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Appendix I
April 16, 2003 CFEC Memo
to
ADFG Commissioner Kevin Duffy

State of Alaska

Frank Murkowski, Governor
Commission
99801

Commercial Fisheries Entry
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MEMORANDUM

To: Kevin Duffy
Commissioner
Dept. of Fish and Game

Date: April 16, 2003

Phone: (907) 789-6160 VOICE
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From: Bruce Twomley, Chairman
Marlene Johnson, Commissioner
Mary McDowell, Commissioner

Subject: Bristol Bay salmon drift gillnet
optimum number

The Commercial Fisheries Entry Commission (CFEC) requests the Department's assistance in its study of the optimum number of limited entry permits in the Bristol Bay salmon drift gillnet fishery.

Under AS 16.43.290 (see Attachment A), the Commission is directed to determine an optimum number based upon a reasonable balance of three standards. We are addressing the first and third standards with a detailed analysis of the historic rates of economic returns in the fishery, and with forecasts of the range of future economic returns. The second standard refers to management of the fishery; we feel the Alaska Department of Fish and Game (ADFG or Department) has the best expertise to help CFEC address this standard. It reads as follows:

(2) the number of entry permits necessary to harvest the allowable commercial take of the fishery resource during all years in an orderly, efficient manner, and consistent with sound fishery management techniques;

The Commission is aware the Bristol Bay salmon fishery is very complex. We understand that Bristol Bay salmon returns are made up of many stocks with numbers that have fluctuated widely over the history of the fishery. Given these conditions, we understand that some of the questions we ask may not have definitive answers; therefore, we designed many of the questions to provide a range, or an upper and lower bound, to criteria we feel should be considered when determining an optimum number under standard two. We hope that structuring our questions in this manner will help the Department answer them.

We greatly appreciate your help. We consider the scientists and fishery managers of ADFG to be the most capable experts to help answer these questions. If the questions do not have definitive answers, we still welcome any professional direction or judgment you may offer. Please feel free to qualify or clarify your answers in any manner you feel is appropriate.

**Bristol Bay Salmon Drift Gillnet Fishery
ADFG Management Optimum Number Questions**

Run Forecasts and Stock Sizes

Bristol Bay salmon returns have varied greatly over the last 100 years, with especially high returns observed from 1989 through 1996. With respect to both area-wide and individual district returns:

- 1) What are the main factors that have caused fluctuations in the size of salmon returns to the rivers in Bristol Bay?
- 2) To what extent can ADFG project estimates for future salmon returns?
- 3) If it is possible, what are ADFG's best estimates of minimum, average, and maximum returns and minimum, average, and maximum set and drift gillnet harvests, for each Bristol Bay district, and for the fishery as a whole:
 - a) over the next 10 years?
 - b) over the next 30 years?

Maximum Sustained Yield

In March, 2000, after three years of work and a lengthy public process, the Alaska Board of Fisheries (Board) passed its Sustainable Salmon Fisheries Policy (SSFP) (see 5 AAC 39.222). The SSFP is used by the Board and ADFG to evaluate the health of the state's salmon fisheries and address any conservation issues and problems as they arise. It provides guidance for many of ADFG's management goals and actions, including the determination of biological, optimal, sustainable, and inriver escapement goals. The SSFP also has provisions calling for a regular review of salmon stocks by the Board of Fisheries and ADFG, where escapement goals are reviewed.

- 4) How often are Bristol Bay salmon escapement goals re-evaluated?
 - a) To what extent have Bristol Bay salmon escapement goals changed in the last 30 years?
 - b) Does the Department expect substantial changes to escapement goals in the future?

The SSFP states that, unless otherwise directed, ADFG shall manage salmon fisheries for maximum sustained yield (MSY). Sockeye salmon, which account for the vast majority of the ex-vessel value in the Bristol Bay salmon fishery, are currently managed for MSY in all the major river systems in Bristol Bay.

- 5) Are there other stocks of salmon in Bristol Bay that are managed under the principles of MSY?
- 6) Does the Department feel that all salmon stocks currently managed for MSY in Bristol Bay will continue to be managed under these principles in the foreseeable future?

Achieving Escapements

It is our understanding that the principal objective of managing the Bristol Bay salmon fisheries is to achieve escapement goals, which, if properly established, will ensure the conservation and sustained yield management of the resource. Other management objectives include providing for an orderly fishery, helping to obtain a high-quality fishery product, and allocating the harvests between user groups according to management plans developed by the Board of Fisheries.

Achieving escapement goals is principally done by controlling fishing time, within a framework of regulations that establish the size and location of fishing districts and the amount of allowable fishing gear (number and length of nets, gillnet mesh size, length of vessels). Assuming that existing regulations for fishing districts, fishing gear, and allocation management plans remain the same:

- 7) What determines the amount of fishing time allowed in a district on a day-to-day basis during the fishing season?

- 8) What have been the shortest Bristol Bay drift gillnet fishery openings allowed in a district during the peak weeks of the fishery over the last 30 years?
 - a) What conditions determined this opening(s)?

 - b) Does the Department believe these short openings could occur anytime again in the foreseeable future?

 - c) How does a substantial increase or decrease in the number of fishing operations in a district affect the length of the opening?

 - d) Is it possible that fishery managers would face a situation where they would keep a district closed to fishing because there were too many fishing operations in the district? If so, what conditions would those be?
 - (i.) Is it possible such closures could then result in escapements that exceed the upper range of the annual escapement goal?

 - (ii.) Is it possible that such closures could result in escapements that exceed the desired levels for the inseason time period?

- 9) Over the last 30 years, have any fishing districts in Bristol Bay ever been continuously open to drift gillnet fishing during the peak weeks of the sockeye season?

If there have been continuous openings:

- a) What is the longest continuous opening that has been allowed in a district during the peak weeks of the sockeye season?

- b) What conditions determined a continuous opening(s)?

- c) Does the Department believe continuous openings could occur anytime again in the foreseeable future?

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d) How would a substantial increase or decrease in the number of fishing operations in a district alter a decision for a continuous opening?

e) Is it possible that even with continuous fishing periods, the upper range of escapement goals could be exceeded in a district?

Sustainable Salmon Fisheries Policy and Stocks of Concern

The Board's Sustainable Salmon Fisheries Policy outlines how to address concerns for salmon stocks, defining three levels of concerns: conservation concerns, management concerns, and yield concerns. According to the Board's definitions, yield concerns are considered the least severe of the three, followed by management concerns, then conservation concerns.

It is our understanding that developing meaningful escapement goals, then consistently achieving those goals, should serve to protect salmon stocks and provide harvestable surpluses. The defined concerns in the SSFP appear to address situations where escapement goals or expected yields are not consistently achieved, or where escapement goals may need to be re-evaluated to increase yields and/or conserve stocks.

The SSFP states that when stocks reach any of the three levels of concern, a management plan will be developed which contains specific goals to address the concern. The plan shall contain measurable objectives and actions needed to achieve the goals. These management plans are to be developed by a collaborative effort between ADFG and the Board.

We understand the SSFP is a new policy and the application of specific parts of it is still being determined. To the extent that you can answer the following questions – based upon the short history of the SSFP – we ask for your expertise in providing details on management actions used to address various levels of concern for salmon stocks in the Bristol Bay fishery, and how changes in the number of drift gillnet fishing operations might affect those actions. Please note the questions emphasize sockeye salmon stocks.

a. Yield Concerns

The SSFP defines a yield concern as: *“a concern rising from a chronic inability, despite the use of specific management measures, to maintain expected yields, or harvestable surpluses, above a stock's escapement needs.”*

10) What factors might lead to a yield concern for a Bristol Bay sockeye salmon stock?

11) What types of management measures would be taken by the Department and the Board to address a yield concern?

b) How would management measures used to address a yield concern be affected if there were substantially more Bristol Bay drift gillnet fishing operations?

c) How would management measures used to address a yield concern be affected if there were substantially fewer Bristol Bay drift gillnet fishing operations?

b. Management Concerns

The SSFP defines a stock management concern to be: *“a concern arising from a chronic inability, despite the use of specific management measures, to maintain escapement for a stock within the bounds of the SEG, BEG, OEG, or other specified management objectives for the fishery. “Chronic inability” means the continuing or anticipated inability to meet escapement thresholds over a four to five year period, which is roughly equivalent to the generation time of most salmon species...”*

12) While it seems apparent that management concerns will result from consistently under-achieving escapement goals, can management concerns result from consistently exceeding escapement goals?

13) If sockeye escapement goals are consistently exceeded on a Bristol Bay river, could this result in a lower annual yield? Could exceeding escapement goals result in biological or conservation problems for that stock?

14) Since the SSFP was implemented, have any Bristol Bay salmon stocks reached a level of management concern?

15) If consistently under-achieving or exceeding Bristol Bay sockeye escapement goals meets the definition of a management concern,

a) What types of measures might be taken by the Board and ADFG to address concerns for under-achieving escapement goals?

b) What types of measures might be taken by the Board and ADFG to address concerns for exceeding the escapement goals?

c) How might those respective measures be affected if the number of Bristol Bay drift gillnet fishing operations substantially increased?

d) How might those respective measures be affected if the number of Bristol Bay drift gillnet fishing operations substantially decreased?

c. Conservation Concerns

The SSFP defines a stock conservation concern to be: *“a concern arising from a chronic inability, despite the use of specific management measures, to maintain escapement for a stock above a sustained escapement threshold (SET). “Chronic inability” means the continuing or anticipated inability to meet escapement thresholds over a four to five year period, which is roughly equivalent to the generation time of most salmon species...”*

16) Have any Bristol Bay sockeye salmon stocks ever reached a conservation concern, as defined in the SSFP?

a) How likely is it that in the next 30 years a Bristol Bay salmon stock will reach a level of conservation concern?

d. Other Species Considerations in the SSFP

17) Are there any other salmon species besides sockeyes that have a reasonable likelihood of reaching levels of yield, management, or conservation concern anytime in the next 30 years? If so, what stocks are they?

- a) Would management of adjacent stocks become more difficult if a stock reaches a level of yield, management, or conservation concern?
- b) What type of measures might be taken by the Board and ADFG to address a stock, other than sockeyes, with a yield, management, or conservation concern?

District Registration

The Bristol Bay drift gillnet fishery has regulations requiring registration of permit holders and vessels to Bristol Bay districts. The regulations appear to be designed to reduce the movement of permit holders and vessels between districts.

- 18) Do these regulations have other objectives?
- 19) To what extent do these regulations help ADFG achieve its management objectives?
- 20) What primarily affects the distribution of fishing operations in the Bristol Bay districts?
- 21) Would the distribution of fishing operations be affected by the overall number of permits in Bristol Bay? If so, how?

Allocations

Bristol Bay salmon regulatory management plans provide for harvest allocations between the drift and set gillnet fisheries and for allocations to sport and subsistence fisheries under certain circumstances. Regulations also state that ADFG’s principal management goals will be to obtain escapements and maintain the genetic diversity of escapements; if necessary, these goals will have priority over achieving allocations (see 5 AAC 06.355). Nevertheless, allocations play an important part in ADFG’s management of the Bristol Bay salmon fisheries.

- 22) How would substantially increasing or decreasing the number of fishing operations in the Bristol Bay salmon drift gillnet fishery impact ADFG’s ability to achieve harvest allocations required by regulations?

Orderly Fisheries

Standard two of the optimum number law calls for harvests “...to be taken in an orderly, efficient manner.” Furthermore, an orderly fishery is an objective stated in the Bristol Bay sockeye salmon set and drift gillnet fisheries management and allocation plan (see 5 AAC 06.355). We believe orderliness can be expressed several ways. One is through fewer accidents on the fishing grounds; another can be when fisheries regulations are closely adhered to and enforcement is effective. Avoiding the waste of fish can also be part of an orderly fishery.

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However, it appears that some Board of Fisheries management regulations conflict with providing for orderly fisheries. For example, regulations calling for the use of the Naknek River special inriver harvest area may help conserve weak salmon runs in the neighboring Kvichak River; however, doing so forces boats fishing on Naknek stocks into a small area. We have heard this congestion results in a more disorderly fishery, with higher accident rates, more damage to gear and vessels, and higher rates of fish wastage.

23) What factors contribute to reducing the orderliness of Bristol Bay salmon drift gillnet fisheries?

24) Are there specific areas or situations where orderly fisheries are more difficult to achieve? What are they?

25) What measures does the Department or Board take to promote orderly fisheries in the Bristol Bay salmon drift gillnet fishery?

26) How would the goal of orderly fisheries be affected by substantially increasing the number of fishing operations in the Bristol Bay salmon drift gillnet fishery?

27) How would the goal of orderly fisheries be affected by substantially reducing the number of fishing operations in the Bristol Bay salmon drift gillnet fishery?

Genetic Diversity and the Quality of Escapement

Maintaining the genetic diversity of salmon escapements is a management goal stated in the SSFP:

“(D) Salmon escapement should be managed in a manner to maintain genetic and phenotypic characteristics of the stock by assuring appropriate geographic and temporal distribution of spawners as well as consideration of size range, sex ratio, and other population attributes.”

Fishery managers have also expressed the idea of “quality of escapement.” We understand this to mean escapement where genetic characteristics are maintained, and where the health and vigor of fish that enter the spawning grounds is maintained.

28) What measures are taken by the Department and Board to protect the genetic integrity and / or the overall health of salmon escapements in Bristol Bay?

29) How would those measures be impacted by substantially increasing the number of fishing operations in the Bristol Bay salmon drift gillnet fishery?

30) How would those measures be impacted by substantially decreasing the number of fishing operations in the Bristol Bay salmon drift gillnet fishery?

Quality of the Harvest

The Bristol Bay sockeye salmon set and drift gillnet management and allocation plan (5 AAC 06.355) guides the Board of Fisheries to implement regulations that will improve the quality of harvested salmon.

31) What are the principal factors that contribute to product quality in the Bristol Bay salmon drift gillnet fishery?

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32) How might product quality be affected by increasing or decreasing the number of fishing operations in the Bristol Bay salmon drift gillnet fishery?

Fishing Power

It is generally acknowledged that the fishing power of individual boats has increased dramatically in the Bristol Bay drift gillnet fishery in the last 30 years. This assumption is supported by our preliminary analysis of economic returns and vessel characteristics in the fishery.

33) Do you feel fishing capacity will continue to increase for fishing operations in the Bristol Bay drift gillnet fishery, despite the constraints on vessel lengths and gear?

Costs of Bristol Bay Management and Research

Successfully managing the Bristol Bay salmon fisheries – particularly managing for MSY - requires a high level of management precision and scientific knowledge.

34) What are the major tasks involved in managing the fishery and approximately how much does it cost the state of Alaska to perform these tasks?

35) To what extent would these costs or tasks increase or decrease if the number of permits in the fishery increased or decreased?

36) Does ADFG expect to have additional resources in the future that will increase management precision in the fishery?

Number of Fishing Operations Necessary for Harvests

As noted above, determining an optimum number of limited entry permits under Alaska law requires a balance of three standards set out in statute. The second standard, which has sometimes been called the “management optimum number,” states: *“the number of entry permits necessary to harvest the allowable commercial take of the fishery resource during all years in an orderly, efficient manner, and consistent with sound fishery management techniques;”* This is the standard that we are asking the Department to help address.

During the early years of limited entry, CFEC undertook an effort to establish optimum numbers for salmon fisheries in Alaska, including the Bristol Bay drift gillnet fishery. However, these efforts did not result in regulations establishing optimum numbers since conditions in the salmon fisheries were changing rapidly in the late 1970s.

In 1979, under a contract from CFEC, John Martin provided a report with estimates of both the “economic optimum numbers” and the “management optimum numbers” for the Bristol Bay salmon drift gillnet fishery. Martin’s study is similar to this current effort in that Martin and CFEC sought the advice of ADFG managers to establish the management optimum number under Standard Two of the statute. Martin recognized the complexity of establishing the management optimum number. He derived a methodology to express the number as a range, with the upper bound being the minimum number of units of gear actually needed to harvest the highest anticipated run in the future 10-year period, and the

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lower bound being the maximum number of units of gear that could be effectively managed during the low run years.¹

We have enclosed a copy of sections of Martin's report for your perusal (see Attachment B). The report provides ADFG's calculations for management optimum numbers and estimates of units of gear for the high run and low run years. At that time, ADFG estimated that in high run years, 1,338 units of drift gillnet gear would be necessary to harvest the available surplus, given their assumptions. For low run years, they estimated they could effectively control 840 units of drift gillnet gear, while still maintaining a minimum amount of fishing time of three 12-hour fishing periods per week.²

The methodology used a set of assumptions agreed upon by CFEC and ADFG. The principal assumptions were: 1) Board of Fisheries regulations would remain the same; 2) average harvest proportions between the set gillnet and drift gillnet fisheries would remain the same; 3) that fishing proficiency would increase in future years; and 4) processing capacity would remain constant.

CFEC and ADFG also applied standards for how much fishing time they would theoretically allow during high run and low run years. In high run years, "optimal" fishing periods, from a fishery manager's perspective, were assumed to be those that allowed an average of 24 hours of fishing time every two days from mid-June through mid-July (referred to as the "emergency order period", which describes a period formerly defined in the regulations). For low run years, ADFG assumed an amount of fishing time no less than three 12-hour fishing periods per week. They recognized it was theoretically possible the entire fishery could be closed for the whole season in years of exceptionally low runs; it's possible that under extreme conditions no fishing time would be allowed, even if there was only a small number of units of fishing gear.

Further assumptions were made regarding harvests in high run and low run years. High run harvests were assumed to be equal to the largest harvest recorded between 1952 and 1978 (1952 was the year when the ban on power boats was lifted). The low run harvest was the average harvest for four years with low returns between 1952 and 1978 (which was 1958, 1963, 1968, and 1972).

We believe an approach that estimates the upper and lower bounds of the management optimum number could be useful in our present efforts. However, we are aware that many of the assumptions made in 1979 may not currently apply. For example, any assumptions about harvests in high run years might need to take into account the very large returns during the early 1990's. Regulations have also changed; for example, the regulations that call for special inriver harvest areas may affect the Department's view on the optimum number of units of gear in low run years.

Still, we think that any management optimum number estimates will require at least some of the assumptions mentioned above, particularly those concerning future fishery regulations and processing capacity. We are aware of the dynamic nature of the fishery, and of ongoing discussions that may bring changes to how the fishery is prosecuted and managed; nevertheless, because any regulatory changes at this point can only be speculative, we feel we need to establish benchmarks that will allow the Department to make meaningful estimates. For similar reasons, we would like to assume that processing capacity in Bristol Bay will be adequate – or at least will not significantly affect management's inseason decisions - during the peak portion of the season when most of the harvest occurs.

¹ See the attached document from Martin: *Optimum Numbers, A Report Submitted to the Commercial Fisheries Entry Commission*, June 15, 1979.

² See Martin's report for full details of ADFG's calculations. For high run years, with a standard of 24 hours of fishing time every two days, ADFG assumed a harvest of 22.1 million fish and a catch per unit of effort of 1,100 fish in each 24-hour period. For low run years, they assumed a minimum of three 12-hour fishing periods per week, a total harvest of 1.9 million fish, with a catch per unit of effort of 250 fish for each period.

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Other assumptions that appear to be useful are those regarding the fishing capacity and efficiency of individual fishing operations, and the Department's available resources for managing the fishery. Each of these topics was addressed in questions 33 and 36 above. The Department's answers to these questions can serve as additional qualifiers to management optimum number estimates.

The Bristol Bay salmon drift gillnet permits apply to all districts. Thus we ultimately need to determine a management optimum number range that will work for all districts under most conditions. The two questions below contain the statutory language: "to harvest, in an orderly and efficient manner, and consistent with sound management techniques."

We believe this language includes the concept that the Department should be able to easily manage the fishery to stay within its escapement goals for all species and river systems, on both a seasonal and in-season (to maintain genetic and phenotypic characteristics of the stocks) basis. In other words, the number of units of gear should not be so small that there is a significant risk the Department would exceed the upper bound of its escapement goals, thereby potentially reducing future yields. Similarly, the number of units of gear should not be so large that there is a significant risk that the lower bound of an escapement goal cannot be reached, or so large that it is difficult for the Department to time openings and closures to stay within the Department's escapement goals on a seasonal and in-season basis. Indeed, one can imagine conditions whereby too many units of gear might force the Department to miss the upper bound of an escapement goal or make it difficult to achieve inseason objectives.

As noted earlier, we believe that the meaning of an orderly and efficient harvest also includes the concepts of minimizing accidents that damage vessels or gear, avoiding waste of fish and other resources, and maintaining an atmosphere whereby fishery regulations can be easily enforced and are generally adhered to by the fleet.

With this background, we would like to get the Department's expert advice to the following two questions:

37) Approximately how many fishing operations (drift gill net permits) would actually be needed (the minimum required) to harvest, in an orderly and efficient manner, and consistent with sound management techniques, the allowable Bristol Bay salmon drift gillnet harvest from all districts during years with the highest expected returns over the next 20 to 30 years?

38) Approximately how many fishing operations (permits) could be effectively managed, in an orderly and efficient manner, and consistent with sound management techniques, in the Bristol Bay salmon drift gillnet fishery during years with the lowest expected harvests over the next 20 to 30 years?

cc: Doug Mecum, Director, Division of Commercial Fisheries
James Brady, Regional Supervisor, Central Region
James Browning, Regional Finfish Management Biologist, Central Region
Jeff Regnart, Regional Finfish Management Biologist, Central Region
Brian Bue, Regional Research Biologist, Central Region
Steve Morstad, Area Management Biologist, Naknek / Kvichak
Tim Sands, Area Management Biologist, Nushagak / Togiak
Keith Weiland, Area Management Biologist, Egegik / Ugashik

Appendix II
July 9, 2003 Memo From
ADFG Commissioner Kevin Duffy
To CFEC

STATE OF ALASKA

DEPARTMENT OF FISH AND GAME OFFICE OF THE COMMISSIONER

**FRANK H. MURKOWSKI,
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MEMORANDUM

TO: Bruce Twomley, Chairman, Commercial Fisheries Entry Commission
Marlene Johnson, Commissioner, Commercial Fisheries Entry Commission
Mary McDowell, Commissioner, Commercial Fisheries Entry Commission

FROM: Kevin C. Duffy
Commissioner

DATE: July 9, 2003

SUBJECT: Bristol Bay Salmon Drift Gillnet Optimum Number Study

This memo provides the information requested by the Commercial Fisheries Entry Commission pertaining to management of the Bristol Bay salmon fishery. Each question is listed separately in italicized typeface followed by the Alaska Department of Fish and Game's (ADF&G) response in non-italicized typeface. The information below is a composite from answers provided by both the area and regional level management and research staff associated with the Bristol Bay fishery.

Bristol Bay Salmon Drift Gillnet Fishery ADF&G Management Optimum Number Questions

Run Forecasts and Stock Sizes

Bristol Bay salmon returns have varied greatly over the last 100 years, with especially high returns observed from 1989 through 1996. With respect to both area-wide and individual district returns:

- 1) *What are the main factors that have caused fluctuations in the size of salmon returns to the rivers in Bristol Bay?*

Environmental changes in both the marine and freshwater portions of the salmon life cycle are the factors most likely responsible for large fluctuations in salmon return size. Most of the recent variability observed in spawner-return relationships is believed to be caused by changes in marine survival. Further, studies suggest that early marine survival is the most critical time period of the salmon's marine life stage.

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2) *To what extent can ADF&G project estimates for future salmon returns?*

In the past 20 years, about one-half of the time Bristol Bay total forecasts have had less than 20% absolute error and have ranged from 3% to 76% absolute error. On a finer scale, forecast errors on a system or age class level are generally greater than conglomerate Bristol Bay forecast errors.

3) *If it is possible, what are ADF&G's best estimates of minimum, average, and maximum Returns and minimum, average, and maximum set and drift gillnet harvests, for each Bristol Bay district, and for the fishery as a whole:*

a) *over the next 10 years?*

Based on historical data, over the next 10 years, forecasted returns (in millions of sockeye salmon) are:

District	Min	Max	Average
Naknek-Kvichak	4	33	13
Egegik	4	24	11
Ugashik	1	6	4
Nushagak	5	9	7
Togiak	0	1	1
Bristol Bay	17	63	34

b) *over the next 30 years?*

District	Min	Max	Average
Naknek-Kvichak	4	33	16
Egegik	4	24	10
Ugashik	1	8	4
Nushagak	3	9	6
Togiak	0	1	1
Bristol Bay	17	63	34

Set gillnet versus drift gillnet sockeye harvest ratios should remain relatively stable since there is an allocation plan in regulation that directs the managers to take management action to maintain the present percentages.

Maximum Sustained Yield

In March, 2000, after three years of work and lengthy public process, the Alaska Board of Fisheries (Board) passed its Sustainable Salmon Fisheries Policy (SSFP) (see 5 AAC 39.222). The SSFP is used by the Board and ADF&G to evaluate the health of the state's salmon fisheries and address any conservation issues and problems as they arise. It provided guidance for many of ADF&G's management goals and actions, including the determination of biological, optimal, sustainable, and inriver escapement goals. The SSFP also has provisions calling for a regular review of salmon stocks by the Board of Fisheries and ADF&G, where escapement goals are reviewed.

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- 1) *How often are Bristol Bay salmon escapement goals re-evaluated?*

Bristol Bay escapement goals are re-evaluated every 3 years as part of the Alaska Board of Fisheries cycle.

- a) *To what extent have Bristol Bay salmon escapement goals changed in the last 30 years?*

Escapement goals have increased by approximately 150% over the last 30 years and are likely to increase in the near future, due to the review currently in progress in preparation for the December 2003 Board of Fisheries meeting.

- b) *Does the department expect substantial changes to escapement goals in the future?*

The SSFP states that, unless otherwise directed, ADF&G shall manage salmon fisheries for maximum sustained yield (MSY). Sockeye salmon, which account for the vast majority of the ex-vessel value in the Bristol Bay salmon fishery, are currently managed for MSY in all the major river systems in Bristol Bay.

- 1) *Are there other stocks of salmon in Bristol Bay that are managed under the principles of MSY?*

Nushagak River Chinook salmon are also actively managed for MSY.

- 2) *Does the department feel that all salmon stocks currently managed for MSY in Bristol Bay will continue to be managed under these principles in the foreseeable future?*

In the short term, management for MSY in Bristol Bay is not likely to change. However, with current market conditions and the possibility of restructuring the methods of harvest, it is possible that MSY management may become blended with economic factors.

Achieving Escapements

It is our understanding that the principle objective of managing the Bristol Bay salmon fisheries is to achieve escapement goals, which, if properly established, will ensure the conservation and sustained yield management of the resource. Other management objectives include providing for an orderly fishery, helping to obtain a high-quality fishery product, and allocating the harvests between user groups according to management plans developed by the Board of Fisheries.

Achieving escapement goals is principally done by controlling fishing time, within a framework of regulations that establish the size and location of fishing districts and the amount of allowable fishing gear (number and length of nets, gillnet mesh size, length of vessels). Assuming that existing regulations for fishing districts, fishing gear, and allocation management plans remain the same:

- 3) *What determines the amount of fishing time allowed in a district on a day-to-day basis during the fishing season?*

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Cumulative and daily escapement levels compared to historical entry curves. Historical entry curves have been developed from averaging daily escapement levels for the last 40 + years that the counting towers have been operating. Comparing current year escapement level and rate (hourly and daily) against these curves indicates to the manager whether additional exploitation (fishing time) is needed to achieve a final escapement within the biological escapement goal range.

- 4) *What have been the shortest Bristol Bay drift gillnet fishery opening allowed in a district during the peak weeks of the fishery over the last 30 years?*

The shortest opening have been between 1.5 and 4 hours in duration depending on the district. Ugashik District had a 1.5 hour drift period in 1999; there was a 3 hour drift opening in the Naknek River Special Harvest Area, also in 1999; and 4 hour drift openings have occurred in the Nushagak District on several occasions.

- a) *What conditions determined this opening(s)?*

Two different conditions can result in short duration drift openings: 1) a desire on the manager's part to test or sample fish abundance in the district without harvesting a high proportion of the fish present; and 2) management action directed at adjusting allocation percentages for drift gillnets.

- b) *Does the department believe these short openings could occur anytime again in the foreseeable future?*

Yes. Each year one of the two scenarios above can develop in one or more districts.

- c) *How does a substantial increase or decrease in the number of fishing operations in a district affect the length of the opening?*

An increased number of fishing operations may either decrease the number of openings or decrease the length of openings or both; a decreased number of fishing operations would likely increase the number of openings and the duration of openings.

- d) *Is it possible that fishery managers would face a situation where they would keep a district closed to fishing because there were too many fishing operations in the district? If so, what conditions would those be?*

No. If there was a harvestable surplus above escapement needs, openings would eventually occur; the first openings may be delayed or shortened, but the manager would not keep the district closed because of large fleet size. If there were no harvestable surplus, no openings would occur regardless of the number of fishing operations.

- (i.) *Is it possible such closures could then result in escapement that exceed the upper range of the annual escapement goal?*

N/A

- (ii.) *Is it possible that such closures could result in escapements that exceed the*

desired levels for the inseason time period?

N/A

- 1) *Over the last 30 years, have any fishing districts in Bristol Bay ever been continuously open to drift gillnet fishing during the peak weeks of the sockeye season?*

Yes.

If there have been continuous openings:

- a) *What is the longest continuous opening that has been allowed in a district during the peak weeks of the sockeye season?*

Anywhere from several days to a couple of weeks, depending on the district and year. In 1980, a year in which there was a strike by the permit holders for higher prices, at least one district was open from early June through mid July. Processing companies then control their own fleet by putting them on poundage limits depending on the amount of salmon that the company can process. Also continuous fishing can occur with one gear type as a result of management action directed at adjusting the allocation percentages.

- b) *What conditions determine a continuous opening(s)?*

Escapement tracking above the level needed to stay below the upper end of the escapement goal range, or escapement level already above the BEG range.

- c) *Does the department believe continuous openings could occur anytime again in foreseeable future?*

Possible, but would likely be with one gear type to adjust allocation percentages. Fishery managers generally try to avoid continuous fishing for a variety of biological and socioeconomic reasons.

- d) *How would a substantial increase or decrease in the number of fishing operations in a district alter a decision for a continuous opening?*

Although fewer fishing operations would generally warrant a more liberal fishing schedule and could lead to continuous fishing in the above scenarios, a more likely occurrence would be longer, more frequent openings. An increased number of fishing operation in a district would reduce the likelihood of continuous fishing, but again, continuous fishing is not a preferred management strategy.

- e) *Is it possible that even with continuous fishing periods, the upper range of escapement goals could be exceeded in a district?*

Yes. Since continuous fishing is avoided until absolutely necessary, the upper end of the BEG range has been exceeded in the past, even with continuous fishing. Togiak District is a good example where a management plan restricts transfers into the Togiak District; in 2000 and 2001, with continuous fishing for over two weeks,

the upper end of the BEG range was exceeded because there was insufficient effort to harvest the large runs.

Sustainable Salmon Fisheries Policy and Stocks of Concern

The Board's Sustainable Salmon Fisheries Policy outlines how to address concerns for salmon stocks, defining three levels of concerns: conservation concerns, management concerns, and yield concerns. According to the Board's definitions, yield concerns are considered the least severe of the three, followed by management concerns, then conservation concerns.

It is our understanding that developing meaningful escapement goals, then consistently achieving those goals, should serve to protect salmon stocks and provide harvestable surpluses. The defined concerns in the SSFP appear to address situations where escapement goals or expected yields are not consistently achieved, or where escapement goals may need to be re-evaluated to increase yields and/or conserve stocks.

The SSFP states that when stocks reach any of the three levels of concern, a management plan will be developed which contains specific goals to address the concern. The plan shall contain measurable objectives and action needed to achieve the goals. These management plans are to be developed by a collaborative effort between ADF&G and the Board.

We understand the SSFP is a new policy and the application of specific parts of it is still being determined. To the extent that you can answer the following questions – based upon the short history of the SSFP – we ask for your expertise in providing details on management actions used to address various levels of concern for salmon stocks in the Bristol Bay fishery, and how changes in the number of drift gillnet fishing operation might affect those actions. Please note the questions emphasize sockeye salmon stocks.

a. Yield Concerns

The SSFP defines a yield concern as: “a concern rising from a chronic inability, despite the use of specific management measures, to maintain expected yields, or harvestable surpluses, above a stock's escapement needs.”

- 1) *What factors might lead to a yield concern for a Bristol Bay sockeye salmon stock?*

Factors such as reduced marine survival, reduced freshwater productivity, increased interception or increased predation.

- 2) *What types of management measures would be taken by the department and the Board to address a yield concern?*

Prosecuting “inriver” fisheries in which the fishing activity is moved into the river so that no interception of stocks of concern passing through the district is taking place. Also restricting fishing activity “downstream” of the affected stock, such as restricting fishing in the Egegik and Ugashik districts to their special harvest area boundaries when trying to conserve Kvichak sockeye.

- b) *How would management measures used to address a yield concern be affected if there were substantially more Bristol Bay drift gillnet fishing operations?*

Management measures used to address a yield concern would not likely be affected with more fishing operation, since the additional fishing operations would register for districts where stocks were not “stocks of concern”.

- c) *How would management measures used to address a yield concern be affected if there were substantially fewer Bristol Bay drift gillnet fishing operations?*

Again, most permit holders are going to register for districts without yield concerns, so a district with a stock of yield concern is likely to get fewer of the active permits to begin with. An overall reduction in permits baywide, may tend to reduce the restrictions necessary to rebuild the stock.

b. Management Concerns

The SSFP defines a stock management concern to be: “a concern arising from a chronic inability, despite the use of specific management measures, to maintain escapement for a stock within the bounds of the SEG, BEG, OEG, or other specified management objectives for the fishery. “Chronic inability” means the continuing or anticipated inability to meet escapements thresholds over a four to five year period, which is roughly equivalent to the generation time of most salmon species...”

- 1) *While it seems apparent that management concerns will result from consistently underachieving escapement goals, can management concerns result from consistently exceeding escapement goals?*

Yes.

- 2) *If sockeye escapement goals are consistently exceeded on a Bristol Bay river, could this result in a lower annual yield? Could exceeding escapement goals result in biological or conservation problems for that stock?*

Yes. Exceeding escapement goals could result in cyclic reductions in freshwater productivity by cropping food sources in the lacustrine environment; this would then be compensated for by supporting less outmigrating smolt which would ultimately allow the freshwater food source to rebound and support large numbers of juvenile salmon.

- 3) *Since the SSFP was implemented, have any Bristol Bay salmon stocks reached a level of management concern?*

No, not at this time. The Kvichak River is currently recognized as a stock of yield concern. The BEG range has not been reached in 5 of the last 7 years including the last 3 consecutive years, despite management measures that included no fishing in the Naknek/Kvichak District in 2002.

- 4) *If consistently under-achieving or exceeding Bristol Bay sockeye escapement goals meets the definition of a management concern;*

- a) *What types of measures might be taken by the Board and ADF&G to address concerns for under-achieving escapement goals?*

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Less exploitation of the stock by implementing a more restrictive fishing schedule; fewer, shorter openings or complete closures. Additionally, any interception of the stock in other districts or management areas could be investigated and curtailed.

- b) *What types of measures might be taken by the Board and ADF&G to address concerns for exceeding the escapement goals?*

More exploitation of the stock by implementing a more liberal fishing schedule; more frequent and longer openings, establishing new areas to target the stock such as inriver Special Harvest Areas.

- c) *How might those respective measures be affected if the number of Bristol Bay drift gillnet fishing operations substantially increased?*

If less exploitation were the desired effect, an increased number of fishing operations would generally lead to a more restrictive fishing schedule; while if more exploitation was desired, more fishing operations would assist with this.

- d) *How might those respective measures be affected if the number of Bristol Bay drift gillnet fishing operations substantially decreased?*

If less exploitation were the desired effect, a substantial decrease in the number of fishing operations would assist with this; while if more exploitation was desired, more frequent and longer openings would be required to exploit the stock at the required level.

c. Conservation Concerns

The SSFP defines a stock conservation concern to be: “a concern arising from a chronic inability, despite the use of specific management measures, to maintain escapement for a stock above a sustained escapement threshold (SET). “Chronic inability” means the continuing or anticipated inability to meet escapement thresholds over a four to five year period, which is roughly equivalent to the generation time of most salmon species...”

- 1) *Have any Bristol Bay sockeye salmon stocks ever reached a conservation concern, as defined in the SSFP?*

No.

- a) *How likely is it that in the next 30 years a Bristol Bay salmon stock will reach a level of conservation concern?*

It is highly unlikely for two reasons. First, although no SET has been established for any system in Bristol Bay at his time, discussions regarding SET levels have focused on the lowest spawning escapement recorded for a river system that has eventually replaced itself over the next life cycle. For the Kvichak, the 1973 sockeye escapement of 227,000 fish was the lowest recorded since 1956 when tower counts began; this escapement produced a return of 2.5 million sockeye. If and when SETs are established for the systems in Bristol Bay, they will be at low levels relative to the historical production of that system. The second reason is the

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extreme management measures that would be undertaken prior to escapement declining to the level of the SET for a system. All commercial, sport and subsistence fishing on the stock would cease, in addition to any known interception of the stock. Thus, it is unlikely with these management measures, that the threshold would not be achieved for several consecutive years.

Other Species Considerations in the SSFP

- 1) *Are there any other salmon species besides sockeye that have a reasonable likelihood of reaching levels of yield, management, or conservation concern anytime in the next 30 years? If so, what stocks are they?*

To answer this question would be to merely speculate. We have no way of predicting stock performance this far into the future.

- a) *Would management of adjacent stocks become more difficult if a stock reaches a level of yield, management, or conservation concern?*

Yes

- b) *What type of measures might be taken by the Board and ADF&G to address a stock, other than sockeye, with a yield, management, or conservation concern?*

Same measures that would be taken with sockeye salmon: management action directed at deduced exploitation. These measures would be reduced duration and frequency of openings and perhaps mesh restriction to conserve chinook salmon. The timing of coho salmon in Bristol Bay and available markets allow conservation of coho salmon without much effect on other species.

District Registration

The Bristol Bay drift gillnet fishery has regulations requiring registration of permit holders and vessels to Bristol Bay districts. The regulations appear to be designed to reduce the movement of permit holders and vessels between districts.

- 1) *Do these regulations have other objectives?*

No

- 2) *To what extent do these regulations help ADF&G achieve its management objectives?*

They do not help ADF&G achieve its management objectives.

- 3) *What primarily affects the distribution of fishing operations in the Bristol Bay districts?*

District harvest from the previous season, the current forecast, the number of vessels registered for a particular district, and the permit holder's familiarity and fishing success in the district.

- 4) *Would the distribution of fishing operations be affected by the overall number of permits in Bristol Bay? If so, how?*

The total number of permits would not be a major factor in determining distribution. The factors above would be the primary consideration for a permit holder's decision on where to fish.

Allocations

Bristol Bay salmon regulatory management plans provide for harvest allocations between the drift and set gillnet fisheries and for allocations to sport and subsistence fisheries under certain circumstances. Regulations also state that ADF&G's principal management goals will be to obtain escapements and maintain the genetic diversity of escapements; if necessary, these goals will have priority over achieving allocations [see 5 AAC 06.355]. Nevertheless, allocations play an important part in ADF&G's management of the Bristol Bay salmon fisheries.

- 5) *How would substantially increasing or decreasing the number of fishing operation in the Bristol Bay salmon drift gillnet fisher impact ADF&G's ability to achieve harvest allocations required by regulations?*

Unknown. Some instances would occur when more drift fishing operations would make achieving the allocation percentages more difficult; in other situations, more drift effort would make achieving the allocations percentages easier.

Orderly Fisheries

Standard two of the optimum number law calls for harvests "...to be taken in an orderly, efficient manner." Furthermore, an orderly fisher is an objective stated in the Bristol Bay sockeye salmon set and drift gillnet fisheries management and allocation plan [see 5 AAC 06.355]. We believe orderliness can be expressed several ways. One is through fewer accidents on the fishing grounds; another can be when fisheries regulations are closely adhered to and enforcement is effective. Avoiding the waste of fish can also be part of an orderly fisher.

However, it appears that some Board of Fisheries management regulations conflict with providing for orderly fisheries. For example, regulations calling for the use of the Naknek River special inriver harvest area may help conserve weak salmon runs in the neighboring Kvichak River; however, doing so forces boats fishing on Naknek stocks into a small area. We have heard this congestion result in a more disorderly fishery, with higher accident rates, more damage to gear and vessels, and higher rates of fish wastage.

- 6) *What factors contribute to reducing the orderliness of Bristol Bay salmon drift gillnet fisheries.*

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Reduced fishing areas with large number of vessels, long openings, lack of enforcement presence and/or unenforceable regulations, high volumes of fish, high prices, and line fisheries.

- 7) *Are there specific areas or situations where orderly fisheries are more difficult to achieve? What are they?*

“Inriver” or special harvest area fisheries are likely to promote disorderliness; continuous fishing that create “line” fisheries at district boundaries, particularly during the ebb tide, also tend to become disorderly.

- 8) *What measures does the department or Board take to promote orderly fisheries in the Bristol Bay salmon drift gillnet fishery?*

Allow short openings that prevent line fisheries; allow closed periods between openings that give salmon time to disperse throughout the district, allowing the drift fleet to spread out; change or delete unenforceable regulations.

- 9) *How would the goal of the orderly fisheries be affected by substantially increasing the number of fishing operations in the Bristol Bay salmon drift gillnet fishery?*

Fisheries would tend to be less orderly with more drift fishing operations.

- 10) *How would the goal of the orderly fisheries be affected by substantially reducing the number of fishing operations in the Bristol Bay salmon drift gillnet fishery?*

Fisheries would tend to be more orderly with less drift fishing operations.

Genetic Diversity and the Quality of Escapement

Maintaining the genetic diversity of salmon escapements is a management goal stated in the SSFP:

“(D) *Salmon escapement should be managed in a manner to maintain genetic and phenotypic characteristics of the stock by assuring appropriate geographic and temporal distribution of spawners as well as consideration of size range, sex ratio, and other population attributes.*”

Fishery managers have also expressed the idea of “quality of escapement.” We understand this to mean escapement where genetic characteristics are maintained, and where the health and vigor of fish that enter the spawning grounds is maintained.

- 11) *What measures are taken by the Department and Board to protect the genetic integrity and/or the overall health of salmon escapements in Bristol Bay?*

Schedule openings that are spread throughout the entire migration, and attempt to allow pulses of fish into the river that have not been exposed to the selectivity of commercial gear [see 5 AAC 06.361.(b)(c)].

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- 12) *How would those measures be impacted by substantially increasing the number of fishing operations in the Bristol Bay salmon drift gillnet fishery?*

Not a serious impact; managers would still implement the above measures.

- 13) *How would those measures be impacted by substantially decreasing the number of fishing operations in the Bristol Bay salmon drift gillnet fishery?*

A substantial decrease in the number of fishing operations could eliminate the need for the above measures. With a small drift fleet in a district, there can be continuous escapement even during openings; the commercial fishery could become inefficient to the point of harvesting only a portion of the salmon that pass through the district.

Quality of the Harvest

The Bristol Bay sockeye salmon set and drift gillnet management and allocation plan [5 AAC 06.355] guides the Board of Fisheries to implement regulations that will improve the quality of harvested salmon.

- 14) *What are the principal factors that contribute to product quality in the Bristol Bay salmon drift gillnet fishery?*

Time and temperature are the major factors; time between when the fish leaves the water to when it is processed, and the temperature the flesh is held at during that time. Shorter time and lower temperature leads to better product quality. Handling is another important factor influencing product quality; gentle handling prevents bruising and gaping of the flesh. Activities such as towing hard on the net, particularly in rough weather, reduce quality.

- 15) *How might product quality be affected by increasing or decreasing the number of fishing operations in the Bristol Bay salmon drift gillnet fishery?*

Quality is influenced more by the individual permit holder's commitment to better handling, e.g., chilling, gentle handling of fish, bleeding, than any increase or decrease in the number of fishing operations. In theory, slower, more continuous fishing operations allow fishing operations to take better care of their fish. Thus, measures that slow the fishery down and spread it out in time tend to promote better quality. Whether reducing the number of fishing vessels in Bristol Bay would contribute to increased quality is a speculative matter.

Fishing Power

It is generally acknowledged that the fishing power of individual boats has increased dramatically in the Bristol Bay drift gillnet fishery in the last 30 years. This assumption is supported by our preliminary analysis of economic returns and vessel characteristics in the fishery.

- 16) *Do you feel fishing capacity will continue to increase for fishing operations in the Bristol Bay drift gillnet fishery, despite the constraints on vessel length and gear?*

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Recent observations indicate that fishing capacity peaked a few years ago and has declined during the last few years with low salmon prices. Less crew and less experienced crew are being brought to the Bay fishery; therefore the ability to pick large quantities of salmon out of the net in a short period of time is reduced. Technology and salmon prices will affect fishing capacity in the future; neither of which are easily predicted.

Costs of Bristol Bay Management and Research

Successfully managing the Bristol Bay salmon fisheries – Particularly managing for MSY – requires a high level of management precision and scientific knowledge.

- 17) *What are the major tasks involved in managing the fishery and approximately how much does it cost the State of Alaska to perform these tasks?*

The major tasks are adult enumeration, sampling escapement and commercial harvest for age-weight-length data, aerial surveying for effort and spawning populations, test fishing for temporal abundance, and compilation of assimilation of this information in order to make management decisions. Separate from the above are administrative functions associated with prosecuting the commercial fishery; these currently include district registration, district transfers, data entry, permit-related transactions such as vessel registration, request for duplicates, etc. Cost for Bristol Bay salmon management and research: \$1.6 million.

- 18) *To what extent would these costs or tasks increase or decrease if the number of permits in the fishery increased or decreased?*

Very little impact on these costs from increasing or decreasing the number of fishing permits. We observed no reduction in costs last season with less than 1200 active drift permits participating in the fishery.

- 19) *Does ADF&G expect to have additional resources in the future that will increase management precision in the fishery?*

Given the budgetary environment in the foreseeable future, we have no expectation of additional resources.

Number of Fishing Operations Necessary for Harvests

As noted above, determining an optimum number of limited entry permits under Alaska law requires a balance of three standards set out in statute. The second standard, which has sometimes been called the “management optimum number,” states: “ the number of entry permits necessary to harvest the allowable commercial take of the fishery resource during all years in an orderly, efficient manner, and consistent with sound fishery management techniques,” This is the standard that we are asking the Department to help address.

- 20) *Approximately how many fishing operations (drift gill net permits) would actually be needed (the minimum required) to harvest, in an orderly and efficient manner, and consistent with sound management techniques, the allowable Bristol Bay salmon drift*

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gillnet harvest from all districts during years with the highest expected returns over the next 20 to 30 years?

It is the best professional judgment of current Division of Commercial Fisheries management staff that 1400 – 1500 drift permits are required to orderly harvest the salmon return when all years are considered. This number is not based on any systematic analysis, but merely represents the views of the people who have been managing the fishery in recent years. It should be considered as a qualitative and subjective estimate.

Note: In the preceding discussion outlining assumptions for this study, it is assumed that processing capacity will remain “adequate – or at least will not significantly affect management’s inseason decisions – during the peak portion of the season when most of the harvest occurs.” ADF&G staff recognizes that the processing capacity in Bristol Bay has declined significantly over the last 5 years, and as recently as 1999, with simply an average sockeye harvest of 25 million, this reduction in capacity directly impacted inseason management decisions and led to increased escapements in most major river systems in the Bay. This trend of reduced capacity and “elasticity” is continuing and has a strong likelihood of having significant effects in inseason management decisions in the future, particularly during years with sockeye returns that are above average.

21) Approximately how many fishing operations (permits) could be effectively managed, in an orderly and efficient manner, and consistent with sound management techniques, in the Bristol Bay salmon drift gillnet fishery during years with the lowest expected harvests over the next 20 to 30 years?

800 – 900. Like the answer to questions 37, these numbers represent the best professional judgment of current commercial fisheries managers in Bristol Bay. These people have experience managing the fishery under current economic and market conditions and are replying on that experience to provide these subjective and qualitative estimates.

Sincerely,

Kevin C. Duffy
Commissioner

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