OR SOLE WILL FLUCTUATE BUT NOT COLLAPSE.

B. THIS IS WHY IT IS CRITICAL TO REBUILD AND PROTECT HABITAT.

6. THE TRAWLING INDUSTRY WILL COME TO YOU NOW AND SAY.

A. "WE HAVE A LEGAL RIGHT TO GO IN AND HARVEST SOLE; BECAUSE OF OUR % OF LEGAL CRAB."

B. I WOULD ALLOW FOR A SLIGHT ADJUSTMENT TO THE AREA. BUT NOT WITH THE ARGUMENT OF. "WE HAVE MORE BARIDI AND HALIBUT BYCATCH WHEN YOU FORCE US OUT." THE PROBLEM IS BYCATCH.

7. THESE AREAS ARE CLOSED WITH FISH STILL TO HARVEST. I WOULD ENCOURAGE LONGLINING FOR AND POT FISHING FOR COD.

A. YOU WILL NEED TO SPLIT THE BYCATCH BETWEEN EACH GEAR TYPE. TRAWL, LONGLINE, AND POTS

8. IF MORE BYCATCH OF HALIBUT AND BARIDI ARE OCCURRING WE NEED TO TAKE CARE OF THAT ALSO.

A. IF NOT YOU WILL HAVE ANOTHER GROUP OF CRABBERS AND LONGLINERS HAVING AN EMERGENCY MEETING.

David Killstrom

F/V ZOLOTOI

DATE: April 16, 1995

TO: Mr. Rick Lauber, Chairman
North Pacific Fishery Management Council
P.O. Box 103136
Anchorage, AK 99501

FROM: Gordon Blue
managing partner,
F/V ZOLOTOI
F/V OCEAN CAPE

RE: AGENDA ITEM D-2 (b) BERING SEA / ALEUTIAN ISLANDS CRAB BYCATCH. THE NEED FOR TIME AND AREA CLOSURES IN THE GROUND FISH FISHERIES TO PROTECT KING AND TANNER CRAB STOCKS.

SUMMARY:

Daily reporting was shown to provide the means necessary to impose the intent of the Council to constrain fisheries within PSC limits in the 1995 Rock Sole fishery in Zone 1.

Taken by itself timely reporting and closures by NMFS to protect caps would have resulted in dramatically lower total retained catch of Rock Sole in 1992, 1993 and 1994.

The area closure provided a dramatic reduction in observed bycatch of Red King Crab. Less than 14% of the number of animals reported for 1994 was reported for 1995.

The emergency action taken in 1995 to protect King Crab stocks in Bristol Bay produced benefits to those stocks as well as to the Rock Sole fishery. This emergency action is good regulation, and should be made permanent.

The catch data of the Rock Sole fishery should be analyzed to determine areas of greatest historical bycatch of Halibut. This information should be considered by the Council to determine whether Halibut Protection areas can be of benefit in reducing bycatch of Halibut.

Hot-spot identification and closure; deductions of excess bycatch from the following year cap; reduced caps and caps on additional species; individual Vessel incentives and sanctions on bycatch; and changes in timing of fisheries are all potentially valuable tools to augment the benefits of daily catch reporting and closure of areas of high historic bycatch. The Council should continue to develop these tools.

TDX DOCK

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DISCUSSION:

In November 1994 the Council initiated emergency action to protect Red King Crab stocks in Bristol Bay from bottom trawl mortality effects, observed and unobserved, in order to provide for the possibility of rebuilding these stocks.

The emergency action encompassed two separate, and vital, factors.

- The daily reporting and recording of catch and bycatch data allowed the fishery to be closed at the cap on bycatch intended by the Council. Prohibited Species Caps were widely exceeded in each of the previous three years.
- The area closure provided a dramatic reduction in observed bycatch of Red King Crab. Less than 14% of the number of animals reported for 1994 was reported for 1995.

These factors are recorded on the table which follows.

The distinction between the reporting requirement and the area closure allows the results to be compared with previous years results without confounding the effects of these two different actions. In previous years NMFS managers failed to protect stocks of prohibited species as mandated by the council. What would the result have been, in tons of directed fishery catch, if the caps had been observed in the years 1992 through 1994? This information can be derived from the weekly reports of catch and bycatch available from the NMFS data. This result is in the right -hand column of the following table, for each of the bycatch species. For each week of the fishery, the reported bycatch was tabulated. For the week in which bycatch exceeded the cap, the catch was constrained in ratio of the remaining bycatch available before the cap to the total bycatch actually reported that week. For any remaining weeks, catch was disallowed. This yields an approximation of the effect of daily catch reporting. This result appears in the right hand column titled "CATCH @ CAP, interpolated."

- Daily reporting was shown to provide the means necessary to impose the intent of the Council to constrain fisheries within PSC limits, in the 1995 Rock Sole fishery in Zone 1. Taken by itself timely reporting and closures by NMFS to protect caps would have resulted in dramatically lower total retained catch of Rock Sole in 1992, 1993 and 1994.

The additional protection of King Crab stocks afforded by the closure area benefits the directed fishery as well as the stocks of crab within the closure area. The 1995 fishery closed at a higher catch of Rock Sole than in any of the previous three years, had bycatch caps been enforced.

The 1995 fishery continued into a sixth week, in each of the previous three years the fishery closed in the fifth week. This slowing of catch allowed more responsive management, and also produced the benefit to industry of higher roe recovery rates in the fishery. This resulted as more female Rock Sole with mature roe aggregated prior

to spawning. Although the biological effect on Rock Sole of trawling on spawning stocks has not been assessed, the more mature roe was certainly of higher commercial value. The hallmark of good regulation is that it produces benefits to both the public-at-large (in this case, the crab resource) and to the segment of industry regulated.

- The emergency action taken in 1995 to protect King Crab stocks in Bristol Bay produced benefits to those stocks as well as to the fisheries the action impacted. This emergency action is good regulation, and should be made permanent.

The 1995 fishery was closed by attainment of the cap set for Halibut. The NMFS catch data should be analyzed to show those areas of most historical sensitivity to bycatch of halibut. The 1995 fishery showed that the industry is able to take large amounts of high quality product outside of the accustomed ground. As the Rock Sole resource is apparently increasing, the ground covered by the resource can be expected to increase as well. This presents the opportunity to take the catch of Rock Sole outside the areas of greatest bycatch.

- The catch data of the Rock Sole fishery should be analyzed to determine areas of greatest historical bycatch of Halibut. This information should be considered by the Council to determine whether Halibut Protection areas can be of benefit in reducing bycatch of Halibut.

These regulations are of value in assuring compliance with caps, and in helping industry to maximize catch while doing so. They are not a complete articulation of the benefit of responsible fishing practice. If Industry wishes to maximize catch in the directed fisheries, it must continue to explore means of reducing impacts on non-target animals - both within the species sought, and among species affected as bycatch. In 1994, the fifth week of the fishery produced record bycatch of King Crab. The potential for this sort of occurrence is reduced by daily reporting, but not eliminated. Rather than a haul-by-haul reporting requirement, Industry needs to be encouraged to take responsibility for reducing bycatch.

- Hot-spot identification and closure; deductions of excess bycatch from the following year cap; reduced caps and caps on additional species; individual Vessel incentives and sanctions on bycatch; and changes in timing of fisheries are all potentially valuable tools to augment the benefits of daily catch reporting and closure of areas of high historic bycatch. Means of bringing these tools to bear should continue to be considered by the Council.

In the 1995 Rocksole fishery in Zone 1 of the Bering Sea, two new management tools were brought to bear by emergency action.

1) The timely reporting and processing of data on catch and bycatch was mandated.

This provided a mechanism to actually implement bycatch caps at the levels intended by the Council.

2) The most sensitive areas of crab bycatch were identified, and were closed to trawling.

This diverted trawl effort from areas of sensitive crab habitat (where female crab are known to gather to molt and spawn), promoting crab stock recovery.

Only 13.7% of the observed bycatch of red king crab experienced in the 1994 fishery occurred.

The emergency rule, including area closure and timely reporting requirements, must be made permanent.

Not only were bycatch caps followed, and spawning crab stocks protected as intended, but the directed fishery accrued certain real benefits.

1) The catch of rocksole was maximized. By fishing outside the area of highest king crab bycatch, the fishery attained a higher tonnage before reaching a cap.

This is shown in the right hand column, below.

2) The fishery lasted longer, which lead to more mature roe. This resulted in higher recovery rate of the product desired, and increased market value.

This emergency rule is good regulation. It produced benefits to all user groups and to the habitat as well.

The areas of high halibut bycatch should also be identified.

Closure of the most sensitive areas of halibut bycatch could well yield even greater benefit to the directed fishery.

Rocksole Fishery, Bering Sea Groundfish Harvest (MT)

	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	TOTAL	CATCH @ CAP, interpolated
1992	6,910	6,381	6,127	10,847	6,404	-	36,668	25,342
1993	4,201	14,180	11,869	14,253	6,953	-	51,456	23,042
1994	3,533	10,290	6,806	9,069	12,368	-	42,066	36,549
1995	1,381	3,424	8,811	11,413	10,415	2,155	37,600	37,600

Rocksole Fishery, Bering Sea Red King Crab Bycatch

Zone 1 cap on bycatch is 110,000 animals; assumed mortality 100%

	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	TOTAL	%of cap	110,000 animal cap induced Catch factor if constrained
1992	14,634	11,268	7,179	10,000	2,321	-	45,402	41%	
1993	43,568	57,988	21,505	9,290	3,101	-	135,452	123%	0.392653 of week 3, none of 4,5
1994	9,373	29,346	7,835	25,259	68,934	-	140,747	128%	0.553965 of week 5
1995	5,374	6,675	4,072	2,488	430	302	19,341	18%	

Rocksole Fishery, Bering Sea Bairdi Tanner Crab Bycatch

Zone 1 cap on bycatch is 475,000 animals; assumed mortality 100%

	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	TOTAL	%of cap	475,000 animal cap induced Catch factor if constrained
1992	83,267	110,336	72,883	85,611	114,939	-	467,036	98%	
1993	27,827	43,817	57,761	129,489	76,370	-	335,264	71%	
1994	11,469	55,358	84,948	57,084	99,440	-	308,299	65%	
1995	2,855	11,590	15,001	123,291	124,081	27,409	304,227	64%	

Rocksole Fishery, Bering Sea Halibut Bycatch (MT)

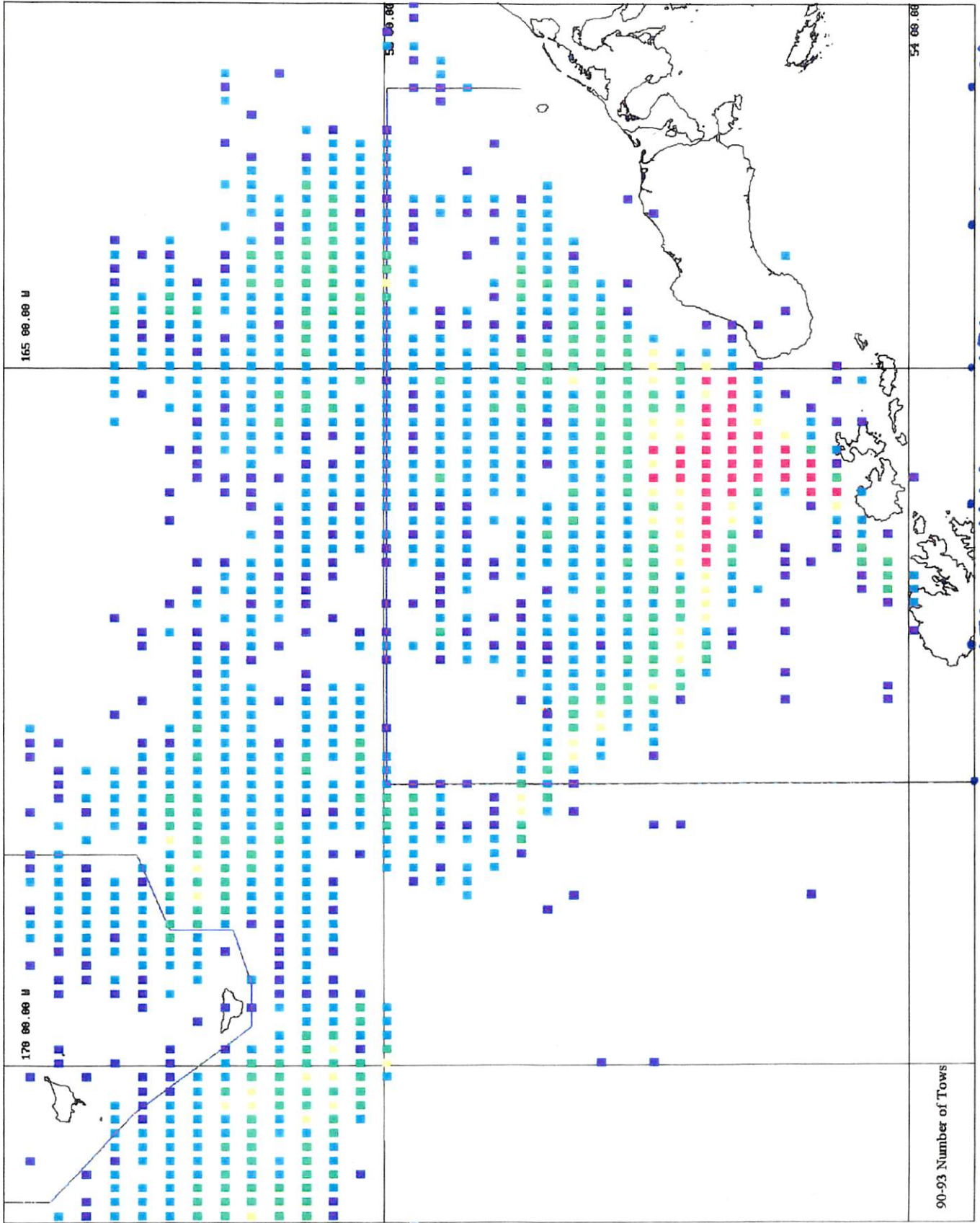
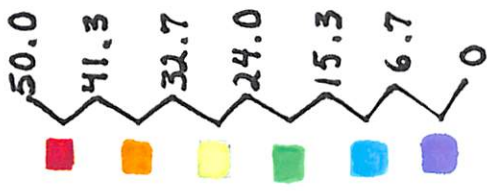
First trimester cap on bycatch is 428 MT; assumed mortality 70% for 1992-94; 75% for 1995

	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	TOTAL	%of cap	428 Metric Ton cap - Catch factor if constrained
1992	95.85	106.74	99.05	231.35	120.05	-	653.04	153%	0.546185 of week 4, none of 5
1993	33.52	141.16	119.02	151.33	82.00	-	527.03	123%	0.887464 of week 4, none of 5
1994	21.49	35.04	26.92	86.77	126.56	-	296.78	69%	
1995	11.19	22.06	41.91	107.60	205.08	31.13	418.97	98%	

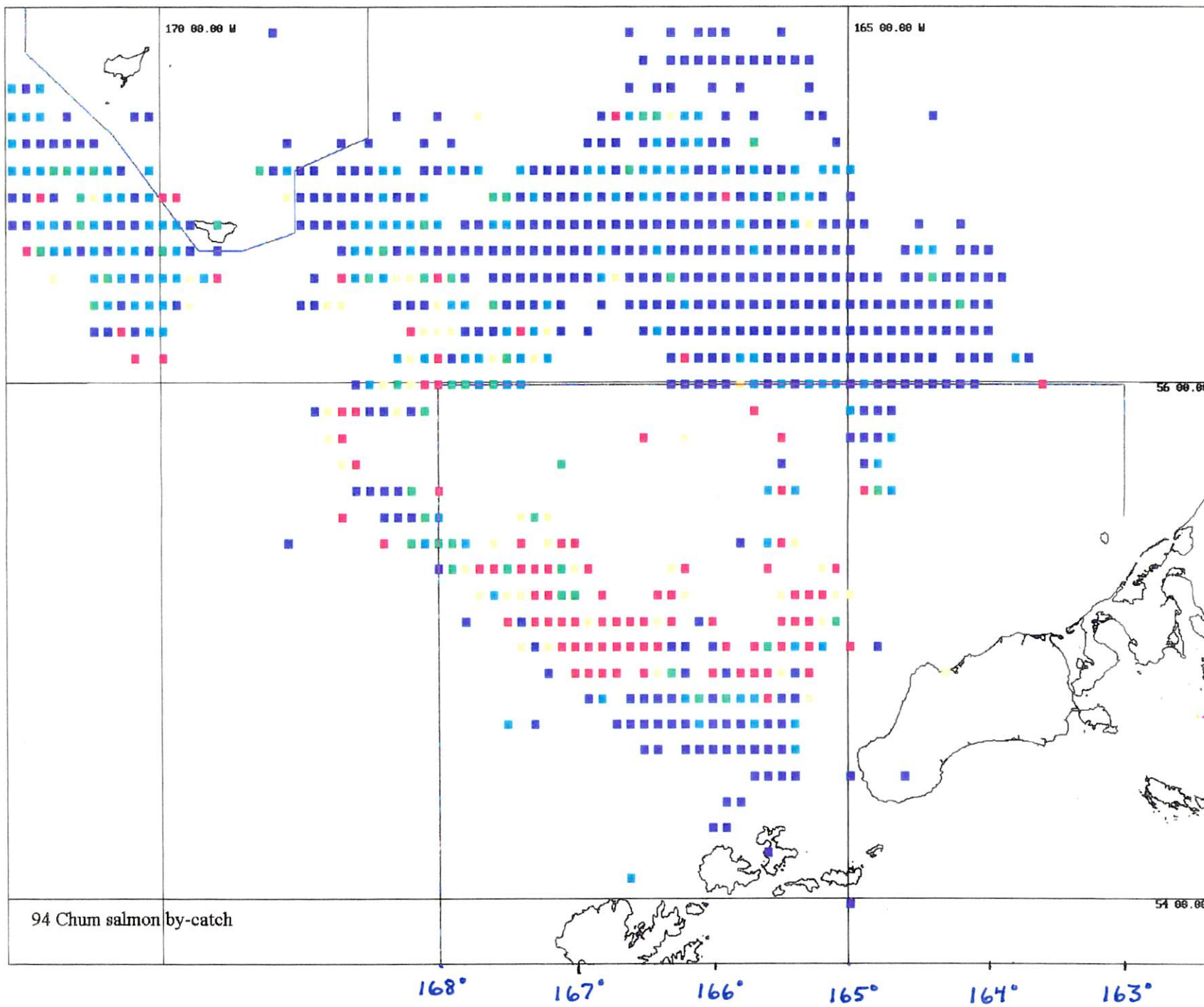
All figures are from NMFS; 1995 as of March 3.

These two columns are derived from NMFS figures.

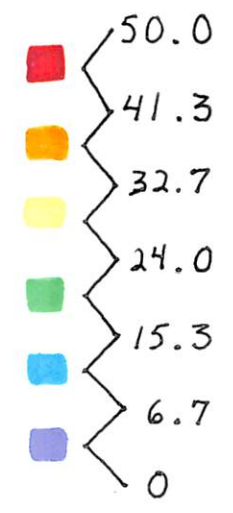
Scale for
of Tows



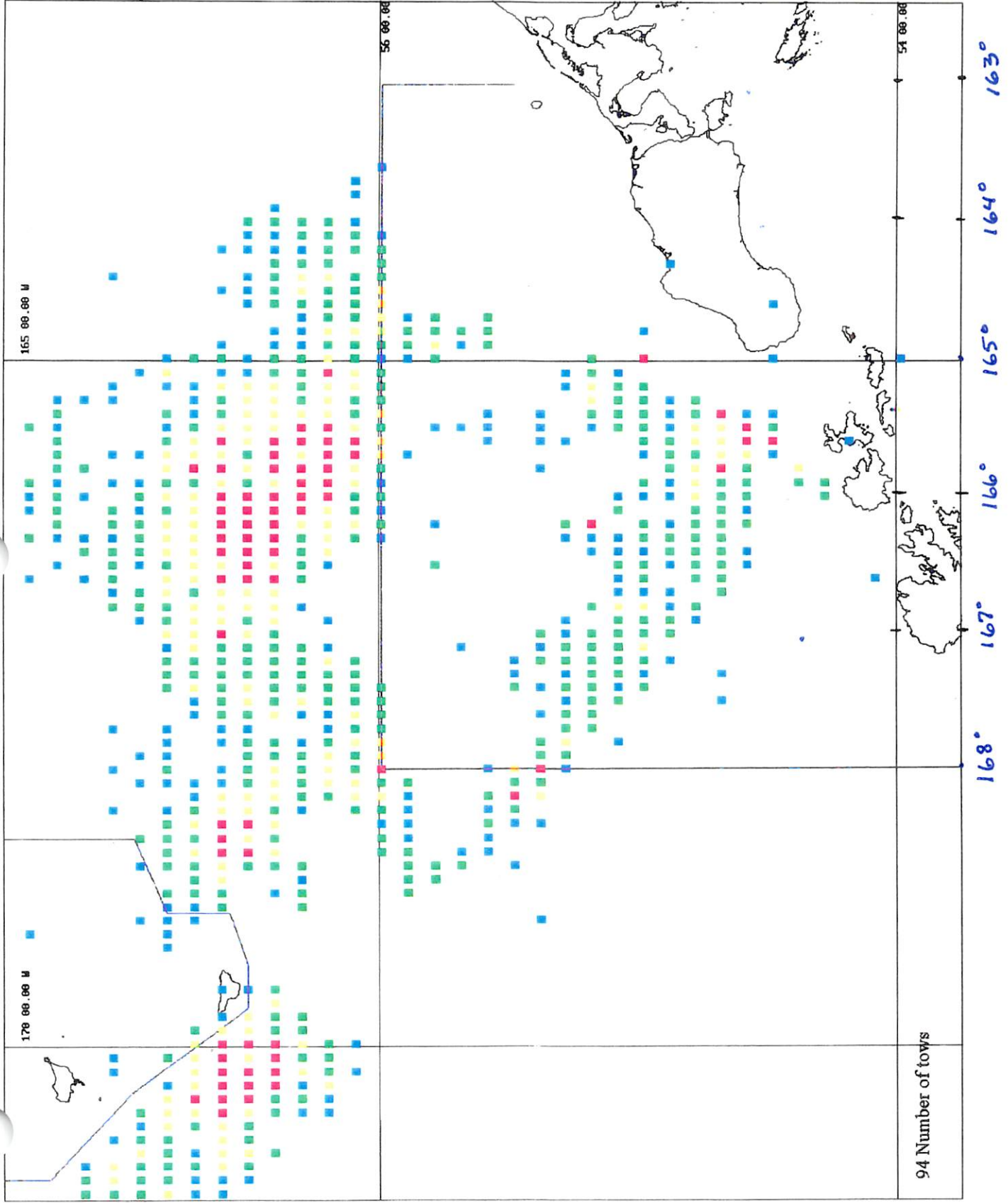
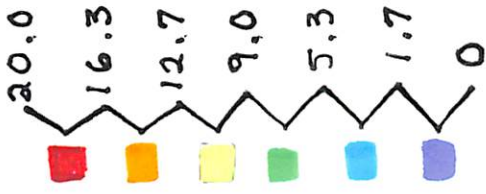
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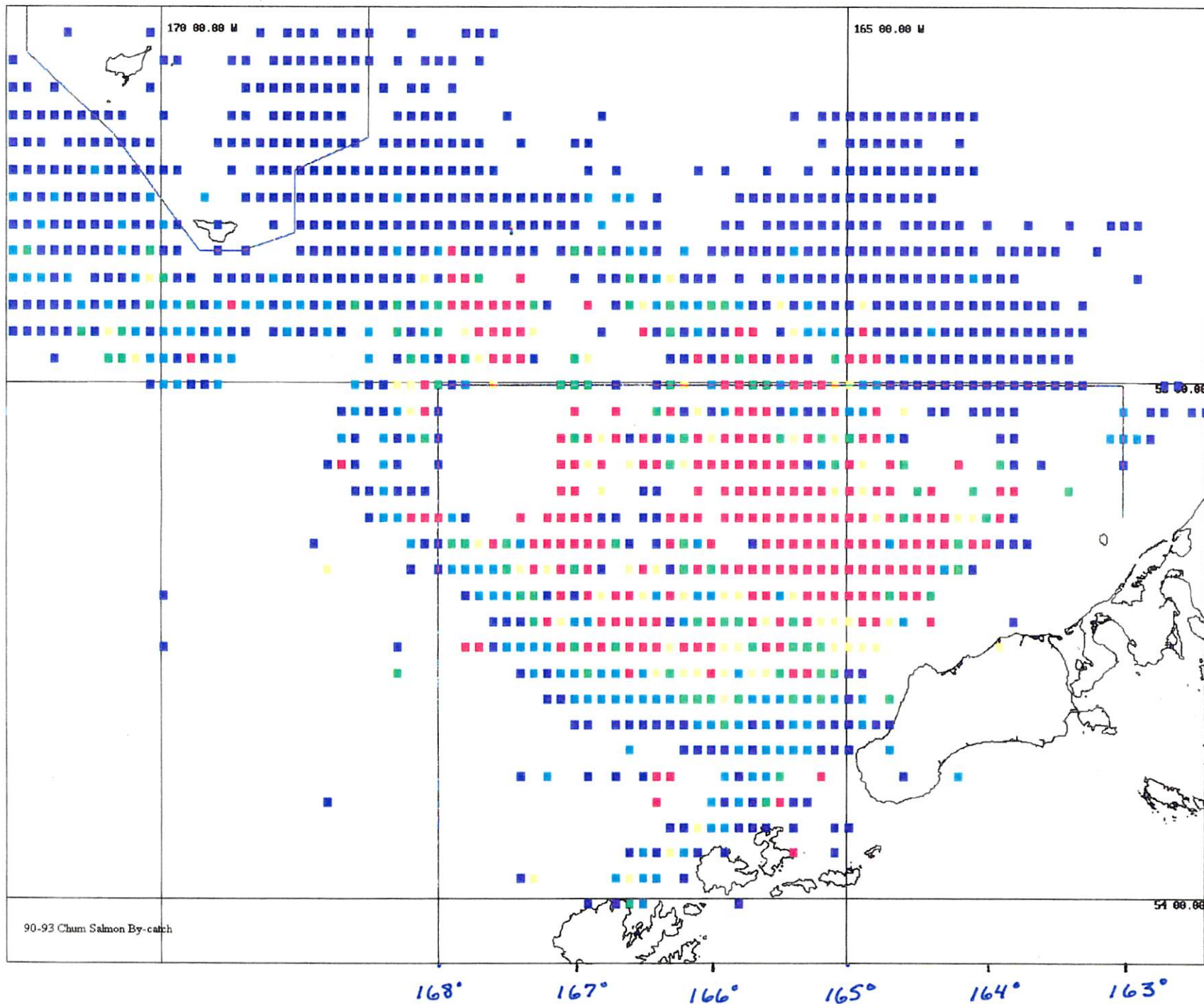


Scale for
Chum Salmon
Bycatch



Scale for
of Tows





Scale for
Chum Salmon
Bycatch

