Executive Summary

Bristol Bay Salmon Drift Gillnet Fishery Optimum Number Report

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Commercial Fisheries Entry Commission
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EEOC / ADA Compliance Statement

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Optimum Number Report

Abstract

This report presents the results of a study to help the Commercial Fisheries Entry Commission determine the optimum number of permits for the Bristol Bay salmon drift gillnet fishery. Under terms of AS.16.43.290, the Commercial Fisheries Entry Commission is directed to determine optimum numbers of permits for the state's limited entry fisheries. The statute requires the commission to choose an optimum number which represents a reasonable balance of three general standards. The standards include economic, conservation, and fishery management concerns.

The report considers each standard separately. It includes a history of the regulatory development of the fishery, historical harvest data, estimates of historical costs and returns in the fishery, forecasts of future returns in the fishery, and a detailed background discussion of conservation concerns. The report recommends that an optimum number falling in the range of 800 to 1,200 permits would represent a reasonable balance of the three standards.

The commission will consider this report and propose for public review and comment a regulation to establish an optimum number for the Bristol Bay salmon drift gillnet fishery.

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Introduction

This report provides the results of an optimum number study for the Bristol Bay salmon drift gillnet fishery. The report recommends that the "optimum number" of permits for the Bristol Bay salmon drift gillnet fishery should range from 800 to 1,200 permits.

An optimum number determination is the second stage of limited entry under Alaska law. Alaska's limited entry statute (AS 16.43) was passed in 1973. The law provides for a multi-stage limited entry process.

In the first stage, a fishery is limited by adopting a "maximum number" of permits and issuing those permits to the highest ranking applicants under a hardship ranking ("point") system. By law and court decision, the maximum number for a fishery should be no less than the highest participation level in any one of the four years immediately prior to the qualification date.

The commission adopted a maximum number of 1,669 for the Bristol Bay salmon drift gillnet fishery in 1974. For a variety of reasons that are explained in the report, the maximum number was exceeded, and today 1,857 potentially active permanent entry permits have been issued in the fishery.

In the second stage of limited entry, the law directs the Commercial Fisheries Entry Commission (commission or CFEC) to determine an "optimum number" for the fishery. The optimum number should represent a reasonable balance of three general standards specified in the law (see AS 16.43.290). The three standards include economic, resource conservation, and management concerns. The purpose of this study was to help the commission determine an optimum number.

An optimum number for a fishery could be greater or less than the maximum number. If the optimum number is greater than the number of permits outstanding in the fishery, the commission is required to put more permits into the fishery. If the optimum number is less than the number of permits outstanding in the fishery, then the commission may develop a fisherman-funded buy-back program for the purpose of reducing the number of permits in the fishery to the optimum number.

The study analyzes each optimum number standard with respect to the Bristol Bay salmon drift gillnet fishery. The report reviews the limited entry amendment to Alaska's constitution, discusses an important Alaska Supreme Court decision that relates to optimum numbers, reviews previous work on optimum numbers, and discusses understandings of the optimum number standards. The report provides a history of the fishery, background on the regulatory framework, a detailed discussion of management and resource conservation concerns, estimates of historical costs and net returns, and forecasts of future rates of return in the fishery.

The limited entry law requires that the optimum number represent a reasonable balance of the three general standards, and the law allows the optimum number for a fishery to be a range of numbers rather than a single number. This report concludes that a range of 800 to 1200 permits for the Bristol Bay salmon drift gillnet fishery represents a reasonable balance of the three optimum number standards.

Optimum Number Standard One: The Economic Optimum Number

The first optimum number standard in Alaska's limited entry law (AS 16.43. 290(1)) seeks the number of entry permits sufficient to maintain an economically healthy fishery. The standard reads as follows:

> *(1) the number of entry permits sufficient to maintain an economically healthy fishery that will result in a reasonable average rate of economic return to the fishermen participating in the fishery, considering time fished and necessary investments in vessel and gear.*

"Economically healthy fishery" is defined in AS 16.43.990(2) as follows:

> *(2) "economically healthy fishery" means a fishery that yields a sufficient rate of economic return to the fishermen participating in it to provide for, among other things, the following:*
>
> *(A) maintenance of vessels and gear in satisfactory and safe operating condition; and*
>
> *(B) ability and opportunity to improve vessels, gear and fishing techniques, including, when permissible, experimentation with new vessels, new gear, and new techniques.*

The first optimum number standard was named the "economic optimum number" standard by commission staff in the early years of the limited entry program.

Average rates of economic return per permit fished were examined in two chapters of the main report and are summarized here. Chapter 3 of the main report provides estimates of historic average economic returns in the fishery. Chapter 4 of the main report forecasts how average economic returns per permit will vary in the future depending upon likely future harvest levels, likely levels of future ex-vessel prices, and the number of permits in the fishery.

Historical Rates of Economic Return

Chapter 3 examines historical data for the Bristol Bay salmon drift gillnet fishery. Data on the number of permits fished, average pounds harvested per permit fished, estimated average sockeye price per pound, estimated average gross earnings per permit, and the estimated permit market value are provided for the 1975-2003 time period.

Data on costs and net economic returns were collected in a CFEC survey of Bristol Bay drift gillnet permit holders in 2002. Data were collected for multiple years. The survey data were then used to model and to produce estimates of average costs and net economic returns per permit fished over the 1983 through 2003 time period.

Two different measures of economic return were used in the study. The reasons for using these two measures of economic returns are provided in Chapter 3, along with a detailed listing of the costs considered for each measure.

The first measure was "Returns to Labor, Management, and Investment" (RLMI). This measure is calculated by subtracting payments for variable and fixed costs and an estimate of the vessel depreciation expense from the permit's gross earnings from fish sales.

The second measure was "Economic Profit." This measure subtracts two additional costs; namely, the opportunity cost of the skipper's time, and the opportunity cost of the investment in vessel and equipment. Economic profit is a measure of economic returns that meets the legislature's "reasonable average rate of economic return" criterion, since it explicitly considers "time fished and necessary investment in vessel and gear."

Table 1 provides estimates of economic returns for the Bristol Bay salmon drift gillnet fishery over the 1983 through 2003 time period. The table includes data on the number of permits fished, and the average pounds harvested per permit. The table also includes estimates of the sockeye ex-vessel price per pound, average gross earnings per permit, average returns to labor, management, and investment per permit, and average economic profits per permit.

The dollar-denominated estimates in Table 1 are in "nominal dollars" which means the actual dollars for the respective year. Nominal dollar estimates are not corrected for inflation. Chapter 3 also provides estimates of the historical costs and returns converted into "real 2003, constant-value" dollars, which are dollars that have been corrected for general price inflation. The results using real dollars follow a roughly similar pattern, but more starkly demonstrate the changes that have occurred over time.

The data in Table 1 indicate that estimated average gross earnings per permit fished in nominal dollars rose over the 1984 to 1990 time period, from $51,418 in 1984 to a peak of $99,564 in 1990. Average gross earnings per permit fluctuated in the 1990's, but tended to decline in the years from 1994 to 2003. Average gross earnings per permit were $93,591 in 1994 and only $25,989 in 2003. The declines in average gross earnings were partly due to declines in harvest, but also reflect the declines in ex-vessel prices for Bristol Bay salmon.

The estimates of average returns to labor, management, and investment (RLMI) per permit fished remained positive over the entire 1983 through 2003 time period. The estimates tended to roughly follow the estimated average gross earnings in the fishery. For example, average RLMI per permit tended to rise over the 1984 through 1990 time period, from $24,599 in 1984 to a peak of $59,551 in 1990. The estimated average RLMI per permit fluctuated in the 1990's, but tended to decline in the years from 1994 through 2003. The estimated average RLMI per permit were $47,718 in 1994 but were only $4,107 in 2003. This measure of economic returns hit a low in 2001 at $929.

The estimates of economic profits per permit include deductions for the opportunity cost of the skipper's time and the opportunity cost of the investment in the vessel. Again, average profits also tended to roughly follow the estimates of average gross earnings in the fishery. Estimated average profits per permit tended to rise over the 1984 through 1990 time period, from $13,127 in 1984 to $47,300 in 1990. Average profits fluctuated in the 1990's, but tended to decline over the 1994 through 2003 time period. Average estimated profits per permits fished were $35,899 in 1994 but were -$3,318 per permit in 2003. Over the 1997 to 2003 time period, estimated average profits per permit fished were negative in all years except 1999.

Estimated average profits per permit fished were negative for the first time in 1997 at -$6,662. Permit participation rates began to fall in 1997 when 1,875 permits were fished.

Table 1. Bristol Bay Salmon Drift Gillnet Fishery, 1983-2003: Estimated Average Harvests, Gross Earnings, Costs, and Net Returns (in nominal dollars)

Year	Permits With Landings	Average Pounds per Permit	Sockeye Average Price	Average Gross Earnings	Avg. Fixed and Variable Costs	Avg. Return Labor, Mgt. & Investment	Average Opportunity Costs	Average Economic Profits
1983	1,797	113,001	$0.64	$71,012	$30,456	$40,556	$10,377	$30,179
1984	1,804	83,564	$0.66	$51,418	$26,818	$24,599	$11,472	$13,127
1985	1,815	72,463	$0.83	$58,785	$27,929	$30,856	$10,571	$20,285
1986	1,823	49,832	$1.42	$65,238	$27,675	$37,563	$9,260	$28,303
1987	1,824	51,242	$1.40	$65,990	$27,768	$38,222	$9,887	$28,335
1988	1,837	48,647	$2.10	$91,150	$36,867	$54,284	$11,690	$42,594
1989	1,855	80,573	$1.25	$96,747	$39,028	$57,719	$13,150	$44,569
1990	1,869	94,070	$1.09	$99,564	$40,013	$59,551	$12,251	$47,300
1991	1,873	73,026	$0.75	$52,979	$28,076	$24,903	$9,768	$15,135
1992	1,879	89,362	$1.12	$96,976	$42,627	$54,348	$11,126	$43,222
1993	1,875	116,342	$0.68	$77,534	$39,577	$37,957	$10,471	$27,485
1994	1,865	97,168	$0.99	$93,591	$45,874	$47,718	$11,829	$35,889
1995	1,882	115,835	$0.80	$90,345	$46,240	$44,105	$13,786	$30,319
1996	1,884	88,440	$0.81	$69,327	$38,329	$30,998	$12,982	$18,017
1997	1,875	33,380	$0.94	$30,235	$24,374	$5,862	$12,524	-$6,662
1998	1,858	27,431	$1.21	$30,787	$24,048	$6,740	$11,530	-$4,790
1999	1,847	61,480	$0.84	$50,296	$29,809	$20,486	$11,806	$8,680
2000	1,823	57,408	$0.67	$37,527	$26,821	$10,706	$12,593	-$1,887
2001	1,566	51,491	$0.42	$20,699	$19,770	$929	$8,762	-$7,832
2002	1,184	45,751	$0.49	$21,482	$18,989	$2,492	$6,908	-$4,415
2003	1,424	55,099	$0.50	$25,989	$21,882	$4,107	$7,926	-$3,819

Notes: Average pounds per permit include landings of all species on the permit.
Estimates of average sockeye price per pound are provided because sockeye salmon is the predominant species harvested.
Fixed and variable cost categories include: food; crew shares (excluding the skipper); fuel; maintenance and repairs; gillnets; miscellaneous gear; fish taxes; transportation; moorage and storage; insurance; administrative costs; permit and vessel license fees; property taxes; and depreciation.
Opportunity costs include the opportunity cost of the skipper's time during the fishery and the opportunity cost of the investment in vessel and equipment.

In 2001, the number of permits fished declined to 1,566, and in 2002 only 1,184 permits were fished. The number of permits fished rebounded somewhat in 2003 to 1,424, but still remained well below the number of permits outstanding in the fishery. Even with fewer permits fished in recent years, estimated average profits per permit fished remained negative.

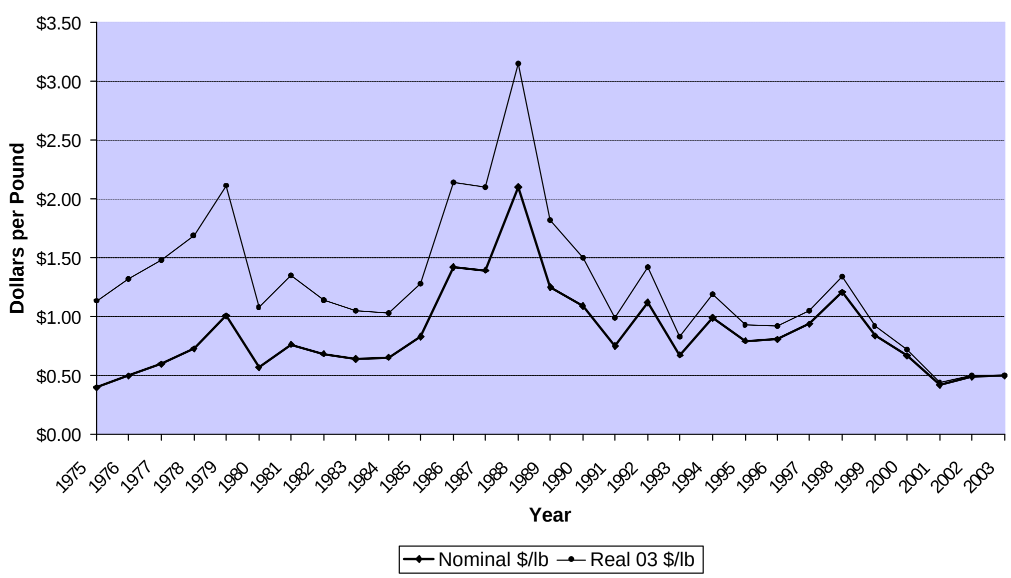
Changes in average gross earnings and average net returns can be caused by changes in average pounds per permit and changes in average ex-vessel prices. Average gross earnings per permit are dependent upon total pounds harvested, ex-vessel prices, and the number of permits fished. For example, in 1987 there were 1,824 permits fished in the drift gillnet fishery and a harvest of about 93.5 million pounds, for an average harvest of 51,242 pounds per permit fished. The average ex-vessel price for sockeye (the bulk of the harvest) was $1.40 per pound. This combination of price and average harvest per permit resulted in average gross earnings of $65,990, and average estimated profits of $28,335.

In contrast, in 2001 there were only 1,566 permits fished, and a total harvest of about 80.6 million pounds of salmon, for an average harvest of 51,491 per permit fished. While the average pounds were similar to 1987, the average ex-vessel price for sockeye was only $.42 per pound. As a result, this combination of prices and average harvest per permit resulted in average gross earnings of only $20,699 and an average estimated loss of -$7,832 per permit. Thus, the same number of pounds per permit could result in either a profitable or unprofitable year, depending upon the ex-vessel prices received by fishermen.

Future profits in the fishery will depend critically on salmon harvests, ex-vessel prices, and the number of permits in the fishery. Chart 1 provides a view of Bristol Bay sockeye ex-vessel prices from 1975 through 2003. The prices are shown in both nominal and real 2003 dollars. In nominal terms, sockeye ex-vessel prices were about as low in 2001 through 2003 as they were in 1976 and 1977. However, when converted to real 2003 dollars, the ex-vessel prices from 2001 through 2003 were the lowest of the entire time period. The dramatic decline in ex-vessel prices in recent years is partially due to the dramatic growth in the supply of farmed salmon and trout and the concomitant decline in the price of substitutes for wild salmon.

The number of permits that will generate a reasonable average rate of economic return in the future depends critically upon the likely range of future ex-vessel prices, as well as the size of the salmon harvests. Chapter 4 of the report examines the issue of likely future returns in more detail.

Chart 1.
Bristol Bay Sockeye Salmon Ex-Vessel Price per Pound, 1975-2003:
Real 2003 Dollars and Nominal Dollars



Forecasts of Future Rates of Economic Return

Chapter 4 of the report provides forecasts of how future average rates of return in the Bristol Bay salmon drift gillnet fishery will vary depending upon the number of entry permits in the fishery and other assumptions about future conditions in the fishery. The chapter also provides an estimate of the "economic optimum number" under Standard One in Alaska's limited entry law. The estimate of the economic optimum number of permits under Standard One ranged from 600 to 1,200 permits.

If future economic returns in the fishery were expected to vary as economic returns varied over the entire 1983-2003 time period, the economic optimum number of permits would likely remain near current permit levels.

However, the decline in ex-vessel prices, coinciding with a dramatic growth in farmed salmon and trout production and a concomitant decline in the price of farmed substitutes for wild salmon, suggests that economic returns will be lower in the future, reflecting these factors and the reality of more recent experience. The sharp decline in the market value of entry permits for the fishery and the large decline in participation rates suggest that fishermen have revised their expectations about future net returns sharply downward.

To make the forecasts, the authors developed an economic simulation model that is derived from relationships estimated from historic and survey data, and relies on assumptions about likely "future values" of key explanatory variables. The model was used to generate estimates for a "baseline scenario," a "high ex-vessel price scenario," and a "low ex-vessel price scenario."

The results of these simulations are shown in Chapter 4 in real 2003 constant-value dollars. All scenarios assume that harvests will continue to vary in the same fashion as harvests varied over the 1978 through 2003 time period. However, the assumptions about future ex-vessel prices reflect the reality of the growth of the salmon farming industry. Therefore, the price forecasts tend to be much lower, on average, than average ex-vessel prices observed during the 1980's and early 1990's.

Ex-vessel prices are a critical part of forecasts of future net economic returns. If harvests are held constant, percentage change in ex-vessel prices lead to equal percentage changes in total gross earnings. Thus, forecasts of future economic returns are very sensitive to forecasts of future ex-vessel prices.

Because ex-vessel prices have recently declined to new lows, and future ex-vessel prices are of critical importance in an optimum number determination, CFEC contracted with Dr. Gunnar Knapp to help with forecasts of future ex-vessel prices. Dr. Knapp is a Professor of Economics at the University of Alaska Anchorage and is a recognized expert on world salmon markets. Dr. Knapp's recommendation for a sockeye ex-vessel price forecasting equation was used in the CFEC economic simulation model of future net returns. Ex-vessel prices for the other Bristol Bay salmon species were related to the sockeye ex-vessel price.

The baseline simulation follows directly from Dr. Knapp's equation, as well as from the other ex-vessel price equations and the assumptions about future harvest levels. The results of 100 simulations of the baseline scenario suggest that future average sockeye ex-vessel prices will be somewhat lower in real terms than any observed over the 1975-2003 time period. The overall mean of the sockeye ex-vessel price from the 100 simulations was $0.41 per pound, measured in real 2003 "constant-value" dollars. Forecasts of ex-vessel prices for the other salmon species were also near historic lows. The results, coupled with forecasts of average operating costs per permit, suggest that a reduction to around 900 permits would be needed to achieve positive average economic profits in the future. Even at 900 permits, some of the simulations twenty-five years into the future suggest that average profits may still be negative.

Table 2. Sockeye Salmon Ex-vessel Price Forecasts. Mean Prices From the Distribution of Sample Means of 100 Simulations.

Mean Prices are in Real 2003 Dollars per Pound.

Scenario	Overall Mean	Minimum Mean	Maximum Mean
Baseline	$ 0.41	$ 0.35	$ 0.47
High Price	$ 0.54	$ 0.45	$ 0.61
Low Price	$ 0.29	$ 0.24	$ 0.33

The two other scenarios were run to put boundaries around the economic optimum number. The scenarios reflect the fact that there is great uncertainty about future ex-vessel prices and hence future economic profits. One can come up with many hypotheses suggesting why ex-vessel prices in the future could be higher or lower than under the baseline case. Some of these theories are mentioned in Chapter 4 and are discussed in more detail in Dr. Knapp's report to the commission. The results from the economic simulation model are highly sensitive to future ex-vessel price assumptions, and these two scenarios highlight that sensitivity.

The "high ex-vessel price" scenario simply increased sockeye ex-vessel price forecasts by 30%, which also increased the forecast for the other salmon species. The overall mean of the sockeye ex-vessel price from 100 simulations of this high price scenario was $0.54 per pound. Simulations under this scenario suggest that positive average economic profits per permit in the future could be achieved with a reduction to around 1,200 permits.

The "low ex-vessel price" scenario simply decreased the sockeye ex-vessel price forecast by 30%, which also decreased the forecast for the other salmon species. The overall mean of the sockeye ex-vessel price from 100 simulations of this low price scenario was $0.29 per pound. Simulations under this scenario suggest that positive average economic profits per permit in the future would be achieved only with a reduction to around 600 permits. Table 3 shows the results of the 3 simulation scenarios. It illustrates the overall estimated average profits derived from varying levels of permits for the baseline, the high price, and the low price scenarios. Note again the forecast is the result of 100 simulations; therefore, the table also shows the range (the minimum and maximum) of the average estimated profits generated by the simulations.

Results from the economic simulation model are highly sensitive to the assumptions about future ex-vessel prices. Modifications of other elements of the model, such as the cost function, could also lead to significant changes.

Table 3. Average Economic Profits by Number of Permits for the Baseline, High Price, and Low Price Scenarios.
Distribution of Means From 100 Simulations of 25 Years into the Future
Assumes That All Permits Will be Fished

Number of Permits	Baseline Scenario Estimated Profits			High Price Scenario Estimated Profits			Low Price Scenario Estimated Profits		
	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum
500	$25,726	$18,639	$31,904	$44,582	$34,890	$53,117	$6,843	$2,361	$10,942
600	$16,078	$10,424	$21,061	$31,760	$23,932	$38,627	$374	-$3,106	$3,697
700	$9,313	$4,695	$13,501	$22,727	$16,244	$28,388	-$4,121	-$6,873	-$1,356
800	$4,337	$496	$7,923	$16,052	$10,576	$20,883	-$7,394	-$9,615	-$5,037
900	$542	-$2,697	$3,658	$10,934	$6,239	$15,157	-$9,865	-$11,800	-$7,758
1,000	-$2,435	-$5,196	$306	$6,899	$2,826	$10,636	-$11,783	-$13,495	-$9,873
1,100	-$4,823	-$7,199	-$2,339	$3,646	$75	$6,992	-$13,303	-$14,837	-$11,555
1,200	-$6,773	-$8,915	-$4,488	$974	-$2,182	$3,999	-$14,531	-$15,919	-$12,919
1,300	-$8,390	-$10,353	-$6,277	-$1,254	-$4,064	$1,505	-$15,537	-$16,803	-$14,045
1,400	-$9,751	-$11,561	-$7,788	-$3,138	-$5,656	-$598	-$16,374	-$17,537	-$14,986
1,500	-$10,908	-$12,589	-$9,075	-$4,749	-$7,036	-$2,378	-$17,077	-$18,153	-$15,780
1,600	-$11,902	-$13,471	-$10,182	-$6,139	-$8,277	-$3,916	-$17,674	-$18,675	-$16,456
1,700	-$12,764	-$14,235	-$11,143	-$7,351	-$9,358	-$5,258	-$18,185	-$19,122	-$17,037
1,800	-$13,518	-$14,903	-$11,986	-$8,416	-$10,307	-$6,438	-$18,627	-$19,507	-$17,541
1,900	-$14,183	-$15,491	-$12,729	-$9,359	-$11,148	-$7,484	-$19,013	-$19,843	-$17,982
2,000	-$14,773	-$16,013	-$13,390	-$10,200	-$11,897	-$8,417	-$19,352	-$20,138	-$18,370

Summary: Optimum Number Standard One

Given the uncertainties about the future, the broad range of 600 to 1,200 permits was selected for the "economic optimum number" under Standard One. Even the upper bound of this range would require a substantial decrease in the number of permits from current levels.

Optimum Number Standard Two: The Management Optimum Number

The second optimum number standard, AS 16.43.290(2), 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;

This standard brings the concepts of manageability, orderliness, and efficiency into the optimum number determination. "Sound fishery management techniques" are necessarily interconnected with the need to manage for resource conservation. This is the optimum number standard that most closely addresses the resource conservation purpose of the limited entry amendment to Alaska's constitution. The commission has referred to this standard as the "management optimum number."

To derive the range of values for the management optimum number, CFEC staff relied heavily upon the expertise of the Alaska Department of Fish and Game (ADFG or Department) and its fishery managers. The commission believes that persons charged with the responsibility of successfully managing a safe and orderly commercial fishery for resource conservation would best be able to outline the nature of the management problems which they face.

For purposes of this study, 800 to 1,500 permits will be used as the best estimate for the range of permits under optimum number Standard Two. This range is based largely upon two concepts and a set of questions asked of the Department in a formal memo sent by the commission to ADFG Commissioner Kevin Duffy in September, 2003. In addition to the direct questions regarding optimum numbers, the commission's memo asks many other questions about managing the Bristol Bay drift gillnet fishery. The Department's answers provide an important background to understand their advice regarding the management optimum number range.

In addition to the formal memo sent to Commissioner Duffy, CFEC staff interviewed ADFG biologists several times, and were able to observe management of the fishery first-hand during the 2002 season. Through this experience, the CFEC staff was able to gain a greater understanding and appreciation for the extremely complex and challenging task that biologists have in managing the Bristol Bay salmon fisheries. Chapter 2 in the main report provides details on how the fishery is managed. It outlines the most important considerations that biologists have to account for to accomplish their management goals; it also provides a summary of some of the principal regulations that affect management. Chapter 2 is summarized below.

Management of the Bristol Bay Drift Gillnet Salmon Fishery

The Bristol Bay management area encompasses all coastal and inland waters east of a line from Cape Newenham to Cape Menshikof. The area is divided into five fishery management districts, which correspond to the major river systems of the region. The salmon fishery is managed by the Alaska Department of Fish and Game.

Sockeye salmon are the predominant species harvested, comprising approximately 91% of the pounds of salmon harvested in the region since 1975. Both set and drift gillnet gear are allowed in Bristol Bay, forming two separate fisheries that occur concurrently. There are currently 1,857 potentially active entry permits in the drift gillnet fishery, and 992 in the set gillnet fishery.

Figure 2 illustrates the pattern of commercial salmon harvests in Bristol Bay. From 1900 through 2003, harvests averaged 15.6 million fish. Returns and harvests from 1970 to 1973 were exceptionally low, possibly resulting from harsh winter weather during that period. By 1978, however, harvests improved dramatically. The average harvest from 1978 through 2003 was 25.2 million fish, considerably higher than the long-term average. A series of especially high harvests occurred from 1989 through 1996, averaging 35.1 million fish. The record high harvest was in 1995, when 45.4 million fish were taken.

Bristol Bay Salmon Harvests

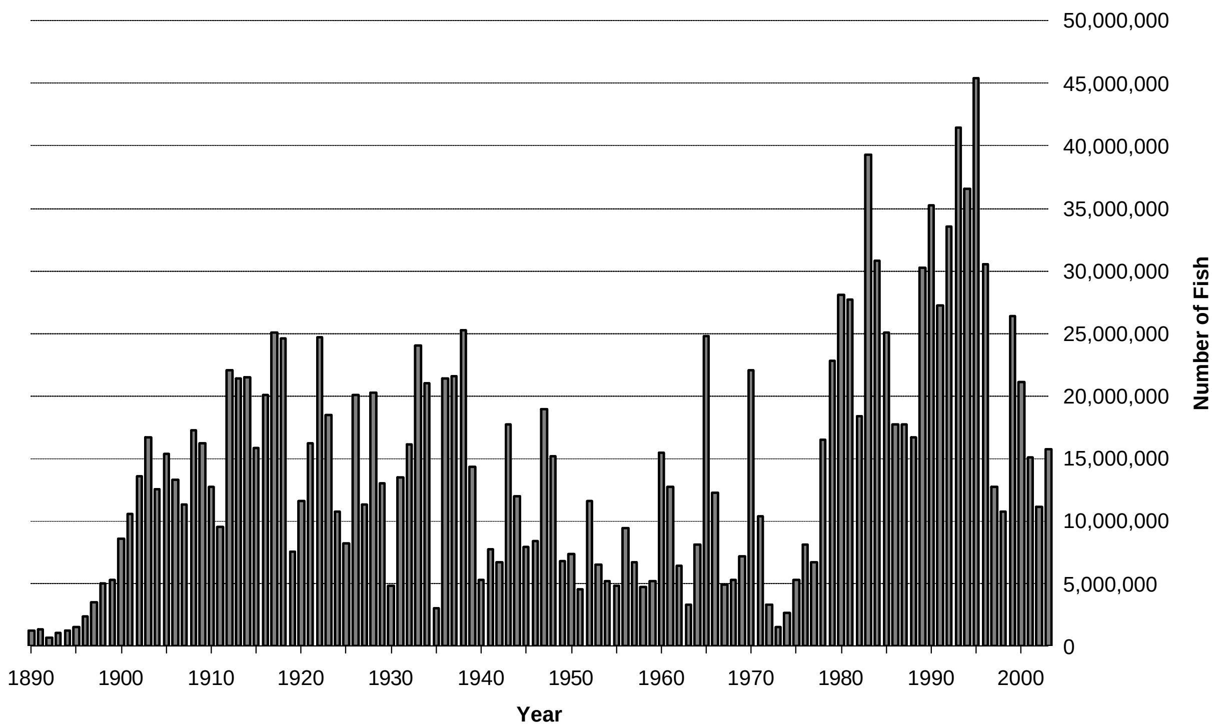


Figure 2

Current Management Objectives

ADFG's management of the salmon fisheries in Bristol Bay includes the regulatory objectives of managing for sustained yields (largely accomplished by adhering to escapement goals), maintaining the genetic diversity and overall health of the escapement, providing an orderly fishery, helping to obtain a high-quality fishery product, and harvesting fish consistent with regulatory management plans. Of all these goals, regulations state that obtaining escapements and maintaining the genetic diversity of the escapement shall be given the highest priority.

Escapement Goals and Maximum Sustained Yield

Escapement goals are established through scientific review and in collaboration with the Board of Fisheries. Sockeye escapement goals for the major spawning systems are based upon the principle of maximum sustained yield (MSY), which is the greatest average annual yield that one could expect from a stock of fish without harming the population.

Managing for MSY requires a high degree of scientific information and monitoring of a salmon stock's performance. Under MSY there is an optimum range of escapement that produces, on average, the highest harvests. The ranges take into account that return-per-spawner rates can exhibit wide variation. From year-to-year, spawning success fluctuates and the survivability of immature salmon in the fresh and salt-water environments is highly variable. Escapement goal ranges also account for uncertainties in the data used to estimate spawning productivity.

Escapement goals that provide the greatest potential to achieve MSY are called biological escapement goals (BEG). Each major spawning system in Bristol Bay has a BEG for sockeye salmon. There is also a BEG for chinook and coho salmon on the Nushagak River.

Sometimes there are biological, allocative, or economic considerations apart from MSY that require ADFG to manage for an escapement level that is different from the biological escapement goal. These are referred to as optimal escapement goals (OEG), which are established by the Board of Fisheries and set out in state regulatory management plans. When an OEG is set, it becomes the primary management objective, taking precedent over biological escapement goals. In Bristol Bay, the Naknek and Nushagak River sockeye runs are the only stocks that currently have an OEG.

In systems where BEG's cannot be estimated due to a lack of scientific information on salmon returns, ADFG may establish a sustainable escapement goal (SEG), which is an estimate based upon historical performance and/or indices known to conserve the stock. Maximum sustained yield might not be attained with these goals, but the stock should remain healthy while still allowing some level of commercial harvest. Apart from sockeye salmon, there are several stocks of other salmon species in Bristol Bay with escapement goals that fall into this classification.

Genetic Diversity and Healthy-Fish Escapement

Along with the goal of attaining escapement goals, state regulations direct ADFG to conserve distinct genetic races of fish within a spawning system. Large spawning systems, such as those found in Bristol Bay, contain multiple stocks of fish that return to particular areas to spawn. Preserving the genetic diversity of spawning stocks ensures the overall health of the system. ADFG attempts to maintain this diversity by allowing proportionate catches and escapements to occur throughout the run, avoiding excessive harvests or escapements at any particular time. Additionally, biological escapement goals themselves are designed to protect the genetic integrity of a spawning system. If escapement levels are set correctly, small stocks of fish will receive adequate escapements, even at the lower limits of escapement goals.

ADFG also takes efforts to maintain the quality, or health, of escaped fish. Fish that escape through an active fishery are often harmed by gillnets; biologists feel these fish are less likely to spawn successfully. By scheduling frequent fishery closures throughout the run, ADFG allows healthy, untouched fish to escape upriver. As mentioned, these "pulse" closures also help to maintain the genetic diversity of the escapement. ADFG also advances healthy escapement by attempting to schedule fishery openings to occur near the high tide; fishing during periods of deeper water allows more fish to escape unharmed by gillnets. There can be trade-offs to frequent fishery closures, however. Although they may facilitate healthy and genetically diverse escapement, they can also lessen management precision; it is easier to exceed escapement goals with frequent closures, particularly when the run is strong and large numbers of fish enter the district quickly.

Product Quality

High product quality is another goal of Bristol Bay salmon management. ADFG can manage for the quality of the delivered catch by scheduling shorter openings. Closed periods - even if they are short - allow fish to be delivered and processed sooner. However, as mentioned above, short openings with frequent closures can also present problems with achieving escapement goals.

Bristol Bay salmon management plans call for the use of special inriver harvest areas that are used under certain conditions. The special inriver harvest areas are much smaller than the general districts. Salmon management plans specify when fishing will be restricted to the special inriver harvest areas; the smaller areas are used to adjust harvest rates on specific stocks of fish when it is necessary to lower rates of interception of fish between river systems, or to allocate fish between the set and drift gillnet fisheries.

Although special inriver harvest areas are designed to help achieve certain management goals, quality is reduced when fisheries move from the larger districts into the inriver harvest areas. In the small inriver areas where fishing conditions are crowded, currents are especially strong and boats frequently have to drag their nets to keep them from snagging or tangling with other nets, or to keep the nets from drifting out of the allowable fishing area. Fishing in this fashion damages captured fish and lowers product quality.

Managers also have more difficulty managing for the biological escapement goals of systems where inriver fisheries occur. When fishing effort is spread out in the normal district, managers have more advanced notice when large numbers of fish quickly enter the district, but when fishing is restricted only to the special harvest areas, managers lose this response time, making it more likely to exceed escapement goals. Managers also have more problems balancing allocations between drift and set gillnet fisheries in the inriver fisheries.

Orderly Fisheries

Orderly fisheries are supported by regulations that discourage congestion on the fishing grounds. There are regulations for keeping a minimum distance between set and drift gillnet gear and for reducing the amount of allowable gear when fisheries are restricted to the small, inriver special harvest areas. ADFG and the Board of Fisheries also promote orderliness through regulations for more effective fisheries enforcement, such as the requirements for marking and identifying gear and for restrictions on how many fathoms of gillnet each vessel may have onboard.

Orderliness is also a consideration when ADFG sets the length of fishery openings. Shorter, more frequent openings tend to promote orderliness, especially in some districts. Before a fishery opening, fish will usually be distributed throughout the district, but if there are enough boats in the district most of the fish will be caught shortly after the fishery opens. After this initial phase of harvest, oftentimes the only productive fishing that remains will be on the district boundary line, where fresh incoming fish can be caught. The infamous Bristol Bay "line fisheries" result, with boats extremely congested at the district boundary. Collisions and other accidents are frequent, and fishery violations are common.

If fishing is closed shortly after the initial harvest phase, then line fisheries are less likely to occur. Fresh fish can enter the district, again distributing themselves throughout the area, where they can be harvested in the next fishing period. As mentioned above, these short "pulse" periods also serve to enhance product quality and allow escapement to occur throughout the run. Recall, however, that short openings can sometimes make it difficult for biologists to manage for escapements. It is easier to exceed escapement goals if there are frequent closures, especially when returns are large.

Orderly fisheries also have meaning in the avoidance of wasting harvested fish. For example, when processors reached their capacity during the 1999 season, ADFG reduced fishing time to avoid wasting fish that could have spoiled before they were processed.

Although the small inriver harvest areas that are specified in some management plans are designed to promote conservation and to help allocate fish among gear and user groups, they also interfere with managing for orderly fisheries. The inriver areas are much smaller than the full districts, and orderliness declines when vessels crowd into small areas. Collisions between vessels are more frequent, gillnets tangle, and regulation violations increase - particularly violations for fishing "over the line," or fishing outside of the allowable fishing district.

Inseason Management

ADFG's most important management objective is to achieve escapement goals, which is accomplished mainly by restricting fishing time and allowing fishing only in the terminal areas of each management district. However, actually attaining these escapement goals can be very difficult, involving a complicated set of considerations. The sockeye salmon run occurs over a very short time period. The vast majority of the fish enter the streams in only a two-week period, but the fishing power of the drift and set gillnet fisheries is extraordinary; the fishing fleet can harvest enormous numbers of fish in a short time. The behavior of the fish can also complicate management; how quickly and in what direction fish move through a fishing area can dramatically affect their vulnerability to fishing gear. In addition to achieving escapement goals, ADFG must also balance the other management objectives of fishery allocations, high product quality, providing for an orderly fishery, and maintaining the genetic diversity of fish populations by spreading escapements proportionately over the entire run.

To judge the size, movements, and timing of salmon returns, ADFG receives inseason information from a variety of sources, each one giving managers more information that helps them determine what actions are needed to achieve their objectives. The size and timing of the run is the principal determining factor in how much fishing time is allowed in a district. Other factors that may be considered to determine the amount of fishing time include the number of fishing boats (effort) in the district, fishery allocations, orderly fisheries, healthy and genetically diverse escapement, weather and tides, and processing capacity.

Perhaps the most important tool biologists have in managing for escapement goals are inseason run predictions that compare cumulative and daily escapement levels with historical run sizes and timing. Other sources of information used by biologists include preseason forecasts, test fishing operations, salmon age class determination, aerial surveys, and the performance of the fishing fleet, measured as catch per unit of effort.

Regulatory management plans also determine many management actions. These plans, adopted by the Board of Fisheries, call for specific adjustments to fishing time, fishing areas, and allowable gear. As mentioned above, the plans are mainly designed to allocate portions of the harvest to specific groups of fishermen (set gillnet or drift gillnet), or to help achieve escapements under certain conditions.

The body of regulations that govern salmon fishing in Bristol Bay help accomplish management goals, or they are designed to help enforce the fishery rules. Other regulations provide measures to limit competition between fishing operations, and serve mainly social or economic purposes.

As mentioned above, Bristol Bay salmon management plans mainly address salmon escapement and/ or interception issues. They also provide guidance on the allocation between user groups. In addition to salmon management plans, there are rules that restrict how much gear each vessel may carry and deploy, and a rule requiring vessels to be no longer than 32 feet in overall length. There are also restrictions on the transfer of permit holders and vessels between districts.

Concepts Used for Optimum Number Standard Two

The Bristol Bay drift gillnet fishery optimum number report builds upon earlier commission understandings of Standard Two to bracket the management optimum number within a range of values. Care has been taken to ensure that concepts used herein comport with the purposes of limited entry cited in the law, and with the purposes of the limited entry amendment to Alaska's constitution. Recall the second optimum number standard 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;*

Fundamental to the application of Standard Two in the determination of an optimum number is an understanding of the concepts of: "*harvesting the allowable commercial take...in an orderly, efficient manner*," and "*consistent with sound fishery management techniques.*"

ADFG manages for maximum sustained yield of the Bristol Bay sockeye salmon stocks, and for a long-term sustainable yield for other salmon stocks in Bristol Bay. Successfully attaining escapement goals is consistent with Alaska's constitutional mandate for resource conservation, and is also consistent with the limited entry constitutional amendment and "sound fishery management techniques" under Standard Two of the state limited entry law.

"Sound fishery management techniques" as interpreted under Standard Two should also include the other regulatory management goals of maintaining the genetic diversity and the overall health of the escapement, providing for orderly fisheries, helping to obtain a high-quality fishery product, and harvesting fish consistent with regulatory management plans.

Harvesting fish in an orderly manner is an important management goal and needs to be considered under optimum number Standard Two. Orderly harvests include the avoidance of accidents that occur during the fishery, and effective enforcement of fishery regulations. Orderly fisheries are also linked to resource conservation, as understood by the framers of the state constitution and by the legislature when they drafted the amendment allowing Alaska's limited entry program. The link between orderly fisheries and resource conservation is described in detail in Chapter 5 of the main report. The link includes not only avoiding the waste of fish and wise use of the fishery resource, it also includes the notion of containing excessive labor and capital in the fishery, to the extent that the waste associated with a disorderly fishery can be avoided.

CFEC relied heavily upon the advice of ADFG managers to help determine the range of permits for the management optimum number. It should be noted that some questions about the fishery were difficult to answer definitively due to the inherent uncertainties involved and the variety of circumstances that managers may face. Nevertheless, to address the optimum number question, CFEC needed the expert opinions of managers, even where scientific evidence was inadequate or lacking. Because of this, many of the answers received from ADFG should be viewed as the expert judgments of those charged with the management tasks.

To bracket the management optimum number of permits, the Department was asked to answer two questions which would attempt to establish boundaries for the management optimum number. The Department was asked to answer the questions assuming that existing regulations would remain unchanged, and that there would be at least enough processing capacity in Bristol Bay so that inseason management would not be significantly affected. The commission asked for these assumptions to establish benchmarks that would help the Department form their answers. Although it is entirely possible that new regulations and changes in processing capacity could affect future management of the fishery, at this time it can only be speculative as to what those changes might be.

Under the first conceptual boundary for management optimum numbers, the Department was asked to answer the following question:

> *Approximately how many fishing operations (drift gillnet 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?*

The Department's answer to the question was 1,400-1,500 drift net permits. The Department noted that the estimate was not based on a systematic analysis but was based upon the best professional judgment of the persons who have been managing the fishery in recent years. They were also careful to note that their estimates were made using the assumptions of adequate processing capacity and unchanged regulations. However, they said that processing capacity could indeed affect inseason management decisions in the future, noting that capacity has declined significantly in the last 5 years. They indicated the likelihood is strong that processing capacity will affect management, particularly during years of large sockeye returns.

Note that the commission's question includes the statutory language that the harvest should occur in an orderly and efficient manner and consistent with sound fishery management techniques. The question in the CFEC memorandum to the Department came after the discussion on "orderly" cited above. Harvests "in an orderly and efficient manner" are part of optimum number Standard Two and are part of the resource conservation definition used herein. Resource conservation is also one of the constitutional purposes of limited entry. An objective would be to pick a number of permits that would avoid the most acute types of wastage caused by a disorderly fishery.

The CFEC question asks for the *minimum* number of units of gear needed to harvest the highest expected returns in an orderly, efficient manner. The minimum number of permits needed in years of the highest expected runs could represent considerable excess harvesting capacity in other years with lower returns. Moreover, it is possible that large excess harvesting capacity in years with lower run sizes could make it difficult to manage the fishery in an orderly fashion.

Under the second conceptual boundary for management optimum numbers, the Department was asked to answer the following question:

> *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?*

The Department's answer to this question was 800 to 900. Again, the Department says this represents the professional judgment based on the experience of those managing the fishery and they characterize the estimates as subjective and qualitative.

Summary: Optimum Number Standard Two

Using the Department's advice, and considering the concepts outlined above, this report recommends that 800 to 1,500 permits should be used as the best estimate of the range of permits for the fishery under optimum number Standard Two.

Optimum Number Standard Three

AS 16.43.290(3) contains the third optimum number standard under Alaska's limited entry law. The standard reads as follows:

> *(3) the number of entry permits sufficient to avoid serious economic hardship to those currently engaged in the fishery, considering other economic opportunities reasonably available to them.*

John Martin, in a contract report done for CFEC in the early years of limited entry, indicated the commission believed that: "*The third criteria [sic] outlined in the statute was to be utilized to adjust the economic and management optimum numbers as required by local employment conditions.*" The authors believe that Standard Three allows the commission to moderate changes suggested by the other two standards when appropriate. Moreover, the standard is probably most applicable when fleet reductions are being contemplated.

Under Alaska's limited entry law, if the optimum number is greater than the number of permits outstanding, then the commission is required to put additional permits into the fishery. Any optimum number must be consistent with *Johns v. State*, 758 P.2d 1256, 1266 (Alaska 1988) [citation and footnote omitted], in which our Alaska Supreme Court declared:

> *[T]here is a tension between the limited entry clause of the state constitution and the clauses of the constitution which guarantee open fisheries. We suggested that to be constitutional, a limited entry system should impinge as little as possible on the open fishery clauses consistent with the constitutional purposes of limited entry, namely, prevention of economic distress to fishermen and resource conservation . . . . The optimum number provision of the Limited Entry Act is the mechanism by which limited entry is meant to be restricted to its constitutional purposes. Without this mechanism, limited entry has the potential to be a system which has the effect of creating an exclusive fishery to ensure the wealth of permit holders and permit values, while exceeding the constitutional purposes of limited entry.*

In contrast, when the optimum number is less than the maximum, the commission may establish a fisherman-funded buyback program to reduce the number of permits to the optimum number. Imposition of a buyback assessment might force some fishermen to exit the fishery who cannot continue to fish profitably and pay the tax, and who have few other occupational alternatives. Such individuals would arguably have low opportunity costs, and in some instances it might be better if they stayed in the fishery. Under such conditions, using Standard Three to achieve a reasonable balance might lead to a somewhat higher optimum number than implied by the first two standards in order to avoid disenfranchising persons with few other alternatives.

Thus, the commission believes the third optimum number standard should be used when the results from the first two standards need to be moderated to avoid serious economic hardship to those currently engaged in the fishery. When the optimum number for the fishery is adopted as a range with a minimum and a maximum, any adjustments under the third optimum number standard could be accommodated through selection of a higher target number within the range.

Recommended Optimum Number

Chapter 6 of the report summarizes the findings and recommends an optimum number for the Bristol Bay salmon drift gillnet fishery as a range from 800 to 1,200 permits. The authors believe this range provides a reasonable balance of the three optimum number standards.

The commission's early work on optimum numbers in the 1970's bracketed the first two optimum number standards into bounded ranges. Given the large uncertainties about the future, many believe that defining the optimum number for a fishery as a bounded range of numbers rather than as a single number would make the optimum number determination more meaningful and defendable.

In a sense, a bounded range acknowledges the fact that the future has many uncertainties, and even if there were no uncertainties, future economic returns from a fishery would still vary considerably on an annual basis. Recent changes in Alaska's limited entry law have made it clear that the optimum number can be an optimum range of numbers.

Choosing an optimum range of numbers may also provide more flexibility with respect to buyback options. The law allows the commission to establish a buyback program with the object of reducing the number of permits to the optimum. An optimum range of permits may provide more choices for a target number for a buyback program.

The recommended range of 800 to 1,200 is within the estimated bounded ranges for optimum number Standards One and Two. Since it is a wide range, the authors believe there is ample room to accommodate any concerns under optimum number Standard Three. In short, the range allows for some flexibility in choosing a fleet reduction target and provides a reasonable balance among the three standards.

The "economic optimum number" range under Standard One is estimated to be 600 to 1,200 permits. The results of the simulations under the baseline case scenario, which is the scenario the authors believe is most likely, showed the overall average future profits from 100 simulations were positive when there were about 900 permits in the fishery, and were negative at higher permit levels. With 800 permits being fished under the baseline case, average profits were positive in all 100 simulations.

Under the "low ex-vessel price scenario," overall average future profits per permit from 100 simulations were positive at 600 permits but negative at higher permit levels. Under the "high ex-vessel price scenario," overall average profits per permit were positive at 1,200 permits, but negative at higher permit levels. However, if the "high ex-vessel price scenario" would eventually prove to accurately reflect the future, and the number of permits is reduced to 600, then average profits per permit and permit values at 600 permits might be high enough to put at risk a portion of the fleet reduction if a court challenge emerges on the "degree of exclusivity" of the fishery.

Using 800 as a lower bound for the optimum number range should reduce the risk that the optimum number determination would face a legal challenge that the fishery is "too exclusive" under Alaska's constitution after a permit reduction has occurred. The warnings of Alaska's Supreme Court in *Johns* should not be taken lightly. The commission would not want to be ordered to put more permits back into the fishery after permit holders have invested in a buyback program and permit reduction.

The "management optimum number" under optimum number Standard Two also had 800 permits as a lower bound. As such, it represents the Department of Fish and Game's rough estimate of the maximum number of permits they could manage effectively in an orderly and efficient manner while achieving other management objectives during years of the lowest expected run sizes.

Resource conservation is one of the stated reasons for allowing limited entry under the limited entry amendment to Alaska's constitution, and the available evidence suggest that "wise use of resources" was the intended definition of resource conservation. Permit levels above 800 permits will make it more difficult for managers to run an orderly fishery and achieve their other objectives in some years. Thus it would be difficult to argue that 800 permits is "too exclusive" from a resource conservation perspective if it is the maximum number of permits that can be effectively managed in an orderly manner during low run years.

Should the "low ex-vessel price" scenario eventually prove to be true, the optimum number range could be revised downward in the future under the authority provided in AS 16.43.300. A conservative approach to fleet reduction should help discourage a legal challenge if future ex-vessel prices and profits prove to be better than forecasted. If future ex-vessel prices and profits prove to be worse than the baseline case, then the optimum number range can be revised downward in the future.

The recommended upper bound of the optimum number range is 1,200 permits. Based upon 100 simulations of the "high ex-vessel price scenario," overall average profits permit were positive at 1,200 permits, but negative at higher permit levels. The high ex-vessel price scenario is the most optimistic future scenario in this report; therefore, the recommended upper bound of the "economic optimum number range" is 1,200 permits under the law's optimum number Standard One.

Twelve hundred permits also falls within the "management optimum number range" under optimum number Standard Two in the law. This number of permits may represent considerable excess capacity in some years, and may make it difficult to manage the harvest in an orderly, efficient manner in some years. However, it is also below the upper bound of the management optimum number range of 1,500 permits.

As noted previously, the Department of Fish and Game's memorandum to the commission suggested that it might take up to 1,400 to 1,500 permits to harvest the available surplus in an orderly and efficient manner and consistent with sound fishery management techniques in years of the highest expected returns. The answer assumed that current regulations would continue unchanged.

The Department's answer may raise a concern that a lower number may be inadequate to harvest the available surplus in an orderly and efficient manner in years of the highest expected returns. Nevertheless, the Department's answers to other questions suggest that the available surplus could usually be taken by adjusting the number of openings and/or the length of openings, depending upon the fleet size. Moreover, the Alaska Board of Fisheries changes regulations frequently and may be able to alter regulations to help a smaller fleet harvest any available surplus in an orderly and efficient manner.

For these reasons, the authors believe that a lower bound for the optimum number range of 800 permits, and an upper bound for the optimum number range of 1,200 permits would best achieve a reasonable balance of the three optimum number standards. These bounds would also serve the constitutional purposes of preventing economic distress to fishermen and promoting resource conservation.

Other Considerations

The commission, the Alaska Board of Fisheries, and participants in the fishery will need to carefully consider what should happen next after an optimum number regulation is established. An optimum number determination that is below the number of permits currently outstanding in the fishery would indicate the Commission believes a fleet consolidation is appropriate under the limited entry law and Alaska's constitution. There may be several alternatives for promoting fleet consolidation.

One alternative would reduce the number of permits in the fishery using a fisherman funded buyback program developed under the authority of Alaska's limited entry law. The commission could work with stakeholders to develop a state-managed buyback program under AS 16.43.310. For a buyback of use-privileges to occur entirely at one point in time, a source for the requisite funds would be needed. If the funds are in the form of a "loan" with a required loan payback, then the commission would need to establish regulations for buyback assessments under AS 16.43.310(b). Other agencies, such as the Department of Revenue, would also need to be involved.

However, under recent changes in the limited entry law, establishment of an optimum number that is less than the number of permits outstanding no longer automatically triggers a fisherman-funded buyback program. Thus care should be taken to make sure that any fisherman-funded buyback proposal has adequate support among permit holders and the fishing industry.

A second alternative for reducing the number of permits might be for permit holders to conduct a privately run buyback program. In 2002, the legislature passed a law (Chapter 134 SLA 2002) allowing permit holders to form a qualified salmon fishery association and conduct fleet reductions by private initiative. Once the qualified salmon fishery association is formed, fishermen can vote to assess themselves up to 5% of the value of the salmon sold in the fishery. The legislature may then appropriate the money collected from the assessment to the Department of Fish and Game for funding the association. The fishery association must develop an annual operating plan to expend the funds, and consolidation of the fishing fleet must be a valid purpose of the plan. Presumably, the association could contract with persons to retire their permits from the fishery.

A third possible alternative for a fisherman-funded buyback program might be Section 312 of the Magnuson-Stevens Fishery Conservation and Management Act. Under this section, the buyback program would be run by the federal government, and great care would be needed to assure that the program comports with both state and federal law. Funding for such a program would again be in the form of a "loan" that would need to be paid back by assessments on the remaining permit holders. However, it is not clear that this law is directly applicable.

It might also be possible for stakeholders to seek special funding for a buyback program that was in the form of a "grant" rather than in the form of a loan that needed to be repaid by permit holders. Such funding would make a buyback option much more attractive to permit holders.

Development of any buyback program will take time and may require more statutory changes as well as regulatory changes. In the interim, an optimum number in the range recommended in the report will signal to the Alaska Board of Fisheries and to permit holders in the fishery that the commission believes a fleet reduction makes sense under Alaska's limited entry law and would be defendable under Alaska's constitution.

The Alaska Board of Fisheries could continue to consider regulatory proposals that would encourage voluntary fleet consolidation. Some ideas for such regulations do not require an actual reduction in the number of entry permits or changes to laws. Indeed, the Board has already experimented with a voluntary fleet consolidation regulation for the Bristol Bay salmon drift gill net fishery during the 2004 season. Such efforts by the Board may reduce harvesting costs and increase profitability for permit holders, even at existing permit levels. The commission can support the efforts of the Board and the fishing industry to search for alternative ways to encourage fleet consolidation, even if those alternatives are viewed only as temporary interim measures.