FRED Reports

FRED 1986 ANNUAL REPORT
TO THE ALASKA STATE LEGISLATURE

Edited by
Jeffrey A. Hansen

Number 70

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

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Alaska Department of Fish and Game
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Enhancement and Development

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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.

Over 1 billion salmon eggs were collected for hatcheries in the State of Alaska during 1986 through the combined efforts of FRED Division and the PNP hatchery operators. At least 19 million salmon are expected to return to the fisheries throughout the state as a result of these eggs.

During 1986, FRED released more than 390 million young salmon, an increase of 39 million over 1985 releases. FRED personnel also planted over 3 million trout, sheefish, and grayling statewide in 1986. About 502 million eggs were taken for incubation during the year, and over 5.3 million adult salmon returned in 1986 as a result of FRED projects. An additional 429,000 trout, sheefish, and grayling were harvested by sport fishermen during the year.

PNP hatcheries throughout the state released nearly 381 million salmon, and collected 522 million salmon eggs in 1986. Some of these eggs (about 20 million) were transferred from state facilities. An estimated 7.9 million adult salmon returned in 1986 as a result of PNP hatchery operations.

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PREFACE

The seafood industry in Alaska could be the largest and most profitable in the world. The North Pacific Ocean and the Bering Sea are reputed to hold 20% of the world's protein. That makes Alaska the "Saudi Arabia" of seafood. Recently, the North American people have discovered that eating fish is healthy and fun, and in 1986, the per-capita consumption of fish in the United States for the first time passed the consumption of chocolate. Predictions of per-capita consumption of seafood in the United States at the end of this century will now probably be realized as early as 1990.

Alaska is seafood country. This industry represents about the only real manufacturing sector in our underdeveloped Alaskan economy and is our largest employer. In 1986, in round numbers, there were 28,600 vessel permits issued and 17,300 individual commercial fishing permits, as well as 30,000 crew licenses sold. The processing and fish companies in the private sector employed between 25,000 and 30,000 workers during peak periods. We also find over 300,000 sportsmen enjoying our waters. The sport fishing industry is finally becoming recognized as an important segment of our economy.

In order to manage, research, enhance, rehabilitate, protect, inspect, and administer our fisheries, several divisions in the Department of Fish and Game are involved. They will spend roughly $32 million in FY 87. State government is also involved in enforcement of fishing regulations, and this cost an additional $7.5 million. The Departments of Commerce and Economic Development and Environmental Conservation are also involved with budgets of about $2 and $0.9 million, respectively. The total General Fund dollars to carry out government's role in the care of our commercial fisheries resource is roughly $42 million in FY 87.

In 1986 the licenses and taxes collected as "rent" from the seafood industry was roughly $37 million. This rent comes in the form of license fees, raw fish tax, and marine fuel taxes. Therefore, the rent collected nearly offsets the "overhead" cost to manage our seafood assets.

In 1971 the Fisheries Rehabilitation, Enhancement and Development (FRED) program was put in place by the Alaska State Legislature to ensure that our production of salmon would not fall to those levels experienced in the early 1970s. The long-range goal for the enhancement program, including the involvement of the fishermen (regional associations) and the private sector (ma and pa operations), was to produce 25 million salmon for harvest annually. We now have most of the system to accomplish this goal in place. In 1985 the total number of eggs collected from the hatcheries in the state was just under one billion eggs, and in 1986, the billion-egg mark was passed. This production will represent a harvest of over 19 million salmon worth about $40 million to the fishermen annually.

The year of 1986 also brought with it a drastic reduction in the price of oil, resulting in a huge drop in revenues for Alaska. The "rent" collected from the sale of oil was, and had been for several years, paying for the cost of most of the goods and services we all enjoyed. Now that our "petrol dividends" have dropped, we are faced with deciding how to reduce the level of goods and services; i.e., how to reduce the overhead or the cost of doing business, and how and where can the "rent" be raised on other state-owned assets. The solution is that both must be examined.

In cutting goods and services, it is important to know the impact so that economic activity, in the form of resident jobs, income, and wages, is impacted the least. Likewise, in determining how and who should be responsible for paying more rent, it is important to apply increases in taxes and license fees to those who are benefiting the most from the harvest and utilization of our fisheries resource. In this regard, fish are not unlike oil, except the fisheries resource is forever, and oil will be for one time.

The FY 88 budget proposes sweeping reductions in the enhancement of our commercial fisheries. In addition to the reductions, many projects in the FRED program will be on a holding posture, which is counter to cost-effectiveness.

In determining the consequences of proposed reductions in the FRED program, independent leading experts at the Institute of Social and Economic Research (ISER) were contracted, specifically under the direction of Dr. Oliver S. Goldsmith. The result of this independent study is a preliminary computer model of the salmon fishing economy designed to identify some of the economic consequences of fisheries enhancement for the commercial fisheries. Because the fishing industry includes a great deal of employment and the only real manufacturing sector in our Alaskan economy, changes in the gross revenue of the salmon catch result in staggering changes in resident employment and wages. The ISER analysis evaluates the operation of FRED projects at $2.5 million below the current potential. While the proposed reductions will save the state treasury $2.5 million, the decrease in economic activity will result in a loss of over $4.1 million in resident income and the loss of over 130 full- or part-time jobs.

Reducing the overhead; i.e., the reduction in spending from the state treasury causes impacts through the economy that fall beyond the commonly held assumption that any reduction in state spending and elimination of state jobs is good. The Alaskan fisheries resource is the most important renewable resource the state has. Most of our investment in developing this resource has centered around managing a harvest with small investments in research and enhancement. The seafood industry is the state's most important industry in terms of employment. Its ability to sustain itself and grow will be because of the renewability of the raw product and consumer demand for one of the world's greatest foods.

All of the economic analyses done in recent years concerning this industry illuminate its potential and verify that the rather small investments that government has made to manage this valuable asset is one of the best investments the state makes. If government no longer has the financial resources to support its fisheries, then it is time to consider raising the rent to at least cover the overhead, because the impact of reduction in state spending causes a disproportionate amount of economic despair.

S. A. Moberly
Director

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; mitigates fish losses from foreign interceptions and environmental disruptions; contributes fish to existing but depressed fisheries; and creates new opportunities for commercial, sport, and subsistence fisheries.

Statutory 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. Fishpasses located throughout the state 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 (USFS). 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.

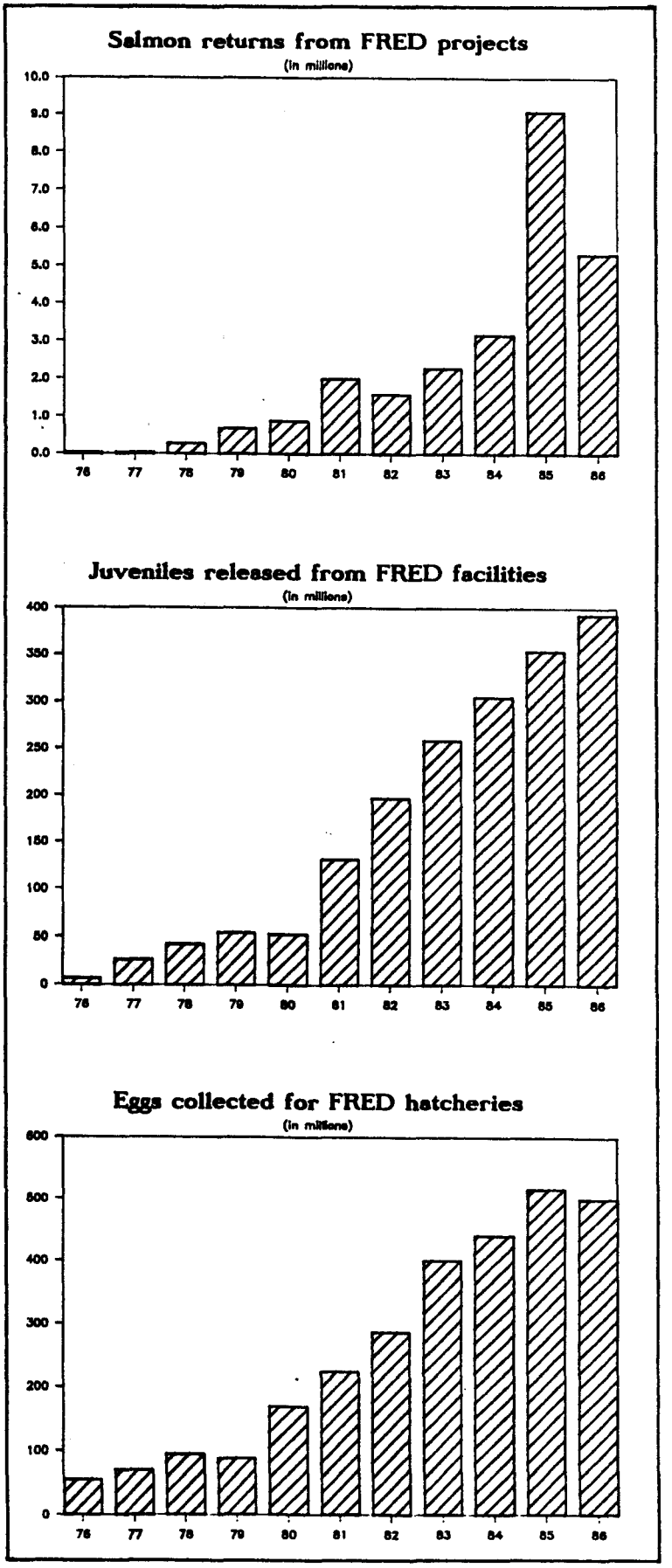
FRED Division has become involved in the organization, permitting, and coordination of mariculture projects on shellfish. The program has begun with 16 active or potential private mariculturists working on scallop, mussel, and oyster projects. A cooperative project, involving ADF&G and the Japanese Overseas Fishery Cooperative Foundation (OFCF), to study the feasibility of scallop spat collection in the Kodiak area is scheduled to begin in 1987.

Over 5.3 million adult salmon returned in 1986 as a result of FRED projects. Of these, nearly 3.9 million salmon were harvested by commercial fishermen. Another 200,000 salmon and 425,000 trout were estimated to have been caught by sport fishermen. Although the total return in 1986 was less than the previous year, the number of fish returning increased for every species except pink salmon. A listing of the returns to FRED projects by species and facility appears in Table 1.

Releases of fish by FRED projects during 1986 totaled over 393 million, 39 million more than in 1985. Fewer chum salmon were released in 1986, while chinook and pink salmon releases were at least 35% above the 1985 releases. Releases by area, facility, and species appear in Table 2. Hatchery survivals for all fish released in 1986 are shown in the tables in Appendix A, and release locations by species appear in Appendix B.

During 1986, FRED personnel took over 501 million eggs. Nearly 75 million more chum salmon eggs were taken in 1986 than the previous year, while the pink salmon egg total decreased by 78 million. This decrease was due mainly to reduced brood stock availability in the Prince William Sound hatcheries. Egg takes by area, facility, and brood stock are shown in Table 3.

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 Southeast. Area biologists in Juneau, Sitka, Petersburg, and Ketchikan are responsible for various enhancement and rehabilitation projects for which the hatcheries supply fishes. In Southeast, 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, fry stocking, and lake fertilization.

One example of stream habitat improvement occurs near Haines. In an effort to increase coho salmon rearing area on the Chilkat River, FRED Division personnel have connected seven formerly barren ponds with the river. The man-made channels simulate the access to other naturally connected ponds that are used by coho salmon. Coded-wire tagging studies have shown that fish from the enhanced ponds have a similar survival rate and, in at least one year, better over-winter survival rate than the natural ponds. In an effort to find ways of producing additional sockeye salmon fry outside of the hatcheries, in-lake incubation was attempted at two locations in Southeast. A trial at Hugh Smith Lake successfully hatched about 50,000 sockeye salmon fry from small aluminum tray incubators suspended in the lake. The overall survival from egg to fry was a very acceptable 73%. The other in-lake incubation trial near Snettisham did not fair as well. The water chemistry at this site proved to be unacceptable for sockeye salmon egg development, and most of the eggs did not survive.

The FRED Division works in cooperation with other agencies on numerous fisheries projects. As an example, the USFS 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 salmon from Fish Creek to stock the channel, and active spawning began just two hours after the transport. In the spring of 1986 FRED personnel tagged 30,000 chum salmon fry from this project to determine the contribution to the fisheries. Another 5,000 adult chum salmon were moved from Fish Creek to Marx Creek in the summer of 1986.

FRED Division biologists also work with the USFS at many of the fishpass sites in Southeast planting coho salmon fry above the new fishpass locations. This is done so that the adults from these fry will return to the underutilized spawning areas upstream from the fishpasses. The regional aquaculture associations joined in cooperative projects with FRED Division and the USFS to provide coho salmon fry for the area above the new fishpasses at Slippery Creek and St. John's Creek. Eggs were collected at these two creeks and transported to Crystal Lake Hatchery for incubation. The Northern Southeast Regional

Aquaculture Association (NSRAA) will be responsible for returning the resultant fry back to their originating creek each spring.

Although many coho, chinook, and sockeye salmon are released into lakes and streams for advanced rearing, most cultured fishes in Southeast are released at the hatcheries.

Figure 1 shows the location of the six state-operated salmon/trout hatcheries in Southeast. The Snettisham Hatchery near Juneau and the Hidden Falls Hatchery on Chatham Strait at Baranof Island feature chum salmon. Each facility has a design capacity of about 70 million eggs that should produce returns of about 1 million chum salmon per year for each facility. The Snettisham and Hidden Falls Hatcheries, as well as the Crystal Lake Hatchery at Petersburg and the Deer Mountain Hatchery at Ketchikan culture 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 salmon fry will be released into lakes.

Southeast Highlights

- Chum salmon returning to Hidden Falls contributed at least 585,000 adults to the commercial fisheries.
- 1980 brood chum salmon released from Hidden Falls had an overall marine survival of over 8%.
- Over 98 million chum salmon eggs were taken in Southeast.
- Hidden Falls collected a total of 65.6 million chum salmon eggs. Nineteen million of these were transferred to two private hatcheries.
- More chum salmon eggs were taken (28.8 million) and chum salmon fry released (19.6 million) from Snettisham Hatchery than ever before.
- Nearly 5 million chinook salmon eggs were taken in 1986. Over 3.5 million of these eggs resulted from returns to Crystal Lake Hatchery.
- Hatchery-produced chinook and coho salmon contributed at least 6,500 fish to marine sport fisheries from Ketchikan to Juneau.
- More than 2.7 million juvenile chinook salmon were released by FRED hatcheries in Southeast.

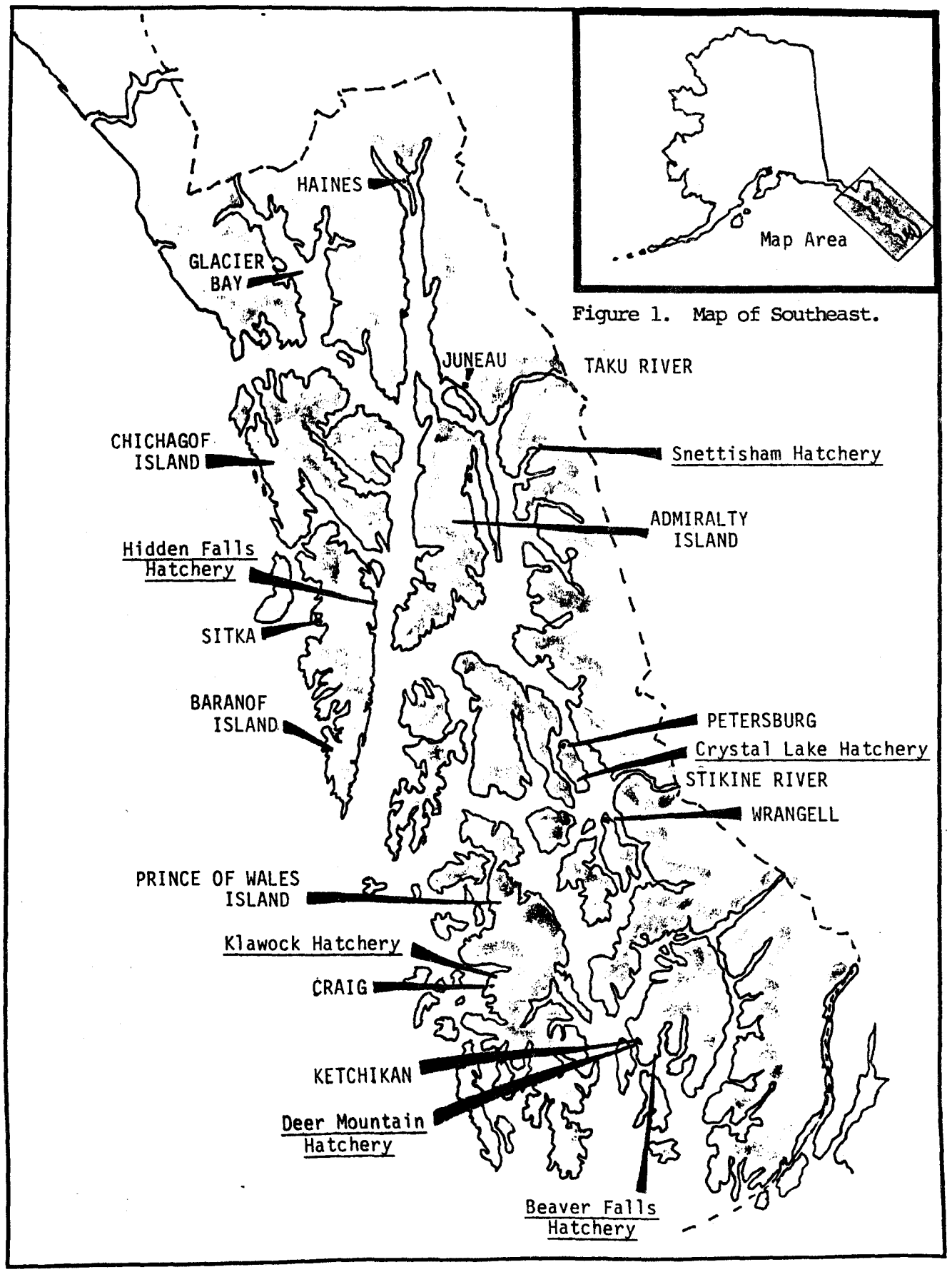


Figure 1. Map of Southeast.

Southeast Returns and Fishery Contributions

The total return of salmon to state-operated projects in southeast Alaska exceeded 1.5 million fish in 1986 (Table 1). The predominant species was chum salmon, which accounted for over 860,000 of the returns. As in 1984 and 1985, the majority of these chum salmon returned to the Hidden Falls Hatchery, which supported a terminal-harvest fishery in Kasnyku Bay totaling 585,000 salmon; there were a total of 222 different seine boats that fished the 12 commercial openings in Kasnyku Bay from 29 June to 4 August. The quality of the harvested fish was excellent, with a high percentage of brights and semi-brights. The largest fishery occurred on 10 July, during which 190 boats fished and 116,000 chum salmon were landed. The recovery of marked fish from the fishery and at the hatchery provide biologists with information that illustrates the importance of feeding chum salmon fry before release and releasing fry at the optimal time. As an example, preliminary estimates of salmon returns from the release of chum salmon fry in 1982 (1981 brood) show that the survival rate of fry released in May is more than double the survival rate for fry released in April (6.16% vs. 2.35%). Both groups of chum salmon fry were fed for a short time. Also, the preliminary returns from the 1982 brood chum salmon released at Hidden Falls indicate that the ocean survival for chum salmon fry that were fed before release is nearly nine times greater than the survival of fry released unfed. The chum salmon return to Beaver Falls, Snettisham, and Klawock Hatcheries combined to contribute another 107,000 adult chum salmon to the commercial fisheries of southeast Alaska.

The chinook salmon return to state hatcheries in 1986, though not as high as expected, totaled 11,000 fish; two-thirds of these were the result of operations at Crystal Lake Hatchery. These returning chinook salmon 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 salmon are also becoming significant to the urban sport fisheries in southeast Alaska. Preliminary information shows that nearly 22% of all chinook salmon turned in at the 1986 Golden North Salmon Derby in Juneau were from enhancement facilities in southeast Alaska. Chinook salmon produced at Deer Mountain Hatchery contribute to the sport fisheries in the Ketchikan area and in 1986 provided for a special personal-use fishery in Ketchikan Creek. In this dip-net fishery, 254 chinook salmon, which were in excess of brood-stock needs at Deer Mountain Hatchery, were collected by the Ketchikan public. The salmon caught during the two 1-day openings in August averaged 18 pounds. It is estimated that several hundred people took part in the fishery each day, while many more onlookers enjoyed the excitement.

Over 100,000 adult coho salmon returned to southeast Alaska in 1986 as a result of FRED facilities. In addition to the

collective commercial harvest of over 82,000 coho salmon, the return of hatchery coho salmon contributed greatly to the marine sport fisheries of Southeast. In the 1986 Golden North Salmon Derby in Juneau, only 350 coho salmon were harvested--the lowest ever recorded. Over 10% of these coho salmon were from hatchery releases at Snettisham and Auke Creek.

Klawock Hatchery accounted for nearly 50% of the total return of coho salmon and contributed over 49,000 salmon to the commercial troll and seine fisheries. Crystal Lake Hatchery was the next largest producer of coho salmon, as 23,300 salmon were harvested by gill net fishermen and trollers. An additional estimated 9,400 coho salmon were produced from fry released by Crystal Lake Hatchery in 1984 at remote locations. Adult coho salmon returning to Snettisham, Dredge Lake (near Juneau), and Ward Creek (near Ketchikan) contributed another 5,400 salmon in 1986.

Southeast Releases

Nearly 74 million juvenile chum salmon were released from Southeast FRED facilities in 1986 (Table 2). Hidden Falls Hatchery released over 45 million chum salmon; of these, 19.7 million were fed prior to release, 24 million were released at the hatchery unfed, and 1.5 million were released at Baranof Warm Spring Bay. Snettisham Hatchery released 19.6 million chum salmon fingerling, which is the largest release ever from this facility, and 8.8 million fingerling chum salmon were released from Klawock.

During 1986 more juvenile chinook salmon were released from FRED Division hatcheries in Southeast than any previous year, and nearly half of these chinook salmon came from Snettisham Hatchery. Over 1.3 million chinook salmon were released from Snettisham, including 911,000 fed fry to Redoubt Lake (near Sitka), 190,000 smolts at the hatchery, and 204,000 smolts from four locations near Juneau. The releases near Juneau are part of a federally funded Dingell-Johnson program designed to put adult salmon returns in areas where marine and roadside sport fishermen can benefit. The Crystal Lake Hatchery handled the most chinook salmon smolts in 1986 by releasing 650,000 smolts at the hatchery and two other locations. This includes the transfer of chinook salmon smolts to the Southern Southeast Regional Aquaculture Association's (SSRAA) net-pen operation at Earl Wess Cove on east Wrangell Island. In June SSRAA personnel had liberated 98,000 smolts from this joint effort.

Remote releases of 1985 brood chinook salmon occurred from the Deer Mountain and Hidden Falls Hatcheries in 1986. From Hidden Falls Hatchery, about 51,000 fed chinook salmon were put into the Indian River (near Tenakee Springs), and 130,000 fed fry were stocked into Eliza Lake. Another 140,000 zero-check chinook salmon smolts were transferred from Deer Mountain Hatchery and released equally into the waters of Crab Bay and Thorne Bay

(Prince of Wales Island). Chinook salmon smolts were also directly released from these hatcheries to provide returns for brood stock.

Over one million juvenile coho salmon were released from both Crystal Lake and Klawock Hatcheries during 1986. Crystal Lake released about 120,000 coho salmon smolts into the Petersburg area and over 950,000 emergent fry into Irish Creek and Crystal Creek. This was the fourth and final release of coho salmon fry into the Irish Creek system, which is designed so that returning adults will spawn above the newly completed fishway. Klawock Hatchery released 37,000 coho salmon pre-smolts and 818,000 coho salmon smolts into Klawock Lake in 1986 to continue the successful coho salmon program at that facility as well as 120,000 pre-smolts into Tunga Lake. Coho salmon smolts were also released from Snettisham Hatchery for brood-stock returns and stocked into Salmon Creek (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 salmon fry were released for the second year from the Beaver Falls Hatchery near Ketchikan. About 273,000 fry were returned to Hugh Smith Lake, and 515,000 fry were planted into the Badger/Bakewell Lakes system, south of Ketchikan. As part of a joint rehabilitation project with the USFS, fry plants are scheduled to continue for the next three years, following reconstruction of the Bakewell fishpass.

Juvenile steelhead trout were released from Crystal Lake and Klawock Hatcheries in 1986. Annual stocking of steelhead trout from the Klawock Hatchery to Ward Lake in Ketchikan was continued. Ward Lake, on the Ketchikan road system, has been identified as a priority site for recreational enhancement. Over 2,400 steelhead trout smolts from Crystal Lake Hatchery were planted into Montana Creek near Juneau.

Southeast Egg Takes

In 1986 over 110 million eggs were taken for the six FRED facilities in southeast Alaska (Table 3); chum salmon accounted for nearly 99 million of that total. The Hidden Falls Hatchery had the largest chum salmon egg take in Southeast, with the collection of 65.6 million chum salmon eggs. From this egg take, 11 million eyed chum salmon eggs were transferred to the Gunnuk Creek Hatchery, a facility operated by the City of Kake; and 8 million eyed chum salmon eggs were transferred to the Douglas Island Pink and Chum, Inc. (DIPAC) facility at Sheep Creek near Juneau. At Snettisham, 28.8 million chum salmon eggs were collected; this is the most ever taken at this facility. Although the total return of chum salmon to Snettisham was slightly less in 1986 than in 1985, more eggs were available to the hatchery in 1986. The larger egg take was due to a combination of factors,

including less straying of adults near the hatchery, larger and older chum salmon to the hatchery, and a high proportion of females in the return. Chum salmon eggs were also collected at the Klawock and Crystal Lake Hatcheries.

Nearly 5 million chinook salmon eggs were taken at four FRED facilities in 1986. Crystal Lake Hatchery collected over 3.5 million of these eggs from salmon returning to the facility. Even though these were fewer chinook salmon eggs than planned for, Crystal Lake still provided eggs for two private hatcheries and two other state hatcheries as well as providing over 1.9 million eggs for their own chinook salmon program. Crystal Lake chinook salmon eggs were sent to Snettisham (1,600,000) and Hidden Falls (146,000) Hatcheries to utilize rearing space at those facilities, and 265,000 chinook salmon eggs were transferred to NSRAA's facility at Medvejie Creek and 50,000 were transferred to the hatchery operated at Sheldon Jackson College in Sitka. Returning chinook salmon to the Deer Mountain Hatchery provided over 1 million eggs for the facility's brood stock, and chinook salmon returns to Snettisham produced 167,000 eggs. Chinook salmon eggs were also taken from the King Salmon, Tahini, and Harding Rivers. The King Salmon River eggs provided brood stock for Snettisham Hatchery, and the Tahini River eggs comprise the brood-stock development at Hidden Falls. The USFS contracted FRED Division to conduct a chinook salmon habitat study on the Harding River above a partial barrier. This project included taking 48,000 chinook salmon eggs to Crystal Lake Hatchery and returning the fry to the upper Harding River in the spring of 1987.

Coho salmon returning to the Klawock, Snettisham, and Crystal Lake Hatcheries provided more than enough eggs for each of those facilities to obtain their goals. As mentioned earlier, coho salmon eggs were taken to Crystal Lake from St. John's Creek and Slippery Creek in joint projects with the USFS, NSRAA, SSRAA, and FRED Division. The resulting fry will be returned to the stream of origin above the newly installed fishpasses. In an effort to increase sport fishing opportunities near Ketchikan, 66,000 coho salmon eggs were collected at Reflection Lake for incubation at Deer Mountain Hatchery. The adults from this stock are expected to return earlier than most coho salmon stocks, which should make them available for harvest after the chinook salmon runs and before normal peak coho salmon returns.

Nearly 1.7 million sockeye salmon eggs were collected from Hugh Smith Lake and Three Mile Creek in the Klawock River system. These eggs were incubated at the Beaver Falls Hatchery. About 300,000 of the resulting fry will be used to continue the joint rehabilitation project with the USFS, following reconstruction of the Bakewell fishpass. The rest of the fry will be planted into Hugh Smith Lake.

Steelhead trout eggs were also collected in 1986 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 northwestern 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 near Whittier, Valdez, and Cordova.

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 USFS in constructing and operating fishpasses to introduce salmon stocks in habitat above waterfalls.

In another cooperative project, FRED Division provided juvenile chum, coho, and chinook salmon to the Prince William Sound Aquaculture Corporation (PWSAC) for their Esther Island Hatchery. The chum salmon fry were transferred from the Main Bay Hatchery, while the coho and chinook salmon were provided by the Fort Richardson Hatchery, which is located near Anchorage.

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

Coded-wire tags have been recovered from marked adult sockeye salmon in the Copper River commercial fishery and from the spawning areas above Summit Lake. Aside from providing valuable biological data concerning run timing, relative abundance, and hatchery contribution, this information provides the assurance that the facility is making a significant contribution to the fish population.

Prince William Sound Highlights

- A record 23.6 million sockeye salmon fry were released from the Gulkana facility.
- 31,600,000 sockeye salmon eggs were collected for Gulkana (another record).
- The largest chum salmon egg take in the state (84.6 million) occurred at Main Bay.

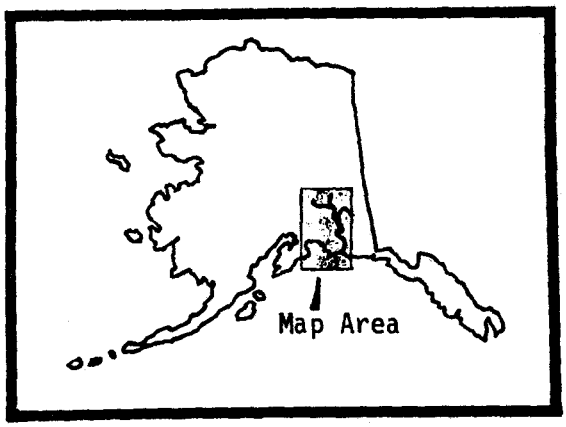


Figure 2. Map of Prince William Sound.

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

- 1.2 million salmonids of four species were stocked into waters in the Prince William Sound area to enhance the sport fisheries.

Prince William Sound Returns and Fishery Contributions

An estimated 1.3 million fish returned or were harvested in 1986 as a result of FRED Division projects in Prince William Sound (Table 1). About 92% (782,000) of the pink salmon destined for the Cannery Creek Hatchery were commercially harvested. The total pink salmon return of 853,000 was less than expected, but it still represents a 2.3% ocean survival. Over 95% of the pink salmon returning to Main Bay Hatchery were harvested by commercial fishermen, allowing just 10,000 pink salmon for brood stock at the facility.

One of the bright spots in 1986 was the first substantial return of chum salmon to the Main Bay Hatchery. The total return of over 103,000 chum salmon provided nearly 35,000 for harvest and enough brood stock for nearly 85 million eggs. Based upon recovery of marked fish returning to Main Bay, the ocean survival of fed chum salmon fry was twice that of fry released unfed.

The streamside incubation project near Gulkana produced an estimated 66,000 adult sockeye salmon in 1986, including nearly 40,000 in the commercial harvest.

Sport fishermen harvested an estimated 35,000 fish attributed to FRED projects in the Prince William Sound area during 1986. This includes the harvest of coho salmon near Cordova, coho and chinook salmon near Whittier, and an estimated 29,000 rainbow trout from various lakes in the area. These fish are the result of juveniles transported from the Anchorage area hatcheries of Fort Richardson and Elmendorf.

Prince William Sound Releases

Nearly 89 million pink salmon fry and 9.8 million chum salmon fry were released from Cannery Creek and Main Bay Hatcheries in 1986 (Table 2). Over 2 million of the pink salmon fry from Cannery Creek Hatchery were released into Derickson Creek to create a return of pink salmon that will utilize the fishpass installed by the USFS in 1986. As part of an ongoing cooperative project with PWSAC, 4.3 million chum salmon fry were transported from Main Bay and released into Lake Bay on Esther Island. This was the third year of releases that are designed to develop the chum salmon brood stock for PWSAC's Esther Island Hatchery. FRED Division also provided 62,900 chinook salmon fingerling, 229,000 eyed chinook salmon eggs, 104,000 coho salmon smolts, 125,000 coho salmon fingerling, and 273,000 eyed coho salmon eggs to the Esther Island facility. All of these were transferred from the Fort Richardson Hatchery near Anchorage.

A total of 23.6 million sockeye salmon fry from the Gulkana streamside-incubation project was released into Gunn Creek and the Gulkana River. This represents the largest release of juvenile sockeye salmon from any facility since statehood. Another 516,000 sockeye salmon fry released into Eshamy Lake were the result of eggs taken in 1985 and incubated at the Trail Lakes Hatchery.

Fish were transported from three hatcheries and released into the Prince William Sound area in 1986 to enhance the sport fishing opportunities there. Almost 400,000 coho and chinook salmon smolts were released near Whittier, Cordova, and Valdez. Another 158,400 coho salmon fingerlings were stocked in Culross and Surprise Cove Lakes in cooperation with Sport Fisheries Division and the USFS. Chinook salmon fingerling (25,000) were stocked into Granite Bay lakes to evaluate the feasibility of lake rearing for chinook salmon production.

A total of 197,200 rainbow trout fingerlings from the Fort Richardson Hatchery was stocked into 16 lakes in the Prince William Sound area, and over 412,000 juvenile grayling from Clear Hatchery were released at 24 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 163 million salmon eggs were collected for incubation at the three FRED facilities in Prince William Sound in 1986 (Table 3). At Cannery Creek Hatchery, 44.2 million pink salmon eggs were collected, which was well short of the 103 million taken last year. Sufficient brood stock did not arrive at the hatchery because of the high interception rate (92%) and lower than expected ocean survival rate (2.3%). Poor returns and high interception rates of pink salmon also occurred at the Main Bay Hatchery, where only 3 million pink salmon eggs were taken in 1986. Chum salmon returns to Main Bay, however, were very encouraging, allowing enough brood stock to collect nearly 85 million eggs. That is the largest chum salmon egg take in the State of Alaska.

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

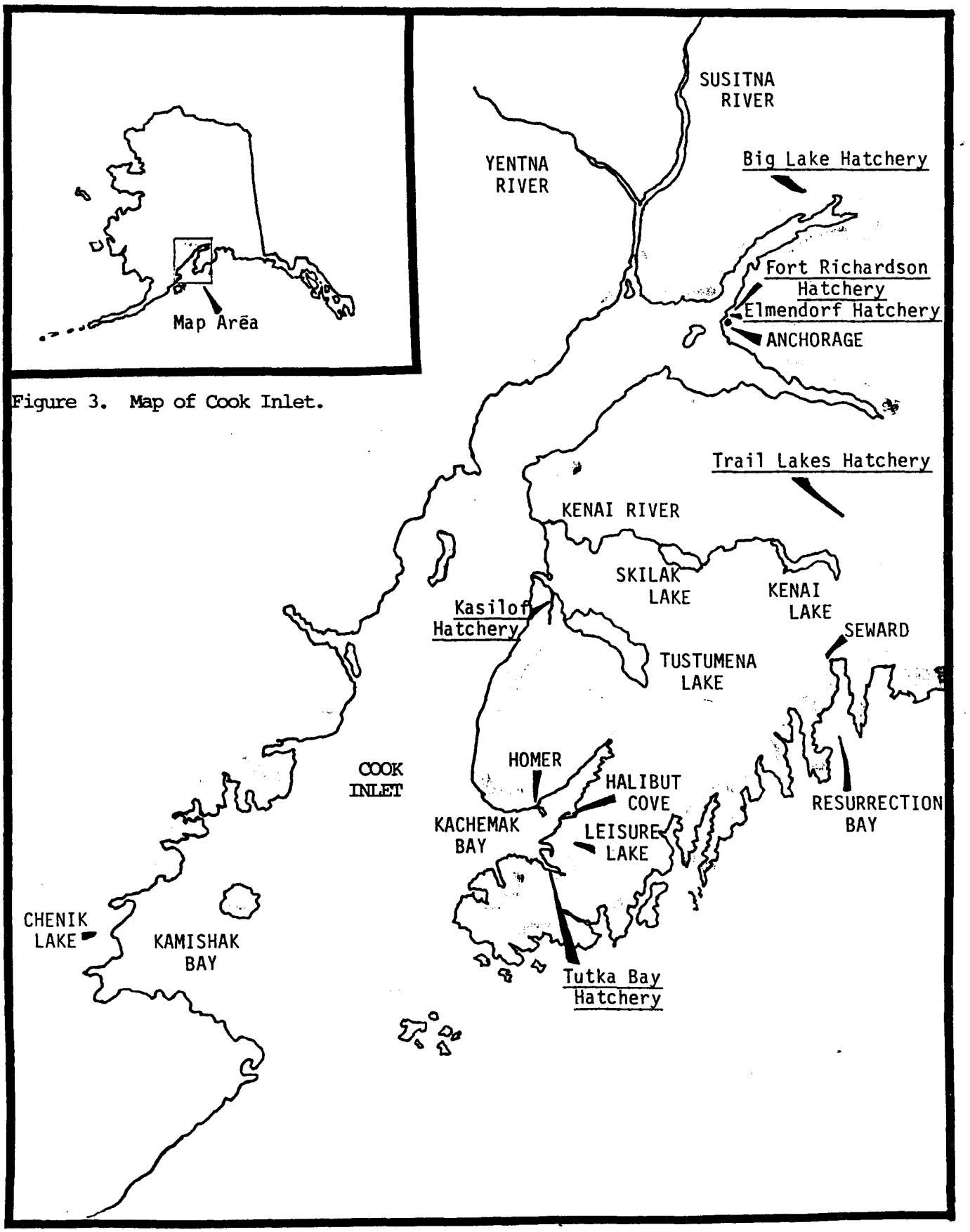


Figure 3. Map of Cook Inlet.

chinook, coho, and sockeye salmon 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 salmon releases for the creation of sport fisheries in the Anchorage and Matanuska/Susitna Valley areas. Supplemental production of chinook and coho salmon fingerlings and smolts by FRED Division is an important tool to provide additional sport fishing opportunities for Cook Inlet. The fingerlings are released into underutilized lakes for juvenile development, while the smolts are released into streams from which they will migrate quickly; so competition for food with other juvenile salmonids is minimal. FRED Division is involved in projects in cooperation with the USFS and/or Cook Inlet Aquaculture Association; e.g., the Grant Lake coho salmon stocking and lake fertilization projects.

The six 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. The Fort Richardson Hatchery at Anchorage operates on water heated by the military power plant. This facility features rainbow trout for placement in over 120 lakes in southcentral and interior Alaska. Juvenile coho and chinook salmon produced by this facility will be stocked at locations in upper Cook Inlet as well as at Whittier, Cordova, 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, located on Crooked Creek near Soldotna, is the only sockeye salmon facility that has not experienced IHN virus mortalities. This facility deals largely with Tustumena Lake sockeye salmon but also provides sockeye salmon fry to Leisure, Chenik, and Paint Lakes in lower Cook Inlet. 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 pink salmon per year from this hatchery stock.

A 100-year flood struck northern Cook Inlet drainages along the Parks Highway from Willow Creek to Talkeetna during 1986. It is estimated that at least 50% of the stream channels were changed in Willow Creek, Sheep Creek, and Montana Creek. Areas where salmon had been seen spawning were left high and dry as the water receded. Alevins, undeveloped eggs, and juvenile salmonids that have been found in isolated swamp ponds and sloughs will not survive the winter because of isolation from the main drainage. Egg takes in Willow and Montana Creeks, and reconstruction of the Sheep/Goose Creek dike are needed in 1987 to partially offset these tremendous losses.

Cook Inlet Highlights

- Leisure Lake and Chenik Lake returns made up 55% of the total lower Cook Inlet sockeye salmon harvest.
- The sockeye salmon return to Tustumena Lake was the largest ever, at 1.7 million salmon; about 35% were from hatchery releases.
- Sport fishermen harvested 6,900 chinook salmon from Halibut Cove Lagoon, Homer Spit, and Crooked Creek.
- 67% of the chinook salmon return to Crooked Creek was a result of hatchery releases. Record return of 12,500 chinook salmon occurred in 1986.
- Tutka Hatchery provided over 28% of the lower Cook Inlet commercial pink salmon catch.
- Sockeye salmon smolt emigration from Tustumena Lake was about 7.5 million in 1986. About 25% were estimated to be from hatchery releases.
- 80% of the largest-ever sockeye salmon smolt emigration from Hidden Lake (610,200) were from hatchery releases.
- FRED hatchery fish contributed over 37% of the Resurrection Bay coho salmon sport fish harvest.

Cook Inlet Returns and Fishery Contributions

Nearly 735,000 sockeye salmon returned to Cook Inlet in 1986 as a result of Kasilof Hatchery operations (Table 1). The adult return from sockeye salmon fry that had been planted into Tustumena Lake (by Kasilof Hatchery) was the main producer. The adult return to Tustumena in 1986, the largest ever recorded for the system, was almost 1.7 million sockeye salmon (1.4 million harvest and 276,000 escapement). The hatchery's contribution to this return was estimated to be 35% (593,000 sockeye salmon). Sockeye salmon also returned to Leisure Lake in Kachemak Bay and

Chenik Lake in Kamishak Bay as a result of fry that had been stocked from Kasilof Hatchery. The combined commercial catch of nearly 130,000 salmon from these two lakes represented 55% of the total lower Cook Inlet sockeye salmon harvest. The Trail Lakes Hatchery also produced adult sockeye salmon returns in 1986. An estimated 60,000 sockeye salmon returned to Hidden Lake from fry stocked by Trail Lakes Hatchery. Another estimated 55,000 sockeye salmon returned to upper Cook Inlet as a result of fry released from Big Lake Hatchery. All together, over 850,000 adult sockeye salmon attributed to FRED projects returned to Cook Inlet in 1986.

The chinook salmon return to Crooked Creek in 1986 was the largest ever at 12,500 fish. Approximately 68% (8,480) of this return were from hatchery releases, and 5,500 of these hatchery-produced chinook salmon were taken by sport fishermen in Crooked Creek. The Crooked Creek sport fishery is very popular, and it provides one of the highest success rates for chinook salmon on the Kenai Peninsula. Chinook salmon have also been produced in Kachemak Bay to enhance sport fishing. The return of 750 chinook salmon to Halibut Cove Lagoon allowed 1,100 sport fishermen to harvest 400 salmon, while 350 more were collected in a commercial set-net fishery. At Homer Spit, approximately 1,000 one-ocean and 300 two-ocean chinook salmon returned from previous releases of smolts. These returns have created an extremely popular family-oriented, shore-based fishery, where over 120 anglers have fished at one time. This highly visible, roadside fishery has generated intensive fishing effort, successful results, and very positive public response from residents and tourists.

Additional sport fishing opportunities have been created by FRED Division in Cook Inlet, as nearly 500,000 fish were harvested in 1986. The majority of these were rainbow trout that had been stocked by the Fort Richardson and Elmendorf Hatcheries into numerous lakes in the Cook Inlet area. The Cook Inlet hatcheries also stock coho salmon into landlocked lakes to provide year-round sport fishing opportunities to harvest resident coho salmon.

Coho lake- and stream-stocking projects produced coho salmon returns and sport fishing opportunities at several locations on the Kenai Peninsula. Over 12,100 coho salmon returned from juvenile coho salmon planted in Seward Lagoon, Grouse Lake, and Bear Lake. These hatchery releases into Resurrection Bay produced over 37% (5,320 fish) of the total sport harvest of coho salmon in the Seward area.

The pink salmon return to the Tutka Hatchery in 1986 was estimated at 441,000 salmon; of these salmon, the commercial catch of 380,000 represented 72% of the southern district and 95% of the Tutka subdistrict pink salmon catches. Sport fishermen also harvested an estimated 8,000 pink salmon from Tutka Lagoon.

Cook Inlet Releases

Salmon releases from the six facilities in Cook Inlet totaled close to 68 million in 1986 (Table 2); releases of juvenile sockeye salmon accounted for the majority of these. A total of nearly 17.5 million sockeye salmon fingerlings was released from the Kasilof Hatchery. Most of these (13.6 million) were stocked into Tustumena Lake. It was estimated that 25% of the sockeye salmon smolts leaving Tustumena Lake in 1986 are a result of previous hatchery releases. The rest of the sockeye salmon fingerlings from Kasilof were stocked into Leisure Lake in Kachemak Bay (2.2 million) and Paint (820,000) and Chenik Lakes (839,000) in Kamishak Bay. The Big Lake Hatchery released over 15 million sockeye salmon fry into Meadow Creek and Blodgett Lake. The returning adults from Big Lake releases will provide sockeye salmon for the commercial fisheries of upper Cook Inlet.

The Tutka Hatchery was the only Cook Inlet facility to release pink and chum salmon fry in 1986. Over 23 million pink salmon were released from the hatchery, and of these, a record 19.5 million were fed prior to release, which will substantially increase the marine survival of these fry. Another 2 million fed fry were released from Halibut Cove Lagoon in a cooperative project with ADF&G, the Lower Cook Inlet Seiners Association, and the Cook Inlet Aquaculture Association. This was done to introduce pink salmon fry into new nursery areas and to disperse the commercial fishery when the adults return.

Big Lake Hatchery was again the leading producer of juvenile coho salmon in the Cook Inlet area. The Knik Arm drainages were stocked with nearly 3 million coho salmon fingerlings from Big Lake Hatchery. Nancy Lake also received over 577,000 coho salmon smolts and 200,000 coho salmon fingerlings from Fort Richardson Hatchery. Coho salmon smolt studies indicate that previous hatchery releases contributed 36% of the smolts emigrating from Big Lake and 100% of the smolts leaving Nancy Lake; the adults from these smolts will return in 1987.

Juvenile coho salmon were also released by Fort Richardson, Elmendorf, and Trail Lakes Hatcheries into numerous lakes and creeks throughout the Cook Inlet area, near Whittier and Cordova in Prince William Sound, and into Seward Lagoon. Fort Richardson Hatchery also transferred 273,000 eyed coho salmon eggs, 229,000 eyed chinook salmon eggs, 63,000 chinook salmon fingerlings, 125,000 coho salmon fingerlings, and 104,000 coho salmon smolts to PWSAC's hatchery on Esther Island in Prince William Sound. For further information on stocking locations of coho salmon, refer to Appendix B (Table 4).

A total of over 1.5 million chinook salmon was released by Cook Inlet facilities in 1986. Over 1.2 million of these were produced by the Elmendorf and Fort Richardson Hatcheries. Elmendorf Hatchery released juvenile chinook salmon into landlocked lakes in upper Cook Inlet as well as into the traditional locations; i.e., areas near Whittier and Seward, Crooked Creek, Homer Spit,

and Halibut Cove Lagoon. The Fort Richardson Hatchery released juvenile chinook salmon into Deception Creek in upper Cook Inlet, and Anderson Bay, Granite Bay, and Logging Camp Creek in Prince William Sound. Those releases are designed to increase the chinook salmon sport fishing opportunities in the Matanuska/ Susitna, Whittier, and Valdez areas. Releases of chinook salmon that had been raised at the Trail Lakes Hatchery occurred at Granite Creek, Bench Creek, and Summit Lake on the Kenai Peninsula.

Nearly 1.4 million rainbow trout from Fort Richardson Hatchery were planted not only into lakes throughout the Cook Inlet area but also into 16 lakes in the Prince William Sound region and 18 lakes on Kodiak Island. These rainbow trout along with coho salmon that have been stocked into landlocked lakes provide important opportunities for sport fishermen. For a complete listing of the lakes stocked with rainbow trout, refer to Appendix B (Table 7).

Cook Inlet Egg Takes

More sockeye salmon eggs were collected in 1986 for Cook Inlet hatcheries than any other species (Table 3). The Kasilof Hatchery collected 21.5 million, Big Lake Hatchery achieved its second largest sockeye salmon egg take at 18.1 million, and over 4.4 million eggs were collected for Trail Lakes Hatchery.

More than 1.2 million chinook salmon eggs were taken from Crooked Creek by the crew at the Kasilof Hatchery; these eggs were incubated at Elmendorf and Trail Lakes Hatcheries. The only other location where chinook salmon eggs were collected in Cook Inlet was at the Deshka River. These eggs were transported to the Fort Richardson Hatchery for incubation and rearing. In prior years, survival of chinook salmon eggs to the eyed-egg stage at Fort Richardson was about 80%. In 1986, when eggs in the transport containers were chilled (from 12°C to 4°C) immediately after fertilization, the survival was 96%.

Tutka Hatchery collected 31.5 million pink salmon eggs, which is the hatchery's capacity, and 877,000 chum salmon eggs. Nearly 6.3 million coho salmon eggs were collected in 1986; 3.2 million were incubated at Big Lake Hatchery and 550,000 at the Fort Richardson Hatchery. The Little Susitna River coho salmon egg take was hampered by high water and less-than-normal stream escapement. The Fort Richardson Hatchery achieved its goal from there, but lack of spawners limited the number of eggs for Big Lake Hatchery to 18,000. Most of the resulting juveniles from these two facilities will be released into the Matanuska/Susitna area. Coho salmon eggs (63,000) were also taken for the Elmendorf Hatchery and 2.3 million coho salmon eggs for Trail Lakes Hatchery. Many of the resulting fingerling from Trail Lakes Hatchery will be used for coho salmon landlocked lake-stocking programs.

Nearly 5 million rainbow trout eggs were taken in 1986 for the Fort Richardson Hatchery. About 606,000 of these rainbow trout eggs were transferred to the Clear Hatchery for rearing and release into Interior lakes.

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 along the Thumb River has been an important part of the Karluk Lake sockeye salmon rehabilitation project. During 1986 FRED Division personnel applied fertilizer to Karluk Lake to increase the food supply for the juvenile sockeye salmon which will result from the record escapement of sockeye salmon into the lake system. A feasibility study conducted for a proposed sockeye salmon hatchery at Pillar Creek just north of Kodiak shows substantial merit. Although receiving money for new facilities appears doubtful, the construction of a hatchery to create a new sockeye salmon fishery would be of great benefit to the Kodiak area fishermen.

FRED Division has also maintained the fishpasses in the Kodiak area, including the famous Frazer Lake fishpass on Kodiak Island and a series of fishpasses on Afognak Island. To increase efficiency in the Kodiak area, the operation and maintenance of these fishpasses has been transferred to the Commercial Fisheries Division.

One of the most important events in Kodiak in 1986 was the rapid development of the mariculture program, including the organization, permitting, and coordination of mariculture projects on shellfish. The program was initiated with 16 active or potential private mariculturists working on scallop, mussel, and oyster projects. A cooperative project, involving Japan's OFCF and FRED Division, to study the feasibility of scallop spat collection in the Kodiak area is scheduled to begin in 1987.

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. Since its construction, however, it has suffered from inadequate design. The major remedial construction efforts occurring in 1985 and early 1986 resulted in no production of chum salmon fry for 1986. The scheduled collection of 5 million chum salmon eggs in 1986 could not be accomplished because of exceedingly high-water conditions in Russell Creek. Although adequate brood stock were present,

the flooding conditions made it impossible to contain the brood stock or take eggs; so no chum salmon fry releases will be made in 1987. Figures 4 and 5 show the location of these facilities.

Kodiak and Alaska Peninsula Highlights

- Over 109 million eggs from 4 salmonid species were taken for Kitoi Hatchery in 1986.
- The sockeye salmon return to the Upper Thumb River in 1986 was estimated to be 31,400 salmon.
- 23.4 million sockeye salmon eggs were taken for the Karluk streamside incubation project, the most ever.
- A cold-water pipeline was constructed at Kitoi Hatchery for chum and pink salmon incubation.
- Shellfish mariculture projects begin in Kodiak area.
- The largest release from a state facility occurred at Kitoi Hatchery in 1986.

Kodiak and Alaska Peninsula Returns and Fishery Contributions

Just over 1 million salmon returned to the Kodiak-Alaska Peninsula area in 1986 as a result of FRED projects (Table 1). About half of these were pink salmon returning to the Kitoi Bay Hatchery, and of these, over 341,000 were harvested in the commercial fisheries. The poor return and low ocean survival rate (0.68%) of pink salmon to the Kitoi Hatchery was disappointing, but it had been predicted because of the cold- water conditions when the fry were released. The ocean survival of directly released emergent pink salmon fry has exceeded 1% in 5 of 9 years; however, the survival of short-term reared salmon fry has always exceeded 1%. This shows again the importance of being able to feed salmon fry before release. Nearly 5,000 coho salmon were collected by sport fishermen as a result of juvenile coho salmon stocking projects from Kitoi Hatchery. This includes an estimated 3,000 coho salmon from landlocked lakes near Kodiak.

For several consecutive years, the sockeye salmon return to the upper Thumb River has set records. About 31,400 sockeye salmon returned to the system in 1986; most of these fish were produced by the Karluk rehabilitation project.

Of the 141,500 sockeye salmon returning to the Frazer fishpass, approximately 15,000 were commercially harvested. In addition, the fishpasses on Afognak Island contributed at least 60,000 pink, coho, and sockeye salmon to the north Afognak fisheries.

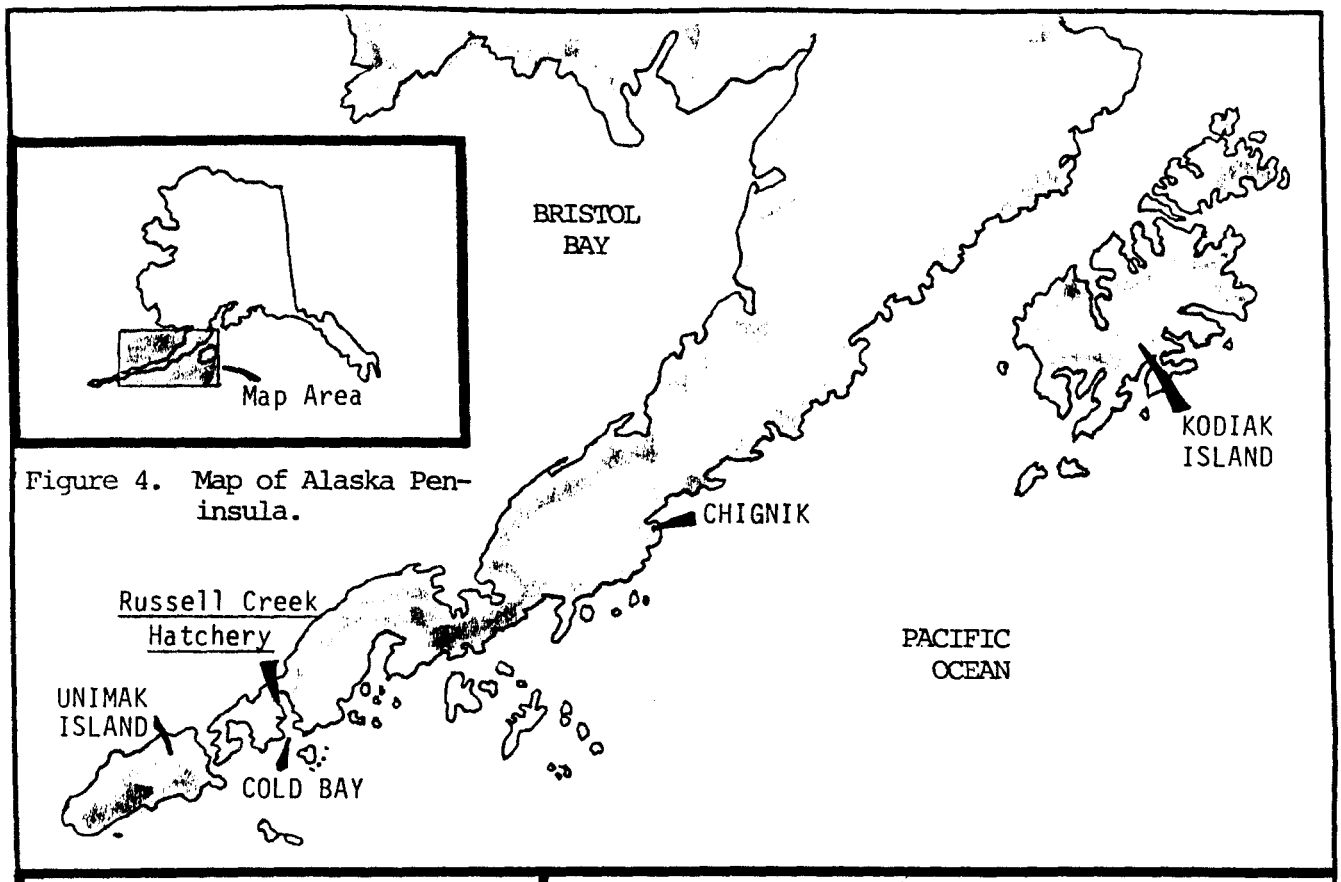


Figure 4. Map of Alaska Peninsula.

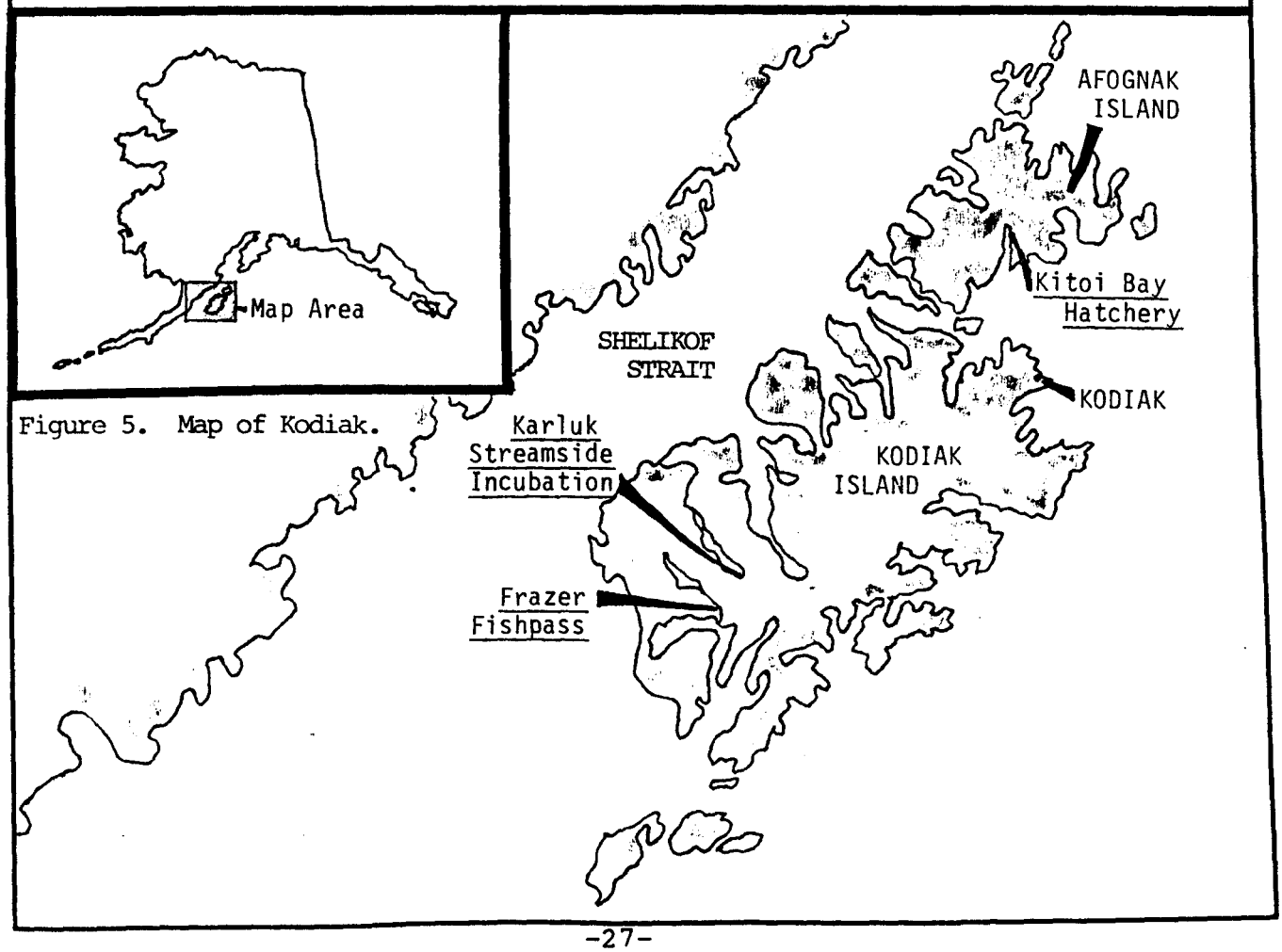


Figure 5. Map of Kodiak.

An estimated 70,000 Russell Creek Hatchery chum salmon were harvested in the commercial fisheries, and another 70,000 returned to Russell Creek.

Kodiak and Alaska Peninsula Releases

Again in 1986, Kitoi Hatchery released more juvenile salmonids than any other state facility. Along with the release of 97.8 million pink salmon and 422,000 chum salmon fry, the hatchery personnel also released three other species of salmonids (Table 2): about 1,700 chinook salmon, 223,000 coho salmon, and 10,100 rainbow trout were released from Kitoi Hatchery to enhance the roadside sport fisheries around Kodiak. The combined release represents the biggest release ever from a state facility. Of the 97.8 million pink salmon released, 11.9 million were fed (short-term reared) before release. As mentioned earlier, this should increase the ocean survival of that release.

A record 19.8 million eyed sockeye salmon eggs were planted into the upper Thumb River in 1986. These eggs were incubated at the Karluk streamside incubation facility.

Kodiak and Alaska Peninsula Egg Takes

The 108 million pink salmon eggs taken at the Kitoi Hatchery represents the largest number of eggs taken at a FRED facility in 1986. In addition to these, the Kitoi Hatchery personnel also collected 845,000 chum salmon eggs, nearly 400,000 coho salmon eggs, and 12,500 rainbow trout eggs (Table 3).

More than 23 million sockeye salmon eggs were taken for the Karluk streamside incubation project. The resulting eyed eggs (19.8 million) were planted into the upper Thumb River in 1986. There were no chum salmon eggs taken at the Russell Creek Hatchery in 1986 because of flooding conditions in Russell Creek during the time spawners were in the creek.

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 (Figure 6). The Clear Hatchery was completed at Clear Air Force Station near Nenana in 1980. This facility produces chinook, coho, and chum salmon for the Tanana and Yukon River commercial and subsistence fisheries and chinook salmon, coho salmon, and other fish for Interior sport fisheries. This site was selected mainly for the availability of heated water from the Air Force station, which allows a flexible rearing program. Clear Hatchery has become a

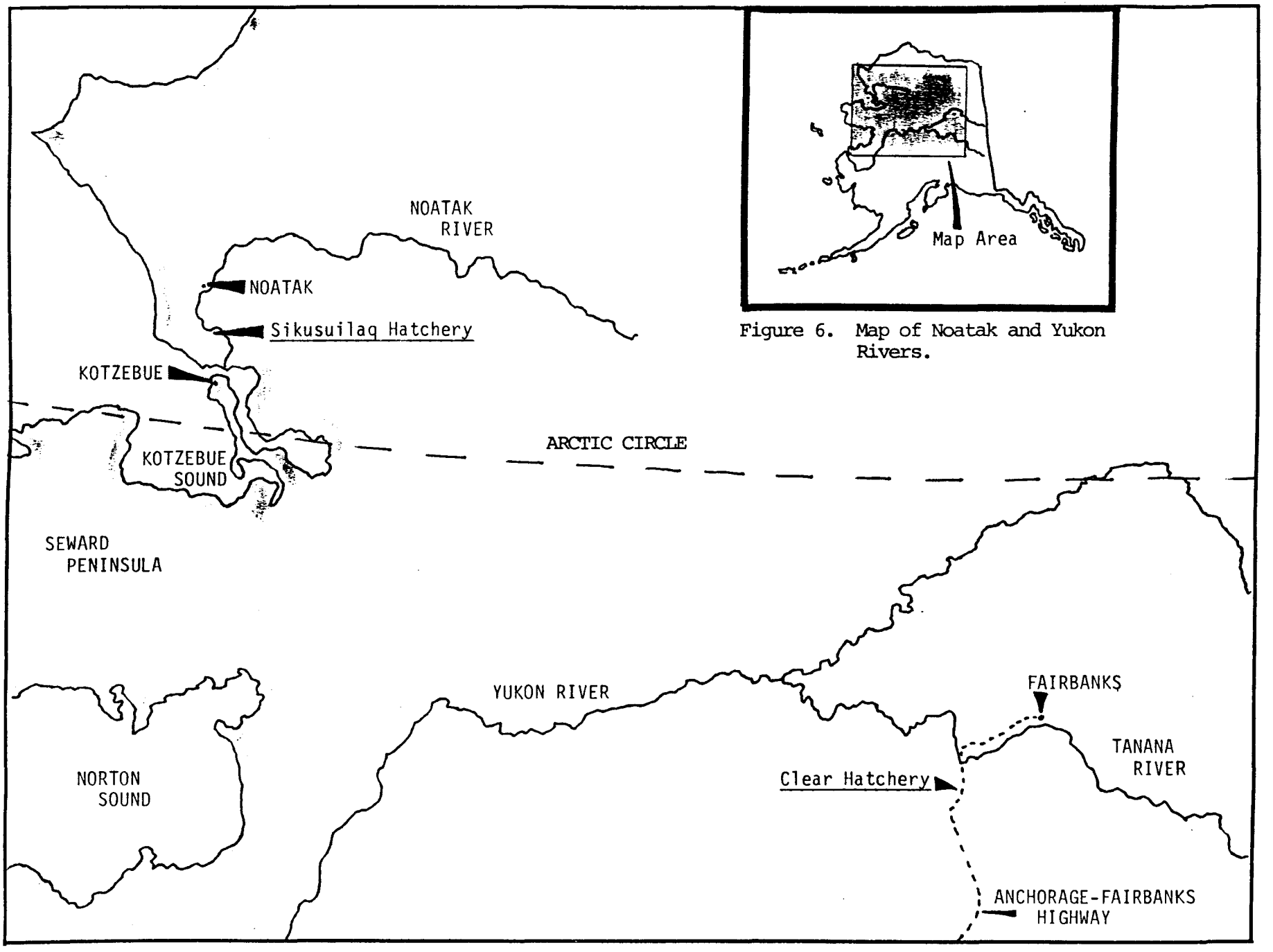


Figure 6. Map of Noatak and Yukon Rivers.

center for developing rearing programs for Interior fishes, including sheefish, grayling, and Arctic char. Recently, chum salmon were discontinued, and the mission of Clear Hatchery was shifted to support sport fisheries.

Construction of the Sikusuilaq Hatchery on the Noatak River was completed in early 1982. This facility is testing the feasibility of producing fall chum salmon for the Kotzebue Sound commercial fishery. It was designed to handle 2 million eggs, but there is enough water available to incubate at least 40 million eggs. It appears that the hatchery must expand to that level for a favorable benefit/cost ratio. Biological studies are carried out in conjunction with both hatcheries. These studies include marking fish prior to release to evaluate adult returns as well as studies on the growth, residence, and migration of hatchery and wild juvenile salmon.

Arctic-Yukon-Kuskokwim Highlights

- Clear Hatchery personnel collected eggs from Arctic char for the second year in 1986.
- The first significant returns of hatchery-produced chum salmon returned to Sikusuilaq Hatchery.
- Over 2 million fish of six species were stocked for sport fisheries throughout central Alaska, as a result of Clear Hatchery operations in 1986.

Arctic-Yukon-Kuskokwim Returns and Fishery Contributions

The first significant return of chum salmon to Sikusuilaq occurred in 1986 (Table 1). An estimated 2,500 Sikusuilaq chum salmon were harvested in the Kotzebue Sound fishery, and another 1,100 returned to the hatchery.

The fall chum salmon return to Clear Hatchery appeared to be similar to what was expected (about 1% marine survival). The returns of chinook and coho salmon, however, were less than forecasted. At this time, it is unclear why the returns are down, but the return of the wild stocks in 1986 were also less than expected.

It was estimated that over 100,000 fish from Clear Hatchery were harvested by sport fishermen in 1986. Most of these were coho salmon and rainbow trout that were planted by hatchery personnel into numerous lakes throughout central Alaska. These estimates were made using assumed survival and harvest rates provided by Sport Fisheries Division personnel.

Arctic-Yukon-Kuskokwim Releases

Clear Hatchery released seven species of juvenile fish in 1986, totaling over 3.4 million (Table 2). Over one million of those were grayling fry that were stocked into 91 locations throughout southcentral and interior Alaska. Clear Hatchery personnel also planted 498,000 rainbow trout, 90,000 sheefish, and 340,000 coho salmon into numerous lakes in the interior of Alaska. In addition, Arctic char were released for the first time from any Alaskan hatchery. 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 1.5 million chum salmon fry were released into the Noatak River.

Arctic-Yukon-Kuskokwim Egg Takes

Over 6.2 million eggs were taken by the two facilities in this area (Table 3). At Clear Hatchery, eggs were taken from five species of fish, including 2.1 million grayling and 1.2 million sheefish. Over 1 million of the sheefish eggs were taken from fish that had been raised to maturity at the hatchery. Coho salmon, chinook salmon, and Arctic char eggs were also taken for Clear Hatchery. Over 2 million chum salmon eggs, the current capacity, were collected for the Sikusuilaq Hatchery.

Table 1. Estimated contribution of fish by FRED hatcheries and projects in 1986.

Hatchery or Project	Species	Commercial Catch	Sport Catch	Brood Stock/ Escapement	Total	Comments
SOUTHEAST REGION						
Bakewell	coho	3,000		2,000	5,000	Fishpass near Ketchikan. See footnote.
Beaver Falls	chum	31,600			31,600	Hatchery near Ketchikan.
Chilkat Ponds	coho	1,000		250	1,250	Habitat improvement project near Haines.
Crystal Lake	chinook	3,590	1,100	2,700	7,390	Hatchery near Petersburg.
	coho	29,700	1,000	6,100	36,800	Includes estimate from remote releases.
	chum	340		800	1,140	
	steelhead		140	148	288	
Deer Mountain	chinook	320	720	1,360	2,400	Hatchery in Ketchikan.
Ward Lake	coho	300	20	80	400	Remote release from Deer Mountain Hatchery.
Fish Creek-Hyder	chum	36,000		24,000	60,000	Cooperative spawn channel project with USFS. Catch based upon escapement.
Hidden Falls	chum	585,000		70,500	655,500	Hatchery on east side of Baranof Island.
	chinook	190	53	7	250	
Ketchikan Cr	pink	228,000		77,000	305,000	Fishpass in Ketchikan. See footnote.
Klawock	coho	49,200	2,000	4,600	55,800	Hatchery near Klawock on Prince of Wales.
	chum	60,000	300	60,000	120,300	
	steelhead		45		45	See footnote.
McDonald Lake	sockeye	18,600		33,000	51,600	Lake fertilization project. See footnote.
Snettisham	chum	15,200		39,000	54,200	Hatchery 40 miles SE of Juneau.
	coho	3,300	30	1,700	5,030	Includes Dredge Lake returns.
	chinook	590	190	180	960	
Twin Lakes	coho		600		600	Includes only Derby catch.
Sunny Creek	pink	108,000		36,000	144,000	Fishpass on Prince of Wales. See footnote.
SOUTHEAST TOTALS:		1,173,930	6,198	359,425	1,539,553	
PRINCE WILLIAM SOUND						
Cannery Creek	pink	781,900		71,100	853,000	Hatchery in Unakwik Inlet.
	chum	4,900		75	4,975	
Hobo Creek	pink	4,930		1,180	6,110	Fishpass 20 miles NE of Whittier.
Ft. Rich/Elmendorf						Hatcheries located near Anchorage.
Whittier	coho	3,000	5,000		8,000	See footnote.
	chinook		100		100	
Cordova	coho		1,000		1,000	
Culross Lake	coho	1,000		10	1,010	See footnote.
PWS Lakes	rainbow		29,000		29,000	Based upon survival and harvest assumptions.
Gulkana	sockeye	39,600		26,400	66,000	Streamside incubation facility near Paxson.
Main Bay	pink	222,000		10,000	232,000	Hatchery SE of Whittier.
	chum	34,800		68,600	103,400	
PWS TOTALS:		1,092,130	35,100	177,365	1,304,595	
COOK INLET						
Big Lake	sockeye	33,000		22,000	55,000	Hatchery near Wasilla.
	coho	1,890		1,890	3,780	
Landlocked Lakes	coho		46,000		46,000	See footnote.
Kasilof	chinook		2,870	1,240	4,110	Hatchery located on Crooked Creek.
	coho		3,000	3,500	6,500	
Tustumena Lake	sockeye	496,000		97,000	593,000	Stocking location on Kenai Peninsula.
Leisure Lake	sockeye	18,500	250	20	18,770	Stocking location in Kachemak Bay.
Chenik Lake	sockeye	111,300		12,000	123,300	Stocking location in Kamishak Bay.
Crooked Creek	steelhead			116	116	

-Continued-

Table 1. Continued

Hatchery or Project	Species	Commercial Catch	Sport Catch	Brood Stock/ Escapement	Total	Comments
Ft. Rich/Elmendorf						Hatcheries also produced fish in PWS.
Crooked Creek	chinook		2,630	1,740	4,370	In addition to chinook produced by Kasilof.
Halibut Cove	chinook	350	400		750	Remote release location in Kachemak Bay.
Homer Spit	chinook		1,000	300	1,300	Remote release location in Kachemak Bay.
Fritz Creek	coho		500	25	525	Remote release location in Kachemak Bay.
Bear Lake	coho		1,570	5,500	7,070	Release location near Seward.
Seward Lagoon	chinook		400	100	500	Release location near Seward.
	coho		3,130	277	3,407	Release location near Seward.
Little Susitna	coho	550		370	920	Release location north of Anchorage.
Grouse Lake	coho		623	1,036	1,659	Release location near Seward.
Deception Creek	chinook			160	160	Release location north of Anchorage.
Cook Inlet lakes	rainbow		365,000		365,000	Based upon survival and harvest assumptions.
	coho		28,000		28,000	Based upon survival and harvest assumptions.
Trail Lakes						Hatchery north of Seward on Kenai Peninsula.
Hidden Lake	sockeye	48,000	2,000	10,000	60,000	Release location on Kenai Peninsula.
Grant Lake	coho	435	435	870	1,740	Catch estimated from escapement.
Quartz Creek	coho	190	190	375	755	Release location. See footnote.
Caribou Lake	coho	400	400	400	1,200	Release location. See footnote.
Seldovia Lake	coho	200	200	200	600	Release location. See footnote.
Six Mile	coho	1,000	100	400	1,500	Release location. See footnote.
Cook Inlet lakes	coho		15,000		15,000	Based upon survival and harvest assumptions.
Tutka	pink	380,000	8,000	53,000	441,000	Hatchery located in Kachemak Bay.
	chum	500		200	700	
COOK INLET TOTALS:		1,092,315	481,698	212,719	1,786,732	
KODIAK/ALASKA PENINSULA						
Kitoi Bay	pink	341,500		169,000	510,500	Hatchery located on Afognak Island.
	chum	300		2,000	2,300	
	coho	500	40	460	1,000	Anadromous returns only.
Kodiak Lakes	coho	100	1,840	2,400	4,340	See footnote.
Landlocked lakes	coho		3,000		3,000	
Lake Rose Tead	chinook		5	25	30	
Karluk	sockeye	11,900		34,100	46,000	Streamside incubation on Thumb River.
Frazer fishpass	sockeye	15,000		126,500	141,500	Fishpass on Kodiak Island.
	chinook	75		75	150	
Afognak Fishpasses (combined)	coho	1,000	300	10,200	11,500	See footnote.
	pink	56,500		82,000	138,500	See footnote.
	sockeye	3,280		5,400	8,680	See footnote.
Russell Creek	chum	70,000		70,000	140,000	See footnote.
KODIAK/AK PEN TOTALS:		500,155	5,185	502,160	1,007,500	
ARCTIC-YUKON-KUSKOKWIM						
Clear	coho	240	50	150	440	Hatchery located south of Fairbanks.
	chum	1,300		600	1,900	
	chinook	120	5	32	157	
Interior lakes	coho		68,000		68,000	Based upon survival and harvest assumptions.
	rainbow		31,000		31,000	Based upon survival and harvest assumptions.
	grayling		4,000		4,000	Based upon survival and harvest assumptions.
	sheefish		20		20	Based upon survival and harvest assumptions.
Sikusuilaq	chum	2,500		1,100	3,600	Hatchery on the Noatak River.
AYK TOTALS:		4,160	103,075	1,882	109,117	
STATE TOTALS:		3,862,690	631,256	1,253,551	5,747,497	

Footnote: Estimate based upon a combination of historical data, standard survival assumptions, and minimal or no sampling.

Table 2. Number of fish released during 1986 by FRED facilities.

Facility	Brood year, Stock	Species	Released
SOUTHEAST			
Beaver Falls	1985 Hugh Smith	sockeye	788,000
Crystal Lake	1984 Crystal Creek	chinook	650,000
	1985 Tahini River	chinook	46,200
	1985 Farragut River	chinook	12,000
	1984 Crystal Creek	coho	121,000
	1985 Crystal Creek	coho	965,000
	1985 Crystal Creek	chum	117,000
	1983 Falls Creek	steelhead	2,440
Deer Mountain	1984 Ketchikan Creek	chinook	46,400
	1985 Ketchikan Creek	chinook	423,000
Hidden Falls	1985 Hidden Falls	chum	45,300,000
	1984 Crystal Cr./Tahini	chinook	92,100
	1985 Crystal Creek	chinook	181,000
Klawock	1985 Klawock/Beaver Falls	chum	8,800,000
	1984 Klawock River	coho	818,000
	1985 Klawock River	coho	184,000
	1985 Klawock River	steelhead	58,500
Snettisham	1985 Snettisham	chum	19,600,000
	1983 Speel Lake/Snettisham	coho	5,010
	1984 Snettisham	coho	191,000
	1985 Snettisham	coho	120,000
	1984 King Salmon River	chinook	140,000
	1984 Crystal Creek	chinook	254,000
	1985 Crystal Creek	chinook	911,000
	SOUTHEAST REGION TOTAL:		79,825,650
PRINCE WILLIAM SOUND			
Cannery Creek	1985 Cannery Creek	pink	56,200,000
	1985 Cannery Creek	chum	284,000
Gulkana	1985 Gulkana River	sockeye	23,600,000
Main Bay	1985 Cannery Creek	pink	32,700,000
	1985 Wells River/Main Bay	chum	9,510,000
	PRINCE WILLIAM SOUND TOTAL:		122,294,000
COOK INLET			
Big Lake	1985 Fish Creek	sockeye	5,310,000
	1985 Meadow Creek	sockeye	9,750,000
	1985 Big Lake	coho	2,670,000
	1985 Little Susitna	coho	316,000
Elmendorf	1985 Crooked Creek	chinook	619,000
	1984 Bear Creek	coho	106,000
	1984 Crooked Creek	coho	105,000
	1985 Crooked Creek	coho	207,000
Kasilof	1985 Glacier Flats	sockeye	9,400,000
	1985 Bear Creek	sockeye	8,070,000
	1984 Crooked Creek	chinook	69,200
	1984 Crooked Creek	coho	84,400
Tutka	1985 Tutka Lagoon	pink	25,100,000
	1985 Tutka Creek	chum	18,000

-Continued-

Table 2. Continued

Facility	Brood year, Stock	Species	Released
Ft. Richardson	1985 Deshka River	chinook	349,000
	1985 Willow Creek	chinook	276,000
	1984 Little Susitna	coho	577,000
	1985 Little Susitna	coho	201,000
	1984 18 Mile Creek	coho	148,000
	1985 18 Mile Creek	coho	50,000
	1985 Eyak Lake	coho	283,000
	1985 Eyak Lake (eggs/PWSAC)	coho	273,000
	1985 Big Lake	rainbow	34,700
	1986 Big Lake	rainbow	156,000
	1985 Swanson River	rainbow	115,000
	1986 Swanson River	rainbow	1,040,000
	1985 Anchor River	steelhead	44,900
Trail Lakes	1985 Crooked Creek	chinook	218,000
	1985 Quartz Creek	coho	230,000
	1985 Crooked Creek	coho	919,000
	1985 Bear Creek	coho	692,000
	1985 Eshamy Lake	sockeye	516,000
	COOK INLET TOTAL:		67,947,200
KODIAK & AK. PENINSULA			
Karluk	1986 Thumb River (eyed egg)	sockeye	19,800,000
Kitoi Bay	1985 Kitoi Bay	pink	97,800,000
	1985 Sturgeon River	chum	414,000
	1985 Big Kitoi	chum	8,500
	1985 Pasagshak River	chinook	1,700
	1985 Little Kitoi	coho	173,000
	1985 Buskin River	coho	50,000
	1986 Big Kitoi	rainbow	10,100
	KODIAK & AK. PENINSULA TOTAL:		118,247,200
ARCTIC-YUKON-KUSKOKWIM			
Clear	1985 Clear Creek	chinook	203,000
	1985 Wood Creek	chum	1,040,000
	1985 Wood Creek	coho	499,000
	1985 Swanson River	rainbow	83,800
	1986 Swanson River	rainbow	414,000
	1986 Moose Lake	grayling	975,000
	1986 Goodpaster Lake	grayling	106,000
	1985 Yukon River	sheefish	89,600
	1985 Amiloyak Lake	char	12,800
Sikusuilaq	1985 Noatak River	chum	1,500,000
	ARCTIC-YUKON-KUSKOKWIM TOTAL:		4,923,200
	SPECIES TOTALS		
		Chinook:	4,491,600
		Coho:	9,987,410
		Sockeye:	77,234,000
		Chum:	86,591,500
		Pink:	211,800,000
		Steelhead:	105,840
		Rainbow Trout:	1,853,600
		Grayling:	1,081,000
		Sheefish:	89,600
		Arctic Char:	12,800
		TOTAL RELEASE:	393,247,350

Table 3. Estimated number of eggs taken by FRED division during 1986.

Facility	Broodstock	Species	Eggs Taken
SOUTHEAST			
Beaver Falls	Hugh Smith Lake	sockeye	478,000
	Klawock/3 Mile Creek	sockeye	1,220,000
Crystal Lake	Harding River	chinook	48,000
	Crystal Creek	chinook	2,230,000
	Crystal Creek	chum	347,000
	Crystal Creek	coho	645,000
	St. John's Creek	coho	17,000
	Slippery Creek	coho	65,000
	Crystal Creek	steelhead	87,000
Deer Mountain	Ketchikan Creek	chinook	1,030,000
	Reflection Lake	coho	66,000
Hidden Falls	Hidden Falls	chum	65,600,000
	Crystal Creek	chinook	146,000
	Hidden Falls	chinook	5,200
	Tahini River	chinook	67,000
Klawock	Klawock River	chum	3,780,000
	Klawock River	coho	1,630,000
	Klawock River	steelhead	128,000
Snettisham	Snettisham	chum	28,800,000
	Crystal Creek	chinook	1,160,000
	King Salmon River	chinook	132,000
	Snettisham	chinook	167,000
	Snettisham	coho	1,740,000
	Speel Lake	sockeye	483,000
	Peterson Creek	steelhead	32,000
	SOUTHEAST	TOTAL	110,103,200
PRINCE WILLIAM SOUND			
Cannery Creek	Cannery Creek	pink	44,200,000
		chum	41,000
Gulkana	Gulkana River	sockeye	31,600,000
Main Bay	Main Bay	pink	3,020,000
	Main Bay	chum	84,600,000
	PRINCE WILLIAM SOUND	TOTAL	163,461,000
COOK INLET			
Big Lake	Meadow Creek	sockeye	16,800,000
	Fish Creek	sockeye	1,300,000
	Big Lake	coho	3,180,000
	Little Susitna	coho	18,000
Elmendorf	Crooked Creek	chinook	787,000
	Ship Creek	coho	63,000
Kasilof	Bear Creek	sockeye	8,040,000
	Glacier Flats	sockeye	13,500,000
	Crooked Creek	steelhead	127,000

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Table 3. Continued

Facility	Broodstock	Species	Eggs Taken
Ft. Richardson	Deshka River	chinook	290,000
	Ft. Rich (select)	rainbow	93,000
	Swanson River	rainbow	3,900,000
	Big Lake	rainbow	969,000
	Little Susitna	coho	550,000
	Eyak Lake	coho	227,000
Tutka	Tutka Creek Lagoon	pink	31,500,000
	Tutka Creek	chum	56,000
	Westside Creek	chum	821,000
Trail Lakes	Crooked Creek	chinook	427,000
	Hidden Lake	sockeye	4,430,000
	Crooked Creek	coho	1,360,000
	Bear Creek	coho	892,000
	Anchor River	steelhead	46,000
	COOK INLET TOTAL		89,376,000
KODIAK & AK. PENINSULA			
Karluk	Thumb River	sockeye	23,400,000
Kitoi Bay	Kitoi Bay	pink	108,000,000
	Stugeon River	chum	632,000
	Big Kitoi	chum	213,000
	Little Kitoi	coho	397,000
	Big Kitoi	rainbow	12,500
	KODIAK & AK. PENINSULA TOTAL		132,654,500
ARCTIC-YUKON-KUSKOKWIM			
Clear	Moose Lake	grayling	1,900,000
	Good Paster River	grayling	198,000
	Clear Creek/Salcha	chinook	209,000
	Wood Creek	coho	641,000
	Clear Hatchery	sheefish	1,070,000
	Koyukuk River	sheefish	134,000
	Amiloyak	arctic char	20,600
Sikusuilaq	Noatak River	chum	2,060,000
	ARCTIC-YUKON-KUSKOKWIM TOTAL		6,232,600
	Egg Totals by Species:	Chinook:	6,698,200
		Chum:	186,950,000
		Coho:	11,491,000
		Pink:	186,720,000
		Sockeye:	101,251,000
		Grayling:	2,098,000
		Rainbow:	4,974,500
		Steelhead:	420,000
		Sheefish:	1,204,000
		Arctic Char:	20,600
	STATE TOTAL:		501,827,300

PROGRAM PROJECTIONS FOR 1987

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. Often more than one of these strategies are used in combination. 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 4 and 5 are based only upon hatchery production of salmon. The evaluation of nonsalmon species (e.g., rainbow trout, grayling) that are stocked 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 1986 met or exceeded the statewide projections for every species except pink salmon. The pink salmon returns to the Prince William Sound and Kitoi Hatcheries were only 40% and 45%, respectively, of the number of salmon projected to return in 1986. The number of sockeye, coho, and chum salmon that returned in 1986 exceeded the statewide projections for those species. The return of nearly 600,000 salmon to Tustumena Lake was the largest return of hatchery-produced sockeye salmon in the state. Again in 1986, the southeast Alaska hatcheries of Hidden Falls and Klawock produced the largest returns of chum salmon and anadromous coho salmon, respectively, in the state.

Projected Returns for 1987

A statewide total of nearly 7.5 million salmon are expected to return in 1987 from previous releases of hatchery fish (Table 4). This is an increase of 1 million salmon over what was expected to return in 1986.

Pink salmon again comprise the largest segment of the projected returns, with over 5 million fish expected to return to the Prince William Sound, Kodiak, and lower Cook Inlet fisheries.

Over 1 million of both sockeye and chum salmon are expected to return to release sites throughout the state in 1987. Over two-thirds of the sockeye salmon return are expected from releases of fry into Tustumena Lake, and nearly 90% of the anticipated statewide sockeye salmon will be returning to Cook Inlet. Almost 80% of the total expected return of chum salmon will return to southeast Alaska, with the Hidden Falls Hatchery accounting for nearly two-thirds of the statewide total. The Main Bay Hatchery in Prince William Sound should be the second-largest contributor of adult chum salmon with the return of 160,000 fish.

The hatchery returns of chinook salmon in 1987 is expected to be about 80% above the number that returned in 1986. Crystal Lake Hatchery near Petersburg is expected to produce about 13,000 chinook salmon from its previous releases. The largest return of chinook salmon outside of southeast Alaska is expected at Crooked Creek in central Cook Inlet. These chinook salmon are a result of smolt releases by the Elmendorf and Kasilof Hatcheries. The largest producer of coho salmon should again be the Klawock Hatchery. This Southeast facility is expected to have returns of nearly 100,000 coho salmon in 1987.

Hatchery Objectives for Fiscal Year 1988

Assuming that FRED Division would receive the funding to operate all 20 facilities during FY 88, a total of over 637 million eggs will be collected in 1987 (Table 5). This level of egg take will produce over 11 million fish, including nearly 500,000 rainbow trout, steelhead trout, grayling, and sheefish. This represents an increase of about 130 million eggs over the amount taken the previous year (FY 87). The main reasons for the increase would be the operation of Russell Creek Hatchery (50 million chum salmon eggs) and the expectation that sufficient pink salmon brood stock would return to Cannery Creek Hatchery in Prince William Sound, allowing 100 million pink salmon eggs to be taken.

However, the latest version of the FY 88 Governor's Budget Request (1-21-87) reduces the General Fund portion of FRED Division's budget by 15% from the FY 87 allocation. At this funding level, FRED Division would not operate four facilities, and other facilities will be operated below their possible production capacity. This would decrease the total egg-take objective for FY 88 to 380 million eggs, which should produce about 5.5 million fish. Following the intent language from the 1985 Legislature, the reductions would occur at pink and chum salmon hatcheries and would amount to the loss of 3.9 million returning pink salmon and 1.2 million chum salmon. A more detailed description of where these reductions will occur is outlined in the Program Expenditures section of this report (page 70).

FRED Division has entered into a professional services agreement with a leading expert in Alaska economic impact assessment at the Institute of Social and Economic Research (ISER). One product of this independent study is a computer model of the salmon fishing economy in Alaska. This model is designed to identify some of the economic changes that will occur if salmon enhancement facilities are being closed or operated below their production capabilities. Using this model, it is estimated that the lost salmon production associated with the current FY 88 Governor's Budget would result in the loss of 133 full-time and part-time jobs as well as over $4.1 million in resident wages and income.

Table 4. A projection of the number of salmon expected to return in 1987 as a result of FRED hatcheries and projects (excluding fishways).

Return site	Numbers by species				
	Chinook	Coho	Sockeye	Chum	Pink
SOUTHEAST					
Crystal Lake	11,000	6,700	—	300	—
Ohmer Creek	1,800	—	—	—	—
Irish Creek	—	9,400	—	—	—
Petersburg	—	500	—	—	—
Deer Mountain	710	—	—	—	—
Hidden Falls	820	—	—	736,000	—
Klawock	—	95,000	—	79,000	—
Snettisham	1,500	3,400	—	75,000	—
Indian Lake	—	700	—	—	—
Salmon Creek	—	1,000	—	—	—
AREA TOTALS:	15,830	116,700	0	890,300	0
PRINCE WILLIAM SOUND					
Cannery Creek	—	—	—	32,000	2,870,000
Cordova	—	1,500	—	—	—
Culross Lake	—	900	—	—	—
Gulkana	—	—	99,000	—	—
Main Bay	—	—	—	160,000	457,000
Whittier	1,700	3,000	—	—	—
AREA TOTALS:	1,700	5,400	99,000	192,000	3,327,000
COOK INLET					
Big Lake	—	4,500	74,000	—	—
Cottonwod Drainage	—	4,000	—	—	—
Willow Creek	6,400	—	—	—	—
Little Susitna	—	5,000	—	—	—
Bear Creek	—	5,100	—	—	—
Crooked Creek	7,700	4,200	—	—	—
Tustumena	—	—	720,000	—	—
Grant Lake	—	6,650	—	—	—
Quartz Creek	—	1,000	—	—	—
Box Canyon Creek	—	1,800	—	—	—
Tern Lake	—	700	—	—	—
Six Mile Creek	900	3,000	—	—	—
Hidden Lake	—	—	61,200	—	—
Ptarmigan Lake	—	—	11,200	—	—
Tutka	—	—	—	6,200	521,000
Halibut Cove	2,600	—	—	—	—
Homer Spit	2,600	—	—	—	—
Leisure Lake	—	—	18,600	—	—
Seldovia Lake	—	1,500	—	—	—
Caribou Lake	—	2,500	—	—	—
Bear Lake	—	660	—	—	—
Resurrection Bay	2,600	—	—	—	—
Seward Lagoon	200	1,800	—	—	—
AREA TOTALS:	23,000	42,410	885,000	6,200	521,000

-Continued-

Table 4. Continued

Return site	Chinook	Coho	Sockeye	Chum	Pink
	Numbers by species				
KODIAK-AK. PENINSULA					
Karluk	--	--	44,500	--	--
Kitoi	--	--	--	2,300	1,220,000
Kodiak Lakes	--	700	--	--	--
Russell Creek	--	--	--	43,000	--
AREA TOTALS:	0	700	44,500	45,300	1,220,000
ARCTIC-YUKON-KUSKOKWIM					
Clear	160	2,600	--	6,600	--
Sikusuilaq	--	--	--	9,400	--
AREA TOTALS:	160	2,600	0	16,000	0
STATE TOTALS:	40,690	167,810	1,028,500	1,149,800	5,068,000
	GRAND TOTAL:		7,454,800		

Table 5. Production potential for FRED hatcheries in Fiscal Year 1988.

Species	1987 Egg take objectives a/	Expected adult returns from 1987 eggs b/
Sockeye salmon	110,000,000	980,000
Chum salmon	255,800,000	3,910,000
Pink Salmon	232,000,000	5,310,000
Chinook salmon	12,490,000	183,000
Coho Salmon	21,550,000	261,000
Steelhead	170,000	3,000
Rainbow trout	2,200,000	450,000
Grayling	1,700,000	15,500
Sheefish	1,500,000	7,100
TOTAL	632,410,000	11,119,600

a/ Assumes funding of FRED Division at full request.
b/ These adults will return over several years, beginning in 1989.

TECHNOLOGY AND DEVELOPMENT

The format this year for the technology and development report departs from years past. While a brief synopsis is given for each of the major program areas under the technology and development branch, these are followed by a general narrative describing the major accomplishments made by the science disciplines since the establishment of the division.

Coded-Wire Tag Laboratory

In 1986 the Coded-Wire Tag (CWT) Laboratory processed 26,000 marked fish from throughout the state. Tags from commercial and sport fisheries were extracted and read; information was distributed within one week of the time the heads of marked fish were received at the lab. CWT recovery data was made available for in-season fisheries management for all commercial fisheries sampled in southeast Alaska this year. Estimates of hatchery contribution of chinook salmon to all of Southeast's commercial fisheries were used to take advantage of the in-season "add-on provision" under the U.S./Canada Pacific Salmon Treaty. The CWT Laboratory sent out 1,800 letters to sport fishermen and 1,500 letters to commercial fishermen concerning information on marked fish that these fishermen had voluntarily submitted to the lab.

Limnology/Lake Fertilization

Water samples from 62 lakes around the state were obtained and processed in the Soldotna Limnology Laboratory. More than 31,000 water-quality analyses were performed by the lab staff. Eight lakes were fertilized, and six were planted with either sockeye, chinook, or coho salmon. Aerial application of fertilizer to Karluk Lake was initiated and promises to be our most ambitious project to date. Experiments at Leisure Lake continue to prove phenomenal. Prior to enrichment, Leisure Lake was able to produce about 200,000 smolts. Following enrichment, it is expected that the lake can easily turn out 1,500,000 smolts. The USFS continued as a major financial supporter of lake fertilization projects. Further, the City and Borough of Juneau enlisted assistance for rehabilitation of Auke Lake and for scientific support of the Juneau Wetlands Study. Other cooperators included the regional aquaculture associations, the City of Kodiak, the City of Valdez, and the U.S. Fish and Wildlife Service.

Pathology Laboratory

During the past year, the pathology staff handled more than 185 separate cases (requests for analytical services) and conducted more than 15,000 individual laboratory procedures in support of

this casework. As the caseload constantly increases, new equipment for increasing the speed with which certain tests can be conducted is being sought. Much of the lab work revolves around testing for Bacterial Kidney Disease (BKD) and Infectious Hematopoietic Necrosis Virus (IHNV) in salmon. Recently acquired equipment will greatly increase our efficiency in screening for these particular diseases.

Space for the new southeast Alaska laboratory has not yet been obtained, but acquisition is imminent. It is expected that modification of the space for laboratory functions plus installation of equipment will take 2-3 months. The need for this facility continues to grow, especially so if the much talked-about pen-farming of salmon becomes a reality, sockeye salmon culture continues to expand, and the mariculture industry for imported oysters and indigenous bivalve mollusks continues to increase in popularity.

Working in tandem with shellfish biologists from the Division of Commercial Fisheries, a new disease agent has been discovered in tanner crabs from northern southeast Alaska. This "bug" produces a condition called "bitter crab", recognized by a milkiness in the meat and, when consumed, a bitter taste. The disease imparts a significant negative economic impact--about 10% of the catch is discarded because of the condition. Efforts are underway to modify the fishery in ways so that the distribution of the disease agent is not extended to yet uninfected populations.

Genetics Laboratory

The rainbow trout brood-stock development center at Fort Richardson Hatchery was completed. Selection experiments got underway immediately with the rainbow trout egg take during the spring of 1986. This program is designed to develop a brood stock superior to that which we now have on hand; features being selected for include fry survival and growth. Efforts are also underway to selectively shift from early May to early March the time at which these fish will be ready to spawn. This will allow the hatchery culturists to have by summer fish that attain a larger size than what occurs now. These larger fish can be planted out into lakes and, subsequently, offer larger fish for catch by sport anglers.

Electrophoresis screening work on wild chum salmon from the Noatak and Kobuk Rivers has been completed. The complete data set consists of results obtained from three consecutive years. These data provide a baseline for judging how much, if any, genetic interaction occurs in the future between the hatchery brood stock and these wild stocks.

Again, as with last year, samples were obtained from sockeye salmon inhabiting seven different tributaries in Tustumena Lake. The purpose of this investigation is to determine whether or not fish from these streams are genetically different and constitute different "stocks." The U.S. Fish and Wildlife Service is concerned that the division's enhancement program in Tustumena Lake may upset this difference, if it exists.

Engineering

1986 saw the retirement of our most senior engineer, Mr. Fred Harding. Fred's knowledge and experience regarding construction in Alaska, especially as these apply to our remote hatcheries, will be missed. Major projects included the completion (rebuild) of Russell Creek Hatchery; conceptual design, fabrication and installation of a heat exchanger into the process water lines for Fort Richardson Hatchery; completion of raceways and construction of a fish food preparation/storage building at Snettisham Hatchery; and design and construction of sockeye salmon isolation incubation modules at Beaver Falls Hatchery.

Mariculture

Early in 1986, Dr. Michael Kaill was appointed as FRED Division's mariculture coordinator. He then spent the summer at the Japan fishery agency's research laboratory at Kushiro, Hokkaido. He studied the Japanese scallop (closely related to our Alaska weathervane scallop) in preparation for a joint scallop feasibility project with Japan's OFCF slated for Kodiak in the spring. One of the products of the summer is a manual of scallop mariculture now in final draft.

As the Legislature moves into the 1987 session, there are many questions confronting it, not the least of which is mariculture. What shape should it take? How will we best resolve some of the conflicts now looming? How much control should the state exercise in determining size and distribution of sea farms? FRED Division, working with other agencies and with the industry-supported Alaska Mariculture Association, has produced an issues paper to provide some background information to legislators dealing with these issues.

There is much grass-roots interest in mariculture, and some small-scale sea farmers are already underway in this private for-profit program. We continue to place a high priority on providing technical assistance to these operators.

Economics

Resource economics has been "officially" added to the division's repertoire of disciplines that, collectively, make up the decision processes used for overall management. Mr. Jeff Hartman, formerly a bioengineer but now a promising student and practitioner of resource economics, has been transferred to headquarters and occupies our single economist position. For the past several years, Mr. Hartman has been engaged in the development of economic valuation models that show the dollar returns on investments in public hatcheries around the state. Output data are very valuable when applied to the difficult task of budgetary decision making. Just recently, this effort has been taken one big step further into the realm of what is called economic "impact" analyses, which reveals not only the dollars gained or lost to the immediate users of fish produced from particular projects but also the impact in terms of dollars and jobs to the communities located within the sphere of influence of the subject project. Economists from the University of Alaska's Institute of Social and Economic Research are leading this effort at our request.

Given the current picture of revenue dollars, resource economics will no doubt continue to have a role within FRED Division, and probably will extend to other divisions within the department as well.

APPLIED SCIENCE = PUBLIC BENEFITS

Oftentimes we hear that technology and development (science) is the first thing to be "let go" when monies get tight and budgets get smaller. It's true--shortsighted but true--and it makes no difference whether a public agency or private enterprise is involved. Some may argue and, obviously, some convincingly that such is appropriate. Technology and Development is the future, and we need to take care of the present, they say. Why do today what can be put off till tomorrow, they say. Others, myself included, argue that tomorrow is today or that the future is now. What we do today is tomorrow in that one sets the stage for the other. So, are we stuck in some paradox? Maybe yes, maybe no. Depends upon the decisions that are made. Leaders can choose to give up projects and people in the technology area during hard times, or they can choose to keep a balanced program that embraces all the elements necessary to do a good all-around job now and into the future. Since its outset, the FRED Division has had leaders that opted for the balanced approach. Has this approach paid off? Should it be maintained? The succeeding paragraphs document why the answer to these questions is "yes".

The FRED Division produces three products: fish, technical services, and information. Everything done in the division revolves around three themes: hatchery technology, quality

control, and patterns in nature. The business is one of technology application--from office automation to the feeding of fish. People with widely varying backgrounds and training carry out the work. The science disciplines of biology, genetics, biometrics, pathology, fish culture, limnology, and engineering are represented.

Hatchery Technology

Some folks think that the technology used in building Alaskan hatcheries existed on the shelf, and all we had to do was pull it down and put it in place. Not so. Construction costs in remote settings demanded efficiency of design in the delivery of water to the hatchery and in the utilization of hatchery floor space.

Hanging lakes (lakes situated about 100 feet more or less above sea level) constitute the water source for many of the hatcheries built in Southeast and in Prince William Sound. The manner in which water is delivered from the lake to the hatchery, located a few feet above sea level, is quite novel. The water is essentially siphoned from the lake through large pipes and delivered down to the hatchery. Usually two pipelines are installed. One placed to withdraw water from the surface of the lake while the second is placed at depth, thereby taking advantage of the thermal properties of lakes so that water entering the hatchery incubators and rearing ponds can be adjusted to the temperature desired. Further, some of the water coming downhill can be passed through a small hydrogenerator thereby yielding free electricity to power the buildings and homes on the site. With regard to the construction of fish hatcheries, this is unique.

Efficient use of hatchery floor space meant squeezing as many eggs as possible into a given space. This dictated radical departure from incubation technology of the day. We had to turn to using bigger incubators than anybody had previously dreamed about, let alone used. These were designed in-house and then fabricated to our specifications. Incubators require substrate. Heretofore, pea gravel was used. While pea gravel is okay, it is heavy and difficult, if not impossible, to clean and does not lend itself to the incubation of massive numbers of eggs. We adopted a piece of plastic called the Intalox saddle and it became the substrate used in our incubators. All of this sounds commonplace today, but only a few years ago these approaches were viewed with great skepticism. Today, plastic substrates are used coastwide, but the large incubators are still unique to Alaska. The result of these developments is that production hatcheries in Alaska, both public and private, incubate more salmon eggs per square foot of floor space than do salmon hatcheries found elsewhere in the world.

Alaska leads the world in the successful incubation and release of sockeye salmon. No other country in the Pacific rim even attempts a hatchery program with sockeye salmon because of the

dreaded viral disease that afflicts sockeye salmon in nature and is exacerbated when hatchery culture is attempted. The disease is called infectious hematopoietic necrosis virus, or IHNV for short. During 1985-86, FRED Division incubated approximately 112 million sockeye salmon eggs. Of these, 70% survived to be released to sea as juveniles. While we have certainly not "conquered" IHN disease, we have learned to "farm" around it. Our approach is one of working with the virus to minimize its effects, rather than trying to eradicate the virus from the animal. Special attention to artificial spawning procedures and use of virus-free water for incubation are integral to our success.

Other types of fish culture technical development include hatchery construction and brood-stock development north of the Arctic Circle; pioneering work in the culture of grayling and sheefish, saltwater rearing of juvenile (zero check) chinook salmon, and development of a fish food manufactured in Alaska from salmon carcasses.

Quality Control

How do we know that little fish "out the door" translates to big fish "back at the door?" Well, considerable time and money is spent monitoring what we call "hatchery evaluation," aimed at answering that specific question. Calculated percentages of released juveniles are coded-wire-tagged and adipose-clipped at release. A large monitoring program of the fishing fleet is then conducted to subsample the catch. Those fish with missing adipose fins are enumerated and identified as to origin of release, using the internal tag which is extracted and decoded at our tag lab. From these data, extrapolations are made to determine the contribution of hatchery fish to the catch. Add these numbers to that number of fish that return to the hatchery door, and one has the total number of adults produced from the juveniles released. FRED Division has been instrumental in working with the developer of coded-wire tags to perfect this technology. We have pioneered the use of half-length tags for use in pink, chum, and sockeye salmon. Chinook and coho salmon received the normal-length tag because these fish are bigger at release than the others. The tag processing laboratory, located in Juneau, sets the coast-wide standard for head processing and data handling and storage.

Released fish must be healthy if they are to survive well in the ocean environment. Quality control and monitoring of fish health is a significant effort, no matter where in the world aquaculture is conducted. All diseases that affect salmon occur in nature; fish brought to the hatchery environment bring these diseases with them, unless care is taken to screen the brood stock and separate and discard the carrier fish from the noncarriers. Hatchery environments have attendant stressors that aggravate disease problems. Our fish pathologists work hand-in-hand with our hatchery managers to ensure the production of healthy fish,

because healthy fish come back in greater numbers as adults. Without the fish pathology discipline in place within the department, salmon aquaculture in Alaska could not exist. The success of mariculture (culture in saltwater) of oysters, scallops, mussels, and other shellfish will also depend heavily on the delivery of pathology services and adherence to recommendations from the pathology discipline.

Quality control is also integral to the work-a-day world of our engineers and fish culturists. Multimillion dollar fish hatcheries require constant vigilance. You know how your house always seems to require repair, and new houses require more than old ones! Magnify that many times and then weave into this the notion of a large, live inventory of tens of millions of fish, part or all of which can be lost at the slightest malfunction, and you can begin to appreciate the demands of the task. Maintaining a live inventory means that success is had only if potential problems are anticipated or somehow discerned prior to the accident happening. Fixing a malfunction after the fish have been lost really won't cut it.

Patterns in Nature

Why would enhancement biologists be interested in patterns in nature? Insights to the patterns of ecosystem dynamics is the key to understanding fish population dynamics that, in turn, are central to knowing/learning how to manipulate systems to produce more fish as well as understanding why fish released from hatcheries survive well or poorly. Take for example sockeye salmon stocks. Recently it has become evident that size of individual fish is related to number of adults that return: when runs are large, size is small; when runs are small, size is large. This becomes important in the context of efforts like fry stocking and lake fertilization, because one does not want to lose the benefits of larger and more numerous juveniles to lessened accumulation of adult biomass in the ocean environment.

Synchrony is the "watchword" for those of us who look for patterns in nature. Natural systems are wonderfully tuned to a myriad of intrinsic and extrinsic events. Understanding this "tuning" or synchrony can help us produce fish. How? Let's look first at the timing of the release of fish from our hatcheries. When is the best period to release the fish? Many factors come into play. Logically, one wants to release when forage in the nearshore marine environment is optimal. A simple monitoring program enables us to "see" when the time is right. Size and age combine to create a maturation factor that readies the juvenile fish for its transition from fresh water to salt water. The production of fish in freshwater environments is a symphony of events that must be in synchrony in order to maximize the end product--fish. When this system becomes asynchronous, it is,

first, a difficult job to discover this and, second, a difficult job to fix it. But this is what fish scientists get paid to do. How well they succeed is a matter of how well they understand the system(s) that they are dealing with. In a very real way this understanding is as powerful for producing fish as is, say, a hatchery. Let me give just one example.

Karluk Lake. Events within the lake that are critical to sockeye fry survival are out of synchrony. Fry survival is low. Manipulation of sockeye salmon escapement will not solve the problem. The key is to make the timing of lake residence of juveniles coincide with elevated forage availability. The only way to accomplish this is to add fertilizer in the spring and bring the system back to synchrony. This is being done. We calculate that this action will result in approximately three times as many harvestable adults, adding three million dollars to the value of the catch.

The mix of many disciplines within the FRED Division has served the state well. In Alaska right now, the FRED and PNP hatcheries have over one billion eggs under incubation. We have a salmon aquaculture program that works. We have the most stringent fish disease laws in the nation, and these serve to protect our wild fish as well as our hatchery brood stocks. We have laboratories that provide services without which an aquaculture industry could not exist.

Management biologists forecast a downturn in the harvest of wild salmon. Already in Prince William Sound over half the pink salmon harvested are hatchery fish. What has been put in place statewide is growing in significance. We will continue to improve our abilities to produce salmon, especially sockeye. No doubt about it. The same disciplines are in place to embrace new endeavors--sea farming, for example. Already we have struck a cooperative research and development project with the Japanese to investigate mariculture of scallops in and around Kodiak. There is interest in giant kelp culture as well. Opportunities abound. We have the people resources to make it happen, to take advantage of those opportunities, and to turn them into new platforms of employment and revenue for the state.

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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 PNP 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 salmon hatcheries and shellfish farms;
- coordination of technical assistance to PNP hatcheries; and
- 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 (RPT) 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 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 the team is currently in the plan-maintenance process.

2. Northern Southeast

   The northern Southeast regional plans have been approved, and the team is in the plan-maintenance process. In this instance, plan maintenance has involved a revision of the comprehensive plan to incorporate supplemental production ceilings for certain species in sensitive areas and a tracking system to follow the progress of plan implementation toward regional goals and objectives.

* Indicates inactive regional association

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 USFS 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 has completed the Phase II, or site-specific, comprehensive salmon plans for the Prince William Sound and the Copper River areas. The team has proceeded into the plan maintenance and updating process.

5. Cook Inlet

The planning team efforts in Cook Inlet are presently directed toward 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 revising a regional Phase II plan. Anticipated completion date of a draft plan for public and agency review is February 1987.

7. Bristol Bay

The Bristol Bay Regional Planning Team has completed drafting the first comprehensive salmon production plan ever written for the Bristol Bay region. The plan is unique in that, unlike plans for other salmon production regions in Alaska, it does not concentrate on fisheries enhancement through such strategies as hatcheries; rather, it emphasizes maintenance and restoration of fisheries habitat and effective management practices. The Bristol Bay Plan still requires approval by the Commissioner of ADF&G.

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 River's salmon resource to the region's users. This review may be used in U.S./Canada salmon negotiations dealing with the Yukon River.

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 Legislature, the most recent occurring in 1982. At that time, the maximal 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 and accrual of interest 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, except 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 collateral 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. Loans were available only for continued operations at existing facilities, and construction and operation of new facilities that had been approved prior to 15 February 1984. In April 1986 the restriction on funding was lifted for new increments of chinook, coho, and sockeye salmon production. Funding for new increments of production is now being determined on a case-by-case basis, according to the merits of individual projects.

Table 6 presents cumulative state loans secured by corporations for capital construction and operations, cumulative enhancement funds returned to the regional aquaculture associations, and estimates by the hatchery operators of revenue generated during 1986 by corporate sales of returning hatchery fish. To date, $51.5 million has been borrowed by PNP corporations.

Program Implementation

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

Table 6. Cumulative state loans and enhancement funds returned to associations (through June 30,1986), and annual fish sales for 18 private nonprofit (PNP) hatcheries (through Dec. 31, 1986).

Region/Corporation (number of permits)	State Loans		Cumulative Enhancement Funds Generated through Assessments, Returned to Associations via Contract	Estimated Revenue From 1986 Sales of Fish Returning to Special Harvest Areas
	For Capital Construction	For Operations		
SOUTHERN SOUTHEAST				
Southern Southeast Regional Aquaculture Association-SSRAA (3)	$10,156,342.00	$1,785,600.00	$5,516,442.00 (note 1)	$704,396.00
Alaska Aquaculture,Inc. (1)	$1,103,235.00	$826,575.00	N/A	$0.00
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	$1,606,769.00	$3,333,071.00 (note 1)	$122,384.30
Armstrong-Keta, Inc.- A-K (1)	$1,152,145.00	$875,500.00	N/A	$5,364.00
Burro Creek Farms, Inc.-BCF (1)	$191,375.00	$92,000.00	N/A	$880.00
Douglas Island Pink and Chum Corp.-DIPC (2)	$838,000.00	$1,561,500.00	N/A	$6,724.57
Kake Nonprofit Fisheries Corp.-KNFC (1)	$739,274.00	$746,046.00	N/A	$0.00
Sheldon Jackson College-SJC (1)	$362,254.00	$61,370.00	N/A	$18,800.15
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)	$17,838,539.00	$585,500.00	$3,640,739.00 (note 2)	$938,370.43
Valdez Fisheries Development Corp.-VFDC (1)	$3,113,830.00	$2,056,879.00	N/A	$54,712.00
COOK INLET				
Cook Inlet Regional Aquaculture Corp.-CIAA (1)	$1,348,881.00	$444,755.00	$3,143,476.00 (note 3)	$15,423.00
STATEWIDE TOTALS	$40,866,944.00	$10,642,494.00	$15,633,728.00	$1,867,054.45

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

The regulations identify a single application process for a PNP hatchery permit that 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 submission 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. The team's review is conducted in accordance with performance standards identified in the PNP regulations.

Since the inception of the PNP Program, 24 salmon hatchery permits have been issued, and 26 applications have been either denied or withdrawn. Seventeen of the permitted PNP hatcheries are in operation and 14 had returns of adult salmon during 1986. Currently, there are nine preliminary or final applications for PNP hatchery permits under consideration. In addition, 48 scientific/educational permits for PNP research projects or school district aquaculture programs were issued in 1986 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, 8, and 9.

Hatchery Production

In 1986 PNP corporations estimated that 7.9 million adult salmon originally released as juveniles from corporate facilities were either harvested in common-property fisheries or returned to hatchery special harvest areas (Table 7). In Prince William Sound, returns to the Armin F. Koernig Hatchery were estimated by PWSAC to have contributed over 3.8 million pink salmon to the commercial fishery. SSRAA estimates its hatcheries at Neets Bay and Whitman Lake contributed over 441,000 chum, coho, and chinook salmon to the common-property fisheries in Southeast.

Statewide production data since 1975 for combined species, including adult returns and harvests, are presented in Table 8. Preliminary estimates by the PNP corporations indicate that

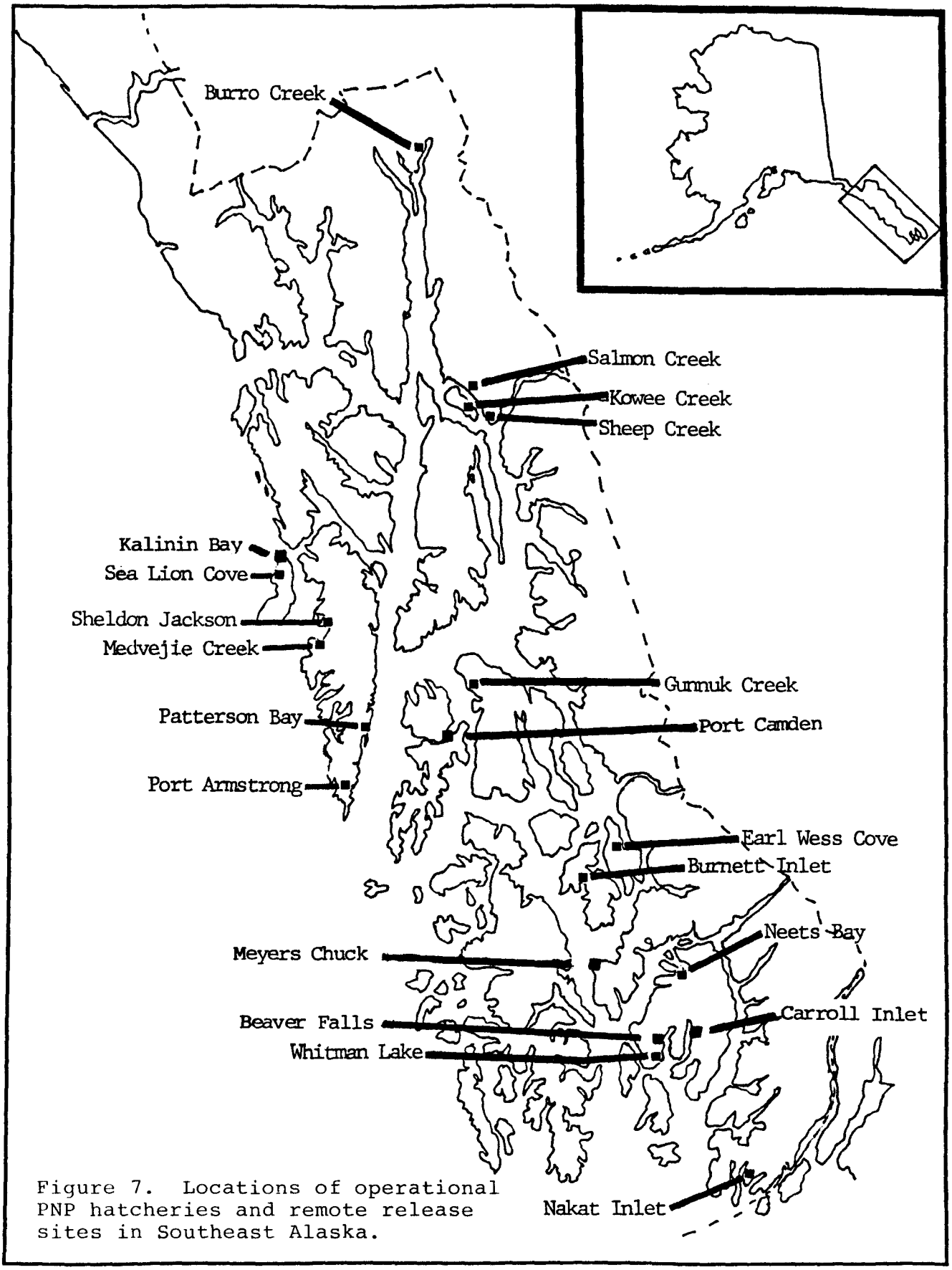

Figure 7. Locations of operational PNP hatcheries and remote release sites in Southeast Alaska.

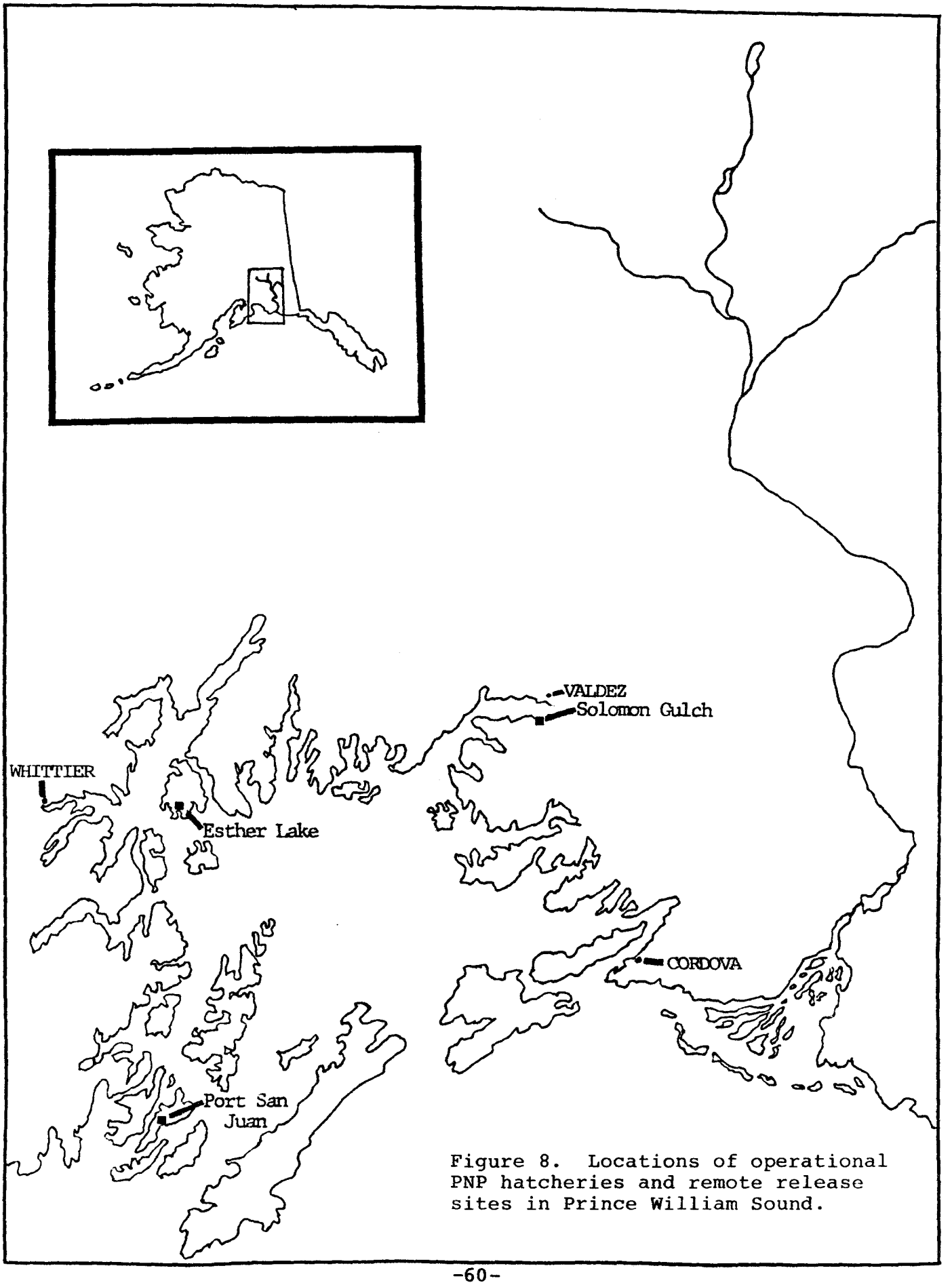

Figure 8. Locations of operational PNP hatcheries and remote release sites in Prince William Sound.

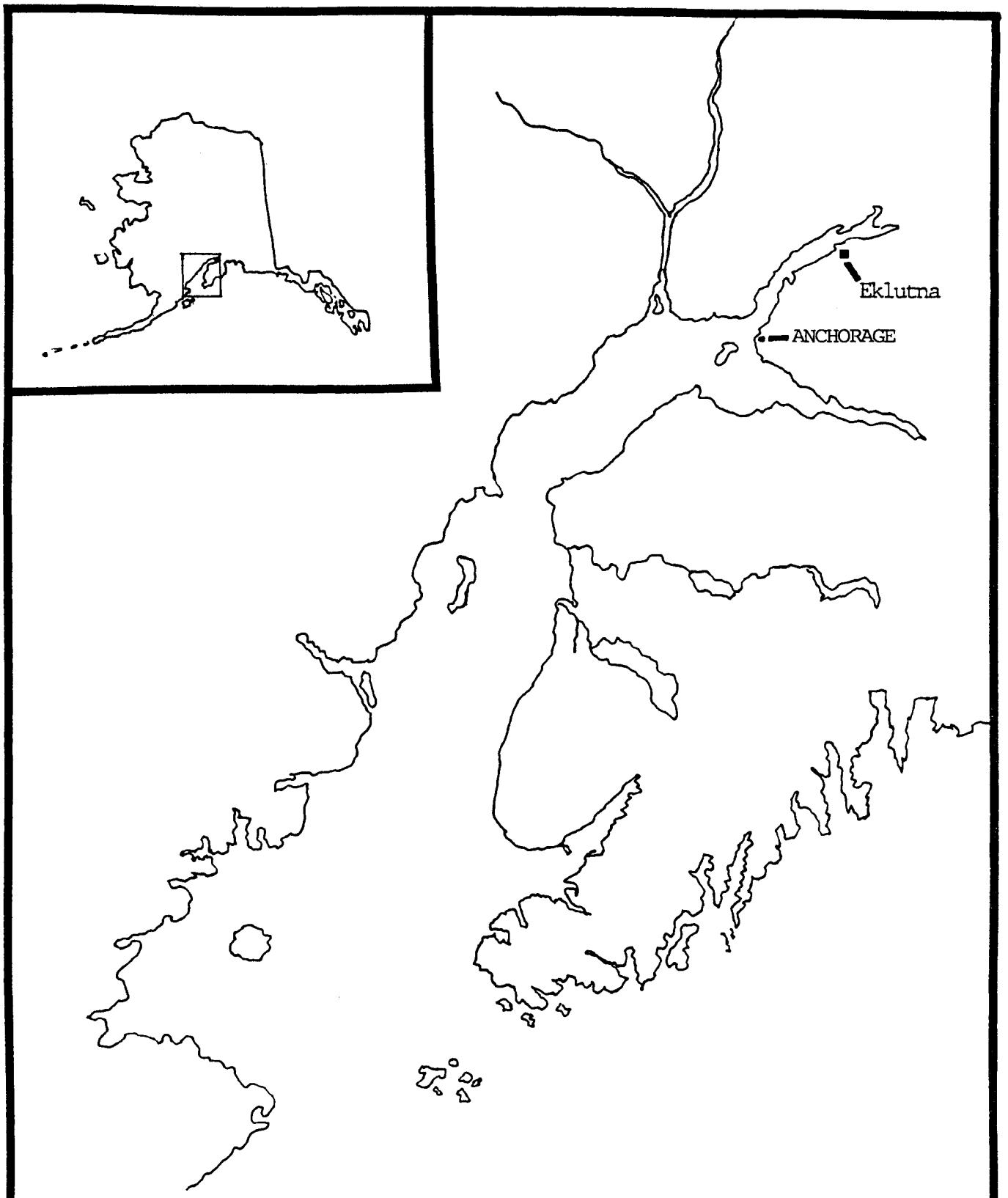

Figure 9. Location of operational PNP hatchery in Cook Inlet.

common-property harvest of the 1986 return was over 5.9 million fish. This represents a 17% increase over 1985 in common-property harvest. Cumulative data for chum salmon produced by PNP corporations since 1975 are presented in Table 9. Similar data for sockeye, pink, coho, and chinook salmon are presented in Tables 10, 11, 12, and 13, respectively.

Egg takes and fry or smolt stocking are regulated by ADF&G through fish transport permits (FTP), which are administered by the PNP program. During 1986, fry and smolt releases increased to 380 million juvenile fish, an increase of over 78 million (or 26%) from 1985 levels (Table 14). 1985 egg takes for PNP hatcheries totaled over 522 million green eggs, up 52 million (or 11%) from 1985 levels. The largest egg take of 1986 was again at Armin F. Koernig Hatchery where over 218 million green pink and and chum salmon eggs were taken for incubation there and at Esther Lake Hatchery (Table 15). This was followed by the Valdez Fisheries Development Association's (VFDA) Solomon Gulch Hatchery with over 69 million pink, chum, and coho salmon eggs and the SSRAA's Neets Bay Hatchery with over 63 million chum, coho, and chinook salmon eggs.

Significant progress was made in 1986 in initiating hatchery-originated sockeye salmon production from PNP hatcheries. Sockeye salmon egg takes totaled 1.3 million eggs, an increase of 1 million over 1985 levels. Significant increases in both chum and coho salmon production also were made in 1986. Chum salmon egg takes increased by 62 million, or 52%, over 1985 levels; coho salmon egg takes increased by 4.2 million, or 102%, over 1985 levels; and chinook salmon egg takes increased by a modest 400,000 eggs, or 7%, over 1985.

Pink salmon egg takes decreased from the previous year for the first time since 1982. The principal reason for the decrease was a pink salmon run failure in the northern Southeast region that resulted in over 26 million fewer eggs being taken than were taken in 1985.

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 over 1.13 billion green eggs, an increase of over 56 million from 1985 levels (Table 16). Potential returns from statewide PNP hatchery-originated production at the 1-billion egg level should exceed 15 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 57% of hatchery capacity is scheduled for pink salmon, 37% for chum salmon, and 5% for sockeye, coho, and chinook salmon.

For the 1987 season, projected returns to PNP facilities in southeast Alaska are expected to include approximately 8,000 chinook salmon, 340,000 coho salmon, 1,036,000 chum salmon, and 1,172,000 pink salmon, assuming standard survival conditions. Returns to PNP facilities in Prince William Sound are projected at 10,000,000 pink salmon, 210,000 chum salmon, and 18,000 coho salmon for 1987.

Significant hatchery special harvests are expected at the Armin F. Koernig, 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 and Earl Wess Cove) Hatcheries.

Annual Management Plans

The PNP regulations 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 1987 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 the number of fish required in order to meet capital and operating expenses.

Table 7. 1986 estimated adult returns, by species, to PNP hatcheries (including common property harvests) as reported by operators.

REGION/LOCATION	Pink	Chum	Coho	Chinook	TOTAL	
SOUTHEAST						
SSRAA - Whitman Lake		93,157	130,338	799	224,294	(note 1)
- Neets Bay		272,964	206,431	10,277	489,672	(note 1)
NSRAA - Salmon Creek	0	18,792	0		18,792	(note 1)
- Medvejie Creek		181,743	1,792	80	183,615	(note 1)
AAI - Burnett Inlet	64,000	9,712			73,712	(note 2)
A-K - Port Armstrong	60,196	-			60,196	(note 2)
BCF - Burro Creek	4,576	362			4,938	(note 2)
DIPAC - Sheep Creek	298,625	2,549			301,174	(note 3)
- Kowee Creek	80,003	957			80,960	(note 3)
KNFC - Gunnuk Creek	0	0			0	
MCAA - Meyers Chuck	0	-			0	
SJC - Indian River	56,473	2,935	329	-	59,737	(note 1&3)
THCC - Sandy Bay	0	-			0	
SOUTHEAST TOTALS	563,873	583,171	338,890	11,156	1,497,090	
PRINCE WILLIAM SOUND						
PWSAC - Armin F. Koernig	4,964,000	166,250			5,130,250	(note 4)
- Esther Lake	-	49	-	-	49	
VFDC - Solomon Gulch	1,239,841	6,215	4,356	-	1,250,412	(note 4)
PWS TOTALS	6,203,841	172,514	4,356	0	6,380,711	
COOK INLET						
CIAA - Eklutna	270	23,952	1,503	0	25,725	(note 2)
COOK INLET TOTALS	270	23,952	1,503	0	25,725	
STATEWIDE TOTALS	6,767,984	779,637	344,749	11,156	7,903,526	

note 1: estimation based on expansion of coded wire tag recoveries.
note 2: estimation based on assumed common property interception rates.
note 3: estimation based on assumed marine survival rates.
note 4: estimation based on data provided by Division of Commercial Fisheries.

Table 8. Summary of statewide salmon production (all species) from PNP hatcheries as reported by operators.

Year	Egg Take	Fry or smolt release	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	$130,726.00
1978	37,346,167	26,796,238	160,967	114,188	$141,799.00
1979	54,295,879	29,131,774	356,501	244,555	$309,612.00
1980	125,740,500	35,587,200	1,506,466	346,168	$436,171.00
1981	223,600,000	101,600,000	2,563,913	850,293	$1,274,640.00
1982	234,390,000	126,990,000	5,340,720	1,370,110	$1,165,608.00
1983	261,310,000	170,375,000	4,285,989	744,767	$669,838.00
1984	372,880,000	217,730,000	4,764,144	1,048,701	$1,668,788.00
1985	469,960,000	302,320,000	8,106,485	1,853,483	$1,878,348.00
1986	522,200,000	380,890,000	7,903,526	1,211,620	$1,867,054.45
Cumulative hatchery revenue from special harvest:					$9,542,584.45

Table 9. Summary of chum salmon production from PNP hatcheries.

Year	Egg Take	Fry release	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	$24,640.00
1982	46,130,000	23,590,000	22,133	378	$302.00
1983	68,790,000	41,770,000	126,783	35,099	$37,120.00
1984	122,170,000	54,780,000	1,001,449	436,617	$690,393.00
1985	119,450,000	97,880,000	525,088	123,215	$209,208.00
1986	181,450,000	100,490,000	779,637	188,754	$303,080.00

Table 10. Summary of sockeye salmon production from PNP hatcheries

Year	Egg Take	Fry or smolt release	Total return	Special harvest	Hatchery revenue
1985	310,000	0	0	0	$0.00
1986	1,295,700	102,000	0	0	$0.00

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

Year	Egg Take	Fry release	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	$130,726.00
1978	34,851,807	25,732,238	160,397	114,188	$141,799.00
1979	46,582,015	28,204,674	356,498	244,555	$309,612.00
1980	98,030,000	31,690,000	1,504,878	346,168	$436,171.00
1981	188,000,000	78,800,000	2,491,345	838,037	$1,200,000.00
1982	185,170,000	102,550,000	5,253,378	1,354,732	$1,084,806.00
1983	185,520,000	126,890,000	4,086,552	701,399	$613,618.00
1984	241,760,000	159,340,000	3,637,927	583,185	$741,673.00
1985	339,910,000	199,490,000	7,404,789	1,698,732	$1,320,320.00
1986	324,570,000	271,960,000	6,767,984	948,624	$1,012,420.00

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

Year	Egg Take	Fry or smolt release	Total return	Special harvest	Hatchery revenue
1975	12,000				
1976	24,150				
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	$50,000.00
1982	2,870,000	700,000	61,709	11,500	$80,500.00
1983	6,200,000	1,570,000	71,781	7,396	$19,100.00
1984	6,300,000	3,230,000	121,112	27,310	$233,466.00
1985	4,100,000	4,220,000	168,427	29,530	$293,820.00
1986	8,300,000	4,280,000	344,749	72,960	$535,203.00

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

Year	Egg Take	Fry or smolt release	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	$3,256.00
1985	6,180,000	720,000	8,181	2,006	$55,000.00
1986	6,580,000	4,050,000	11,156	1,282	$16,351.00

Table 14. 1986 releases from PNP hatcheries in millions.

REGION/LOCATION	Pink	Chum	Coho	Chinook	Sockeye	TOTAL
SOUTHEAST						
SSRAA - Whitman Lake		7.70	1.33	0.57	*	9.60
- Neets Bay		26.52	2.36	3.23		32.10
- Beaver Falls					0.10	0.10
NSRAA - Salmon Creek	*	*	*			0.00
- Medvejie Creek	0.06	25.22	0.07	0.11		25.46
- Port Camden		0.03				0.03
AAI - Burnett Inlet	9.00	0.83	0.01	*		9.85
A-K - Port Armstrong	9.76	1.63		*		11.39
BCF - Burro Creek	2.24	0.29				2.53
DIPC - Kowee Creek	6.29	*				6.29
- Sheep Creek	29.46	6.81		0.03		36.30
KNFC - Gunnuk Creek	3.07	8.11	*			11.18
MCAA - Meyers Chuck	0.40	*	*			0.40
SJC - Indian River	10.05	2.24	0.09	0.05		12.44
THCC - Sandy Bay	*	*				0.00
SOUTHEAST TOTALS	70.33	79.37	3.85	4.00	0.10	157.66
PRINCE WILLIAM SOUND						
PWSAC - Armin F. Koernig	112.53	2.04				114.57
- Esther Lake	34.44	15.17	0.10	0.06	*	49.77
VFDC - Solomon Gulch	54.63	2.26	0.23	*		57.12
PWS TOTALS	201.59	19.47	0.33	0.06		221.45
COOK INLET						
CIAA - Eklutna	0.03	1.65	0.10	*		1.79
COOK INLET TOTALS	0.03	1.65	0.10	0.00		1.79
STATEWIDE TOTALS	271.96	100.49	4.28	4.05	0.10	380.89

Note : * indicates permitted species but no releases this season.

Table 15. 1986 egg takes for PNP hatcheries in millions.

REGION/LOCATION	Pink	Chum	Coho	Chinook	Sockeye	TOTAL
SOUTHEAST						
SSRAA - Whitman Lake		5.09	1.80	1.95	*	8.84
- Neets Bay		57.50	2.09	4.04		63.63
- Beaver Falls					0.41	0.41
NSRAA - Salmon Creek	*	*	*			0.00
- Medvejie Creek	0.10	31.01	0.95	0.23		32.29
- Port Camden		0.21				0.21
AAI - Burnett Inlet	9.90	4.64	0.01	*		14.55
A-K - Port Armstrong	14.52	2.17		0.08		16.77
BCF - Burro Creek	0.71	0.59	0.01			1.31
DIPC - Kowee Creek	8.16	*				8.16
- Sheep Creek	1.53	19.91	0.07			21.51
KNFC - Gunnuk Creek	3.08	10.93				14.01
MCAA - Meyers Chuck	3.37	*				3.37
SJC - Indian River	15.02	1.88	0.16	0.05		17.11
THCC - Sandy Bay	*	*				0.00
SOUTHEAST TOTALS	56.39	133.94	5.08	6.35	0.41	202.17
PRINCE WILLIAM SOUND						
PWSAC - Armin F. Koernig	125.03	*				125.03
- Esther Lake	79.00	40.21	1.79	0.23	0.89	122.12
VFDC - Solomon Gulch	64.10	4.14	1.35	*		69.59
PWS TOTALS	268.13	44.35	3.14	0.23	0.89	316.74
COOK INLET						
CIAA - Eklutna	0.05	3.16	0.08	*		3.29
COOK INLET TOTALS	0.05	3.16	0.08	0.00		3.29
STATEWIDE TOTALS	324.57	181.45	8.30	6.58	1.30	522.20

Note : * indicates permitted species but no egg take this season.

Table 16. Permitted egg capacities, in millions, of PNP hatcheries within the planning regions, 1986.

REGION	Pink	Chum	Coho	Chinook	Sockeye	TOTAL
SOUTHERN SOUTHEAST						
Association Facilities	0.00	91.80	8.40	5.50	2.80	108.50
Non-Association Facilities	21.00	47.00	1.25	0.75		70.00
Total	21.00	138.80	9.65	6.25	2.80	178.50
NORTHERN SOUTHEAST						
Association Facilities	13.10	55.00	4.10	0.30		72.50
Non-Association Facilities	99.00	67.50	1.72	0.18		168.40
Total	112.10	122.50	5.82	0.48	0.00	240.90
PRINCE WILLIAM SOUND						
Association Facilities	361.00	124.00	1.00	1.00	31.00	518.00
Non-Association Facilities	146.00	28.00	1.00	0.05		175.05
Total	507.00	152.00	2.00	1.05	31.00	693.05
COOK INLET						
Association Facilities	10.00	10.00	1.10	0.10		21.20
Total	10.00	10.00	1.10	0.10	0.00	21.20
STATEWIDE TOTALS	650.10	423.30	18.57	7.88	33.80	1133.65

PROGRAM EXPENDITURES

Fiscal Year 1987 Operating Budget

The FRED Division, as a Budget Request Unit (BRU), requests operating funds in three components. About 93% of the FY 87 authorized budget is in the FRED component, which includes nearly all the division's operational, technical, and administrative functions; the other BRU components are special projects and Capital Improvement Project (CIP) costs. Special Projects are those that are contracted from federal agencies such as the USFS and other interagency receipts. Most of the money received for the special projects component in FY 87 was from U.S./Canada Pacific Salmon Treaty mitigation funds for projects dealing with sockeye and chum salmon in southeast Alaska. The CIP costs are those incurred to implement in-house construction projects. The total FY 87 authorized budget for the FRED Division BRU was $15,496,700.

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 1988 Operating Request

The latest version of the FY 88 Governor's Budget Request (21 January 1987) includes $13,826,100 for the FRED component. This represents a 15.1% reduction in the General Fund amount, compared to FY 87. Along with this budget, there is a request to allow FRED Division to collect up to $500,000 in program receipts and use U.S./Canada mitigation money to fund the operation of Beaver Falls Hatchery. The program receipts could be collected through several methods, including sales of salmon at terminal-harvest locations. Even with these other potential funding sources, the FY 88 request, as it stands now, would force the closure of four hatcheries and reduce the scale of operations for at least two other facilities. There will also be reductions to many of the support projects associated with this hatchery production.

Following the intent language expressed during the 1985 legislative session, the reductions would involve pink salmon and then chum salmon facilities. With the current Governor's Budget Request, the operation of the following facilities would be affected:

1. Cannery Creek Hatchery (pink salmon hatchery in Prince William Sound) would not be operated. This facility has the capacity to incubate 100 million pink salmon eggs

that would produce over 2.6 million returning pink salmon annually. During the past five years, this hatchery has contributed over 4.7 million pink salmon to the commercial fisheries of Prince William Sound.

2. Tutka Hatchery (pink and chum salmon hatchery in Kachemak Bay) would incubate only 2.5 million chum salmon eggs. The capacity of this facility is 30 million pink salmon and 1 million chum salmon eggs that would annually produce 875,000 pink salmon and 15,000 chum salmon. This hatchery annually produces about 40% of the total commercial pink salmon harvest in lower Cook Inlet.

3. Russell Creek Hatchery (chum salmon hatchery on Alaska Peninsula) would not be operated. There has been no production at this facility for the past two years because of remedial reconstruction. The facility now has the capacity to incubate 50 million chum salmon eggs that could produce about 770,000 adult chum salmon annually.

4. Sikusuilaq Hatchery (chum salmon hatchery on Noatak River) would be closed. The current capacity at this experimental facility is about 2.2 million chum salmon eggs. In order to be cost effective, this facility would need to be expanded to handle about 40 million chum salmon eggs.

5. Karluk Sockeye--no sockeye salmon eggs would be taken for the streamside incubation facility, but the lake fertilization project will continue.

6. Reduced Chum Salmon Production in Southeast--reduce out the number of chum salmon eggs taken at Snettisham and/or Hidden Falls Hatcheries. Depending upon where this reduction would occur, the potential loss of chum salmon returns would be between 200,000 to 300,000 salmon.

The planned hatchery production associated with this budget request is explained in more detail in the Program Projection section (page 38) of this report.

Table 17. FRED Division FY87 operating budget (all funding sources)

Function	Budget (x$1000)	Percent
Management/Administration (headquarters & regional offices)	1,755.7	11.3
Private Nonprofit Hatchery Coordination & Regional Planning	233.6	1.5
Hatchery Production Statewide (facility operating budgets)	8,605.6	55.5
Biological Projects/Staff (plans, operations, assessments)	834.2	5.4
Lake & Stream Improvement/Stocking (fishpasses, habitat and stocking projects)	210.7	1.4
Technical Supervision/Quality Control (biology, fish culture, engineering, maintenance, library, mariculture)	1,028.2	6.6
Fish Pathology Laboratory (statewide services)	590.8	3.8
Genetics Laboratory (statewide services)	146.3	0.9
Limnology (principal scientist and project leaders)	201.4	1.3
Lake Fertilization/Stocking (field projects statewide and limnology lab support)	219.1	1.4
Tagged Fish Recovery Laboratory (statewide & US/Canada concerns)	383.5	2.5
Biometrics/Data Processing	273.9	1.8
Special Projects (cooperative funding projects)	719.5	4.6
C.I.P. Costs	294.2	1.9
TOTAL	15,496.7	100.0

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Production Report	Bill Hauser Marianne McKean Steve Schwartz
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APPENDICES

APPENDIX A

Life-Stage Survival Summaries for Fish Released in 1986

Table 1. Survival summary of chinook salmon released in 1986 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	1985 Tahini River	60,000	57,000 (94.7%)	56,000 (98.7%)	46,200[a] (82.5%)	
	1985 Faragut River	50,000	44,000 (88.0%)	13,000 (28.8%)	12,000[a] (92.3%)	
	1984 Crystal Creek	1,250,000	940,000 (74.9%)	918,000 (97.7%)		650,000[a] (70.8%)
Deer Mountain	1984 Ketchikan Creek	739,000	635,000 (86.0%)	552,000 (86.9%)		527,400[b] (95.5%)
	1985 Ketchikan Creek	813,000	678,000 (83.4%)	603,000 (88.9%)		423,000[c] (70.1%)
Hidden Falls	1984 Crystal/Tahini Mix	54,000	99,000[d] (91.1%)	95,000 (96.1%)		92,100[a] (96.9%)
	1985 Crystal Creek	276,000	238,000 (86.2%)	231,000 (97.0%)	230,000[e] (99.6%)	
Snettisham	1984 Crystal Creek	998,000	849,000 (85.0%)	811,000 (95.5%)		254,000[a] (31.3%)
	1984 King Salmon River	194,000	188,000 (97.0%)	185,000 (98.8%)		140,000[a] (75.7%)
	1985 Crystal Creek	5,050,000	3,110,000 (61.6%)	2,830,000 (91.2%)	2,601,000[f] (91.9%)	

a/ Number released.
b/ 481,000 were released in 1985 as zero-check smolt, and 46,400 were released as smolt in 1986.
c/ These were released as zero check smolt.
d/ 50,000 eyed eggs were recieved from Crystal Lake Hatchery.
e/ 181,000 were released as fingerling in 1986. The remainder are still being reared.
f/ 911,000 were released as fingerling in 1986. The rest will be reared to the smolt stage.

Table 2. Survival summary of chinook salmon released in 1986 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	1985 Clear Creek	250,000	221,000 (88.4%)	210,000 (95.0%)	203,000[a] (96.7%)	
Trail Lakes	1985 Crooked Creek	311.000	234,000 (75.2%)	223,000 (95.3%)	218,000[a] (97.8%)	
Elmendorf	1985 Crooked Creek	883,000	681,000 (77.1%)	639,000 (93.8%)		619,000[a] (96.9%)
Ft. Richardson	1985 Willow Creek	377,000	308,000 (81.7%)	308,000 (100 %)		276,000[a] (89.6%)
	1985 Deshka Creek	458,000	373,000[b] (81.4%)	373,000 (100 %)	367,000[c] (98.4%)	213,000[a] (92.1%)
Kitoi Bay	1985 Pasagshak River	12,000	2,300 (19.2%)	1,800 (78.3%)	1,700[a] (94.4%)	
Kasilof	1984 Crooked Creek				72,000[d]	69,200[a] (95.8%)

a/ Number released.
b/ An additional 229,000 eyed eggs were transfered to Esther Lake Hatchery (PWSAC).
c/ 135,500 were released as fingerlings.
d/ Transfered from Trail Lakes Hatchery.

Table 3. Survival summary of coho salmon released in 1986 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	1985 Wood Creek	559,000	539,000 (96.4%)	517,000 (95.9%)	499,000[a/] (96.5%)	
Big Lake	1985 Little Susitna	364,000	336,000 (92.3%)	274,000	316,000[a/] (94.0%)	
	1985 Big Lake	3,620,000	3,370,000 (93.1%)	2,920,000 (86.7%)	2,670,000[a/] (91.4%)	
Elmendorf	1984 Bear Creek				126,000[b/]	106,000[a/] (84.1%)
	1984 Crooked Creek				125,000[b/]	105,000[a/] (84.0%)
	1985 Crooked Creek	312,000	265,000 (84.9%)	258,000 (97.4%)	207,000[a/] (80.2%)	
Ft. Richardson	1984 18 Mile Creek	476,000	381,000 (80.0%)	397,000	391,000[c/] (98.5%)	148,000[a/]
	1985 18 Mile Creek	188,000	119,000 (63.3%)	116,000 (97.5%)	115,000[d/] (99.1%)	
	1984 Little Susitna	675,000	594,000 (88.0%)	594,000 (100%)		577,000[a/] (97.1%)
	1985 Little Susitna	539,000	476,000 (88.3%)	466,000 (97.9%)	432,000[e/] (92.7%)	
	1985 Eyak Lake	730,000	569,000[f/] (77.9%)	289,000 (97.6%)	283,000[a/] (97.9%)	

-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	1984 Crooked Creek				89,000[b/]	84,400[a/] (94.8%)
Kitoi Bay	1985 Buskin River	54,000	53,000 (98.2%)	51,000 (96.2%)	50,000[a/] (98.0%)	
	1985 Little Kitoi	186,000	176,000 (94.6%)	175,000 (99.4%)	173,000[a/] (98.9%)	
Trail Lakes	1985 Crooked Creek	1,160,000	988,000 (85.2%)	938,000 (94.9%)	919,000[a/] (98.0%)	
	1985 Quartz Creek	299,000	272,000 (91.0%)	259,000 (95.2%)	230,000[a/] (88.8%)	
	1985 Bear Lake	1,000,000	939,000 (93.9%)	892,000 (95.0%)	692,000[a/] (77.6%)	

a/ Number released.
b/ Fingerling transfer from Trail Lakes Hatchery.
c/ 261,000 were released as fingerling in 1985.
d/ 50,000 were released as fingerling in 1986.
e/ 201,000 were released as fingerling in 1986.
f/ 273,000 eyed eggs were transfered to PWSAC.

Table 4. Survival summary of coho salmon released in 1986 from Southeast Region FRED Division facilities.

Facility	Brood year, Brood stock	Green eggs	Eyed eggs (90%)	Emergent (95%)	Fry (95%)	Smolt (72%)
			(percent survival goals from previous stage)			
Crystal Lake	1984 Crystal Creek	1,910,000	1,360,000 (71.5%)	1,350,000[a] (99.0%)		121,000[b] (80.7%)
	1985 Crystal Creek	1,660,000	1,510,000 (90.8%)	1,490,000[c] (99.0%)		
Klawock	1985 Klawock River	1,630,000	1,520,000 (93.2%)	1,480,000 (97.1%)	1,182,000[d] (79.9%)	
	1984 Klawock River	1,580,000	1,500,000 (95.3%)	1,410,000 (93.9%)	1,226,000[e] (87.0%)	818,000[b] (95.0%)
Snettisham	1985 Snettisham	1,720,000	1,570,000 (91.1%)	1,480,000[f] (94.4%)		
	1983 Speel/Snettisham	367,000	352,000 (95.8%)	343,000 (98.3%)		239,000[g] (69.7%)
	1984 Snettisham	721,000	696,000 (96.6%)	688,000 (98.8%)	277,000[h] (40.3%)	191,000[b] (91.3%)

a/ 1,200,000 were released in 1985.
b/ Number released.
c/ 965,000 fry were stocked in 1986. The remainder will be reared to the smolt stage.
d/ 184,000 were released as pre-smolts in 1986.
e/ 365,000 were released as fingerling in 1985.
f/ 120,000 fry were released in 1986. The rest will be reared to the smolt stage.
g/ 234,000 were released as smolt in 1984, and 5,010 were released into Twin Lakes in 1985.
h/ 67,700 were released as fingerling in 1985.

Table 5. Survival summary of pink salmon released in 1986 from Central Region FRED Division facilities.

Facility	Brood year, Brood stock	Green eggs	Eyed eggs (90%)	Emergent (95%)	Fry (95%)	Fingerling (90%)
			(percent survival goals from previous stage)			
Cannery Creek	1985 Cannery Creek	103,000,000	58,600,000[a] (90.0%)	56,200,000[b] (95.9%)		
Main Bay	1985 Cannery Creek		34,100,000[a]	32,700,000 (95.9%)	32,700,000[b] (100 %)	
Kitoi Bay	1985 Kitoi Bay	114,000,000	104,000,000 (91.2%)	98,100,000[c] (94.3%)	11,900,000[b] (97.3%)	
Tutka	1985 Tutka Lagoon	32,300,000	25,800,000 (79.9%)	25,100,000[d] (97.3%)	21,400,000[b] (99.6%)	

[a] Eyed eggs transfered from Cannery Creek Hatchery.
[b] Number released.
[c] 85,900,000 were released as emergent fry.
[d] 3,620,000 were released as emergent fry.

Table 6. Survival summary of chum salmon released in 1986 from Central Region FRED Division facilities.

Facility	Brood year, Brood stock	Green eggs	Eyed eggs (90%)	Emergent (95%)	Fry (95%)	Fingerling (95%)
			(percent survival goals from previous stage)			
Cannery Creek	1985 Cannery Creek	351,000	330,000 (94.0%)	284,000[a] (86.1%)		
Clear	1985 Wood Creek	1,130,000	1,064,000 (94.2%)	1,057,000 (99.3%)		1,043,000[a] (98.7%)
Kitoi Bay	1985 Big Kitoi	9,600	9,000 (93.8%)	8,800 (97.8%)		8,500[a] (96.6%)
	1985 Sturgeon River	484,000	437,000 (90.3%)	418,000 (95.7%)		414,000[a] (99.0%)
Main Bay	1985 Wells River	10,700,000	9,270,000 (86.6%)	9,660,000[b] (92.4%)		4,320,000[a] (96.6%)
	1985 Main Bay	1,260,000	1,190,000 (94.4%)			
Sikusuilaq	1985 Noatak River	2,461,000	2,148,000 (87.3%)	1,560,000 (72.6%)	1,503,000[a] (96.4%)	
Tutka Bay	1985 Tutka Creek Lagoon	20,000	19,000 (95.0%)	18,000[c] (94.7%)	15,500[a] (96.3%)	

[a] Number released.
[b] 5,190,000 were released as fed fry.
[c] 2,500 were released as emergent fry.

Table 7. Survival summary of chum salmon released in 1986 from Southeast Region FRED Division facilities.

Facility	Brood year, Brood stock	Green eggs	Eyed eggs (90%)	Emergent (95%)	Fed Fry (95%)	Fingerling (95%)
			(percent survival goals from previous stage)			
Hidden Falls	1985 Hidden Falls	58,000,000	48,200,000[a] (97.2%)	47,100,000[b] (97.7%)	19,700,000[c] (91.6%)	
Klawock	1985 Klawock River, Beaver Falls	15,200,000	11,600,000 (76.5%)	11,100,000[d] (95.6%)		8,740,000[c] (78.7%)
Snettisham	1985 Snettisham	21,700,000	21,200,000 (97.7%)	20,800,000[e] (98.1%)	19,200,000[c] (96.2%)	

[a] Transfered 8,200,000 eyed eggs to Kake Hatchery.
[b] 25,600,000 were released as emergent fry.
[c] Number released.
[d] Released 59,000 emergent fry.
[e] 400,000 were released as emergent fry.

Table 8. Survival summary of sockeye salmon released in 1986 from Southeast Region FRED Division facilities.

Facility	Brood year, Brood stock	Green eggs	Eyed eggs (90%)	Emergent (95%)	Fed fry (90%)
			(percent survival goals from previous stage)		
Beaver Falls	1985 Hugh Smith Lake	1,340,000	1,160,000 (87.1%)	1,000,000 (86.0%)	788,000[a] (78.8%)

[a] Number released.

Table 9. Survival summary of sockeye salmon released in 1986 from Central Region FRED Division facilities.

Facility	Brood year, Brood stock	Green eggs	Eyed eggs (90%)	Emergent (95%)	Fry (95%)	Fingerling (90%)
			(percent survival goals from previous stage)			
Big Lake	1985 Meadow Creek	13,800,000	11,200,000 (81.2%)	9,790,000 (87.4%)	9,750,000[a] (99.6%)	
	1985 Fish Creek	7,750,000	5,830,000 (75.2%)	5,320,000 (91.3%)	5,308,000[a] (99.8%)	
Gulkana	1985 Gulkana River	31,600,000		23,600,000[a] (74.6%)		
Karluk	1986 Thumb River	23,400,000	19,800,000[b] (84.6%)			
Kasilof	1985 Bear Creek	9,160,000	8,550,000 (93.3%)	8,200,000 (95.9%)		8,070,000[a] (98.4%)
	1985 Glacier Flats	14,500,000	13,300,000 (91.7%)	13,000,000 (97.7%)		9,400,000[a] (72.3%)
Trail Lakes	1985 Hidden Lake	7,020,000	5,860,000 (83.5%)	5,560,000[c] (94.9%)		
	1985 Eshamy Lake	1,880,000	1,510,000 (80.3%)	1,430,000 (94.7%)		516,000[a] (36.1%)

[a] Number released.
[b] These were planted back into the Thumb River as eyed eggs in 1986.
[c] These were destroyed due to an outbreak of IHN virus.

Table 10. Survival summary of rainbow trout released in 1986 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)			
Ft. Richardson	1986 Big Lake	969,000	416,000 (42.9%)	296,000 (71.2%)	170,000[a] (57.4%)	
	1985 Big Lake	648,000	464,000 (71.6%)	438,000 (94.4%)	294,000[b] (67.1%)	34,700[c] (19.5%)
	1986 Swanson River	3,900,000	2,450,000[d] (62.8%)	1,392,000 (75.5%)	1,200,000[e] (86.2%)	
	1985 Swanson River	2,140,000	1,833,000[f] (85.7%)	916,000 (84.0%)	750,000[g] (81.9%)	115,000[c] (95.0%)
Clear	1985 Swanson River		743,000[f]	574,000 (77.3%)	530,000[h] (92.3%)	83,800[c] (82.2%)
	1986 Swanson River		606,000[d]	576,000 (95.1%)	504,000[i] (87.8%)	
Kitoi	1986 Big Kitoi	12,500	12,200 (97.6%)	11,800 (96.4%)	10,100[c] (85.6%)	

a/ 156,000 were released as fingerling in 1986.
b/ 116,000 were released in 1985.
c/ Number released.
d/ 606,000 eyed eggs were transfered to Clear Hatchery.
e/ 1,038,000 were released in 1986 including the transfer of 183,000 fingerling to Elmendorf Hatchery.
f/ 743,000 eyed eggs were transfered to Clear Hatchery.
g/ 629,000 were released in 1985.
h/ 428,000 were released in 1985.
i/ 414,000 were released in 1986.

Table 11. Survival summary of steelhead trout released in 1986 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%)		6,040[a] (35.9%)
	1984 Crystal Creek	184,000	154,000 (83.4%)	76,000 (49.5%)	62,300[b] (82.0%)	
Klawock	1985 Klawock River	84,000	69,000 (82.6%)	69,000 (99.5%)		58,525[c] (84.8%)

a/ 3,600 were released in 1985 and 2440 were released in 1986.
b/ These fish were released in 1985 but were not reported in total in the 1985 FRED Annual Report.
c/ Number released.

Table 12. Survival summary of steelhead trout released in 1986 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	1985 Anchor River	54,000	51,000[a] (94.4%)	50,000 (98.0%)		44,900[b] (89.8%)

a/ Eyed eggs were transfered from Trail Lakes Hatchery.
b/ Number released.

Table 13. Survival summary of grayling released in 1986 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	1986 Moose Lake	1,902,000[a]		1,283,000[b] (72.0%)		189,000[c] (38.0%)
	1986 Goodpaster Lake	198,000		118,000[d] (59.6%)		56,400[c] (82.9%)

[a] 120,000 eyed eggs were sent to the Arizona Dept. of Fish & Game.
[b] 782,000 were released as swimup fry, and 4,000 were released as fed fry.
[c] Number released.
[d] 50,000 were released as fed fry.

Table 14. Survival summary of sheefish released in 1986 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	1985 Yukon River	411,000	254,000 (61.8%)	147,000 (57.9%)		89,600[a] (61.0%)

[a] Number released.

APPENDIX B

Stocking Location by Species for Fish Released in 1986

Table 1. Sockeye salmon stocked by FRED Division in 1986.

Stocking Location	Area	Species	Hatchery	Life Stage	Brood Stock	Number Stocked
BEAR CREEK	CCI	SOCKEYE	KASILOF	FINGERLINGS	BEAR CREEK	8,071,821
GLACIER FLATS (TUST)	CCI	SOCKEYE	KASILOF	FINGERLINGS	GLACIER FLATS (TUST)	5,490,162
UPPER THUMB RIVER	KOD	SOCKEYE	KARLUK	EYED EGGS	THUMB RIVER	19,800,000
LEISURE LAKE	LCI	SOCKEYE	KASILOF	FINGERLINGS	GLACIER FLATS (TUST)	2,250,303
PAINT LAKE	LCI	SOCKEYE	KASILOF	FINGERLINGS	GLACIER FLATS (TUST)	820,026
CHENIK LAKE	LCI	SOCKEYE	KASILOF	FINGERLINGS	GLACIER FLATS (TUST)	839,000
ESHAMY LAKE	PWS	SOCKEYE	TRAIL LAKES	FINGERLINGS	ESHAMY LAKE	516,000
GUNN CREEK	PWS	SOCKEYE	GULKANA	SWIMUP FRY	GULKANA RIVER	14,999,085
GULKANA RIVER	PWS	SOCKEYE	GULKANA	SWIMUP FRY	GULKANA RIVER	8,586,509
BLODGETT LAKE	UCI	SOCKEYE	BIG LAKE	FEED FRY	MEADOW CREEK	922,300
MEADOW CREEK	UCI	SOCKEYE	BIG LAKE	FEED FRY	MEADOW CREEK	8,825,876
MEADOW CREEK	UCI	SOCKEYE	BIG LAKE	FEED FRY	FISH CREEK	5,308,000
BADGER LAKE	SEA	SOCKEYE	BEAVER FALLS	SWIMUP FRY	HUGH SMITH LAKE	515,000
HUGH SMITH LAKE	SEA	SOCKEYE	BEAVER FALLS	SWIMUP FRY	HUGH SMITH LAKE	273,000

Table 2. Chum salmon stocked by FRED Division in 1986.

Stocking Location	Area	Species	Hatchery	Life Stage	Brood Stock	Number Stocked
NOATAK RIVER	AYK	CHUM	SIKUSUILAQ	FEED FRY	NOATAK RIVER	1,503,306
WOOD CREEK	AYK	CHUM	CLEAR	FINGERLINGS	WOOD CREEK	1,043,007
KITOI BAY	KOD	CHUM	KITOI	FINGERLINGS	BIG KITOI CREEK	8,517
KITOI BAY	KOD	CHUM	KITOI	FINGERLINGS	STURGEON RIVER	414,233
TUTKA LAGOON	LCI	CHUM	TUTKA	FEED FRY	TUTKA BAY LAGOON CR	4,800
TUTKA BAY LAGOON CR	LCI	CHUM	TUTKA	SWIMUP FRY	TUTKA BAY LAGOON CR	2,500
TUTKA BAY LAGOON CR	LCI	CHUM	TUTKA	FEED FRY	TUTKA BAY LAGOON CR	10,700
MAIN BAY	PWS	CHUM	MAIN BAY	FINGERLINGS	WELLS RIVER	4,324,686
MAIN BAY	PWS	CHUM	MAIN BAY	FEED FRY	WELLS RIVER	933,606
CANNERY CREEK	PWS	CHUM	CANNERY CREEK	SWIMUP FRY	CANNERY CREEK	284,000
LAKE BAY	PWS	CHUM	MAIN BAY	FEED FRY	WELLS RIVER	4,251,497
BARANOF BAY	SEA	CHUM	HIDDEN FALLS	SWIMUP FRY	HIDDEN FALLS	1,560,000
KASNYKU BAY	SEA	CHUM	HIDDEN FALLS	SWIMUP FRY	HIDDEN FALLS	24,060,000
KASNYKU BAY	SEA	CHUM	HIDDEN FALLS	FED FRY	HIDDEN FALLS	19,680,000
KLAWOCK RIVER	SEA	CHUM	KLAWOCK	SWIMUP FRY	KLAWOCK/BEAVER FALLS	58,500
KLAWOCK INLET	SEA	CHUM	KLAWOCK	FINGERLING	KLAWOCK/BEAVER FALLS	8,740,000
SNETTISHAM	SEA	CHUM	SNETTISHAM	FED FRY	SNETTISHAM	19,620,000

Table 3. Chinook salmon stocked by FRED Division in 1986.

Stocking Location	Area	Species	Hatchery	Life Stage	Brood Stock	Number Stocked
BOLIO LAKE (LL)	AYK	CHINOOK	FT RICHARDSON	FINGERLINGS	DESHKA R	20,500
DONNELLY L (LL)	AYK	CHINOOK	FT RICHARDSON	FINGERLINGS	DESHKA R	6,300
LITTLE HARDING L (LL	AYK	CHINOOK	FT RICHARDSON	FINGERLINGS	DESHKA R	10,000
WOOD CREEK	AYK	CHINOOK	CLEAR	FINGERLINGS	CLEAR CREEK	202,991
BENCH CREEK	CCI	CHINOOK	TRAIL LAKES	FINGERLINGS	CROOKED CREEK	40,076
CROOKED CREEK	CCI	CHINOOK	ELMENDORF	SMOLTS	CROOKED CREEK	184,456
CROOKED CREEK	CCI	CHINOOK	KASILOF	SMOLTS	CROOKED CREEK	69,164
GRANITE CREEK	CCI	CHINOOK	TRAIL LAKES	FINGERLINGS	CROOKED CREEK	93,463
LOWELL CREEK	CCI	CHINOOK	ELMENDORF	SMOLTS	CROOKED CREEK	100,900
SUMMIT LAKE	CCI	CHINOOK	TRAIL LAKES	FINGERLINGS	CROOKED CREEK	84,143
LAKE ROSE TEAD	KOD	CHINOOK	KITOI	FINGERLINGS	PASAGSHAK RIVER	1,707
HALIBUT COVE LAGOON	LCI	CHINOOK	ELMENDORF	SMOLTS	CROOKED CREEK	101,331
HOMER SPIT	LCI	CHINOOK	ELMENDORF	SMOLTS	CROOKED CREEK	103,946
ANDERSON BAY	PWS	CHINOOK	FT RICHARDSON	SMOLTS	DESHKA R	113,535
ESTHER HATCHERY	PWS	CHINOOK	FT RICHARDSON	EYED EGGS	DESHKA RIVER	228,631
ESTHER HATCHERY	PWS	CHINOOK	FT RICHARDSON	FINGERLINGS	DESHKA R	62,889
GRANITE BAY #162	PWS	CHINOOK	FT RICHARDSON	FINGERLINGS	DESHKA R	7,934
GRANITE BAY #171	PWS	CHINOOK	FT RICHARDSON	FINGERLINGS	DESHKA R	17,138
LOGGING CAMP CREEK	PWS	CHINOOK	FT RICHARDSON	SMOLTS	DESHKA R	49,850
PASSAGE CANAL	PWS	CHINOOK	ELMENDORF	SMOLTS	CROOKED CREEK	85,164
AUKE CREEK	SEA	CHINOOK	SNETTISHAM	SMOLTS	CRYSTAL CREEK	85,636
CRAB BAY	SEA	CHINOOK	DEER MOUNTAIN	0 CHK SMOLTS	KETCHIKAN CREEK	71,000
CRYSTAL CREEK	SEA	CHINOOK	CRYSTAL LAKE	SMOLTS	CRYSTAL CREEK	351,000
EARL WESS COVE	SEA	CHINOOK	CRYSTAL LAKE	SMOLTS	CRYSTAL CREEK	98,000
ELIZA LAKE	SEA	CHINOOK	HIDDEN FALLS	FED FRY	CRYSTAL CREEK	130,000
FARRAGUT RIVER	SEA	CHINOOK	CRYSTAL LAKE	FINGERLING	FARRAGUT RIVER	12,040
FISH CREEK	SEA	CHINOOK	SNETTISHAM	SMOLTS	CRYSTAL CREEK	60,272
INDIAN RIVER	SEA	CHINOOK	HIDDEN FALLS	FED FRY	CRYSTAL CREEK	51,020
KASNYKU BAY	SEA	CHINOOK	HIDDEN FALLS	SMOLTS	ANDREW CREEK/TAHINI	92,101
KETCHIKAN CREEK	SEA	CHINOOK	DEER MOUNTAIN	SMOLTS	KETCHIKAN CREEK	46,375
MONTANA CREEK	SEA	CHINOOK	SNETTISHAM	SMOLTS	CRYSTAL CREEK	28,335
OHMER CREEK	SEA	CHINOOK	CRYSTAL LAKE	SMOLTS	CRYSTAL CREEK	201,000
REDOUBT LAKE	SEA	CHINOOK	SNETTISHAM	FED FRY	CRYSTAL CREEK	911,000
SHEEP CREEK	SEA	CHINOOK	SNETTISHAM	SMOLTS	CRYSTAL CREEK	30,280
SNETTISHAM	SEA	CHINOOK	SNETTISHAM	SMOLTS	CRYSTAL CREEK	49,782
SNETTISHAM	SEA	CHINOOK	SNETTISHAM	SMOLTS	KING SALMON RIVER	140,295
TAHINI RIVER	SEA	CHINOOK	CRYSTAL LAKE	FINGERLING	TAHINI RIVER	46,236
THOMAS BASIN	SEA	CHINOOK	DEER MOUNTAIN	0 CHK SMOLTS	KETCHIKAN CREEK	284,000
THORNE BAY	SEA	CHINOOK	DEER MOUNTAIN	0 CHK SMOLTS	KETCHIKAN CREEK	68,000
DECEPTION CREEK	UCI	CHINOOK	FT RICHARDSON	SMOLTS	WILLOW CREEK/DESHKA R	325,304
ED LAKE	UCI	CHINOOK	FT RICHARDSON	FINGERLINGS	DESHKA R	10,750
JEWEL LAKE (LL)	UCI	CHINOOK	ELMENDORF	SMOLTS	CROOKED CREEK	8,452
JOHNSON LAKE (LL)	UCI	CHINOOK	ELMENDORF	SMOLTS	CROOKED CREEK	4,038
MEMORY LAKE (LL)	UCI	CHINOOK	ELMENDORF	SMOLTS	CROOKED CREEK	8,300
OTTER LAKE (LL)	UCI	CHINOOK	ELMENDORF	SMOLTS	CROOKED CREEK	7,846
ROCKY LAKE (LL)	UCI	CHINOOK	ELMENDORF	SMOLTS	CROOKED CREEK	4,508
SAND LAKE (LL)	UCI	CHINOOK	ELMENDORF	SMOLTS	CROOKED CREEK	8,548
VICTOR LAKE (LL)	UCI	CHINOOK	ELMENDORF	SMOLTS	CROOKED CREEK	1,340

Table 4. Coho salmon stocked by FRED Division in 1986.

Stocking Location	Area	Species	Hatchery	Life Stage	Brood Stock	Number Stocked
28 MILE PIT (LL)	AYK	COHO	CLEAR	FINGERLINGS	WOOD CREEK	500
31 MILE PIT (LL)	AYK	COHO	CLEAR	FINGERLINGS	WOOD CREEK	500
BIRCH LAKE (LL)	AYK	COHO	CLEAR	FINGERLINGS	WOOD CREEK	40,000
CHENA LAKE (LL)	AYK	COHO	CLEAR	FINGERLINGS	WOOD CREEK	30,000
CLEAR CREEK	AYK	COHO	CLEAR	FINGERLINGS	WOOD CREEK	79,974
DUNE LAKE (LL)	AYK	COHO	CLEAR	FINGERLING	WOOD CREEK	15,000
GESKAMINA L (LL)	AYK	COHO	CLEAR	FINGERLING	WOOD CREEK	20,000
JOHNSON RD PIT #1-LL	AYK	COHO	CLEAR	FINGERLINGS	WOOD CREEK	500
JUNE LAKE	AYK	COHO	CLEAR	FINGERLINGS	WOOD CREEK	38,869
MANCHU LAKE (LL)	AYK	COHO	CLEAR	FINGERLINGS	WOOD CREEK	10,000
MOOSE LAKE (LL)	AYK	COHO	CLEAR	FINGERLINGS	WOOD CREEK	5,000
QUARTZ LAKE (LL)	AYK	COHO	CLEAR	FINGERLINGS	WOOD CREEK	168,500
WOOD CREEK	AYK	COHO	CLEAR	FINGERLINGS	WOOD CREEK	79,974
BEAR LAKE	CCI	COHO	TRAIL LAKES	FINGERLINGS	BEAR LAKE	445,730
BOX CANYON CREEK	CCI	COHO	ELMENDORF	SMOLTS	BEAR LAKE	53,607
CROOKED CREEK	CCI	COHO	KASILOF	SMOLTS	CROOKED CREEK	84,350
CROOKED CREEK HATCH.	CCI	COHO	TRAIL LAKES	FINGERLINGS	CROOKED CREEK	70,384
EAST FORK CREEK	CCI	COHO	TRAIL LAKES	FINGERLINGS	CROOKED CREEK	34,040
ENCELEWSKI LAKE	CCI	COHO	TRAIL LAKES	FINGERLINGS	CROOKED CREEK	22,320
ENGINEER L (LL)	CCI	COHO	TRAIL LAKES	FINGERLINGS	CROOKED CREEK	60,750
GRANITE CREEK	CCI	COHO	TRAIL LAKES	FINGERLINGS	CROOKED CREEK	204,604
GRANT LAKE	CCI	COHO	TRAIL LAKES	FINGERLINGS	QUARTZ CREEK	230,051
INGRAM CREEK	CCI	COHO	TRAIL LAKES	FINGERLINGS	CROOKED CREEK	71,760
INSTITUTE MARINE SCI	CCI	COHO	ELMENDORF	SMOLTS	BEAR LAKE	1,200
QUINTAN LAKE	CCI	COHO	TRAIL LAKES	FINGERLINGS	CROOKED CREEK	4,671
SEWARD LAGOON	CCI	COHO	ELMENDORF	SMOLTS	BEAR LAKE	51,544
SEWARD LAGOON	CCI	COHO	TRAIL LAKES	FINGERLINGS	BEAR LAKE	122,908
SILVERTIP CREEK	CCI	COHO	TRAIL LAKES	FINGERLINGS	CROOKED CREEK	34,040
SUMMIT LAKE	CCI	COHO	TRAIL LAKES	FINGERLINGS	CROOKED CREEK	89,968
UNION LAKE (LL)	CCI	COHO	TRAIL LAKES	FINGERLINGS	CROOKED CREEK	22,320
WIK LAKE (LL)	CCI	COHO	TRAIL LAKES	FINGERLINGS	CROOKED CREEK	59,520
BARRY LAKE (LL)	KOD	COHO	KITOI	FINGERLINGS	LITTLE KITOI LAKE	30,375
BUSKIN LAKE	KOD	COHO	KITOI	FINGERLINGS	BUSKIN LAKE	25,917
DARK LAKE (LL)	KOD	COHO	KITOI	FINGERLINGS	LITTLE KITOI LAKE	7,875
DOLGOI LAKE (LL)	KOD	COHO	KITOI	FINGERLINGS	LITTLE KITOI LAKE	2,720
GENEVIEVE LAKE	KOD	COHO	KITOI	FINGERLINGS	BUSKIN LAKE	24,107
ISLAND LAKE (LL)	KOD	COHO	KITOI	FINGERLINGS	LITTLE KITOI LAKE	22,500
KALSIN LAKE	KOD	COHO	KITOI	FINGERLINGS	LITTLE KITOI LAKE	22,390
LITTLE KITOI LAKE	KOD	COHO	KITOI	FINGERLINGS	LITTLE KITOI LAKE	53,360
MAYFLOWER L (LL)	KOD	COHO	KITOI	FINGERLINGS	LITTLE KITOI LAKE	6,500
MISSION LAKE	KOD	COHO	KITOI	FINGERLINGS	LITTLE KITOI LAKE	10,000
ORBIN LAKE (LL)	KOD	COHO	KITOI	FINGERLINGS	LITTLE KITOI LAKE	7,500
PONY LAKE (LL)	KOD	COHO	KITOI	FINGERLINGS	LITTLE KITOI LAKE	2,000
POTATO LAKE	KOD	COHO	KITOI	FINGERLINGS	LITTLE KITOI LAKE	7,500
CARIBOU LAKE	LCI	COHO	TRAIL LAKES	FINGERLINGS	CROOKED CREEK	138,039
SELDOVIA LAKE	LCI	COHO	TRAIL LAKES	FINGERLINGS	CROOKED CREEK	71,496

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Table 4. Continued.

Stocking Location	Area	Species	Hatchery	Life Stage	Brood Stock	Number Stocked
CORDOVA ESTUARY	PWS	COHO	FT RICHARDSON	SMOLTS	MILE 18 CREEK	44,470
CULROSS LAKE	PWS	COHO	FT RICHARDSON	FINGERLINGS	EYAK LAKE	99,600
ESTHER HATCHERY	PWS	COHO	FT RICHARDSON	SMOLTS	MILE 18 CREEK	104,000
ESTHER HATCHERY	PWS	COHO	FT RICHARDSON	FINGERLINGS	EYAK LAKE	125,000
ESTHER HATCHERY	PWS	COHO	FT RICHARDSON	EYED EGGS	EYAK LAKE	273,218
MILE 18 CREEK	PWS	COHO	FT RICHARDSON	FINGERLINGS	MILE 18 CREEK	49,990
SURPRISE COVE L #1	PWS	COHO	FT RICHARDSON	FINGERLINGS	EYAK LAKE	20,053
SURPRISE COVE L #2	PWS	COHO	FT RICHARDSON	FINGERLINGS	EYAK LAKE	38,698
WELLS PASSAGE	PWS	COHO	ELMENDORF	SMOLTS	CROOKED CREEK	104,724
BEAR PAW L (LL)	UCI	COHO	TRAIL LAKES	FINGERLINGS	CROOKED CREEK	8,000
BENKA LAKE (LL)	UCI	COHO	TRAIL LAKES	FINGERLINGS	BEAR LAKE	25,000
CHRISTIANSEN L (LL)	UCI	COHO	TRAIL LAKES	FINGERLINGS	CROOKED CREEK	15,908
COTTONWOOD LAKE	UCI	COHO	BIG LAKE	FINGERLINGS	BIG LAKE	161,059
ECHO LAKE (LL)	UCI	COHO	ELMENDORF	FINGERLINGS	CROOKED CREEK	4,609
FINGER LAKE (LL)	UCI	COHO	ELMENDORF	FINGERLINGS	CROOKED CREEK	72,215
JOHNSON LAKE (LL)	UCI	COHO	ELMENDORF	FINGERLINGS	CROOKED CREEK	4,030
JUNCTION LAKE (LL)	UCI	COHO	ELMENDORF	FINGERLINGS	CROOKED CREEK	3,277
LOON LAKE (LL)	UCI	COHO	ELMENDORF	FINGERLINGS	CROOKED CREEK	21,600
LOST LAKE (LL)	UCI	COHO	CLEAR	FINGERLINGS	WOOD CREEK	10,000
LUCILLE LAKE (LL)	UCI	COHO	ELMENDORF	FINGERLINGS	CROOKED CREEK	67,805
MEADOW CREEK	UCI	COHO	BIG LAKE	FINGERLINGS	BIG LAKE	2,188,961
MEMORY LAKE (LL)	UCI	COHO	ELMENDORF	FINGERLINGS	CROOKED CREEK	8,300
NANCY LAKE	UCI	COHO	FT RICHARDSON	SMOLTS	LITTLE SUSITNA RIVER	577,448
NANCY LAKE	UCI	COHO	BIG LAKE	FINGERLINGS	LITTLE SUSITNA RIVER	316,270
NANCY LAKE	UCI	COHO	FT RICHARDSON	FINGERLINGS	LITTLE SUSITNA RIVER	200,578
NEKLASSON LAKE	UCI	COHO	BIG LAKE	FINGERLINGS	BIG LAKE	43,058
PRATOR LAKE (LL)	UCI	COHO	ELMENDORF	FINGERLINGS	CROOKED CREEK	19,845
ROCKY LAKE (LL)	UCI	COHO	ELMENDORF	FINGERLINGS	CROOKED CREEK	4,078
STEPAN LAKE	UCI	COHO	BIG LAKE	FINGERLINGS	BIG LAKE	55,059
TRAIL LAKE (LL)	UCI	COHO	TRAIL LAKES	FINGERLINGS	BEAR LAKE	98,000
TWIN LAKES	UCI	COHO	BIG LAKE	FINGERLINGS	BIG LAKE	110,705
VICTOR LAKE (LL)	UCI	COHO	ELMENDORF	FINGERLINGS	CROOKED CREEK	1,364
WASILLA LAKE	UCI	COHO	BIG LAKE	FINGERLINGS	BIG LAKE	111,764
WOLF LAKE (LL)	UCI	COHO	TRAIL LAKES	FINGERLINGS	CROOKED CREEK	11,020
CRYSTAL CREEK	SEA	COHO	CRYSTAL LAKE	SWIMUP FRY	CRYSTAL CREEK	253,000
IRISH CREEK	SEA	COHO	CRYSTAL LAKE	SWIMUP FRY	CRYSTAL CREEK	712,000
CRYSTAL CREEK	SEA	COHO	CRYSTAL LAKE	SMOLTS	CRYSTAL CREEK	112,373
3 MILE CREEK	SEA	COHO	CRYSTAL LAKE	SMOLTS	CRYSTAL CREEK	2,540
NORDIC DR. CREEK	SEA	COHO	CRYSTAL LAKE	SMOLTS	CRYSTAL CREEK	997
HAMINER SLOUGH	SEA	COHO	CRYSTAL LAKE	SMOLTS	CRYSTAL CREEK	2,501
SANDY BEACH CREEK	SEA	COHO	CRYSTAL LAKE	SMOLTS	CRYSTAL CREEK	2,589
KLAWOCK LAKE	SEA	COHO	KLAWOCK	SMOLTS	KLAWOCK RIVER	818,000
TUNGA LAKE	SEA	COHO	KLAWOCK	PRE-SMOLT	KLAWOCK RIVER	147,000
KLAWOCK RIVER	SEA	COHO	KLAWOCK	PRE-SMOLT	KLAWOCK RIVER	37,000
TWIN LAKES (LL)	SEA	COHO	SNETTISHAM	CATCHABLE	SPEEL LAKE	5,010
SALMON CREEK	SEA	COHO	SNETTISHAM	SMOLTS	SNETTISHAM	20,422
SNETTISHAM	SEA	COHO	SNETTISHAM	SMOLTS	SNETTISHAM	171,000
INDIAN LAKE	SEA	COHO	SNETTISHAM	FED FRY	SNETTISHAM	120,000

Table 5. Pink salmon stocked by FRED Division in 1986.

Stocking Location	Area	Species	Hatchery	Life Stage	Brood Stock	Number Stocked
KITOI BAY	KOD	PINK	KITOI	SWIMUP FRY	BIG KITOI CREEK	85,885,314
KITOI BAY	KOD	PINK	KITOI	FEED FRY	BIG KITOI CREEK	11,887,738
TUTKA LAGOON	LCI	PINK	TUTKA	SWIMUP FRY	TUTKA LAGOON	389,300
HALIBUT COVE LAGOON	LCI	PINK	TUTKA	FEED FRY	TUTKA LAGOON	2,000,000
TUTKA LAGOON	LCI	PINK	TUTKA	FEED FRY	TUTKA LAGOON	19,445,000
TUTKA BAY LAGOON CR	LCI	PINK	TUTKA	SWIMUP FRY	TUTKA LAGOON	2,936,800
TUTKA BAY	LCI	PINK	TUTKA	SWIMUP FRY	TUTKA LAGOON	294,400
DERICKSON BAY	PWS	PINK	CANNERY CREEK	SWIMUP FRY	CANNERY CREEK	2,057,000
MAIN BAY	PWS	PINK	MAIN BAY	FEED FRY	CANNERY CREEK	32,728,663
CANNERY CREEK	PWS	PINK	CANNERY CREEK	SWIMUP FRY	CANNERY CREEK	54,159,000

Table 6. Steelhead, sheefish, and arctic char stocked by FRED Division in 1986.

Stocking Location	Area	Species	Hatchery	Life Stage	Brood Stock	Number Stocked
EARTHMOVER PIT (LL)	AYK	SHEEFISH	CLEAR	FINGERLINGS	YUKON RIVER	300
HARDING LAKE (LL)	AYK	SHEEFISH	CLEAR	FINGERLINGS	YUKON RIVER	88,460
SILVER FOX PIT (LL)	AYK	SHEEFISH	CLEAR	FINGERLINGS	YUKON RIVER	200
WEIGHT STA PND #2-LL	AYK	SHEEFISH	CLEAR	FINGERLINGS	YUKON RIVER	400
WEIGHT STA POND (LL)	AYK	SHEEFISH	CLEAR	FINGERLINGS	YUKON RIVER	200
TRAP LAKE	AYK	CHAR	CLEAR	FINGERLINGS	AMILOYAK L	12,778
CAMPBELL CREEK	UCI	STEELHEAD	FT RICHARDSON	SMOLTS	ANCHOR RIVER	44,873
MONTANA CREEK	SEA	STEELHEAD	CRYSTAL LAKE	SMOLTS	FALLS CREEK	2,440
KLAWOCK LAKE	SEA	STEELHEAD	KLAWOCK	SMOLTS	KLAWOCK RIVER	30,200
WARD LAKE	SEA	STEELHEAD	KLAWOCK	SMOLTS	KLAWOCK RIVER	28,325

Table 7. Rainbow trout stocked by FRED Division in 1986.

Stocking Location	Area	Species	Hatchery	Life Stage	Brood Stock	Number Stocked
31 MILE PIT (LL)	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON RIVER	500
BATHING BEAUTY (LL)	AYK	RAINBOW	CLEAR	FINGERLINGS	SWANSON RIVER	1,000
BIRCH LAKE (LL)	AYK	RAINBOW	CLEAR	SUBCATCHABLES	SWANSON RIVER	83,368
CHENA LAKE (LL)	AYK	RAINBOW	FT RICHARDSON	CATCHABLES	BIG LAKE	29,102
CHET LAKE (LL)	AYK	RAINBOW	CLEAR	FINGERLINGS	SWANSON RIVER	1,000
CLEAR AFB HATCHERY	AYK	RAINBOW	FT RICHARDSON	EYED EGGS	SWANSON RIVER	606,372
FOUR MILE L (LL)	AYK	RAINBOW	CLEAR	FINGERLINGS	SWANSON RIVER	10,000
GRAYLING LAKE (LL)	AYK	RAINBOW	CLEAR	FINGERLINGS	SWANSON RIVER	500
HARDING LAKE (LL)	AYK	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	139,963
HARDING LAKE (LL)	AYK	RAINBOW	FT RICHARDSON	FINGERLING	BIG LAKE	47,522
HIDDEN LAKE (LL)	AYK	RAINBOW	CLEAR	FINGERLINGS	SWANSON RIVER	4,500
JAN LAKE (LL)	AYK	RAINBOW	CLEAR	FINGERLINGS	SWANSON RIVER	8,800
JOHNSON RD PIT #1-LL	AYK	RAINBOW	CLEAR	FINGERLINGS	SWANSON RIVER	500
KOOLE LAKE (LL)	AYK	RAINBOW	CLEAR	FINGERLINGS	SWANSON RIVER	31,250
LAKE SANSING (LL)	AYK	RAINBOW	CLEAR	SUBCATCHABLES	SWANSON RIVER	450
LISA LAKE (LL)	AYK	RAINBOW	CLEAR	FINGERLINGS	SWANSON RIVER	1,000
MANCHU LAKE (LL)	AYK	RAINBOW	CLEAR	FINGERLINGS	SWANSON RIVER	10,000
NICKEL LAKE (LL)	AYK	RAINBOW	CLEAR	FINGERLINGS	SWANSON RIVER	1,000
NORTH TWIN L (LL)	AYK	RAINBOW	CLEAR	FINGERLINGS	SWANSON RIVER	4,000
QUARTZ LAKE (LL)	AYK	RAINBOW	CLEAR	FINGERLINGS	SWANSON RIVER	329,865
STEESE HWY 45.5 (LL)	AYK	RAINBOW	CLEAR	FINGERLINGS	SWANSON RIVER	1,000
BARBARA L (LL)	CCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	9,000
CABIN LAKE (LL)	CCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	11,932
CARTER LAKE (LL)	CCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	9,300
CHUGACH ESTATES	CCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	10,073
ISLAND LAKE (LL)	CCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	21,064
JEROME LAKE (LL)	CCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	6,600
LONGMARE L (LL)	CCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	17,000
RAINBOW L (LL)	CCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	3,000
STORMY LAKE (LL)	CCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	27,530
THETIS LAKE	CCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	11,400
TIRMORE LAKE (LL)	CCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	10,000
VAGT LAKE (LL)	CCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	8,800
ABERCROMBIE L (LL)	KOD	RAINBOW	KITOI	FINGERLINGS	BIG KITOI CREEK	1,850
ABERCROMBIE L (LL)	KOD	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	1,745
AUREL LAKE (LL)	KOD	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	3,000
BIG LAKE (LL)	KOD	RAINBOW	KITOI	FINGERLINGS	BIG KITOI CREEK	1,800
BIG LAKE (LL)	KOD	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	1,800
BULL LAKE (LL)	KOD	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	1,000
BULL LAKE (LL)	KOD	RAINBOW	KITOI	FINGERLINGS	BIG KITOI CREEK	1,000
CAROLINE LAKE (LL)	KOD	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	1,400
CASCADE L (LL)	KOD	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	3,300
CICELY LAKE (LL)	KOD	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	1,200
DOLGOI LAKE (LL)	KOD	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	2,430
DRAGONFLY L (LL)	KOD	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	1,070
HEITMAN L (LL)	KOD	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	3,250
HORSESHOE LAKE (LL)	KOD	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	1,000
JACK LAKE (LL)	KOD	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	1,000
LEE LAKE (LL)	KOD	RAINBOW	KITOI	FINGERLINGS	BIG KITOI CREEK	1,400
LEE LAKE (LL)	KOD	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	1,388

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Table 7. Continued.

Stocking Location	Area	Species	Hatchery	Life Stage	Brood Stock	Number Stocked
LILLY LAKE (LL)	KOD	RAINBOW	KITOI	FINGERLINGS	BIG KITOI CREEK	800
LILLY LAKE (LL)	KOD	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	799
LUPINE LAKE (LL)	KOD	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	1,600
MARGARET LAKE	KOD	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	798
MARGARET LAKE	KOD	RAINBOW	KITOI	FINGERLINGS	BIG KITOI CREEK	800
SATURN LAKE (LL)	KOD	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	2,100
TANIGNAK LAKE (LL)	KOD	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	6,000
TWIN LAKE (LL)	KOD	RAINBOW	KITOI	FINGERLINGS	BIG KITOI CREEK	2,423
BLUEBERRY LAKE	PWS	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	1,500
BUFFALO LAKE (LL)	PWS	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	782
CRATER LAKE	PWS	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	3,185
CRATER LAKE (LL)	PWS	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	5,000
GERGIE LAKE (LL)	PWS	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	9,138
LITTLE CRATOR LAKE	PWS	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	385
MIRROR LAKE (LL)	PWS	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	8,997
NORTH JANS L (LL)	PWS	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	11,600
OLD ROAD LAKE	PWS	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	300
ROUND LAKE	PWS	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	394
SCULPIN LAKE (LL)	PWS	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	27,715
SQUIRREL CR LAKE	PWS	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	950
TEX SMITH LAKE	PWS	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	3,400
THREE MILE LAKE (LL)	PWS	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	4,137
TOLSONA LAKE	PWS	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	30,000
VAN LAKE (LL)	PWS	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	79,221
AK STATE FAIR (LL)	UCI	RAINBOW	FT RICHARDSON	BROOD STOCK	BIG LAKE	1,700
AK STATE FAIR (LL)	UCI	RAINBOW	FT RICHARDSON	BROOD STOCK	SWANSON RIVER	340
BARLEY LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLING	BIG LAKE	2,600
BARLEY LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	2,600
BEACH LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	BROOD STOCK	SWANSON RIVER	2,485
BENKA LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	12,248
BEVERLY LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	13,041
BIG NO LUCK L (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	13,731
CAMPBELL CREEK	UCI	RAINBOW	FT RICHARDSON	CATCHABLES	SWANSON RIVER	4,073
CAMPBELL PT L (LL)	UCI	RAINBOW	FT RICHARDSON	CATCHABLES	SWANSON RIVER	2,606
CHENY POND (LL)	UCI	RAINBOW	FT RICHARDSON	BROOD STOCK	BIG LAKE	5,059
CHRISTIANSEN L (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	17,942
CLUNIE LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	CATCHABLES	SWANSON RIVER	8,928
CRYSTAL LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	26,340
DAWN LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	1,550
DAWN LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLING	BIG LAKE	1,550
DELONG LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	CATCHABLES	SWANSON RIVER	5,900
DERBY POND (LL)	UCI	RAINBOW	FT RICHARDSON	CATCHABLES	BIG LAKE	2,570
DERBY POND (LL)	UCI	RAINBOW	FT RICHARDSON	CATCHABLES	SWANSON RIVER	10
DERBY POND (LL)	UCI	RAINBOW	FT RICHARDSON	BROOD STOCK	SWANSON RIVER	55
DISHNO LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	CATCHABLES	SWANSON RIVER	994
DJ LAKE	UCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	400
EAST TWIN L (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	8,361
ECHO LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	2,300
ELMENDORF	UCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	183,130
FINGER LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	36,040
FISH LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	CATCHABLES	SWANSON RIVER	2,520

-Continued-

Table 7. Continued.

Stocking Location	Area	Species	Hatchery	Life Stage	Brood Stock	Number Stocked
FLORENCE L (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLING	BIG LAKE	11,058
GREEN LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	CATCHABLES	SWANSON RIVER	995
GWEN LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	CATCHABLES	SWANSON RIVER	3,998
HILLBERG LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	CATCHABLES	SWANSON RIVER	995
HONEYBEE LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLING	BIG LAKE	11,600
IRENE LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	1,800
IRENE LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	CATCHABLES	BIG LAKE	1,800
JEWEL LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	CATCHABLES	SWANSON RIVER	7,844
JOHNSON LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	21,030
JOHNSON LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLING	BIG LAKE	4,030
KALMBACK LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLING	BIG LAKE	12,999
KALMBACK LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	13,013
KEPLER BRADLEY (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	5,800
KEPLER BRADLEY (LL)	UCI	RAINBOW	FT RICHARDSON	CATCHABLES	SWANSON RIVER	5,800
KNIK LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	10,035
LAKE OTIS	UCI	RAINBOW	FT RICHARDSON	CATCHABLES	SWANSON RIVER	995
LITTLE NO LUCK L (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	7,185
LONG L (KB)(LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	10,266
LONG LAKE	UCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	18,572
LOWER BONNIE L (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	20,000
LOWER FIRE L (LL)	UCI	RAINBOW	FT RICHARDSON	CATCHABLES	SWANSON RIVER	2,461
LUCILLE LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	CATCHABLES	SWANSON RIVER	19,878
LYNNE LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	14,000
MARION LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLING	BIG LAKE	11,307
MARION LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	11,319
MATANUSKA L (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	6,163
MATANUSKA L (LL)	UCI	RAINBOW	FT RICHARDSON	CATCHABLES	SWANSON RIVER	6,200
MIRROR LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	CATCHABLES	SWANSON RIVER	2,985
OTTER LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	CATCHABLES	BIG LAKE	1,245
OTTER LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	CATCHABLES	SWANSON RIVER	9,150
RAPID LAKE (LL)	UCI	RAINBOW	CLEAR	FINGERLINGS	SWANSON RIVER	2,000
RAVINE LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	2,460
REED LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	3,894
ROBERTSON #2 (LL)	UCI	RAINBOW	CLEAR	FINGERLINGS	SWANSON RIVER	3,000
SAND LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	CATCHABLES	SWANSON RIVER	20,099
SEYMOUR LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLING	BIG LAKE	45,817
SIX MILE LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	CATCHABLES	SWANSON RIVER	1,466
SLIPPER LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	1,800
SOUTH ROLLY L (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	10,785
SOUTH TWIN L (LL)	UCI	RAINBOW	CLEAR	FINGERLINGS	SWANSON RIVER	4,000
SPRING LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	CATCHABLES	SWANSON RIVER	2,023
TAKU CAMPBELL (LL)	UCI	RAINBOW	FT RICHARDSON	CATCHABLES	SWANSON RIVER	2,514
TAKU CAMPBELL (LL)	UCI	RAINBOW	FT RICHARDSON	BROOD STOCK	SWANSON RIVER	2,434
THOMPSON LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	CATCHABLES	SWANSON RIVER	994
TIGGER LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	3,780
TRIANGLE LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	CATCHABLES	SWANSON RIVER	1,988
TWIN LAKE	UCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	4,315
WALBY LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	10,730
WEINER LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	4,183
WISHBONE L (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	12,112
X LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLINGS	SWANSON RIVER	20,437
Y LAKE (LL)	UCI	RAINBOW	FT RICHARDSON	FINGERLING	BIG LAKE	7,977

Table 8. Grayling stocked by FRED Division in 1986.

Stocking Location	Area	Species	Hatchery	Life Stage	Brood Stock	Number Stocked
BATHING BEAUTY (LL)	AYK	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	10,000
CHENA HS #30.0 (LL)	AYK	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	10,000
CHENA HS #30.9 (LL)	AYK	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	10,000
CHENA HS #32.9 (LL)	AYK	GRAYLING	CLEAR	FINGERLINGS	MOOSE LAKE	1,000
CHENA HS #32.9 (LL)	AYK	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	10,000
CHENA HS #42.8 (LL)	AYK	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	10,000
CHENA HS #45.5 (LL)	AYK	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	10,000
CHENA HS #47.9 (LL)	AYK	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	8,000
CHENA HS #47.9 (LL)	AYK	GRAYLING	CLEAR	FINGERLINGS	MOOSE LAKE	800
CHENA LAKE (LL)	AYK	GRAYLING	CLEAR	FINGERLINGS	GOODPASTER RIVER	400
CLEARWATER RIVER	AYK	GRAYLING	CLEAR	FINGERLINGS	GOODPASTER RIVER	6,048
DELTA CLEARWATER R	AYK	GRAYLING	CLEAR	FINGERLINGS	GOODPASTER RIVER	6,029
DELTA NO NAME LAKE	AYK	GRAYLING	CLEAR	FINGERLINGS	MOOSE LAKE	500
ENGINEER HILL L (LL)	AYK	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	25,000
FBKS FISH AND GAME (LL	AYK	GRAYLING	CLEAR	FINGERLINGS	MOOSE LAKE	500
GOODPASTER RIVER	AYK	GRAYLING	CLEAR	FINGERLINGS	GOODPASTER RIVER	15,910
GRAYLING LAKE (LL)	AYK	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	10,000
HARDING LAKE (LL)	AYK	GRAYLING	CLEAR	FINGERLINGS	GOODPASTER RIVER	18,759
HARDING LAKE (LL)	AYK	GRAYLING	CLEAR	FINGERLINGS	MOOSE LAKE	60,653
HIDDEN LAKE (LL)	AYK	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	10,000
JOHNSON RD PIT #2-LL	AYK	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	10,000
KETTLE LAKE (LL)	AYK	GRAYLING	CLEAR	FINGERLINGS	MOOSE LAKE	1,200
LONG POND (LL)	AYK	GRAYLING	CLEAR	FINGERLINGS	MOOSE LAKE	1,400
NO-NAME LAKE	AYK	GRAYLING	CLEAR	FINGERLINGS	MOOSE LAKE	500
NO-NAME LAKE	AYK	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	10,000
ROUND POND (LL)	AYK	GRAYLING	CLEAR	FINGERLINGS	MOOSE LAKE	800
SHEEFISH LAKE	AYK	GRAYLING	CLEAR	FINGERLINGS	MOOSE LAKE	1,000
SHEEFISH LAKE	AYK	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	10,000
SKAUGSTAD LAKE	AYK	GRAYLING	CLEAR	FINGERLINGS	MOOSE LAKE	500
STEESE HWY 29.5 (LL)	AYK	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	10,000
STEESE HWY 30.6 (LL)	AYK	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	10,000
STEESE HWY 31.6 (LL)	AYK	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	8,000
STEESE HWY 31.6 (LL)	AYK	GRAYLING	CLEAR	FINGERLINGS	MOOSE LAKE	525
STEESE HWY 33.5 (LL)	AYK	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	10,000
STEESE HWY 34.6 (LL)	AYK	GRAYLING	CLEAR	FINGERLINGS	MOOSE LAKE	800
STEESE HWY 34.6 (LL)	AYK	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	8,000
STEESE HWY 35.8 (LL)	AYK	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	10,000
STEESE HWY 36.6 (LL)	AYK	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	10,000
UNIVERSITY OF ALASKA	AYK	GRAYLING	CLEAR	FINGERLINGS	MOOSE LAKE	3,000
UNIVERSITY OF ALASKA	AYK	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	3,000
UNIVERSITY OF ALASKA	AYK	GRAYLING	CLEAR	FED FRY	MOOSE LAKE	3,000
WEST OP LAKE	AYK	GRAYLING	CLEAR	FED FRY	GOODPASTER RIVER	25,000
WEST POND (LL)	AYK	GRAYLING	CLEAR	FED FRY	GOODPASTER RIVER	25,000
ARIZONA LAKE (LL)	PWS	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	10,000
BEAR CUB LAKE	PWS	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	10,000
BUFFALO LAKE (LL)	PWS	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	8,000
BUFFALO LAKE (LL)	PWS	GRAYLING	CLEAR	FINGERLINGS	MOOSE LAKE	400

-Continued-

Table 8. Continued.

Stocking Location	Area	Species	Hatchery	Life Stage	Brood Stock	Number Stocked
CARIBOU LAKE	PWS	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	15,000
CONNER LAKE	PWS	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	15,000
DICK LAKE (LL)	PWS	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	10,000
ELBOW LAKE	PWS	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	5,000
FARMER L	PWS	GRAYLING	CLEAR	FINGERLINGS	MOOSE LAKE	2,807
FORGOTTEN LAKE	PWS	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	10,000
GRASS LAKE	PWS	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	10,000
JUNCTION LAKE (LL)	PWS	GRAYLING	CLEAR	FINGERLINGS	MOOSE LAKE	3,600
JUNCTION LAKE (LL)	PWS	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	36,000
KETTLE LAKE (LL)	PWS	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	12,000
LITTLE ECHO L (LL)	PWS	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	1,000
LITTLE JUNCION L(LL)	PWS	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	5,000
MEIERS LAKE	PWS	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	40,000
MOOSE CR	PWS	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	50,000
MOOSE LAKE	PWS	GRAYLING	CLEAR	FED FRY	MOOSE LAKE	1,000
MOOSE LAKE	PWS	GRAYLING	CLEAR	FINGERLINGS	MOOSE LAKE	33,423
POPLAR GROVE LAKE	PWS	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	20,000
SQUIRREL CR LAKE	PWS	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	10,000
SQUIRREL CR LAKE	PWS	GRAYLING	CLEAR	FINGERLINGS	MOOSE LAKE	1,154
SQUIRREL CREEK	PWS	GRAYLING	CLEAR	FINGERLINGS	MOOSE LAKE	500
THREE MILE LAKE (LL)	PWS	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	16,000
TOLSONA LAKE	PWS	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	66,332
TWO MILE LAKE (LL)	PWS	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	10,000
WALDEN POND (LL)	PWS	GRAYLING	CLEAR	FINGERLINGS	MOOSE LAKE	1,500
BEAVER LAKE	UCI	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	15,000
BRUCE LAKE (LL)	UCI	GRAYLING	CLEAR	FINGERLINGS	GOODPASTER	3,090
BRUCE LAKE (LL)	UCI	GRAYLING	CLEAR	FINGERLINGS	MOOSE LAKE	2,910
CANOE LAKE (LL)	UCI	GRAYLING	CLEAR	FINGERLINGS	MOOSE LAKE	3,335
CANOE LAKE (LL)	UCI	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	42,400
FARMER L	UCI	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	42,000
FIRE LAKE	UCI	GRAYLING	CLEAR	FINGERLINGS	MOOSE LAKE	20,000
KEPLER BRADLEY (LL)	UCI	GRAYLING	CLEAR	FINGERLINGS	MOOSE LAKE	21,600
LONG L (KB)(LL)	UCI	GRAYLING	CLEAR	FINGERLINGS	MOOSE LAKE	2,910
LONG L (KB)(LL)	UCI	GRAYLING	CLEAR	FINGERLINGS	GOODPASTER RIVER	3,090
LONG L (MI86)(LL)	UCI	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	63,600
MATANUSKA L (LL)	UCI	GRAYLING	CLEAR	FINGERLINGS	GOODPASTER RIVER	2,060
MATANUSKA L (LL)	UCI	GRAYLING	CLEAR	FINGERLINGS	MOOSE LAKE	1,940
MEIRS LAKE (LL)	UCI	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	33,600
MEIRS LAKE (LL)	UCI	GRAYLING	CLEAR	FINGERLINGS	MOOSE LAKE	3,300
SLIPPER LAKE (LL)	UCI	GRAYLING	CLEAR	FINGERLINGS	GOODPASTER RIVER	1,030
SLIPPER LAKE (LL)	UCI	GRAYLING	CLEAR	FINGERLINGS	MOOSE LAKE	970
SLIVER LAKE (LL)	UCI	GRAYLING	CLEAR	SWIMUP FRY	MOOSE LAKE	14,400
SLIVER LAKE (LL)	UCI	GRAYLING	CLEAR	FINGERLINGS	MOOSE LAKE	2,820
WOLF LAKE (LL)	UCI	GRAYLING	CLEAR	FINGERLINGS	MOOSE LAKE	12,400
ARIZONA F&G	OTHER	GRAYLING	CLEAR	EYED EGGS	MOOSE LAKE	120,000

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