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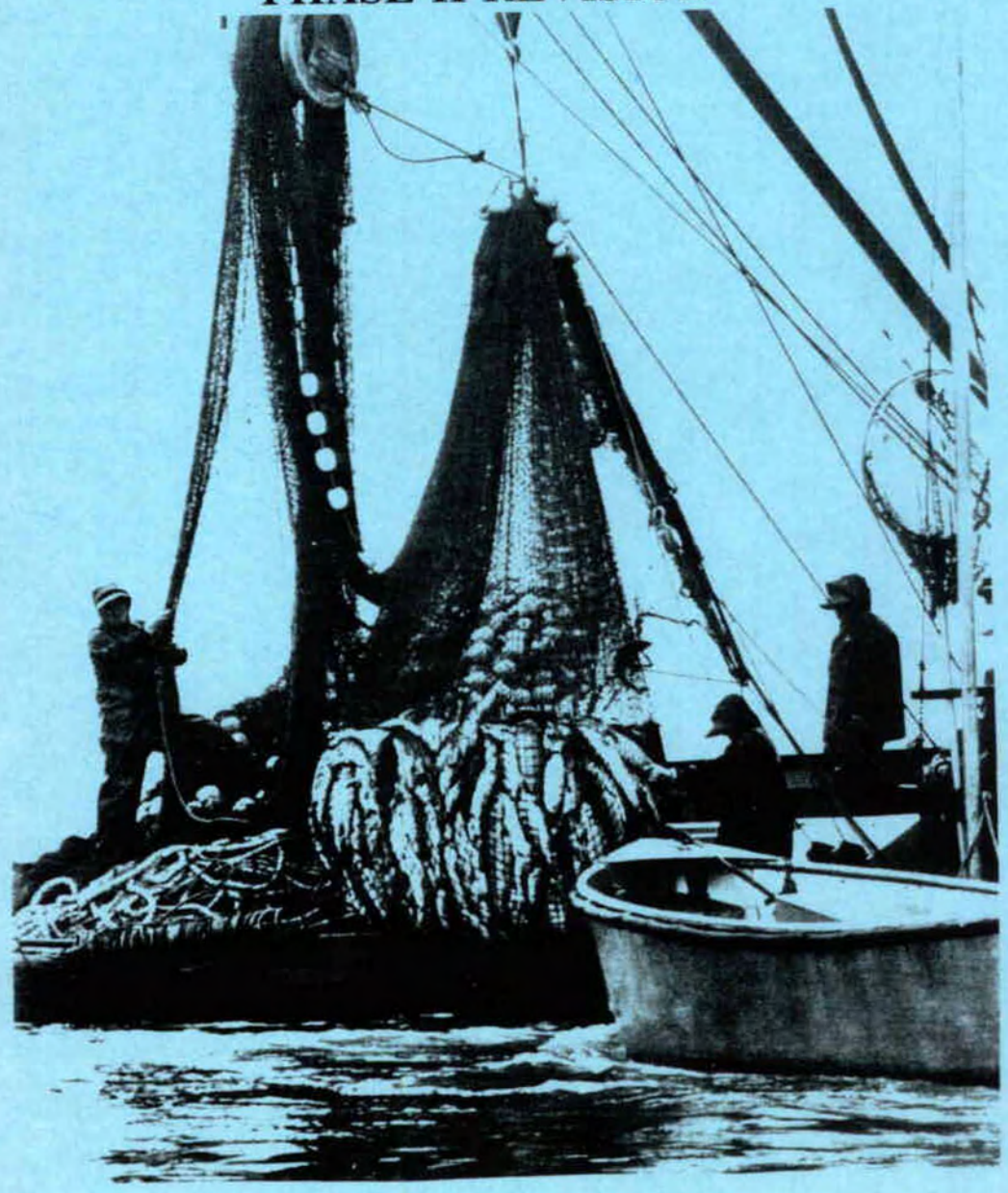
KODIAK REGIONAL COMPREHENSIVE SALMON PLAN 1982 - 2002 PHASE II REVISION



DEVELOPED BY
KODIAK REGIONAL PLANNING TEAM
MARCH 1992

STATE OF ALASKA

WALTER J. HICKEL, GOVERNOR

DEPARTMENT OF FISH AND GAME

OFFICE OF THE COMMISSIONER

P.O. BOX 3-2000
JUNEAU, ALASKA 99802-2000
PHONE: (907) 465-4100

April 27, 1992

Kodiak Regional Planning Team (KRPT)
P.O. Box 3407
Kodiak, AK 99615

Dear KRPT Members:

This letter is to officially inform KRPT members of my approval of the Kodiak Regional Comprehensive Salmon Plan 1982-2002, Phase II Revision. In compliance with Alaska Statute 16.10.375, the KRPT distributed a public review draft of the revised plan (December 6, 1991), solicited public comments on the proposed revisions through published notices in the local newspaper (Kodiak Mirror, December 3 and 30, 1991), and scheduled a KRPT meeting in Kodiak (January 8, 1992) to address public concerns and questions. The revised plan was also subjected to thorough technical reviews by Kodiak regional staff members from each of the fisheries divisions (i.e., Commercial Fisheries, Sport Fish, and Fisheries Rehabilitation, Enhancement and Development [FRED]) of the Alaska Department of Fish and Game (ADF&G) as well as staff members of the Kodiak Regional Aquaculture Association (KRAA) and the U.S. Fish and Wildlife Service, Kodiak National Wildlife Refuge. Accordingly, I am confident that the KRPT has been responsive to the comments and suggestions resulting from this thorough review process.

Based on the efforts of the KRPT in preparing this revision and comments I have received on the quality of those efforts, I believe a viable and responsible document has been produced that will further refine the goals, objectives, and strategies reflected in both the Phase I (approved on April 13, 1984) and Phase II plans (approved on September 15, 1987). Therefore, I offer my congratulations and appreciation to you and all members of the team for cooperating with the department and me in producing a truly comprehensive salmon plan for the Kodiak region.

Sincerely,

Carl L. Rosier

Carl L. Rosier
Commissioner

cc: ADF&G Division Directors

11-K2LH

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EXECUTIVE SUMMARY

Kodiak's salmon fishery is at a crossroad. In the face of budget cutbacks, growing regional and international competition for salmon markets, and an uncertain future for Kodiak pink salmon, there has never been a better time for all user groups to work together to strengthen the salmon industry of Kodiak Island.

In the Phase I comprehensive plan, the Kodiak Regional Planning Team (KRPT) provided a framework for improving salmon stocks over the next 20 years by setting harvest goals, objectives, and strategies by species. In the Phase II comprehensive plan, short-term projects were identified according to management district, strategy, and species. The RPT planning process also provides an ongoing forum to exchange diverse points of view regarding the enhancement and rehabilitation of salmon in the region.

In 1990, the KRPT began the Phase II Revision of the comprehensive plan because (1) realization of initial goals and objectives for some species, (2) increase in fisheries (management and biological) data, and (3) changes in project priorities. This 1992 edition represents the current status of the comprehensive salmon planning process for the Kodiak region.

CHAPTER 1

INTRODUCTION

The Kodiak Regional Comprehensive Salmon Plan represents an on-going process of identifying salmon escapement and production goals for the Kodiak salmon management region, which includes the Kodiak Island Archipelago and the southern and eastern slopes of the Alaska Peninsula from Cape Douglas to the southern entrance of Imuya Bay near Kilokak Rocks (Figure 1). Kodiak and Afognak Islands have over 1,000 miles of coastline, numerous lakes, and 348 designated anadromous fish streams. The Kodiak region is home to all five species of salmon, steelhead, rainbow trout, Dolly Varden char, and numerous species of marine fish. Most of the area is located within the Kodiak National Wildlife Refuge, Alaska Peninsula Wildlife Refuge, Katmai National Park, and private landholdings.

The 19-year average annual harvest (1970-88) is 10.6 million salmon. The total harvest in 1988 was 18.6 million salmon. Harvest data for these periods, including contributions by species and the overall increase in 1988 over that for the 19-year annual average, are provided in Table 1.

Table 1. Average annual harvest of salmon for 1970-1988, contribution (%) by species, 1988 harvest, and percent increase in 1988 harvest over that for the 1970-1988 period.[a]

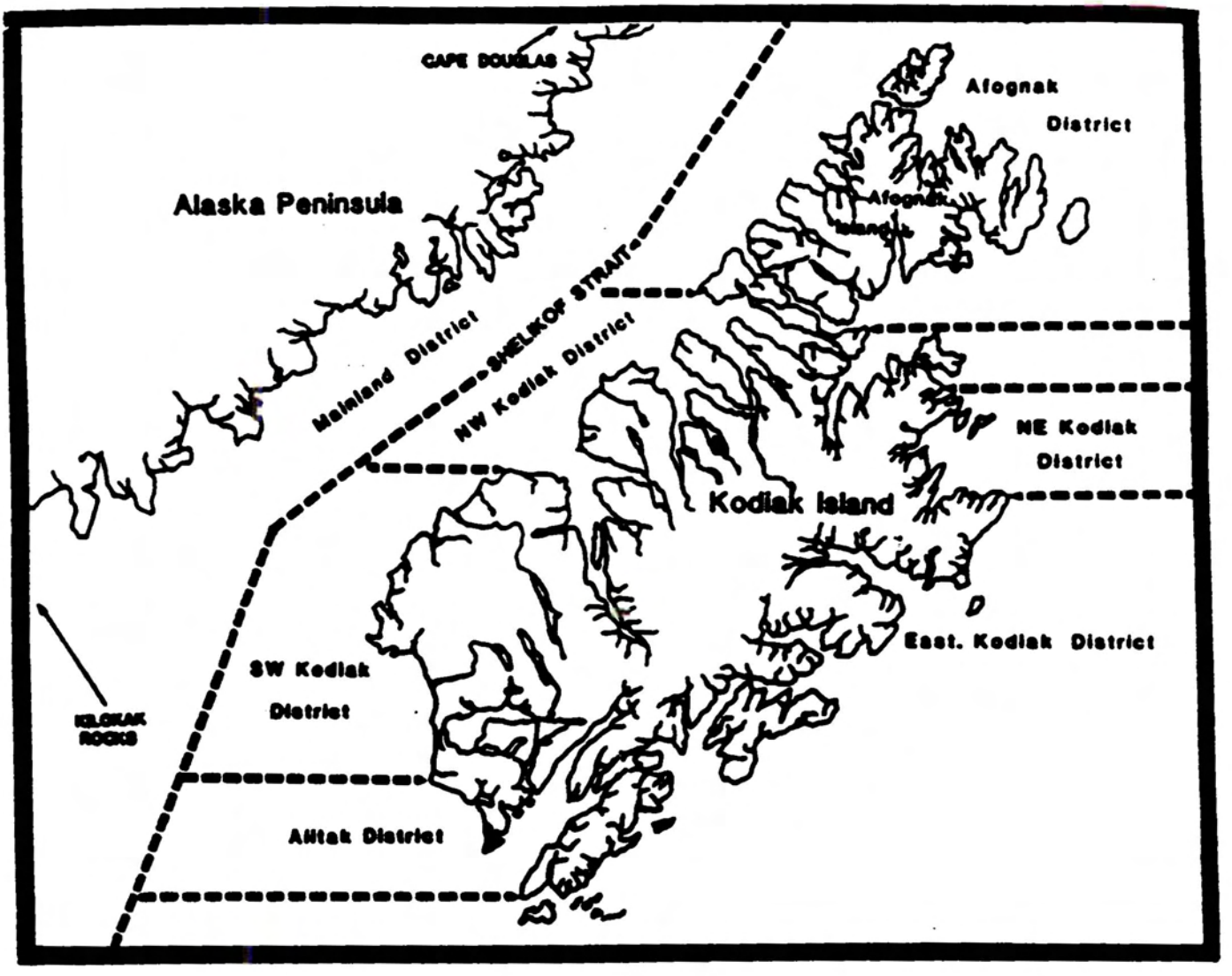
Species	1970-1988 Annual Average Harvest	% Harvest Contribution	1988 Harvest	% Increase
Pink	8,300,000	78.4%	14,200,000	71%
Sockeye	1,300,000	12.3%	2,700,000	108%
Chum	860,000	8.1%	1,400,000	63%
Coho	120,000	1.2%	300,000	147%
Chinook	3,000	0.0%[b]	20,000	539%
Total	10,583,000	100.0%	18,620,000	75%

[a] harvest numbers are approximate (i.e., rounded to the nearest 100,000 for pinks and sockeyes, 10,000 for chums and cohos, and 1,000 for chinook.

[b] harvest contribution was 0.03%.

The 1988 total harvest of 18,620,000 and escapements (actual & indexed) totaling 4,711,000 equal an indexed total return of 23,331,000 salmon for all species combined. The total 1988 harvest was 76% higher (i.e., 8,037,000 fish) than that for the 19-year annual average (Table 1). The commercial value of the 1988 Kodiak area salmon harvest was approximately $94.0 million. Sockeye salmon accounted for $41.9 million of that value (Source: Alaska Department of Fish and Game, Kodiak Area Salmon Management Report to the Alaska Board of Fisheries, 1988). Commercial Fisheries Entry Commission data indicated that of the 600 gear permits issued (380 purse seine, 32 beach seine, 188 set gillnet), 524 were utilized in 1988: 323 purse seine, 21 beach seine, and 180 set gillnet.

Figure 1. Kodiak Salmon Management Region



Authority for the Writing of the Phase II Plan

The Commissioner of the Alaska Department of Fish and Game (ADF&G), in accordance with Alaska Statutes 16.10.375-470, has designated salmon production regions throughout the state. In each region, the Commissioner is responsible for the development and amendment of a comprehensive salmon production plan. The Commissioner has placed this responsibility with regional planning teams (RPTs) that statutorily consist of representatives from ADF&G and the regional aquaculture associations. The mission of the RPTs is to plan for the long-term future of the salmon resource within its region by initiating and continuing an orderly process that examines the full potential of the region's salmon production capacity. The RPT is the only legislatively mandated planning group with ADF&G and private sector participation. Alaska statutes define certain duties of the RPT as follows:

1. Plan development and amendment;
2. Review of private nonprofit (PNP) hatchery permit applications and recommendations to the Commissioner;
3. Review and comment on proposed permit suspensions or revocations by the Commissioner.

Creation of the Kodiak Regional Aquaculture Association

The Kodiak Regional Aquaculture Association (KRAA) was officially approved by the Commissioner of ADF&G on June 17, 1983. The main purpose of the association is to provide public and user-group assistance in the process of enhancing salmon production through the RPT planning process and its own enhancement efforts. In 1985 KRAA received a $100,000 grant from the Alaska Department of Commerce and Economic Development for organizational and planning purposes.

A regular exchange of information, discussion of objectives, and active cooperation between the association, RPT, affected land managers, and various divisions of ADF&G is possible with this planning effort. The actual comprehensive salmon plan consists of two phases: Phase I sets the goals, objectives, and strategies for the area; and Phase II identifies potential projects and establishes criteria for evaluating the enhancement and rehabilitation potentials of the salmon resource. While 20 years is a reasonable amount of time to consider long-term salmon production planning, experience has indicated a necessity for updating the plan on an annual basis.

Background of the Kodiak Comprehensive Salmon Plan

The Kodiak Regional Comprehensive Salmon Plan, 1982-2002 Phase I was approved by the Commissioner of ADF&G on April 13, 1984. Phase I identified the geographic planning area, provided a socioeconomic overview of the region, and documented the fishery status from an historical perspective. It also established long-range goals and objectives to be achieved during the 20-year life of the plan; however, in as much as the 1992 goals for pink and sockeye salmon

were met during 1985 and returns of coho and chum salmon have been at all-time highs, it became necessary to reevaluate those intial goals and objective through the Phase II planning process. In 1986 the KRPT established a species prioritization for the Phase II plan that are ranked as follows: (1) sockeye, (2) coho, (3) chum, (4) pink, and (5) chinook salmon.

Phase I Survey Results:

To gather data for the Phase I plan, KRPT conducted a public involvement program. In February 1983, they mailed questionnaires to commercial (including crew members), subsistence, and sport fishermen in the Kodiak region. The purpose of this questionnaire was to obtain a representative sample of (1) the preferred fish to catch for each group, (2) problems each group was currently encountering, and (3) the preferred methods of fisheries rehabilitation and enhancement. A total of 600 questionnaires were sent to Area K permit holders.

The RPT received 214 (36%) responses. Major findings indicated (1) most respondents were not satisfied with their income, (2) 25 percent were involved in multiple fisheries, and (3) the preferred fish, in descending order, were sockeye and pink salmon; coho and chum salmon were equally preferred. Furthermore, the majority of respondents asked for more sockeye salmon enhancement projects in the Alitak and Southwest Kodiak Districts and pink salmon in the Northeast Kodiak District. To increase runs in these areas, fishermen preferred the stocking of unproductive lakes and associated fertilization techniques. The construction of more hatcheries appeared to be the least preferred method of enhancing the fisheries. Further information on the results of this questionnaire can be found in the Phase I plan.

Phase II Planning:

As part of the Phase II planning process, the RPT again solicited public input on potential rehabilitation and enhancement projects designed to improve the salmon fishery in the Kodiak region. Questionnaires were distributed to all limited-entry permit holders (599 mailed, 5% returned) and processors (11 mailed, 9% returned); representative samples of subsistence fishing permit holders (152 mailed, 8.5% returned) and sport fish license holders (486 mailed, 4.3% returned) in the area were sent questionnaires as well. Respondents generally indicated strong support for the salmon planning process conducted by KRPT. Additional public input was gathered through informal surveys conducted at the local docks and from meetings called to discuss the planning process.

Budgetary Constraints for Phase II:

The recent worldwide shift to lower prices for crude oil has resulted in a dramatic decline in revenues used to fund Alaska's capital and operating budgets. This decline in state revenue may mean that many programs already underway or soon scheduled to begin may have to be eliminated altogether. Only the most important functions and needs of government may be funded in the years ahead. Therefore, budgetary constraints were considered as KRPT identified and prioritized future fishery rehabilitation and enhancement projects in this Phase II plan.

Participants in the fishery should also realize that some of the projects identified in the plan may never be implemented because of a lack of funding. Never before in the Kodiak area has the need for a strong, active regional aquaculture association been more important. The KRAA has recognized this and stepped forward to fill the fiscal gap through cooperatively supporting enhancement projects with ADF&G or totally supporting facilities and programs that had been nearly lost to Kodiak fishermen through budget cuts by the state.

The KRPT will continue to meet at least once a year to update the comprehensive plan. These updates include the identification of new projects and an assessment of progress of ongoing projects toward achievement of their goals and objectives. This updating and annual reporting process will involve the RPT, KRAA, and implementing agencies. The RPT will continuously seek information from various user groups and the public on new recommendations for salmon rehabilitation and enhancement projects and programs. This information will be included as part of the annual report to the Commissioner of ADF&G.

Benefits to the Gear Groups

One of the primary goals of the Phase I plan was to improve the salmon fishery over a 20-year period. A requisite assumption to any project prioritization planning accomplished by KRPT was to identify projects that would benefit as many of the fishing user groups as possible. The selection of projects was based on the KRPT's knowledge of the fisheries and on information obtained from questionnaires.

Brief narratives of the benefits to each of the user groups follow. These benefits are based on the needs expressed by the groups during the Phase I planning process. The reader is encouraged to refer to that plan for additional background.

Salmon Purse Seine:

Between 1975 and 1983, salmon provided approximately 31 percent of the total earnings from the Kodiak regional fisheries (Manthey 1984), and the purse seine fleet harvested 75 percent (range = 65% to 85%) of the salmon. In 1988, approximately 60 percent of the active commercial salmon permit holders were purse seine operators. Purse seine operations occur throughout the area. The Alitak Bay, Red River, Southwest Kodiak, and Uganik Bay Districts are important seining areas because of strong sockeye and pinks salmon runs. Kitoi Bay, Afognak District, and the Cape Igvak section of Mainland District are also important seining areas. A majority of purse seiners fish the Northwest Kodiak District. The most recent survey indicates that purse seine fishermen would like more enhancement programs developed in the Alitak Bay, Northwest Kodiak, and Southwest Kodiak Districts.

Sockeye salmon projects underway at Frazer and Karluk Lakes are already showing signs of improved salmon production. Purse seiners would also like to see more sockeye enhancement projects in districts located at the northern end of Kodiak Island. Such projects might alleviate pressure on the major sockeye systems to the south by spreading out the effort area wide.

Pink salmon enhancement programs continue to do very well in the Kodiak area. For example, during 1985 Kitoi Bay Hatchery contributed approximately 3.4 million pinks to the harvest in what was an exceptional year.

Set Gillnet and Beach Seine:

Gillnet salmon permit holders account for approximately 30 percent of the total commercial salmon permits in Kodiak region; beach seiners for about five percent. Gillnet sites are mainly concentrated on the west side and part of the south end of Kodiak Island (Figure 2). Gillnet sites are often spaced every 900 feet along the shoreline. Beach seiners are permitted to fish area wide, except for a set-net-only area on the south end of Kodiak Island. While timing of the different stocks varies, all five species of salmon are taken in the Kodiak Management Area, and fall coho salmon runs are increasingly sought.

A majority of setnet sites in the Kodiak management area are located within the Kodiak National Wildlife Refuge. While the construction of salmon hatcheries in the refuge is restricted, other types of enhancement programs may be allowed on a case-by-case basis. The Karluk Lake fertilization program is an example. As sockeye salmon runs begin to grow to levels approaching reasonable harvest numbers, gillnet groups harvesting sockeye salmon bound for the Karluk Lake/River system will benefit. Salmon enhancement efforts identified in the Phase II plan, such as fish pass construction and fertilization projects, should also benefit the less mobile gear groups. A fair and proportionate distribution of salmon to these groups from both natural and supplemental production is a goal that the KRPT hopes to achieve with the projects recommended in Phase II.

Sport Fishermen:

Most of the effort by sport fishermen and the highest catches continue to occur in waters adjacent to the Kodiak road system. The principal areas fished include the Buskin (including the beach), Pasagshak, American, Olds, and Saltry Rivers. Results from the 1983 KRPT questionnaire sent to sport fishermen showed coho salmon to be the preferred sport fish species; however, the preferred enhancement species (ranked according to preference) were (1) chinook, (2) coho, and (3) sockeye salmon. Sport fishermen furthermore desired reductions in overcrowding on the fishing grounds; they also continue to support the lake-stocking and enhancement programs. Of growing concern among this group is the question of guaranteed access to traditional sport fishing areas. Since passage of the Alaska Native Claims Settlement Act (ANCSA) in 1971 and the Alaska National Interest Lands Conservation Act (ANILCA) of 1980, access disputes between fishermen and native land owners are on the rise. The question of guaranteed access to fishing sites could take several years to resolve. The ADF&G Sport Fish Division is projecting several projects by 1994. These include improvements in access at Russian Creek; potential land acquisition on the Karluk River for "angler" access; the same at Ayakulik River (Ayakulik Lagoon); and boat launch ramp and parking area at Woman's Bay near the Coast Guard Base.

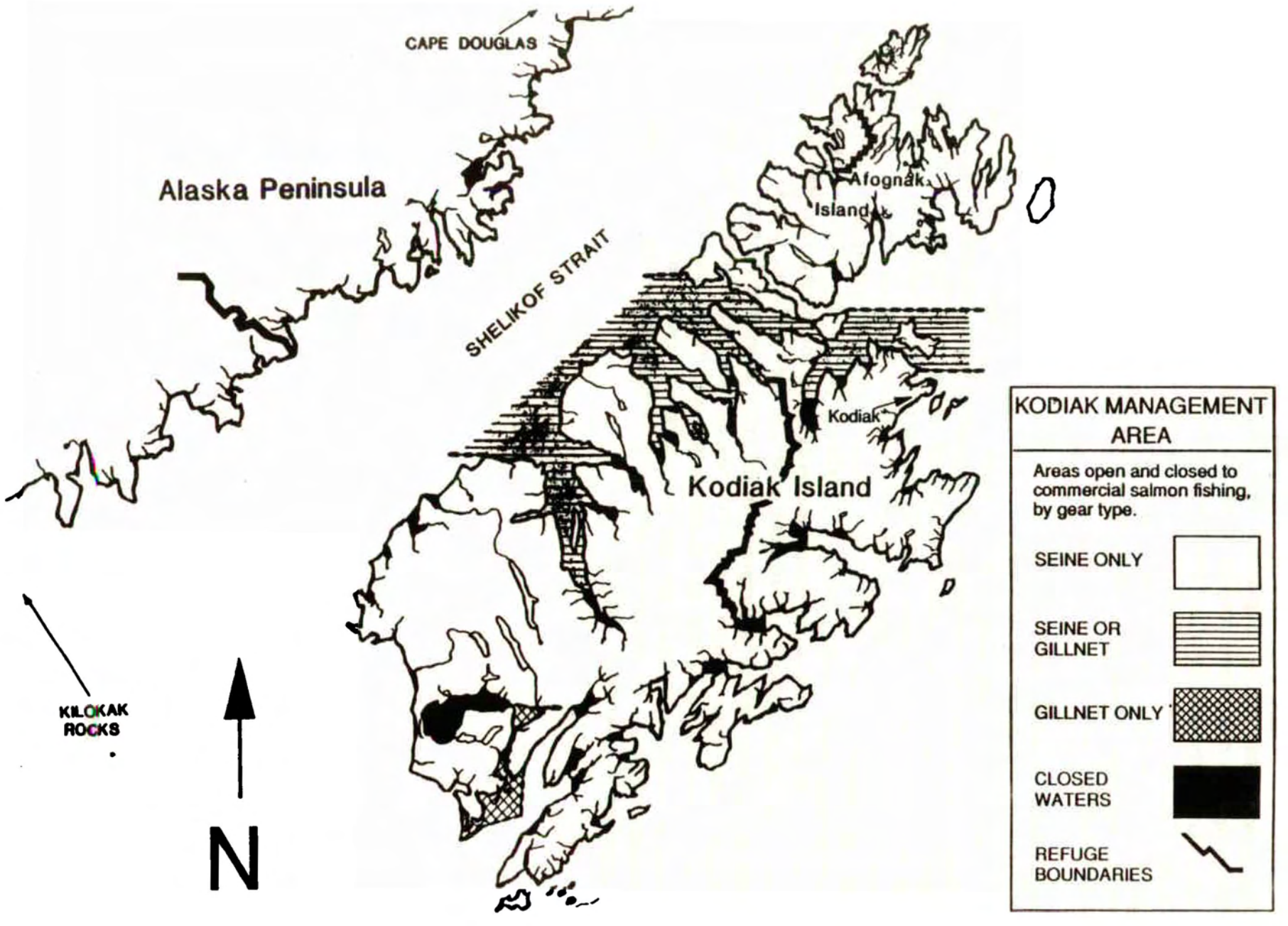


Figure 2. Areas open and closed to commercial salmon fishing by gear type in the Kodiak management area.

The spawning and rearing programs at Kitoi Bay Hatchery will continue to benefit sport fishermen, and coho salmon fry will be stocked annually in lakes and ponds along the road system to enhance sport fishing opportunities and to reduce sport fishing pressure on local wild stocks. During 1989, 700,000 coho salmon fry were produced for stocking at 12 locations. According to the Kitoi Hatchery 5-year plan, 1.4 million coho salmon eggs will be taken in 1994 for the lake-stocking program; a total return of 25,000 fish is anticipated (24,000 for harvest and 1,000 for brood stock).

Subsistence/Personal Use:

Subsistence and personal needs in the Kodiak Island area are met by several direct and indirect means. Management and enhancement activities at Port Lions, Ouzinkie, Afognak lake, Buskin Lake, and Karluk Lake have affected subsistence catches there. Subsistence needs were met at the village of Ouzinkie by planting 22,000 coho salmon fry from Kitoi Bay Hatchery into two small nearby lakes. This enhancement activity, which occurred in 1987 and 1988, resulted in the establishment of a self-sustaining run. At the village of Port Lions, an ongoing coho salmon lake-stocking project provides between 125,000 and 240,000 fry to nearby barren lakes each year. In 1991 nearly all of the subsistence needs of the community were realized when 5,000 adult coho salmon returned. Lake fertilization activities at Karluk and Afognak Lakes may indirectly increase harvest opportunities for the areas subsistence fishermen. The Buskin and Afognak Lakes sockey salmon runs are the most important contributors to resident subsistence fishermen who use the Kodiak road system for access to fishing areas. These runs are actively managed through weir escapement data and emergency closings and openings to provide for subsistence needs. A historic harvest summary of the Kodiak area's subsistence salmon fisheries is provided in Appendix A, Table 5.

CHAPTER 2

LONG-TERM OPPORTUNITIES (1982-2002)

Phase I Goals and Objectives

To achieve the overall goal of improved fisheries over the next 20 years, three major sub-goals were identified in Phase I: (1) Production/Harvest Goals, (2) research and Data-Gathering Goals, and (3) policy/Management Goals.

Production/Harvest Goals

The long-term harvest goals for odd and even years for 2002 are 31.0 and 26.0 million fish, respectively. With strong habitat protection measures and continued implementation of enhancement projects, increases in salmon production over the life of the plan should support an increase in annual harvests in both the even and odd years (Table 2). To express the number of salmon available for harvest by the user groups, production and harvest goals have been identified for the years 1992 and 2002 (Table 3). Future enhancement of the stocks will occur through implementation of projects identified for each district over the life of the plan. Depending on the enhancement strategies and their successes, the short-term harvest goals for 1992 are 15.6 million fish in even years and 10.6 million fish in odd years.

Table 2. Total projected harvest for 2002.

Species	Even Year	Odd Year
Pink Salmon	24,000,000	19,000,000
Sockeye Salmon	4,400,000	4,400,000
Chum Salmon	2,000,000	2,000,000
Coho Salmon	543,000	543,000
Chinook Salmon	15,000	15,000
	30,958,000	25,958,000

Research and Information Goals

Efforts to improve the quality and quantity of information required for more efficient salmon harvests in the Kodiak region will depend on the strategies undertaken over the next 20 years. Additional surveys of salmon habitat to determine the extent of available spawning

Table 3. Kodiak Comprehensive Salmon Plan 1982-2002: Harvest objectives for years 1992 and 2002[a].

		OBJECTIVES 1992	OBJECTIVES 2002
		Sockeye	
Natural		1,000,000	2,700,000
Supplemental			1,700,000
Goal		**1,000,000**	**4,400,000**
1980-85 average commercial harvest: 1,362,000			
		Coho	
Natural		120,000	161,000
Supplemental		2,000	383,000
Goal		**122,000**	**544,000**
1980-85 average commercial harvest: 213,000			
		Chum	
Natural		900,000	900,000
Supplemental		67,000	1,100,000
Goal		**967,000**	**2,000,000**
1980-85 average commercial harvest: 957,000			
		Pink	
Natural	odd year	6,200,000	7,500,000
	even year	11,200,000	12,600,000
Supplemental	odd year	2,390,000	11,500,000
	even year	2,390,000	11,500,000
Goal	**odd year**	**8,590,000**	**19,000,000**
	even year	**13,590,000**	**24,100,000**
1980-85 odd-year average commercial harvest: 7,425,000			
1980-85 even-year average commercial harvest: 12,070,000			
		Chinook	
Natural		3,000	12,000
Supplemental		1,000	3,000
Goal		**4,000**	**15,000**
1980-85 average commercial harvest: 2,833			

[a] Assumptions in Chapter 6 of Phase I Salmon Plan Kodiak; the difference between the target harvest and the harvest resulting from natural production is the GAP; the goal is a figure that must be sustained at least over a 5-year period.

and rearing areas need to be done, and stream escapement monitoring should be expanded throughout the region. A better understanding of harvest pressures will occur with an expansion of stock separation studies. These methods may not directly result in more salmon in the short-term, but they are very important to the overall long-term health of the stocks.

Objectives to better meet these goals have already been identified in the Phase I plan (see Section 6.3). The scope of these objectives are expanded through the Phase II plan to identify candidates for an effective stream rehabilitation program. Survey and inventory work will include evaluation of stream rehabilitation potentials. The KRPT has recently identified a key objective: increase limnological studies and research aimed at increasing the knowledge of the region's lakes as potential rearing habitat for sockeye salmon.

Current projects such as the Karluk Lake fertilization program, if successful, will serve as the model for future studies under these objectives. A top priority for all research and evaluation objectives will be to collect data that assists in determining the optimum carrying capacity of a system and its escapement goals.

Recently, there has been a concerted effort by the Kodiak area FRED and Commercial Fisheries Divisions staff to identify and quantify potential lake systems suitable for enhancement or rehabilitation on Kodiak and Afognak Islands. Through the collection of fisheries and limnological data, over 20 lake systems have been identified as having fry stocking potential or needing analysis on current or potential production (see Appendix A: Table 5).

Implementation of all sockeye salmon stocking projects would require from 23 to 45 million fry[1] annually. During the initial phases of enhancement, Spiridon Lake (now barren) would require from 4 to 8 million fry; after 4 years of evaluation it may reach 11 million fry. In certain cases, lake fertilization techniques may also be used to further increase sockeye salmon production. The KRPT also recognizes the importance of coordinating with various local, state, and federal agencies in an effort to increase the amount of information on incidental high-seas salmon harvests occurring in Alaska waters. Recently, the legislature funded an on-board observer program that will better ensure compliance of high-seas commercial fishing operations with by-catch regulations, indicating that positive steps are being taken to close this management data gap.

Policy/Management Goals

The KRPT will continue to update the plan using specific criteria to address changing goals and objectives (see Chapter 5). This will require strong public participation in the salmon planning and project implementation processes throughout the life of the plan to better ensure an equal and just distribution of the economic benefits resulting from the projects.

---

[1] based on euphotic volume calculations through 1991.

The salmon species presented in Table 3 are arranged in order of enhancement priorities; their respective 1992 objectives and 2002 goals are provided. Harvest averages from 1980 to 1985 are also provide to assess the status of the goals and objectives. In the 1992 updating of the comprehensive plan, the targeted harvest goals were examined in the context of known projects and their production potentials (Table 4). Although the supplemental production goals are considerable, the KRP felt they were achievable in the long term. The GAPs identified in Table 4 represent the differences between the targeted goals for 2002 and cureen natural and supplemental production by species.

Achieving Goals by 2002

Three strategies that will be undertaken to close the GAP by the year 2002 are (1) research and improved management, (2) enhancement and rehabilitation, and (3) habitat protection. Strategies will vary according to the unique characteristics of a species, site features, and governing land uses.

Research and Improved Management:

ADF&G fishery resource managers in Kodiak will work to increase the numbers of natural salmon stocks for harvest as well as maintain the brood stock population at a level that will maximize increased production. To achieve goals established within this plan without causing adverse impacts to the wild runs, supplemental salmon programs will be developed to produce more salmon on a sustained-yield basis.

Table 4. Supplemental salmon production necessary to meet desired 2002 GAP.

Species	Target Goal	Natural Runs	Supplemental Production	Total GAP
Pink				
odd year[a]	19,000,000	7,500,000	11,500,000	--
even year[a]	24,000,000	12,000,000	11,500,000	500,000
Sockeye	4,400,000	2,700,000		1,700,000
Chum	2,000,000	900,000		1,100,000
Coho	543,000	161,000		382,000
Chinook	15,000	12,000		3,000
Total catch:				
odd years	25,958,000	11,273,000	11,500,000	8,685,000
even years	30,958,000	15,773,000	11,5000,000	9,185,000

[a] pink salmon only.

A number of management programs already exist to increase salmon harvests beyond their present levels, while carefully providing for optimal escapements. Regulatory management plans are prepared for complex, mixed-stock fisheries; these plan are updated and reviewed through the Board of Fisheries process. Based on projected returns, harvest management strategies are updated and reviewed annually to implement those regulatory plans. To avoid undue hardship to longstanding historic fisheries, ADF&G, Commercial Fisheries staff manage the fisheries on a single-stock basis as much as possible.

It is difficult to achieve desired escapement goals when there is insufficient knowledge of run strengths, timing, run composition, and stream escapements. Improvements in these areas over the life of this plan are expected to complement management opportunities identified in the next chapter.

Enhancement and Rehabilitation:

Outstanding region-wide successes have been documented for some systems. Enhancement involves the building of salmon stocks to production levels beyond their former capabilities. Methods for achieving these production levels include (1) artificial or semiartificial production systems (e.g., hatcheries or fish passes), (2) increasing the physical productivity of an area (e.g., lake fertilization projects), or (3) egg-planting and rearing programs. Rehabilitation strategies apply to depressed natural stocks and attempts to increase run sizes of these fish to their former historical levels.

Habitat Protection

The success of this comprehensive salmon plan for the Kodiak region will depend on the level and quality of the area's habitat protection. Several key state and federal regulatory agencies exist to better ensure such protection. Besides the important work performed by ADF&G Habitat Division, the roles the Alaska Department of Natural Resources (DNR) and the U.S. Environmental Protection Agency plays in maintaining water quality and protecting salmon-producing systems from point and nonpoint source pollution is critical. In addition, since a large percentage of the region's lands are under the jurisdiction of the U.S. Department of Interior (USFWS & NPS), the planning nprocess also relies on federal mandates for protection of fishery resource habitat on those lands. Without aggressive enforcement of state water quality standards by the Department of Environmental Conservation (DEC), salmon production in the Kodiak planning area would probably be reduced over time by siltation from logging activities, land clearing and road construction and by pollution from improperly constructed septic systems, mining, and a variety of industrial activities. Loss of critical salmon spawning and rearing area to developments such as logging, subdivisions, and hydroelectric projects or the pollution of anadromous streams through indifferent industrial activities must not be permitted.

The DNR plays an important role in the long-term management of salmon habitat by regulating the allocation of fresh water and the use and disposal of state lands. A significant percentage of the flow of several salmon-producing streams on Kodiak have either been allocated or will

be allocated for out-of-stream uses; for example, industrial water or hydroelectrical systems. The KRPT recognizes the problem that increasing demands for out-of-stream uses place on producing salmon streams. In future revisions to this plan, KRPT will be looking at necessary mitigative steps to reserve instream flow rates in order to ensure the long-term protection of salmon habitat.

During the course of the writing of the Phase II, the KRPT has received strong public comment relative to the need for increased enforcement on all lands and waters where new developments affecting the fishery resource occur. To bring about this compliance, the KRPT recognizes and unanimously supports the madatory presence of ADF&G Habitat Division personnel during construction activities impacting the salmon fisheries.

Regional Designation of Natural Salmon Stocks

In any rehabilitation and enhancement program, particularly those involving new hatcheries, the potential for reduction in the genetic variability among wild salmon stocks exists; therefore, it is important that genetic vigor be maintained within the range of natural stocks found in Kodiak waters. These same wild stocks could eventually provide a source of new brood stock for future enhancement programs. The current statewide policy for maintenance of genetic vigor includes the prohibition of artificial production of salmon in designated watershed areas. ADF&G has created strict wild stock protection policies to help safeguard natural salmon stocks (ADF&G 1985). Based on these policies, KRPT will be helping to identify these areas as wild-stock sanctuaries in which no enhancement activity is permitted, except egg collection for brood stock development (ADF&G 1985). Additionally, one of the objectives outlined in the 1991 fishery management plan for the Kodiak National Wildlife Refuge is to establish one or more watersheds to act as fishery gene banks. The ADF&G Fisheries Cover Program is also currently drafting and reviewing a draft "Wild Stock Sanctuaries" policy. The KRPT role in implementing this policy should be determined in 1992.

CHAPTER 3

LONG-TERM STOCK-BUILDING STRATEGIES

This chapter is divided into five sections, with each section addressing the importance of one species of salmon to the Kodiak fisheries as well as their production objectives during the period covered by the plan. Broad regionwide strategies and project descriptions are provided for each management district. The high-priority projects are those that are either ongoing or scheduled for completion in the next five years by ADF&G or KRAA. Low-priority projects will be addressed over the life of the plan. Potential hatchery sites that could be developed by KRAA to augment region-wide production are provided in Appendix A, Table 6.

Sockeye Salmon

The 1992 harvest objective for sockeye salmon in the Kodiak management area is to increase the natural runs to a level that provides an annual harvest of 1.0 million fish (natural stocks, including production from Frazer Lake and Afognak Island fishpasses and the Karluk Rehabilitation Project). During the 1988 season, this goal was surpassed with 2.7 million sockeye salmon harvested from natural runs. The 1970-1988 average sockeye harvest was 1.4 million.

To achieve the annual harvest objectives for sockeye salmon (4.4 million) by the year 2002, an additional 3 million fish must be produced. Strategies to help accomplish this include current management techniques and innovative enhancement programs. Sockeye enhancement technology in Alaska is rapidly moving ahead. Development of improved aquaculture techniques over the past several years has dramatically lessened the incidence of IHN epizootics (Figure 3). New opportunities (e.g., Pillar Creek Hatchery) will provide much-needed local data on advanced hatchery techniques for sockeye production. This hatchery will further serve as an educational tool in instructing students enrolled in fisheries courses at the Kodiak Community College and High School.

There is also the possibility of developing a zero-check smolt program at Kitoi Hatchery. One program method involves under-yearling smolt, or juvenile sockeye salmon that normally migrate to sea as smolts after rearing in freshwater lakes for two or three months. The occurrence of sockeye smolts migrating to sea as under-yearlings or age-0 is not common, but it has been documented at several locations in Alaska and British Columbia. Rapid growth of under-yearling sockeye in estuaries has been observed, and age-0 smolt growth has been nearly equivalent to a year's growth in fresh water.

Successes in sockeye enhancement and rehabilitation programs during the next ten years will largely depend on limnological studies that will increase understanding of the carrying capacities of lakes. This information will result in informed decisions regarding the initiation or continuation of new lake fertilization programs and lake stocking.

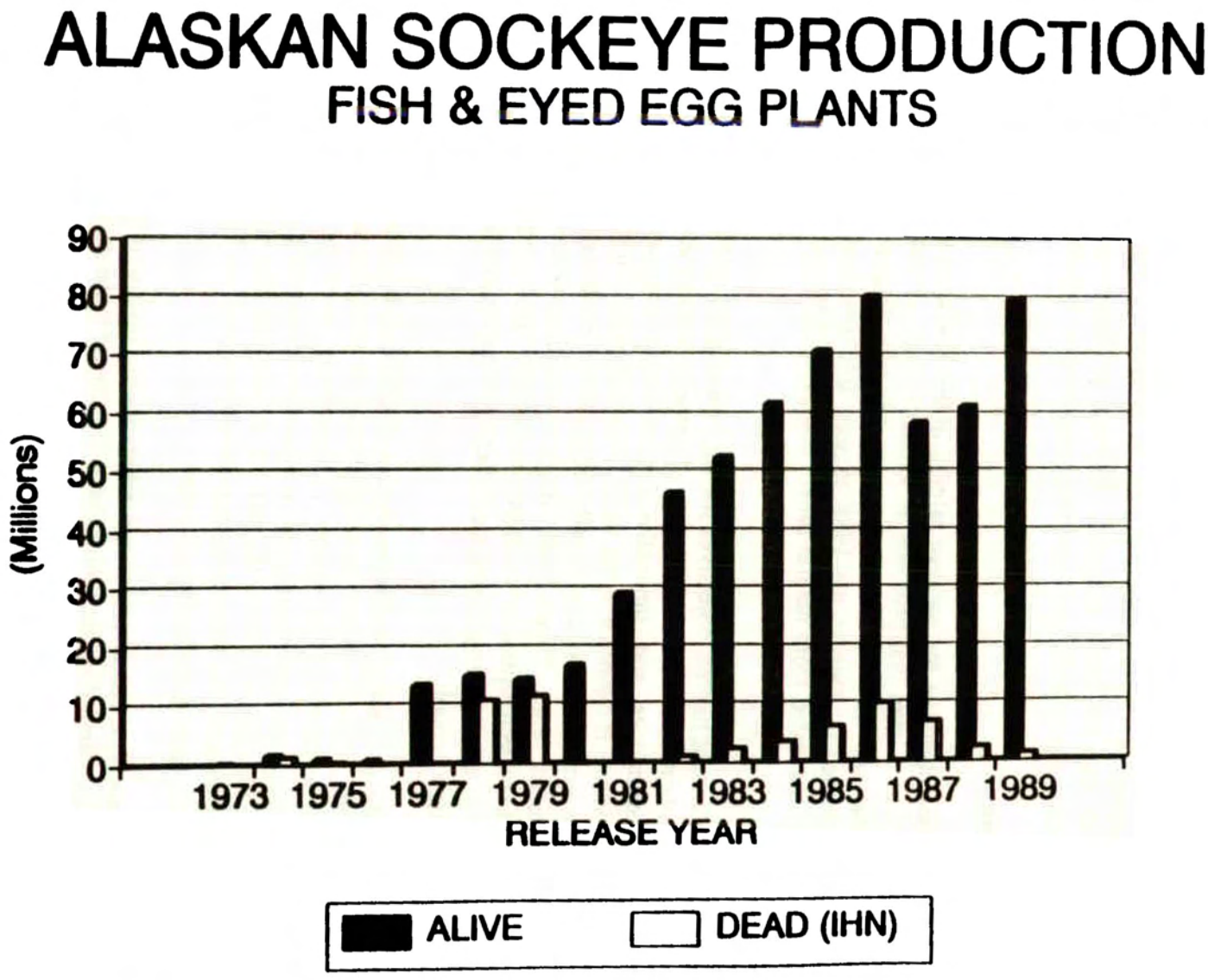


Figure 3. Alaska sockeye salmon production, 1973-1989.

In this 1992 Phase II Revision, KRPT adjusted the natural stock production goal for 2002 to 2.7 million and the supplemental production goal to 1.7 million, for a total of 4.4 million. This is keeping within KRPT's intent of periodically reviewing and updating the plan. Lake fertilization opportunities will complement other enhancement strategies, such as fishpass construction, sockeye incubation, and stream clearance projects. The majority of the sockeye salmon harvested on the west side of Kodiak Island are produced by four major systems: Karluk, Red River, Frazer, and Upper Station. These stocks remain close to shore during their return to natal streams and are harvested in the fixed-gear (set gillnet) or purse seine fisheries. Surplus sockeye salmon are also harvested from minor systems around the Afognak and Eastsiude Kodiak districts.

Kodiak's sockeye stocks are primarily managed by achieving interim escapement goals. The Cape Igvak and North Shelikof fisheries are managed according to management plans that have been approved by the Board of Fisheries. Moreover, the management strategies maintain an adequate population of salmon for acceptable harvest and escapement during most years.

Overall Opportunities in the Region:

While the regional sockeye salmon opportunities (Table 5) presented here are expected to raise overall harvest potentials, they are also intended to safeguard the natural populations. Opportunities aimed at increasing the numbers of sockeye salmon in the Kodiak management area will receive KRPT's highest priority in the Phase II plan. Major sockeye-producing systems will continue to receive priority management status in a predominately mixed-stock fishery. Management plans have already been developed to address escapement goals as well as the fisheries that will probably be affected by them. Stock separation and timing studies to improve in-season management of mixed stocks will have a low priority in this plan. It will be the primary responsibility of ADF&G Division of Commercial Fisheries.

Rehabilitation and Enhancement. High priority opportunities include (1) prioritized candidates for lake investigations that include but are not limited to the following: Afognak, Spiridon Uyak, Malina (two lakes), Miam, Sitkalidak[2], Akalura, Crescent system, Pauls system, Little River, Uganik, Hidden, Portage, Barabara, Kitoi area lakes, Red Fox Bay, Big Waterfall, Little Waterfall, and Buskin. These projects will be pursued according to the priorities established by KRPT. Other systems will be investigated as the opportunities arise (see Table 5); (2) research into development of zero-check sockeye salmon smolts and extended saltwater rearing; (3) construction and maintenance of fish ladders; (4) spawning and rearing habitat improvement, including debris removal, spawning channels, lake fertilization, and fry plants; and (5) extended freshwater rearing of sockey salmon.

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[2] recently investigated and determined not to have enhancement potential.

Table 5. Long-term sockeye salmon projects for Kodiak area by management districts.

District	Priority	Projects
Eastside Kodiak		
	High	Saltery Lake weir
	High	Miam/Summit Lake studies
	Low	Pasagshak weir construction
	Low	Pasagshak River spawning area expansion
	Low	Kaguyak, Kaiugnak Lakes
	Low	Sitkinak Lagoon/Lake
	Low	Stream No. 259422
Afognak		
	High	Afognak Lake studies and fertilization
	High	Afognak Fish Passes
	High	Maintain weirs at Litnik, Pauls, Portage, Waterfall, Malina, and Thorsheim systems
	High	Kitoi Bay Sockeye enhancement
	High	Hidden Lake studies/stocking
	High	Laura and Paul Lakes investigations
	High	Portage Lake prefertilization studies
	High	Fertilization/stocking of Upper Malina Lake
	High	Big and Little Waterfall stocking
	High	Jennifer Lake stocking
	High	Big and Little Kitoi Lakes water quality
	Low	Other studies on prioritized systems
Northeast Kodiak		
	High	Pillar Creek Hatchery
	High	Buskin River weir
Alitak		
	High	Dog Salmon, Upper Station, and Akalura River weirs
	High	Upper Station Lake studies
	High	Frazer Lake limnology, fertilization, and fish pass
	High	Akalura Lake investigations
	Low	Horse Marine fish pass
Northwest/Southwest Kodiak		
	High	Ayakulik and Karluk River weirs
	High	Crescent, Barabara, and Uyak studies
	High	Karluk post fertilization and evaluation studies
	High	Spiridon Lake limnological and stocking evaluations
	High	Mush Lake
	High	Uganik River weir
	High	Little River Lake studies
	High	Ayuakulik (Red River) Lake studies
	Low	Browns Lagoon Lake

Habitat Management. Review of activities that result in habitat alterations (e.g., logging, road construction, mining, etc.) is a high priority. The intent of KRPT is to develop and implement measures to minimize impacts on salmon and their respective fisheries.

Opportunities for Afognak District:

Sockeye Salmon habitat improvement opportunities in Afognak District are very good; however, limnological research will be needed before enhancement plans can be implemented. Success in using long-term management and enhancement strategies in this district will depend on close cooperation with local land managers in the public and private sectors and the ability to work toward mutually agreeable resource-base developments.
Programs identified for this district will directly benefit commercial seine, subsistence, and sport fishermen. Fixed-gear fishermen will experience the indirect benefits from a better distribution of fishing pressure, as other user groups move to noncompetitive locations.

High-priority Rehabilitation and Enhancement. (1) Afognak Lake has excellent potential for the enhancement of sockeye salmon; limnological studies need to continue there. (2) The potential for establishing a sockeye stocking program exists at Hidden Lake; initially, adequate conditions for spawning and/or rearing areas need to be substantiated with additional studies. (3) Laura and Pauls Lakes are potential sites for sockeye enhancement projects, and in order to increase harvestable numbers of this introduced sockeye run, limnology and prefertilization studies need to be initiated to generate adequate baseline data for evaluation. Additionally, ongoing projects need to be continued or project potentials investigated on the the following systems: (4) Upper and lower Malina Lakes, (5) Portage Lake, (6) Little Waterfall, (7) Kitoi Hatchery underyearling production, and (8) Kitoi area lakes.

Low-priority Enhancement. Appropriate studies need to be conducted at other lakes identified and prioritized by KRPT to determine the enhancement potential of these sites.

High-priority Habitat Management. All habitat alteration activities operating in the Afognak District should subscribe to state regulations governing these types of practices. The ADF&G Habitat Division should monitor these activities on a regular basis.

High-priority Research and Management. Adequate funding needs to be provided to maintain and operate the salmon weirs located in the Afognak, Pauls, Laura, Portage, and Thorshiem systems.

Opportunities for Northeast Kodiak District:

Programs aimed at increasing the amount of sockeye salmon available for harvest address the needs of commercial fishermen who have responded to the KRPT survey. Pillar Creek Hatchery has the potential to serve as an underyearling production facility for sockeye salmon smolts.

High-priority Rehabilitation and Enhancement. A sockeye salmon hatchery has been constructed at Pillar Creek as a central outstocking facility to produce 20 million fry. It will provide an education opportunity to local schools and potentially generate an annual run of 25,000 sockeye salmon to Monashka Bay through their production of zero-check smolts.

Opportunities for Alitak District:

Realization of opportunities in this district would especially benefit seine gear and gillnet fishermen. Enhancement efforts for sockeye salmon will proceed cautiously. The Kodiak RPT will review each program on a project-by-project basis in order to minimize problems of mixed-stock management. Management of the fishery will be based on the run strength of Frazer and Upper Station; such factors as commingling of stocks and differential rates of return will be considered.

High-priority Research and Management. Detailed lake studies need to be conducted at Upper Station and Akalura Lake to identify specific sockeye salmon rearing potentials and carrying capacities. Adequate funding is needed to maintain and operate the Dog Salmon and Upper Station Weirs.

High-priority Rehabilitation and Enhancement. Funding to maintain and operate the Frazer Lake fishpass will be needed to assure the continued success of the introduced run. Limnology/fertilization projects need continued funding so that high levels of sockeye salmon production can be maintained.

Low-priority Rehabilitation and Enhancement. During low water an existing falls at Horse Marine Bay delays or impedes the passage of sockeye from reaching the spawning areas. A fishpass project would remedy this problem.

Opportunities for Southwest Kodiak District:

User groups have recently begun to experience the benefits from the combined management and rehabilitation efforts of ADF&G. The Karluk Lake fertilization program is a promising method for increasing sockeye salmon production. The ultimate success of these types of programs depends on the continuation of achieving desired escapements, favorable environmental conditions, and continued evaluation.

High-priority Rehabilitation and Enhancement. The rehabilitation project at Karluk Lake will require post-fertilization funding over the life of the project to fully evaluate work conducted there during the years 1985 to 1990.

High-priority Research and Management. Detailed studies of the Ayakulik system will be conducted to determine rearing and spawning capacities. Adequate funding will be needed to maintain and operate the Ayakulik and Karluk River Weirs.

Opportunities for Northwest Kodiak District:

Projects in this district will benefit the set gillnet and seine gear fishermen.

High-priority Research and Management. A weir needs to be maintained on the Uganik system so that better in-season escapement information on the early spring sockeye run as well as pink, chum, and coho runs can be obtained.

Low-priority Research and Management. A weir needs to be developed on the Little River system for the purpose of developing an escapement data base to be utilized along with limnological data to determine the optimal escapement requirements for the system. A more detailed productivity study of Little River Lake is needed to determine the rearing potential of this sockeye system, which presently receives an indexed estimated escapement of between 10,000 and 20,000 fish.

High-priority Rehabilitation and **Enhancement.** The Spirodon Lake project needs to receive continued funding in order to realize full implementatiion and to satisfy the requirements of an environmental assessment prepared by USFWS staff at the Kodiak Refuge. Potential systems to consider for stocking are (1) Port Bailey Lakes, (2) Twin Lakes located at the head of Viekoda Bay, (3) a no-name lake located behind Sally Island in the Northeast Arm of Uganik Bay, (4) a no-name lake located northeast of Spiridon Lake, and (5) Browns Lagoon Lake[3].

Opportunities for Eastside Kodiak District:

High-priority Rehabilitation and Enhancement. Miam/Summit Lakes have been identified by the KRPT as high priority in this category through the sockeye salmon opportunity evaluation process.

High-priority Research and Management. A weir is presently located on Saltery Creek so that ADF&G, Commercial Fisheries staff can obtain escapement data for an often underutilized Eastside sockeye salmon run. Current budget cuts could eliminate the weir. Every effort should be made to maintain this management program by identifying long-term sources of funding.

Low-priority Research and Management. Secondarily funding should be provided to maintain and operate the Pasagshak Weir.

Low-priority Rehabilitation and Enhancement. Spawning area expansion should be investigated in the Pasagshak River system.

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[3] investigated in 1991, this system was determined to have no lake-stocking potential for sockeye salmon.

Coho Salmon

The harvest goal for coho salmon for the year 2002 is 543,000. In 1988, 52 percent of that goal was achieved when 303,000 coho salmon were commercially harvested. The 1988 harvest also surpassed the 1992 harvest goal of 122,0001 coho salmon. Recent information collected by ADF&G biologists indicates that there is growing sport and commercial interests in coho salmon. Prior to 1985, an extended closed period during late August and early September was implemented to protect weak sockeye salmon runs bound for the Karluk River. The Karluk River is also a significant contributor to coho salmon harvests on the "West Side," and this commercial fishing closure sometimes resulted in lost opportunities for harvesting migrating coho salmon. This arrangement between user groups and management staff is a trade-off to ensure that short-term economic objectives do not endanger long-term production goals. Stronger sockeye salmon runs in the past few years have allowed mixed-stock fisheries on coho and sockeye salmon. Escapement data are obtained at the Karluk weir, which has been in the same location since 1976. Although sockeye salmon runs have improved, both coho and sockeye salmon require some protection. More harvests occur on even years because of strong pink salmon returns.

A high degree of coho salmon harvests often eliminate the need for a terminal harvest inside Karluk Lagoon. This kind of management response can be expected to occur more frequently as sockeye salmon runs improve for the various systems throughout the region.

The KRPT recognizes the growing sport fish/commercial interests in coho salmon and has placed added emphasis in the five-year plan on identifying and implementing improved management and rehabilitation/enhancement strategies for them. For example, in 1986 enhancement projects contributed to the sport fish and commercial harvests of coho salmon. Approximately 5,500 fish were attributed to efforts at Kitoi Bay Hatchery, and according to the best available estimates, this figure represents only a fraction of the potential supplemental production that these kinds of programs are capable of producing. With recent advances in lake fertilization technology, the potential for coho salmon enhancement in the region is very good. The Kitoi Bay Hatchery 5-year management plan projects more than 200,000 and 800,000 coho salmon smolts and fingerlings, respectively, will be released Kodiak region-wide annually from 1990 through 1995.

Ninety-six percent of the total commercial harvest of coho salmon in 1985 occurred on the natural stocks returning to the Kodiak Management Area. Coho salmon populations in Chiniak and Monashka Bays (General District) could potentially be overharvested by commercial, sport, and subsistence fishermen because of easy public access.

Coho fingerline plants are one possible technique for increasing the number of coho salmon for all user groups. Since 1986 an average of 85,000 coho fingerlings have been planted in nine lakes flowing into Chiniak Bay. This program has proven to be very effective.

Overall Opportunities for Coho Salmon in the Region:

A prioritized list of long-term coho salmon management, research, rehabilitation, or enhancement projects for the Kodiak region are provided in Table 6.

High-priority Management. It will be necessary to direct coho research efforts over a wide range of systems to gain a better understanding of the area-wide opportunities. Evaluating coho escapement into important producer systems such as Pauls Bay, Paramanof Bay, Saltry Cove, and the Buskin River may be very difficult to achieve in the face of ADF&G budget reductions that may result in elimination of weirs. In many areas, weirs are the only accurate way to determine if desired escapement levels are being achieved. Therefore, emphasis will be placed on obtaining in-season escapement data through construction of weirs on important systems. Weirs placed near the terminus of streams provide a means for making more accurate counts of salmon than do aerial surveys; they also greatly improve the ability to manage harvests and achieve desired escapements. Immediate measures should be taken to encourage funding of weirs through the peak of the coho season and insure they remain in place until late September. Moreover, KRPT supports USF&WS research to determine methods to develop optimal coho salmon escapement goals for Kodiak coho salmon systems.

Low-priority Management. Funding for stock separation programs is needed for improved identification of stocks in the commercial fishery to improve management of stocks. Tagging and tag-recovery, scale analysis, and test fishing programs are needed to determine run strength and timing of natural stocks.

High-priority Rehabilitation and Enhancement. To supplement natural stocks of coho salmon and allow annual harvests of 543,000 fish by the year 2002, efforts must be directed toward determining suitable remote release sites for hatchery-produced coho salmon. Programs to produce more coho salmon at the Kotoi Hatchery should be continued and increased. Stream surveys must be conducted to identify coho salmon production opportunities. Candidate lakes to be stocked with sockeye salmon may be stocked with coho salmon if sockeye salmon are not available. Potential sites for developing coho salmon production should not conflict with natural runs, but focus on isolated areas.

High-priority Habitat Management. Coho salmon have special rearing habitat requirements. Shallow pond or marshy areas, often a result of beaver activity, are ideal. Gross disturbances to the habitat can have immediate repercussions on developing coho salmon. Some of the best coho-producing areas are located in the Afognak District, an area where extensive long-term timber harvesting is planned. The KRPT recommends that planning efforts between resource managers and timber interests be undertaken to work out the best long-term guidelines to satisfy the needs of both interests. Close public scrutiny and participation in this effort will be needed to assure that fishery resources are not sacrificed.

Table 6. Long-term coho salmon projects for Kodiak area by management district.

District	Priority	Projects
Afognak		
	High	Little Afognak Lake stocking information studies
	High	Paul-Laura-Gretchen Lakes, Portage Lake, Little Kitoi Lake, Seal Bay Creek, and Waterfall fishpas
	High	Pauls, Portage, Litnik, Waterfall, and Thorsheim weirs
	High	Kitoi Bay Hatchery one-check coho salmon
	High	Hidden Lake stocking
	High	Cold Creek fishpass
	High	Portage Lake habitat
	High	Shuyak Island enhancement studies
	High	Red Fox Bay management for escapement
	Low	Selief Bay site studies
Southwest Kodiak		
	High	Coho monitoring program
	High	Ayakylik River and Karluk weir coho salmon escapement
Northwest Kodiak		
	High	Dry Spruce and Crescent Lakes stocking studies
	High	Uganik River weir
	Low	Brown's Lagoon, Bowmans Creek, Twin Lakes fishpass investigation
	Low	Spruce Island scientific-educational projects
Northeast Kodiak		
	High	Road system coho stocking
	High	Buskin River weir
Alitak		
	High	Operate and maintain weirs on Silver Salmon, Horse Marine, Upper station, Dog Salmon, and Akalura systems (cooperative projects of USFWS and ADF&G)
Eastside Kodiak		
	High	Saltery Creek weir
	High	Pasagshak/Lake Rose Tead rehabilitation and enhancement
	Low	Summit Lake Study

Opportunities for Afognak District:

The Afognak District possesses some of the best habitat in the management district for increasing coho salmon production. Fish survey records predating statehood (i.e., 1959) identified successful rehabilitation and enhancement projects for this species.

High-priority Research and Management. Studies need to be undertaken at Little Afognak Lake and the Danger Bay (Kazakof) area to develop coho salmon lake-stocking information. Coho salmon plants could be made from brood stock raised at nearby Kitoi Bay Hatchery. Red Fox Bay stocks are adequate, but they require careful escapement and habitat monitoring. Funding needs to be continued for the Afognak District's salmon escapement monitoring weirs.

High-priority Rehabilitation and Enhancement. Fish passes at Pauls, Laura, Gretchen, Portage, and Little Kitoi Lakes as well as at Waterfall will require continued sources of funding for maintenance, thereby sustaining production of coho, sockeye, chum, and pink salmon. Plans to produce greater numbers of enhanced coho salmon will be feasible only with adequate funding for upgrading existing facilities over the life of the plan. A fish pass is needed at Cold Creek to assist coho salmon in reaching spawning areas located above falls. Portage Lake is important to the commercial and sport fisheries of Afognak Island. Repairs are needed to maintain the existing fish pass in this system. Large-scale logging in this area may cause long-term negative impacts to these fish runs, making the need for reliable enhancement facilities especially important. Studies need to be continued at Shuyak Island to determine potential enhancement projects for coho salmon. Efforts must be directed towards increasing hatchery coho production programs at Kitoi Hatchery to the projected 1.4 million egg target. Coho salmon brood stock will be monitored at Kitoi Bay Hatchery to develop coho salmon smolts. The stocking of Hidden Lake remains a high priority of KRPT.

Low-priority Management and Research. Further studies are needed at Selief Bay to determine the potential stocking and rearing programs in that area. Baseline data will be developed for Red Fox Bay.

Opportunities for Northeast Kodiak District:

Harvests of coho salmon by each of the user groups in the district have been receiving special attention of fishery managers. In 1984, ten of 11 coho salmon streams between Cape Chiniak and Monashka Bay (adjacent to the road system) received below-average annual escapement; it occurred again during 1985 in three of the 11 streams. Increased sport fishing pressure during 1984 resulted in the first-time Emergency Closure of the aforementioned streams to coho salmon sport fishing between mid-October and the end of December. As this effort increases, regulatory measures will become a necessary management strategy for coho production in the district. Strategies for all fisheries may include reductions in fishing time, enlarged closed-water sanctuaries, or complete closures--especially during years with below-average returns.

Low-priority Rehabilitation and Enhancement. Enhancement of Pillar Creek coho should be accomplished by using the returning natural runs for brood stock. Scientific/educational coho salmon hatchery projects in local schools should be continued and expanded.

Opportunities for Southwest Kodiak District:

While no new opportunities are anticipated for coho salmon enhancement in this district, the fisheries will require close monitoring to prevent excessive harvests of sockeye and coho so that escapement needs continue to be met.

High-priority Research and Management. Operations of Ayakulik River and Karluk weirs must be extended to enumerate coho salmon escapement. The continuation of enumeration and monitoring efforts through postseason aerial surveys by USFWS and ADF&G is encouraqed by KRPT.

Opportunities for Northwest Kodiak District:

Project opportunities in this district will directly benefit all user groups.

High-priority Research and Management. Further studies at Dry Spruce and Crescent Lakes are required to determine the feasibility of a large, interconnected lake system for rearing coho salmon (Kupreanoff Peninsula). A weir on the Uganik River would ensure adequate escapements of coho as well as sockeye, pinks, and chums. The weir is currently operated by USFWS Kodiak Refuge, and its operation needs to be transferred to ADF&G; however a source of funding will be needed. Furthermore, aerial surveys will need to be conducted at Spiridon River.

Low-priority Research and Management. Site investigations should be conducted for potential fish pass locations at Brown's Lagoon, Bowmans Creek, and Twin Lakes.

Opportunities for Alitak District:

High-priority Research and Management. Operation and maintenance of weirs on Silver Salmon and Horse Marine systems will be cooperative done by USF&WS and ADF&G.

Opportunities in the Eastside District:

High-priority Rehabilitation and Enhancement. Pasagshak/Lake Rose Tead system need to be investigated.

Chum Salmon

Although the 1.4 million chum salmon harvested in Kodiak waters in 1988 represents the attainment of the 2002 harvest goal established in the Phase I plan, the average annual harvest is expected to remain near 1.0 million. Site-specific information on the rearing and spawning potential of streams will continue to be required in areas where accelerated stock-building programs are deemed desirable. Should the number of chum salmon grow through increased hatchery efforts during the next 15 years, evaluation programs are recommended to accurately monitor the effects of this supplemental production on natural runs.

Overall Opportunities for Chum Salmon in the Region:

Chum salmon escapement and production goals need to be evaluated and assessed throughout the region. Projects have been prioritized and the enhancement programs at Kitoi Bay Hatchery identified (Table 7).

High-priority Management and Research. Escapement-monitoring projects should be continued in the following districts: Northeast Kodiak, Mainland, Alitak Bay, Eastside, and Northwest Kodiak. Weirs and aerial surveys need to be maintained.

Low-priority Rehabilitation and Enhancement. Investigate the potential of establishing a chum salmon hatchery in conjunction with Terror Lake power house.

Opportunities for Afognak District:

In order to produce sufficient returns by the 1990s, supplemental stock-building programs were phased in at Kitoi Bay Hatchery as early as 1977. To meet the long-term goals of the comprehensive plan, the hatchery will require funds for maintaining its present production level and physical condition of the facilities as well as for upgrading the site.

High-priority Rehabilitation and Enhancement. The success of supplemental programs at Kitoi Bay Hatchery has been well documented (Blackett 1985). Clearly, if the projects planned by KRPT for chum salmon and other species are expected to have a chance of success, funds other than those now provided by the state will be needed. Cooperative efforts between the state and the Kodiak Regional Aquaculture Association are presently being pursued.

Opportunities for Mainland District:

Long-term chum salmon enhancement projects will focus on the Kuliak and Alinchak sections of the Mainland District. Basic research is needed on the many systems in this area. The remoteness of this district will place enhancement efforts for chum salmon near the bottom of the list of projects under consideration. The identification of spawning habitat for salmon rehabilitation and enhancement projects is considered a low-priority project.

Table 7. Long-term chum salmon projects for Kodiak area by management district.

District	Priority	Projects
Afognak		
	High	Kitoi Bay Hatchery upgrade
Mainland		
	High	Escapement-monitoring projects
	Low	Kukak and Alinchak spawning-habitat studies
Northeast Kodiak		
	High	Escapement-monitoring projects
Alitak		
	High	Escapement-monitoring projects
Northwest Kodiak		
	High	Escapement-monitoring projects
Eastside Kodiak		
	High	Escapement-monitoring projects
	High	Information gathering for proposed Old Harbor/Three Saints Bay Hatchery
Southwest Kodiak		
	High	Escapement-monitoring projects

Pink Salmon

At the time strategies were being developed in Phase I for the two-year, odd and even cycles for pink salmon, a working assumption was the continuation of healthy markets for pinks. In this Phase II Revision, KRPT increased the harvest goals for pink salmon in the year 2002 as follows: 24.0 million during even years and 19.0 million during the odd years. These harvest figures represent 80 percent of the total harvest goal for all species of salmon in the Kodiak region for 2002.

The total harvest of pink salmon in 1988 was 14,262,000, which was considerably above the even-year annual average since 1970 of 9,237,000. The KRPT recommends that pink salmon production at Kitoi Bay Hatchery be maintained. Pink salmon returns can be maintained or increased through manipipulation of incubation levels at Kitoi Bay Hatchery; KRAA and

ADF&G are involved in a cooperative effort to expand the capacity at Kitoi through the use of additional rearing net pens, incubators, and building space. Whenever hatchery programs become the principal method of enhancing one or more of a species of salmon for purposes of adding to the overall harvest, there is a risk of over-harvesting the natural runs. This can occur when increasing numbers of supplemental salmon commingle with the natural runs so that accurate separation of stocks is not possible. One method to help reduce this risk is locating the hatchery at a site that does not compromise management strategies for natural runs and by conducting terminal fishery harvests at the hatchery. Kitoi Bay Hatchery is located and managed with this policy in mind. Should the market for pink salmon improve during the next 15 years, additional management activities can be initiated. These will include improved stock-forecasting and separation programs for long-term evaluation programs. Long-term regional projects will be addressed in the following sections (Table 8).

Research and Management Opportunities in the Region:

All salmon weirs need continued maintenance. Assessment of pink salmon production and escapement through aerial surveys and preemergent fry index studies in the spring also need to be continued.

Table 8. Long-term pink salmon projects for Kodiak area, by management districts.

District	Priority	Projects
All districts		
	High	Expansion of Kitoi Bay Hatchery and a new facility
Northwest Kodiak		
	High	Brown's Lagoon fishpass investigation
Eastside Kodiak		
	High	Seven Rivers fishpass investigation
Eastside, Northwest, and Northeast Kodiak		
	High	Hatchery water site investigations
Afognak		
	High	Operation and Maintenance of existing fish passes
	High	Coal Creek investigations

High-priority Rehabilitation and Enhancement. During the next 10 years, projects aimed at improving and increasing the use of existing habitat for pink salmon spawning and development through removal of stream obstructions and debris should be initiated. New site investigations for fish passes at Brown's Lagoon and Seven Rivers should be conducted.

High-priority Research and Management. Fish pass sites investigations should be conducted at Brown's Lagoon, Seven Rivers, Bauman's Creek (Terror Bay), Twin Lakes (Viekoda Bay), and Cold Creek (Afognak).

Chinook Salmon

The Karluk and Ayakulik River (Red River) systems are the only places where chinook salmon runs naturally occur in any significant numbers. There is no chinook production at Kitoi Bay Hatchery. Natural systems throughout Kodiak are producing at near optimal levels. An introduced run of chinook salmon also occurs in the Dog Salmon/Frazer Rivers area and in the Pasagshak River. Few of these fish are available for commercial purposes, and harvests have only incidentally occurred during fisheries targeted on such species as sockeye and pink salmon. Sport fishing for chinook salmon is closed in both the Pasagshak and Dog Salmon Rivers.

The average annual commercial harvest over the recent 10-year period is 5,000. Based on return per spawner and escapement data, the harvest should be at least 15,000. There is the possibility that chinook salmon are being intercepted in other fisheries. In 1988, 22,345 chinook salmon were commercially harvested. This is the fifth consecutive year that the incidental harvest of chinook salmon has exceeded 4,000. The Phase I annual harvest goals of 1992 were set at 3,000 from natural populations and 1,000 from enhancement efforts. Harvest goals for the year 2002 are 15,000 chinook from all sources.

Although sport and subsistence harvests have been low, chinook salmon are a very desireable species to the fishermen. A recent sport fish project has attempted to develop another road-system fishery for trophy chinook salmon at Lake Rose Tead (Pasagshak system). This project failed to produce a fishery, and sport fishing for chinook salmon was closed.

High-priority Rehabilitation and Enhancement Opportunity in the Region:

A zero-check chinook salmon program for the Kodiak road system, specifically for Mill Bay, Potato Patch, and Mission Lakes, need to be developed. Approximately 100,000 chinook salmon smolts from Elmendorf Hatchery were stocked in 1989, 1990, and 1991. Annual stocking efforts are planned for the future.

CHAPTER 4

A PLAN OF ACTION FOR THE NEXT FIVE YEARS

Recommendations for projects in this chapter are based on previously identified high-priority projects, and these projects are scheduled for implementation over the next five years. Because a number of projects identified in this chapter do not have a clearly defined source of funding, by prioritizing the projects KRPT hopes to influence the selection of management and enhancement opportunities during the budget-building process.

Responsibilities for carrying out the recommendations presented in the Phase II Five-Year Plan rests with ADF&G, KRAA, USF&WS, native regional corporations, and the City and Borough of Kodiak, and overlapping areas of authority are expected. Habitat protection, for example, involves USFWS, ADF&G, and National Marine Fisheries Service (NMFS). Enhancement, rehabilitation, and research programs will involve ADF&G, KRAA, and USF&WS. The Karluk Lake fertilization program is a good example of cooperative effort among the aforementioned parties and the Kodiak Island Borough.

Participation in hatchery management and development will take place within ADF&G and KRAA (or any approved PNP facitlity). Each organization, identified as a cooperator, while agreeing to work together, has a mission distinctly its own. USF&WS is responsible for conserving habitats and populations on refuge lands, ADF&G's responsibility and authority for management of the salmon resource and anadromous fish habitat is all encompassing, and KRAA is primarily involved with programs that directly produce more salmon for fishermen. ADF&G's efforts must be reflected in benefits to the state economy as a whole, while KRAA is controlled and directly accountable to its Board of Directors, the majority of whom are commercial fishermen. A free exchange of information and ideas among all the participating parties, focused in the KRPT meeting forum, will ensure that the plan's goals reflect current thinking and needed programs are implemented in a timely manner.

A list of salmon projects oriented by species (Table 9) represents ongoing projects that require continued funding as well as opportunities for new projects that should begin during the next five years. Neither set of recommendations stands much of a chance of implementation without a clearly defined funding source. The KRAA supports the KRPT recommendation that state funding for ADF&G within the Commercial Fisheries Division should continue to be used for weir maintenance, aerial surveys, and stream pre-emergent studies.

Table 9. 5-year salmon projects for Kodiak area, by species and management districts.

SOCKEYE - Ongoing projects (Lead Agency: ADF&G)

Alitak District
Frazer Lake fishpass and fertilization studies.
Upper Station baseline data collection. Red Lake limnological studies (a backup for escapement goals).

Southwest Kodiak District
Karluk Lake post-fertilization studies.
Evaluation of Upper Thumb and Karluk Lake rehabilitation.

Northeast Kodiak District
Pillar Creek Hatchery operation.

Northwest Kodiak District
Spiridon Lake limnological studies.

All Districts
Continuation of escapement monitoring programs using weirs, aerial surveys, and foot surveys.

SOCKEYE - Proposed Projects (Lead Agency: KRAA)

Southwest Kodiak District
Karluk Lake postfertilization project.

Northeast Kodiak District
Pillar Creek Hatchery funding.
Crescent Lake fry stocking.

Northwest Kodiak District
Spiridon Lake fry stocking.

Alitak District
Frazer Lake fertilization project.

Afognak District
Afognak Lake fertilization study.

-Continued-

Table 9 Continued.

Laura and Pauls Lakes habitat and limnological studies.
Red Fox, Hidden, Portage, Little Kitoi, Jennifer, Waterfall Lakes limnological studies.
Malina Lake fertilization and fry stocking.
Hidden Lake fry and pre-smolt stocking.
Waterfall Lake fry and pre-smolt stocking.

COHO - Ongoing projects (Cooperative Lead Agencies: ADF&G/USF&WS/KRAA)

Afognak District
Fishpass operations at Waterfall, Paul and Laura Lakes, Gretchen, and Little Kitoi Lake.
Kotoi lakes stocking and smolt production from Kitoi Bay Hatchery.
Spruce Island/Ouzinkie scientific/educational hatchery.

Northwest Kodiak District
Uganik River Cooperative weir operation.
Dry Spruce and Crescent Lakes put and take stocking.

All Districts
Continuation of escapement monitoring program using weirs, aerial surveys, and foot surveys of streams.
Kodiak road system lake stocking.

COHO - proposed projects (Cooperative Lead Agencies: ADF&G/KRAA)

Afognak District
Cold Creek fishpass project (Afognak logging company--cooperator).

CHUM - ongoing projects (Cooperative Lead Agencies: ADF&G/KRAA/USF&W)

Afognak District
Chum salmon phase-in program for Kitoi Bay Hatchery.
Northwest Kodiak
Uganik weir

-Continued-

Table 9 Continued.

Table 9 Continued.

PINK - ongoing projects (Cooperative Lead Agencies: ADF&G/KRAA/USF&W)

All Districts

Continued escapement-monitoring programs (weirs, aerial surveys, and foot surveys of streams).

Continued surveys of additional streams for fish pass improvement.

Northwest Kodiak

Continued escapement-monitoring programs on Uganik weir.

Afognak District

An expansion of the pink salmon production program at Kitoi Bay Hatchery.

Waterfall fish pass operations.

PINK - proposed projects (Cooperative Lead Agencies: KRAA/ADF&G)

Afognak District

Completion of fishpasses at Waterfall Creek.

Completion of Cold Creek fishpass. (Afognak logging company are cooperators).

Eastside Kodiak District

Site survey for a fishpass at Seven Rivers.

Hatchery site selection.

Northwest Kodiak District

Hatchery site selections.

CHINOOK - ongoing projects (Lead Agency: ADF&G)

Northeast Kodiak District

Road-system lake-stocking program.

Current Sources of Funding

A list of funding sources in the following section have been prioritized according to their availability and ease of access; the contact persons have also been provided. As the projects in Phase II continue to be implemented, new sources of funding will be identified.

1. Salmon Enhancement Tax. A two percent (2%) assessment tax on the gross earnings of commercial fishermen derived from salmon is collected and appropriated to the regional aquaculture association to fund the region's rehabilitation and enhancement program. This rehabilitation/enhancement tax requires approval by a majority vote of the eligible interim-use permit and entry permit holders. Contact: Kodiak Regional Aquaculture Association.

2. State of Alaska, Department of Community and Regional Affairs. Both direct grants and loans are being pursued at the time of this writing. Contact person: Mr. Thomas Peterson.

3. State of Alaska, Department of Revenue. The use of the raw fish tax as a regional funding source would require appropriate legislation before it could occur.

4. State of Alaska, Department of Fish and Game. Cost-recovery agreements between the ADF&G and the regional aquaculture associations for harvesting a portion of returns to state hatcheries to pay for operational costs occurred in 1987. Contact person: Dr. Jeffery P. Koenings.

5. Federal Funds. Dingell-Johnson funding is limited to Sport Fish projects and available primarily to state agencies. Contact person: Bill Martin, U.S. Fish and Wildlife Service.

CHAPTER 5

CONTINUATION AND IMPLEMENTATION OF THE PLAN

The Regional Planning Team's Role

Alaska statutes specify three functions of the Regional Planning Team: (1) development of a comprehensive salmon plan, including provisions for both public and private nonprofit hatchery systems (AS 16.10.375); (2) review of private nonprofit hatchery permit applications (AS 16.10.400 [a]); and (3) review of the proposed suspension or revocation of a permit (AS 16.10.430). The remainder of this chapter provides a further elaboration on the responsibilities identified above and also a description of the annual updating process.

Ongoing Planning

Alaska Statute 16.10.375 provides the KRPT with the responsibility for development of a comprehensive salmon plan. Plan development is a constantly evolving process, as opposed to one that is fixed or static. This nature of the planning process gives the KRPT a continuing role in salmon rehabilitation and enhancement planning. The KRPT is responsible for relating actual events to the plan and making the plan responsive to new knowledge, ideas, and changing conditions.

Opportunities have thus far been presented within a 20-year timeframe. Numerous unknowns surround many of these opportunities, and some will never become actual projects. As projects in the five-year action plan become implemented or are determined to be infeasible or undesirable, they will be replaced with new projects for the upcoming five years.

The 20-year plan will be revised as necessary. A procedure for an annual update of the action plan will allow for revision of certain sections. At times, new information and events will require the reevaluation of goals, objectives, district and section targets, or assumptions used for planning.

Annual Update

The Phase II plan is designed to be a working document that provides a framework for increasing salmon production for the Kodiak region; therefore, the five-year action plan will be updated on an annual basis, and an annual report on regional comprehensive salmon planning in Kodiak will be submitted to the Commissioner of ADF&G. For these annual updates, the KRPT will meet at least once a year to discuss (1) reports on current projects; (2) new projects under consideration; and (3) new opportunities that may be investigated as potential future projects.

Each year a statement of progress toward achievement of the goals and objectives in the Phase I plan and a project status report will be incorporated into the annual report. Over time, this annual report will reflect the achievement or non-achievement of the goals and objectives of the Phase I plan.

Criteria for RPT Review of PNP Hatchery Permit Applications

AS 16.10.400(a) provides that a hatchery application must be at least evaluated in the context of its compatibility with the comprehensive salmon plan by the RPT, as well as criteria established by current regulations and statutes. AS 16.10.400(g) identifies conditions that must be satisfied if permits are to be issued by the Commissioner before the regional comprehensive salmon plan is complete.

Part (f) of the same law requires that the commissioner shall classify a stream as suitable for enhancement purposes prior to a permit being issued. There are, however, more than 330 anadromous streams in the Kodiak area. The process of evaluating a stream to determine whether or not it would be suitable for enhancement is very complicated, time consuming, and expensive.

To accomplish a full inventory and classification of all the anadromous streams in the Kodiak area was, therefore, beyond the financial and temporal limits of the plan. Instead, the RPT decided to formally make recommendations to the Commissioner at the time the department initiates the RPT review of a project for rehabilitation or enhancement of the fisheries.

The following criteria are hereby set forth in the Phase II Plan and are consistent with the language and the charge provided in AS 16.10.400(a), (f), (g). In reviewing and making recommendations to the Commissioner on nonprofit hatchery permit applications, the RPT will consider the following criteria in their review. The criteria will also be used to the extent practicable, in their review of other projects.

1. Will it make a significant contribution to the common-property fisheries? (Authority: Section 1, Chapter 111, SLA 1974). The RPT will consider and make its recommendations on each species to be produced if there is a reasonable opportunity for common property harvest consistent with the average Western Region common property fishery exploitation rate for that species. For a site to be suitable for private nonprofit development, there must be capability to generate common property harvest and at the same time provide adequate cost recovery for the facility. Considerations pertinent to determining the potential common property benefits include the following:

(a) Does the application contain significant omissions or error in assumptions? If so, the use of more accurate assumptions might indicate increased hatchery needs and decreased benefits to common property fisheries. Pertinent assumptions might include those relating to interception (harvest) rates in common property fisheries, harvest in the special harvest areas, and survivals of green eggs to adults.

(b) If returns cannot provide the "significant" common property benefit in the traditional fisheries, is there an adequate terminal area where new fisheries could be created for the desired common property benefit without endangering the wild stock?

(c) If the application provides insufficient information for adequate RPT evaluation, the team will request additional information. If they conclude that basic production and harvest assumptions are not realistic, they will recommend that changes in the proposed projects be incorporated by the applicant.

2. Does it allow for continued protection of wild stocks? (Authority: Section 1, chapter 111, SLA 1974) (AS 16.400(g) and AS 16.10.420/10). Any judgment as to the acceptability of impacts on natural stocks from an enhancement project should be made on only on the actual and potential size of the affected wild stocks, but also on the extent of benefits from enhancement and alternative enhancement opportunities in the area that may have less impact on natural stocks. Considerations include the following:

(a) Can management or harvest strategies be developed to allow harvest of enhanced returns while protecting natural stocks?

(b) Is there a segregated area for hatchery harvest that will provide adequate cost recovery without impacting wild stocks?

(c) Does the affected stock actually or potentially support a commercial, sport, and/or subsistence fishery?

(d) Does the affected stock have unique characteristics or are there special circumstances (e.g., a unique early run of coho)?

(e) What is the degree of risk and the probable degree of loss to the natural stock?

3. Is the proposed project compatible with the Comprehensive Plan? (Authority: Section 1, chapter 111, SLA 1974) (AS 16.10.375, AS 16.10.400(g)). The goals and objectives of the Comprehensive Plan, Phase I, are directed toward substantial public benefits. Phase II identifies ongoing and proposed projects that are compatible with management strategies for the wild stocks. Thus, the goals and objectives of Phase I and the recommendations in Phase II provide a basis for evaluating all projects.

The project should also be compatible with management concerns and guidelines set forth in the plan and with specific recommendations concerning strategies and projects. The RPT, in its recommendation to the commissioner, will take all of those factors into consideration in determining the project's compatibility with the comprehensive plan.

4. Does it make the most appropriate use of the site's potential? (Authority: AS 16.10.400(g), AS 16.10.430(b)). A number of very good opportunities for further enhancement

programs exist in the Kodiak management area. If the plan goals and objectives, as well as substantial public benefits, are to be achieved, enhancement sites must be developed to their fullest potential with appropriate species using the best available technology.

In most instances, investigation will show one strategy to be far more effective than the others. Within a given strategy, it will be extremely important that the proposed project will develop the site appropriately and to its full potential. Given technical feasibility, the RPT's determination of the appropriate development of a site will be based on such factors as the magnitude of its water supply, harvest potentials, manageability, and potentials to address user needs.

The applicant, in his application and presentation to the RPT, should demonstrate adequate plans for the site and the capabilities to carry them out. If the applicant does not show adequate planning and documentation, the RPT cannot judge the proposed project's ability to satisfy any criteria or determine in general whether the proposed hatchery would result in substantial public benefit as required under AS 16.10.400(g), AS 16.10.430(b), and the Mission Statement of the plan (Phase I).

An applicant should document to the RPT an ability to develop the site properly and to its full potential. This documetation should include the following: (a) plans for implementation and full development of long- and short-term production goals and objectives; and (b) an adequate description of facility plans for incubation and rearing.

The RPT will formulate a recommendation based on its review of the application and forward it to the commissioner within 14 days of the date when the application is considered. The RPT's recommendation should not be construed as denoting the decision to be made by the Commissioner. The ADF&G staff as well as concerned members of the public also provide reviews and recommendations to the Commissioner. The Commissioner may uphold or reject the recommendations of the RPT after reviewing all the merits and potential problems associated with the proposal.

Since the RPT need adequate review time prior to considering an application, it will generally require that applications and attendant materials be received by the RPT members at least two weeks before the meeting at which the application is to be considered. It may also request additional information during the initial review if the information in the application is inadequate. A representative from the corporation making the application will be expected to make a presentation of the proposal at the RPT meeting.

Alaska statutes specifically grant the RPT an opportunity to review a permit suspension or revocation; however, revocation by the Commissioner would occur only as a very last, unavoidable course of action. It is far more desirable to identify problems early and attempt to remedy them. Existing procedures provide for an annual evaluation of operating hatcheries. The annual report supplies information on the hatchery's past performance, while the annual management plan provides a mechanism for monitoring and modifying hatchery operations on

a year-to-year basis. These documents are subject to standard departmental review. RPT review of annual reports and annual management plans is a part of ongoing planning and is also the logical extension of review of hatchery applications. Actual hatchery performance will show whether it contributes to the fishery as planned. This departmental and RPT review allows for monitoring or ongoing performance.

If the department has determined that a hatchery's performance is inadequate and that a permit suspension or revocation is being considered, the Commissioner will notify the RPT, and the RPT will be provided with an opportunity to make a recommendation on the proposed action. In evaluating any PNP operation that is referred to the RPT by the Commissioner, the RPT will use the specific performance criteria in their review, evaluation, and recommendation to the Commissioner. The criteria are established in 5 AAC 40.860 of the 1986 edition of the "Alaska Statutes and Regulations for Private Nonprofit Hatcheries." The RPT, in this evaluation, will also consider any mitigating circumstances that were beyond the control of the hatchery operator. The reader is referred to Appendix C for a detailed listing of project review criteria used during an initial review by the RPT of rehabilitation and enhancement projects.

In addition to the fish culture information provided in the annual report for each PNP hatchery, one additional tool is needed for evaluation of performance. The RPT may recommend mandatory tagging of hatchery-released salmon of all species for at least several cycles in order to measure contributions to the fishery as well as to provide valuable information for management. This tagging may, of course, be accompanied by an adequate program for tag recovery.

Contribution to the fishery will be the ultimate measure of hatchery performance. However, it is not easy to define this criterion in measurable terms or to delineate what actions should be taken if the criterion is not met. Furthermore, the build-up of production at any facility may be slow, so that the ultimate success or failure cannot be determined for many years. As experience with hatchery operations is gained, the performance criteria should be reviewed and refined as needed.

APPENDIX A

Tables

1. Estimated salmon harvests and values by gear type in the Kodiak management area, 1970-1991.

2. Kodiak management area summary of limited entry permit activity, 1975-1991.

3. Kodiak area historical salmon harvests by species, 1948-1991.

4. Optimal sockeye salmon fry-stocking potential in the Kodiak area.

5. Historical harvest summary of subsistence fisheries in the Kodiak area, 1962-1990.

6. Potential fish hatchery sites in the Kodiak management area.

Figure

1. Historical harvest profile of all salmon species combined for the Kodiak area, 1982-1988.

Table 1. Estimated salmon harvests and values by gear type in the Kodiak Management area, 1970-1991.

Year	Total Harvest[a]	Total Value[b]	Average Purse Seine	Average Beach Seine	Average Set Net
1970	13,949,000	$21,658,000	$41,880	$10,470	$21,083
1971	6,376,000	4,973,000	13,397	2,919	3,015
1972	3,890,000	3,909,000	9,233	647	1,451
1973	1,001,000	2,094,000	5,075	251	852
1974	3,323,000	4,808,000	15,993	4,406	4,828
1975	3,187,000	3,831,000	13,300	5,600	3,849
1976	12,484,000	16,976,000	43,017	11,035	14,481
1977	7,977,000	21,000,000	48,382	12,434	19,351
1978	16,942,000	32,000,000	72,158	15,731	25,495
1979	12,420,000	25,000,000	48,906	18,839	23,000
1980	19,157,000	31,000,000	69,117	7,710	21,578
1981	13,057,000	33,000,000	75,257	17,312	26,231
1982	10,892,000	16,230,000	31,868	10,549	30,554
1983	7,082,000	14,530,000	32,832	5,886	19,338
1984	13,678,000	26,202,000	72,018	12,577	26,777
1985	9,898,000	20,782,000	45,303	6,451	31,296
1986	15,956,959	39,106,000	92,933	9,517	69,644
1987	7,745,000	28,113,000	71,170	12,780	38,000
1988	18,711,000	94,075,000	228,000	41,000	115,000
1989[c]	26,209,000	54,114,000	130,000	30,000	100,000
1990	12,123,000	53,407,000	123,000	10,292	72,414
1991	23,723,000	31,489,000	65,442	4,518	46,662
Average for previous decades:					
1970-80	**8,155,100**	**$13,624,900**	**$31,134**	**$8,233**	**$11,741**
1980-89	**14,307,200**	**$36,682,600**	**$87,273**	**$15,980**	**$48,170**
Average for previous 5 years:					
1986-90	**16,278,800**	**$55,697,800**	**$133,872**	**$21,921**	**79,669**

[a] Includes total commercial harvest, test fishery, and Kitoi cost-recovery harvests in number of fish.

[b] Ex-vessel value based on in-season prices; it may exclude values associated with dock deliveries and postseason settlements.

[c] Actual harvest limited by PWS oil spill in 1989; harvest figures for 1989 include actual & projected harvest of wild stocks & actual harvest of hatchery stocks from cost-recovery fishery. 1989 total value is estimated by expanding average in-season prices for actual wild harvest & in-season bid price for hatchery harvest. 1989 ex-vessel value was estimated using 1988 gear levels & proportional harvest.

Table 2. Kodiak Management Area summary of limited entry permit activity, 1975-1991.

Year	Purse Seine		Beach Seine		Set Gillnet		Total		Percent
	Fishable	Fished	Fishable	Fished	Fishable	Fished	Fishable	Fished	Fished
1975	468	280	26	8	229	116	703	404	56
1976	394	325	23	17	187	140	604	482	80
1977	378	312	32	22	186	142	596	476	80
1978	388	345	32	24	188	152	608	521	86
1979	385	340	34	28	184	154	603	522	87
1980	387	360	35	29	187	158	609	547	90
1981	387	325	35	30	187	169	609	524	86
1982	386	338	34	28	187	169	607	535	88
1983	383	342	35	27	188	174	606	543	90
1984	384	298	31	25	188	168	607	491	81
1985	384	272	35	21	188	169	607	467	77
1986	385	288	35	15	187	175	607	478	79
1987	386	298	35	18	188	173	609	489	80
1988	387	323	35	21	188	180	610	523	86
1989[a]	388	4	35	1	189	187	612	92	15
1990	389	354	35	21	190	185	614	560	91
1991	388	348	35	17	189	185	612	550	90
17-year average (1975-88)	**391**	**322**	**33**	**22**	**190**	**162**	**614**	**507**	**83**

[a] 1989 effort levels not included in average totals because of extensive fishery closures caused by the presence of oil from Exxon Valdez spill.

Table 3. Kodiak area historical salmon harvests by species 1948-1988[a].

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1948	1,000	1,260,000	32,000	5,958,000	331,000	7,582,000
1949	1,000	892,000	54,000	4,928,000	700,000	6,575,000
1950	2,000	921,000	41,000	5,305,000	685,000	6,954,000
1951	2,000	470,000	48,000	2,006,000	422,000	2,948,000
1952	1,000	631,000	36,000	4,554,000	984,000	6,206,000
1953	3,000	392,000	39,000	4,948,000	490,000	5,872,000
1954	1,000	329,000	56,000	8,325,000	1,140,000	9,851,000
1955	2,000	164,000	35,000	10,794,000	480,000	11,475,000
1956	1,000	306,000	54,000	3,349,000	660,000	4,370,000
1957	1,000	234,000	35,000	4,691,000	1,152,000	6,113,000
1958	2,000	288,000	21,000	4,039,000	931,000	5,281,000
1959	2,000	330,000	15,000	1,800,000	734,000	2,881,000
1960	2,000	362,000	54,000	6,685,000	1,133,000	8,236,000
1961	1,000	408,000	29,000	3,296,000	519,000	4,883,000
1962	1,000	785,000	54,000	14,189,000	795,000	15,824,000
1963	--	407,000	57,000	5,480,000	305,000	6,249,000
1964	1,000	478,000	36,000	11,862,000	932,000	13,309,000
1965	1,000	346,000	27,000	2,887,000	431,000	3,692,000
1966	1,000	632,000	68,000	10,756,000	763,000	12,220,000
1967	1,000	284,000	10,000	188,000	221,000	704,000
1968	2,000	760,000	56,000	8,761,000	750,000	10,329,000
1969	2,000	604,000	35,000	12,493,000	537,000	13,671,000
1970	1,000	917,000	66,000	12,045,000	919,000	13,949,000
1971	1,000	478,000	23,000	4,333,000	1,541,000	6,378,000
1972	1,000	222,000	14,000	2,486,000	1,165,000	3,883,000
1973	1,000	167,000	4,000	512,000	318,000	1,001,000
1974	1,000	409,000	14,000	2,635,000	248,000	3,329,000
1975	--	137,000	25,000	2,945,000	85,000	3,187,000
1976	1,000	641,000	24,000	11,078,000	740,000	12,485,000
1977	1,000	623,000	28,000	6,252,000	1,072,000	7,977,000
1978	3,000	1,072,000	49,000	15,004,000	814,000	16,942,000
1979	2,000	632,000	141,000	11,287,000	358,000	12,420,000
1980	1,000	651,000	139,000	17,290,000	1,076,000	19,157,000
1981	1,000	1,289,000	122,000	10,337,000	1,345,000	13,094,000
1982	1,000	1,205,000	344,000	8,076,000	1,266,000	10,892,000
1983	4,000	1,232,000	158,000	4,603,000	1,085,000	7,082,000
1984	5,000	1,951,000	230,000	10,884,000	649,000	13,678,000
1985	5,000	1,843,000	284,000	7,335,000	431,000	9,898,000
1986	4,000	3,155,000	168,000	11,504,000	1,126,000	16,304,000
1987	5,000	1,793,000	192,000	5,073,000	682,000	7,747,000
1988	22,000	2,698,000	303,000	14,262,000	1,426,000	19,010,000
1989[b]	5,000	2,629,000	141,000	22,649,000	836,000	26,259,000
1990	18,810	5,248,000	293,700	5,983,810	577,740	12,122,150
1991	22,200	5,704,000	324,900	16,642,800	1,029,100	23,723,000

-Continued-

Table 3. Continued

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
48-year avg	2,864	1,007,950	89,710	7,392,270	786,422	9,279,216
Odd-year average (21 years) pink:				5,848,700		
Even-year average (22 years) pink:				8,864,810		

[a] Data source: for the period 1948-1991, harvest data was derived from fish ticket information summarized by ADF&G.

[b] The 1989 harvest data shown is unique from all other years in that the total harvest by species in this table is the summation of the actual harvests that occurred and the projected harvest that would have occurred if there had not been restrictions placed on the 1989 fisheries because of the presence of oil-contaminated waters in the Kodiak area caused by the Exxon Valdez oil spill that occurred on April 24, 1989; harvest dat for 1989 is not included in the average harvest totals.

Table 4. Optimal sockeye salmon fry-stocking potential in the Kodiak area[ab].

LAKE NAME	TYPE PROJECT	EUPHOTIC VOLUME	OPTIMAL FRY	RUN TIMING	CATCH POTENTIAL
Afognak	Rehab	46.1	2,489,400	Early	44,809
Akalura	Rehab	45.1	2,435,400	Late	43,837
Barabra	Rehab	4.4	237,600	Early	4,277
Busking	Rehab	11.6	626,400	Early	11,275
Crescent	Enhanc	5.6	302,400	Early	9,072
Hidden	Enhanc	19.6	1,058,400	Early	31,752
Jennifer	Enhanc	5.8	313,200	Late	9,396
Laura	Rehab	40.1	2,165,400	Late	38,977
L.Kitoi	Enhanc	4.5	243,000	Late	7,290
Little R	Rehab	12.2	658,800	Early	11,858
Malina	Rehab	21.1	1,139,400	Early	20,509
Portage	Rehab	11.1	599,400	Early	10,789
Red Fox	Enhanc	1.7	91,800	Early	2,754
Spiridon	Enhanc	211.6	11,426,400	Late	342,792
Summit	Enhanc	1.6	86,400	Early	2,592
Uganik	Rehab	11.1	599,400	Early	10,789
Uyak	Enhanc	2.8	151,200	Late	4,536
Waterfall	Enhanc	8.3	448,1200	Early	13,446
TOTALS			**25,072,200**		**620,750**

Rehabilitation = 10,951,200
Enhancement = 14,121,000

[a] Stocking potential is estimated at 54,000 fryi per euphotic volume unit (EV); harvest estimated at 100% for enhancement lakes and 60% for rehabilitation lakes; fry to adult survival estimated at 3%.

[b] Source: Lorne White (Kodiak Area Biologist) and Steve Honnold (Fishery Biologist), ADF&G, Fisheries Rehabilitation, Enhancement, Development (FRED) Division.

Table 5. Historical harvest summary of subsistence fisheries in the Kodiak area, 1962-1990[a].

Yr	Permits Issued	Permits Returned	%	Chinook	Sockeye	Coho	Pink	Chum	Total
1962	74	13	17.6	zero	zero	433	397	20	850
1963	74	15	20.3	zero	297	576	836	195	1,904
1964	43	9	20.9	6	332	184	88	71	681
1965	67	7	10.5	2	19	318	244	12	595
1966	48	13	27.1	zero	295	331	334	393	1,353
1967	84	29	34.5	2	1,306	571	894	344	3,117
1968	132	28	21.2	zero	658	433	529	45	1,665
1969	242	30	12.4	1	481	338	620	30	1,470
1970	213	49	23.0	1	959	939	797	265	2,961
1971	267	131	49.1	5	3,442	1,720	1,276	472	6,915
1972	329	176	53.5	11	3,633	1,531	2,516	2,729	10,420
1973	400	149	37.3	7	4,453	2,289	1,393	1,166	9,308
1974	367	90	24.5	1	1,909	846	1,094	128	3,978
1975	508	90	17.7	1	1,141	922	947	221	3,232
1976	536	243	45.3	4	4,338	962	2,275	370	7,949
1977	739	451	61.0	54	8,119	2,508	2,849	317	13,847
1978	860	539	62.7	50	7,239	3,699	2,747	572	14,307
1979	1,085	697	64.2	111	10,376	3,840	3,300	333	17,960
1980	1,239	756	61.0	67	13,746	4,407	2,755	566	21,541
1981	1,166	733	62.9	44	12,756	3,729	2,278	470	19,277
1982	1,276	993	77.8	110	16,615	7,192	3,558	667	28,142
1983	1,307	1,082	82.8	111	15,526	6,283	2,536	800	25,256
1984	1,240	1,061	85.6	265	17,620	5,808	1,877	720	26,290
1985	1,476	1,196	81.0	172	16,231	8,873	2,756	855	28,887
1986	1,244	1,049	84.3	91	14,451	7,087	2,371	605	24,605
1987	1,124	969	86.2	162	11,562	6,149	2,195	1,061	21,129
1988	1,098	663	60.4	108	10,152	4,094	1,271	366	15,991
1989	2,800	687	--	39	11,979	3,577	1,453	328	17,376
1990	2,900	1,177	--	131	17,920	8,638	1,605	655	28,949
Total				1,556	207,585	88,277	47,791	14,776	359,955
Avg.	791[b]			54	7,158	3,044	1,648	509	12,413
Percent of Total				0.4%	57.7%	24.5%	13.3%	4.1%	100%

[a] In 1989 and 1990 subsistence permits were mailed to all eligible applicants; in 1990 approximately 20% of the 2,900 (580) permits mailed were "returned to sender" by reason they were undeliverable--these names were removed from the list of permitees.

[b] Excludes data from 1989 and 1990 when subsistence permits were mailed to eligible applicants.

Table 6. Potential fish hatchery site in the Kodiak management area.

District	Bay	Site No.	Stream No.	Description/ salmon species
Northwest Kodiak	Viekoda	1	253-321	anadromous system pink and coho
Northwest Kodiak	Viekoda	2	253-322	anadromous system accessible to only coho stock
Northwest Kodiak	Uganik	1	253-XXX	nonanadromous stream inaccessible steep gradient
Northwest Kodiak	Uganik	2	253-133	intertidal cataract prevents anadromous access
Eastside Kodiak	Ugak	1	259-422	anadromous system natural pink stock

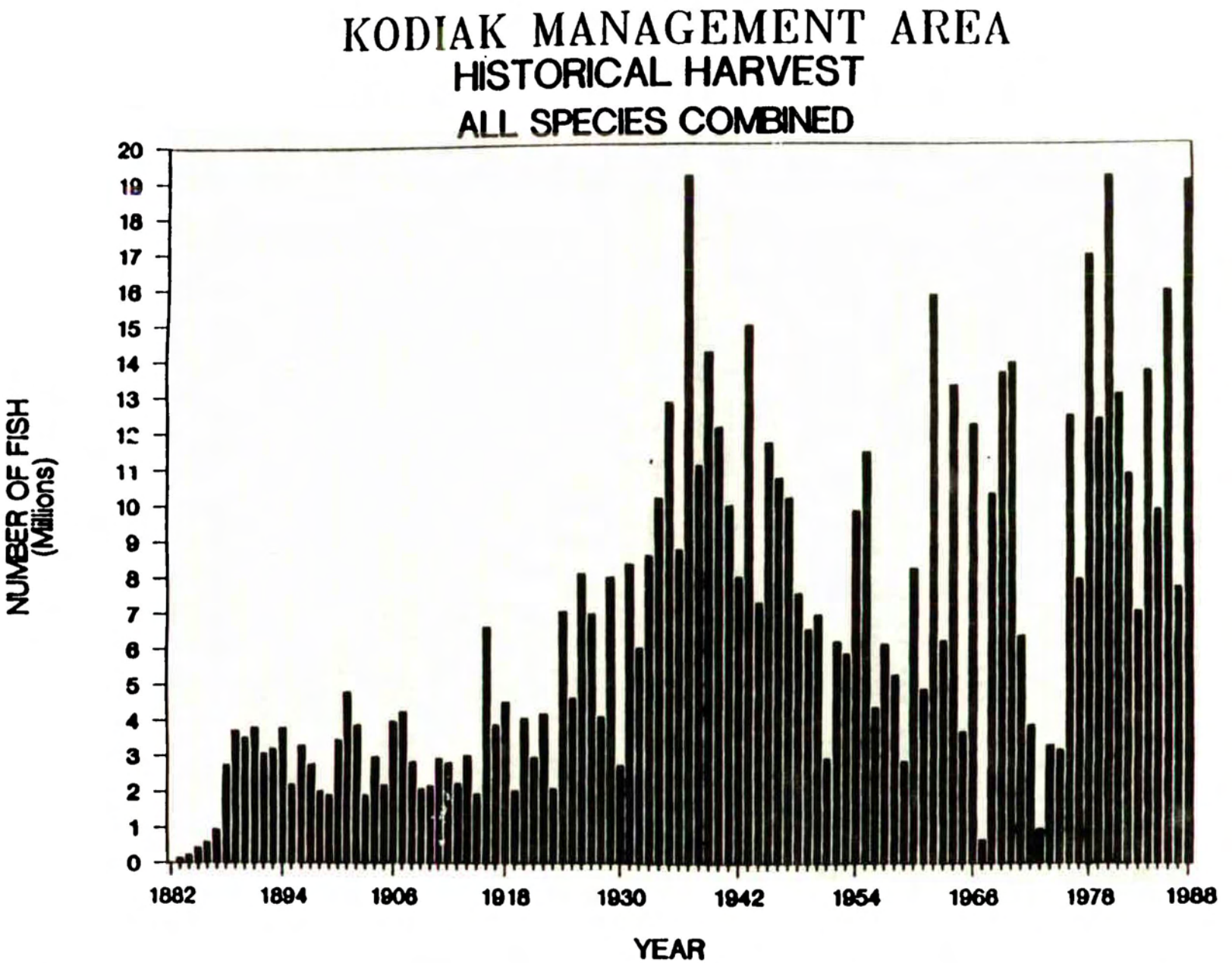

Figure 1. Historical harvest profile of all salmon species combined for the Kodiak area, 1882-1988.

APPENDIX B

PROJECT REVIEW CRITERIA
PHASE II PLANNING - KODIAK

FRED PROJECT REVIEW CRITERIA

FISHERY CONCERNS:

1. Is supplemental salmon production needed and desirable?

   a. What is the socioeconomic impact on local residents and fishermen?

   b. Do the public and user groups want a hatchery in that location?

   c. Will the hatchery fulfill a substantial portion of the region's 20-year salmon goals?

SITE LOCATIONS:

1. Can the hatchery be constructed?

   a. Is the land available for reasonable purchase or lease, and will the landowners consent to construction?

   b. What is the likelihood of site and construction permit applications being approved or disapproved.

   c. Is the site area suitable and of sufficient size for hatchery construction?

   d. Will the site require special biological and/or engineering studies and surveys (i.e., land, soil, water, and organisms)?

   e. Will the hatchery be compatible with existing and future development in the area (i.e., potential habitat conflicts)?

2. Can the hatchery be operated and maintained?

   a. How accessible and logistically difficult will the hatchery be to operate (i.e., access by road, air, or sea and distance from supply point)?

   b. Protected and deep water bay for vessel docking and supply?

   c. Winter access and supply problems (i.e., bay ice conditions)?

d. Is the beach suitable for amphibious aircraft and landing craft (i.e., surf and wind protection, tidal changes,beach slope, and stability)?

e. Can electrical and fueling requirements be met?

f. Can personnel (including families) and support service be provided?

g. Is the site capable of the type of hatchery (incubation and rearing systems) that would be needed?

3. Is the water supply adequate and suitable?

a. Adequate flow year around for intended operations?

b. Are water quality and seasonal temperature regimes suitable for intended operation?

c. Are exclusive water rights available, and can water quality be maintained to hatchery standards?

d. Are prime and secondary back-up water sources available?

e. Is gravity surface flow available, or will well field development and pumping be required?

f. What is the anticipated pipeline size, length, head, and route?

g. Anticipated hazards to the pipeline and intake?

h. Will future land/habitat uses conflict with quality or quantity of the water supply?

i. What is the probability of disease transmission in the water supply (i.e., virus shed by salmonids)?

4. Can brood fish be obtained and held?

a. Are local brood fish stocks available and in sufficient number at the right time?

b. Is brood fish disease history known, and are disease problems anticipated?

c. Are brood fish stocks genetically and biologically suitable and matched to hatchery water conditions (incubation and rearing schedules?

d. Can brood fish be protected from the fishery and held in

estuary or other holding area for ripening?

5. Can hatchery fry production be reared?

   a. Is the estuary suitable for saltwater rearing pens (i.e., protected from seas, sufficient depth, salinities, temperature, fouling organisms, etc.)?

   b. Can rearing be accomplished with land-based facilities (water and facility requirements)?

6. What is the capacity of the estuary and bay for additional salmon rearing?

   a. Are food organisms abundant and available at time of release?

   b. Will abundance of predatory and competitor species severely limit survival of hatchery fish?

   c. Are estuarine and bay conditions suitable for good fry survival?

   d. Will hatchery fish displace or decrease wild salmon fry (compete and prey upon wild fry)?

7. Can adult returns of hatchery fish be readily evaluated?

   a. Will returning fish be mixed with other hatchery stocks and/or wild stocks?

   b. What type and quantity of evaluation effort will be required to assess hatchery operation and goal achievement?

<u>FEASIBILITY CONCERNS</u>:

Is the hatchery feasible?

1. Are cost/benefit ratios and Net Present Value (NPV) acceptable and justifiable?

2. Are there specific or special economic impacts, benefits, and costs involved?

3. If constructed, will the hatchery distract from other worthwhile or perhaps more feasible projects and facilities for the region?

CRITERIA FOR FISHPASSES

FISHERY CONCERNS:

Same as for hatcheries with the frequent addition of increased need for regulation enforcement in remote areas as a salmon run is increased and additional escapement is required.

SITE CONCERNS:

1. Can the fish pass be constructed?

   Same as for hatcheries with additional engineering requirements on high and low water flows and velocity, rock competence and fracture zones (geomorphology), fishpass location (protection) and salmon entrance, and passage capability. Each site requires specialized studies to determine the best engineering design for a specific location and target species.

2. Can the fish pass be operated and maintained?

   Many of the same criteria as for hatcheries, especially during the construction stage, but less restrictive and demanding once built.

   Fish passes require only seasonal operation and maintenance before, during, and after salmon migration. Larger fishpasses with salmon diversion weirs and manual water control structures require manned operation. Smaller installations require only opening, maintenance, spot-checking operation, and end-of-season closure.

   Manned facilities require construction, operation, and maintenance of field living quarters, equipment, and seasonal logistical support of personnel.

3. Is the water supply adequate and suitable?

   Many of the same water quantity and quality concerns for hatcheries are also important for fishpasses. Fishpasses require adequate flow for efficient salmon attraction and passage. Salmon are attracted to the area of greatest flow. Falls close to a fishpass entrance will tend to attract salmon to the falls rather than the fishpass unless diversion weirs are operated.

   High water flows are of more concern for fishpasses than most hatcheries. Fishpasses can be flooded-out by high flows or permanently damaged by debris and ice during floods. Weirs and other associated fishpass structures have a high risk of wash-out and damage by debris at a falls.

Low water flows require either self-controlling or manual water control diversion to the fishpass.

4. Will wild salmon naturally use the fishpass and establish upstream spawning?

Some systems and stocks will require a hatchery and fry or egg transplants to establish new spawning area. Brood-stocks, therefore, become a consideration for fishpasses, as well as for hatcheries.

Natural stock below the falls may be sufficient to extend spawning range and use the fishpass without assistance. Stocks that are genetically programmed to spawn downstream or in site-specific areas (i.e., intertidal pink salmon, chum salmon that spawn in spring areas, etc.) may be slow to use a fishpass or may not extend spawning range.

Increased escapements are usually necessary to increase salmon density below the fishpass and, in turn, increase range extension upstream and salmon passage. Salmon passage through a fishpass is to some extent density related.

5. Is the upstream spawning and rearing area adequate?

The quality and quantity of spawning and rearing area above the falls area needs to be assessed to determine potential production capability. Biological evaluation of egg-to-fry survival may be required as part of this assessment.

6. Will emigrant fry or smolts survive to reach salt water?

Fry and/or smolt survival at falls requires assessment. Substantial mortality might occur at high vertical drop-offs on underlying rock. A series of falls may have greater mortality risk than a single fall.

7. What is the capacity of the estuary and bay for additional salmon rearing?

Same considerations as for hatchery fish releases.

8. Can adult returns of fish produced by a fish pass project be readily evaluated?

Both escapement and catch assessment is required. Counts at the fishpass and on spawning areas, in addition to commercial catch information, are a minimum evaluation effort. Frequently, mark and recovery projects are needed. Evaluation concerns for fishpasses are the same as for hatcheries; further evaluation to improve fishpass effectiveness passage is often required.

FEASIBILITY CONCERNS:

1. Is the fishpass feasible?

Same as for hatcheries. Normally, benefits are high for dollars spent on fishpasses, but the return on investment is usually more limited than for a hatchery and may also take longer to realize.

SPORT FISH PROJECT REVIEW CRITERIA

1. Fishery Status
   - Is it a depressed fishery?
   - Has the fish population been decimated or eliminated?

2. Habitat Assessment
   - Lakes should be five acres in size or large, at least eight feet deep.
   - Predator/competitor concerns must be identified.
   - Available spawning area should be identified/estimated.
   - Water quality characteristics.
     - D.O., Temp., Alkalinity, Conductivity
     - Morphodaphic Index-richer lakes are stocked prior to poorer lakes.

3. Access
   - Will it create new fisheries (has to have the potential)?
   - Accessible to the fishing public, anything you can hike to from the Kodiak road system within two hours would be a priority over fly-in.

4. Effect on Management
   - New sport fish projects should not complicate commercial fisheries management plans.

5. Lake Stocking Guidelines
   - ADF&G guidelines should be adhered to with any new projects.

6. Genetics Consideration
   - Donor stocks would have to be taken from as close to the area as possible.

COMMERCIAL FISHERIES PROJECT REVIEW CRITERIA

Regarding supplemental production (enhancement):

1. What are the potential effects on management plans with the placement of a hatchery?

2. What effects will the proposed production, by species, have on present management schemes?

3. What effects will the hatchery stocks (and their harvest) have on natural stocks in the area?

4. Can returns be harvested to provide "significant" common property benefits in traditional fisheries?

5. Is there an adequate terminal area where new fisheries could be created to affect the desired common property benefit?

6. Does the hatchery as proposed allow for the continued protection of natural stocks?

   a. Can management or harvest strategies be developed to allow harvest or enhanced returns while protecting natural stocks?

   b. Is there a segregated area for hatchery harvest that will provide adequate cost recovery without impacting wild stocks?

   c. Does the affected wild stock actually or potentially support a commercial, sport, and/or subsistence fishery?

   d. Does the affected stock have unique characteristics or are there special circumstances (e.g., an unique early run of coho)?

   e. What is the degree of risk and the probable degree of loss to the natural stocks?

7. Does the hatchery proposal make the most appropriate use of the site's potential?

Ref./File#:_____
Date:_____

KODIAK REGIONAL PLANNING TEAM

FISHERIES REHABILITATION AND/OR ENHANCEMENT
NEW PROJECT SOLICITATION FORM

This form is to be used by Fish and Game and other government agency personnel and the public to identify opportunities that may be worthy to pursue to help rehabilitate and/or enhance the fisheries.

PROJECT DESCRIPTION:

1. WHAT: (Give a brief description of the project):

_____
_____
_____
_____
_____
_____
_____

2. WHERE (be specific as to project location):

_____
_____
_____
_____
_____
_____
_____

3. BENEFITS TO USER GROUPS:

_____
_____
_____
_____
_____
_____

4. COST ESTIMATE OF PROJECT (IF KNOWN):

_____
_____
_____
_____
_____
_____

5. SUBMITTED BY:

Name:_____ Date:_____
Address:_____ Phone:_____
_____ Occupation:_____

6. ADF&G COMMENTS:

_____
_____
_____
_____
_____
_____

7. COMMERCIAL FISH MANAGEMENT COMMENTS:

_____
_____
_____
_____
_____
_____

8. SPORT FISH MANAGEMENT COMMENTS:

_____
_____
_____
_____
_____

9. **HABITAT PROTECTION COMMENTS:**

10. **FRED MANAGEMENT COMMENTS:**

11. **REMARKS:**

Ref./File #:_____
Date:_____

POTENTIAL PROJECT VERIFICATION FORM

NAME:_____ Date:_____

LATITUDE:_____ SURVEYED BY:_____

LONGITUDE:_____GE

ODETIC MAP NO:_____

LOCATION:_____AE

RIAL SURVEY

NOTES:_____

_____

TRAILS:_____

_____

PROJECT WILL PRIMARILY BENEFIT:_____

_____

AVAILABLE ESCAPEMENT DATA:

Year	Pink	Chum	Coho	Sockeye	King	Steelhead

_____Other Species Present:_____

_____

_____

APPENDIX C

Elements of the Benefit/Cost Analysis

Steps for undertaking the projects identified in this plan will incorporate variables such as the facilities and equipment, cost of operations, and the financing.

Feasibility of a Project

In determining the feasibility of a project, the team may consider the four following questions:

1. Are benefit/cost ratios and Net Present Value acceptable?

2. What special economic impacts, benefits, and costs are involved?

3. If a hatchery or other facility is constructed, will it detract from other more worthwhile projects in the region?

4. Will the cost for an annual hatchery or other facility operation and maintenance decrease funding available for other projects in the region?

Costing a Project

The cost of a project can generally be segregated into three major categories, depending upon the nature and the scope of the task. These are as follows:

Facility and Equipment:

- Site section, including studies of alternative areas.
- Site acquisition.
- Construction costs, including planning fees.
- Equipment acquisition.

Operations:

- Cost of labor, utilities, fish feed, personnel, and maintenance costs.
- Administrative.
- Project evaluation costs.

Financing:

- Available funding sources.

- Current interest rates.

Economic benefits to most groups directly affected by specific projects are easier to identify. However, the benefits of an enhanced fishery to sport and personal use fishermen are, again, very subjective and therefore difficult to assign a dollar value. The dollar impact to this group may not vary significantly from project to project and, when compared to the total economic benefit/cost ratio, will not have a significant effect on the overall analysis.

Economic Benefits to Commercial Fishermen and Processors

The economic benefits to these two groups can be expressed in dollar terms throughout the analysis of two major components; the anticipated increase product available for catch and the dollar value of the catch increase. Regardless of the nature of the project, however, the amount of product available depends on the annual adult salmon rate of return and the annual catch rate, expressed in terms of pounds of product.

Variables to Consider in Determining the Product Value

The value of the caught product includes a scrutiny of the following variables:

1. Type of product;

2. Anticipated market price, including the effect of world supply and demand on the market price; and

3. Cost of catching and processing the product.

In order to prepare a benefit/cost analysis for hatchery stock development, a form is available from ADF&G which provides in detail the variables required to determine the quantity of catchable product, value of the catch, impact multipliers, and cost information relating the development of fish hatcheries. For further information, contact ADF&G, FRED Division in Kodiak.

APPENDIX D

LIST OF TERMS

ADF&G - Alaska Department of Fish and Game

allocation - To apportion, through regulation, salmon harvest to various user groups (i.e., subsistence, sport, or commercial fishermen).

aquaculture - Culture of husbandry of salmon (or other aquatic fauna/flora).

brood stock - Salmon contributing eggs and milt for supplemental culture purposes.

commissioner - Principal Executive Officer of the Alaska Department of Fish and Game.

commissioner approval - Formal acceptance of a salmon development plan or other RPT products by the Commissioner.

comprehensive salmon production plan - A statutory-mandated, strategic plan, spanning 20 years, for perpetuation and increase of salmon resources on a regional basis.

criteria - Accepted measures or rules for evaluation of program and project proposals and operations.

depressed stock - A stock which is currently producing at levels far below its historical levels.

enhancement - Strategy designed to supplement the harvest of naturally produced salmon species by using artificial or semi-artificial production systems or to increase the amount of productive natural habitat. Procedures applied to a salmon stock to supplement the numbers of harvestable fish to a level beyond what could be naturally produced. This can be accomplished by artificial or semi-artificial production systems. It can also be an increase of the amount of productive habitat in the natural environment through physical or chemical changes.

escapement - Salmon which pass through the fisheries to return upstream to a spawning ground or used as broodstock in a hatchery.

ex-vessel price - Price paid to the commercial fishermen for their catch.

eyed egg - The stage in which pigmentation of the eyes of the embryo becomes visible.

fecundity - The number of eggs per adult female salmon (or other fish).

fingerling - The stage of salmon life between fry and smolt.

fishpass - A fish ladder to enable salmon to get past a barrier to reach spawning grounds.

five-year action plan - The section of phase II planning that recommends projects for implementation within the next five years.

FRED - Division of Fisheries Rehabilitation, Enhancement and Development, Alaska Department of Fish and Game.

fry - The stage of salmon life from emergence from gravel until it doubles its emergence weight.

goals - Broad statements of what the Planning Team, with input from the user groups, hopes to see accomplished within the 20-year life of the plan.

green egg - The stage of salmon egg development form ovulation until the eye becomes visible, at which time it becomes an eyed egg.

incidental catch - Harvest of a salmon species other than the desired species from which the fishery is managed. Fish of another species and/or stock caught during harvest of specific species and/or stock.

instream incubator - A device, located adjacent to a stream, that collects water from the stream and is used to incubate and hatch salmon or trout eggs.

mixed stock fishery - Harvest of salmon at a location and time during which several stocks are intermingled. Harvest of more than one stock at a given location and/or period.

natural production - Salmon which spawn, hatch, and rear without human intervention (i.e., in a natural stream environment).

phase II plan - An analytical document or process that addresses salmon production development by geographic unit, project, and site and makes recommendations concerning both long- and short-range opportunities (usually 20-year and 5-year timeframes).

plan (The Plan) - Comprehensive Salmon Plan.

plan amendment - Analyzing and evaluating a planning document with the option of changing the plan.

plan content outline - A document that defines topics and gives guidance and shape to comprehensive salmon plans.

plan development - Composing, drafting, revising, and finalizing a planning document.

plan maintenance - Process through which the RPT reviews and comments on existing plans to preserve, continue, and expedite planned salmon production.

plan update - The process and results of RPT review and changes of a plan document.

PNP - Private nonprofit: level and/or operational status of a private sector organization without profit motives.

present condition - the average catch for the last five years.

private nonprofit hatchery permit application - A request presented by a private nonprofit corporation to the Department of Fish and Game for a permit to operate a private nonprofit hatchery.

private sector - That group active in salmon resource development which is not employed by government.

production - Perpetuation or increase of the salmon resource through maintenance, rehabilitation, or enhancement programs and techniques. The comprehensive salmon plan addresses stock perpetuation and increase through appropriate balance and integration of program and techniques within reason.

project - A unit of work having a beginning, middle, and end that functions according to defined performance criteria.

projected status - Continuation of the present condition without additional supplemental production.

public sector - That group active in salmon resource development that is employed by government.

recent 22-year average - The historical catch for the years 1970-1991 (<u>see</u> Appendix A, Table 1, page 42).

regional aquaculture association (RAA) - A statutory-based nonprofit corporation comprised of representatives of fisheries user groups organized for the purpose of producing salmon.

regional planning team (RPT) - A statutory-mandated planning group, composed of ADF&G staff and regional aquaculture association representatives, designated to develop a comprehensive salmon plan.

rehabilitation - Procedures applied to a depressed natural stock that increase it to historical abundance. A strategy directed towards restoring depressed natural stocks to previous levels of production.

residual gap - The required increase in salmon needed from the "projected status' to meet the "Target 1992" and "Target 2002" goals.

restoration - Increasing the annual harvest of salmon to historic levels using management, habitat protection, enhancement, and rehabilitation strategies.

review and comment process - A collection of accepted procedures to solicit and generate examination and remarks.

revised plan - A document resulting from incorporation of commissioner-approved material into a plan.

run - Returning salmon stock(s) bound for its spawning area which is often further described by its timing and numbers.

run strength - Total run of salmon, including escapement, plus catch.

salmon:

chinook (king) - Oncorhynchus tshawytscha

Chum (dog) - Oncorhynchus keta

Coho (silver) - Oncorhynchus kisutch

Pink (humpy or humpback) - Oncorhynchus gorbuscha

Sockeye (red) - Oncorhynchus nerka

salmon stock - A population of salmon identified with a specific water system, or portion thereof. Salmon of a single species that are produced from a single geographic location and are of the same genetic origin.

smolt - A salmon, trout, or char which has passed through the physiological process of becoming ready to migrate to salt water.

supplemental production - Salmon produced by method other than natural spawning using enhancement and/or rehabilitation methods.

target 1992 goal - The desired magnitude of the salmon resource by 1992 as a result of natural and supplemental production.

target 2002 goal - The desired magnitude of the salmon resource by 2002 as a result of natural and supplemental production.

terminal fishery - An area where a terminal fishery harvest could be conducted.

total run (run strength) - Number of salmon returning in a year for a stock or area (escapement plus harvest number).

uniform procedures - Those practices that have been accepted by planning participants as appropriate for conducting or accomplishing a task.

user group - Identification by method and/or reason for the harvest of salmon (commercial, sport, or subsistence).

weir - A fence, dam, or other device by which the stream migrations of salmon (or other fish) may be stopped or funnelled through for enumeration or holding purposes.

wild stock - Any stock of salmon which spawns naturally in a natural environment and is not subjected to man-made practices pertaining to egg deposition, incubation, or rearing. Stocks which have not been rehabilitated or enhanced.

zooplankton - Free swimming, drifting, or floating organisms, mostly microscopic in size, which are found primarily in open water and are an important source of food for small fish.

APPENDIX E

LIST OF REFERENCES

Alaska Department of Fish and Game. 1985. Catalog of Waters Important for Spawning, Rearing, or Migration of Anadromous Fishes. SW Region Resource Management Region III. Habitat Division, Juneau, Alaska.

Alaska Habitat Management Guide. Southwest Region, Vol. 1 and 2. Habitat Division, ADF&G Regional Office, 333 Raspberry Road, Anchorage, Alaska.

Bevan, Donald E., P. Pedersen, K.R. Manthey, L.M. Malloy, and D. Prokopowich. 1982. Timing, escapement, distribution and catch of Kodiak Island salmon. 1980. Circular No. 82-1. Fisheries Research Inst., College of Fisheries, University of Washington, Seattle, Washington.

Blackett, Roger. 1985. Annual Area Report of Fisheries Rehabilitation and Enhancement Division, Kodiak Area Office, Kodiak, Alaska.

Cultural Dynamics, LTD. 1986. A description of the economic and social systems of the Kodiak-Shumagin Region. Alaska OCS economic and social studies program. DRAFT #14-12-0001-20186. 719.5 N Street, Anchorage, Alaska.

Davis, Robert. 1985. Alaska Department of Fish and Game. Genetic Policy. FRED Special Report. ADF&G Headquarters Office, Juneau, Alaska.

Deleuw, Cather. 1986. Kodiak Road Master Plan (DRAFT). Deleuw Cather Consultants. Anchorage, Alaska.

Eggers, Douglas M. 1985. Preliminary forecasts and projections for 1985. Alaska Salmon Fisheries Information Leaflet No. 244. State of Alaska, Department of Fish and Game, Juneau, Alaska.

Kodiak National Wildlife Refuge Comprehensive Conservation Plan/E Environmental Impact Statement and Wilderness Review DRAFT. 1986. USDI, USFWS, Anchorage, Alaska.

Malloy, Larry. 1988. Kodiak Area Salmon Management Report to the Alaska Board of Fisheries.

Manthey, Kenneth and David Prokopowich. 1984 and 1985. Kodiak Area Annual Finfish Reports. Commercial Fisheries Division: Westward Region Finfish Data Reports.

Manthey, Kenneth. 1986. Kodiak Management Area 1986 Salmon Report to the Alaska Board of Fisheries. Alaska Department of Fish and Game, Kodiak Region, Kodiak, Alaska.

Murray, John B. 1984. Sport Fish Report to the Alaska Board of Fisheries. Alaska Department of Fish and Game, Kodiak Region, Kodiak, Alaska.

USDI Minerals Management Service. 1986. Proposed 5-year Outer Continental Shelf Oil and Gas Leasing Program: January 1987 - December 1991. DRAFT EIS Vol. 2 OCS EIS-EA MMS 89-001.

Woodward-Clyde Consultants. 1983. Kodiak Island Borough Coastal Management Program. Anchorage, Alaska.

White, Lorne. 1990. Kodiak Area Sockeye Salmon Stocking Potential Report to Kodiak Regional Planning Team.