FRED Reports

FRED 1985 ANNUAL REPORT
TO THE ALASKA STATE LEGISLATURE

Edited by
Jeffrey A. Hansen

Number 59

Alaska Department of Fish & Game
Division of Fisheries Rehabilitation,
Enhancement and Development

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ABSTRACT *(100 words maximum)*

FRED's major objectives are the rehabilitation, enhancement, development, protection, and maintenance of the salmon, trout, sheefish, and grayling resources of the state for the use of all Alaskans. To accomplish these, FRED utilized hatcheries and fishways as its basic tools. Hatcheries are about eight times more efficient in converting eggs to fish than the natural environment, and fishways open new spawning areas to anadromous fishes. FRED's Genetics, Limnology, Coded Wire Tag Recovery, and Pathology Laboratories continue to provide important information about the state's fish resources. FRED encourages rehabilitation efforts by private nonprofit (PNP) aquaculture corporations and provides technical services to them.

During 1985, FRED released more than 351 million young salmon, an increase of 46 million over 1984 releases. FRED personnel also planted over 3.2 million trout, sheefish, and grayling statewide in 1985. Over 517 million eggs were taken for incubation during the year, representing an increase of over 76 million eggs from 1984. Over 9 million adult salmon returned in 1985 as a result of FRED projects (excluding fishways). This is nearly three times the previous high of 3.2 million that returned in 1984.

PNP hatcheries throughout the state released over 302 million salmon, and collected 470 million salmon eggs in 1985. An estimated 8.1 million adult salmon returned in 1985 as a result of PNP hatchery operations.

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PREFACE

In 1985 the Alaska Salmon Enhancement Program marked its 15th anniversary with a record collection of just under one billion eggs.

Only ten years ago, fishermen and ADF&G biologists set production goals of 25 million salmon to be produced by enhancement and rehabilitation projects in both public and private sectors, including the participation of small private nonprofit operators referred to as "Mom and Pop hatcheries."

In 1975 the enhancement goal of 25 million salmon for harvest seemed ambitious, especially when the salmon harvests for the entire state had fallen below that number in 1973 and 1974. A large investment in hatchery technology and a commitment to rehabilitate and enhance our fishery has led us to realize that we can attain these goals.

Last year 15 private nonprofit hatcheries and 19 State hatcheries collected just under one billion eggs (987,314,600); from those eggs, 19.4 million adult salmon are expected to be produced.

An economic evaluative study of the state's investment in salmon rehabilitation and enhancement that was ordered by Governor Sheffield in 1984 concluded that it will provide positive benefits and that, perhaps, it is one of the best investments the state has ever made.

With advanced fish-culture technology, Alaska has become a leader in the production of hatchery salmon. Because it has been able to sucessfully mesh this technology with an abundance of natural stocks, Alaska's salmon enhancement program has become the most significant in the world. In addition to hatcheries, the Alaska program includes a large investment in research and evaluation. Perhaps the most important feature of the enhancement effort is Alaska's commitment to evaluate the results. Stream and lake stocking, lake fertilization, and fish ladders are other tactics used extensively.

Alaska's salmon rehabilitation, enhancement, and development program is a unique combination of government and industry working together to accomplish a common goal--that of making Alaska the world's greatest salmon producer. Alaska's investment in its fisheries is an investment in the future, and it will play an increasingly important role in our state's economy. These investments will also play an ever more significant role in providing Alaskan seafood for health, pleasure, and enjoyment across the country and around the world.

S.A. Moberly, Director
FRED Division

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FRED DIVISION BACKGROUND

The Fisheries Rehabilitation, Enhancement and Development (FRED) program comprises a part of the State's salmon management program. It contributes knowledge gained from tagged fish studies and technological research; it mitigates fish losses from foreign interceptions and environmental disruptions; it contributes fish to existing but depressed fisheries; and creates new opportunities for commercial, sport, and subsistence fisheries.

Statute Authorities

The mission of FRED is to plan and implement a program that ensures the perpetual and increasing production and use of Alaska's fishery resources (AS 16.05.092). In addition, members of FRED Division, with approval of the Commissioner's office, coordinate the rehabilitation and enhancement activities of the Department and Regional Aquaculture Associations (AS 16.10.380) and process fish transport permits and applications for private nonprofit hatcheries (AS 16.10.440). The division also technically assists the nonprofit hatcheries to the extent possible (AS 16.10.443) and cooperates in the development of regional salmon plans (AS 16.10.375).

FRED's duties (AS 16.05.092) include the annual presentation of a comprehensive report to the Legislature. This report, along with a detailed budget request, satisfies these reporting requirements.

Functions and Services

The division operates 20 hatcheries to produce salmon and trout for subsistence, commercial, and sport fisheries. Twenty-three fishpasses statewide provide spawning and rearing habitat that would otherwise be unattainable to salmon stocks. Many of these fishpasses are maintained cooperatively with the U.S. Forest Service. The strategies of lake fertilization, habitat improvement, and fish stock introduction provide improved freshwater survival and new production opportunities for salmon stocks.

FRED Division operates four biological laboratories that serve the Alaska Department of Fish and Game (ADF&G) and other agencies. The Fish Pathology and Genetics Laboratories provide diagnostic services and brood-stock evaluations for State and private nonprofit fisheries programs. The Limnology Laboratory provides supervision of all lake enrichment projects and analyses of water, plankton, and aquatic insects sampled for lake productivity studies. The Tag Recovery Laboratory decodes metal tags implanted in fish and supplies resultant information for hatchery and natural stock evaluation, as well as for the evaluation of United States/Canada salmon interceptions.

The Private Nonprofit (PNP) Hatchery Program is administered by the division. One of the responsibilities of administering this program is to organize the regional salmon planning teams, which are comprised of ADF&G and Regional Aquaculture Association members. The PNP office coordinates the review of private non-profit hatchery applications, and the permitting process, which includes hatchery and fish transport permits.

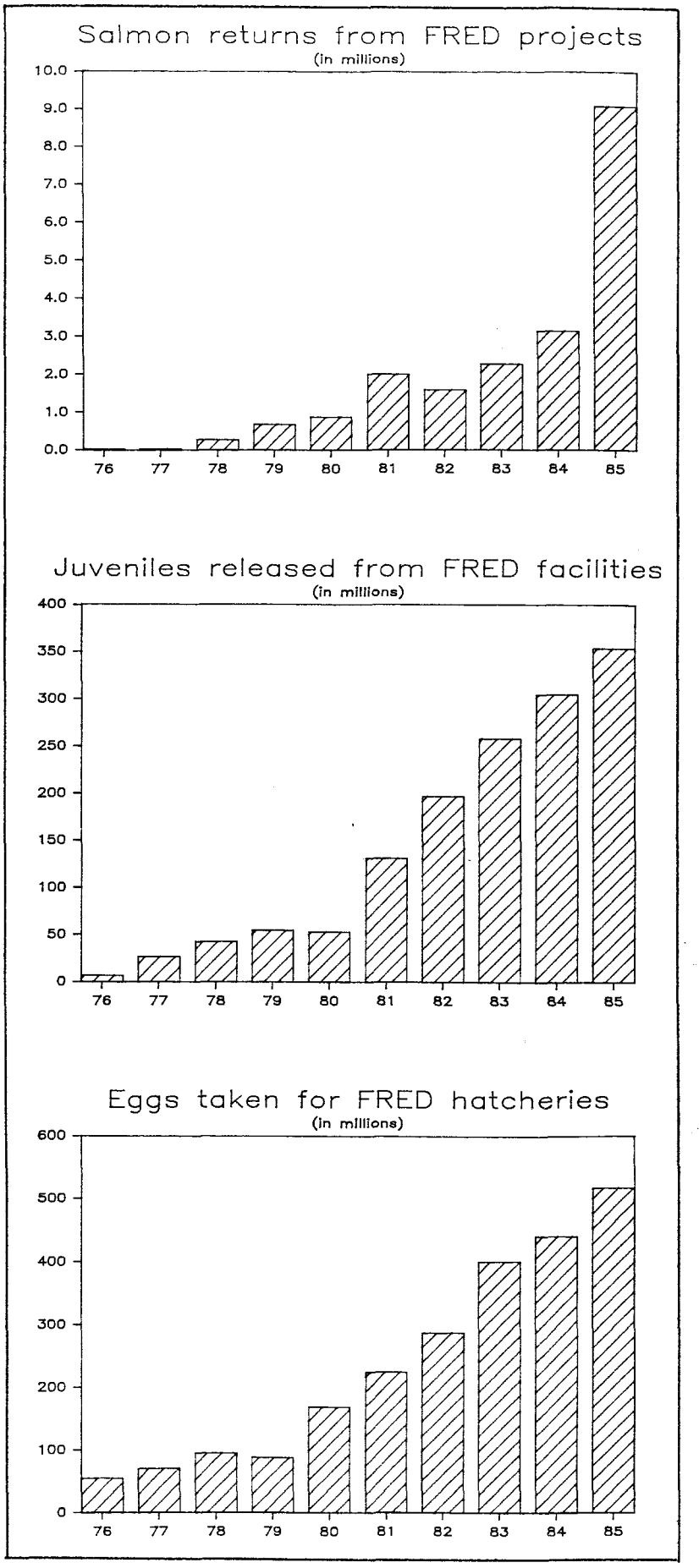
FRED provides engineering services to the department. Projects include field facilities, hatcheries, and coordination with consultants, contractors, and land owners.

Over 9 million adult salmon returned in 1985 as a result of FRED projects (excluding fishways). This is nearly three times the previous high of 3.2 million that returned in 1984. Of those 9 million, at least 8 million were harvested by commercial fishermen and an estimated 39,600 were taken by sport fishermen. FRED hatchery returns by species and facility appear in Table 1.

Releases of fish by FRED projects during 1985 totaled over 354 million, 49 million more than in 1984. Fewer pink salmon were released in 1985, while chum salmon increased 84% compared to 1984 releases. Releases by area, facility, and species appear in Tables 2 and 3. Hatchery survivals for all fish released in 1985 are shown in the tables in Appendix A, and release locations by species appear in Appendix B.

During 1985, FRED personnel took over 517 million eggs, 76 million more than were taken in 1984. Statewide totals for both sockeye and pink salmon eggs taken in 1985 increased at least 30% over 1984 levels. Egg takes by area, facility, and brood stock are shown in Table 4.

Returns, releases, egg takes, and a description of the projects are discussed in greater detail in the area summaries that follow.



SOUTHEAST

Summary of FRED Projects

The FRED Division maintains four area offices throughout Southeastern. Area biologists are responsible for various enhancement and rehabilitation projects for which the hatcheries supply fishes. In Southeastern, as in other regions of the State, FRED employs the strategies of hatchery production and direct release to estuaries as well as development and rehabilitation of lake and stream stocks through fishpasses, stream habitat improvement, and lake fertilization.

FRED Division also works in cooperation with other agencies on numerous fisheries projects. As an example, the U.S. Forest Service completed the construction of a chum salmon spawning channel on Marx Creek, near Hyder, in time for the 1985 spawning season. FRED Division personnel transported 1,900 adult chum from Fish Creek to stock the channel, and active spawning began just two hours after the transport. In the spring of 1986, FRED personnel will tag emergent fry from this project to determine the contribution to the fisheries.

Most cultured fishes in Southeast are released at the hatcheries. However, releases in 1985 included projects where coho, chinook, and sockeye salmon were stocked into lakes and streams for advanced rearing.

Figure 1 shows the location of the six state-operated salmon/trout hatcheries in Southeast. Three of those feature chum salmon: (1) Snettisham, near Juneau; (2) Hidden Falls, on Chatham Strait at Baranof Island; and (3) Klawock, on Prince of Wales Island. Each facility has a design capacity of about 70 million eggs, which should produce returns of about 1 million chums per year for each facility. The Snettisham and Hidden Falls hatcheries, along with the Crystal Lake Hatchery at Petersburg and the Deer Mountain Hatchery at Ketchikan, also feature chinook salmon. Coho salmon and steelhead trout are produced at the Klawock, Crystal Lake, and Snettisham hatcheries.

The Beaver Falls Hatchery at Ketchikan has been reconstructed into a sockeye salmon facility; in conjunction with lake fertilization and fishpass construction projects, the resulting sockeye fry will be released into lakes.

Capital Improvement Project (CIP) funds from FY 85 were received to expand or enhance hatchery production at five of the six FRED facilities in Southeast. At the Snettisham Hatchery, funds were provided to complete the raceways that will allow the facility to reach the design production capacity of 1 million adult chum and 70,000 chinook and coho adults. Annual chinook production at the Crystal Lake and Hidden Falls hatcheries will be expanded to 49,500 and 8,000 adults, respectively. CIP funds for the Klawock and Deer Mountain hatcheries are being used to upgrade existing

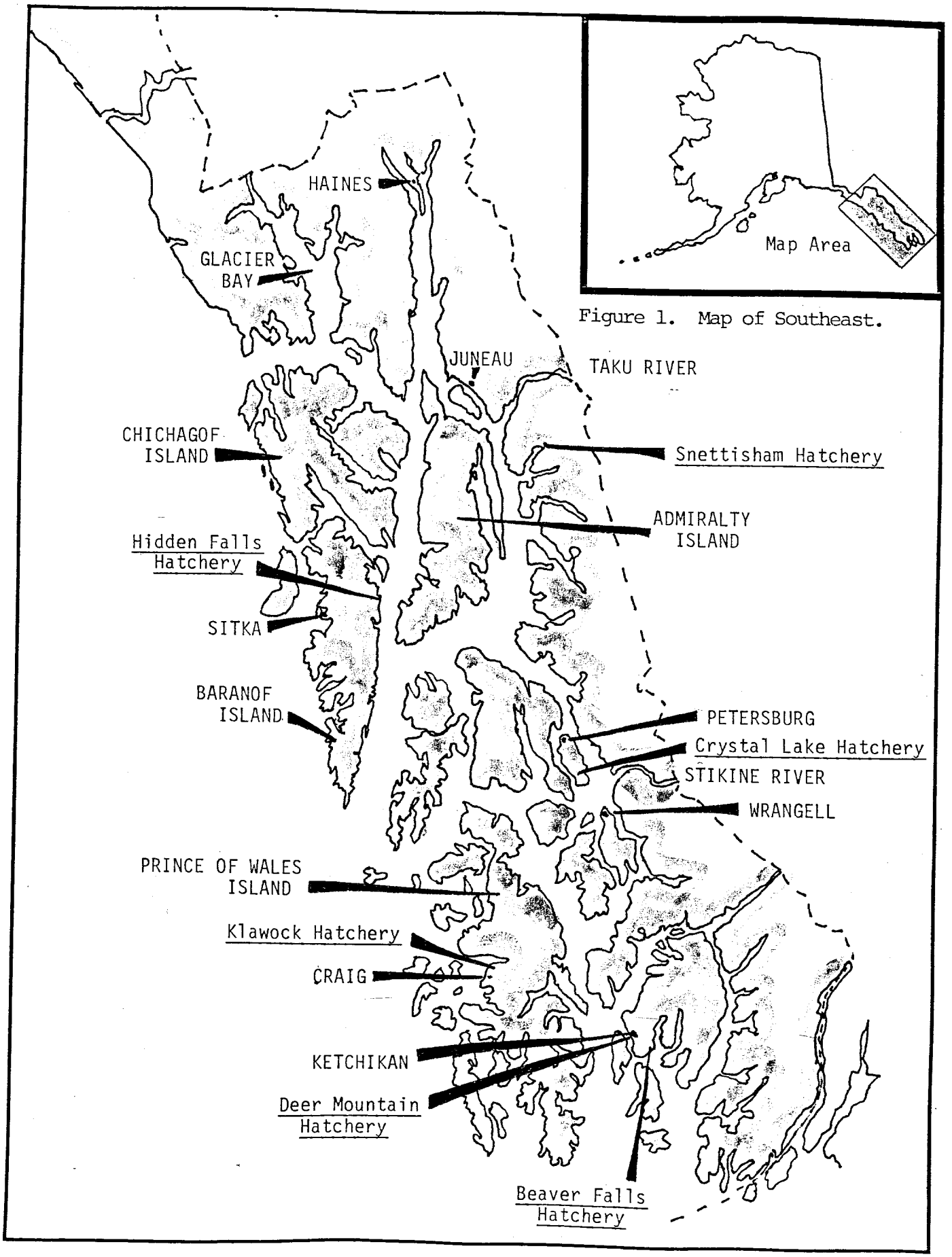


Figure 1. Map of Southeast.

support facilities and purchase essential operational equipment. All construction should be completed (or be near completion) by July 1, 1986.

Southeast Highlights

- Chums returning to Hidden Falls contributed at least 373,000 adults to the commercial fisheries.
- Over 95 million chum eggs were taken.
- Nearly 9.6 million chinook eggs were taken in 1985. Over 8.3 million of these eggs resulted from returns to Crystal Lake.
- The winning fish in the 1985 Ketchikan Fishing Derby was a 53 pound, 6 ounce chinook salmon released from Deer Mountain Hatchery in 1981.
- Hatchery-produced chinook contributed at least 1,700 fish to sport fisheries from Ketchikan to Juneau.
- Coho returning to Klawock contributed about 54,000 adults to the commercial, sport, and personal-use fisheries.

Southeast Returns

The total return of FRED hatchery-produced salmon to Southeast Alaska in 1985 exceeded three quarters of a million fish (Table 1). The predominant species was chum salmon, which accounted for over 650,000 of the returns. As in 1984, the majority of these chum salmon returned to the Hidden Falls Hatchery, which supported a terminal-harvest fishery totaling over 370,000 salmon. The chum return to Beaver Falls Hatchery was better than anticipated, with 93,000 adults harvested from a total return of nearly 103,000. Returns to the Snettisham and Klawock hatcheries combined to contribute another 113,000 adult chum salmon to the waters of Southeast Alaska.

The chinook salmon return to state hatcheries in 1985 totaled nearly 13,400 fish; 70% of these were the result of operations at Crystal Lake Hatchery. These returning chinook are very important to the commercial fisheries of Southeast Alaska, because their numbers help increase the harvest limits established by the U.S./Canada Pacific Salmon Treaty. Enhancement chinook are also becoming significant to the urban sport fisheries in Southeast Alaska. Preliminary information shows that nearly 12% of all chinook salmon turned in at the 1985 Golden North Salmon Derby in Juneau were from enhancement facilities, and half of those were from Crystal Lake Hatchery. Over 50% of the chinook salmon caught in the Ketchikan sport fisheries were produced by either the Deer Mountain Hatchery or Southern Southeast Regional Aquaculture Association's Whitman Lake facility. For the second

year in a row, the largest fish turned in at the Ketchikan Little League Salmon Derby was a chinook salmon produced at Deer Mountain Hatchery. The first-prize-winning chinook weighed 53 pounds, 6 ounces.

Two special terminal sport fisheries were conducted in 1985 to harvest salmon returns in excess of the hatchery's brood stock needs. One of the fisheries targeted on chinook returning to the Deer Mountain Hatchery in Ketchikan and the other on chinook returning to the Crystal Lake Hatchery near Petersburg. About 100 chinook were harvested in the Blind Slough terminal fishery in Petersburg, and 180 were harvested in the Thomas Basin terminal fishery in Ketchikan. Another 200 Deer Mountain chinook were taken in a special 12-hour personal-use fishery in Ketchikan Creek.

Over 100,000 adult coho returned to Southeast Alaska in 1985, as a result of FRED facilities. Nearly two-thirds of these were attributed to the Klawock Hatchery. In addition to the commercial harvest of nearly 47,000 salmon, the return of coho to the Klawock Hatchery was strong enough to support a sport fishery in the Klawock River that accounted for about 5,500 fish; a surplus of over 1,400 coho that exceeded the hatchery's brood stock needs were given to the public.

Crystal Lake Hatchery accounted for approximately 23,000 returning coho, from its releases at the facility. Some additional but unknown number of coho was produced by Crystal Lake Hatchery from the releases of fry into Irish Creek and Sumner Creek in 1983. Since these fry were unmarked and since no adult evaluation took place at the release site in 1985, the number of adults produced by these fry plants could not be determined. Adult coho returning to Snettisham and Ward Lake, a Deer Mountain Hatchery release site, contributed another 13,000 salmon in 1985.

Southeast Releases

Nearly 58 million juvenile chum salmon were released from Southeast FRED facilities in 1985 (Table 2). Hidden Falls Hatchery released over 30 million chum; of these, 21.5 million were fingerling and the rest were released as emergent fry. Klawock Hatchery released 16.1 million fingerling and over 4 million emergent fry, and over 7.5 million fingerling chum were released from Snettisham.

A total of 566,000 chinook smolts were released from 4 facilities in Southeast. The largest release was the 225,000 zero-check smolts released into Thomas Basin from the Deer Mountain Hatchery. Chinook smolt releases were also made from Snettisham, Crystal Lake, and Hidden Falls hatcheries. Additionally, 236,000 chinook fingerling were planted into Brennan Lake; this will help supply information regarding the use of lakes for rearing hatchery chinook. Eggs taken from the Tahini and Farragut rivers in

1984 were raised in isolation at the Crystal Lake Hatchery, and the resulting fingerling were planted back into the streams of origin in 1985.

The Crystal Lake Hatchery released over 1.9 million juvenile coho in 1985, including nearly one million fry to Irish Creek. This was the third release of coho fry into the Irish Creek system, which is designed so that returning adults will spawn above the newly completed fishway. Over 700,000 coho smolt were also released from Crystal Lake Hatchery into Crystal Creek and Ohmer Creek. Klawock Hatchery released 365,000 coho fingerling and 766,000 coho smolt into Klawock Lake in 1985 to continue the successful coho program at that facility. Coho smolt were also released from Snettisham Hatchery, and Snettisham coho were planted into Dredge Lake, near Juneau, in an effort to increase sport fishing opportunity. Coho salmon catchables were again stocked into Twin Lakes, a landlocked lake along the Egan Expressway in Juneau. The Snettisham Hatchery provided the fish for what has become a popular youth and winter fishery.

Sockeye fry were released for the first time since 1980 from a Southeast hatchery; sockeye eggs were taken from Hugh Smith Lake in 1984 and incubated at the Beaver Falls Hatchery. The resulting fry were planted into the Badger/Bakewell Lakes system, south of Ketchikan. As part of a joint rehabilitation project with the U.S. Forest Service, fry plants are scheduled to continue for the next four years, following reconstruction of the Bakewell fishpass.

Juvenile steelhead were released from Crystal Lake and Klawock hatcheries in 1985. Annual stocking of steelhead from the Klawock Hatchery to Ward Lake in Ketchikan was initiated. Ward Lake, on the Ketchikan road system, has been identified as a priority site for recreational enhancement.

Southeast Egg Takes

In 1985, over 111 million eggs were taken for the six FRED facilities in Southeast Alaska (Table 4). Chum salmon accounted for nearly 96 million of that Southeast total. The Hidden Falls Hatchery had the largest chum salmon egg take in the state, with the collection of 58 million chum eggs. The 21.7 million chum eggs collected at the Snettisham Hatchery in 1985 represents a record number of chum eggs for the facility and marks the first year that Snettisham relied entirely upon adult returns to the facility for their chum egg supply. Over 6 million chum eggs were taken from the Klawock River, and another 9.8 million chum eggs from Beaver Falls were incubated at the Klawock Hatchery. The eggs taken from chum salmon returning to Beaver Falls were transferred to Klawock Hatchery, since the Beaver Falls facility has been converted to target upon sockeye rehabilitation.

1985 was an extremely successful year for chinook salmon egg takes in Southeast. Over 9.5 million chinook eggs were taken, which is more than twice the number collected in 1984. Chinook salmon returning to the Crystal Lake Hatchery provided over 8.3 million eggs; this was over 1 million more than the statewide total of chinook eggs collected in 1984. More than 5 million of these eggs were sent to the Snettisham Hatchery, and 276,000 were shipped to Hidden Falls. Crystal Lake Hatchery also sent 319,000 chinook eggs to the Northern Southeast Regional Aquaculture Association's facility at Medvejie, near Sitka, and another 57,000 were sent to the hatchery at Sheldon Jackson College. Returning chinook salmon to the Deer Mountain Hatchery provided over 900,000 eggs for the facility's brood stock, and chinook returns to Snettisham produced 60,000 eggs. Chinook salmon eggs were also taken from the King Salmon, Tahini, and Farragut rivers. The resulting fry from the eggs taken at the Tahini and Farragut rivers will be restocked into these streams, and the King Salmon River eggs provide brood stock for Snettisham.

Coho salmon returning to the Klawock, Snettisham, and Crystal Lake hatcheries provided over 1 million eggs for each of those facilities. In addition, 236,000 coho eggs from Montana Creek and King Salmon River were incubated at Snettisham Hatchery to develop an earlier run coho stock, which is expected to contribute to the Juneau sport fishery.

Sockeye eggs were collected at Hugh Smith Lake and transported to the Beaver Falls Hatchery again in 1985. Half of the resulting fry will be returned to Hugh Smith Lake, and the rest will be used to continue the joint rehabilitation project with the U.S. Forest Service, following the reconstruction of the Bakewell fishpass. Steelhead eggs were also taken in 1985 for incubation at Crystal Lake, Klawock, and Snettisham hatcheries.

PRINCE WILLIAM SOUND

Summary of FRED Projects

The FRED Division maintains a field office at Cordova and operates two hatcheries in the northwest part of the sound and one sockeye streamside-incubation facility on the upper Copper River (Figure 2). Biologists stationed in Cordova participate in projects such as determining the potential for sockeye and coho salmon production by means of lake enrichment along the Copper River as well as in the sound. Other projects include the development of salmon sport fisheries at Whittier and Valdez.

The Main Bay and Cannery Creek hatcheries produce chum and pink salmon primarily for the commercial fisheries. Fishery contributions by these stocks are evaluated by the biological staff, which also cooperates with the U.S. Forest Service in constructing and operating fishpasses to introduce salmon stocks in habitat above waterfalls.

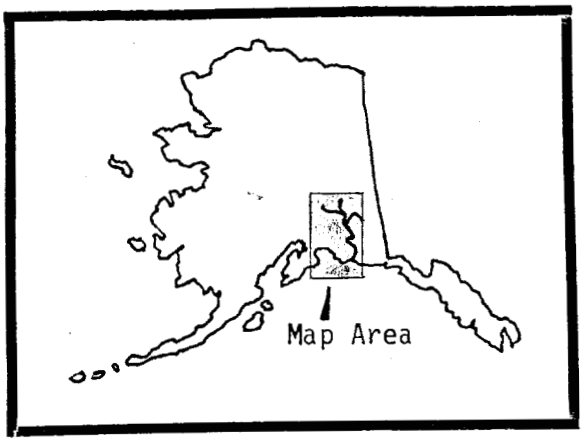


Figure 2. Map of Prince William Sound.

SUMMIT LAKE
Gulkana Facility
PAXSON LAKE
GULKANA RIVER
GLENNALLEN
COPPER RIVER
VALDEZ
Cannery Creek Hatchery
WHITTIER
Main Bay Hatchery
PRINCE WILLIAM SOUND
CORDOVA
HINCHINBROOK ISLAND
MONTAGUE ISLAND

The Gulkana streamside incubation facility produces sockeye for the commercial fishery off the Copper River delta and supplies fish to the upstream subsistence and personal use fisheries.

Prince William Sound Highlights

- Cannery Creek Hatchery contributed a minimum of 2.5 million pink salmon to commercial catches in PWS in 1985.
- More sockeye eggs were taken at Gulkana than anywhere in the state since the early 1900's.
- More than 162 million salmon eggs were taken in 1985 for incubation at the three state facilities in the PWS area.
- Over 1 million salmonids of 4 species were stocked into waters in the PWS area to enhance the sport fisheries.

Prince William Sound Returns

An estimated 3.2 million adult salmon returned to Prince William Sound in 1985 as a result of FRED Division projects (Table 1). Cannery Creek Hatchery accounted for most of these, as over 2.5 million pink salmon returned from releases at the hatchery; another 140,000 pink salmon returned as a result of fry releases in Eaglek Bay. Pink fry from Cannery Creek Hatchery were released into six streams in Eaglek Bay in 1984, so the returns in 1985 would augment the low odd-year pink salmon production there. An estimated 383,000 adult pink salmon attributed to Main Bay Hatchery operations were also harvested by commercial fishermen in 1985. The pink return to Main Bay was lower than expected, and the possible causes for this are being investigated.

The streamside-incubation project near Gulkana produced an estimated 55,000 adult sockeye in 1984, including approximately 33,000 in the commercial harvest. Past releases of juvenile chinook and coho at Whittier produced 900 adult coho and 250 chinook for the sport fishery at Whittier. The young salmon were transported from the Elmendorf Hatchery in Anchorage.

Prince William Sound Releases

Nearly 66 million pink fry and 24.4 million chum fry were released from Cannery Creek and Main Bay hatcheries in 1985 (Table 2). As part of an ongoing cooperative project with Prince William Sound Aquaculture Corporation (PWSAC), 12.6 million chum fry were transported from Main Bay and released into Lake Bay, on Esther Island. This release was to develop the chum salmon brood stock for PWSAC's future Esther Lake Hatchery.

A total of 19 million sockeye fry were released into Crosswind Lake, Summit Lake, and the Gulkana River. These fry were a result of the Gulkana streamside incubation project.

Four species of salmonids were transported and released into the PWS area in 1985 to enhance the sport fisheries. Over 132,000 chinook smolt and 109,000 coho smolt were transported from the Elmendorf Hatchery and released in the Whittier area. An additional 240,500 coho fingerling, from the Fort Richardson Hatchery, were released into three lakes near Whittier. In cooperation with the Valdez Sportfishermen's and the Valdez Fisheries Development associations, 148,000 chinook smolt were released from Anderson Bay to enhance the sport fishing opportunities near Valdez.

A total of 104,400 rainbow trout fingerling from the Fort Richardson Hatchery were stocked into seven lakes in the PWS area, and over 338,000 juvenile grayling from Clear Hatchery were released at 12 locations in Prince William Sound. For a listing of the number of fish released at each location, see Appendix B.

Prince William Sound Egg Takes

Over 162 million salmon eggs were collected for incubation at the three FRED facilities in Prince William Sound in 1985 (Table 4). The largest egg take occurred at the Cannery Creek Hatchery; 103 million pink eggs were collected. Over 34 million of those eggs were transferred to the Main Bay Hatchery, which will establish Cannery Creek pink salmon as the new brood stock source for Main Bay. Another 15 million pink salmon eggs were incubated for a short time at Main Bay and then transferred to PWSAC's Esther Lake Hatchery. In another cooperative effort between the Main Bay Hatchery and Prince William Sound Aquaculture Corporation, 10.7 million chum eggs were taken at the Wells River and incubated at Main Bay Hatchery. Half of the resulting fry will be released from the site of PWSAC's Esther Lake Hatchery. Hatchery returns also provided chum salmon eggs; 1.3 million chum eggs were collected at the Main Bay Hatchery and 351,000 were taken from returning chums at the Cannery Creek Hatchery.

The largest sockeye egg take in the state occurred at the Gulkana streamside incubation facility; 31.6 million sockeye eggs were collected. This should produce over 200,000 adult sockeye for the Copper River fisheries.

COOK INLET

Summary of FRED Projects

The FRED Division maintains field offices at Big Lake, Soldotna, and Homer and operates six hatcheries throughout the Cook Inlet drainage (Figure 3). The biological staff is involved in

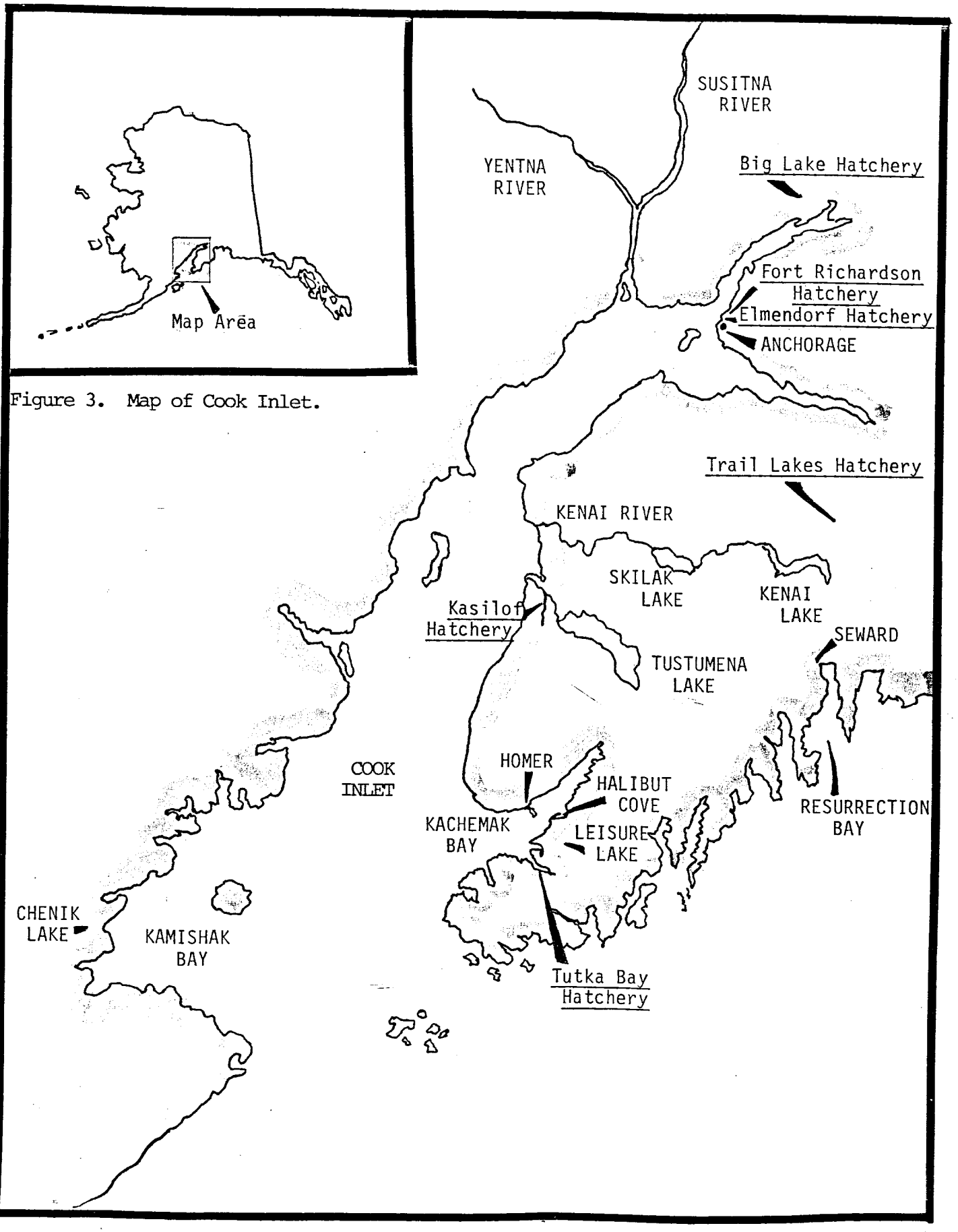


Figure 3. Map of Cook Inlet.

chinook, coho, and sockeye rehabilitation projects in upper and central Cook Inlet, which include determination of waters to be stocked, brood-stock acquisition, and evaluation of hatchery releases. In addition, the biological staff supervises fishery enhancement projects that feature chinook and coho releases for the creation of sport fisheries in the Anchorage and Matanuska/Susitna Valley areas. Stocking studies to determine the feasibility of introducing chinook, coho, and sockeye salmon in unoccupied lakes also shows promise for production increases. The feasibility of expanded steelhead production on the Kenai Peninsula is also being investigated. FRED Division is involved in projects in cooperation with the U.S. Forest Service and/or Cook Inlet Aquaculture Association; e.g., the Grant Lake coho stocking and lake fertilization projects.

The 6 hatcheries serving the Cook Inlet area all provide fish for subsistence, sport, and commercial fisheries. The Big Lake Hatchery, near Wasilla, produces sockeye salmon for the Big Lake and Nancy Lake systems. Many of these fish are caught by Cook Inlet gillnetters. The hatchery also produces coho salmon, which are stocked in Knik Arm streams as well as the Little Susitna River and are targeted for harvest in the sport fisheries. Big Lake Hatchery received capital funds in FY 85 to enlarge the facility. Large aluminum raceways have been installed to increase rearing capacity and to serve as an adult capture and holding facility for egg takes. The Fort Richardson Hatchery at Anchorage operates on water heated by the military power plant. This facility features rainbow trout for placement in over 75 lakes in Southcentral and Interior Alaska. Coho and chinook salmon smolts produced by this facility will be stocked at locations near Homer and Seward, as well as at Whittier and Valdez in Prince William Sound. Chinook and coho salmon produced at the Elmendorf Hatchery are presently stocked in the Kasilof River (Crooked Creek), Kachemak and Resurrection bays, Whittier, and in many landlocked lakes throughout Southcentral Alaska.

Three of the six salmon hatcheries in Cook Inlet are located on the Kenai Peninsula. The newest facility is at Trail Lakes, near Moose Pass. This facility can culture several species and/or stocks of salmonids in isolation to prevent the transfer of disease. Presently, sockeye, coho, and chinook salmon are the target species for stocking into Kenai Peninsula lakes and streams. The Kasilof Hatchery is the only sockeye facility that has not experienced IHN virus mortalities. This facility deals largely with Tustumena Lake sockeye but also provides sockeye fry to Leisure Lake, in Kachemak Bay. Chinook salmon eggs taken at this facility are utilized by the Elmendorf and Trail Lakes hatcheries for Cook Inlet projects. The third Kenai Peninsula hatchery is located at Tutka Bay, on the eastern shore of Kachemak Bay. This facility annually provides 40% or more of the total pink salmon seine fishery harvest in lower Cook Inlet. In addition, sport anglers catch about 5,000 pinks per year from this hatchery stock.

Cook Inlet Highlights

- The 1985 adult sockeye returns to Leisure Lake represent a marine survival of 41%.
- Leisure Lake returns made up 21% of the total lower Cook Inlet sockeye salmon harvest.
- The sockeye return to Tustumena Lake was the largest ever, at 1.5 million salmon; about 33% were from hatchery releases.
- Sports fishermen harvested nearly 4,000 chinook salmon from Halibut Cove Lagoon and Crooked Creek.
- 85% of the chinook return to Crooked Creek was a result of hatchery releases.
- Tutka Hatchery provided about 38% of the lower Cook Inlet commercial pink salmon catch.
- Sockeye salmon smolt emigration from Tustumena Lake was about 16.6 million in 1985, a record for the system. About 23% were estimated to be from hatchery releases.
- Over 54 million sockeye eggs were taken for 3 hatcheries in Cook Inlet.
- Nearly 1.4 million rainbow trout from Elmendorf and Fort Richardson hatcheries were stocked in 1985.

Cook Inlet Returns

Nearly 600,000 sockeye salmon returned to Cook Inlet in 1985 as a result of Kasilof Hatchery operations (Table 1). The adult return from sockeye fry that had been planted into Tustumena Lake (by Kasilof Hatchery) was the main producer. The adult return to Tustumena in 1985, the largest ever recorded for the system, was 1.5 million sockeye (1 million harvest and 500,000 escapement). The hatchery's contribution to this return was estimated to be 510,000 sockeye. All of the 66,000 sockeye returning to Leisure Lake, in Kachemak Bay, were a result of fry that had been stocked by Kasilof Hatchery. The commercial harvest of 61,500 of these returning sockeye represented 21% of the total lower Cook Inlet sockeye harvest. In addition to this, 3,000 sockeye were taken in a personal-use dipnet fishery, and another 500 were harvested by sports fishermen.

The chinook salmon return to Crooked Creek in 1985 was estimated to be 5,900 fish. Approximately 85% (5,000) of this return were from hatchery releases, and nearly 3,000 of these hatchery-produced chinook were taken by sport fishermen in Crooked Creek. At Halibut Cove Lagoon, 1,200 adult chinook returned in 1985. This

return is smaller than previous years, because fewer smolt were released in 1982 because of the reconstruction of the Anchorage hatcheries. This return still supported a sport harvest of 700 chinook and a Halibut Cove setnet fishery that took over 300 chinook.

Coho lake and stream stocking projects produced coho returns and sport-fishing opportunities at several locations on the Kenai Peninsula. Over 6,000 coho returned from juvenile coho plants in Seward Lagoon and Bear Lake. As a result of previous hatchery releases, a special sport fishery was opened to harvest the coho returning to Grant Lake.

The pink salmon return to the Tutka Hatchery in 1985 was estimated at over 525,000 salmon. The commercial catch of 463,000 of these salmon represented 90% of the southern district and 95% of the Tutka subdistrict pink salmon catches.

Cook Inlet Releases

Salmon releases from the six facilities in Cook Inlet totaled over 64 million in 1985 (Table 2). Releases of juvenile sockeye accounted for the majority of these. The Kasilof Hatchery continued the stocking of Tustumena and Leisure lakes in 1985, with 16.4 million and 2 million sockeye fry, respectively. Trail Lakes Hatchery released 1.8 million sockeye fingerling into Hidden Lake, another lake on the Kenai Peninsula. The Big Lake Hatchery released a total of 12.4 million sockeye fry into Meadow Creek and Blodgett Lake. The returning adults from Big Lake releases will provide sockeye for the commercial fisheries of Upper Cook Inlet.

The Tutka Hatchery is the only facility to release pink fry in Cook Inlet and one of two facilities to release chum fry in 1985. Tutka Hatchery released 23.5 million pink fry and 26,000 chum fry from the facility, while Trail lakes Hatchery released 454,000 chum fingerling into waters draining into Resurrection Bay.

A total of over 2.1 million chinook were released by Cook Inlet facilities in 1985. Nearly one million of these were produced by the Elmendorf Hatchery. Elmendorf released juvenile chinook into landlocked lakes in upper Cook Inlet and Interior Alaska, as well as into the traditional locations, such as Crooked Creek, areas near Whittier and Seward, Homer Spit, and Halibut Cove Lagoon. The Fort Richardson Hatchery released a total of 681,000 chinook into Deception Creek in upper Cook Inlet and Anderson Bay in Prince William Sound. Those releases are designed to increase the chinook sport fishing opportunities in the Matanuska/Susitna and Valdez areas. Releases of chinook that had been raised at the Trail Lakes Hatchery occurred at Sixmile Creek and Summit Lake on the Kenai Peninsula and at Seward Lagoon.

Big Lake Hatchery was again the leading producer of juvenile coho in the Cook Inlet area; releases totaled over 3.2 million fish. These coho were released from 12 locations in upper Cook Inlet. Juvenile coho were also released by Fort Richardson, Elmendorf, and Trail Lakes hatcheries into numerous lakes and creeks throughout the Cook Inlet area and near Whittier in Prince William Sound. For further information on stocking locations, refer to Appendix B.

Nearly 1.4 million rainbow trout from Elmendorf and Fort Richardson hatcheries were planted not only into lakes throughout the Cook Inlet area, but into seven lakes in the Prince William Sound region and four lakes on Kodiak Island. These rainbow trout and coho salmon that have been stocked into landlocked lakes provide important opportunities for sports fishermen. According to the "Statewide Harvest Study, 1984 Data", which was prepared by the Sport Fish Division, in the Matanuska Valley and Anchorage area only, hatchery-produced fish from landlocked lakes provided nearly 110,000 angler days of fishing effort; during that time, over 14,000 coho and 56,000 rainbow trout were taken by sports fishermen.

Cook Inlet Egg Takes

More sockeye eggs were collected in 1985 for Cook Inlet hatcheries than any other species. The Kasilof Hatchery collected 23.7 million, Big Lake Hatchery achieved its largest sockeye egg take at 21.6 million, and nearly 9 million eggs were collected for Trail Lakes Hatchery. Almost 1.2 million chinook eggs were taken from Crooked Creek by the crew at the Kasilof Hatchery; these eggs were incubated at Elmendorf and Trail Lakes hatcheries. About 835,000 chinook eggs were taken from Willow Creek and the Deshka River for incubation and rearing at Fort Richardson Hatchery. In order to enhance the chinook returns to the Matanuska/Susitna area, the resulting smolts will be released into their originating watersheds.

Tutka Hatchery collected 32.3 million pink eggs, which is the most in its 9 years of operation; 20,000 chum eggs were also collected.

Nearly 8.2 million coho eggs were collected in 1985; 3.8 million were incubated at Big Lake Hatchery and 1.5 million at the Fort Richardson Hatchery. Most of the resulting juveniles from these two facilities will be released into the Mat/Su area. Coho eggs were also taken for the Elmendorf Hatchery and 2.5 million coho eggs for Trail Lakes Hatchery. Many of the resulting fingerling from Trail Lakes Hatchery will be used for coho landlocked lake stocking programs.

A total of nearly 2.5 million rainbow trout eggs were taken in 1985 for the Fort Richardson Hatchery, and 1.2 million were taken for Elmendorf. All of the resulting fingerling from Elmendorf were stocked in 1985.

KODIAK AND ALASKA PENINSULA

Summary of FRED Projects

The FRED Division maintains an area office at Kodiak and operates a 100 million-egg salmon hatchery at Kitoi Bay on Afognak Island. This facility also stocks salmon and trout at a variety of locations accessible to sports anglers in the Kodiak area.

In addition, a streamside incubation system is an integral part of the Karluk Lake sockeye rehabilitation project. The famous Frazer Lake fishpass on Kodiak Island and six other fishpasses on Afognak Island provide salmon with access to stream spawning and lake rearing areas.

The FRED Division operates a chum salmon hatchery at Russell Creek, near Cold Bay. That facility was originally intended to release about 45 million fed fry each year, which would return about 700,000 chum salmon to the fishery. Major mechanical problems have prevented that hatchery from handling more than 20 million chum salmon eggs per year. However, the hatchery is presently being remodeled and should be able to handle 50 million chum eggs in 1986.

Figures 4 and 5 show where these projects are located.

Kodiak and Alaska Peninsula Highlights

- Nearly 115 million eggs from 4 salmon species were taken for Kitoi Hatchery in 1985.
- The sockeye return to the Upper Thumb River in 1985 was estimated to be 30,000 salmon.
- A record 650,000 sockeye utilized the Frazer Lake fishpass in 1985.
- Over 3.6 million pink salmon returned to Kitoi Hatchery, which is the largest return ever to a state-operated hatchery.
- The Kitoi Hatchery pink salmon return amounted to 47% of the total return to the Kodiak area.
- Renovation of the Russell Creek Hatchery began in the fall of 1985, and will be completed by egg-take season in 1986.

Kodiak and Alaska Peninsula Returns

The largest salmon return to a FRED facility occurred in 1985 at Kitoi Hatchery. The pink salmon return to Kitoi Hatchery was 3.6

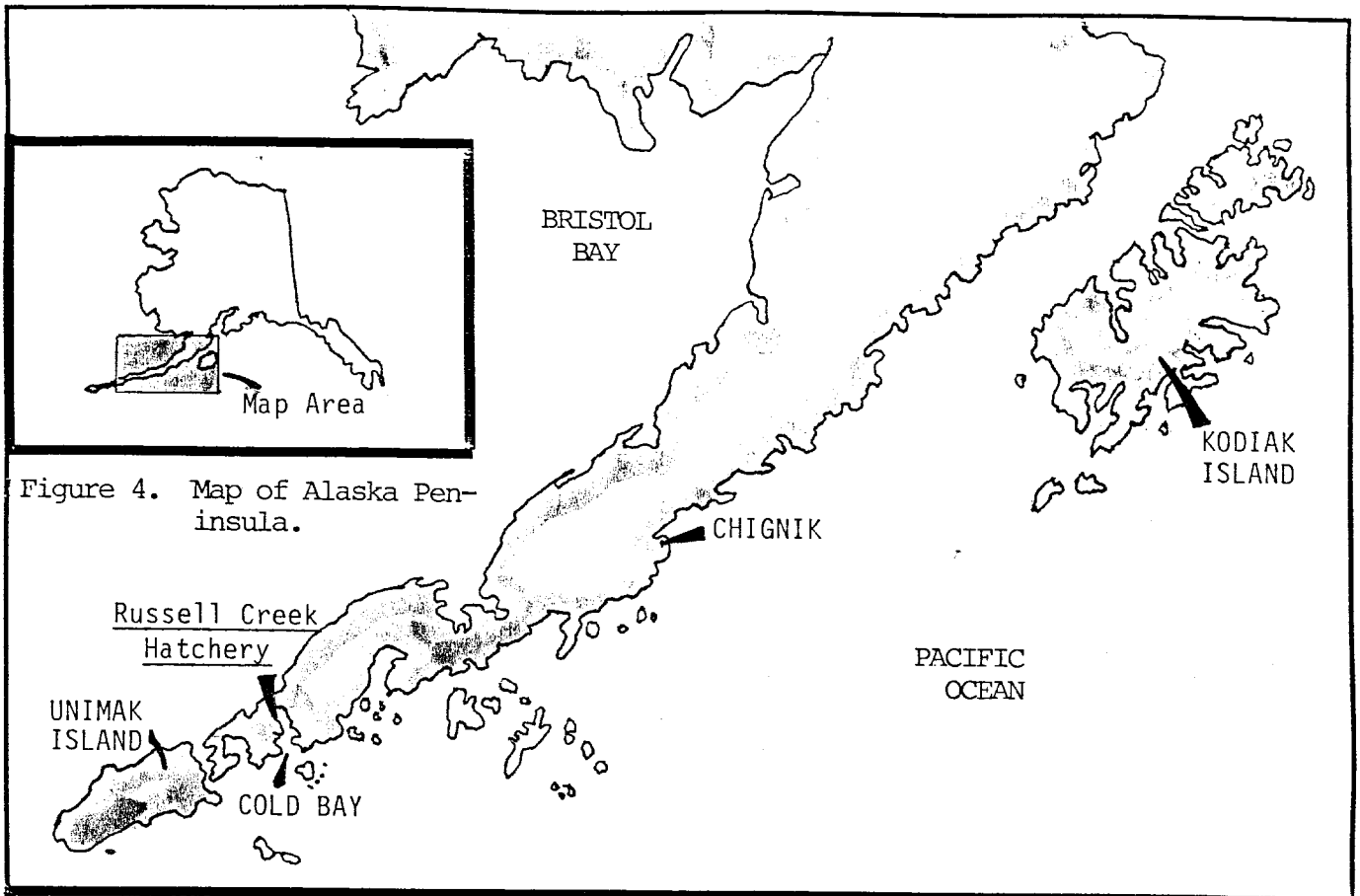


Figure 4. Map of Alaska Peninsula.

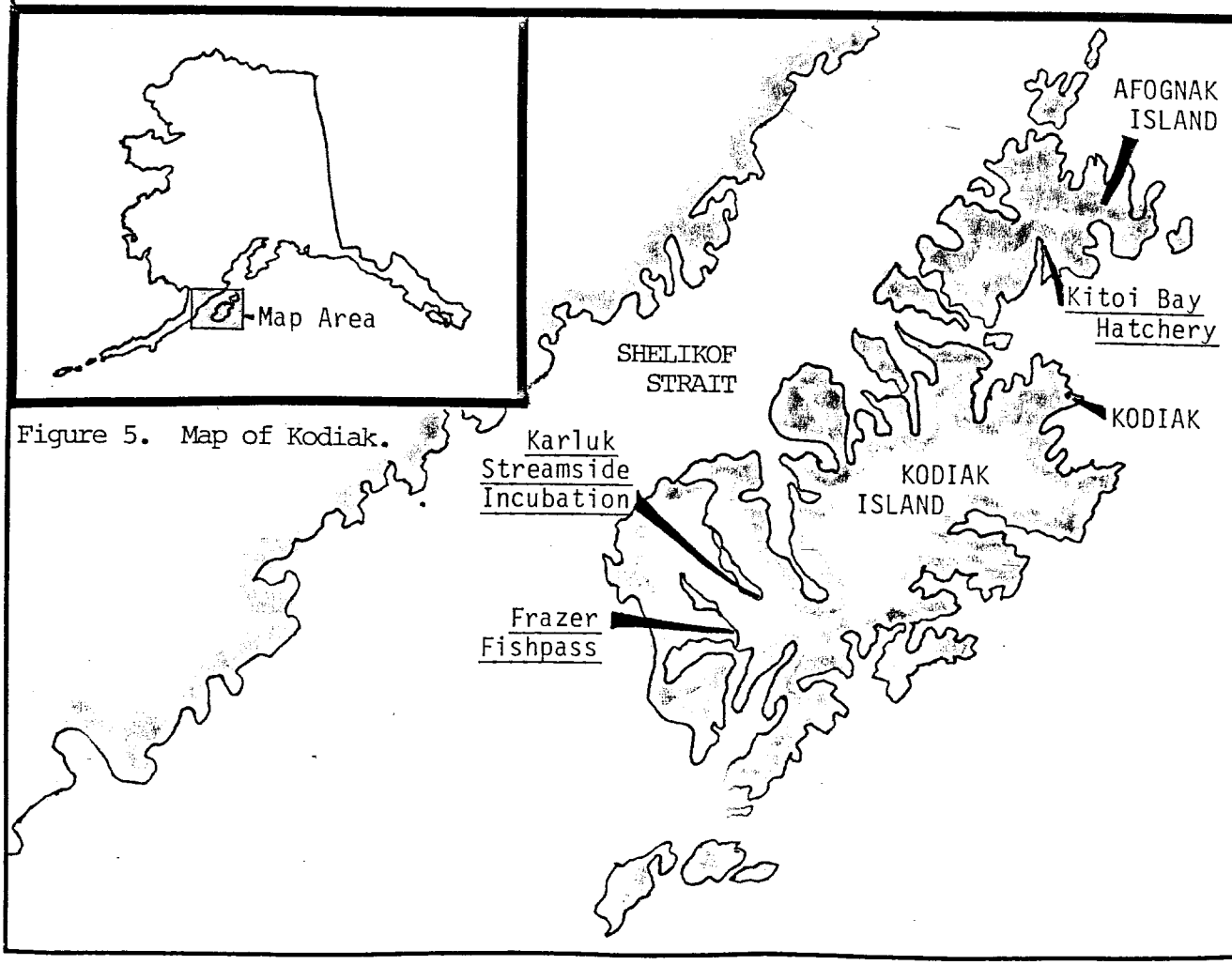


Figure 5. Map of Kodiak.

million; 3.4 million salmon were harvested by commercial fishermen (Table 1). This amounted to 47% of the total pink salmon return to the Kodiak area. Approximately 1,100 chum salmon also returned to the Kitoi Hatchery; this created an incidental fishery and contributed to the development of brood stock for a chum program at the facility.

For several consecutive years, the sockeye salmon return to the upper Thumb River has set records. About 30,000 sockeye returned to the system in 1985; most of them resulted from the Karluk rehabilitation project.

The sockeye salmon return of 650,000 fish to the Frazer fishpass was also a record high. Of these returning sockeye, approximately 165,000 were commercially harvested. In addition, the fishpasses on Afognak Island contributed at least 115,000 pink, coho, and sockeye salmon to the north Afognak fisheries.

An estimated 120,000 Russell Creek Hatchery chum salmon were harvested in the commercial fisheries, and another 40,000 returned to Russell Creek. This is the largest estimated return to the facility ever.

Kodiak and Alaska Peninsula Releases

Again in 1985, Kitoi Hatchery released more juvenile salmonids than any other state facility. Along with the release of 75.1 million pink salmon and 790,000 chum fry, the hatchery personnel also released three other species of salmonids (Tables 2 and 3). About 79,000 chinook, 211,000 coho, and 48,300 rainbow trout were released from Kitoi Hatchery to enhance the roadside sport fisheries around Kodiak. 115,000 grayling fry were brought in from Clear Hatchery and were released into six lakes on Kodiak Island.

There were two other hatchery releases that occurred in this area in 1985. Approximately 16.3 million chum salmon fry were released from the Russell Creek Hatchery, and 18.8 million eyed sockeye eggs were planted into the upper Thumb River as a result of the Karluk streamside incubation project.

Kodiak and Alaska Peninsula Egg Takes

The 114 million pink salmon eggs taken at the Kitoi Hatchery represents the largest number of eggs ever taken at a FRED facility. In addition to these, the Kitoi Hatchery personnel also collected nearly half a million chum eggs, over 200,000 coho eggs, 12,000 chinook eggs, and 76,000 rainbow trout eggs (Table 4).

Nearly 21 million sockeye eggs were taken for the Karluk streamside incubation project. The resulting eyed eggs (18.8

million) were planted into the upper Thumb River in 1985. There were no chum eggs taken at the Russell Creek Hatchery in 1985 because of the remodification of the facility.

ARCTIC-YUKON-KUSKOKWIM

Summary of FRED Projects

The FRED Division maintains an area project office at Fairbanks and fish hatcheries on the Tanana and Noatak rivers. The Noatak facility is testing the feasibility of producing chum salmon, and if successful, it could eventually be able to double the annual catch of chum salmon in Kotzebue Sound. The hatchery on the Tanana River is located near Anderson; it is studying the feasibility of producing grayling, sheefish, and rainbow trout, in addition to chinook, chum, and coho salmon. Salmon that are tagged and released by the hatchery may provide important information on migration of Yukon River salmon stocks when those tags are recovered from high seas and coastal fisheries.

Figure 6 is a map showing the Noatak and Yukon river drainages and the locations of the Sikusuilaq and Clear hatcheries.

Arctic-Yukon-Kuskokwim Highlights

- Clear Hatchery personnel collected eggs from Arctic char for the first time in 1985.
- The first returns of hatchery-produced chinook returned to Clear Hatchery.
- Over 2 million salmonids of four species were stocked for sport fisheries throughout central Alaska, as a result of Clear Hatchery operations in 1985.
- Nearly 2.5 million chum eggs were collected for Sikusuilaq Hatchery.

Arctic-Yukon-Kuskokwim Returns

About 4,300 chum salmon returned in 1985 as a result of Clear Hatchery operations (Table 1). This return provided all the brood stock necessary to meet the hatchery's chum salmon objectives. Coho and chinook salmon also returned to the hatchery's release site in 1985. The chinook salmon return, while not large, is significant because it demonstrates the successful releases of zero-check chinook from Clear Hatchery. For the second year, the surplus salmon returning to Clear Hatchery were donated to local charities.

The first returns of chum salmon (three-year-olds) were expected at Sikusuilaq Hatchery in 1985, but none were found. However,

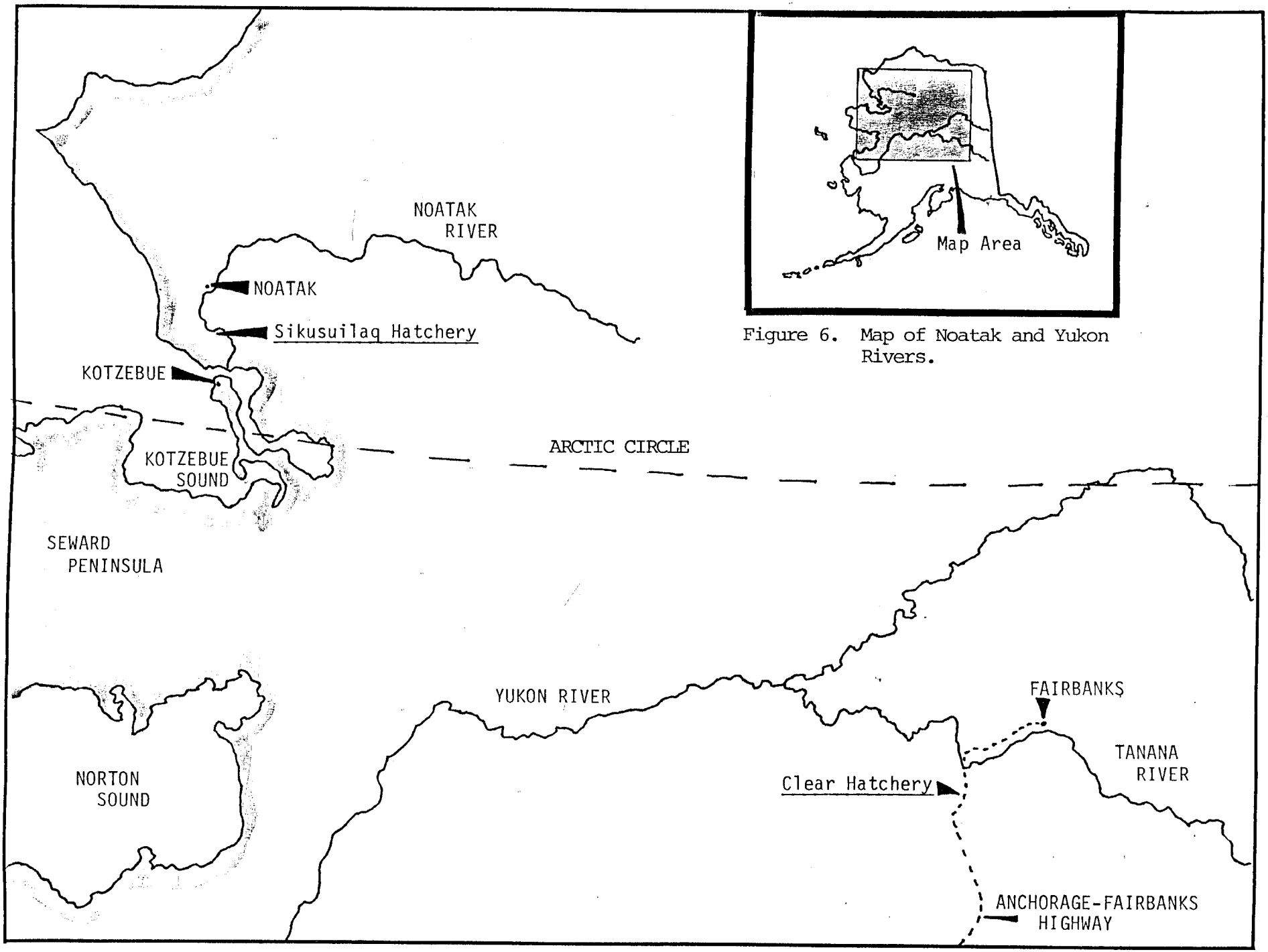


Figure 6. Map of Noatak and Yukon Rivers.

since few three-year-old chums were found in the commercial fishery, the poor return may be due to marine conditions rather than hatchery fry quality. Also, only a small number of fish were expected to return in 1985, and very little effort was spent looking for these returns.

Arctic-Yukon-Kuskokwim Releases

Clear Hatchery released six species of juvenile salmonids in 1985, totaling over 3.8 million (Tables 2 and 3). Over one million of those were grayling fry that were stocked into 58 locations throughout Southcentral and Interior Alaska. Clear Hatchery personnel also planted 428,000 rainbow trout, 140,000 sheefish, and 270,000 coho salmon into numerous lakes in the interior of Alaska. For a complete listing of the stocking locations, see Appendix B. Releases of chinook, chum, and coho salmon were also made at Clear Hatchery. At the Sikusuilaq Hatchery, approximately 1.7 million chum fry were released into the Noatak River.

Arctic-Yukon-Kuskokwim Egg Takes

Over 7.5 million eggs were taken by the two facilities in this area (Table 4). At Clear Hatchery, eggs were taken from 6 species of salmonids, including 2.6 million grayling, 443,000 sheefish, and a new species at the facility--arctic char. Some of the sheefish eggs were taken from fish that had been raised to maturity at the hatchery. Coho, chinook, and chum salmon eggs were also taken for Clear Hatchery. Nearly 2.5 million chum eggs, the current capacity, were collected for the Sikusuilaq Hatchery.

Table 1. Estimates of the numbers of salmon, produced by FRED hatcheries, that returned as adults to the fisheries and facilities in 1985.

Hatchery or Project	Species	Commercial Catch	Sport Catch	Brood Stock/ Escapement	Total
SOUTHEAST					
Beaver Falls	chum	93,300		9,469	102,769
Crystal Lake	chinook	4,513	917	4,213	9,643
	coho	20,000		3,095	23,095
	chum	190		688	878
Deer Mountain	chinook	1,036	781	1,350	3,167
Ward Lake	coho	2,260		1,300	3,560
Hidden Falls	chum	373,000		70,000	443,000
	chinook	67	9	20	96
Klawock	coho	46,880	6,900	12,984	66,764
	chum	1,900		44,953	46,853
Snettisham	chum	28,800		37,526	66,326
	coho	6,610	203	2,539	9,352
	chinook	387	8	81	476
SOUTHEAST TOTALS:		578,943	8,818	188,218	775,979
PRINCE WILLIAM SOUND					
Main Bay	pink	382,900		400	383,300
	chum	556		1,677	2,233
Cannery Creek	pink	2,422,000		170,000	2,592,000
	chum	36,000		400	36,400
Eaglek Bay	pink	111,760		27,940	139,700
Hobo Creek	pink	28,500		6,000	34,500
Gulkana	sockeye	33,000		22,000	55,000
PWS TOTALS:		3,014,716		228,417	3,243,133
COOK INLET					
Kasilof					
Crooked Creek	chinook		640	450	1,090
Tustumena Lake	sockeye	330,000	10,000	170,000	510,000
Leisure Lake	sockeye	65,300	3,500	900	69,700
Chenik Lake	sockeye	10,500		8,500	19,000
Crooked Creek	coho		950	1,900	2,850

-Continued-

Table 1. Continued

Hatchery or Project	Species	Commercial Catch	Sport Catch	Brood Stock/ Escapement	Total
Big Lake	sockeye	40,000	500	39,500	80,000
	coho	1,300	250	1,300	2,850
Ft. Rich/Elmendorf					
Crooked Creek	chinook		2,340	1,585	3,925
Halibut Cove	chinook	300	700	200	1,200
Homer Spit	chinook		300	100	400
Whittier	coho		900		900
	chinook		250		250
Culross Lake	coho		600		600
Seward Lagoon	coho		578	484	1,062
Bear Lake	coho		310	4,677	4,987
Grouse Lake	coho		474	174	648
Tutka Bay	pink	463,600	8,000	53,800	525,400
	chum				0
Trail Lakes					
Grant Lake	coho	500	500	1,000	2,000
Quartz Creek	coho				0
COOK INLET TOTALS:		911,500	30,792	284,570	1,226,862
KODIAK/ALASKA PENINSULA					
Kitoi Bay	pink	3,448,000		190,000	3,638,000
	chum	1,100			1,100
Buskin River	coho	12,000			12,000
Karluk	sockeye	1,800		29,500	31,300
Russell Creek	chum	120,000		40,000	160,000
KODIAK/AK PEN TOTALS:		3,582,900		259,500	3,842,400
ARCTIC-YUKON-KUSKOKWIM					
Clear	coho	105		183	288
	chum	2,300		2,000	4,300
	chinook	105		82	187
AYK TOTALS:		2,510		2,265	4,775
STATE TOTALS:		8,090,569	39,610	962,970	9,093,149

Table 2. Number of salmon released during 1985 by FRED facilities.

Facility	Brood year, Stock, Species	Salmon released
SOUTHEAST		
Beaver Falls	1984 Hugh Smith, sockeye	559,000
Crystal Lake	1983 Andrew-Crystal Creek, chinook	135,000
	1984 Tahini River, chinook	43,000
	1984 Farragut River, chinook	45,300
	1983 Crystal Creek, coho	703,000
	1984 Crystal Creek, coho	1,200,000
Deer Mountain	1984 Ketchikan Creek, chinook	481,000
Hidden Falls	1984 Hidden Falls, chum	30,100,000
	1983 Andrew/Crystal Creek, chinook	97,000
Klawock	1984 Klawock/Beaver Falls, chum	20,100,000
	1983 Klawock River, coho	766,000
	1984 Klawock River, coho	365,000
Snettisham	1984 Snettisham/Neka River, chum	7,510,000
	1982 Speel Lake/Snettisham, coho	3,100
	1983 Speel Lake/Snettisham, coho	234,000
	1984 Snettisham, coho	67,700
	1983 King Salmon/Snettisham,chinook	109,000
	SOUTHEAST REGION TOTAL:	62,518,100
PRINCE WILLIAM SOUND		
Cannery Creek	1984 Cannery Creek, pink	36,500,000
	1984 Cannery Creek, chum	760,000
Gulkana	1984 Gulkana River, sockeye	19,000,000
Main Bay	1984 Cannery Creek, pink	29,300,000
	1984 Wells River, chum	23,600,000
	PRINCE WILLIAM SOUND TOTAL:	109,160,000
COOK INLET		
Big Lake	1984 Fish Creek, sockeye	6,820,000
	1984 Meadow Creek, sockeye	5,610,000
	1984 Cottonwood Creek, coho	29,000
	1984 Fish Creek, coho	78,000
	1984 Little Susitna, coho	1,230,000
	1984 Meadow Creek, coho	1,880,000
Elmendorf	1984 Ship Creek, chinook	119,000
	1984 Crooked Creek, chinook	876,000
	1983 Bear Creek, coho	119,000
	1983 Crooked Creek, coho	127,000
	1984 Crooked Creek, coho	99,300

-Continued-

Table 2. Continued

Facility	Brood year, Stock, Species	Salmon released
Ft. Richardson	1983 Willow Creek, chinook	101,000
	1984 Willow Creek, chinook	592,000
	1983 Little Susitna, coho	54,000
	1984 18 Mile Creek, coho	261,000
Kasilof	1984 Glacier Flats, sockeye	9,590,000
	1984 Bear Creek, sockeye	8,830,000
	1983 Crooked Creek, chinook	53,700
	1983 Crooked Creek, coho	102,000
Trail Lakes	1983 Kenai River, chinook	53,200
	1984 Crooked Creek, chinook	345,000
	1984 Tonsina, chum	454,000
	1984 Quartz Creek, coho	571,000
	1984 Crooked Creek, coho	669,000
	1984 Bear Lake, coho	300,000
	1984 Hidden Lake, sockeye	1,810,000
Tutka	1984 Tutka Lagoon, pink	23,500,000
	1984 Tutka Creek, chum	26,000
	COOK INLET TOTAL:	64,299,200
KODIAK & AK. PENINSULA		
Karluk	1985 Thumb River, sockeye(eyed egg)	18,800,000
Kitoi Bay	1984 Kitoi Bay, pink	75,100,000
	1984 Sturgeon River, chum	784,000
	1984 Big Kitoi, chum	7,100
	1984 Pasagshak River, chinook	79,400
	1984 Little Kitoi, coho	165,000
	1984 Buskin River, coho	46,000
Russell Creek	1984 Russell Creek, chum	16,300,000
	KODIAK & AK. PENINSULA TOTAL:	111,281,500
ARCTIC-YUKON-KUSKOKWIM		
Clear	1984 Salcha River, chinook	90,500
	1984 Wood Creek, chum	1,550,000
	1984 Wood Creek, coho	551,000
Sikusuilaq	1984 Noatak River, chum	1,690,000
	ARCTIC-YUKON-KUSKOKWIM TOTAL:	3,881,500
	SPECIES TOTALS	
	Chinook:	3,220,100
	Coho:	9,620,100
	Sockeye:	71,019,000
	Chum:	102,881,100
	Pink:	164,400,000
	Total Salmon Release:	351,140,300

Table 3. Numbers of fish, other than salmon, planted by FRED in 1985.

Species	Hatchery	Brood stock	Number
Rainbow trout	Elmendorf	1985 Elmendorf	530,000
	Ft. Richardson	1984 Big Lake	79,000
	Ft. Richardson	1985 Big Lake	116,000
	Ft. Richardson	1984 Swanson River	28,000
	Ft. Richardson	1985 Swanson River	629,000
	Clear	1985 Swanson River	428,000
	Kitoi	1985 Big Kitoi	48,300
Steelhead	Klawock	1984 Klawock River	51,300
	Crystal Lake	1983 Falls Creek	6,100
	Crystal Lake	1984 Crystal Creek	30,300
	Ft. Richardson	1984 Anchor River	50,400
	Kasilof	1983 Anchor River	27,900
Grayling	Clear	1985 Moose Lake	683,000
	Clear	1985 Jack Lake	206,000
	Clear	1985 Goodpaster Lake	182,600
Sheefish	Clear	1984 Yukon River	137,000
		1984 Clear	3,000

Table 4. Estimated number of eggs taken by FRED division during 1985.

Facility	Broodstock	Species	Eggs Taken
SOUTHEAST			
Beaver Falls	Hugh Smith Lake	sockeye	1,360,000
Crystal Lake	Tahini River	chinook	60,000
	Farragut River	chinook	50,000
	Crystal Creek	chinook	2,470,000
	Crystal Creek	chum	318,000
	Crystal Creek	coho	1,230,000
	Crystal Creek	steelhead	88,000
Deer Mountain	Ketchikan Creek	chinook	917,000
Hidden Falls	Hidden Falls	chum	58,000,000
	Crystal Creek	chinook	276,000
	Tahini River	chinook	63,000
Klawock	Beaver Falls	chum	9,790,000
	Klawock River	chum	6,070,000
	Klawock River	coho	923,000
	Klawock River	steelhead	91,000

-Continued-

Table 4. Continued

Facility	Broodstock	Species	Eggs Taken
Snettisham	Snettisham	chum	21,700,000
	Crystal Creek	chinook	5,590,000
	King Salmon River	chinook	90,000
	Snettisham	chinook	60,000
	King Salmon River	coho	80,000
	Montana Creek	coho	156,000
	Snettisham	coho	1,880,000
	Peterson Creek	steelhead	28,000
	SOUTHEAST TOTAL		111,290,000
PRINCE WILLIAM SOUND			
Cannery Creek	Cannery Creek	pink	103,000,000
		chum	351,000
Gulkana	Gulkana River	sockeye	31,600,000
Main Bay	Main Bay	pink	2,900,000
	Port San Juan	pink	12,500,000
	Main Bay	chum	1,260,000
	Wells River	chum	10,700,000
	PRINCE WILLIAM SOUND TOTAL		162,311,000
COOK INLET			
Big Lake	Meadow Creek	sockeye	13,800,000
	Fish Creek	sockeye	7,750,000
	Fish Creek	coho	3,460,000
	Little Susitna	coho	352,000
Elmendorf	Crooked Creek	chinook	883,000
	Crooked Creek	coho	312,000
	Ship Creek	coho	68,000
	Elmendorf	rainbow	1,160,000
Ft. Richardson	Willow Creek	chinook	377,000
	Deshka River	chinook	458,000
	Swanson River	rainbow	1,830,000
	Big Lake	rainbow	648,000
	Little Susitna	coho	539,000
	18 Mile Creek	coho	175,000
	Caswell Creek	coho	54,000
	Eyak Lake	coho	750,000
	Anchor River	steelhead	54,000
Kasilof	Bear Creek	sockeye	9,160,000
	Glacier Flats	sockeye	14,500,000
	Crooked Creek	steelhead	82,000
Tutka	Tutka Creek Lagoon	pink	32,300,000
	Tutka Creek Lagoon	chum	20,000

-Continued-

Table 4. Continued

Facility	Broodstock	Species	Eggs Taken
Trail Lakes	Crooked Creek	chinook	311,000
	Eshamy Lake	sockeye	1,880,000
	Hidden Lake	sockeye	7,020,000
	Crooked Creek	coho	1,160,000
	Quartz Creek	coho	299,000
	Bear Creek	coho	1,000,000
	COOK INLET TOTAL		100,402,000
KODIAK & AK. PENINSULA			
Karluk	Thumb River	sockeye	21,000,000
Kitoi Bay	Kitoi Bay	pink	114,000,000
	Stugeon River	chum	484,000
	Big Kitoi	chum	9,600
	Pasagshak River	chinook	12,000
	Little Kitoi	coho	164,000
	Buskin River	coho	44,000
	Big Kitoi	rainbow	76,000
	KODIAK & AK. PENINSULA TOTAL		135,789,600
ARCTIC-YUKON-KUSKOKWIM			
Clear	Moose Lake	grayling	1,280,000
	Jack Lake	grayling	985,000
	Good Paster River	grayling	388,000
	Clear Creek	chinook	245,000
	Wood Creek	chum	1,130,000
	Wood Creek	coho	588,000
	Clear Hatchery	sheefish	32,000
	Yukon River	sheefish	411,000
	Amiloyak	arctic char	27,000
Sikusuilaq	Noatak River	chum	2,460,000
	ARCTIC-YUKON-KUSKOKWIM		7,546,000
	Egg Totals by Species:	Chinook:	11,862,000
		Chum:	112,292,600
		Coho:	13,234,000
		Pink:	264,700,000
		Sockeye:	108,070,000
		Grayling:	2,653,000
		Rainbow:	3,714,000
		Steelhead:	343,000
		Sheefish:	443,000
		Arctic Char	27,000
	STATE TOTAL:		517,338,600

PROGRAM PROJECTIONS, 1986

The FRED Division utilizes several strategies other than hatchery production to increase the abundance of salmon: operation of fish ladders to allow salmon into unutilized spawning areas, lake fertilization, habitat improvement, and fish stocking programs. For some of these strategies, especially fish ladders and habitat improvement, it would be very difficult and cost prohibitive to estimate the increased number of fish attributable to the project. Since hatchery production is the most quantifiable strategy, it is often used as the standard by which the effectiveness of fisheries enhancement is measured. For this same reason, the projections shown in Tables 5 and 6 are based only upon hatchery production of salmon. The evaluation of nonsalmon species (e.g., rainbow, grayling) that are planted into lakes and streams by FRED Division is conducted by the Division of Sport Fisheries.

The number of salmon that returned as a result of FRED operations in 1985 exceeded the statewide projections for every species. The pink salmon returns to both Cannery Creek and Kitoi Bay hatcheries were nearly three times the number projected, and the total production of pink salmon in 1985 was nearly double the statewide projection. Sockeye salmon returning as a result of FRED activities exceeded the predicted number for every project in 1985, and the statewide total return of sockeye to these projects was over three times the number projected. The return of over half of one million salmon to Tustumena Lake was the largest number of sockeye to return as a result of FRED activities and was over five times the number projected to return. The total number of adult chinook, chum, and coho salmon returning in 1985 exceeded the projections by 12%, 25%, and 38%, respectively.

Projected Returns, 1986

A statewide total of over 6.5 million salmon are expected to return in 1986 from previous releases of hatchery fish (Table 5). This is an increase of 1.5 million salmon over what was expected to return in 1985. If favorable ocean survivals are experienced in 1986 as they were in 1985, then the return of salmon to FRED projects could exceed the projected 6.5 million fish by as much as 50%.

Pink salmon again comprise the largest segment of the projected returns, with over 4 million fish returning to the Prince William Sound, Kodiak, and lower Cook Inlet fisheries.

About one million of both sockeye and chum salmon are expected to return to release sites throughout the state in 1986. Over two-thirds of the sockeye return are expected from releases of fry into Tustumena Lake, and nearly 90% of the anticipated statewide sockeye will be returning to Cook Inlet. Almost 80% of the total expected return of chum salmon should return to Southeast Alas-

ka, with the Hidden Falls Hatchery accounting for about half of the statewide total. The Main Bay Hatchery (Prince William Sound) and the Russell Creek Hatchery (Alaska Peninsula) should be the secondary contributors of adult chum salmon.

The hatchery-related returns of chinook and coho salmon in 1986 are both expected to be about 50% higher than the anticipated returns for 1985. The largest producers of coho salmon are expected to be the Crystal Lake and Klawock hatcheries in Southeast Alaska; they should contribute about 78,000 salmon. About 27,000 coho are expected to return to the Big Lake and Nancy Lake systems as a result of Big Lake Hatchery releases; these returns should contribute significantly to the Matanuska/Susitna area sport fisheries. Crystal Lake Hatchery is expected to produce about half of all returning chinook salmon in 1986, with Deer Mountain, Snettisham, and Hidden Falls hatcheries also producing chinook for Southeast Alaska. The largest return of chinook salmon outside of Southeast Alaska is expected at Cooked Creek. These chinook are a result of smolt releases by the Elmendorf and Kasilof hatcheries.

Hatchery Objectives, Fiscal Year 1987

Based upon hatchery objectives from the FY 87 Governor's Budget Request, state-operated facilities propose to handle about 600 million fish eggs (Table 6). This represents an increase of about 73 million over the number of eggs taken the previous year (FY 86). The pink and chinook salmon egg-take objectives for FY 87 are basically the same as the FY 86 numbers, while the coho egg-take objective increased about 5 million eggs; mostly due to the expansion of the Big Lake Hatchery. Due to budget reductions, the operation of the sockeye rehabilitation project at Karluk is not included in the FY 87 Governor's Request. For this reason, the sockeye egg-take objective is less than the actual number of sockeye eggs collected in FY 86.

The statewide FY 87 objective for chum salmon is over 100 million eggs more than were taken in FY 86. One reason for this is that Russell Creek Hatchery, which did not collect eggs in FY 86 because of reconstruction of the facility, will be taking chum eggs in FY 87. Also, fewer chum eggs were taken in FY 86 than were anticipated. This is mainly due to smaller than expected returns of chum to Main Bay (and Wells River remote stock), Snettisham, and Klawock hatcheries that did not supply adequate brood stock to meet the chum egg objectives at those hatcheries. If similar chum returns occur in 1986, then chum salmon egg-take objectives may not be reached at Main Bay and Snettisham hatcheries in FY 87.

If the egg-take objectives for all species are met in FY 87, an estimated 11 million fish should be produced, including nearly 500,000 rainbow, grayling, sheefish, and steelhead.

Table 5. A projection of the number of salmon expected to return in 1986 as a result of FRED hatcheries and projects (excluding fishways).

Return site	Numbers by species				
	Chinook	Coho	Sockeye	Chum	Pink
SOUTHEAST					
Beaver Falls	--	--	--	52,000	--
Crystal Lake	13,000	15,800	--	300	--
Ohmer Creek	--	31,800	--	--	--
Irish Creek	--	9,300	--	--	--
Sumner Creek	--	1,800	--	--	--
Deer Mountain	2,200	--	--	--	--
Ward Creek	--	1,000	--	--	--
Hidden Falls	700	--	--	506,000	--
Klawock	--	20,000	--	157,000	--
Snettisham	2,100	4,300	--	86,000	--
AREA TOTALS:	18,000	84,000		801,300	
PRINCE WILLIAM SOUND					
Cannery Creek	--	--	--	--	2,000,000
Culross Lake	--	600	--	--	--
Gulkana	--	--	82,300	--	--
Main Bay	--	--	--	140,000	700,000
Whittier	1,250	900	--	--	--
AREA TOTALS:	1,400	1,500	82,300	140,000	2,700,000
COOK INLET					
Big Lake	--	22,000	77,000	--	--
Nancy Lake	--	5,000	--	--	--
Grouse Lake	--	1,000	--	--	--
Crooked Creek	4,300	5,100	--	--	--
Tustumena	--	--	670,000	--	--
Grant Lake	--	4,000	--	--	--
Quartz Creek	--	800	3,700	--	--
Tern Lake	--	700	--	--	--
Six Mile Creek	--	6,000	--	--	--
Hidden Lake	--	--	48,800	--	--
Ptarmigan Creek	--	--	3,400	--	--
Fritz Creek	--	1,500	--	--	--
Tutka	--	--	--	15,000	550,000
Halibut Cove	800	--	--	--	--
Homer Spit	400	--	--	--	--
Leisure Lake	--	--	12,000	--	--
Seldovia Lake	--	600	--	--	--
Caribou Lake	--	1,200	--	--	--
Seward Lagoon	--	1,200	--	--	--
AREA TOTALS:	5,500	49,100	814,900	15,000	550,000

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Table 5. Continued.

Return site	Numbers by species				
	Chinook	Coho	Sockeye	Chum	Pink
KODIAK-AK. PENINSULA					
Karluk	--	--	31,300	--	--
Kitoi	--	--	--	1,100	1,129,000
Buskin Lake	--	12,000	--	--	--
Pasagshak	100	--	--	--	--
Russell Creek	--	--	--	104,000	--
AREA TOTALS:	100	12,000	31,300	105,100	1,129,000
ARCTIC-YUKON-KUSKOKWIM					
Clear	300	6,100	--	500	--
Sikusuilaq	--	--	--	6,700	--
AREA TOTALS:	300	6,100	--	7,200	--
STATE TOTALS:	25,300	152,700	928,500	1,068,600	4,379,000
	GRAND TOTAL: 6,554,100				

Table 6. Production potential for FRED hatcheries in Fiscal Year 1987.

Species	Egg objectives 1986 (thousands)	Expected adult returns from 1986 eggs (thousands)a/
Sockeye salmon	77,000.0	829.4
Chum salmon	234,100.0	3,504.0
Pink salmon	255,000.0	5,806.0
Chinook salmon	9,930.0	139.4
Coho salmon	19,050.0	233.9
Steelhead	135.0	2.5
Rainbow trout	2,500.0	470.0
Grayling	1,700.0	15.5
Sheefish	1,500.0	7.1
TOTAL	600,915.0	11,007.8

a/ These adults will return over several years, beginning in 1988.

TECHNOLOGY AND DEVELOPMENT

Laboratories

The FRED Division operates four technical laboratories: coded-wire-tag (CWT) lab, limnology lab, fish pathology lab, and fish genetics lab. The technical services provided by these laboratories is fundamental to the salmon aquaculture and the marine invertebrate mariculture programs in the state. The bulk of the work products from these laboratories is information. Information that is immediately applicable to the operation and performance of enhancement programs and, more and more, to the management of Alaska's fishery resources in general. It comes as no surprise that as a result of having these laboratories, much new information is generated and subsequently reported in the scientific literature. Nevertheless, the mission of these laboratories is focused directly at support of fisheries managers and production operations.

CWT Laboratory:

As of November 26, 1985, the Tag Lab had processed and reported the sampling, biological, and tag code information for tags recovered from the heads of 26,391 salmon and trout:

10,589	Chinook
11,518	Coho
128	Steelhead
1,110	Sockeye
2,620	Chum
419	Pink
7	Species unknown

This same number can be broken down by sample source:

20,363	Commercial
1,435	Sport
1,618	PNP cost recovery fisheries
2,835	Hatchery rack or escapement surveys
140	Subsistence test fisheries, etc.

Also, another 1,500 heads from hatchery racks have been received and await processing. We anticipate receiving an additional 1,200 heads from University of Alaska's pink salmon studies, as well as another 1,000 heads from FRED hatcheries. By the end of the year, the lab will have processed approximately 32,000 heads from adult salmon and steelhead.

In addition to dealing with adult salmon, we also processed 1,400 samples from fry and smolt outmigration and tag-retention studies. Further, a seemingly endless series of ad-hoc requests for information were received and answered.

Each week throughout the season, the lab generated and distributed a series of reports. For the first time this season, these reports included in-season expansion factors for fish caught in Southeast Alaska's commercial fisheries. Embellishments to existing reports and several new reports fulfilling common user needs were written.

In order to implement the "new enhancement" provision of the U.S./Canada Salmon Treaty during the season, a program to estimate hatchery contribution to Southeast Alaska's chinook fisheries was written. Refinements to these basic programs were requested and implemented throughout the season. As a by-product of the chinook programs, the contribution of all species of salmon to troll, seine, and gillnet fisheries in Southeast Alaska were also calculated and made available each week to managers and researchers. Contributions are now reported both by hatchery and by tag code. Catch statistics are automatically retrieved from the Commercial Fisheries in-season catch estimation system.

This season, the lab distributed over 1,600 individual letters to sport fishermen. Each letter provides specific release information for each adipose-clipped fish caught by that individual and recovered by the department. At the end of the year, we will generate similar letters to approximately 2,200 commercial fishermen. These letters will list recovery information for each adipose-clipped fish recovered by the department and attributable to a particular boat.

Release information from over 300 new CWT codes that were used in Southeast Alaska in 1985 was collected, edited, and reported to the Pacific Marine Fisheries Commission. The physical coding on the wire spools was also verified at the Tag Lab.

A great deal of energy was expended to assess needs, write specifications, justify, prepare a bid, and evaluate proposals for the Tag Lab's new data-processing system. The purchase requisition for this new system was issued in December of 1985.

Finally, during the past calendar year, the workload at the lab increased by 23% over last year. This additional work was accomplished with about the same budget as the previous year.

Limnology Laboratory:

The limnology lab conducts a variety of analyses on lake-water samples in support of lake fertilization/stocking projects across the state. During the past year, the lab received and processed samples from over fifty different lakes. Numerous agencies cooperate to support the services provided by the laboratory. Included among these agencies are Regional Aquaculture associations, USEPA, U.S. Forest Service, U.S. Geological Survey, USFWS, Department of Environmental Conservation, and recently, the City and Borough of Juneau. This makes for extremely complicated

budget tracking, but considering the variety of groups/people serviced, it certainly is worth the extra effort. The work of the laboratory assists fisheries and habitat managers in carrying out their jobs. The demand for these technical services far outstrips our capabilities to satisfy everyone's requests. The leader and staff of the limnology laboratory produce more scientific manuscripts than any other unit within the division. During the coming months, they will complete a lengthy laboratory manual that describes all the chemical and biological procedures employed at the lab, as well as in the field. This manuscript will no doubt attract the attention of textbook publishers.

Pathology Laboratory:

Between the FRED and private nonprofit hatcheries, there are now approximately one billion fish eggs under culture in Alaska. Programs of this magnitude place a great reliance on the delivery of fish health services from our pathologists and the pathology laboratory. Combine this with the increasing need for shellfish pathology services in support of our growing oyster industry, and the outcome is a tremendous strain on our current capabilities, both human and laboratory. In order to try to keep up with the demand for these technical services, the FRED Division has entered into an agreement with the University of Alaska, Juneau (UAJ), to establish and operate a joint Southeast Fish Pathology Laboratory in Juneau. Our present laboratory in Anchorage will remain and service the Southcentral Alaska geographic region. The joint laboratory in Juneau will provide a unique opportunity to meet the needs of the industry as well as a training opportunity for students interested in the various aspects of finfish/shellfish pathology.

We are still in the throes of completing an updated fish-disease policy/guidelines document that will serve as a guidepost for fish transports, disease, and other related aspects of concern to hatchery operators and shellfish growers. Simultaneously, we are examining our current laboratory practices with an eye toward improving the speed of sample processing. Screening for Bacterial Kidney Disease is one of our most time-consuming procedures, and new, perhaps better techniques may be available to replace the present fluorescent antibody technique.

Genetics Laboratory:

Work in the genetics laboratory is directed towards protecting the genetic diversity of wild salmon stocks and maintaining the genetic diversity within and among hatchery brood stocks. Genetic profiles of various stocks are developed, using starch gel electrophoresis. Genetic profiles describe the level of genetic variation present and are used to investigate the genetic structure of populations and monitor the interaction of hatchery stocks with neighboring wild stocks. During FY 85, 105 fish

transport requests were reviewed, and the department's "Genetic Policy" was completed and published as a FRED special report.

Noatak River Chum Salmon: Tissue samples were collected from ten spawning sites in the Noatak and Kobuk River drainages. A genetic profile is being developed for each of these samples.

Tutka Lagoon Hatchery Genetic Marking: Tissues were collected from four Kachemak Bay pink salmon populations. Laboratory analysis has been completed, and the final report on this project is being prepared.

Neets Bay Chum Salmon: Tissue samples from Neets Bay and Nakat Inlet were collected and thirty-six genetic loci screened. The National Marine Fisheries Service collected tissue samples from Traders Cove for comparison. Unfortunately, laboratory analysis has not been completed by the contracting agency. Preliminary results show that there is very little difference between these two populations, except at the IDH-2 locus. Tissue sampling from these locations will continue.

Genetic Screening: In addition to the samples cited above for the various specific projects, we have also sampled three pink salmon populations, nine chum salmon populations, and one sockeye salmon population. These populations are either from hatcheries or neighboring streams where changes in the levels of genetic variation are being monitored.

Tustumena Sockeye: The Tustumena sockeye project was initiated in FY 85. Samples from populations spawning in the tributaries of Tustumena Lake were collected in the summer of 1985 (FY 86). They will be screened for biochemical genetic variation. The resulting data will be used to determine the genetic structure of the populations.

Development

The projects that we have been working on during the past year are described in detail in the technical report series that we publish (see following sections on technical publications and presentations). However, several areas of endeavor are so diverse that they warrant a paragraph or two here in order to summarize their status.

Chinook Salmon:

A lot of excitement has been generated over the release of age-zero juvenile chinook from our hatcheries. What is this new technology? What does it involve? Simply put, age-zero releases constitute taking a chinook population, whose evolved strategy is to have its juveniles overwinter in fresh water (one check or age I) before going to sea, and placing that population

into a hatchery situation where we purposely modify the natural one-check strategy to a situation that dictates release of the juvenile to sea at an age preceding one-check; i.e., zero check or age zero. Doing such places an unquantified burden on the individual fish; since the fish have not reared for a longer period, they are smaller and have less chance for survival at sea. So, what is the benefit to a hatchery manager? Well, even though fewer chinooks may survive when released as age zeros vs. those released as yearlings (at least age I), the hatchery can produce 3-4 times as many age-zero chinooks for release than age-1 chinooks. Why is this? Raceway space places limits on the number of fish one can have on hand. Little fish (not "held over" to grow another year) take less space than bigger or yearling fish.

The true measure of the success of this release strategy is the number that survive and return as adults. So far, the data are not yet clear. The approach looks promising and is still under development. Both public and private hatcheries in Southeast Alaska have test groups out at sea. It will take several more years of return data to reach conclusions. Early trials may have coincided with increasingly favorable marine conditions, leading to some amount of distortion in the results. One has to keep in mind that, to the best of our knowledge, all Alaska chinook stocks have the strategy of spending at least one year growing in fresh water before going to sea and that Mother Nature has run many "experiments" to arrive at the best adaptive strategy for a species. Just because it is attractive from a hatchery operations view doesn't make it biologically sound.

Lake Fertilization/Lake Stocking:

We set about several years ago to develop an approach based upon empirical evidence that eventually would become a decision matrix for guiding us through the process of rehabilitation and/or enhancement of sockeye systems. Because of the diversity of lake types encountered and the number of variables that affect lake productivity, the job has been one of differentiating recruitment vs. carrying capacity as limitations to sockeye production and then doing something about modification of either one or the other or both, all in the context of biotic and abiotic variables that come together to affect general lake productivity. Development of an approach has now been completed and appears in a paper by Koenings and Burkett entitled "The Production Patterns of Sockeye Salmon Smolts Relative to Temperature Regimes, Euphotic Volume, Fry Density, and Forage Base Within Alaskan Lakes". So, what we now have coming together on a new threshold is an understanding of the behavior of sockeye producing lakes, the ability to elevate the carrying capacity via nutrient enrichment, and the where-with-all to artificially recruit fry to these systems. In Alaska, 102 million sockeye eggs are under artificial incubation; the ability to successfully "farm around" IHN virus has been achieved.

Sockeye rehabilitation and enhancement in Alaska is ready to ascend to a higher plateau.

Does lake fertilization work in Alaska? The answer is yes, with occasional exceptions. We can manipulate lake systems by addition of fertilizer such that "target" forage organisms are increased in abundance, leading to increases in size and abundance of rearing juveniles and outmigrant smolts. The tool is even more powerful when combined with the ability to stock hatchery produced fry. Hugh Smith Lake, in southeastern Alaska, is an exception. Here, the sockeye juveniles associate throughout their lake residence with a particular temperature isotherm such that physiologically they cannot take advantage of the increased forage; temperature is limiting their ability to increase their individual size. Nevertheless, the lake can "carry", or rear, more juveniles now, so we are planting sockeye fry into it from our Beaver Falls Hatchery.

What has been said above for sockeye also applies for lake plants of coho and chinook. Further, our abilities to ascertain carrying capacity of the rearing environment will allow an entirely new view of setting escapement goals for sockeye systems. The economic returns from this alone will be great.

Mariculture:

Will Alaska's many miles of coastline and uncontaminated waters attract the "blue revolution" to her shores? The possibilities loom large on the horizon. The Governor has appointed a special advisory committee to examine the pros and cons of this industry in the context of what is good for the state and her people, especially her seafood industry. The committee is looking at pen rearing of salmon as one category of endeavor and "everything" else (oysters, scallops, sea vegetables, etc.) as the other category. The special charge to the advisors is to "ready" our state for entry into the activities of tideland permitting, marketing, and development and, in short, to write the play for the stage (habitat) that is here.

Simultaneously, our Southeast regional engineers are in the early stages of designing and siting an oyster hatchery to produce spat for the 20 or so oyster grow-out farms in Southeast Alaska. Further, we are in the early stages of planning and development for of a three-year-long cooperative development effort with the Japanese Overseas Fisheries Cooperative Foundation, which will be aimed at scallop culture in and around Kodiak Island and kelp culture along the outer coast off Sitka.

Engineering:

During the past year, our engineers have commenced with a major $2.5 million rebuild of our Russell Creek Hatchery, which is

located at Cold Bay. When completed, this facility will incubate and release 40 million chum salmon annually.

Other major construction projects at our hatcheries around the state have included raceway completion at Snettisham and Big Lake hatcheries; adult holding and spawning facilities at Deer Mountain, Klawock, and Crystal Lake hatcheries; gas stabilization projects at Fort Richardson and Elmendorf hatcheries; and, at long last, completion of the rainbow brood stock facility at Ft. Richardson Hatchery so that we can get on with the task of genetic manipulation and culture research on the improvement of our rainbow brood stocks there.

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THE PRIVATE NONPROFIT HATCHERY PROGRAM

Background

The 1974 Legislature authorized the Private Nonprofit (PNP) Hatchery Program. The PNP program is administered by the Commissioner of the Alaska Department of Fish and Game (ADF&G) in cooperation with the department's fisheries divisions to carry out statutory and regulatory responsibilities pertaining to public and private aquaculture in Alaska.

The PNP program, with the approval of the Commissioner, is responsible for:

* strategic salmon production planning;
* administration of the permitting process for private nonprofit salmon hatcheries and scientific/educational aquaculture programs;
* development of annual operations management plans for all salmon hatcheries;
* administration and coordination of the fish transport permit system for all hatcheries;
* coordination of technical assistance to private nonprofit hatcheries;
* coordinating the development of qualified regional aquaculture associations.

Regional Associations

The 1976 Legislature authorized creation of regional aquaculture associations. Regional associations are comprised of representatives of commercial fishermen and other user groups in the region, including sport fishermen, subsistence fishermen, and members of local communities. Seven regional associations have been formed:

1. Southern Southeast Regional Aquaculture Association (SSRAA)
2. Northern Southeast Regional Aquaculture Association (NSRAA)
3. Prince William Sound Aquaculture Corporation (PWSAC)

4. Cook Inlet Aquaculture Association (CIAA)

5. Lower Yukon/Kuskokwim Regional Aquaculture Association (LY/KRAA)*

6. Imarpik Regional Aquaculture Corporation - Bristol Bay (IRAC)*

7. Kodiak Regional Aquaculture Association (KRAA)

These associations cooperate with the department in developing and maintaining regional salmon production plans and in the implementation of various salmon rehabilitation and enhancement activities.

Strategic Planning

The 1976 law authorized the Commissioner to designate regions of the state for the purpose of enhancing salmon production. This same law also established the formation of regional planning teams (RPTs) to develop regional salmon plans. Each RPT consists of six voting members, with three department personnel appointed by the Commissioner and three appointed by the Board of Directors of the appropriate regional aquaculture association. The duties and responsibilities of the RPTs are described in a formal charter to the planning teams from the Commissioner. Additionally, specific provisions of the PNP regulations identify their structure and functions. The regulations identify the responsibilities of the RPTs in developing regional comprehensive salmon plans, including provisions for public involvement in the planning process. The Commissioner may also request the involvement of representatives of other federal and state agencies.

The status of planning by region follows:

1. Southern Southeast

   The southern southeast regional plans have been approved and are currently in the plan-maintenance process. This region is presently involved in mitigation planning in connection with the U.S./Canada Pacific Salmon Treaty.

2. Northern Southeast

   The northern southeast regional plans have been approved and are in the plan-maintenance process. In this instance, plan maintenance has involved a revision of the comprehensive plan to incorporate supplemental production ceilings for

* Indicates inactive regional association

certain species in sensitive areas and a tracking system to follow the progress of plan implementation towards regional goals and objectives. This region is also involved in mitigation planning in connection with the U.S./Canada Pacific Salmon Treaty.

3. Yakutat

No formal salmon planning activities have occurred in Yakutat since the approval of the regional plan. The plan has been accepted by the U.S. Forest Service as a basis for the development of land management plans applicable to the region.

4. Prince William Sound

The Prince William Sound Regional Planning Team is nearing completion of Phase II, or site-specific, comprehensive salmon plans for the Prince William Sound area and the Copper River area. Upon approval of these plans by the Commissioner of ADF&G, the team will proceed into the plan maintenance and updating process.

5. Cook Inlet

The planning team efforts in Cook Inlet are presently directed towards watershed system planning, with a goal of assessing the capacity of specific systems to sustain and maintain significant, naturally occurring salmon stocks. Watershed system planning also includes an identification of opportunities for salmon enhancement techniques designed to strengthen existing runs and create new runs. Provisions for user-group access and harvest preferences are of primary consideration in this planning process.

6. Kodiak

The Kodiak Regional Planning Team is presently in the process of developing a Phase II plan for the Kodiak region. Anticipated completion date of a draft plan is June, 1986.

7. Bristol Bay

The staff from the PNP program have been working in cooperation with representatives of the region's salmon users to reactivate an RPT. To accomplish this, the Commissioner has chartered a new Bristol Bay Regional Planning Team. The team is presently developing a draft comprehensive plan for public and agency review this winter.

8. Lower Yukon/Kuskokwim

No formal salmon planning activities are presently occurring in the Lower Yukon/Kuskokwim region. The department has completed a review of the value of the Yukon's salmon resource to the region's users. This review may be used in U.S./Canada salmon negotiations on the Yukon.

Program Funding

Since 1977, funding necessary for the implementation of salmon rehabilitation and enhancement activities by PNP corporations has primarily been obtained through the Fisheries Enhancement Revolving Loan Fund, administered by the Alaska Department of Commerce and Economic Development (DCED). The loan program has gone through several modifications by the State Legislature, the most recent occurring in 1982. At that time the maximum loan amount available for an individual project was increased to $10 million, with a payback period of up to 30 years at approximately a 9.5% interest rate. Payments on these loans can be deferred for 6 to 10 years. Loans for projects not endorsed by the regional aquaculture association may also have these terms with the exception that they are limited to a maximum of $1 million. Loans are available for the purpose of planning, construction, and operation of salmon rehabilitation and enhancement projects, primarily salmon hatcheries. These loans are secured through a collatoral that may include returning hatchery fish and assessments of commercial fishermen.

A cooperative agreement between ADF&G and DCED addresses an interagency review and coordination process regarding PNP hatchery permit applications, the alteration of previously issued PNP hatchery permits, and loans related to PNP hatchery operations or other rehabilitation and enhancement activities.

In 1984, the Governor's fisheries mini-cabinet recommended a freeze on the revolving loan fund pending a review of the costs and benefits of the state's investments in both public and private salmon rehabilitation and enhancement projects. Since that time, loans have been available only for continued operations at existing facilities, some capital improvements at existing facilities, and for construction and operation of new facilities that were approved prior to February 15, 1984.

Table 7 presents cumulative state loans secured by corporations for capital construction and operations, cumulative enhancement funds returned to the regional aquaculture associations, and preliminary estimates by the hatchery operators of revenue generated during 1985 by corporate sales of returning hatchery fish. To date, $47 million has been borrowed by PNP corporations.

Table 7. Cumulative state loans and enhancement funds returned to associations (through June 30,1985), and annual fish sales for 17 private nonprofit (PNP) hatcheries (through Dec. 15, 1985).

Region/Corporation (number of permits)	State Loans		Cumulative Enhancement Funds Generated through Assessments, Returned to Associations via Contract	Estimated Revenue From 1985 Sales of Fish Returning to Special Harvest Areas
	For Capital Construction	For Operations		
SOUTHERN SOUTHEAST				
Southern Southeast Regional Aquaculture Association-SSRAA (2)	$10,156,342.00	$1,785,600.00	$4,199,545.00 (note 1)	$547,034.00
Alaska Aquaculture Foundation, Inc.-AAFI (1)	$1,053,500.00	$590,925.00	N/A	$3,369.34
Meyers Chuck Aquaculture Association-MCAA (1)	$10,000.00	$0.00	N/A	$0.00
NORTHERN SOUTHEAST				
Northern Southeast Regional Aquaculture Association-NSRAA (2)	$2,459,209.00	$1,317,780.00	$2,749,583.00 (note 1)	$17,304.44
Armstrong-Keta, Inc.- A-K (1)	$1,077,145.00	$623,000.00	N/A	$15,000.00
Burro Creek Farms, Inc.-BCF (1)	$191,375.00	$92,000.00	N/A	$1,745.00
Douglas Island Pink and Chum Corp.-DIPC (2)	$563,000.00	$1,223,500.00	N/A	$152,830.00
Kake Nonprofit Fisheries Corp.-KNFC (1)	$543,087.00	$550,663.00	N/A	$0.00
Sheldon Jackson College-SJC (1)	$177,254.00	$61,370.00	N/A	$98,582.84
Tlingit and Haida Central Council-THCC (1)	$1,553,860.00	$0.00	N/A	$0.00
PRINCE WILLIAM SOUND				
Prince William Sound Aquaculture Corp.-PWSAC (2)	$16,052,539.00	$585,500.00	$3,395,816.00 (note 2)	$911,673.05
Valdez Fisheries Development Corp.-VFDC (1)	$3,113,830.00	$1,676,879.00	N/A	$157,717.31
COOK INLET				
Cook Inlet Regional Aquaculture Corp.-CIAA (1)	$1,348,881.00	$444,755.00	$1,906,959.00 (note 3)	$0.00
STATEWIDE TOTALS	$38,300,022.00	$8,951,972.00	$12,251,903.00	$1,905,255.98

note 1: 3% mandatory assessment tax collected collected from commercial fishermen.
note 2: 2% voluntary assessment tax (through 1984) collected from commercial fishermen.
note 3: 2% mandatory assessment tax collected collected from commercial fishermen.

Program Implementation

The application procedures and standards for issuance of PNP salmon hatchery permits are defined by regulations that became effective in April, 1985.

The regulations identify a single application process for a PNP hatchery permit, which supersedes the two-stage (preliminary and final) application process previously used by ADF&G. The regulations require the completion of a management feasibility analysis, by ADF&G, prior to the submittal of a PNP hatchery application. This analysis must be completed within 30 days after the applicant provides the information requested in 5 AAC 40.130 of the regulations. The application process takes approximately 135 days and is designed to comply with a coastal zone consistency review process established by the Governor's Office of Management and Budget.

The appropriate RPT reviews each application and makes a recommendation to the Commissioner on the application's compatibility with the regional comprehensive plan. The RPT uses review criteria which are defined in the PNP regulations.

PNP permit holders may request alterations of their permits and basic management plans, based on accumulated experience and changing conditions. The RPT may review and make a recommendation to the Commissioner on a permit alteration request. Their review is conducted in accordance with performance standards identified in the PNP regulations.

Since the inception of the PNP program, 22 salmon hatchery permits have been issued and 26 applications have been either denied or withdrawn. Fifteen of the permitted PNP hatcheries are in operation and 14 have had returns of adult salmon during 1985. Currently there are seven preliminary or final applications for PNP hatchery permits under consideration. In addition, 41 scientific/educational permits for PNP research projects or school district aquaculture programs have been issued in 1985 by the Commissioner. These permits are administered by the PNP program.

Locations of operational PNP programs and remote release sites are illustrated in Figures 7 and 9.

Hatchery Production

In 1985, PNP corporations estimated that 8.1 million adult salmon, originally released as juveniles from corporate facilities, were either harvested in common-property fisheries or re-

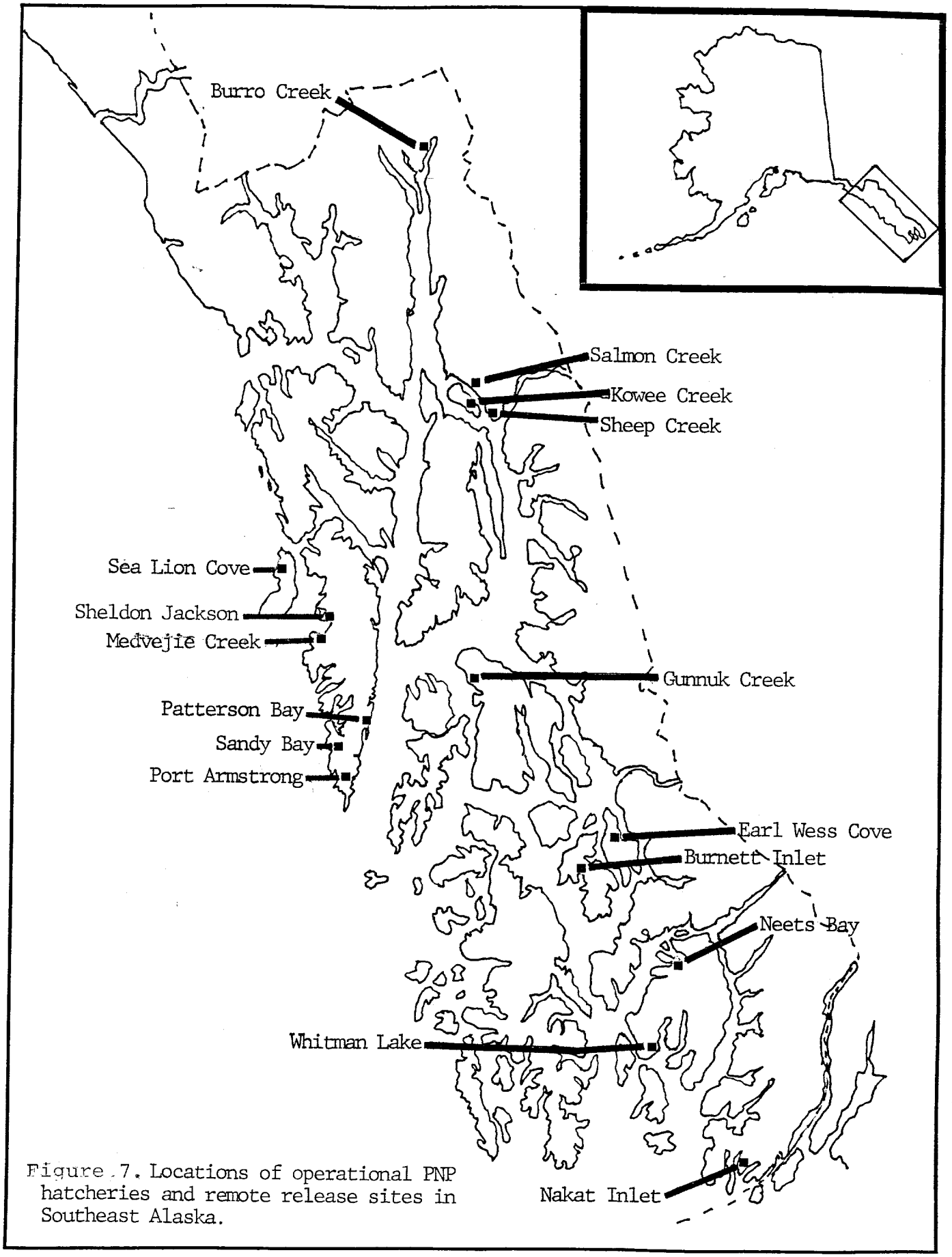

Figure 7. Locations of operational PNP hatcheries and remote release sites in Southeast Alaska.

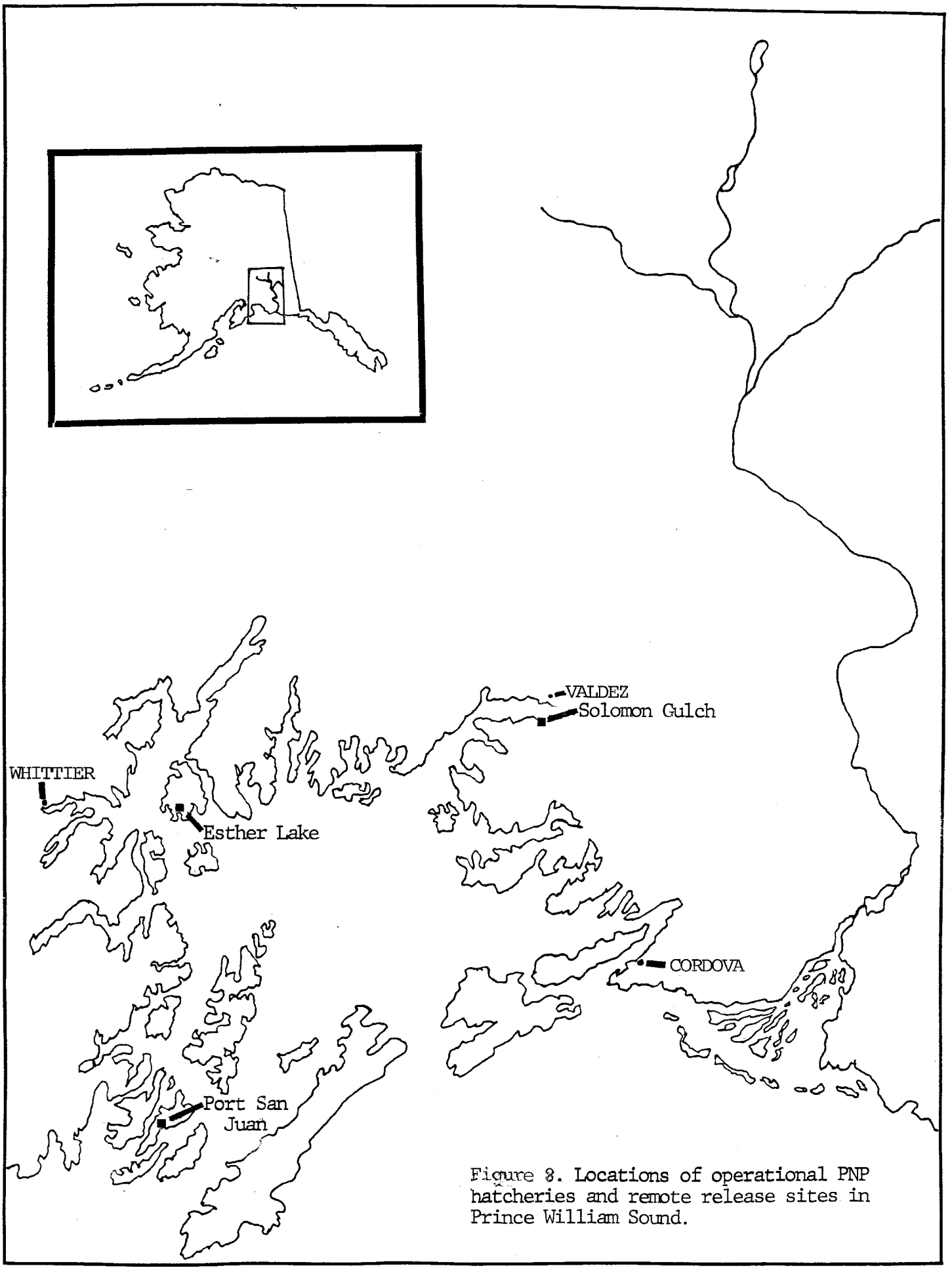

Figure 8. Locations of operational PNP hatcheries and remote release sites in Prince William Sound.

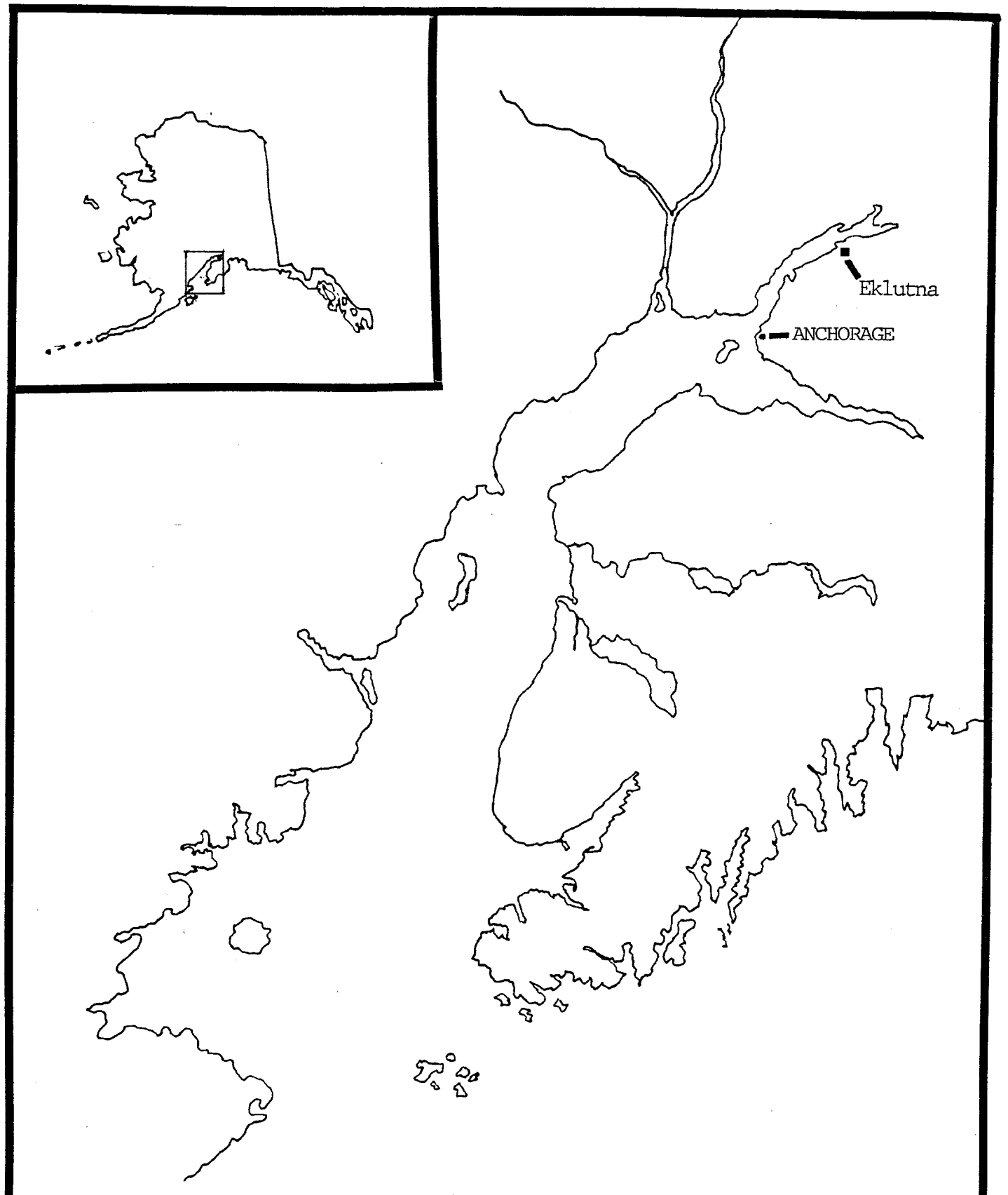

Figure 9. Location of operational PNP hatchery in Cook Inlet.

turned to hatchery special harvest areas (Table 8). In Prince William Sound, returns to the Port San Juan Hatchery were estimated by Prince William Sound Aquaculture Corporation (PWSAC) to have contributed over 3.7 million pinks to the commercial fishery. The Southern Southeast Regional Aquaculture Association (SSRAA) estimates its hatcheries at Neets Bay and Whitman Lake contributed over 245,000 chum, coho, and chinook to common property fisheries in Southeast.

Statewide production data since 1975 for combined species, including adult returns and harvests, are presented in Table 9. Preliminary estimates by the PNP corporations indicate that common property harvest of the 1985 return was over 5.1 million fish. This represents a 42% increase over 1984 in common property harvest. Cumulative data for chum salmon produced by PNP corporations since 1975 are presented in Table 10. Similar data for pink, coho, and chinook are presented in Tables 11, 12, 13, respectively.

Egg takes and fry or smolt stocking are regulated by the ADF&G through fish transport permits (FTPs), which are administered by the PNP program. During 1985, fry and smolt releases increased to 302 million juvenile fish, an increase of over 85 million or 39% from 1984 levels (Table 14). 1985 egg takes for PNP hatcheries totaled nearly 470 million green eggs, up 119 million, or 34%, from 1984 levels. This season's largest egg take was again at Port San Juan Hatchery where over 111 million green pink and chum eggs were taken (Table 15). This was followed by the Valdez Fisheries Development Association (VFDA) -- Solomon Gulch Hatchery -- with over 100 million pink and chum eggs, the PWSAC -- Esther Lake Hatchery -- with over 70 million pink and chum eggs, and the SSRAA -- Neets Bay Hatchery -- with over 40 million chum, coho, and chinook eggs.

Significant progress has again been made in increasing hatchery-originated chinook production. Chinook egg takes this season totaled nearly 6.2 million green eggs, an increase of 3.5 million or 230% above 1984 levels. Estimates of returns from the increased number of eggs taken in 1985 (over 1984) show the potential for providing an additional 59,000 harvestable chinook to the state's common-property fisheries.

A substantial setback in production occurred at the Eklutna Hatchery in 1985 because of an outbreak of Infectious Hematopoietic Necrosis (IHN) in juvenile chinook and chum salmon. All stocks of these species had to be destroyed and the hatchery completely disinfected. Eggs taken from returning chum also were destroyed. The Cook Inlet Aquaculture Association (CIAA) is cooperating fully with ADF&G to take the necessary steps to prevent a reoccurrence of IHN at their hatchery. However, the setback in production will substantially delay brood stock devel-

opment and may impact maximum hatchery capacities for some species at Eklutna.

Many PNP hatcheries are currently in the process of brood stock development and, consequently, have not reached their permitted capacities. Permitted capacities for PNP hatcheries now total nearly 1.08 billion green eggs, an increase of over 36 million from 1984 levels (Table 16). Potential returns from statewide PNP hatchery-originated production at the one billion egg level could approach or exceed 14 million adults, assuming FRED standard assumptions of hatchery and marine survival. Exceptional marine survival, similar to that experienced during recent years, could boost adult production considerably over these estimates. Under the existing permits, approximately 61% of hatchery capacity is scheduled for pink salmon, 37% for chum, and 2% for sockeye, coho, and chinook.

For the 1986 season, projected returns to PNP facilities in southeast Alaska are expected to include approximately 9,000 chinook, 291,000 coho, 669,000 chum, and 638,000 pink salmon, assuming standard survival conditions. Returns to PNP facilities in Prince William Sound are projected at 8,100,000 pink, 95,000 chum and 5,600 coho salmon for 1986.

Significant hatchery special harvests are expected at the Port San Juan, Solomon Gulch, Sheldon Jackson College, Sheep Creek, Neets Bay, Port Armstrong, and Medvejie Creek Hatcheries. Common-property terminal harvests by commercial gear groups are expected only at the Neets Bay and Whitman Lake (Nakat Inlet) Hatcheries.

Annual Management Plans

The PNP regulations, promulgated in April, 1985, require that ADF&G prepare, in conjunction with PNP permit holders, an annual management plan (AMP) to guide hatchery operations for the succeeding calendar year.

AMPs will be developed for each state and PNP hatchery facility prior to the 1986 operating season. The AMPs will be reviewed by both the department and the RPTs before final approval by the Commissioner. The AMPs outline expected operational activities at each facility, including wild and hatchery egg takes, proposed fish and egg transports and releases, anticipated adult returns, anticipated impacts on the management of mixed-stock fisheries, and terminal harvest management strategies. Also included are anticipated facility brood stock requirements and, in the case of PNP facilities, hatchery cost-recovery plans that identify legal gear types for hatchery harvest and number of fish required in order to meet capital and operating expenses.

Table 8. Estimated 1985 adult returns for PNP hatcheries (including common property harvests), as reported by operators.

Region/Facility	Pink	Chum	Coho	Chinook	
SOUTHEAST					
SSRAA - Whitman Lake	-	77,640	29,400	4,964	Note 1
- Neets Bay	-	358,142	114,500	2,531	Note 1
NSRAA - Salmon Creek	60,000	6,069	20,048	-	Note 1
- Medvejie Creek		39,906	624	686	Note 1
AAFI - Burnett Inlet	90,000	5,948	-	-	Note 3
A-K - Port Armstrong	148,000	-	-	-	
SJC - Indian River	306,772	601	3,209	-	Note 2
KNFC - Gunnuk Creek	10,000	40	-	-	
BCF - Burro Creek	42,000	303	-	-	Note 3
MCAA - Meyers Chuck	500	-	-	-	
DIPAC - Sheep Creek	1,137,135	208	-	-	Note 2
- Kowee Creek	13,654	970	-	-	Note 2
SOUTHEAST TOTALS	1,808,061	489,827	167,781	8,181	
PRINCE WILLIAM SOUND					
PWSAC - Port San Juan	5,030,616	31,936	-	-	Note 4
VFDC - Solomon Gulch	566,112	450	34	-	Note 4
PRINCE WM. SD. TOTALS	5,596,728	32,386	34	-	
COOK INLET					
CIAA - Eklutna	-	2,875	612	-	Note 2
COOK INLET TOTALS	-	2,875	612		
STATEWIDE TOTALS	**7,404,789**	**525,088**	**168,427**	**8,181**	

Note 1: estimation based on coded wire tag recoveries.
Note 2: estimation based on assumed marine survival rates.
Note 3: estimation based on assumed interception rate in fisheries.
Note 4: estimation based on data provided by Division of Commercial Fisheries.

Table 9. Summary of statewide salmon production (all species) from PNP hatcheries as reported by operators.

Year	Eggs taken	Fry or Smolt released	Total return	Special harvest	Hatchery revenue
1975	8,091,395				
1976	16,622,881	3,719,741			
1977	37,008,186	12,360,354	160,147	108,718	$130,726
1978	37,346,167	26,796,238	160,967	114,188	$141,799
1979	54,295,879	29,131,774	356,501	244,555	$309,612
1980	125,740,500	35,587,200	1,506,466	346,168	$436,171
1981	223,600,000	101,600,000	2,563,913	850,293	$1,274,640
1982	234,390,000	126,990,000	5,340,720	1,370,110	$1,165,608
1983	261,310,000	170,375,000	4,285,989	744,767	$669,838
1984	372,880,000	217,730,000	4,764,144	1,048,701	$1,668,788
1985	469,960,000	302,320,000	8,106,485	1,853,483	$1,878,348

Cumulative hatchery revenue from special harvest: $7,645,530

Table 10. Summary of chum salmon production from PNP hatcheries.

Year	Eggs taken	Fry or Smolt released	Total return	Special harvest	Hatchery revenue
1975	77,000				
1976	347,275	66,075			
1977	1,614,574	264,068			
1978	1,684,930	1,064,000	543		
1979	6,782,864	924,400	3		
1980	26,850,000	3,340,000	1,588		
1981	32,400,000	21,900,000	20,518	6,115	$24,460
1982	46,130,000	23,590,000	22,133	378	$302
1983	68,790,000	41,770,000	126,783	35,099	$37,120
1984	122,170,000	54,780,000	1,001,449	436,617	$690,393
1985	119,450,000	97,880,000	525,088	123,215	$209,208

Table 11. Summary of pink salmon production from PNP hatcheries.

Year	Eggs taken	Fry or Smolt released	Total return	Special harvest	Hatchery revenue
1975	8,002,395				
1976	16,251,456	3,653,666			
1977	35,383,112	12,093,184	160,147	108,718	$130,726
1978	34,851,807	25,732,238	160,397	114,188	$141,799
1979	46,582,015	28,204,674	356,498	244,555	$309,612
1980	98,030,000	31,690,000	1,504,878	346,168	$436,171
1981	188,000,000	78,800,000	2,491,345	838,037	$1,200,000
1982	185,170,000	102,550,000	5,253,378	1,354,732	$1,084,806
1983	185,520,000	126,890,000	4,086,552	701,399	$613,618
1984	241,760,000	159,340,000	3,637,927	583,185	$741,673
1985	339,910,000	199,490,000	7,404,789	1,698,732	$1,320,320

Table 12. Summary of coho salmon production from PNP hatcheries.

Year	Eggs taken	Fry or Smolt released	Total return	Special harvest	Hatchery revenue
1975	12,000				
1976	24,150	8,000			
1977	10,500	3,102			
1978	809,430	0	27		
1979	931,000	2,700	0		
1980	666,500	557,200	0		
1981	2,800,000	900,000	52,050	6,141	$50,000
1982	2,870,000	700,000	61,709	11,500	$80,500
1983	6,200,000	1,570,000	71,781	7,396	$19,100
1984	6,300,000	3,230,000	121,112	27,310	$233,466
1985	4,100,000	4,220,000	168,427	29,530	$293,820

Table 13. Summary of chinook salmon production from PNP hatcheries.

Year	Eggs taken	Fry or Smolt released	Total return	Special harvest	Hatchery revenue
1980	194,000				
1981	400,000				
1982	220,000	150,000	3,500	3,500	N/A
1983	800,000	140,000	872	872	N/A
1984	2,730,000	380,000	3,656	1,589	$3,256
1985	6,180,000	720,000	8,181	2,006	$55,000

Table 14. 1985 releases from PNP hatcheries in millions.

REGION/LOCATION	Pink	Chum	Coho	Chinook
SOUTHEAST				
SSRAA - Whitman Lake		13.18	0.86	0.03
- Neets Bay		41.95	2.15	0.67
NSRAA - Salmon Creek				
- Medvejie Creek		6.23	1.08	0.02
AAFI - Burnett Inlet	1.65	0.49		
A-K - Port Armstrong	7.31	1.18		
BCF - Burro Creek	1.45	0.46		
DIPAC - Kowee Creek	4.00			
- Sheep Creek	14.93	4.29		
KNFC - Gunnuk Creek		1.98		
SJC - Indian River	11.07	2.31	0.01	
THCC - Sandy Bay	3.99	0.24		
SOUTHEAST TOTALS	44.40	72.32	4.09	0.72
PRINCE WILLIAM SOUND				
PWSAC - Port San Juan	103.53	10.94		
- Esther Lake		12.47		
VFDC - Solomon Gulch	51.28	2.15	0.09	
PRINCE WM. SD. TOTALS	154.81	25.56	0.09	
COOK INLET				
CIAA - Eklutna	0.28		0.04	
COOK INLET TOTAL	0.28		0.04	
STATEWIDE TOTAL	**199.49**	**97.88**	**4.22**	**0.72**

Table 15. 1985 egg takes for PNP hatcheries in millions.

REGION/LOCATION	Pink	Chum	Coho	Chinook	Sockeye
SOUTHEAST					
SSRAA - Whitman L.		11.53	1.00	1.41	0.31
- Neets Bay		33.80	2.48	4.43	
NSRAA - Salmon Cr.					
- Medvejie Cr.		26.80	0.05	0.29	
AAFI - Burnett In.	9.99	0.90	0.10		
A-K - Port Armstrong	14.00	3.00			
BCF - Burro Creek	2.36	0.30			
DIPC - Kowee Cr.	6.63				
- Sheep Cr.	31.47	7.22	0.06		
KNFC - Gunnuk Cr.	3.30	8.20			
MCAA - Meyers Chuck	0.48				
SJC - Indian R.	12.00	2.86	0.15	0.05	
THCC - Sandy Bay					
SOUTHEAST TOTALS	80.23	94.61	3.84	6.18	0.31
PRINCE WILLIAM SOUND					
PWSAC - Port San Juan	109.16	2.13			
- Esther Lake	53.59	17.39			
VFDC - Solomon Gulch	96.85	3.25	0.07		
PRINCE WM. SD. TOTALS	259.60	22.77	0.07	0.00	
COOK INLET					
CIAA - Eklutna	0.08	2.07	0.19	0.00	
COOK INLET TOTALS	0.08	2.07	0.19	0.00	
STATEWIDE TOTALS	**339.91**	**119.45**	**4.10**	**6.18**	**0.31**

Table 16. Permitted egg capacities, in millions, of PNP hatcheries within the planning regions, 1985.

Region	Pink	Chum	Coho	Chinook	Sockeye	Total
Southern Southeast						
Association Facilities	0.00	91.80	8.40	5.50	2.50	108.20
Nonassociation Facilities	21.00	32.00	1.10			54.10
Total	21.00	123.80	9.50	5.50	2.50	162.30
Northern Southeast						
Association Facilities	13.00	52.20	4.10	0.30		69.60
Nonassociation Facilities	98.50	62.00	1.75	0.10		162.35
Total	111.50	114.20	5.85	0.40	0.00	231.95
Prince William Sound						
Association Facilities	361.00	124.00	1.00	1.00		487.00
Nonassociation Facilities	146.00	28.00	1.00	0.05		175.05
Total	507.00	152.00	2.00	1.05	0.00	662.05
Cook Inlet						
Association Facility	10.00	10.00	1.10	0.10		21.20
Total	10.00	10.00	1.10	0.10	0.00	21.20
STATEWIDE TOTAL	**649.50**	**400.00**	**18.45**	**7.05**	**2.50**	**1,077.50**

PROGRAM EXPENDITURES

Fiscal Year 1986 Operating Budget

The FRED Division, as a Budget Request Unit (BRU), requests operating funds in four components. About 95% of the FY 85 authorized budget is in the FRED component, which includes nearly all the division's operational, technical, and administrative functions. The other BRU components are Data and Word Processing, Special Projects, and C.I.P. costs. Special Projects are those that are contracted from federal agencies such as the U.S. Forest Service and other interagency receipts. C.I.P. costs are those incurred to implement in-house construction projects. The total FY 86 authorized budget for the FRED Division BRU was $16,250,200.

The FRED Division can be partitioned into functions for the purpose of examining the BRU's involvement in the state's fisheries program. Table 17 presents a breakdown of the various services the FRED Division performs for Alaska's fisheries enhancement program.

Fiscal Year 1987 Operating Request

The Governor's FY 87 request for the FRED BRU is $15,384,600. This represents a 5.3% reduction from the FY 86 authorized budget. This reduction in funding will mean that some projects and activities will be eliminated and many reduced in scope. Also, opportunities for expansion of some projects will not be realized.

One of the more significant changes is a reduction of the lake fertilization budget to about 40% of the FY 86 level. Much of the research for this enhancement strategy has been accomplished and is outlined on page 39 in the Technology and Development section of this report. Work on several lake systems throughout the state will be curtailed because of the reduced budget. Another impact of the budget will be that several biologist positions will be eliminated or reduced from full time to seasonal and many seasonal employees will remain on layoff status.

The Sikusuilaq Hatchery feasibility investigations have been completed, and this hatchery will be closed unless a decision is reached to fund the expansion of the small-scale facility to a full 60 million egg production hatchery. The Beaver Falls Hatchery will also close unless mitigation funding from the U.S./Canada Pacific Salmon Treaty can be obtained. The sockeye objectives may be transferred to the Klawock Hatchery if Beaver Falls does not operate in FY 87. The sockeye incubation project at Karluk Lake will be curtailed and a final report prepared during FY 87. Another change necessitated by the reduced budget is the transfer of the Kenai River juvenile chinook investigations to the Division of Sport Fisheries. Even though the FY 87 request

is nearly one million dollars less than the FY 86 allocation, the hatchery egg-take objectives are 73 million eggs above the number taken during FY 86. The adult return from the projected 600 million eggs to be taken in 1986 will be approximately 10.5 million salmon. The planned hatchery production associated with this budget request is explained in more detail in the Program Projection section (page 31) of this report.

Table 17. FRED Division operating budget, FY 86.

Function	Budget (x1,000)	Percent
Management/Administration (headquarters & regional offices)	$1,687.2	10.4
Private Nonprofit Hatchery Coordination & Regional Planning	209.2	1.3
Hatchery Production, Statewide (facility operating budgets)	8,288.3	51.0
Biological Projects/Staff (plans, operations, assessments)	1,245.5	7.7
Fish Introduction/Stocking (new opportunities)	252.1	1.7
Lake/Stream Improvement (fishpasses, Kenai River studies)	246.7	1.5
Technical Supervision/Quality Control (biology, fish culture, engineering, maintenance, library)	1,355.4	8.3
Fish Pathology Laboratory (statewide services)	576.2	3.5
Genetics Laboratory (statewide services)	159.8	1.0
Limnology (principal scientist and project leaders)	265.4	1.6
Lake Fertilization/Stocking (field projects statewide and limnology laboratory)	573.7	3.5
Tagged Fish Recovery Laboratory (statewide-U.S./Canada concerns)	249.1	1.5
Biometrics/Data Processing	581.7	3.6
Special Projects (cooperative funding)	314.0	1.9
C.I.P. Costs	245.9	1.5
Total	$16,250.2	100.0

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Report Section	Contributor
Production Report	Mike Kaill, Ph.D. Kit Rawson Marianne McKean Steve Schwartz
Technology and Development	Robert Burkett, Ph.D.
Private Nonprofit Hatcheries	Steve McGee

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APPENDIX A

Life-Stage Survival Summaries for Fish Released in 1985

Table 1. Survival summary of chinook salmon released in 1985 from Southeast Region FRED Division facilities.

Facility	Brood year, Brood stock	Green eggs	Eyed eggs (90%)	Emergent (95%)	Fingerling (90%)	Smolt (72%)
			(percent survival goals from previous stage)			
Crystal Lake	1984 Tahini River	112,000	95,000a/ (84.8%)	47,000 (99.0%)	44,000b/ (92.1%)	
	1984 Faragut River	53,000	49,000 (92.3%)	48,000 (98.0%)	45,000b/ (93.7%)	
	1983 Andrew/Crystal Cr.	227,000	190,000 (83.3%)	186,000 (98.1%)		135,000b/ (73.2%)
Deer Mountain	1984 Ketchikan Creek	739,000	635,000 (86.0%)	552,000 (86.9%)		528,000c/ (95.7%)
Hidden Falls	1983 Andrew/Tahini Mix	86,000	106,000d/ (92.8%)	103,000 (97.2%)		97,000b/ (94.2%)
Snettisham	1983 Snettisham	5,600	5,500 (97.0%)	5,300 (96.4%)		4,900b/ (93.5%)
	1983 King Salmon River	136,000	125,000 (92.3%)	119,000 (94.7%)		104,000b/ (87.4%)

a/ 47,000 eyed eggs were sent to Hidden Falls Hatchery from Crystal Lake Hatchery.
b/ Number released.
c/ 481,000 were released in 1984 as zero-check smolt. The rest are still being reared.
d/ 50,600 eyed eggs were recieved from Crystal Lake Hatchery.

Table 2. Survival summary of chinook salmon released in 1985 from Central Region FRED Division facilities.

Facility	Brood year, Brood stock	Green eggs	Eyed eggs (90%)	Emergent (95%)	Fingerling (90%)	Smolt (72%)
			(percent survival goals from previous stage)			
Clear	1984 Salcha River	106,000	94,000 (88.7%)	93,000 (98.9%)	90,500a/ (96.7%)	
Trail Lakes	1984 Crooked Creek	482.000	434,000 (90.0%)	425,000 (97.9%)	417,000b/ (98.1%)	
	1983 Kenai River	108,000	64,000 (59.3%)	66,000	61,500c/ (93.2%)	53,200a/ (95.0%)
Elmendorf	1984 Crooked Creek	1,050,000	990,000 (94.3%)	973,000 (98.3%)		876,000a/ (90.0%)
	1984 Ship Creek	124,000	123,000 (95.9%)	122,000 (99.2%)		119,000a/ (97.5%)
Ft. Richardson	1983 Willow Creek	307,000	253,000 (82.4%)	161,000 (63.6%)		101,000a/ (62.7%)
	1984 Willow Creek	759,000	630,000 (83.0%)	615,000 (97.6%)		581,000a/ (94.5%)
Kitoi Bay	1984 Pasagshak River	125,000	85,000 (68.0%)	80,000 (94.1%)	79,400a/ (91.90%)	
Kasilof	1983 Crooked Creek	161,000	151,000 (93.8%)	63,000 (41.7%)		53,700a/ (85.7%)

a/ Number released.

b/ 345,000 were released and 72,000 fingerlings were transfered to Kasilof Hatchery.

c/ 5,700 fingerlings were released in 1984.

Table 3. Survival summary of coho salmon released in 1985 from Central Region FRED Division facilities.

Facility	Brood year, Brood stock	Green eggs	Eyed eggs (90%)	Emergent (95%)	Fingerling (90%)	Smolt (72%)
			(percent survival goals from previous stage)			
Clear	1984 Wood Creek	593,000	583,000 (98.3%)	583,000 (100%)	551,000a/ (94.5%)	
Big Lake	1984 Little Susitna	1,350,000	1,310,000 (97.0%)	1,010,000	1,225,000a/ (93.5%)	
	1984 Meadow Creek	2,770,000	2,680,000 (95.0%)	1,960,000 (73.1%)	1,880,000a/ (96.0%)	
	1984 Fish Creek	312,000	252,000 (80.8%)	138,000 (54.8%)	78,000a/ (56.5%)	
	1984 Cottonwood Creek	35,000	34,000 (97.1%)	36,000	29,000a/ (85.3%)	
Elmendorf	1983 Crooked Creek				157,000b/	127,000a/ (80.9%)
	1984 Crooked Creek	213,000	178,000 (83.6%)	167,000 (93.8%)	99,000a/ (44.6%)	
	1983 Seward-Bear Creek	1,140,000	1,010,000 (88.4%)	979,000 (96.9%)	957,000c/ (97.8%)	119,000a/ (34.0%)
Ft. Richardson	1984 18 Mile Creek	476,000	381,000 (80.0%)	397,000	391,000d/ (98.5%)	
	1983 Little Susitna	56,000	55,000 (98.2%)	55,000 (100%)		54,000a/ (98.2%)

-Continued-

Table 3. Continued.

Facility	Brood year, Brood stock	Green eggs	Eyed eggs (90%)	Emergent (95%)	Fingerling (95%)	Smolt (72%)
			(percent survival goals from previous stage)			
Kasilof	1983 Crooked Creek				119,000e/	102,000a/ (97.1%)
Kitoi Bay	1984 Buskin River	47,000	46,000 (97.9%)	46,000 (100%)	46,000a/ (100%)	
	1984 Little Kitoi	212,000	195,000 (92.0%)	174,000 (89.2%)	165,000a/ (94.8%)	
Trail Lakes	1984 Crooked Creek	1,280,000	1,110,000 (86.7%)	1,090,000 (98.2%)	987,000f/ (90.6%)	
	1984 Quartz Creek	737,000	656,000 (89.0%)	646,000 (98.5%)	571,000a/ (88.4%)	
	1984 Bear Lake	616,000	553,000 (89.8%)	548,000 (99.1%)	545,000g/ (99.5%)	

a/ Number released.
b/ Fingerling transfer from Trail Lakes Hatchery.
c/ 607,000 were released in 1984. The rest were reared to the smolt stage.
d/ 261,000 were released as fingerling in 1985. The rest are still being reared.
e/ Fingerling transfer from Trail Lakes Hatchery. 14,000 were released in 1984.
f/ 669,000 were released as fingerling in 1985.
g/ 300,000 were released as fingerling in 1985.

Table 4. Survival summary of coho salmon released in 1985 from Southeast Region FRED Division facilities.

Facility	Brood year, Brood stock	Green eggs	Eyed eggs (90%) (percent survival goals from previous stage)	Emergent (95%)	Fry (95%)	Smolt (72%)
Crystal Lake	1984 Crystal Creek	1,910,000	1,360,000 (71.5%)	1,350,000a/ (99.0%)		
	1983 Crystal Creek	2,340,000	2,213,000 (94.5%)	2,192,000 (99.0%)	2,134,000b/ (97.4%)	703,000c/ (94.4%)
Klawock	1983 Klawock River	1,070,000	1,030,000 (96.1%)	1,010,000 (98.2%)		766,000c/ (73.8%)
	1984 Klawock River	1,580,000	1,500,000 (95.3%)	1,410,000 (93.9%)	1,226,000d/ (87.0%)	
Snettisham	1982 Speel/Snettisham	392,000	351,000 (89.7%)	345,000 (98.3%)		237,000e/ (68.7%)
	1983 Speel/Snettisham	367,000	352,000 (95.8%)	343,000 (98.3%)		234,000c/ (68.2%)
	1984 Snettisham	721,000	696,000 (96.6%)	688,000 (98.8%)	277,000f/ (40.3%)	

a/ 1,200,000 were released in 1985. The rest are being reared.

b/ 1,389,000 fry were stocked in 1984. The remainder were reared to the smolt stage.

c/ Number released.

d/ 365,000 were released as fingerling in 1985.

e/ 234,000 were released as smolt in 1984, and 3,060 were released into Twin Lakes in 1985.

f/ 67,700 were released as fingerling in 1985.

Table 5. Survival summary of pink salmon released in 1985 from Central Region FRED Division facilities.

Facility	Brood year, Brood stock	Green eggs	Eyed eggs (90%) (percent survival goals from previous stage)	Emergent (95%)	Fry (95%)	Fingerling (90%)
Cannery Creek	1984 Cannery Creek	79,900,000	37,200,000 (84.1%)	36,500,000a/ (98.1%)		
Main Bay	1984 Cannery Creek		30,000,000b/	29,300,000a/ (97.7%)		
Kitoi Bay	1984 Kitoi Bay	89,200,000	77,900,000 (87.3%)	75,400,000c/ (96.8%)	14,300,000c/ (97.9%)	55,000a/
Tutka	1984 Tutka Creek/Lagoon	29,500,000	24,800,000 (84.1%)	23,600,000d/ (95.2%)	9,400,000a/ (98.9%)	

a/ Number released.

b/ Eyed eggs transfered from Cannery Creek Hatchery.

c/ 61,100,000 were released as emergent fry, and 13,900,000 were released as fed fry.

d/ 14,100,000 were released as emergent fry. The remainder were short term reared.

Table 6. Survival summary of chum salmon released in 1985 from Central Region FRED Division facilities.

Facility	Brood year, Brood stock	Green eggs	Eyed eggs (90%) (percent survival goals from previous stage)	Emergent (95%)	Fry (95%)	Fingerling (95%)
Cannery Creek	1984 Cannery Creek	933,000	779,000 (83.5%)	760,000a/ (97.6%)		
Clear	1984 Wood Creek	1,860,000	1,630,000 (87.6%)	1,620,000 (99.4%)		1,550,000a/ (95.7%)
Kitoi Bay	1984 Big Kitoi	11,000	10,000 (90.9%)	7,100 (71.0%)	7,100a/ (100%)	
	1984 Sturgeon River	964,000	882,000 (91.5%)	809,000b/ (91.7%)		299,000a/ (92.3%)
Main Bay	1984 Wells River	34,900,000	26,600,000 (76.2%)	26,200,000c/ (98.5%)		6,640,000a/ (72.1%)
Russell Creek	1984 Russell Creek	18,300,000	17,500,000 (95.6%)	16,300,000a/ (98.2%)		
Sikusuilaq	1984 Noatak River	2,580,000	2,020,000 (78.3%)	1,780,000 (88.1%)	1,690,000a/ (94.9%)	
Tutka Bay	1984 Tutka Creek Lagoon	28,000	27,000 (96.4%)	27,000 (100%)	26,000a/ (96.3%)	
Trail Lakes	1984 Tonsina	534,000	458,000 (85.8%)	456,000 (99.6%)		454,000a/ (99.6%)

a/ Number released.

b/ 5,300 released were released as emergent fry and 480,000 as fed fry.

c/ 12,600,000 were released at Lake Bay for PWSAC and 4,390,000 at Main Bay.

Table 7. Survival summary of chum salmon released in 1985 from Southeast Region FRED Division facilities.

Facility	Brood year, Brood stock	Green eggs	Eyed eggs (90%) (percent survival goals from previous stage)	Emergent (95%)	Fry (95%)	Fingerling (95%)
Hidden Falls	1984 Hidden Falls	36,000,000	32,600,000 (96.3%)	31,500,000a/ (96.6%)		21,500,000b/ (93.7%)
Klawock	1984 Klawock River, Beaver Falls	28,600,000	26,000,000 (90.8%)	21,900,000c/ (84.6%)		16,100,000b/ (89.5%)
Snettisham	1984 Neka River/ Snettisham	9,860,000	9,010,000 (91.4%)	7,910,000 (87.7%)		7,510,000b/ (94.9%)

a/ Released 8,550,000 emergent fry.
b/ Number released.
c/ Released 4,040,000 emergent fry.

Table 8. Survival summary of sockeye salmon released in 1985 from Southeast Region FRED Division facilities.

Facility	Brood year, Brood stock	Green eggs	Eyed eggs (90%) (percent survival goals from previous stage)	Emergent (95%)	Fingerling (90%)
Beaver Falls	1984 Hugh Smith Lake	756,000	601,000 (79.4%)	559,000a/ (93.1%)	

a/ Number released.

Table 9. Survival summary of sockeye salmon released in 1985 from Central Region FRED Division facilities.

Facility	Brood year, Brood stock	Green eggs	Eyed eggs (90%) (percent survival goals from previous stage)	Emergent (95%)	Fry (95%)	Fingerling (90%)
Big Lake	1984 Meadow Creek	6,990,000	5,560,000 (79.5%)	5,620,000a/	255,000b/ (94.4%)	
	1984 Fish Creek	9,220,000	8,170,000 (88.6%)	6,940,000c/ (84.9%)	809,000b/ (87.0%)	
Gulkana	1984 Gulkana River	26,800,000		19,100,000b/ (71.3%)		
Karluk	1984 Thumb River	15,500,000	13,200,000d/ (80.5%)			
	1985 Thumb River	21,000,000	18,800,000e/ (89.5%)			
Kasilof	1984 Bear Creek	9,540,000	9,010,000 (94.4%)	8,850,000 (98.2%)	8,820,000b/ (99.7%)	
	1984 Glacier Flats	10,100,000	9,370,000 (92.8%)	9,600,000	9,590,000b/ (99.9%)	
Trail Lakes	1984 Hidden Lake	3,770,000	2,240,000 (59.4%)	1,900,000 (84.8%)		1,810,000b/ (95.3%)

a/ 5,350,000 were released as emergent fry.
b/ Number released.
c/ 6,010,000 were released as emergent fry.
d/ These were planted back into the Thumb River as eyed eggs in 1984.
e/ These were planted back into the Thumb River as eyed eggs in 1985.

Table 10. Survival summary of rainbow trout released in 1985 from Central Region FRED Division facilities.

Facility	Brood year, Brood stock	Green eggs	Eyed eggs (90%)	Emergent (90%)	Fingerling (77%)	Catchable (72%)
			(percent survival goals from previous stage)			
Elmendorf	1985 Elmendorf	1,160,000	1,109,000 (95.6%)	994,000 (85.7%)	530,000a/ (53.3%)	
Ft. Richardson	1984 Big Lake	180,000	157,000 (87.2%)	119,000 (75.8%)		79,000a/ (66.4%)
	1985 Big Lake	648,000	464,000 (71.6%)	438,000 (94.4%)	294,000b/ (67.1%)	
	1984 Swanson River	78,000	55,000 (70.5%)	61,000		28,000a/ (45.9%)
	1985 Swanson River	2,542,000	1,833,000c/ (72.1%)	916,000 (84.0%)	718,000d/ (78.4%)	
Clear	1985 Swanson River		743,000c/	521,000 (70.1%)	428,000a/ (82.1%)	
Kitoi	1985 Big Kitoi	76,000	69,000 (90.8%)	64,000 (92.8%)	48,300a/ (75.5%)	

a/ Number released.

b/ 116,000 were released in 1985.

c/ 743,000 eyed eggs were transfered to Clear Hatchery.

d/ 629,000 were released in 1985.

Table 11. Survival summary of steelhead trout released in 1985 from Southeast Region FRED Division facilities.

Facility	Brood year, Brood stock	Green eggs	Eyed eggs (90%)	Emergent (90%)	Fingerling (85%)	Smolt (72%)
			(percent survival goals from previous stage)			
Crystal Lake	1983 Falls Creek	27,000	20,000 (74.6%)	17,000 (86.4%)		6,100a/ (35.9%)
	1984 Crystal Creek	184,000	154,000 (83.4%)	76,000 (49.5%)	62,300b/ (82.0%)	
Klawock	1984 Klawock River	69,000	65,000 (94.5%)	64,000 (98.8%)		51,300c/ (80.2%)

a/ 3,600 were released.
b/ 30,300 were released.
c/ Number released.

Table 12. Survival summary of steelhead trout released in 1985 from Central Region FRED Division facilities.

Facility	Brood year, Brood stock	Green eggs	Eyed eggs (90%)	Emergent (90%)	Fingerling (85%)	Smolt (72%)
			(percent survival goals from previous stage)			
Ft. Richardson	1984 Anchor River	66,000	57,000 (86.4%)	52,300 (91.8%)		50,400a/ (96.4%)
Kasilof	1983 Anchor River	41,000	33,000 (80.5%)	33,000 (100%)		27,900a/ (84.5%)

a/ Number released.

Table 13. Survival summary of grayling released in 1985 from Central Region FRED Division facilities.

Facility	Brood year, Brood stock	Green eggs	Eyed eggs	Emergent (75%)	Fry (75%)	Fingerling (70%)
			(percent survival goals from previous stage)			
Clear	1985 Moose Lake	1,280,000		1,160,000a/ (90.6%)		33,700b/ (6.6%)
	1985 Jack Lake	985,000		507,000c/ (51.5%)		56,000b/ (15.7%)
	1985 Goodpaster Lake	388,000		211,000d/ (54.4%)		27,600b/ (49.3%)

a/ 649,000 were released as emergent fry or fed fry.
b/ Number released.
c/ 150,000 were released as emergent fry or fed fry.
d/ 155,000 were released as emergent or fed fry.

Table 14. Survival summary of sheefish released in 1985 from Central Region FRED Division facilities.

Facility	Brood year, Brood stock	Green eggs	Eyed eggs	Emergent (50%)	Fry (70%)	Fingerling (50%)
			(percent survival goals from previous stage)			
Clear	1984 Clear Hatchery	178,000		13,000 (7.3%)		3,000a/ (23.1%)
	1984 Yukon River	364,000	261,000 (71.7%)	236,000 (90.4%)		137,000a/ (56.8%)

a/ Number released.

APPENDIX B

Stocking Location by Species for Fish Released in 1985

Table 1. Pink salmon stocked by FRED Division in 1985.

Stocking Location	Area	Hatchery	Life Stage	Number Stocked
Cannery Creek	PWS	Cannery Creek	Emergent Fry	34,500,000
Derickson Bay	PWS	Cannery Creek	Emergent Fry	2,000,000
Main Bay	PWS	Main Bay	Emergent Fry	29,300,000
Tutka Bay	LCI	Tutka	Emergent Fry	10,600,000
Tutka Bay	LCI	Tutka	Fed Fry	9,400,000
Tutka Bay Lagoon Creek	LCI	Tutka	Emergent Fry	3,520,000
Kitoi Bay	KOD	Kitoi	Emergent Fry	61,100,000
Kitoi Bay	KOD	Kitoi	Fed Fry	13,900,000
Kitoi Bay	KOD	Kitoi	Fingerling	55,500

Table 2. Sockeye salmon stocked by FRED Division in 1985.

Stocking Location	Area	Hatchery	Life Stage	Number Stocked
Badger Lake	SEA	Beaver Falls	Fed Fry	556,000
Hugh Smith Lake	SEA	Beaver Falls	Fed Fry	3,000
Crosswind Lake	PWS	Gulkana	Emergent Fry	1,290,000
Gulkana River	PWS	Gulkana	Emergent Fry	9,250,000
Summit Lake	PWS	Gulkana	Emergent Fry	8,450,000
Blodgett Lake	UCI	Big Lake	Emergent Fry	2,100,000
Meadow Creek	UCI	Big Lake	Emergent Fry	9,260,000
Meadow Creek	UCI	Big Lake	Fed Fry	1,064,000
Bear Creek	CCI	Kasilof	Fed Fry	6,670,000
Bear Creek	CCI	Kasilof	Fingerling	137,000
Glacier Creek	CCI	Kasilof	Fed Fry	9,590,000
Hidden Lake	CCI	Trail Lakes	Fingerling	1,810,000
Leisure Lake	LCI	Kasilof	Fed Fry	2,020,000
Upper Thumb River	KOD	Karluk	Eyed Egg	18,800,000

Table 3. Chinook salmon stocked by FRED Division in 1985.

Stocking Location	Area	Hatchery	Life Stage	Number Stocked
Bold Island	SEA	Deer Mountain	Fingerling	28,000
Brennan Lake	SEA	Deer Mountain	Fingerling	226,000
Crystal Creek	SEA	Crystal Lake	Smolt	135,000
Farragut River	SEA	Crystal Lake	Fingerling	45,300
Kasnyku Bay	SEA	Hidden Falls	Smolt	97,000
Speel Arm	SEA	Snettisham	Smolt	109,000
Tahini River	SEA	Crystal Lake	Fingerling	43,000
Thomas Basin	SEA	Deer Mountain	0-check smolt	227,000
Anderson Bay	PWS	Ft. Richardson	Smolt	148,000
Cove Creek	PWS	Elmendorf	Smolt	61,400
Passage Canal	PWS	Elmendorf	Smolt	70,800
Campbell Point Lake*	UCI	Elmendorf	Smolt	3,000
Deception Creek	UCI	Ft. Richardson	Smolt	534,000
Delong Lake*	UCI	Elmendorf	Smolt	3,000
Echo Lake*	UCI	Elmendorf	Fingerling	2,300
Finger Lake*	UCI	Elmendorf	Smolt	8,320
Lucille Lake*	UCI	Elmendorf	Fingerling	96,700
Memory Lake*	UCI	Elmendorf	Fingerling	8,350
Prator Lake*	UCI	Elmendorf	Fingerling	19,900
Rocky Lake*	UCI	Elmendorf	Fingerling	5,900
Ship Creek	UCI	Elmendorf	Smolt	119,000
Victor Lake*	UCI	Elmendorf	Fingerling	1,400
Crooked Creek	CCI	Crooked Creek	Smolt	53,700
Crooked Creek	CCI	Elmendorf	Smolt	175,000
Loon Lake*	CCI	Elmendorf	Fingerling	23,100
Lowell Creek (Seward)	CCI	Elmendorf	Smolt	133,000
Seward Lagoon	CCI	Trail Lakes	Smolt	53,200
Six Mile Creek	CCI	Trail Lakes	Fingerling	230,000
Upper Summit Lake	CCI	Trail Lakes	Fingerling	115,000
Halibut Cove Lagoon	LCI	Elmendorf	Smolt	98,000
Homer Spit	LCI	Elmendorf	Smolt	152,000
Lake Rose Tead	KOD	Kitoi Bay	Fed Fry	59,500
Lake Rose Tead	KOD	Kitoi Bay	Fingerling	19,900
Doc Lake*	AYK	Elmendorf	Smolt	200
Little Harding Lake*	AYK	Elmendorf	Fingerling	10,200
Mach Lake*	AYK	Elmendorf	Smolt	1,000
North Twin Lake*	AYK	Elmendorf	Smolt	1,000
South Twin Lake*	AYK	Elmendorf	Smolt	500
Weasel Lake*	AYK	Elmendorf	Smolt	500
Wood Creek	AYK	Clear	Fingerling	90,500

* Land Locked

Table 4. Coho salmon stocked by FRED Division in 1985.

Stocking Location	Area	Hatchery	Life Stage	Number Stocked
Crystal Creek	SEA	Crystal Lake	Emergent Fry	249,000
Crystal Creek	SEA	Crystal Lake	Smolt	200,000
Dredge Lake	SEA	Snettisham	Smolt	20,200
Indian Lake	SEA	Snettisham	Fingerling	67,700
Irish Creek	SEA	Crystal Lake	Emergent Fry	951,000
Klawock Lake	SEA	Klawock	Fingerling	365,000
Klawock Lake	SEA	Klawock	Smolt	766,000
Ohmer Creek	SEA	Crystal Lake	Smolt	503,000
Speel Arm	SEA	Snettisham	Smolt	214,000
Twin Lakes*	SEA	Snettisham	Smolt	3,060
Culross Lake	PWS	Ft. Richardson	Fingerling	96,900
Passage Canal	PWS	Elmendorf	Smolt	109,000
Surprise Cove Lake #1	PWS	Ft. Richardson	Fingerling	77,000
Surprise Cove Lake #2	PWS	Ft. Richardson	Fingerling	66,600
Bear Paw Lake*	UCI	Elmendorf	Fingerling	9,370
Benka Lake*	UCI	Trail Lakes	Fingerling	18,000
Butterfly Lake	UCI	Big Lake	Fed Fry	119,000
Christiansen Lake*	UCI	Trail Lakes	Fingerling	33,000
Cornelius Lake	UCI	Big Lake	Fed Fry	15,400
Cottonwood Creek	UCI	Big Lake	Fed Fry	31,700
Cottonwood Lake	UCI	Big Lake	Fed Fry	161,000
Delyndia Lake	UCI	Big Lake	Fed Fry	49,000
Echo Lake*	UCI	Elmendorf	Fingerling	2,300
Finger Lake*	UCI	Elmendorf	Fingerling	71,900
Finger Lake*	UCI	Big Lake	Fed Fry	232,000
Horseshoe Creek	UCI	Big Lake	Fed Fry	449,000
Horseshoe Creek	UCI	Big Lake	Emergent Fry	85,000
Junction Lake*	UCI	Trail Lakes	Fingerling	4,400
Meadow Creek	UCI	Big Lake	Fed Fry	68,000
Meadow Creek	UCI	Big Lake	Emergent Fry	1,180,000
Meadow Creek	UCI	Big Lake	Fingerling	133,000
Meadow Creek	UCI	Big Lake	Fed Fry	114,000
Memory Lake*	UCI	Elmendorf	Fingerling	8,400
Mile 18 Creek	UCI	Ft. Richardson	Fingerling	20,500
Nancy Lake	UCI	Big Lake	Fed Fry	127,000
Nancy Lake	UCI	Ft. Richardson	Smolt	54,000
Nancy Lake	UCI	Big Lake	Emergent Fry	165,000
Neklasson Lake	UCI	Big Lake	Fed Fry	26,700
Rocky Lake*	UCI	Elmendorf	Fingerling	5,900
Twin lakes	UCI	Big Lake	Fed Fry	150,000
Victor Lake*	UCI	Elmendorf	Fingerling	1,400
Wasilla Lake	UCI	Big Lake	Fed Fry	111,400
Bear Lake	CCI	Trail Lakes	Fingerling	300,000
Crooked Creek	CCI	Kasilof	Smolt	102,000
Grant Lake	CCI	Trail Lakes	Fingerling	495,000

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Table 4. Continued.

Stocking Location	Area	Hatchery	Life Stage	Number Stocked
Grouse Lake	CCI	Elmendorf	Smolt	56,100
Ingram Creek	CCI	Trail Lakes	Fingerling	90,200
Quartz Creek	CCI	Trail Lakes	Fingerling	38,400
Seward Lagoon	CCI	Elmendorf	Smolt	50,300
Six Mile Creek	CCI	Trail Lakes	Fingerling	302,000
Tern Lake	CCI	Trail Lakes	Fingerling	37,800
Caribou Lake	LCI	Trail Lakes	Fingerling	140,000
Fritz Creek	LCI	Elmendorf	Smolt	31,200
Seldovia Lake	LCI	Trail Lakes	Fingerling	81,900
Barry Lagoon	KOD	Kitoi Bay	Fingerling	20,700
Buskin Lake	KOD	Kitoi Bay	Fingerling	22,000
Dark Lake*	KOD	Kitoi Bay	Fingerling	7,500
Genevieve Lake	KOD	Kitoi Bay	Fingerling	23,400
Island Lake*	KOD	Kitoi Bay	Fingerling	22,500
Kalsin Lagoon	KOD	Kitoi Bay	Fingerling	10,000
Kalsin Lake	KOD	Kitoi Bay	Fingerling	9,400
Little Kitoi Lake	KOD	Kitoi Bay	Fingerling	33,500
Mayflower Lake*	KOD	Kitoi Bay	Fingerling	6,500
Mission Lake	KOD	Kitoi Bay	Fingerling	10,000
Monashka River	KOD	Kitoi Bay	Fingerling	10,000
Orbin Lake*	KOD	Kitoi Bay	Fingerling	7,500
Pillar Creek	KOD	Kitoi Bay	Fingerling	2,700
Pillar Lake	KOD	Kitoi Bay	Fingerling	15,000
Pony Lake*	KOD	Kitoi Bay	Fingerling	2,000
Potatoe Lake	KOD	Kitoi Bay	Fingerling	7,500
28 Mile Pit*	AYK	Clear	Fingerling	500
31 Mile Pit*	AYK	Clear	Fingerling	500
Birch Lake*	AYK	Clear	Fingerling	55,500
Chena Lake*	AYK	Clear	Fingerling	30,000
Clear Creek	AYK	Clear	Fingerling	11,300
Foster Creek	AYK	Clear	Fingerling	83,000
Geskamina Lake*	AYK	Clear	Fingerling	10,000
Johnson Lake	AYK	Clear	Fingerling	500
June Creek	AYK	Clear	Fingerling	111,000
Lisa Lake*	AYK	Clear	Fingerling	10,000
Lost Lake*	AYK	Clear	Fingerling	5,000
Manchu Lake*	AYK	Clear	Fingerling	4,500
Moose Lake*	AYK	Clear	Fingerling	5,000
Quartz Lake*	AYK	Clear	Fingerling	150,000
Slate Lake*	AYK	Clear	Fingerling	2,000
White Alice #1*	AYK	Clear	Fingerling	500
Wood Creek	AYK	Clear	Fingerling	71,700

* Land Locked

Table 5. Chum salmon stocked by FRED Division in 1985.

Stocking Location	Area	Hatchery	Life Stage	Number Stocked
Kasnyku Bay	SEA	Hidden Falls	Emergent Fry	8,550,000
Kasnyku Bay	SEA	Hidden Falls	Fingerling	21,500,000
Klawock River	SEA	Klawock	Emergent Fry	4,040,000
Klawock River/Estuary	SEA	Klawock	Fingerling	16,100,000
Speel Arm	SEA	Snettisham	Fingerling	7,510,000
Cannery Creek	PWS	Cannery Creek	Emergent Fry	760,000
Lake Bay	PWS	Main Bay	Emergent Fry	12,600,000
Main Bay	PWS	Main Bay	Emergent Fry	3,690,000
Main Bay	PWS	Main Bay	Fed Fry	700,000
Main Bay	PWS	Main Bay	Fingerling	6,640,000
Jap Creek	CCI	Trail Lakes	Fingerling	281,000
Spring Creek	CCI	Trail Lakes	Fingerling	173,000
Tutka Bay Lagoon	LCI	Tutka	Fed Fry	25,100
Tutka Bay Lagoon Creek	LCI	Tutka	Emergent Fry	900
Big Kitoi Creek	KOD	Kitoi	Emergent Fry	5,300
Big Kitoi Creek	KOD	Kitoi	Fingerling	299,000
Kitoi Bay	KOD	Kitoi	Fed Fry	487,000
Russell Creek	AKP	Russell Creek	Emergent Fry	16,300,000
Noatak River	AYK	Sikusuilaq	Fed Fry	1,690,000
Wood Creek	AYK	Clear	Emergent Fry	142,000
Wood Creek	AYK	Clear	Fed Fry	306,000
Wood Creek	AYK	Clear	Fingerling	1,010,000

Table 6. Rainbow trout stocked by FRED Division in 1985.

Stocking Location	Area	Hatchery	Life Stage	Number Stocked
Buffalo Lake	PWS	Ft. Richardson	Fingerling	1,000
Sculpin Lake	PWS	Ft. Richardson	Fingerling	28,000
South Jans Lake	PWS	Ft. Richardson	Fingerling	25,000
Two Mile Lake	PWS	Ft. Richardson	Fingerling	3,400
Tolsona Mtn. Lake	PWS	Ft. Richardson	Fingerling	12,000
Tolsona Lake	PWS	Ft. Richardson	Fingerling	25,000
Worthington Lake	PWS	Ft. Richardson	Fingerling	9,980
Beach Lake	UCI	Ft. Richardson	Catchable	2,540
Big No Luck Lake	UCI	Ft. Richardson	Fingerling	13,600
C Street Lake	UCI	Elmendorf	Catchable	300
C Street Lake	UCI	Elmendorf	Broodstock	60
Cheney Pond	UCI	Elmen./Ft. Rich	Broodstock	270
Cheney Pond	UCI	Elmen./Ft. Rich	Catchable	5,450
Clunie Lake	UCI	Elmendorf	Fingerling	27,800
Clunie Lake	UCI	Ft. Richardson	Catchable	7,960
Crystal Lake	UCI	Ft. Richardson	Fingerling	26,900
Dawn Lake	UCI	Ft. Richardson	Fingerling	4,600
Delong Lake	UCI	Ft. Richardson	Catchable	3,310
Derby Pond	UCI	Ft. Richardson	Catchable	2,830
Derby Pond	UCI	Ft. Richardson	Broodstock	500
Dishno Lake	UCI	Ft. Richardson	Catchable	1,150
Douglas Lake	UCI	Ft. Richardson	Fingerling	17,200
Fish Lake	UCI	Ft. Richardson	Catchable	1,040
Florence Lake	UCI	Ft. Richardson	Fingerling	10,900
Green Lake	UCI	Elmen./Ft. Rich	Catchable	5,590
Green Lake	UCI	Elmendorf	Broodstock	60
Gwen Lake	UCI	Ft. Richardson	Catchable	4,080
Hillberg Lake	UCI	Ft. Richardson	Catchable	3,300
Honeybee Lake	UCI	Ft. Richardson	Fingerling	11,600
Irene Lake	UCI	Ft. Richardson	Catchable	2,850
Irene Lake	UCI	Ft. Richardson	Fingerling	5,800
Jewell Lake	UCI	Ft. Richardson	Catchable	6,790
Kepler-Bradley Lake	UCI	Ft. Richardson	Catchable	8,040
Kepler-Bradley Lake	UCI	Ft. Richardson	Fingerling	11,600
Knik Lake	UCI	Ft. Richardson	Fingerling	11,600
Long Lake	UCI	Ft. Richardson	Fingerling	22,800
Lorraine Lake	UCI	Ft. Richardson	Fingerling	29,000
Lower Fire Lake	UCI	Ft. Richardson	Catchable	4,980
Lynne Lake	UCI	Ft. Richardson	Fingerling	14,000
Marion Lake	UCI	Elmendorf	Fingerling	15,000
Matanuska Lake	UCI	Ft. Richardson	Fingerling	19,100
Mirror Lake	UCI	Ft. Richardson	Fingerling	9,000
Mirror Lake	UCI	Ft. Richardson	Broodstock	5,050
Mirror Lake	UCI	Ft. Richardson	Catchable	2,500
Otter Lake	UCI	Ft. Richardson	Catchable	8,500

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Table 6. Continued.

Stocking Location	Area	Hatchery	Life Stage	Number Stocked
Peanut Lake	UCI	Ft. Richardson	Fingerling	3,000
Ravine Lake	UCI	Ft. Richardson	Fingerling	4,540
Reed Lake	UCI	Ft. Richardson	Fingerling	8,180
Sand Lake	UCI	Ft. Richardson	Catchable	14,500
Seymour Lake	UCI	Ft. Richardson	Fingerling	68,800
Shulin Lake	UCI	Elmendorf	Fingerling	352,000
Six Mile Lake	UCI	Ft. Richardson	Catchable	1,530
South Rolley Lake	UCI	Ft. Richardson	Fingerling	21,600
Spring Lake	UCI	Ft. Richardson	Catchable	1,110
Susan Lake	UCI	Ft. Richardson	Fingerling	1,500
Taku Campbell	UCI	Ft. Richardson	Catchable	5,100
Taku Campbell	UCI	Ft. Richardson	Broodstock	100
Thompson Lake	UCI	Ft. Richardson	Catchable	1,150
Tigger Lake	UCI	Ft. Richardson	Fingerling	6,390
Triangle Lake	UCI	Ft. Richardson	Catchable	960
Twin Island Lake	UCI	Ft. Richardson	Fingerling	33,000
Upper Fire Lake	UCI	Ft. Richardson	Broodstock	120
Walby Lake	UCI	Ft. Richardson	Fingerling	29,300
Weiner Lake	UCI	Ft. Richardson	Fingerling	4,100
Wishbone Lake	UCI	Ft. Richardson	Fingerling	10,000
"X" Lake	UCI	Ft. Richardson	Fingerling	20,400
"Y" Lake	UCI	Ft. Richardson	Fingerling	8,000
Barr Lake	CCI	Ft. Richardson	Fingerling	7,350
Island Lake	CCI	Ft. Richardson	Fingerling	40,800
Johnson Lake	CCI	Ft. Richardson	Fingerling	14,400
Longmare Lake	CCI	Ft. Richardson	Fingerling	38,400
Meridian Lake	CCI	Ft. Richardson	Fingerling	4,000
Six Mile Creek	CCI	Elmendorf	Broodstock	70
Six Mile Creek	CCI	Elmendorf	Catchable	450
Sport Lake	CCI	Ft. Richardson	Fingerling	11,900
Stormy Lake	CCI	Ft. Richardson	Fingerling	58,000
Trout Lake	CCI	Elmendorf	Fingerling	50,400
Abercrombie Lake	KOD	Ft. Richardson	Fingerling	1,000
Lee Lake	KOD	Ft. Richardson	Fingerling	1,410
Lilly Lake	KOD	Ft. Richardson	Fingerling	800
Margaret Lake	KOD	Ft. Richardson	Fingerling	800
Tanignak Lake	KOD	Kitoi Bay	Fingerling	5,900
Abercrombie Lake	KOD	Kitoi Bay	Fingerling	1,850
Aurel Lake	KOD	Kitoi Bay	Fingerling	3,300
Big Lake	KOD	Kitoi Bay	Fingerling	4,050
Bull Lake	KOD	Kitoi Bay	Fingerling	2,250
Caroline Lake	KOD	Kitoi Bay	Fingerling	1,600
Cascade Lake	KOD	Kitoi Bay	Fingerling	3,300

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Table 6. Continued.

Stocking Location	Area	Hatchery	Life Stage	Number Stocked
Cicely Lake	KOD	Kitoi Bay	Fingerling	1,680
Delphin Lake	KOD	Kitoi Bay	Fingerling	8,120
Dragonfly Lake	KOD	Kitoi Bay	Fingerling	2,200
Heitman Lake	KOD	Kitoi Bay	Fingerling	6,500
Horseshoe Lake	KOD	Kitoi Bay	Fingerling	1,100
Jack Lake	KOD	Kitoi Bay	Fingerling	1,250
Jupiter Lake	KOD	Kitoi Bay	Fingerling	3,650
Lee Lake	KOD	Kitoi Bay	Fingerling	1,400
Lily Pond Lake	KOD	Kitoi Bay	Fingerling	800
Margaret Lake	KOD	Kitoi Bay	Fingerling	800
Saturn Lake	KOD	Kitoi Bay	Fingerling	1,200
Twin Lake	KOD	Kitoi Bay	Fingerling	3,240
Bluff Cabin	AYK	Clear	Fingerling	10,000
Donna Lake	AYK	Clear	Fingerling	11,600
Forest Lake	AYK	Clear	Fingerling	7,000
Jan Lake	AYK	Clear	Fingerling	8,800
Lake Sansing	AYK	Clear	Fingerling	450
Les' Lake	AYK	Clear	Fingerling	750
Little Donna Lake	AYK	Clear	Fingerling	9,400
Koole Lake	AYK	Clear	Fingerling	30,000
Monte Lake	AYK	Clear	Fingerling	36,000
Quartz Lake	AYK	Clear	Fingerling	388,000
Rainbow Lake	AYK	Clear	Fingerling	24,000
Robertson #2	AYK	Clear	Fingerling	2,000

Table 7. Steelhead trout stocked by FRED Division in 1985.

Stocking Location	Area	Hatchery	Life Stage	Number Stocked
Crystal Creek	SEA	Crystal Lake	Smolt	3,630
Klawock Lake	SEA	Klawock	Fingerling	29,400
Ward Creek	SEA	Klawock	Fingerling	21,900
Willie Lowe Creek	SEA	Crystal Lake	Fingerling	30,300
Campbell Creek	UCI	Ft. Richardson	Smolt	35,200
Crooked Creek	CCI	Kasilof	Smolt	18,000
Bridge Creek Res.	LCI	Kasilof	Smolt	9,880
Chena Lake	AYK	Ft. Richardson	Catchable	15,200

Table 8. Grayling stocked by FRED Division in 1985.

Stocking Location	Area	Hatchery	Life Stage	Number Stocked
Grass Lake	PWS	Clear	Fed Fry	5,000
Jack Lake	PWS	Clear	Fed Fry	90,000
Junction Lake	PWS	Clear	Fingerling	3,500
Little Echo Lake	PWS	Clear	Fingerling	1,000
Little Junction Lake	PWS	Clear	Swimup Fry	5,000
Meiers Lake	PWS	Clear	Swimup Fry	40,000
Moose Creek	PWS	Clear	Fed Fry	50,000
Moose Lake	PWS	Clear	Fingerling	29,200
Poplar Grove Cr.	PWS	Clear	Swimup Fry	20,000
Squirrel Creek	PWS	Clear	Swimup Fry	5,000
Thompson Lake	PWS	Clear	Swimup Fry	10,000
Tolsona Lake	PWS	Clear	Swimup Fry	80,000
Canoe Lake	UCI	Clear	Fingerling	4,240
Canyon Lake	UCI	Clear	Swimup Fry	32,500
Christiansen Lake	UCI	Clear	Fingerling	23,000
Johnson Lake	UCI	Clear	Swimup Fry	36,100
Kepler-Bradley Lake	UCI	Clear	Fingerling	11,600
Long Lake	UCI	Clear	Swimup Fry	58,400
Meirs Lake	UCI	Clear	Swimup Fry	12,700
Meirs Lake	UCI	Clear	Fingerling	3,360
Silver Lake	UCI	Clear	Fingerling	1,440
Wolf Lake	UCI	Clear	Fingerling	12,400
Abercrombie Lake	KOD	Clear	Swimup Fry	25,000
Aurel Lake	KOD	Clear	Swimup Fry	20,000
Cascade Lake	KOD	Clear	Swimup Fry	10,000
Cicely Lake	KOD	Clear	Swimup Fry	10,000
Heitman Lake	KOD	Clear	Swimup Fry	25,000
Long Lake	KOD	Clear	Swimup Fry	25,000
29.5 Steese Hwy.	AYK	Clear	Swimup Fry	10,000
30.6 Steese Hwy.	AYK	Clear	Swimup Fry	10,000
31.6 Steese Hwy.	AYK	Clear	Fingerling	1,600
33.5 Steese Hwy.	AYK	Clear	Swimup Fry	10,000
34.6 Steese Hwy.	AYK	Clear	Fingerling	1,660
35.8 Steese Hwy.	AYK	Clear	Swimup Fry	10,000
36.8 Steese Hwy.	AYK	Clear	Swimup Fry	10,000
81 Mile Pit	AYK	Clear	Fed Fry	5,000
Bathing Beauty Pond	AYK	Clear	Swimup Fry	10,000
Chena Hot Spg. 30.9	AYK	Clear	Swimup Fry	19,700
Chena Hot Spg. 32.9	AYK	Clear	Swimup Fry	40,000
Chena Hot Spg. 33.3	AYK	Clear	Swimup Fry	20,000
Chena Hot Spg. 38.8	AYK	Clear	Swimup Fry	20,000
Chena Hot Spg. 42.8	AYK	Clear	Swimup Fry	10,000

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Table 8. Continued.

Stocking Location	Area	Hatchery	Life Stage	Number Stocked
Chena Hot Spg. 43.7	AYK	Clear	Swimup Fry	20,000
Chena Hot Spg. 45.5	AYK	Clear	Swimup Fry	10,000
Chena Hot Spg. 47.9	AYK	Clear	Swimup Fry	10,000
Chet Lake	AYK	Clear	Fed Fry	25,000
Coal Mine #3	AYK	Clear	Fed Fry	15,000
Delta/Clearwater River	AYK	Clear	Fingerling	21,000
Goodpaster River	AYK	Clear	Fingerling	3,300
Grayling Pond	AYK	Clear	Swimup Fry	10,000
Hidden Lake	AYK	Clear	Swimup Fry	10,000
J Lake	AYK	Clear	Smolt	25,000
Johnson Rd. Pit #2	AYK	Clear	Swimup Fry	10,000
Left O.P. Lake	AYK	Clear	Fed Fry	25,000
Nickel Lake	AYK	Clear	Fed Fry	25,000
Walden Pond	AYK	Clear	Swimup Fry	10,000
West Pond	AYK	Clear	Fed Fry	25,000

Table 9. Sheefish stocked by FRED Division in 1985.

Stocking Location	Area	Hatchery	Life Stage	Number Stocked
Chatanika River	AYK	Clear	Fingerling	137,000
Earthmover Pit*	AYK	Clear	Catchable	90
Ft. Greely #4	AYK	Clear	Fingerling	900
Nenana Pond*	AYK	Clear	Fingerling	1,000
Silver Fox Pit*	AYK	Clear	Fingerling	300
Texas Lake	AYK	Clear	Fingerling	300
Weigh Station Pond*	AYK	Clear	Fingerling	500

* Land Locked

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