

**REPORT OF THE
INTERNATIONAL PACIFIC HALIBUT COMMISSION**

APPOINTED UNDER THE CONVENTION BETWEEN CANADA AND THE
UNITED STATES OF AMERICA FOR THE PRESERVATION OF THE
NORTHERN PACIFIC HALIBUT FISHERY

NUMBER 46

**REGULATION AND INVESTIGATION
OF THE PACIFIC HALIBUT FISHERY
IN 1967**

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FOREWORD

The terms of the 1953 Convention between the United States and Canada for the Preservation of the Halibut Fishery of the Northern Pacific Ocean and Bering Sea provide that the International Pacific Halibut Commission shall publish a report of its activities and investigations from time to time.

The present report, the forty-sixth published by the Commission, is the twenty-first of a series of annual reports that was begun in 1947 to provide a summary of the Commission's activities and results of its investigations during the year.

Those desiring additional background information on the Commission's activities are referred to earlier reports.

**REGULATION AND INVESTIGATION OF THE PACIFIC
HALIBUT FISHERY IN 1967**

By
INTERNATIONAL PACIFIC HALIBUT COMMISSION

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INTRODUCTION

Commercial halibut fishing began in the northeastern Pacific Ocean in 1888 off the coasts of Vancouver Island and Washington Territory. Unrestricted fishing during the ensuing 25 years severely reduced the stocks on the grounds as far northward as southeastern Alaska. With expansion of the fishery to the Gulf of Alaska in 1913 and further westward in subsequent years, the intensive exploitation of the stocks continued and the industry including both the fleets and the dealers began expressing concern about overfishing and depletion and advocated some type of international control. Their efforts culminated in a Convention signed on March 2, 1923 between the Dominion of Canada and the United States of America.

The 1923 Convention established a closed season between November 16 and February 15 to protect spawning halibut, and further provided for the creation of the International Fisheries Commission consisting of two members from each country to investigate the fishery and propose measures for its preservation.

A new Convention in 1930 recommended by the International Fisheries Commission provided the Commission with broadened authority to change or abolish the closed season; to divide convention-controlled waters into areas and limit the catch from each; to license and regulate departures of vessels; to collect statistics; to specify type of gear to be used; to close grounds populated by immature halibut; and to conduct necessary investigations upon the life history of halibut. Each country was to be responsible for the proper observance and enforcement of any regulations.

A subsequent Convention signed in 1937 also provided for control of halibut caught incidentally while fishing for other species in areas closed to halibut fishing and for limiting the departure of vessels for areas in which the catch limits were about to be taken.

The most recent Convention signed in 1953 changed the name of the Commission to the more definitive International Pacific Halibut Commission and increased the composition of the Commission to three members from each country. It provided authority to establish one or more open or closed seasons each year in any area. It also specifically provided that all regulations be based on the results of scientific investigations and also that the Commission be charged with the responsibility of developing and maintaining halibut stocks at levels which would permit the maximum sustainable yields.

The annual catch of halibut, which without regulation had declined to about 44 million pounds by 1931, responded to management and was steadily increased to provide a record catch of 75 million pounds by 1962. Such high catch levels exceeded the productivity in some areas causing the catch per unit effort to decline. Fishing intensities and removals in recent years have been reduced in some areas to return the stocks to their respective optimum levels.

Canadian members of the Commission in 1967 were: Mr. Martin K. Eriksen, Prince Rupert, British Columbia, Chairman; Dr. William M. Sprules, Ottawa, Ontario; and Mr. Francis W. Millerd, West Vancouver, British Columbia. United States members in 1967 were: Mr. Harold E. Crowther, Washington, D.C., Vice Chairman; Mr. Haakon M. Selvar, Bainbridge Island, Washington; and Mr. L. Adolph Mathisen, Petersburg, Alaska. The Chairmanship and Vice Chairmanship alternate between the two countries in successive years.

CONDITION OF THE RESOURCE, 1967

The normal pattern of the fishery was severely disrupted throughout 1967 by the May tie-up of the Canadian halibut fleet due to a labor dispute. The total catch reached a 23-year low of 55.6 million pounds, 6.7 million under the amount taken in 1966 with the removals reduced from all areas except Bering Sea. Due to the decline in catch along with a sharp decline in prices, the value of the 1967 catch to the combined fleets of \$12,500,000 was much below the near-record total of \$20,500,000 in 1966.

The 1967 catch from Area 2 including all grounds south of Cape Spencer, was 3 million pounds under the 23-million-pound catch limit due to the May tie-up of the Canadian fleet. The season closed on October 15 as provided by the regulations. An increased catch per unit effort on some grounds more than offset declines on others and continued the slight upward trend of the past four years in the area as a whole. The age composition also showed some improvement except for a persistent over-dependence on young fish on some grounds. However, the extent of the improvement in Area 2 does not seem commensurate with the sharp reduction that has been made in the removals during the past decade.

The 1967 catch from Areas 3A and 3B including all grounds west of Cape Spencer exclusive of Bering Sea was 33.2 million pounds, 3.3 million pounds below the combined catch limits of 36.5 million pounds for the two areas. An increased United States catch was more than offset by the sharp reduction in the Canadian total due to the labor dispute.

The age composition and catch per unit effort both in Areas 3A and 3B continued to show some improvement with increases in the catch per unit effort on some sections more than offsetting declines on others. Notwithstanding the generally satisfactory stock conditions, the recent increase in foreign trawling may be affecting the adult and juvenile halibut populations in the region to some limited but cumulative degree.

The fishery in Bering Sea which was not affected by the Canadian labor dispute produced a catch of 2.4 million pounds taken mostly from Area 4A in the spring and from the northeastern portion of Area 4D in the fall and was double the total catch of 1966. The more adequate 1967 data on age composition and catch per unit effort confirmed the continued improvement in stocks that had been suggested by the sparse data available in 1965 and 1966. However, since the important Polaris and Clipper grounds in Area 4A are far from recovered from the excessive fishing of 1963, close controls are required to assure continuation of the rehabilitation process.

ACTIVITIES OF THE COMMISSION

During 1967 the Commission continued its program of statistical and biological observations which provide the basis for the regulation of the fishery according to scientific principles as required by the 1953 Convention.

The Commission held its Forty-third Annual Meeting in Seattle, Washington from 31 January to 3 February 1967 during which the effects of regulation on the fishery during 1966 were examined, administrative and budgetary matters were reviewed, the industry and staff were consulted regarding the management of the fishery, and regulations were adopted for 1967.

At the first session on 31 January the Commission held a closed meeting to

approve the Provisional Order of Business and to discuss the program for the public session. At the afternoon session the scientific staff reviewed the condition of the various stocks and of the fishery and presented proposals for regulation of the fishery in 1967 to the joint session of the Commission and representatives of all segments of the Pacific coast halibut industry and other invited observers.

On 1 February the Commission met with the Director and biologists of the staff to consider various administrative and fiscal matters and to approve the research plans for 1967 and the budget for 1968.

Representatives of the dealers and the Conference Board, which consists of delegates from vessel owners and union organizations from all major halibut ports, met with the Commission in a joint session on the morning of 2 February to discuss regulatory and other proposals from the industry.

Regulatory proposals recommended by the staff and industry were examined during the afternoon session held on 2 February and regulations for the 1967 season were adopted. A press release listing the important features of the regulations being recommended to the two governments for the 1967 fishing season was released immediately for the information of the industry and public. Further administrative matters were dealt with on 3 February at the last session of the 1967 Annual Meeting.

During the fishing season the Commission kept a detailed and current account of the landings of halibut from each area. Announcements were made from time to time on the cumulative catches from each regulatory area. Due to the May tie-up of the Canadian fleet all areas closed on dates provided in the regulations rather than on dates on which the Commission deemed the respective catch limits would be reached.

The Commission held a Special Meeting in Seattle, Washington on 21 September 1967 to consider the results of the halibut fishery in the Bering Sea in 1967 and to develop proposals for the regulation of that fishery in 1968. Results of investigations in that area and condition of the stocks were reviewed with the staff and representatives of all segments of the United States and Canadian halibut industry concerned with the halibut fishery in Bering Sea.

Proposals recommended by both the staff and industry were examined and regulations under consideration by the Commission for Bering Sea in 1968 were transmitted to the Governments of Canada and United States.

Scientists of the Canadian and United States national sections of the International North Pacific Fisheries Commission met with those of the Halibut Commission on 20 September prior to the Special Meeting to discuss the condition of the halibut resource in Bering Sea.

In addition to the Annual Report for 1966, Report No. 44, three scientific reports were published by the Commission in 1967. Several technical papers were prepared at the request of the Canadian and United States national sections of the International North Pacific Fisheries Commission. Titles of reports and technical papers prepared in 1967 are given at the end of this report.

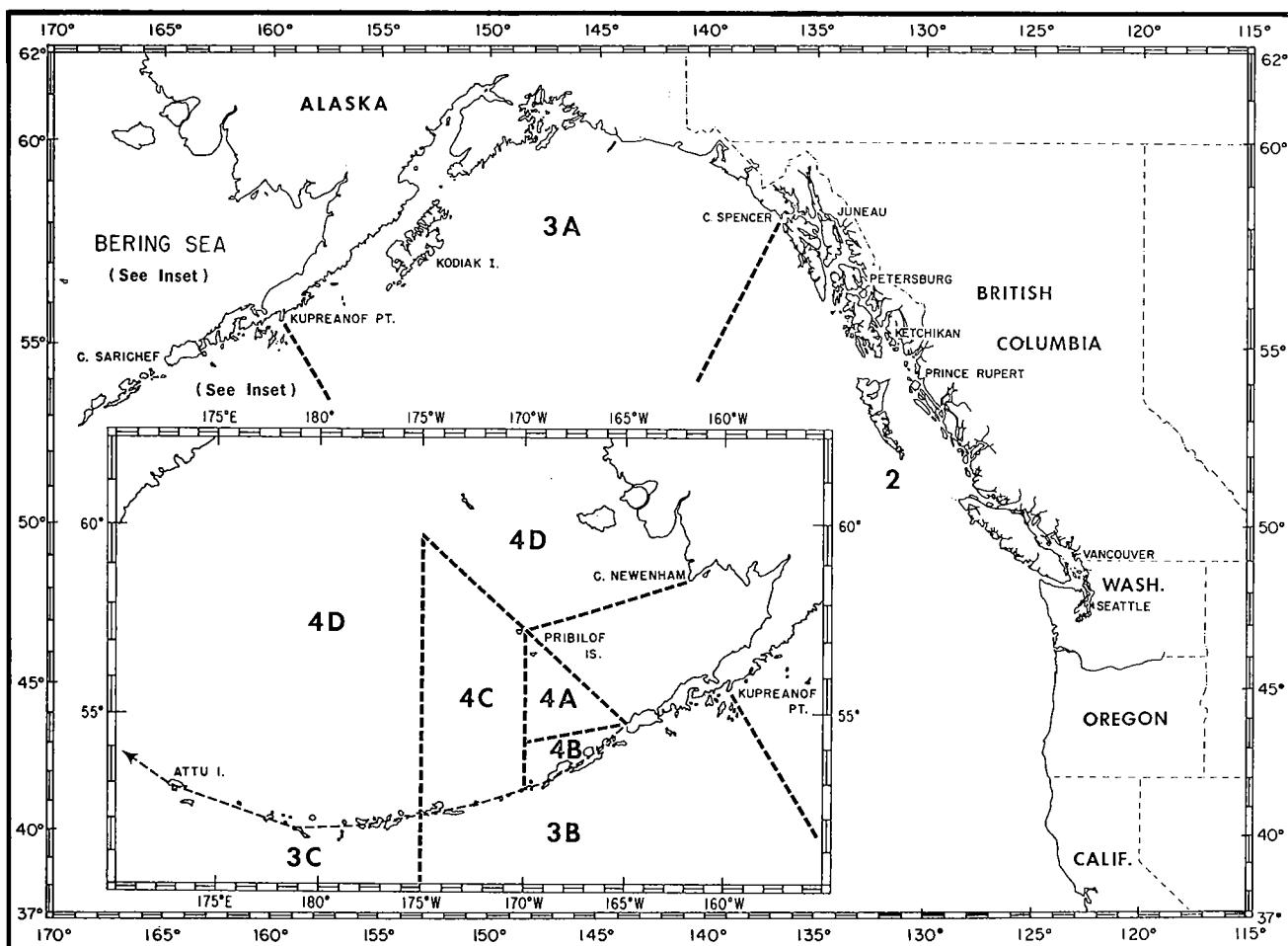


Figure 1. Pacific Coast of North America showing regulatory areas defined by the International Pacific Halibut Commission in 1967.

REGULATION IN 1967

The Pacific Halibut Fishery Regulations adopted by the Commission for 1967 were approved by the Governor General of Canada on March 16 and by the President of the United States of America on March 23, at which time they became effective. As in the previous five years, these regulations also implemented on behalf of Canada and the United States the conservation measures recommended by the International North Pacific Fisheries Commission for eastern Bering Sea. However, the 1967 regulations of the Halibut Commission prohibited the taking of any halibut by trawl net gear by Canadian and United States vessels throughout Bering Sea.

Important changes in the 1967 regulations included the incorporation into Area 2 of the convention waters south of Willapa Bay, Washington formerly designated Area 1, the designation of the former Area 4E as a nursery area and its closure to all halibut fishing, and the elimination of the 10-day first season in Area 3B.

Regulatory Areas

The regulatory areas in 1967, shown in Figure 1, were as follows: Area 2 – the convention waters south of Cape Spencer, Alaska; Area 3A – the waters off Alaska between Cape Spencer and Kupreanof Point near the Shumagin Islands; Area 3B – the waters south of the Alaska Peninsula and the Aleutian Islands between Kupreanof Point and the meridian of 175° W.; Area 3C – the waters south of the Aleutian Islands and west of 175° W.; Area 4A – the waters encompassing the 100-fathom edge lying east of 170° W. and south of a line between Cape Sarichef and Cape Navarin; Area 4B – the waters along the Bering Sea side of the Aleutian Islands east of the meridian of 170° W.; Area 4C – the waters in the region south of a line between Cape Sarichef and Cape Navarin between 170° W. and 175° W.; Area 4D – all of the waters lying north of the Aleutian Islands and west of 175° W. and those waters lying east of 175° W. and north of a line between the Pribilof Islands and Cape Newenham.

Catch Limits

The catch limits in 1967 were 23,000,000 pounds for Area 2, and 33,000,000 pounds for Area 3A, and 3,500,000 pounds for Area 3B. The removals from Area 3C and the four regulatory areas in Bering Sea were effectively controlled by providing stated time periods of fishing for each area.

Lengths of Seasons

The 1967 halibut fishing season in Areas 2, 3A and 3B, the three catch-limit areas, opened on May 9 with the majority of the Canadian fleet tied up in port on account of an involved dispute that included owner-crew, union jurisdictional and lockout problems. This reduced the availability of fishing power and seriously disrupted the pattern of the halibut fishery in all areas for the year. The catch limit was not taken in any area. The fishing seasons in Areas 2 and 3A terminated on October 15 as provided in the regulations after legal fishing periods of 159 days in each area. Area 3B was closed on November 15 as prescribed by the regulations after a legal fishing period of 190 days.

Area 4A, the edge grounds between Unimak Pass and the Pribilof Islands, was opened to halibut fishing on April 3 and closed on April 17, as required by the regulations, providing a 14-day fishing period compared to 9 days in 1966. This

further increase in fishing time in 1967 was justified by indications that the stocks were continuing to respond favorably to the drastic restrictions placed on the fishery in 1965 and 1966. The moderate relaxation also permitted a better evaluation of the resource without jeopardizing the continuation of the rehabilitation process.

Area 4B, the Fox Islands grounds, was opened on September 1 for a 9-day period.

Area 4C, the edge between Pribilof Islands and 175° West longitude, was opened on March 29 and closed on April 22, providing a 24-day fishing period. This is a reduction of 63 days from the 87 fishing days provided in 1966. Until more is known of the size and distribution of the more limited halibut population in this section of the region, precautions must be taken to prevent any possible overfishing as occurred in 1963 in Area 4A, then referred to as the Triangle. A similar precautionary measure had been under consideration by the Halibut Commission for 1966 but it had not received the necessary unanimous support of the North Pacific Commission at that time.

Area 3C, south of the Aleutian Islands west of 175° West longitude, and Area 4D in western and northeastern Bering Sea opened on March 29 and closed on November 15, providing 229 days of fishing. Due to the great distances from outfitting and landing ports these areas have a limited attraction to North American halibut setline vessels. The long seasons in these distant areas are designed to permit some exploration of the resource in the area by setline gear.

REGULATION IN BERING SEA

The joint management of the halibut resource in Bering Sea east of 175° West longitude since 1963 by the International Pacific Halibut Commission of Canada and United States and the International North Pacific Fisheries Commission of Japan, Canada and United States referred to herein as the Halibut and North Pacific Commissions respectively, can now be viewed in light of the more significant events that have occurred during the past five years.

In November 1962 halibut in eastern Bering Sea was removed by the North Pacific Commission from abstention by Japan under the Annex of the International Convention for the High Seas Fisheries of the North Pacific Ocean under which Convention the aforementioned North Pacific Commission functions.

In the spring of 1963 the North Pacific Commission initiated conservation measures for halibut and set a catch limit of 11 million pounds for the important edge grounds between Unimak Pass and the Pribilof Islands that came to be commonly designated as the "Triangle". The remainder of eastern Bering Sea was open to halibut fishing without catch limit from 25 March to 15 October. The retention of halibut taken by net trawl gear was prohibited in southeastern Bering Sea.

In 1963 United States and Canadian vessels fished in the Triangle from late March to early May prior to the opening of Area 3A to fishing. Japanese vessels commenced fishing in early May upon ratification of the removal of the abstention provision with respect to the halibut of eastern Bering Sea. Their operations in the Triangle terminated about mid-July, probably because of the scarcity of fish which developed. During September and October a number of North American vessels revisited the Triangle without success. In all, the fleets of the three countries took 10.9 million pounds of the catch limit.

On the edge between the Triangle and 175° W. longitude, which came to be commonly referred to as the "Corridor", 1.8 million pounds were taken in 1963 by the three nations.

In the fall of 1963 the North Pacific Commission recommended that the catch limit in the Triangle be reduced to 6,393,340 pounds (2900 metric tons) in 1964.

In the spring of 1964 very poor fishing was encountered in the Triangle and only 2.1 million pounds of the 6.4 million pound catch limit was taken. The halibut population had been decimated by the excessive fishing in 1963 superimposed on the already heavy removals in prior years by North American vessels.

The 1964 catch from the Corridor totalled 611,000 pounds and the catch per unit effort showed a sharp decline due to the large removal in 1963.

In view of the excessive reduction in the halibut population in the Triangle as well as the severity of the economic impact upon the Canadian and United States fleets, the Halibut Commission held a Special Meeting in June 1964. Subsequently, Canada and the United States were advised that on the basis of scientific observations it might become necessary for the Halibut Commission to recommend to Canada and United States the closure of the Triangle in 1965.

Further examination of the scientific data in October 1964 led the Halibut Commission to announce that it was considering recommending to Canada and United States that the Triangle open for five days of fishing in 1965, but that if such limited fishing could not be provided the Halibut Commission had under consideration recommending that the Triangle remain closed to halibut fishing in 1965. While these measures were regarded as drastic, the need for rebuilding the halibut population in the region was considered urgent by the Halibut Commission.

In the Corridor, although the large removals of 1963 had caused a sharp reduction in the stock, the conditions were not as precarious as in the Triangle.

The conservation measures for 1965 subsequently arrived at by the North Pacific Commission in the fall of 1964 provided for a 7-day fishing season in the Triangle in 1965 and also reduced the fishing season in the remainder of eastern Bering Sea including the Corridor to 87 days to close on 20 June.

In 1965 the United States and Canadian fleets caught about 1.0 million pounds in eastern Bering Sea of which about one half was taken in the Triangle. There were indications that the halibut population in the Triangle had responded favorably to the reduced removal in 1964. There was no Japanese catch in the Triangle and only a nominal amount elsewhere in eastern Bering Sea.

In the Corridor it appeared that the catch per unit effort and the age composition were being well sustained in view of the reduction in removals in 1964 from the 1963 level.

In November 1965 the Halibut Commission held a Special Meeting and thereafter advised Canada and the United States that in light of its scientific findings in Bering Sea it had under consideration various specific proposals for regulation of the halibut fishery in the region in 1966 including:

- a. prohibiting in all of Bering Sea the retention of halibut caught by trawl gear and of all halibut below 66 centimeters;
- b. extending the fishing period in the Triangle to 9 days;

- c. separating the Fox Islands grounds from the Triangle area and provide a 9-day fishing period in September for the new area;
- d. designating the region between 170° and 175° West longitude that had been commonly referred to as the Corridor as a regulatory area and reducing the fishing period within that area to 21 days;
- e. providing for setline halibut fishing in the remainder of Bering Sea to 15 November rather than terminating on 20 June as in the 1965 regulations.

The conservation measures for 1966 subsequently enacted by the North Pacific Commission concurred with extending the fishing season in the Triangle to 9 days and in providing a 9-day fall fishing period on the Fox Islands grounds and with extending setline fishing in the remainder of Bering Sea to 15 November. Reduction in the length of season in the Corridor to 21 days from 87 in 1965 failed to receive the unanimous approval of the North Pacific Commission. While there was agreement to prohibit the retention of halibut below 66 centimeters throughout Bering Sea, the prohibition against retention of trawl-caught halibut was applicable only to eastern Bering Sea but not including the northeastern section of the region before 20 June.

In 1966 the United States and Canadian fleets caught about 1.1 million pounds in Bering Sea of which 219,000 was taken on the edge in what hitherto was the Triangle and 232,000 from the Fox Islands section of the former Triangle. In the Corridor the catch was 312,000 pounds and in northeastern Bering Sea 346,000 pounds. The 1966 catches from the Triangle and the Corridor were much below early expectations due to a labor dispute that tied up the United States fleet in the spring.

Though based on limited data as in 1965, it appeared that the rehabilitation of the halibut population in the Triangle was continuing and that stock conditions in the Corridor remained satisfactory.

In September 1966 the Halibut Commission reviewed the scientific evidence regarding the condition of the halibut population in Bering Sea and subsequently advised Canada and United States that it had under consideration the following changes in regulation for 1967 with respect to Bering Sea:

That retention of trawl-caught halibut be prohibited throughout Bering Sea; that the fishing period in the Triangle be extended to 14 days in 1967 from the 9 in 1966; that as a precautionary measure the fishing period in the Corridor be reduced from 87 days to 24; and that for the Fox Islands grounds the period be increased to 12 days from the 9 prevailing in 1966 to permit more adequate appraisal of the conditions in the area.

At a meeting in November 1966 the North Pacific Commission concurred with the changes that the Halibut Commission had under consideration except for increasing the length of season on the Fox Islands grounds and for prohibiting retention of trawl-caught halibut throughout Bering Sea.

In 1967 the Canadian and United States catch from Bering Sea totalled 2.4 million pounds and fishing was well distributed between areas and within areas in the region. The catch per unit effort based upon more adequate data in 1967

confirmed the improvement in the resource that had been suggested by the limited data in 1965 and 1966.

The Halibut Commission, after a Special Meeting in September 1967, notified Canada and the United States that since the 1967 regulations with respect to Bering Sea had been largely effective in continuing the rehabilitation of the resource in that area, they should again be considered for regulation of the fishery in 1968 in order to confirm and continue the gains already made. While some small changes in the opening dates or lengths of season in some areas in eastern Bering Sea might have given added assurance to securing an optimal entry and distribution of fishing in the region by North American vessels in 1968, continuing the 1967 provisions unchanged could facilitate the development of parallel conservation measures by the North Pacific Commission.

In November 1967 the North Pacific Commission recommended to their respective governments that the conservation measures in effect in eastern Bering Sea in 1967 be continued in 1968.

Through the procedures that have been developed during the past five years by Canada, Japan and United States the halibut resource in eastern Bering Sea has come under effective control of two international management bodies and the close appraisal of scientists from the three countries.

The Halibut Commission, the joint research agency of Canada and United States with respect to Pacific halibut has, during each of the past three years, provided those two countries with specific statements on the indicated regulatory requirements for scientific management of the halibut resource in eastern Bering Sea.

The North Pacific Commission, acting jointly through its three National Sections and committees of scientific advisors and experts, and in consultation with scientists of the Halibut Commission, has developed and proposed conservation measures for eastern Bering Sea halibut to the governments of the three participating countries.

Scientific management of the resource has also been furthered by the exchange of scientific consultants and of observers between the two Commissions with respect to halibut matters of joint interest to the three countries.

STATISTICS OF THE FISHERY

Catches by Sections of the Coast and Regulatory Areas

Canadian and United States catches of halibut in thousands of pounds for the years 1963 to 1967 are shown in Table 1. Estimates of the poundage taken in contravention of the regulations are included in the totals for each section of the coast. All 1967 figures are preliminary and include no estimates of catches made in the North Pacific Ocean and Bering Sea by other than North American vessels.

SOUTH OF CAPE SPENCER

Due to the circumstances mentioned previously with respect to the Canadian fleet, the Area 2 catch limit of 23 million pounds was not taken prior to the closing date of October 15 provided in the regulations. Landings of 20.1 million pounds represented a deficit of 2.9 million pounds from the catch limit. Most of the catch reduction in 1967 was from Southeastern Alaska waters which corrects some of the imbalance in recent years in removals between Southeastern Alaska and British Columbia.

REGULATION AND INVESTIGATION OF

Table 1. United States and Canadian Catches by Regulatory Areas 1963-1967*
in Thousands of Pounds

		1963	1964	1965	1966	1967
Area 2**	U.S.	11,894	8,315	12,200	12,054	10,178
	Canada	14,462	11,437	12,350	11,522	9,900
	Total	26,356	19,752	24,550	23,576	20,078
Area 3A	U.S.	17,221	15,082	16,146	16,939	18,001
	Canada	15,752	18,052	17,551	17,487	13,033
	Total	32,973	33,134	33,697	34,426	31,034
Area 3B	U.S.	1,823	1,909	1,395	809	519
	Canada	2,135	2,843	2,496	2,277	1,627
	Total	3,958	4,752	3,891	3,086	2,146
Area 3C	U.S.	—	1	—	—	2
	Canada	—	—	—	48	—
	Total	—	1	—	48	2
Area 3 Total	U.S.	19,044	16,992	17,541	17,748	18,522
	Canada	17,887	20,895	20,047	19,812	14,660
	Total	36,931	37,887	37,588	37,560	33,182
BERING SEA***						
Area 4A	U.S.	3,014	875	331	—	558
	Canada	3,990	643	178	219	740
	Total	7,004	1,518	509	219	1,298
Area 4B	U.S.	228	24	—	138	14
	Canada	34	343	42	94	—
	Total	262	367	42	232	14
Area 4C	U.S.	21	141	258	—	220
	Canada	653	219	163	312	222
	Total	674	360	421	312	442
Area 4D	U.S.	88	29	154	419	497
	Canada	—	51	207	13	147
	Total	88	80	361	432	644
Area 4E	U.S.	1	3	2	—	—
	Canada	107	—	—	—	—
	Total	108	3	2	—	—
Bering Sea Total	U.S.	3,352	1,072	745	557	1,289
	Canada	4,784	1,256	590	638	1,109
	Total	8,136	2,328	1,335	1,195	2,398
Total All Areas	U.S.	34,290	26,379	30,486	30,359	29,989
	Canada	37,133	33,588	32,987	31,972	25,669
	Total	71,423	59,967	63,473	62,331	55,658

* 1967 figures are preliminary.

** Area 1 incorporated with Area 2 in 1967. Annual catches therefrom, which averaged 161,000 pounds from 1963 to 1966, are included in Area 2 catches.

***Not including catches by Japan.

WEST OF CAPE SPENCER

In Area 3A the 1967 catch of 31 million pounds was 2 million pounds below the 33 million pound catch limit provided for the area. Failure to take the catch limit in this area is attributable to the strike of the Canadian fleet. Due to the May tie-up the Canadian catch from Area 3A was 4.5 million pounds below the 1966 total. The Area 3A catch of the United States fleet was 1.1 million pounds higher than in 1966.

The catch from Area 3B of 2.1 million pounds was below the 3.5 million pound catch limit. With the protracted season in Area 3A, brought about by the May tie-up of the Canadian fleet, both Canadian and United States vessels tended to remain in Area 3A until its closure on October 15 despite a sharp improvement in the catch per unit effort in Area 3B.

BERING SEA

In Area 4A the total catch of 1.3 million pounds represented a sharp increase over the 219,000 pounds caught in 1966. The larger catch was due to an increased fleet, a moderate increase in the permitted length of season and continued improvement in the condition of stocks in the area.

In Area 4B a single vessel caught 14,000 pounds during the 9-day fishing season commencing September 1 in 1967. With the extended seasons in Areas 3A and 3B, caused primarily by the May strike in the Canadian fleet, those areas offered more attractive fishing to the fleets in September than did Area 4B.

In Area 4C the total catch of 442,000 pounds is of the same magnitude as taken during the past several years.

In Area 4D the catch of 644,000 pounds represents the largest total taken from the area by the North American setline fishery. Of this total, 188,000 pounds were caught by the Commission's research vessel during 4 cruises to various locations within the area. The remainder was taken by commercial setline vessels fishing on the flats in northeastern Bering Sea.

Catch Per Unit of Fishing Effort

In Area 2 the catch per unit effort showed a slight improvement over 1966. This was primarily due to a continued improvement in the waters off British Columbia, particularly in northern Hecate Strait and Dixon Entrance. North of Dixon Entrance off Southeastern Alaska the catch per unit effort showed no material change in 1967 despite the heavy 1966 removals from this section of Area 2.

In Area 3A the catch per unit effort in 1967 was the same as in 1966. A sharp increase on the grounds west of Trinity Islands offset a decline in the catch per unit effort on grounds east of Trinity Islands. Most of this decline was due to an unusual lack of fish during the early part of the season which historically has produced some of the best catches.

In Area 3B there was a marked improvement in the catch per unit effort of over 20 pounds per skate over the 1966 level, continuing an upward trend starting in 1966.

In southeastern Bering Sea the catch per unit effort in most areas has continued to be maintained at satisfactory levels. Also the more extensive catch data available in 1967 permitted a more reliable assessment of the improving condition of the halibut populations in the area and showed that the rehabilitation is proceeding satisfactorily.

Landings by Ports

The distribution of halibut landings by ports or sections of the coast from all areas is shown in Table 2 with comparable data for 1965 and 1966. The most noticeable feature is the large increase in the proportion of landings in the southern ports of Washington and British Columbia and the sharp decrease in Prince Rupert. The more mobile fleet fishing west of Cape Spencer tended to direct a larger proportion of its fares to the railhead ports where higher prices prevail.

The sharply decreased Prince Rupert landings were caused primarily by a labor dispute with strikes and lockouts which effectively tied up most of the fish handling plants in that port for a protracted period in the spring. A portion of the increase in Vancouver was due to some vessels avoiding the uncertainties in Prince Rupert.

Table 2. United States and Canadian Landings by Regions and Ports 1965-1967*
in Thousands of Pounds

Region or Port	1965			1966			1967		
	U.S.	Canada	Total	U.S.	Canada	Total	U.S.	Canada	Total
California and Oregon	157	—	157	149	—	149	142	—	142
Seattle, Washington	5,995	149	6,144	3,775	452	4,227	8,007	163	8,170
Bellingham, Washington	887	1,459	2,346	1,053	2,585	3,638	1,196	802	1,998
Other Washington	149	—	149	304	—	304	193	—	193
Vancouver, British Columbia	—	4,012	4,012	—	4,067	4,067	—	7,158	7,158
Vancouver Island	—	968	968	—	1,298	1,298	—	1,069	1,069
Prince Rupert, British Columbia	566	19,835	20,401	595	17,854	18,449	332	9,507	9,839
Other British Columbia	—	864	864	—	1,263	1,263	—	1,396	1,396
Ketchikan, Alaska	8,155	594	8,749	8,112	234	8,346	6,896	888	7,784
Other Southeastern Alaska	9,749	461	10,210	10,014	594	10,608	8,819	771	9,590
Central Alaska	4,828	4,645	9,473	6,357	3,625	9,982	4,404	3,915	8,319
Totals	30,486	32,987	63,473	30,359	31,972	62,331	29,989	25,669	55,658

*1967 Data are preliminary.

COMPOSITION OF THE CATCHES

Sampling of the landed catches for age and size composition studies was continued at Seattle, Vancouver, Prince Rupert, Ketchikan and Petersburg. The catches from all major fishing grounds are proportionately represented in the landings at these ports which receive about 70 percent of the Pacific halibut catch.

Almost 70,000 halibut measurements and otoliths were collected for length and age data from 292 commercial trips, including 4 setline and 14 trawl vessels sampled at sea.

In addition, information on composition is secured from fish caught by chartered vessels. In 1967 such operations produced over 38,000 measurements including 7,100 with otoliths and sex information, increasing the number of measured fish to 108,000 from all sources.

The total number of samples secured during 1967 shows a substantial increase over 1966 despite the early season strike of Canadian vessels and reduced total catch. The areas of origin of the 1967 samples are shown in Table 3.

The samples taken at sea are of particular value because the length and age data are accompanied by sex determinations made on the fish prior to their evisceration.

Table 3. Summary of Catch Sampling in 1967 Showing Number of Trips and Total Fish Measured According to Area of Origin of the Catches

Area of Origin of Catch	Number of Trips			Number of Fish Measured
	Port Sampling	Sea Sampling	Total	
South of Cape Spencer				
Cape Flattery to Cape Scott	1	9	10	1,747
Queen Charlotte Sound	26	5	31	8,074
Hecate Strait	23	—	23	4,334
Dixon Entrance and West Coast Queen Charlotte Islands	23	—	23	4,401
Southeastern Alaska	48	1	49	11,497
Measured fish from chartered vessels				1,263
Total South of Cape Spencer	121	15	136	31,316
(1966 Totals)	(100)	(16)	(116)	
West of Cape Spencer				
Cape Spencer to Cape Clear	42	1	43	9,825
Cook Inlet - Shelikof Strait	15	—	15	4,180
Portlock - Albatross Banks	50	1	51	12,132
Trinity Islands - Chirikof Island	22	—	22	6,216
Shumagin Islands and West	5	—	5	1,560
Bering Sea	19	1	20	5,947
Measured fish from chartered vessels				36,954
Total West of Cape Spencer	153	3	156	76,814
(1966 Totals)	(122)	(8)	(130)	
Totals Pacific Coast	274	18	292	108,130
(1966 Totals)	(222)	(24)	(246)	

Size and Age Composition

In Area 2 despite the continued slight increase in catch per skate, the catches remain overly dependent upon young fish on most grounds and the rate of improvement does not appear to be commensurate with the sharp reduction made in the catch limits in recent years. It is necessary to ascertain whether there are losses due to other fisheries in the area which are not accounted for and also whether there has been some cyclic change in recruitment or in the availability of halibut to setline gear.

The number of halibut aged 14 and older, which had been increasing in Area 2 in recent years, underwent a setback on most grounds in 1967. On the other hand, young fish, especially those eight years of age and younger, continued to increase in catches from all grounds sampled. As was anticipated, the 1961 year class, which was observed to be abundant as one-, two- and three-year olds in recruitment studies conducted by the Commission has shown the strongest entry into the selective setline fishery of any class in the past 10 years. As six-year-olds it alone accounted for 15 percent of the weight of the catches on Goose Islands and Hecate Strait grounds in 1967, although in Southeastern Alaska it has yet to be represented in strength. This lag in age of entry into Southeastern Alaska setline catches is typical for that region.

In Area 3A there was an increase in the number of older fish in reverse of the decline which had occurred in the early 1960's. Halibut aged 14 and older are contributing a greater proportion to the catches than in other recent years, especially

from the section of the area west of Kodiak Island. Other major contributing year classes continued to display good recruitment into the fishable stock, except that the relatively strong 1955 year class has now begun to level off or show decline on most grounds.

In Area 3B the abundance of halibut 14 years of age and older declined. However, those from 9 to 13 years old displayed a strong recruitment. The 1955, 1957 and 1958 year classes included therein, which appeared to decline prematurely in 1965 and 1966, made a strong reappearance in 1967. This suggests that the change between 1965 and 1966 was one of availability and reaffirms the importance of avoiding conclusions based on short-term observations.

In southeastern Bering Sea the magnitude and distribution of fishing in 1967 and the extent of sampling thereof provided more reliable measures of stock condition on most grounds than had been possible from the severely restricted fishery in 1965 and 1966.

Rehabilitation of the halibut population in Area 4A, which had been suggested by the sparse data in 1965 and 1966, is continuing, although replenishment of older fish on the Polaris ground has not been as rapid as might have been expected. It is possible that further recovery in Area 4A from the low level reached in 1964 will depend upon the careful husbanding of incoming recruitment from young year classes. Also, no great dependence should be placed on immigration of older fish from other grounds in Bering Sea.

On the other hand, the compositions of catches from the Misty Moon ground in Area 4A, and particularly from along the edge in Area 4C between 170° and 175° W. longitude, indicate that these segments of the population are in better condition than those on the longer fished and more heavily exploited Polaris and Clipper grounds.

The composition of the catches from the recently developed fishery on the northeastern Bering Sea flats suggests that the halibut encountered there might well be the summer feeding concentration of the same population being fished on the edge in the spring. Furthermore, it has been observed during exploratory commercial fishing in the region that the availability of halibut declines rapidly on the northeastern flats in the late fall. To confirm such suggested seasonal movements, extensive tagging has been conducted throughout Bering Sea in recent years.

Apart from the seasonal differences noted, conditions on the various grounds are sufficiently diverse as to require continued individual management in order to maximize the potential yield of the region as a whole.

TAGGING EXPERIMENTS

Tagging experiments provide information on the interrelationships between various components of the population of Pacific halibut. They also provide measures of both fishing and natural mortality rates which are required in determining the stock levels which will produce the maximum sustainable yield.

Tag releases totaled 12,827 of which 11,586 were released between Shelikof Bay in Southeastern Alaska to within 60 miles of Cape Navarin on the Siberian coast. Three chartered vessels were used: the setliner *Chelsea* and the trawlers *Don Edwards* and *Harmony*. In addition, 1,194 tags were released off the southern British

Columbia coast from commercial trawlers by Commission observers, and 47 were released in the same region through the courtesy of the United States Bureau of Commercial Fisheries. A summary of 1967 releases is shown in the following table.

Vessel	Gear	Region of Tagging	Number Tagged
HARMONY	Trawl	Bering Sea Flats	874
HARMONY	Trawl	Chirikof and Unimak Islands	292
CHELSEA	Setline	Bering Sea Edge	697
CHELSEA	Setline	Bering Sea - Pribilof Islands	639
CHELSEA	Setline	Bering Sea - Aleutian Chain	1,184
CHELSEA	Setline	Bering Sea - Northeastern Flats	3,587
DON EDWARDS	Trawl	Southeastern Alaska to Chirikof Island	4,313
*Other	Trawl	Cape Flattery to Heceta Strait	1,241
Total			12,827

*The United States commercial trawler, MORNING STAR, the Canadian commercial trawler, SHARLENE K, and the United States Bureau of Commercial Fisheries chartered trawler, WESTNESS.

The setline vessel *Chester* made four cruises during a 103-day charter period between early June and early September. The first cruise was to the edge grounds in western Bering Sea off Cape Navarin and to the Pribilof Islands. The second was to Bowers Bank and the Aleutian Chain. The third and fourth cruises were to the northeastern Bering Sea offshore flats. All cruises resulted in catches and tag releases above expectation.

During the past 12 years over 25,500 tags have been released in Bering Sea. These tags are widely distributed throughout the region as tagging has been conducted along the Aleutian Chain from Unimak Pass to Bowers Bank, along the edge from Unimak Pass to within 60 miles of Cape Navarin, and throughout the southeastern and northeastern flats. Returns in the next few years from these extensive releases should aid materially in understanding the interrelation of the halibut between the various sections within Bering Sea as well as with grounds elsewhere.

Tagging from the chartered trawlers *Don Edwards* and *Harmony* is described in the section of this report dealing with Recruitment Studies.

During the year 1,414 recovered tags were reported, including 30 taken but unreported in previous years. This 1967 total represents a large increase over 1966. Most of the increase is explained by the normal high rate of recovery in the first full recovery season from the large number of tags released off the British Columbia coast in 1966. Japanese vessels reported 18 of the 1967 recoveries. United States and Canadian vessels reported recoveries of an additional six tags released by Japanese research vessels. These were forwarded to the Fisheries Agency of Japan.

The program of premium \$100.00 rewards for the return of certain preselected halibut tags initiated in 1966 was continued in the 1967 season. The number of tags on the premium tag list was raised from 650 to 750 by randomly selecting additional numbers from the tags released during 1966. The recovery of eight premium tags was expected in 1967 based upon the expected recovery rates and the number of listed tags. Nine such tags were reported and premium rewards paid. As in 1966, only nationals of Canada or of the United States were eligible to receive this special reward and the maximum number of such rewards was restricted to 12.

As in 1966, recipients of the premium rewards were widely distributed throughout the industry. Four were from Washington and five from British Columbia. One premium reward tag was recovered by an otter trawler, one by a dockworker, and the other seven by both large and small vessels of the setline halibut fleet. Of the nine recoveries, six were taken in Area 2 and three in Area 3A.

As reported last year, the 1966 tag recoveries from all past experiments exceeded the expected number based on recoveries and fishing effort in past years. Recoveries in 1967 from all past experiments equalled the expected number of recoveries based on the 1966 level of returns but exceeded the expected number based on returns from earlier years. Thus it appears that the elevated level of returns obtained in 1966 was continued in 1967. These observations further confirm the benefit from the premium tag program as suggested by the results in 1966.

RECRUITMENT STUDIES

Experience gained from the extensive field operations in 1966 permitted some reduction in stations sampled in 1967. The savings made it possible to reduce the total charter time from 234 days in 1966 to 200 days in 1967.

The otter trawl vessel *Harmony* operated from May 31 to July 9 in eastern Bering Sea and thereafter until mid-August in the Gulf of Alaska in the vicinity of Unimak and Chirikof Islands for a total period of 109 days. The otter trawler *Don Edwards* operated from June 16 to September 3 on both inshore and offshore locations in the Gulf of Alaska from Shelikof Bay to Chirikof Island for a total period of 92 days. Both vessels joined in replicate sampling and parallel fishing on some stations off Chirikof Island to measure variability in fishing effectiveness between vessels.

In 1967 over 4700 individuals below 65 centimeters and 700 over that length were tagged and released from the two chartered trawlers. Tagging of all viable halibut in excess of those required for age composition purposes has been a function of the recruitment studies for the past several years. The small trawl-caught individuals tagged in past years are now approaching a size available to the selective commercial setline fishery. Such recaptures will provide additional information for the evaluation of the relationship between the recruitment and utilization phases of the various halibut stocks.

The few returns of such tagged young fish to date indicate a west-to-east movement from all tagging areas. Most notable is that of a young individual tagged August 24, 1965 on the flats in southeastern Bering Sea near Hagemeister Island and recovered about September 15, 1967 from Port Camden, Southeastern Alaska. This fish weighed 2.7 pounds when tagged and 6.7 pounds on recovery two years later.

Inshore Areas—Southeastern Alaska and Gulf of Alaska

To evaluate the subsequent contribution of the young fish on the inshore grounds to the commercial setline fishery for the adults, selected inshore indicator grounds were again sampled in 1967 with a standard small-fish trawl in a manner consistent with that of the past 10 years. One hundred seventeen 15-minute hauls were made at depths of 7 to 26 fathoms, and 15,676 individuals were caught, of

which 15,576 were below 65 centimeters in length. To ascertain the relationships of the inshore young to adult populations, tagging is made an integral part of the program. In 1967 1,532 individuals were tagged and released on the inshore areas.

The 1966 year class was available in strength as one-year-olds particularly at the Cape St. Elias and Kodiak Island inshore stations. Also the 1964 year class continues to show good strength as three-year-olds. If these two groups continue to maintain their early strengths they could ultimately make a significant contribution to the commercial catch in the years ahead.

The following table summarizes the catch by age and fishing grounds.

**Number of Halibut Less than 65 Centimeters in Length from
Inshore Areas in 1967 by Age and Locality**

Age: Year-Class:	0 1967	1 1966	2 1965	3 1964	4 1963	5 1962	6 1961	7 1960	8 1959	9 1958	Total	Number Hauls
Shelikof Bay	145	160	45	98	205	117	66	9	3	—	848	30
Icy Strait	—	—	2	9	46	92	165	31	5	6	356	25
Cape St. Elias	240	2,394	273	133	56	30	10	—	—	—	3,136	30
Kodiak Island	—	8,238	1,299	1,431	52	21	3	—	—	—	11,044	30
Unimak Island	—	103	46	22	8	9	4	—	—	—	192	2
Total	385	10,895	1,665	1,693	367	269	248	40	8	6	15,576	117

Offshore Areas—Gulf of Alaska

Recruitment studies on offshore areas in the Gulf of Alaska are directed primarily to ascertaining the effect that the growing foreign trawl fishery in that area may have upon the stocks of halibut. The number of offshore stations occupied in the Gulf of Alaska in 1967 was reduced about 40 percent from the 1966 level. A cluster of stations off Cape Fairweather fished in 1966 was omitted in 1967 and one lying east of Cape Chiniak, Kodiak Island was included again after its omission in 1966.

These offshore stations were sampled by 60-minute hauls with a 3½-inch mesh trawl net that has been standard for all offshore surveys by the Commission. This year 119 hauls were made at depths of 15 to 128 fathoms, and 9,642 halibut were caught, of which 9,080 or 94 percent were below 65 centimeters. There were 3,073 fish tagged at these offshore stations.

The 1964 year class made an impressive appearance as three-year-olds in the catches on the Chirikof Island grounds, but it did not make a comparably large contribution to the catches from other offshore grounds despite the fact it was moderately abundant on the inshore grounds as younger fish in previous years.

The following table summarizes the age composition on the grounds sampled.

**Number of Halibut Less than 65 Centimeters in Length from
Offshore Areas in 1967 by Age and Locality**

Age: Year-Class:	0 1967	1 1966	2 1965	3 1964	4 1963	5 1962	6 1961	7 1960	8 1959	9 1958	Total	Number Hauls
Cape St. Elias	—	—	—	21	69	67	114	32	5	9	317	31
Cape Chiniak	—	—	3	303	234	198	157	18	7	—	920	39
Chirikof Island	—	87	1,240	4,134	967	568	348	32	15	4	7,395	37
Unimak Island	—	—	44	148	148	61	45	2	—	—	448	12
Total	—	87	1,287	4,606	1,418	894	664	84	27	13	9,080	119

Bering Sea—Southeastern and Northeastern Flats

From previous surveys, the eastern Bering Sea is known to possess a very large population of young halibut. The same region has been the locale of a massive foreign trawl net fishery for fishmeal and foodfish species for the past several years. With young halibut particularly vulnerable to trawl fishing it is necessary to monitor the effects of such fishing upon the halibut resource.

The 1967 survey was extended northward to the vicinity of the Yukon River and offshore to St. Lawrence Island (63° N. latitude). Minor concentrations of the larger juvenile halibut were recorded along the mainland shore in the northeastern sector while offshore only an occasional fish was encountered. With this expansion to these northern areas the distribution of the small halibut in the eastern Bering Sea has now been delineated, at least for the environmental conditions that existed during the summer of 1967. By integrating observations of the bottom temperatures with the operations it was possible to reduce the stations sampled in all sections of eastern Bering Sea without loss of data upon the distribution and abundance of young in the region.

By intensifying the daily activity and by basing operations at Dutch Harbor, 153 hauls were made in Bering Sea in 1967 compared to 109 in 1966, while the total number of days of charter was reduced. From the total of 1818 halibut caught, 1679 or 92 percent were under 65 centimeters in length. There were 874 individuals tagged.

The age composition of small halibut from eastern Bering Sea is summarized below. The southeastern flats lying south of a line between Cape Newenham and St. Paul Island have been referred to in other annual reports as Inshore Grounds and the northeastern flats north of that region were previously referred to as Offshore Grounds.

**Number of Halibut Less than 65 Centimeters in Length from
Bering Sea in 1967 by Age and Locality**

Age:	0	1	2	3	4	5	6	7	8	9	Total	Number Hauls
Year-Class:	1967	1966	1965	1964	1963	1962	1961	1960	1959	1958		
Southeastern Flats	—	—	143	203	637	159	152	15	4	—	1,313	94
Northeastern Flats	—	—	--	26	140	74	122	3	—	1	366	59
Total	—	—	143	229	777	233	274	18	4	1	1,679	153

Age composition studies reveal that younger age groups predominate on the southeastern flats and older ages on the northeastern flats. The 1961 year class, which has dominated the age composition structure in previous surveys, has now largely grown out of the recruitment stage and has begun contributing to the commercial setline fishery. However, in the northern area where larger-sized recruits are found, these six-year-olds were still found in greater than expected number. In 1967 the four-year-olds, or 1963 year class, were predominant in the catches both on the southeastern and northeastern flats. However, this is probably indicative of the normal progression of age groups through this selective fishery on these grounds.

PUBLICATIONS AND MANUSCRIPT REPORTS PREPARED DURING 1967**Published Reports:**

- Report No. 42: Mortality Estimates from Tagging Experiments on Pacific Halibut
— Richard J. Myhre.
- Report No. 43: Growth of Pacific Halibut — G. Morris Southward.
- Report No. 44: Regulation and Investigation of the Pacific Halibut Fishery in 1966.
- Report No. 45: The Halibut Fishery, Shumagin Islands and Westward not Including Bering Sea — F. Heward Bell.

Manuscript Reports:

1. Summary of Bering Sea Halibut Tagging and Recovery Since October 1966.
2. Catch Statistics for the North American Halibut Fishery in Bering Sea in 1967 and Earlier Years.
3. Size, Age and Sex Composition Data for North American Setline Halibut Catches in Bering Sea in 1965, 1966 and 1967.
4. The Pacific Halibut Fishery — Conservation of a Marine Resource. Fisherman's News, September 1967 — F. Heward Bell.
5. Canadian and United States Pacific Halibut Production. National Fisherman Yearbook, 1967 — F. Heward Bell.