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BRISTOL BAY AREA

1960

FIELD SEASON REPORT

Annual Report

BRISTOL BAY

-1960-

With the assumption of responsibility for the management of the fishery by the State agency this year, the program of the Commercial Fisheries Division in Bristol Bay mushroomed to include many related activities. Most of these were carried out in the past by other agencies and it was not possible for this Department to immediately assume complete responsibility for all management-centered functions during this first season. The major management and applied research activities accomplished in Bristol Bay during 1960 by the several agencies concerned are here discussed, followed by a summary of the events of the fishing season in each district.

FIELD PROGRAM ACTIVITIES

Enumeration and Sampling of Escapement

The operation of the counting towers was ^{assumed} ~~taken over~~ from the Bureau of Commercial Fisheries at the following locations: Alagnak (Branch) River, Naknek River, Egegik River, Ugashik River, Igushik River, and Nuyakuk River. In addition, coverage was also extended to the Togiak River and to Snake River.

Sampling of the escapement for size, age and sex composition was carried on at Igushik and Branch River. At both the Egegik and Ugashik locations, State personnel assisted an employee of the Bureau of Commercial Fisheries who was responsible for the sampling function. In return, the Federal employee participated in the counting operation. Sampling of the Naknek escapement was carried on completely by the Bureau of Commercial Fisheries as part of their program of research on the entire Naknek system.

The Fisheries Research Institute of the University of Washington continued all counting and sampling at the important Mosquito Point and Igiugig stations on the Wood and Kvichak Rivers.

Aerial surveys of distribution were carried out in all major systems, together with escapement estimates in those few areas not covered by counting towers. Among these were the detailed coverage of red salmon distribution within the Nushagak Bay watersheds and in the Togiak area and the combination aerial-float survey of Nushagak king escapement begun in 1957 by this Department.

Sampling of the Commercial Catch

Sampling of the commercial catch was done by State personnel in the Nushagak and Togiak districts. In the Nushagak district, this sampling also included the king salmon season.

Samples from the Naknek-Kvichak, Egagik, and Ugashik fisheries were obtained by Bureau of Commercial Fisheries personnel at Naknek and Egagik.

Smolt Outmigration Sampling

The State did not begin participation in this activity in 1960. The important Mosquito Point and Igiugig indices continued to be a part of the Fisheries Research Institute's work at those stations and work on the Naknek and Ugashik Rivers was carried out by the Bureau of Commercial Fisheries.

Survival of Spawn from the Previous Year

During the early spring of 1960, Department personnel cooperated with the Fisheries Research Institute in sampling the survival from the large 1959 escapement in the Wood River system. Findings indicated that survival to the fry stage was generally excellent.

Ugashik Tagging Study

On the basis of tagging experiments carried out previously by the Federal agency, the staff of this Department recommended a change in the position of the outer boundary of the Ugashik district to the Alaska Board of Fish and Game. It was felt to be highly desirable for the management of the several eastern Bristol

Bay fisheries to localize the effort in the Ugashik District upon runs destined for that watershed. This recommendation was adopted and in effect during the 1960 season. See Fig. _____. To further explore the intermixture and distribution of salmon stocks in the area of this line, a tagging project utilizing fish caught by a commercial-type drift gillnet boat was carried out.

Analysis of tag recovery data bears out the suspected high incidence of Naknek-Kvichak and Egegik-bound fish which occurs in the area formerly open to commercial effort. This intermingling is shown to undergo sharp reduction at tagging locations within the area of the present fishery.

In addition to confirming the soundness of the direction taken by the boundary move, the project also furnished valuable information on rates of migration for the runs involved.

Kvichak Test Fishing

Since it was realized that one of the most pressing needs facing management would be that of an immediate index of current escapement at all times in this important fishery, a project was initiated which was based upon the methods used by the International Pacific Salmon Fisheries Commission on the Fraser River. One regular Bristol Bay gillnet boat manned by an experienced fisherman and a Fisheries Aide made regular drifts several times during each 24-hour period at a point above the upper Kvichak boundary. Careful records were kept of the number of fish taken, the length of net used and the time covered by the drift. This made possible a direct comparison between drifts.

Catches were subsequently found to bear a close relationship to the escapement which was occurring. As a management tool, such test fishing proved itself highly valuable during its first season of use by the Department, but it is expected that the experiences of future years will allow even greater reliance upon the index which it provides and thus permit continually improved regulation of the fishery.

Stream Clearance in the Ugashik Drainage

In answer to long-standing requests from the Ugashik area for action in regard to reported stream blockage caused by beaver dams, a crew of two men equipped with an 18' Turbocraft ~~loaned by the Protection Division~~ operated throughout the Ugashik Lakes during the month of August. A number of such migrational blocks were located and breached. Stream mouths were also channelized where low flow caused by loss of water through the gravel made access difficult or impossible.

This work was particularly productive in 1960 inasmuch as it permitted fuller utilization of available spawning areas by this season's large escapement.

Surveillance of Construction Affecting Streams

On January 1, when this Department became responsible for carrying out the provisions of the laws adopted by Alaska's legislature for the protection of her fish and game resources, certain projects related primarily to oil exploration and development were already in progress. One such undertaking was present in the Egegik region of Bristol Bay. Here a road had been constructed from the east side of the Alaska Peninsula at Jute Bay across to drilling sites on the Bristol Bay side. Its course crossed many salmon streams and at one time followed the bed of Bear Creek, one of the major spawning streams of the watershed, for most of its productive length. Originally undertaken without adequate restrictions having been imposed for the protection of the resource, this construction had already caused much damage and a number of undesirable features still remained. (See Fig. _____.)

During the first three months of 1960, the equipment from the drilling sites was withdrawn back over this road to Jute Bay. All major portions of the move were carried out under the observation of the staff. Upon completion of the move, the Department required removal of all culverts, and stream crossings were restored to their original condition insofar as it was possible or advisable to do so.

Excellent cooperation was received from the parties involved and the Department feels that such unfortunate effects upon the fisheries resource from industrial

development can be reduced to a minimum or altogether avoided in the future.

MANAGEMENT OF THE FISHERY IN 1960

As background to a study of the first year of control by the State it is worthwhile to review some of the changes which accompanied this transfer from Federal jurisdiction.

Of these, probably the most far-reaching effects resulted from changes in the regulations. Figure ____ illustrates the major district boundary changes.

Among other new regulations adopted by the ^{Alaska} Board ^{of fish & game} which proved to be of particular value were the following: (1) making provision for emergency regulation of the fishery by the Commissioner through field announcement; (2) permitting the use of 5-1/2 inch mesh prior to the traditional opening date of "red season" and the use of 4-3/4 inch mesh for pink salmon immediately after the passage of the main red run; ~~(3) permitting transfer between districts within the area on a more liberal basis;~~ (4) removal of the requirement for a minimum distance between drift gillnets.

Transfer from the Bureau of Commercial Fisheries of some physical equipment necessary to the conduct of the overall program was completed just prior to the field season and arrangements were made to permit the State to temporarily use certain office, storage and living facilities in the King Salmon area belonging to the Bureau and formerly used by them in the management of the fishery.

To improve operational efficiency both in administering the Department's large field program and managing the widely-separated fisheries, offices were maintained both in Dillingham and in King Salmon.

Naknek-Kvichak District

Although some of the available information lent itself to the prediction of a tremendous run for this district, Department policy was guided by the conservative gear-timetable adopted by the ^{Alaska} Board ^{of fish & game} until such precautions proved to be

no longer necessary. Catches of mature fish by research vessels of the United States on the high-seas provided no clear indication of the size of the forthcoming run, nor did catches prior to June 27 within the district itself give any hint of the size of the run to come.

As the fishery began to experience good catches and the Department's test-fishing operation confirmed that satisfactory escapement was also being obtained, alternating open and closed periods were allowed. The success of the fishery soon gave unmistakable evidence that the run would approach the most optimistic predictions. By July 11 there was adequate evidence to indicate that the Department's goal of a ten million fish escapement into Lake Iliamna would be realized and fishing was permitted continuously thereafter.

The final tally showed a catch for this district of 9,847,848 reds and 332,789 of all other species. The migration of reds past the Kvichak River towers reached 14,630,000 and Branch River and Naknek River had escapements of 1,240,000 and 828,000, respectively. The significance of these figures is increased if considered together with some of the noteworthy events of the season in this district.

The 1960 run consisted mainly of four year old fish which were the progeny of the 1956 spawning. They had migrated to the sea in 1958 and were returning after two years of ocean existence. These fish were unusually small in size, even for this age-class, and the average number of fish per case was approximately 15.4.

This year's management by the Alaska Department of Fish and Game was characterized by the ability to adjust fishing time and area according to immediate need in a far more flexible manner than previously possible. As a result, periods were adjusted to permit efficient cropping of the run prior to being opened continuously. The opening hour for a number of periods was timed to coincide with the stage of tide most advantageous to the setnet fishery. The inner Kvichak River boundary was moved successively further upriver finally reaching the village of Levelock. Requirements for transfer from other districts were also relaxed, resulting in a

beneficial influx of gear.

In view of the efforts made to facilitate the harvesting of the run, the magnitude of the Kvichak and Branch River escapements was unexpectedly large. This can be attributed primarily to the small size of the fish, which reduced the efficiency of the gillnet gear beyond expectations. On the other hand, the management of the fishery by field announcement made possible the volume attained by the catch, which could not have been accomplished under less flexible control.

Nushagak District

Fishing effort in this district is first directed at the king salmon run destined for the Nushagak River and its tributaries. This year the run began rather modestly and only 30,000 had been taken by June 20, at which time most of the fleet switched to 5-1/2 inch mesh gear. In the remaining week before the gear-timetable became effective, ~~catches rose rapidly and another 27,000 were caught.~~ Incidental catches during the rest of the season brought the final total up to a rather surprising 81,415 fish. Though topped by the catch of 87,000 kings recorded in 1958, this is the second-highest catch of this species since 1929. Large numbers of jacks were included in ^{the 1960} ~~this year's~~ take. This resulted from the removal of the prohibition which formerly existed against the use of mesh smaller than 8-1/2 inches prior to the beginning of the traditional "red season". As a result, the case pack was correspondingly smaller than has usually been obtained from a catch of this numerical size.

Aerial surveys revealed a king escapement comparing well with those of recent seasons.

Catch during the early portion of the red season gave indications of a healthy run to come, but the heavy effort present in the district prevented development of a correspondingly satisfactory escapement, so additional closure was required during the week of July 3-9. The appearance of a sizeable body of fish coincident with the closure permitted the escapement to mount rapidly. Consequently, the period

which opened on July 9 was extended on a continuous basis until July 23, when weekend closures were again reinstated to provide protection for the pink salmon run.

The final count into the Wood River system of 1,016,000 reds topped our 1960 goal of one million by less than 2 percent. The Department's intention to obtain the majority of the escapement from the peak of the run was also successful and the resulting spawning ground distribution was highly satisfactory.

Escapements to other Nushagak Bay systems were as follows: Igushik, 494,000; Snake, 16,600; Tikchik Lakes, 145,500; Nushagak and Mulchatna Rivers (estimated by aerial survey), 10,000.

The total red catch was 1,460,000 fish. Combined with this was an unusually good take of 620,000 chums.

Special note should be given to the first instance of individualized management of the Igushik River separate from the remainder of Nushagak Bay. This was made possible through the action of the Board of Fish and Game which created the Igushik Section within the Nushagak District. In the only additional fishing period permitted in this Section, 175 drift boats and 50 setnets shared a catch of 82,000 fish which otherwise could not have been utilized.

Because of the large parent escapement of pink salmon in 1958, both fishermen and packers were aware of the possibility that a sizeable run might return this year. Accordingly, a substantial portion of the Nushagak fleet was prepared with the 4-3/4 inch mesh gear permitted after July 18.

In comparison with the parent year, the 1960 return was a disappointment, inasmuch as the estimated total consisted of approximately 436,000 fish. Of these, 290,000 were taken by the fishery and 146,000 were enumerated at the Nuyakuk River tower. (Though a small number of pink salmon occur elsewhere within Nushagak Bay watersheds, these are relatively insignificant in comparison with the population utilizing the Nuyakuk and Tikchik Rivers.) It is obvious that an unusual mortality was incurred at some stage during the life history of this cycle.

Egegik District

Due to the absence of sufficient information to permit the formulation of a reliable forecast, management approached the 1960 Egegik season without dependable knowledge of the possible size of the return which might materialize in this district. A catch indicative of a substantial run to follow was made prior to the beginning of the operation of the gear-timetable and salmon continued to appear in good supply on June 27-28. One additional 24-hour period was allowed during the first week and two supplementary openings were permitted during the second on the basis of comparison between current catches and the catch/escapement ratio of previous years. By the end of the second week, however, the vanguard of the escapement had appeared in the clear waters of the lagoon which lies below Becharof Lake and large daily counts were being tallied by the observers stationed at the towers located above the lagoon. From the strength of the migration it was apparent that the attainment of escapement goals was assured. Accordingly, fishing was opened on a continuous basis after 9:00 a.m. Monday, July 11, and the inner boundary of the district was re-established upriver.

Final figures for the season show a catch of 1,446,884 reds, which is the largest take since 1937. The escapement of 1,798,764 is the largest enumerated since the inauguration in 1952 of a since-unbroken series of annual counts. In considering the total return to the Egegik watershed, it should be kept in mind that knowledge gained from past tagging programs in this fishery indicates that a significant portion of the catch within the present boundaries of the fishing district is contributed by other river systems of eastern Bristol Bay.

Plans are being made to initiate a test-fishing operation immediately above the upper Egegik River boundary in 1961. With the information which such a project would make available, the relationship between catch and escapement could be regulated with far greater precision than has previously been possible.

Ugashik District

The pattern of events in the Ugashik fishery proved to be very similar to that observed in the Egegik District with the exception that the effort present was considerably smaller, resulting in a higher escapement and lower catch. Parent escapements were not of a size which would encourage optimism and it was anticipated that sharp restrictions on the fishery might be necessary in order to obtain sufficient spawners for adequate seeding of the area's gravels. Contrary to these expectations, very good catches were made from the first of the season. Though no idea of the numerical strength of the run could be gained until the early portion of the escapement passed beyond the murky waters of the tidal influence, the volume of the run available to the fleet provided sufficient evidence by July 7 to justify continuous opening. The migration continued with unexpected strength through the following week and at the close of the season the take of reds had passed the 3/4 million mark to a total of 752,000. In spite of the large amount of fishing time permitted, the escapement of 2,304,200 far outweighed the catch and is the largest recorded for the years in which this river has been covered by a weir or towers. It is obvious that the fish returning this year had experienced highly favorable conditions throughout the history of their cycle. A return of this magnitude is unusual, even though the history of the Ugashik system clearly indicates that an extremely wide amount of variation may regularly be expected.

Togiak District

The 1960 season was notable for an increase in the amount of effort which took part in this smallest of the Bay's fisheries. Since the beginning of the present commercial exploitation in 1955, fishing time had previously been restricted only by the 36-hour week-end closure. This year's regulations extended this closure here, as elsewhere in Bristol Bay, to 48-hours and a further six-day closed period

from July 22 to July 28 was also imposed. Augmented by additional numbers secured during this closure, the tally of reds counted past our towers into Togiak Lake totalled 163,000. This was the first time that a tower had been successfully operated on this system. Aerial surveys revealed that this figure compares favorably with good escapements observed during such inspections in past years.

While the combined catch of all species in this district totalled 404,000 fish, only 140,000 were red salmon. With the exception of a take of 7,300 kings, the remainder were virtually all chum salmon. The large catch, together with the correspondingly-satisfactory escapement observed during aerial surveys, is indicative of a better-than-usual return for this species during 1960. It should be noted, however, that the chum return in this district normally exceeds the red salmon run in numerical strength.

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Summary of the Management of the Fishery in 1960

NUSHAGAK DISTRICT

King Salmon: Fishing effort in this District is first directed at the Nushagak king salmon run. This year the run appeared to begin rather modestly, but by June 20, when most of the fleet switched to 5½" gear, over 30,000 kings had been caught. In the remaining week before the gear-timetable became effective, another 27,000 were taken. Incidental catches during the rest of the season brought the final total up to a rather surprising 81,415 fish. This is the second-highest catch of kings since 1929. The proportion of smaller-sized fish was considerably greater than usual, due to the earlier use of small-meshed gear. As a result, the case pack was correspondingly smaller than has usually been obtained from a catch of this numerical size.

Aerial surveys revealed an escapement which compares well with those observed during recent seasons. Although we can't arrive at any number for total escapement from these estimates, we feel that the escapement was satisfactory. Large numbers of jacks, which usually comprise a sizeable share of the escapement, were taken in the catch this year due to the removal of the prohibition which formerly existed against the use of mesh smaller than 8½" prior to the start of the red run.

Red Salmon: The use of a relatively late date for the commencement of the operation of the gear-timetable, together with the abolition of restrictions on the early use of small-meshed gear combined to permit a full week of fishing upon the early portion of the red run. It was the intent of the Department to permit these early fish to be taken and to later obtain the escapement from the peak of the run. This proved to be both successful and desirable. More than a quarter-million fish were taken during this time. Later, unlimited fishing was also permitted on the tail-end of the run, yet overall distribution of spawners throughout the system appeared to be better than has been obtained in many past seasons.

In spite of this rather heavy early fishery, escapement into the Wood River system commenced with better-than-average strength, so two periods were allowed during the first week of the gear-timetable. Effort in this district was rather heavy at this time, with 289 drift boats of all types and 120 set-nets operating.

The Igushik Section appeared to be experiencing a particularly good run, so a special open period of 15 hours was put into effect there on Sunday, July 3. This was the first instance of individual regulation of the Igushik River separate from the remainder of Nushagak Bay. It was made possible through the regulations adopted by this Board last year, setting apart a specially-defined Igushik Section. By this one instance alone, the 175 drift boats and 50 set-nets which participated in this open period shared the proceeds from 82,000 fish, which otherwise could not have been taken.

By July 5, the escapement counts at Mosquito Point, which earlier appeared so healthy, had fallen off to a low level and remained there for several days. At the end of the first period of this second week there was still no sign of a better incoming run materializing. Total escapement at this time was only 50,000 fish and our goal in this system was 1,000,000 spawners. Consequently, there was no alternative but to keep the fishery closed until we were successful in getting some fish into the lake. During this prolonged closure, nearly 150 Nushagak boats transferred

to the Naknek-Kvichak district, though many returned after only a brief stay. Removal at this time of the 48 hour waiting period prior to transfer to another district facilitated this movement to the Kvichak.

This complete closure of the Nushagak fortunately coincided with the appearance of a sizeable body of fish and escapements quickly added up to a half-million fish by Friday, with the promise of more to come. Consequently, an opening was announced for Saturday morning, July 9. Later this was extended and made continuous until July 23, when the 48 hour week-end closure was reinstated to provide protection for the pink run.

The final count into the Wood River system topped our goal of one million fish by less than 2%. It is hard to come much closer. We are proud of our management in this district.

Escapements to other Nushagak Bay systems were as follows: Igushik, 494,814; Snake, 16,598; Tikchiks, 145,500; Nushagak and Mulchatna Rivers (estimated), approximately 10,000.

The total red and chum catch topped two million fish (2,079,509 - reds, 1,459,932; chums, 619,577).

Pink Salmon: Because of the large run and escapement of this species in 1958, fisherman and packers were aware of the possibility that a sizeable return might occur this year. Our regulations gave recognition to the desirability of harvesting a share of whatever run developed by permitting the use of 4 3/4" mesh gear after July 18. A good share of the Nushagak fleet outfitted themselves accordingly.

In comparison with 1958, this season proved rather disappointing. Nevertheless, 300,000 pinks were harvested from a total run of 450,000.

A total of 30,000 silvers was also taken during the late-season fishery.

NAKNEK-KVICHAK DISTRICT

In spite of the prediction of a tremendous run for this district, the Department was of necessity, guided by the conservative gear-timetable adopted by the Board until an abundance of fish might eventually prove this to be unnecessary. That this is the way things finally turned out is now history, but at the beginning of the season the issue was far from clear. Early catches of mature fish by the tagging vessels of the F.W.S. and F.R.I. provided contradictory and less-than-conclusive indications. The catches by the fishery itself prior to June 27, when the timetable took effect, didn't spell "big run", either. Our test-fishing boat, operating above the upper boundary, had caught only four fish by that time.

During this first period, on June 27-28, a good catch of nearly a half-million fish was made. Of this, the set-netters got less than 1%, again raising a question as to what type of run might yet be in the offing. With indications from our test-fishing boat that a good migration was now beginning, we felt it safe to permit a brief fishing period again on Thursday. This was set for 3:00 P.M., three hours before

high water, in an attempt to give the set-netters a better opportunity to share in the catch. In this brief period of only 15 hours, well over a million fish were taken. Plainly the run was going to be a good one. It would now be up to the Department to determine how many should be taken and how many should be allowed to spawn.

During the next week the test-fishing results, tower counts, aerial surveys of the Kvichak River and catch figures themselves were carefully compared and considered while brief, alternating open and closed periods were allowed. The Department stated that if the 1960 run proved to be a big one, an escapement of at least 10,000,000 fish was desired. On July 11, with half this number already in Lake Iliamna and with at least a couple million more lining the sides of the Kvichak, it finally looked as if we were assured of getting our 10,000,000. With this in mind, the period which was then open was continued indefinitely until further notice. It has been open 7 days per week ever since.

The final tally showed a catch for the Naknek-Kvichak district of 10,178,866 fish of all species, with escapements as follows: Kvichak, 14,500,000; Alagnak (Branch) 1,240,000; Naknek, 828,000.

There are several noteworthy points which should be mentioned in connection with this season's management in this district. Probably the foremost of these involves a discussion of the large escapement. We are under criticism from some quarters for our failure to utilize a larger portion of the run. It is true that we exceeded our escapement goals for the Kvichak River to a considerable extent. It can be argued that our regulations themselves permitted a larger harvest but that the catch was reduced by (1) the inability of the canning industry to handle the fish at the peak of the run, and (2) the abrupt reduction in the amount and efficiency of the effort after the fleet had assured itself of a good payday. The simple truth is that the fish were so much smaller than usual that they were not taken by the gear in the proportions which was expected and escapement continued to pile up, even after opening the area to continuous fishing and extending the boundary far upriver.

The second point is the fact that we were able to harvest as many as we did. This is directly attributable to the Commissioner's delegation of emergency regulatory authority to the local level. Without this ability to open seasons at short notice and leave them open during what were formerly mandatory closed periods on the weekends, the ratio would have been far heavier in favor of escapement than it was.

We feel that the use of a test-fishing program to provide an index of escapement assisted us materially and is definitely a step in the right direction.

The Department's attempt to time the openings of the fishing periods to the stage of tide which would assure the set-netters receiving an equal opportunity, has met with overwhelming approval on the part of this important segment of the fishery. We plan to apply it in the future whenever possible.

It is also significant that the reduction in size of this fishing area, which was effected last year by the inward movement of the outer boundary, did not appear to be detrimental in any way to the conduct of the fishery. It was our observation on many occasions that concentrations of the fleet were directly correlated with the occurrence of fish and not brought about through any crowding imposed by the reduction of the area.

The Board's decision to approve of the removal of the minimum distance between units of gear was well justified in our estimation. Complaints regarding drift nets becoming tangled with set-net buoys continue to be received, but there does not seem to be a significant increase over what was experienced formerly when a minimum distance was theoretically in force. I know of no fisherman who will purposely tangle his net on a set-net buoy.

ECEGIK DISTRICT

Management in the Egegik District was based on the traditional method of comparison of current catches with those of previous years. Salmon appeared to be available in good supply through the season and two 24 hour periods were allowed each week until July 9, when an additional period of 24 hours was opened on Saturday morning. On Monday, July 11, this district was opened on a continuing basis. Total catch of all species topped one and one-half million.

The final escapement tally of nearly 1,800,000 in comparison with our stated objective of three-fourths to one million fish is indicative that management was less effective than could have been desired. This we will be the first to admit. It is characteristic of this run to delay their migration for as long as two weeks in the lagoon below the counting towers before passing into the lake. For this reason, the counting towers are of limited usefulness as a management tool. During weather which restricts visibility, it may be impossible to adequately see the fish in the lagoon from a plane and thus get an estimate of escapement by this method. During the coming season, we propose to conduct a test-fishing operation in the Egegik River above the upper boundary of the fishing area. This should assist notably even in its first year and in successive years should permit management to regulate with a precision never before obtained in this district.

UGASHIK DISTRICT

The Ugashik District exhibited a pattern this year very similar to that of Egegik. Because of inadequate data available to make a forecast, we had predicted our regulations upon an expectation of the average return of recent years. In our determination to assure adequate escapement, it was anticipated that the catch might be severely restricted. Because of this, the Board had approved a considerable reduction in effort in both these districts, but only in the Ugashik was this reduction actually obtained, and then only by a block transfer, after the beginning of the season, of the fishing boats belonging to one company.

The pattern of the fishery and the behavior of the migrating spawners paralleled that of the Egegik. Good catches - very good catches were made but it proved impossible to obtain a satisfactory index of escapement. Indications of the unusual size of the run were so evident, however, that continuous fishing was initiated over three days before we had one fish past the counting towers.

The 1960 Ugashik run is the largest ever measured in this district where we have the most extensive data on catch plus escapement of any river in Bristol Bay. This unprecedented and unanticipated return, in combination with the low intensity of effort explains the tremendous escapement of 2,300,000 fish. Although the total

catch was only 800,000 fish, yet individual averages were high and, as was the case elsewhere in the Bay, the local economy was greatly benefitted by the increased share of the catch proceeds which accrued to local fishermen through the regulations promulgated by this Board.

TOGIAC DISTRICT

This area, which has been utilized only in recent years, required increased management attention this past season because of the entry of a second operator, and an accompanying doubling of the fishing effort. Previously restricted only by the week-end closure, this years management also included a six-day closed period from July 22 to July 28. This closure was promulgated because the counts at the Togiak tower led us to believe that the run might be overfished if it were not given added protection. The lateness of the date required that it be immediate and continuous. In our estimation, subsequent results, vindicated this action. The escapement was probably increased by 30,000 fish and the final total of 163,000 reds counted into Togiak Lake compared favorably with escapements observed during aerial surveys in past years. This was the first time that a tower had been successfully operated on this system. The total catch of all species was 404,000 fish. Of these, 135,000 were reds. With the exception of a king catch of 7,000, the remainder were virtually all chums. 1960 proved to be a most successful year for chum salmon in all Togiak Bay rivers.

Other Activities of the Commercial Fisheries Division

Activities Related to Management: With the management function, the Department also received the responsibility for (1) collecting and analyzing information related to management, and (2) carrying out applied research aimed at continual improvement of the Department's ability to manage. Most of these functions were, of course, carried out by other agencies prior to this year and we were unable to immediately assume all of them this first season. Following is a listing of some of the activities in which we did engage.

Enumeration of salmon escapement from towers. On five river systems we took over this function from the Fish and Wildlife Service. In one of these - the Nuyakuk River, which drains the Tikchik System - the tower counting site was pioneered in a new location which also permitted enumeration of the Nushagak pink escapement. Coverage was extended to two additional systems never before enumerated with precision - Togiak River, and (2) the Snake River system on Nushagak Bay.

Sampling of the escapement for size, age and sex composition was carried on at two locations and at two more sites the A.D.F.&G. tower counters assisted an F.W.S. employed crewman, who was responsible for the sampling function. (The federal employee reciprocated by assisting with the counting operation.)

Sampling of the commercial catch was done by our personnel in the Nushagak and Togiak districts. On the Nushagak, this also, included the king season.

Collection and coding of fish tickets from all districts of the Bay was accomplished regularly throughout the season. These were turned over to the Statistical Section in Juneau for final processing by electronic computers.

Aerial, boat, and some foot surveys of escapements were continued and extended. Among these were the detailed coverage of Nushagak red distribution formerly effected by the Fisheries Research Institute, and the combination aerial-float survey of Nushagak king escapement begun in 1957 by this Department.

A tagging experiment in the Ugashik district was carried out for the purpose of learning more of the intermixture and distribution of salmon stocks in the area of the present outer line. Most pertinent of all information obtained was the confirmation of the extensive occurrence of Egagik and Naknek-Kvichak stocks in the area closed by the inward movement of this boundary in 1960. The value of the present line in improving the separation of stocks is clearly indicated.

The test-fishing project on the Kvichak has already been referred to.

Sampling of survival from the huge 1959 escapement in the Wood River system was engaged in by permanent Department personnel in cooperation with the Fisheries Research Institute. Findings indicated that the survival to the fry stage was generally excellent.

Transfer of equipment from and cooperation with the Fish and Wildlife Service. The long awaited transfer of management equipment related to the Bristol Bay area finally materialized in disappointing degree late in the spring. It is best characterized by the words too little and too late.

Cooperation with the federal service was necessary at both the King Salmon base and certain field locations. While the year-round Bristol Bay office is located in Dillingham, summer headquarters are at King Salmon, near the center of Bristol Bay activity. Office space, storage and work facilities, and temporary living quarters were made available to the Department there. A joint mess was also conducted, which included certain field crews in the eastern Bay area, as well as the King Salmon personnel. Cooperation in the form of joint staffs at field locations has already been referred to under the section on sampling of escapement. In a number of instances the Department was generously loaned equipment without which our work would have been far more difficult.

Cooperation with other Departmental Divisions: Coordination with the activities of the Protection Division was carried out whenever possible. This ranged from the tagging of thousands of beaver pelts in the spring to the prosecution of violations and collecting of fines by Commercial Fisheries Division personnel upon occasion during the fishing season. Certain equipment assigned to the Protection Division was, in turn, made available for use by Commercial Fisheries, as circumstances warranted.

Supervision of Industrial Construction of Hydraulic Projects. Upon the date of assumption of responsibility for the fishery resource by this Department, certain industrial projects related primarily to oil exploration were in progress. One such major undertaking was present in the Egegik region of Bristol Bay. Here the Mobil Oil Company and its contracting parties had constructed a road from the east side of the Alaska Peninsula at Jute Bay across to drilling sites on the Bristol Bay side. This road followed a course which crossed many salmon streams and at one time followed the bed of Bear Creek, one of the major spawning streams of the Egegik watershed, for most of its productive length. Originally undertaken without adequate restrictions for the protection of the resource having been imposed, this construction had already caused damage and still contained a number of undesirable features.

During the first three months of 1960, this company withdrew their equipment from the drilling sites back over this road to Jute Bay. All major portions of this move were carried out under the observation of the Area staff. Upon completion of the move, all culverts were required to be removed and stream crossings were restored insofar as possible to their original condition. Excellent cooperation was received from the Mobil Oil Company personnel.

Sale of Hunting and Sport Fishing Licenses. Inasmuch as no suitable individual could be found to handle these licenses in Dillingham, Mrs. Sagmoen assumed this duty late in 1959 in addition to her regular responsibilities. To date in 1960, 578 licenses and tags have been sold, having a total value of \$5,850.00.

Sale of Commercial Fishing Licenses. During 1960, a total of 2,900 commercial fishing, vessel, and gear licenses were issued by the Bristol Bay staff. These had a value of \$41,750.00.

Professional Contacts and Attendance at Various Meetings. Representatives of the Bristol Bay staff, (1) participated in the program of the Pacific Fisheries Biologists convention at Lake Wilderness, Washington in March, (2) discussed red salmon management with members of the International Pacific Salmon Commission and the Fisheries Research Board of Canada at their respective New Westminster and Nanaimo offices prior to the fishing season, (3) attended the meetings of the Alaska Science Conference in Anchorage in August-September, and (4) were present at the annual meetings of the International North Pacific Fisheries Convention in British Columbia in October and November, and (5) a prior meet of the American Section of the Convention in Seattle during September.

Operational Plans for 1961

As indicated by the experience of the past season, the foremost need of the Department in the coming year is to be able to do a more precise job of management. This is highlighted by our failure to confine the escapement in the Egegik and Ugashik districts to the goals stated prior to the season. This problem stems from the inability of Management to accurately assess the strength of the escapement which has currently been obtained at any given time.

To help fill this need we are planning to place a test-fishing operation above the inner limits of each of these two rivers.

The intense demand upon the time of the experienced permanent staff member during the brief and hectic period of the fishery points toward the need for additional personnel in order that adequate attention may be given to the management of the fishery in each district. In 1960, Egegik and Ugashik should have had more attention. It is our opinion that this has always been the case in the past. We cannot afford to allow it to continue.

Because of the problem of intermingling of stocks within the Egegik fishing area and its relation to the matter of determining the location of the area boundary, we plan to carry out a tagging operation in the Egegik district during 1961.

Earlier in this report reference was made to cooperative operations with the Fish and Wildlife Service at two sites where escapement enumeration and sampling were carried on. This situation was strictly an emergency interim measure growing out of the difficulties inherent in the abrupt assumption of responsibility by this Department. Next year we plan to eliminate all cooperative projects which entail divided jurisdiction such as was the case at these sites.

and (5) a prior meet of the American Section of the Convention in Seattle during September. (3) attended the meetings of the Alaska Science Conference in Anchorage in August-September, and (4) were present at the annual meetings of the International North Pacific Fisheries Convention in British Columbia in October and November, and (5) a prior meet

In 1961, it is projected that the responsibility for sampling the Naknek-Kvichak, Egegik, and Ugashik catches will be turned over to this Department by the Fish and Wildlife Service.

The work of sampling the smolt out-migrations and counting and sampling the spawning escapement at the two vitally important locations of Mosquito Point (Wood River System) and Igiugig (Kvichak System) will fall to this Department this coming year. This work has been carried out by the Fisheries Research Institute in the past. Each of these projects has been under the immediate supervision of personnel of advanced standing. Our assumption of these programs requires the further enlargement of the area staff. The importance of this field work is of such a magnitude that it cannot be entrusted completely to beginners.

Collection of field data is but the first step in the process of accumulating scientific knowledge. The tabulation and analysis of this material often requires a volume of effort in excess of that which went into its procurement. The present small staff cannot hope to accomplish this without reinforcement.

The importance of the work of analysis and interpretation has been recently brought forcefully to the attention of all by the publicity relating to the Bristol Bay forecasts. As the Department gradually takes over the projects which secure the raw information on which the forecasts are based, we will also become responsible for contributing to their production in a greater degree. This, we believe, is as it should be.

The number of seasonal employees required to carry out next year's program of the Commercial Fisheries Division in Bristol Bay will be increased to a total of approximately fifty men. In 1960 we used thirty-two.

Prerequisite to the entire program in Bristol Bay is the need for the construction of appropriate facilities at King Salmon. The transfer from the federal agency, still in progress, appears to have left the State without any of the following:

1. Office space.
2. Permanent quarters for either maintenance personnel, a Protection Officer or a resident biologist.
3. Satisfactory ~~temporary~~ quarters *for temporary personnel*.
4. Kitchen and mess facilities.
5. Water supply.
6. Mooring or drydocking facilities.
7. Space and equipment for the repair of vessels, equipment or buildings.
8. Storage space.

Suitable warehouses are being transferred but with the stipulation that they be moved. This has been declared to be impractical by the Buildings Division of the Department of Public Works. The above problem has been brought to the attention of the Department of Public Works.

Some of the above will continue to be made available for our use for at least one more year but we must provide our own kitchen and mess facilities and water supply prior to the 1961 season.

BRISTOL BAY LICENSE SUMMARY

	<u>Total Issued</u>	<u>Total Value</u>
Resident Commercial Fishing Licenses	1,422	\$14,220.00
Non-Resident Commercial Fishing Licenses	745	11,175.00
Resident Vessel Licenses	826	8,260.00
Non-Resident Vessel Licenses	378	11,340.00
150 Fathom Drift Licenses	903	23,805.00
100 Fathom Drift Licenses	111	1,550.00
50 Fathom Set Net Licenses	345	1,725.00
	<u>4,730</u>	<u>\$72,075.00</u>

Gear Breakdown by District *

	<u>Reregistered</u>	<u>Unreregistered</u>	<u>Total</u>	<u>Value</u>
NAKNEK-KVICHAK				
Resident Drift (150)	221	14	235	\$ 3,525.00
Non-Resident Drift (150)	264	9	273	12,285.00
Resident Drift (100)	30	10	40	400.00
Non-Resident Drift (100)	2	2	4	120.00
Set-net (50)	92	24	116	580.00
NUSHAGAK				
Resident Drift (150)	193	7	200	3,000.00
Non-Resident Drift (150)	11	10	21	945.00
Resident Drift (100)	33	3	36	360.00
Non-Resident Drift (100)	13	2	15	450.00
Set-net (50)	154	15	169	845.00
EGEGIK				
Resident Drift (150)	30	2	32	480.00
Non-Resident Drift (150)	38	5	43	1,935.00
Resident Drift (100)	7	2	9	90.00
Non-Resident Drift (100)	2	0	2	60.00
Set-net (50)	28	9	37	185.00
UGASHIK				
Resident Drift (150)	24	3	27	405.00
Non-Resident Drift (150)	2	2	4	180.00
Resident Drift (100)	0	0	0	
Non-Resident Drift (100)	0	1	1	30.00
Set-net (50)	18	5	23	115.00
TOGLAK				
Resident Drift (150)	67	0	67	1,005.00
Non-Resident Drift (150)	1	0	1	45.00
Resident Drift (100)	4	0	4	40.00

*(Distribution as per end of fishing season)

BRISTOL BAY LICENSE STATISTICS, 1960-1961

	<u>1960</u>	<u>1961</u>
COMMERCIAL FISHING LICENSES		
Resident	1,422	2,112
Non-resident	745	1,506
Total	<u>2,167</u>	<u>3,618</u>
VESSEL LICENSES		
Fishing vessels		
Resident	804	1,058
Non-resident	350	665
Total	<u>1,154</u>	<u>1,723</u>
Scows		
Resident	22	14
Non-resident	28	46
Total	<u>50</u>	<u>60</u>
GEAR LICENSES ⁽¹⁾		
Resident 150 fathom drift	561	674
Resident 100 fathom drift	39	106
Resident 50 fathom set-net	345	496
Total Resident	<u>995</u>	<u>1,276</u>
Non-resident 150 fathom drift	342	600
Non-resident 100 fathom drift	22	38
Non-resident 50 fathom set-net	0	10
Total non-resident	<u>364</u>	<u>648</u>
TOTAL GEAR	<u>1,359</u>	<u>1,924</u>

(1) Number of licenses, not units of gear.

Fishing Periods 1960

NUSHAGAK

(District)

Date

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
June 19	20	21	22	23	24	25
	9:00 A.M.					9:00 A.M.
26	27	28	29	30	July 1	2
	9:00 A.M.	9:00 A.M.		9:00 A.M.	9:00 A.M.	
6AM-9PM 3	Igushik sub-section					
	9:00 ⁴ A.M.	9:00 ⁵ A.M.	6	7	8	5:00 ⁹ A.M.
10	11	12	13	14	15	16
17	18	19	20	21	22	23
						9:00 A.M.
24	25	26	27	28	29	30
	9:00 A.M.					9:00 A.M.

Shaded area indicates closed periods.

Fishing Periods 1960

TOGIAK
(District)

Date	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
June 19	June 20	June 21	June 22	June 23	June 24	June 25	June 25
	9:00 A.M.						9:00 A.M.
June 26	June 27	June 28	June 29	June 30	July 1	July 2	July 2
	9:00 A.M.						9:00 A.M.
July 3	July 4	July 5	July 6	July 7	July 8	July 9	July 9
	9:00 A.M.						9:00 A.M.
July 10	July 11	July 12	July 13	July 14	July 15	July 16	July 16
	9:00 A.M.				9:00 A.M.		
July 17	July 18	July 19	July 20	July 21	July 22	July 23	July 23
				9:00 A.M.			9:00 A.M.
July 24	July 25	July 26	July 27	July 28	July 29	July 30	July 30
	9:00 A.M.						9:00 A.M.

Shaded area indicates closed periods.

Fishing Periods 1960

NAKNEK-KVICHAK
(District)

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Date	June 19	20	21	22	23	24	25
		9 AM					9 AM
	26	27	28	29	30	July 1	2
		9 AM	9 AM		3 PM	6 AM	5 AM
	3	4	5	6	7	8	9
	5 AM	6 AM	6 AM 8 PM	8 PM	9 AM	9 AM	11 PM 6 AM
	10	11	12	13	14	15	16
	12 noon						
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30

Shaded area indicates closed periods.

Fishing Periods 1960

ECEGIK
(District)

Date

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
June 19	20	21	22	23	24	25
	9:00 A.M.					9:00 A.M.
26	27 9:00 A.M.	28 9:00	29	30 1:00 A.M.	July 1 9:00 A.M.	2
3	4 9:00 A.M.	5 9:00 A.M.	6	7 9:00	8 9:00 A.M.	9 4:00 A.M.
10 9:00 A.M.	11 9:00 A.M.	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

Shaded area indicates closed periods.

Fishing Periods 1960

UGASHIK
(District)

Date

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
June 19	June 20	June 21	June 22	June 23	June 24	June 25
	9:00 A.M.					9:00 A.M.
June 26	June 27	June 28	June 29	June 30	July 1	July 2
	9:00 A.M.	9:00 A.M.		9:00 A.M.	9:00 A.M.	
July 3	July 4	July 5	July 6	July 7	July 8	July 9
	9:00 A.M.	9:00 A.M.	9:00 A.M.	9:00 A.M.	11:00 P.M.	
July 10	July 11	July 12	July 13	July 14	July 15	July 16
July 17	July 18	July 19	July 20	July 21	July 22	July 23
July 24	July 25	July 26	July 27	July 28	July 29	July 30

Shaded area indicates closed periods.

NUSHAGAK DISTRICT CATCH, ALL SPECIES, 1960

<u>Period</u>	<u>Kings</u>	<u>Reds</u>	<u>Chums</u>	<u>Cohos</u>	<u>Pinks</u>	<u>Total</u>
June 1 - 4	1,088	2				1,090
June 6 -11	10,710	20	41			10,771
June 13-18	30,435	5,022	22,809			58,266
June 20-25	27,273	170,099	58,385			255,757
June 27-28	970	52,342	17,476			70,788
30-July 1	1,679	304,080	101,394			407,153
July 3 ⁽¹⁾	320	62,218	19,170		2	81,710
July 4 - 5	3,477	311,257	95,794		12	410,540
July 9	179	75,307	23,177		13	98,676
July 10-16	3,299	451,140	158,584	59	2,900	615,982
July 17-23	1,656	64,473	115,705	756	83,234	265,824
July 25-30	276	15,541	20,797	7,380	157,882	201,876
Aug. 1 - 6	46	4,664	6,331	3,438	42,433	56,912
Aug. 8 -14	7	1,540	2,057	1,525	3,198	8,327
Aug. 15-17	1	283	379	299	107	1,069
Total	81,416	1,517,988	642,099	13,457	289,781	2,544,741

(1) Igushik section only

TOGIAK DISTRICT CATCH, ALL SPECIES, 1960

<u>Period</u>	<u>Kings</u>	<u>Reds</u>	<u>Chums</u>	<u>Cohos</u>	<u>Pinks</u>	<u>Total</u>
June 6 -11	53					53
June 13-18	792	22	13			827
June 20-25	1,899	4,205	13,809			19,913
27-July 2	2,713	24,621	77,067		12	104,413
July 4 - 9	1,244	30,556	86,131		12	117,943
July 11-16	430	42,749	40,431	1	59	83,670
July 18-22	121	26,191	25,574		154	52,040
July 28-30	35	5,305	7,077	3	688	13,108
Aug. 1 - 6	15	5,025	4,536	7	688	10,271
Aug. 8 -13	7	974	682	54	56	1,773
Total	7,309	139,648	255,320	65	1,669	404,011

NAKNEK-KVICHAK DISTRICT CATCH, ALL SPECIES, 1960

<u>Period</u>	<u>Kings</u>	<u>Reds</u>	<u>Chums</u>	<u>Cohos</u>	<u>Pinks</u>	<u>Total</u>
June 20-25	4,412	61,838	18,356			84,606
June 27-28	265	476,960	11,344			488,569
30-July 1	625	1,139,334	26,884			1,166,843
July 2 - 3	1,159	606,663	14,279			622,101
July 4 - 5	2,885	1,356,212	20,817			1,379,914
July 5 - 6	653	1,285,841	19,782			1,306,276
July 7 - 8	650	1,357,835	20,815	1		1,379,301
July 8 - 9	518	445,320	6,898	1		452,737
July 10-16	3,149	2,556,471	107,167	2	21	2,666,810
July 17-23	2,683	487,337	49,434	14	236	539,704
July 24-30	719	63,870	7,389	12	7,258	79,248
31-Aug. 6	51	9,522	1,049	151	2,785	13,558
Aug. 7 -10	9	645	72	16	282	1,024
Total	17,778	9,847,848	304,286	197	10,582	10,180,691

EGEGIK DISTRICT CATCH, ALL SPECIES, 1960

<u>Period</u>	<u>Kings</u>	<u>Reds</u>	<u>Chums</u>	<u>Cohoes</u>	<u>Total</u>
June 15-18	241	1,451	237		1,929
June 20-25	1,239	110,581	13,658		125,478
June 27-28	344	58,847	3,232		62,423
30-July 1	415	230,140	12,703		243,258
July 4 - 5	154	207,542	3,612		211,308
July 7 - 8	122	193,934	3,371		197,427
July 9-10	206	183,883	3,225		187,314
July 11-16	193	381,479	15,797		397,469
July 17-23	77	77,614	6,856		84,547
July 24-30		376	40	2	418
31-Aug. 6		729	77	510	1,316
Aug. 7 -13		236	24	956	1,216
Aug. 14-19		72	5	953	1,030
Total	2,991	1,446,884	62,837	2,421	1,515,133

UGASHIK DISTRICT CATCH, ALL SPECIES, 1960

<u>Period</u>	<u>Kings</u>	<u>Reds</u>	<u>Chums</u>	<u>Total</u>
June 20-25	1,109	23,323	10,502	34,934
June 27-28	442	33,243	4,026	37,711
30-July 1	143	59,105	7,161	66,409
July 4 - 5	69	116,347	4,168	120,584
July 6 - 7	71	79,542	2,848	82,461
July 8 - 9	58	84,640	3,032	87,730
July 10-16	238	307,037	14,170	321,445
July 17-23	79	49,397	5,508	54,984
Total	<u>2,209</u>	<u>752,634</u>	<u>51,415</u>	<u>806,258</u>

BRISTOL BAY CASE PACKS BY SPECIES
(1951 - 1962)

<u>YEAR</u>	<u>REDS</u>	<u>PINKS</u>	<u>CHUMS</u>	<u>COHOS</u>	<u>KINGS</u>	<u>TOTAL</u>
1951	337,848	0	18,336	3,647	4,598	364,429
1952	702,166	1,258	31,238	694	11,301	746,657
1953	460,886	8	37,666	280	8,065	506,905
1954	341,133	4,710	33,721	2,848	9,052	391,464
1955	312,284	90	20,113	1,541	12,859	346,887
1956	529,726	3,920	30,899	4,441	9,902	578,888
1957	471,979	0	31,074	5,220	20,562	528,835
1958	241,099	60,189	42,143	12,694	25,956	382,081
1959	332,713	25	42,672	6,597	15,872	397,879
1960	852,150	12,176	102,890	2,967	19,068	989,251
1961	934,544	106	62,783	4,116	17,789	1,019,338
Ten-year Average-1951-1961	517,868	16,451	43,519	4,139	15,042	588,818
48-year Average	895,014	17,103	41,984	3,841	12,905	963,008
1962	358,504	37,275	58,747	2,812	16,817	474,155

Average case pack on pinks includes even years only.

Daily Red Salmon Counts--Wood River Escapement
1957-1962

Date	1957	1958	1959	1960	1961	1962
6/19				114		
20		825	57	192		
21	0	1,365	480	96		6
22	656	2,376	348	132		162
23	720	6,747	996	211		84
24	1,194	5,541	1,452	512		96
25	986	1,512	1,176	1,296	30	228
26	900	2,247	3,048	10,013	1,104	1,866
27	1,284	2,172	16,986	8,208	4,224	1,014
28	2,298	902	105,804	4,116	2,874	786
29	3,216	1,119	32,752	4,770	2,805	1,662
30	9,062	17,681	62,766	1,488	3,006	1,056
7/ 1	15,725	81,246	85,542	1,443	96	1,956
2	6,138	40,935	115,712	1,830	9,030	2,094
3	3,752	12,749	340,872 ✓	5,844	15,438	90,558
4	4,338	8,586	201,870	2,826	24,594	112,296
5	2,541	12,295	184,740 ✓	6,474	23,433	248,742 ✓
6	3,660	103,860	163,254	98,460	30,588	230,274
7	4,011	189,830 ✓	85,116	232,140 ✓	30,474	54,960
8	3,700	129,855	29,682	199,596	21,510	23,022
9	7,754	80,631	23,802	167,094	16,728	23,922
10	7,908	30,149	23,292	103,746	30,924	24,036
11	81,337 ✓	21,314	13,758	41,190	26,022	8,562
12	62,092	14,555	116,058	15,600	75,009	7,512
13	29,366	74,523	250,614	13,188	77,736 ✓	3,420
14	12,453	33,249	129,270	15,708	43,734	1,944
15	4,965	24,648	52,236	16,728	8,250	4,554
16	5,086	7,823	14,088	17,418	5,682	12,288
17	3,038	4,391	11,334	16,872	3,492	3,552
18	1,977	3,023	24,612	9,120	1,209	714
19	2,563	4,214	27,738	6,444	1,176	462
20	2,211	7,926	13,242	4,392	507	666
21	3,710	8,208	5,976	1,524	186	480
22	2,995	6,756	4,680	1,376	0	324
23	898	2,652	3,912	368	24	978
24	617	2,232	4,266	760	54	1,116
25	839	1,694	1,515	2,312	486	726
26	1,085	1,533	2,718	1,920	186	696
27	2,617	1,038	912	552	54	534
28	1,350	1,500	1,575		54	1,920
29		1,637	552		18	3,726
30		1,932	54			708
31		1,905	1,836			114
8/ 1		1,788				72
2		654				
TOTAL	299,852	961,818	2,211,793	1,016,073	460,737	873,888

30,00

**Daily Red Salmon Counts--Igushik River Escapement
1958-1962**

Date	1958	1959	1960	1961	1962	1963
6/22		492			0	
23		897		192	0	
24		804		144	0	
25		1,725	0	162	0	36
26	1,422	1,110	30	108	0	0
27	1,596	1,416	48	348	0	0
28	306	1,593	726	1,812	0	0
29	2,544	4,281	4,008	5,880	0	48
30	1,770	9,561	9,048	9,234	204	480
7/ 1	2,400	10,977	2,892	12,270	306	252
2	3,108	17,280	4,452	14,220	312	798
3	1,668	28,878	6,474	16,548	564	1,362
4	1,746	32,538	8,196	14,070	348	
5	5,844	38,654	11,370	18,516	546	
6	2,364	55,998	14,442	20,556	708	
7	3,810	38,034	13,878	21,030	2,286	
8	4,896	35,796	14,352	26,946	3,762	
9	10,500	45,915	18,702	20,568	2,628	
10	16,410	37,461	34,674	17,946	1,752	
11	11,310	31,578	34,812	17,886	720	
12	1,932	29,839	45,426	13,980	834	
13	3,540	15,042	42,780	11,520	372	
14	4,242	11,418	31,314	10,038	90	
15	6,444	19,893	25,434	10,212	42	
16	3,240	20,475	20,064	5,760	42	
17	3,324	16,257	11,892	6,138	54	
18	3,768	21,822	17,322	3,564	72	
19	2,904	23,571	16,686	2,730	6	
20	1,170	22,644	13,872	1,884	0	
21	1,338	18,861	13,080	2,130	0	
22	696	15,906	12,642	1,002	12	
23	978	6,129	12,108	1,146	0	
24	648	5,520	11,958	36	Terminate	
25	372	3,719	8,628	684	Count	
26	270	2,961	6,582	1,110		
27	78	1,306	6,156	540		
28	54	4,635	3,930	390		
29	120	2,946	4,152	630		
30	66	1,706	3,384	444		
31	0	1,734	2,094	756		
8/ 1	0	1,069	2,340	414		
2	--	360	1,590	558		
3		957	1,296	150		
4		--	1,260	--		
5			720			
6						
Tower discont.						
TOTAL	107,478	643,788	494,814	294,252	15,660	

Daily Red Salmon Counts--Snake River Escapement
1960--1962

Date	1960	1961	1962
6/24	0		
25	0		0
26	0		0
27	81	0	0
28	75	0	0
29	0	30	0
30	54	0	8
7/ 1	0	0	4
2	24	6	0
3	0	0	0
4	52	0	0
5	0	0	36
6	144	0	80
7	336	0	40
8	1,124	0	40
9	2,824	312	424
10	3,140	32	580
11	2,368	8	24
12	1,408	44	60
13	1,024	760	84
14	840	1,792	60
15	472	584	8
16	564	464	48
17	236	192	72
18	32	308	52
19	924	112	36
20	500	108	32
21	264	0	12
22	84	0	20
23	20	28	32
24	8	12	8
25	0	8	0
26	Tower discont.	4	0
		52	
TOTAL	16,598	4,856	1,760

136
40
28
2,592

Daily Red Salmon Counts-- Nuyakuk River Escapement
1959--1962

Date	1959	1960	1961	1962
7/ 4	0			
5	498			
6	492			
7	2,442	144	1,896	942
8	3,363	594	9,192	2,148
9	3,213	888	10,698	1,740
10	5,637	1,848	7,044	1,752
11	6,321	8,430	6,864	6,582
12	3,597	37,290	3,462	7,098
13	3,849	38,952	2,544	5,844
14	2,526	28,830	5,508	3,600
15	2,208	12,330	6,150	3,372
16	1,656	4,896	4,980	1,866
17	930	5,328	6,642	834
18	384	3,636	5,922	996
19	399	1,488	3,840	414
20	1,533	300	2,088	324
21	1,485	156	756	120
22	1,344	78	426	42
23	1,371	18	372	42
24	1,326	0	354	18
25	675	0	222	24
26	639	6	162	24
27	411	6	114	12
28	381	12	150	12
29	411	36	138	18
30	249	0	66	6
31	291	12	66	12
8/ 1	324	18	84	6
2	354	36	48	12
3	225	0	--	0
4	117	6		6
5	96	0		6
6	114	0		0
7	--	0		6
8		0		0
9		12		0
10		36		0
11		30		0
12		0		0
13		6		12
14		6		
15		18		
16		0		
17		6		
18		6		
19		6		
20		6		
21		30		
22		0		
23		--		
TOTAL	48,861	145,500	79,788	37,890

Daily Pink Salmon Counts--Nuyakuk River Escapement
1960--1962

Date	1960	1962
7/14	0	0
15	0	0
16	0	702
17	0	1,488
18	672	2,268
19	1,434	1,884
20	1,991	22,572
21	2,262	59,526
22	1,143	46,734
23	747	10,506
24	639	46,878
25	840	25,824
26	543	12,858
27	1,290	10,674
28	1,563	19,416
29	3,306	50,382
30	2,181	68,628
31	2,367	29,706
8/ 1	2,073	10,554
2	7,098	6,588
3	2,196	2,646
4	2,121	6,078
5	18,372	7,164
6	3,213	10,674
7	7,914	10,650
8	4,439	3,906
9	3,942	1,764
10	11,736	1,360
11	19,005	5,076
12	8,079	7,374
13	13,398	2,202
14	5,040	1,680
15	5,181	1,566
16	2,406	1,386
17	2,580	750
18	2,922	462
19	1,692	732
20	1,116	588
21	810	618
22	48	Terminate counts
TOTAL	146,359	493,863

Daily Red Salmon Counts--Togiak River Escapement
1960--1962

Date	1960	1961	1962
7/ 3		0	0
4		42	6
5		84	54
6		0	156
7		876	66
8		1,050	492
9	219	3,348	1,026
10	3,738	4,818	972
11	4,875	4,194	2,448
12	6,234	3,696	3,486
13	7,728	3,294	5,334
14	8,739	4,374	3,720
15	7,281	5,736	3,240
16	7,680	6,162	2,478
17	6,852	4,176	2,568
18	5,190	3,078	2,754
19	7,050	3,942	2,868
20	6,366	6,126	948
21	5,862	5,874	510
22	5,112	3,084	804
23	5,346	2,328	1,290
24	5,190	1,164	942
25	4,680	1,368	414
26	2,598	1,686	546
27	3,672	2,208	1,626
28	4,422	2,970	1,092
29	6,510	4,098	1,470
30	5,004	2,484	738
31	3,378	1,662	144
8/ 1	1,608	1,380	432
2	3,522	966	324
3	5,418	2,166	564
4	5,244	1,866	708
5	5,070	1,134	396
6	4,926	1,638	72
7	4,710	786	384
8	3,300	383	336
9	2,088	504	384
10	1,878	144	240
11	1,320	252	510
12	Tower Discont.	192	216
13			378
14			120
15			84
16			0
17			12
TOTAL	162,810	95,454	47,352

Daily Red Salmon Counts--Kvichak River Escapement
1958 - 1962

Date	1958	1959	1960	1961	1962
6/21		308	402		
6/22		623	135	120	584
6/23	0	307	312	120	486
6/24	0	99	90	120	708
6/25	0	212	--	264	276
6/26	24	941	18	3,378	780
6/27	29	416	186	51,192	5,922
6/28	58	1,133	2,322	88,884	5,670
6/29	515	440	1,776	134,934	3,366
6/30	582	1,098	1,998	122,316	5,724
7/ 1	174	588	9,747	78,510	29,868
7/ 2	1,485	384	155,394	33,804	153,798
7/ 3	960	1,152	221,586	270,726	123,996
7/ 4	153	7,872	361,572	232,488	43,758
7/ 5	129	49,612	384,012	375,048	91,842
7/ 6	48	51,288	359,946	470,478	242,700
7/ 7	29,328	48,780	586,728	420,846	509,478
7/ 8	161,109	30,758	644,058	261,840	413,238
7/ 9	148,760	12,524	702,966	146,634	537,216
7/10	44,945	19,097	727,644	72,684	329,652
7/11	24,802	32,627	1,075,212	169,254	50,370
7/12	3,575	21,285	1,332,329	128,100	2,424
7/13	2,241	52,818	1,046,130	200,028	2,526
7/14	3,966	88,226	972,978	161,700	4,014
7/15	43,458	90,994	943,860	125,376	2,538
7/16	47,559	55,343	1,001,322	48,552	2,904
7/17	5,946	23,398	1,116,582	14,634	5,514
7/18	1,530	16,093	1,262,790	24,546	3,978
7/19	879	17,357	928,770	26,826	1,392
7/20	1,017	13,225	529,158	10,848	360
7/21	2,673	9,140	115,725	5,166	684
7/22	834	5,637	39,345	8,628	282
7/23	2,130	5,631	36,324	6,393	714
7/24	2,274	3,801	22,457	4,038	942
7/25	999	1,514	9,678	2,760	570
7/26	357	2,119	8,808	2,508	870
7/27	543	2,189		960	1,140
7/28	938	2,592		642	396
7/29	384	1,800		264	204
7/30	381	390		180	
7/31				60	
8/ 1		6,189*	27,640*		
TOTAL	534,785	685,615	14,630,000	3,705,849	2,580,884

* Estimated Late Season Migration

Daily Red Salmon Counts--Branch (Alagnak) River Escapement
1957-1962

Date	1957	1958	1959	1960	1961	1962
6/21						
22						
23						
24						
25						
26				6	--	
27			--	0	735	
28	--		375	6	2,214	
29	66		1,128	0	8,295	
30	694	--	1,143	54	4,968	150
7/ 1	1,521	234	258	2,652	276	444
2	1,586	234	870	72,018	150	5,340
3	430	426	1,350	120,792	3,102	3,252
4	1,266	48	27,198	37,926	21,402	3,648
5	203	0	68,544	13,170	11,364	4,788
6	997	1,044	68,650	50,700	5,292	27,870
7	2,640	4,320	82,179	162,516	588	24,060
8	1,422	17,646	25,017	199,386	324	11,994
9	3,378	23,682	19,455	185,598	216	2,718
10	10,842	9,444	28,791	134,592	372	1,752
11	18,174	1,830	3,174	81,912	462	672
12	28,470	1,236	53,655	32,910	1,770	786
13	14,205	390	96,355	22,860	7,998	252
14	4,912	5,484	124,545	15,582	10,512	72
15	4,668	19,146	112,694	23,706	2,880	168
16	7,090	4,518	24,462	45,150	804	900
17	3,114	1,854	6,734	20,610	144	864
18	1,356	678	26,973	8,598	906	606
19	5,562	636	20,553	3,204	1,344	222
20	3,384	168	10,443	1,668	408	24
21	1,050	918	5,040	2,682	474	6
22	1,228	444	4,365	1,182	522	36
23	1,424	66	1,623	570	840	6
24	3,846	36	759	276	438	
25	1,140	114	2,331	180	714	
26	1,104	12	4,404	12	144	
27	372	0	1,884	12	48	
28	204	18	141	Tower discount.	60	
29	247	24	216	--	144	
30	--	--	132	--	126	
TOTAL	126,595	94,650	825,421	1,240,53-	90,030	90,630

Daily Red Salmon Counts--Naknek Riv. Escapement
1958 - 1962

Date	1958	1959	1960	1961	1962
6/21		18			
6/22		858			
6/23		156			
6/24		2,688			
6/25	0	1,182	0		6
6/26	0	594	0	11,166	7,122
6/27	174	7,437	0	13,044	1,578
6/28	18	7,113	0	4,044	1,434
6/29	474	429	582	2,028	10,974
6/30	660	7,542	8,376	1,296	74,286
7/1	258	22,875	89,502	1,218	20,214
7/2	3,108	68,895	31,890	1,836	10,956
7/3	4,296	177,099	11,322	99,042	20,112
7/4	9,456	166,311	20,058	12,258	21,666
7/5	8,352	177,054	9,642	10,034	293,712
7/6	59,016	132,645	147,228	4,266	128,514
7/7	56,676	51,144	95,916	1,674	115,938
7/8	36,690	80,364	62,976	5,472	6,024
7/9	20,244	119,436	90,828	5,592	2,412
7/10	11,550	43,386	36,144	13,668	1,116
7/11	5,364	103,233	15,828	34,302	1,182
7/12	3,306	460,839	19,698	52,218	1,194
7/13	4,032	284,553	20,904	27,228	2,142
7/14	23,718	112,880	11,568	10,260	954
7/15	8,592	32,440	39,972	3,000	66
7/16	2,448	27,036	36,444	5,556	792
7/17	2,316	47,244	10,830	8,664	372
7/18	2,136	26,973	14,088	5,922	216
7/19	2,430	19,132	9,432	684	18
7/20	2,442	6,396	6,810	552	42
7/21	2,610	6,016	6,660	984	24
7/22	1,908	6,256	4,092	552	
7/23	1,488	7,804	3,432	336	
7/24	1,566	6,684	2,928	2,748	
7/25	882	5,824	2,220	1,674	
7/26	774	3,432	2,622	462	
7/27	354	1,860	2,844	324	
7/28	318	1,988	2,496	438	
7/29	270	1,112	2,535	324	
7/30	36	2,104	2,901	204	
7/31	108	1,612	1,356	429	
8/1	48		1,194	354	
8/2	0		822	84	
8/3			1,005	141	
8/4			756		
8/5-8/19			480		
TOTAL	278,118	2,230,000	828,381	351,078	723,066

DAILY RED SALMON COUNTS - EGEK RIVER ESCAPEMENT
1957 - 1962

Date	1957	1958	1959	1960	1961	1962
6/30		16,212	4,800			
7/ 1	9,960	3,606	4,506	0		26,394
2	20,136	7,632	0	0	11,286	38,604
3	3,042	7,524	0	0	58,308	76,638
4	7,524	13,644	80	0	17,826	46,206
5	8,848	30,198	20,348	1,416	17,100	14,124
6	5,632	31,872	15,684	108	49,908	59,994
7	7,552	27,492	98,920	92,346	74,454	182,160
8	13,656	44,490	127,512	62,058	65,562	119,448
9	20,826	18,606	90,436	17,778	119,526	112,512
10	44,664	8,358	96,960	154,728	62,790	79,254
11	85,639	12,042	88,904	193,404	27,414	95,502
12	64,132	5,316	17,152	310,710	22,158	93,972
13	35,985	1,176	2,216	267,738	9,258	15,618
14	8,722	2,094	30,132	68,832	39,228	10,176
15	17,179	408	58,544	216,763	9,390	17,856
16	21,302	294	86,392	165,102	13,446	26,628
17	361	3,534	51,820	137,442	19,626	10,494
18	3,783	3,132	106,704	33,792	18,348	1,482
19	4,596	924	21,840	43,890	23,220	270
20	3,063	1,308	51,152	20,136	17,658	114
21	120	288	25,540	12,108	4,944	36
22	1,169	1,362	21,352	402	588	
23	681	1,302	8,940	6	2,472	
24	1,205	264	5,596	0	9,258	
25	801	432	1,156	0	3,564	
26	154	570	4,624	0	1,404	
27	295	1,266	2,404	Discont.	450	
28	42	432	6,544		612	
29	42	30	1,412		366	
30	96	174	741		228	
31		198	48		378	
8/ 1		114	0		294	
2		60			246	
3					132	
4					126	
TOTAL	391,207	246,354	1,072,459	1,789,764	701,538	1,027,482

BRISTOL BAY RED SALMON ESCAPEMENT IN
NUMBERS OF FISH BY RIVER SYSTEM
1950 - 1962

YEAR	NUSHAGAK	NAKNEK KVICHAK	EGEGIK	UGASHIK	TOGIAK	TOTAL
1950	573,000	1,964,000	625,800	998,342	---	4,161,142
1951	540,000	3,724,000	1,950,000	205,881	---	6,419,881
1952	434,000	4,486,000	756,921	651,209	---	6,328,130
1953	829,000	2,200,000	519,098	1,056,052	---	4,604,150
1954	692,000	1,544,613	506,157	457,834	---	3,200,604
1955	1,934,000	638,187	271,039	76,841	---	2,920,067
1956	1,214,000	11,215,983	1,104,203	425,295	---	13,959,481
1957	499,852	3,604,060	391,207	214,802	25,000	4,734,921
1958	1,274,296	907,553	246,354	279,546	57,000	2,764,749
1959	2,964,462	3,738,065	1,072,439	218,723	178,740	8,172,449
1960	1,672,985	16,698,911	1,798,764	2,304,200	162,810	22,637,670
1961	839,633	4,146,963	701,538	348,639	95,454	6,132,227
12 year av. 1950 - 1961	1,122,269	4,572,361	828,628	603,114	103,800 ^{1/}	7,169,623
1962	937,698	3,393,264	1,027,482	288,676	71,552	5,718,672

^{1/} 5 year average; 1957 - 1961

1960
Bristol Bay Red Salmon Catch & Escapement

NAKNEK-KVICHAK DISTRICT	Escapement		<u>Catch</u>	<u>Total Run</u>
	<u>System</u>	<u>District</u>		
Kvichak	14,630,000			
Naknek	828,381			
Alagnak (Branch)	1,240,530			
		16,698,911	9,847,848	26,546,759
NUSHAGAK DISTRICT				
Wood River	1,016,083			
Igushik	494,814			
Tikchik Lakes	145,500			
Snake River	16,598			
Nushagak-Mulchatna	10,000			
		1,682,995	1,517,988	3,200,983
EGEGIK DISTRICT		1,798,764	1,446,884	3,245,648
UGASHIK DISTRICT		2,304,200	752,634	3,056,834
TOGLAK DISTRICT				
Togiak Lakes	162,810			
Other	29,200			
		192,010	139,648	331,658
Total BRISTOL BAY		22,676,880	13,705,002	36,381,882

COMPARATIVE INDICES FOR RED SALMON SMOLT
AT MOSQUITO POINT, 1951 - 1962

<u>Year</u>	<u>Index Points</u>	<u>Number of Smolts</u>
1951	9.9	16,809
1952	100.0 ^{1/}	170,034
1953	296.1	503,444
1954	438.6	745,769
1955	221.7	376,965
1956	326.6	555,331
1957	165.5	281,406
1958	230.9	392,609
1959	60.0	102,020
1960	223.0	379,176
1961	518.7	881,911
1962	177.6	301,892

1/ Base year: assigned value of 100.00

1 index point = 1700.34 smolts