

FRED Reports

FRED 1987 ANNUAL REPORT
TO THE ALASKA STATE LEGISLATURE

Edited by

Johnny S. Holland, Ph.D.

Number 81



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

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

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ABSTRACT (100 words maximum) FRED's major objectives are the rehabilitation, enhancement, development, protection, and maintenance of the salmon, trout, sheefish, and grayling resources of the state for the use of all Alaskans. To accomplish these, FRED utilized hatcheries and fishways as its basic tools. Hatcheries are about eight times more efficient in converting eggs to fish than the natural environment, and fishways open new spawning areas to anadromous fishes. FRED's Genetics, Limnology, Coded-Wire Tag Recovery, and Pathology Laboratories continue to provide important information about the state's fish resources. FRED encourages rehabilitation efforts by private nonprofit (PNP) aquaculture corporations and provides technical services to them. Over 1.3 billion salmon eggs were collected for hatcheries in the State of Alaska during 1987 through the combined efforts of FRED Division and the PNP hatchery operators. During 1987, FRED released more than 389 million juvenile fish. About 505 million eggs were taken for incubation during the year, and over 6.7 million salmon returned in 1987 as a result of FRED projects. An additional 600,000 trout, sheefish, and grayling were harvested by sport fishermen during the year. PNP hatcheries throughout the state released over 461 million salmon, and collected 868 million salmon eggs in 1987. An estimated 19 million adult salmon returned in 1987 as a result of PNP hatchery operations.		SUBJECT CATEGORY <hr/> <input checked="" type="checkbox"/> NATURAL RESOURCES <input type="checkbox"/> EDUCATION <input type="checkbox"/> SOCIAL SERVICES <input type="checkbox"/> HEALTH <input type="checkbox"/> TRANSPORTATION <input type="checkbox"/> LAW ENFORCEMENT <input type="checkbox"/> COMMERCE & INDUSTRY <input type="checkbox"/> GENERAL GOVERNMENT <input type="checkbox"/> LOCAL GOVERNMENT <input type="checkbox"/> OTHER
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PREFACE

The scope of the enhancement program is bold and as diverse as Alaska itself. The program produces all five species of anadromous Pacific salmon, steelhead trout, and five species of resident fish, all of which contribute to the commercial, sport, subsistence, and personal-use fisheries. The current enhancement portfolio includes 19 public hatcheries, 23 fish ladders, two spawning channels, and numerous enhancement projects from the Noatak River in the Arctic to the City of Ketchikan in Southeast. In addition, the Fisheries Rehabilitation, Enhancement and Development (FRED) Division is involved with the technological development, permitting, and coordination of shellfish mariculture projects, which involves 16 private ventures dealing with oysters, mussels, and scallops. The international nature of the mariculture effort is best exemplified by the scallop spat collection feasibility project in the Kodiak area which involves the transfer of technology from Japan's Overseas Fishery Cooperation Foundation to Alaska. The technical services component to the statewide enhancement program is provided by the pathology, limnology, genetics, and coded-wire tag recovery laboratories within the FRED Division.

In order to understand the magnitude of the Alaskan enhancement program, it is necessary to put it into a worldwide perspective. In 1987, Alaskan hatcheries took over 1.3 billion Pacific salmon eggs plus over 10 million trout eggs. This makes Alaska's salmon ocean ranching program the largest in North America, approximately one-half the size of Japan's program and roughly equal to the Russian program. The sockeye salmon enhancement program has a technological leadership position and is the largest in the world with over 100 million eggs taken in 1987. Statewide salmon harvest data for 1987 suggest that over 26 million salmon, or approximately 28 percent of the total commercial salmon harvest, are reported to have come from public and private nonprofit (PNP) hatcheries.

Aside from the outstanding biological successes, salmon ocean ranching has had and will continue to have a profound impact on the economic and social structure of Alaskan communities. A study conducted in 1984 for the Governor's Mini-Cabinet on Fisheries predicts that the statewide program will generate net benefits over costs in the amount of \$90 million to the Alaskan economy for just the commercial fishery portion of the program. A recent study utilizing an economic impact model developed by the Institute of Social and Economic Research at the University of Alaska at Anchorage suggests that the economic impact in resident income for the public and PNP program for the FY 89 budget is \$75 million in resident personal income and over 2,030 resident jobs. These impacts have resulted as a function of fish dollars directly earned in the fishing industry and by induced or indirect spending in other sectors of the economy.

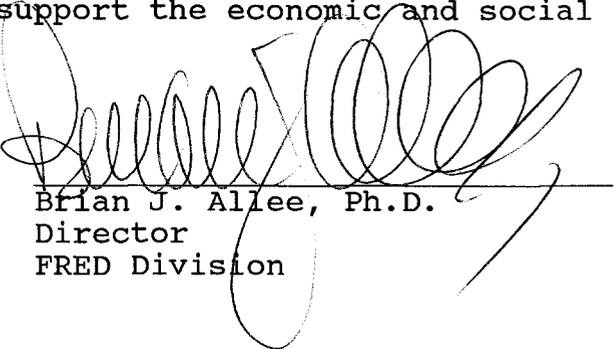
Both these studies have attempted to quantify the economic value of the salmon ocean ranching program to the economy, but have not as yet been able to estimate the recreational value. This is more complex to compute, but will be completed in early 1988 and, as such, both estimates of economic value presently underestimate the total economic impact of the enhancement program.

Just as salmon and trout populations evolve, the enhancement program is evolving and has not yet reached its full biological or economic potential. Since a major driving force in the realization of full program potential is funding, the FRED Division has worked cooperatively with the Alaska State Legislature to seek innovative solutions to the decreasing availability of general funds. This approach has resulted in an active public participation process involving fishermen, the private sector, legislators, and the general public in an effort to maintain the public enhancement program. This cooperative process has established a working group which has developed funding options, role definitions of the public and PNP programs, and solidified a commitment to an ongoing process to evaluate both short- and long-range solutions.

In the spirit of program reevaluation, the division has undertaken a reorganization to achieve clarity of purpose, organizational effectiveness, and cost reduction. This process has solidified the following statement of purpose for the FRED Division:

To sustain and enhance Alaskan fisheries through the development and application of technologies in supplemental production and natural stock rehabilitation.

The FRED Division is committed to reaching the full potential of fisheries enhancement which will support the economic and social integrity of Alaskan communities.



Brian J. Allee, Ph.D.
Director
FRED Division

FRED DIVISION BACKGROUND

The Fisheries Rehabilitation, Enhancement and Development (FRED) program comprises a part of the state's salmon management program. Its purpose is to sustain and enhance Alaskan fisheries through the development and application of technologies in supplemental production and natural stock rehabilitation. During a program review in 1987, the division's roles were redefined as: development of new enhancement technology; hatchery production for sport, subsistence, and non-cost recovery commercial fisheries; technical services; habitat restoration and fisheries rehabilitation; regulation and management of the private non-profit program; and statewide program coordination, including production, planning, and technology transfer. As such, it contributes knowledge gained from tagged-fish studies and technological research; it mitigates fish losses from foreign interceptions and environmental disruptions; it contributes fish to existing but depressed fisheries; it creates new opportunities for commercial, sport, and subsistence fisheries; and it aids other aspects of the statewide enhancement program through technical services and private nonprofit program coordination.

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 Division'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 the reporting requirements.

Functions and Services

The division operates 19 hatcheries to produce salmonid fishes 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 are used to provide improved freshwater survival and new production opportunities for salmon stocks.

FRED Division operates four 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 broodstock 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 insect populations 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 nonprofit hatchery applications and the permitting process, which includes hatchery and fish transport permits.

FRED Division provides engineering services to the department for the design of field facilities and hatcheries. It also provides coordination with consultants, contractors, and land owners.

FRED Division is involved in the organization, permitting, and coordination of shellfish mariculture projects. The program continued in 1987 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 Cooperation Foundation (OFCF), to study the feasibility of scallop spat collection in the Kodiak area continued in 1987.

FRED PRODUCTION SUMMARY

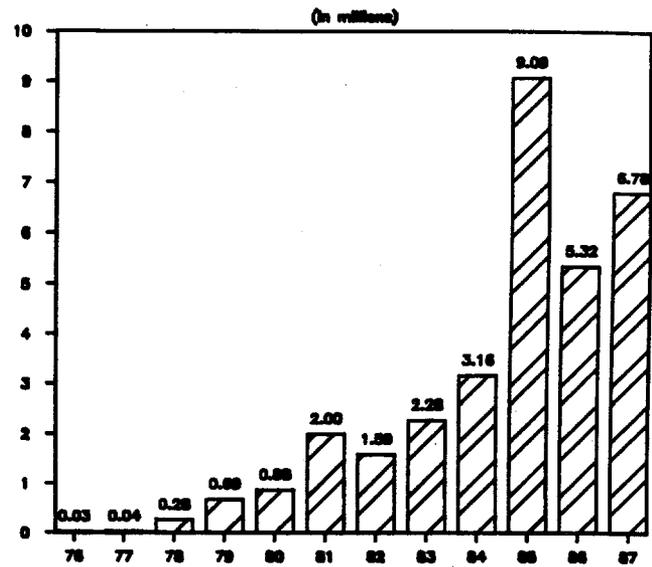
Over 6.7 million adult salmon returned in 1987 as a result of FRED projects. Of these, almost 5 million were harvested by commercial fishermen. Another 304,000 salmon were harvested by sport fishermen, along with nearly 596,000 trout, char, and grayling in marine and freshwater sport fisheries. The 1987 returns from FRED projects increased by approximately 1.5 million fish. A listing of returns by species and project is given in Table 1.

Releases of fish from FRED Division projects decreased by about 5 million fish in 1987. Chinook, sockeye, and pink salmon releases were less in 1987, while chum salmon releases increased by over 62 million fish. Coho salmon releases remained near 1986 levels. Rainbow trout releases almost quadrupled in 1987. Release information by area, facility, and species is given in Table 2. Hatchery survivals for 1987 releases are tabulated in Appendix A. Release locations by species are provided in Appendix B.

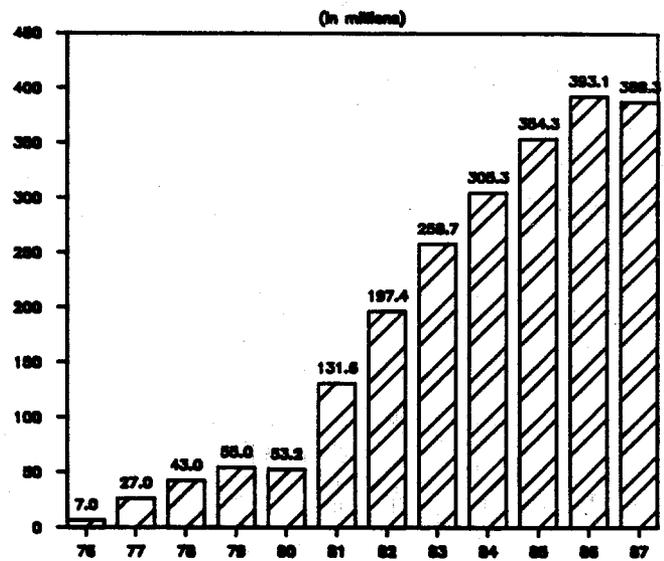
In 1987, FRED personnel took nearly 505 million eggs, an increase of 4 million over 1986. Chum salmon egg takes decreased, while more chinook, sockeye, and pink salmon eggs were taken. Coho salmon egg takes increased slightly as well. Rainbow trout eggs taken almost doubled in 1987. Egg-take information by area, facility, and species is presented in Table 3.

Returns, releases, and egg-take data are discussed in greater detail in the area summaries that follow.

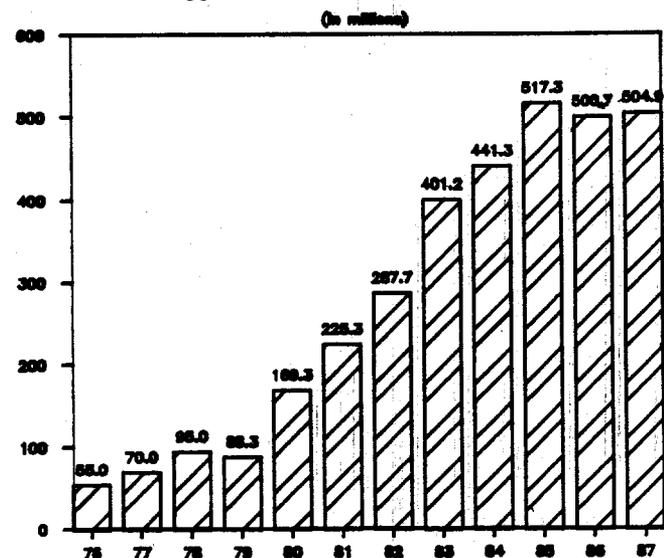
Salmon returns from FRED projects



Juveniles released from FRED facilities



Eggs collected for FRED Hatcheries



SOUTHEAST

Summary of Fred Projects

The FRED Division maintains four area offices and six hatcheries in southeast Alaska. Area offices are found in Juneau, Sitka, Petersburg, and Ketchikan. Hatcheries in this region include Snettisham, approximately 40 miles south of Juneau; Hidden Falls, on the east side of Baranof Island across from Sitka; Crystal Lake, on the road system outside of Petersburg; Deer Mountain and Beaver Falls in Ketchikan; and Klawock on Prince of Wales Island near the community of Klawock (Figure 1). In Southeast, as well as in other regions of the state, FRED Division uses hatcheries as primary tools of enhancement, but employs many other strategies as well.

In Southeast, several habitat improvement projects have been underway for years. On the Chilkat River near Haines, access to riverside ponds continued to be improved by FRED Division in 1987. The expected result is an annual production of 1,250 additional coho salmon, with 80% being harvested. At the other end of the region, another very successful habitat improvement project, the Marx Creek project near Hyder, documented excellent overwinter survival of chum salmon fry. Over 5,000 adult spawners were transported or escaped naturally into the project area in 1987. Contributions resulting from earlier work on this project were estimated at 35,000 commercially caught chum salmon with an escapement of approximately 40,000. Several projects in the region are producing fish and testing new technologies. In-stream incubation at Port Camden, a cooperative project with the Northern Southeast Regional Aquaculture Association (NSRAA) and the USFS, had phenomenal green egg-to-fry survival (99%) of chum salmon this year. Return information on prior rearing studies at Hidden Falls Hatchery indicate a significant survival advantage afforded by rearing chum salmon fry to a minimum of 1 gram prior to release. The advantages of triploid induction (increasing chromosome numbers) of chinook salmon through heat shock and optional overwinter feeding frequency of chinook salmon are being studied at Deer Mountain Hatchery. In-lake experimental incubation systems for sockeye salmon tested at Hugh Smith Lake had excellent egg-to-fry survivals ranging between 84% and 90%. In conjunction with the burgeoning shellfish mariculture program, scallop seed collectors were set at three locations in Southeast with successful collection of 25,000-35,000 scallop spat. Identification of spat is being made to determine if desired species have been collected.

In 1987, FRED Division continued its many cooperative activities with other state, federal, and private sector agencies. Technical and manual assistance was afforded to staff of many private sector facilities, including the Pullen Creek Hatchery in Skagway, the Burro Creek Hatchery near Haines, Douglas Island Pink and Chum, Inc. (DIPAC) hatcheries in Juneau (who reciprocated with a loan of equipment), and the Gunnuk Creek Hatchery at

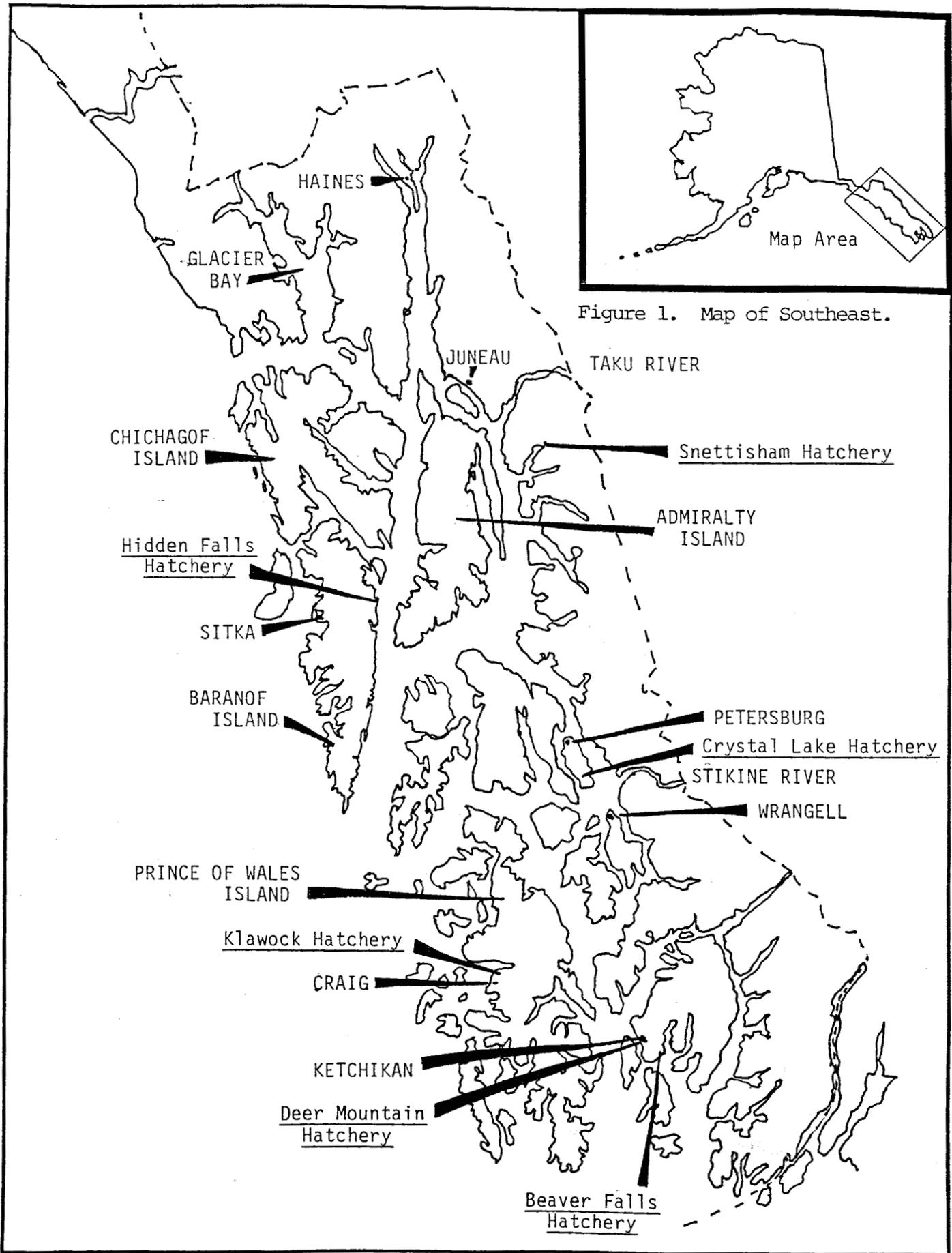


Figure 1. Map of Southeast.

ake. Several major projects that represent cooperative ventures between the FRED Division and other agencies were implemented or continued in 1987. The chum salmon fry-rearing project at Takatz Bay involved transporting fry produced by Hidden Falls Hatchery to a net-pen complex provided by NSRAA in Takatz Bay where they were fed for approximately 2 months and released. This will improve their marine survival and also prevent some of the problems encountered in the past when large numbers of adults returned to the hatchery. FRED and NSRAA cooperated in taking 7 million chum salmon eggs at Hidden Falls Hatchery and transporting them to Snettisham Hatchery. A better utilization of that facility's capacity and an increase in production will result. The operation of the Little Port Walter Hatchery continued in 1987 as a cooperative project between the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) and FRED Division. Planning for the Turner Lake sockeye salmon enhancement project continued through 1987 with interaction between FRED and NSRAA. The City of Ketchikan and FRED Division cooperated in 1987 on the funding of Deer Mountain Hatchery, and the city is taking a continuing role in the operational planning of that facility. A cooperative program for planting coho salmon in Tunga Lake, north of Klawock, continued in 1987 with FRED and USFS interaction. FRED cooperated with the USFS in several fish pass projects, including Harding River, Irish Creek, Dean Creek, Slippery Creek (with NSRAA), St. Johns Creek (with NSRAA and the Southern Southeast Regional Aquaculture Association (SSRAA)), and Cable Creek.

Southeast Highlights

- Over 1% of the Snettisham coho salmon planted in Indian Lake in 1985 were caught in the 1987 commercial and sport fisheries.
- The Dingell-Johnson (D-J) funded Juneau Sport Fish project released 29,000 steelhead trout smolts, 207,000 and 215,000 coho and chinook salmon smolts, respectively, and 16,400 pre-catchable coho salmon in the Juneau area.
- A five-year program to acquire chinook salmon broodstock was completed this year when eggs were taken on the Tahini and King Salmon Rivers. These broodstocks are being used at Hidden Falls and Snettisham Hatcheries, respectively.
- Record numbers of chum and chinook salmon eggs were taken at Snettisham Hatchery when 53.8 million chum salmon eggs and 4.3 million chinook salmon eggs were obtained.
- An estimated 911 chinook salmon from Snettisham Hatchery were caught in the Juneau sport fishery in 1987. This is the greatest contribution ever by a hatchery to this fishery.
- An estimated 72 chinook salmon resulting from eggs of the 1983 Farragut River brood used in a chinook salmon broodstock

- development project were harvested in commercial fisheries in 1987. This was three times the anticipated catch and indicates very positive early results from this project.
- Crystal Lake Hatchery contributed approximately 10,300 chinook salmon to regional fisheries this year. This is the greatest single-year contribution of this species by any Southeast hatchery.
 - Port Camden chum salmon in-stream incubation achieved approximately 99% survival to fry from 200,000 eggs seeded in the fall of 1986.
 - Hidden Falls Hatchery had its fourth year of excellent returns with over 82% of 543,000 returning adults being harvested. This represents over \$2 million worth of fish shared by the 229 different seine boats known to have fished the Hidden Falls Hatchery openings.
 - A cooperative chum salmon rearing project with NSRAA was initiated in 1987 when 19 million fry were transported from Hidden Falls Hatchery to a net-pen complex in Takatz Bay where they were reared and released. This project will increase survivals and distribute the adults more widely for more efficient management.
 - A barrier net was installed at Hidden Falls Hatchery and operated for the first time in 1987. It will allow collection of brood from all phases of the run, while maximizing the efficiency of managing the catch.
 - The 1982 chum salmon released from Hidden Falls Hatchery showed a nearly six-fold marine survival advantage for fed fry as compared to unfed fry. All 1986 chum salmon fry at Hidden Falls Hatchery were short-term-reared and released at sizes up to 1.8 grams.
 - The hatchery add-on to the quota of chinook salmon allowed by the U.S./Canada Pacific Salmon Treaty was 16,000 fish, about 6% of the quota.
 - Deer Mountain Hatchery released 343,000 chinook salmon smolts at four sites in Southeast, including the last of the zero-check experimental smolts pending evaluation of that strategy.
 - Harvest of FRED-produced chum salmon accounted for 21% of the total commercial chum salmon harvest in Southeast in 1987.

Southeast Returns and Fishery Contributions

FRED Division projects produced a return of over 1.1 million fish to southeast Alaska (Table 1). As in the past, the dominant species produced by state projects was the chum salmon, account-

ing for 785,000 adult fish in 1987. Hidden Falls Hatchery produced 543,000 of these. An 82% harvest rate of Hidden Falls chum salmon provided over \$2 million worth of fish to the 229 different seine boats that participated in a series of openings in the area of the hatchery. The chum salmon run to Hidden Falls Hatchery was almost three weeks late this year. This may have been caused by taking eggs later during the past four years. A barrier net was used this year to collect broodstock from all segments of the run; this allowed the excess to be harvested readily and ensured quality fish for the fishermen and broodstock for the hatchery. This should allow the run to regain its original timing. For the first time, more than 100,000 chum salmon adults returned to the Snettisham Hatchery. Klawock Hatchery and the Marx Creek project produced the bulk of other enhanced runs of chum salmon in Southeast in 1987.

Smolts released from Southeast state facilities resulted in almost 21,000 adult chinook salmon in 1987. Of these, 16,600 were produced by Crystal Lake Hatchery. The enhanced production of this species is very important to fishermen of southeast Alaska in that present catch of chinook salmon is limited to a quota mandated by the U.S./Canada Pacific Salmon Treaty, but that quota can be increased by the fish resulting from enhanced production. This year the add-on to the quota was 16,000 chinook salmon, about 6% of the total quota. Enhancement-produced chinook salmon are also becoming very important to urban area sport fishermen of Southeast. Preliminary sport fish information indicates that approximately 32% of all chinook salmon caught in the Golden North Salmon Derby in Juneau were hatchery-produced fish. It is estimated that Snettisham Hatchery contributed approximately 911 chinook salmon to the marine sport fishery in the Juneau area in 1987. This is the greatest known contribution by a hatchery to this fishery. Hatchery-produced chinook salmon have won the Ketchikan Salmon Derby twice in the past five years. Along with contributing to the marine chinook salmon sport fishery in the Ketchikan area, Deer Mountain Hatchery has provided a special personal-use, dip-net fishery in Ketchikan Creek for the last two years. In 1987, 175 adult chinook salmon were dipnetted out of Ketchikan Creek under the watchful eye of FRED staff and to the great pleasure and amusement of both the participating fishermen and the hordes of tourists visiting the hatchery.

Almost 74,000 adult coho salmon were produced in Southeast by FRED Division projects in 1987. This is less than the 1986 production of this species. The primary reason for this decrease was the decision to produce fewer coho salmon at Crystal Lake Hatchery, while replacing that hatchery production with fish produced from habitat made accessible with fishways. There will be a trend to increase numbers of coho salmon from Crystal Lake projects, but management and climatic conditions will continue to play a significant role in annual abundance. The decrease of over 29,000 adult coho salmon from Crystal Lake more than accounts for the indicated regional decrease. Klawock Hatchery was the greatest contributor of coho salmon with a total return of almost 64,000 fish, of which approximately 60,000 were har-

vested in the commercial fishery. Because natural stocks of coho salmon had a poor showing in the southern end of the Southeast Region in 1987, enhanced production was particularly welcome in the Klawock area. Snettisham Hatchery, which is in the process of changing the coho salmon broodstock, had a smaller-than-anticipated return.

Southeast Releases

Southeast FRED facilities released nearly 75 million fish during 1987 (Table 2). This is approximately 5 million fewer than in 1986. There were decreases of varying magnitudes in releases of sockeye salmon from Beaver Falls, coho salmon from Crystal Lake, chum salmon from Hidden Falls and Klawock, and chinook salmon from Deer Mountain, Hidden Falls, and Snettisham Hatcheries. Most of the decreases were relatively minor, reflecting hatchery operational constraints rather than major program changes. The largest decreases were in chum salmon from Hidden Falls and Klawock. The latter decrease of over 5 million does reflect a program change in that Klawock is changing to sockeye and coho salmon and will be minimizing chum salmon production. Increases in releases are most notable at Snettisham where the release of over 25 million chum salmon fingerlings was a hatchery record. Snettisham's release of almost 900,000 coho salmon more than tripled its 1986 release.

Total chinook salmon releases from FRED Southeast facilities decreased in 1987, primarily as a result of the loss of the broodstock development program which, in previous years, had been returning significant numbers of chinook salmon fry to natal streams, in addition to decreasing production of zero-check chinook salmon at Deer Mountain Hatchery. Both of these programs are now in an evaluation phase, awaiting returns from releases in 1987 and prior years. Hidden Falls Hatchery completed additions to their rearing space; this will significantly increase future releases of chinook salmon from that facility. Crystal Lake Hatchery, the primary producer of adult chinook salmon in Southeast this year, maintained its production levels with over 700,000 juveniles released in 1987. Remote releases of zero-check chinook salmon from Deer Mountain Hatchery were completed in 1987, but the remote release program is so popular with local communities that it will be continued with one-check smolts in future years.

Coho salmon releases were slightly decreased in 1987 because stocking Irish Creek with Crystal Lake Hatchery coho salmon was completed in 1986. Crystal Lake produced far fewer coho salmon than in prior years. It did not plant coho salmon fry in Irish Creek in 1987 after having planted over 4 million emergent fry into that system for the previous four years. Snettisham Hatchery released a record number of fry, smolts, and precatchables in 1987. Over 16,000 precatchable coho salmon (7-9 inches) were planted in Twin Lakes and will contribute to the local recreational fishery as they grow. About 207,000 coho salmon

smolts were released in the Juneau marine area and should contribute significantly to the marine recreational fishery of the area. Klawock Hatchery, in its present role as primary producer of coho salmon among Southeast FRED facilities, released over 1 million coho salmon in 1987. The enhanced Klawock River coho salmon run has become important in the local personal-use and sport fisheries, as well as in the commercial fisheries. The first release of Reflection Lake coho salmon from Deer Mountain Hatchery occurred in 1987 with approximately 20,000 summer-run coho salmon fry planted in the Ward Lake system in Ketchikan. The initiation of enhancement of this stock of coho salmon is in response to a need for summer-run coho salmon in southern southeast Alaska.

Southeast Egg Takes

In 1987, over 147 million eggs were taken at FRED facilities in southeast Alaska (Table 3). This is a 37 million-egg increase over 1986 and continues the trend of setting record annual egg takes. A record 127 million chum salmon eggs were taken by Hidden Falls and Snettisham Hatcheries combined. The Snettisham Hatchery crew took 47 million chum salmon eggs from a record number of adults returning to their facility. An additional 6.8 million chum salmon eggs were obtained for Snettisham from Hidden Falls Hatchery. Hidden Falls staff took 80 million chum salmon eggs in 1987, of which 10 million went to the Gunnuk Creek Hatchery, a PNP facility in Kake, in addition to those shipped to Snettisham.

Over 9 million chinook salmon eggs were taken at Southeast state hatcheries in 1987, again setting a number of hatchery records for this species. An escapement of over 6,300 adult chinook salmon to Crystal Lake Hatchery provided 6.82 million green eggs. This fulfilled the needs of three state and three PNP facilities in northern Southeast. Crystal Lake provided chinook salmon eggs for Snettisham, Hidden Falls, Medvejie, Sheldon Jackson, and Burnett Inlet Hatcheries. Snettisham took almost 1.5 million eggs from a record return of chinook salmon in addition to those it received from Crystal Lake Hatchery. Snettisham personnel completed a five-year broodstock acquisition program from the King Salmon River in 1987. The King Salmon River stock will be the stock of choice when eggs are taken at Snettisham in the future. An analogous situation exists at Hidden Falls where a five-year broodstock acquisition program utilizing Tahini River stock was completed this year. Hidden Falls is using Crystal Creek stock for production purposes but, as egg numbers allow, will gradually shift to Tahini River stock. Deer Mountain had an expected poor return of adults because disease had made it necessary to destroy fish in past years. To fill the gap, 164,000 chinook salmon eggs were transferred from Little Port Walter to Deer Mountain. The original stock for these two hatcheries was the same, the Unuk River.

The coho salmon run in Southeast was lower than anticipated in 1987. In some areas, low coho salmon abundance was thought to have resulted from severe winter conditions in 1985-1986 which affected coho salmon fry. Snettisham has had major problems with coho salmon production and is replacing its original broodstock; these factors combined to provide a very poor return of coho salmon to Snettisham in 1987. Only 138,000 eggs were taken at the hatchery. An additional 73,000 were taken at several area lakes and will be reared separately as potential broodstock. Crystal Lake Hatchery took 831,000 coho salmon eggs in 1987, an increase of approximately 100,000 eggs from 1986. Of these, approximately 400,000 are being incubated in isolation for remote release into Slippery Creek. The 328,000 eggs taken by Deer Mountain staff at Reflection Lake was a five-fold increase over 1986. Klawock Hatchery took over 1 million coho salmon eggs in 1987, very close to hatchery capacity. Seventy-five thousand coho salmon eggs were taken at Cable Creek for production of fry to be planted above the fish ladder in that stream.

PRINCE WILLIAM SOUND

Summary of FRED Projects

In addition to an area office in Cordova, FRED Division operates Main Bay and Cannery Creek Hatcheries in the northwestern portion of the sound, and a streamside sockeye salmon incubation facility, Gulkana, on the upper Copper River (Figure 2). Biologists stationed in Cordova examine the potential production of sockeye and coho salmon utilizing lake enrichment at sites along the Copper River and in the sound.

Main Bay Hatchery began 1987 as a chum and pink salmon facility. The combination of increasing interest in sockeye salmon production and technological advances allowed a goal change for that facility. Its chum salmon production will be terminated and replaced with sockeye salmon smolt production. This is the first sockeye salmon one-check smolt production facility in the state, if not the world. Chum salmon production ended on a bright note with the release of over 76 million fed fry. Cannery Creek is a large-scale pink salmon production facility with a chum salmon broodstock-building program.

Several sport fish enhancement projects are continuing in this area, including coho and chinook salmon projects designed to produce more returns of these valuable species to urbanized areas near Cordova, Valdez, and Whittier. The lake stocking programs at Culross and Surprise Cove Lakes were continued in 1987, but because of apparently poor in-lake survivals at Surprise Cove Lakes, will be discontinued in that system. Tokun Lake was fertilized for the fourth consecutive year in 1987 as a cooperative project with the USFS.

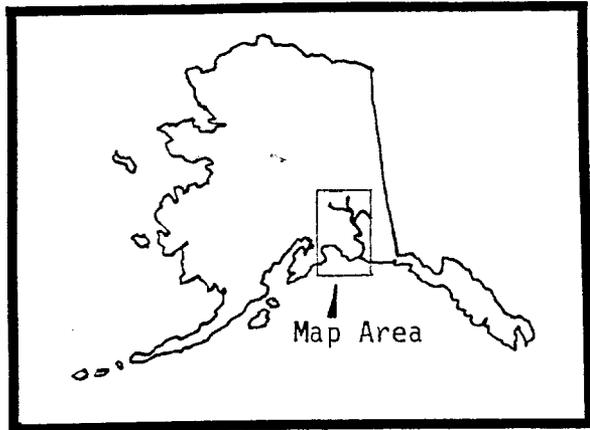
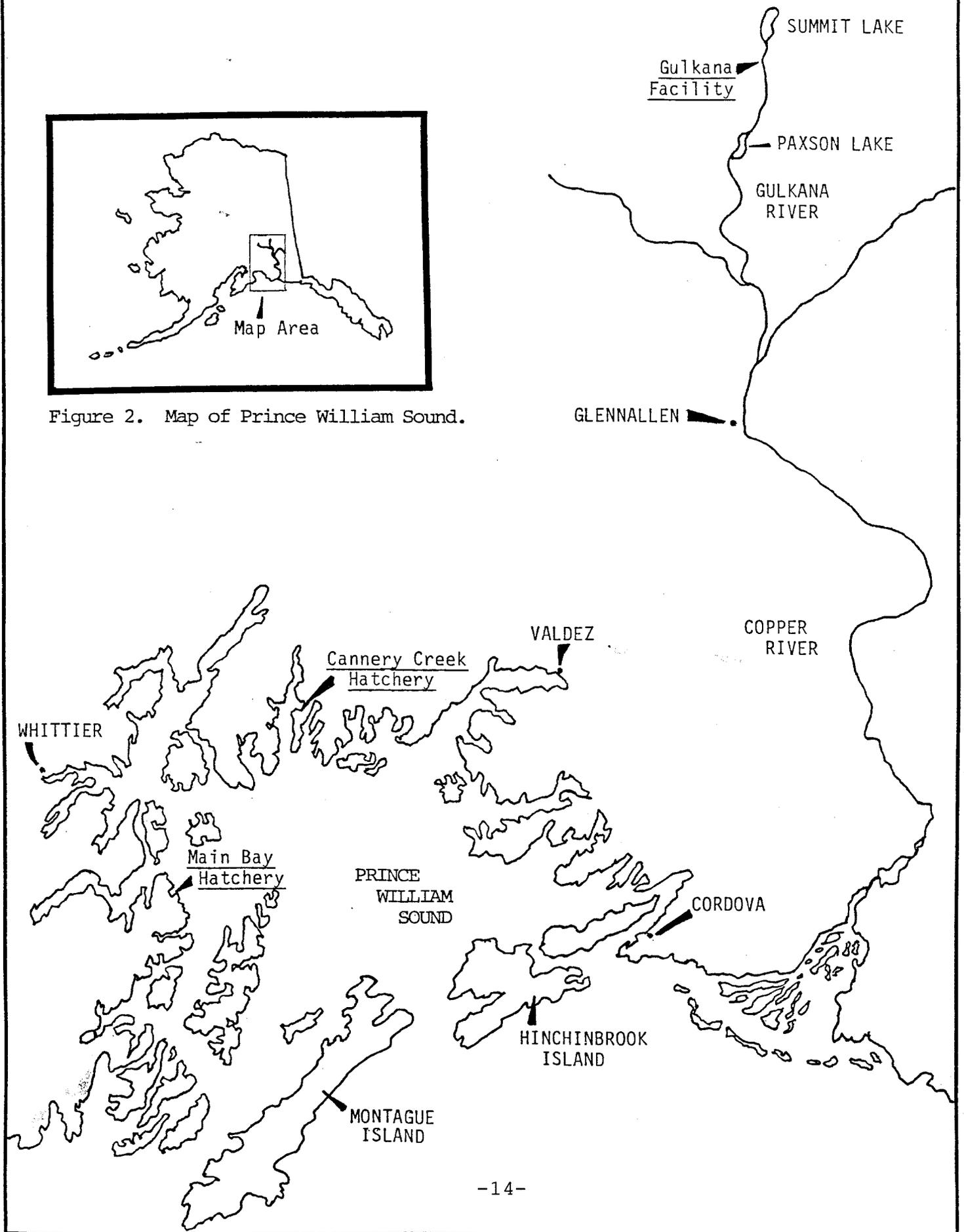


Figure 2. Map of Prince William Sound.



In another cooperative project, FRED Division gave 60,000 of the chum salmon returning to Main Bay to the Prince William Sound Aquaculture Corporation (PWSAC) as broodstock for their Esther Hatchery. PWSAC successfully transferred over 300,000 sockeye salmon fry from Esther Hatchery to Main Bay where they will be reared as smolts. This should accelerate broodstock development at Main Bay by one year.

A comprehensive pink salmon coded-wire tag (CWT) program was conducted jointly with the Commercial Fisheries Division and PWSAC. The program was designed by FRED Division, which supervised the tagging, supervised the broodstock tag recovery at hatcheries, and is doing the data analysis. Over 2.6 million fish were examined for missing adipose fins in the commercial fisheries; 3,498 fish were recovered and 2,351 contained valid tags. Data analysis is not yet complete because of the volume and complexity of the data set.

Prince William Sound Highlights

- An estimated 1.8 million pink salmon from Cannery Creek Hatchery were harvested in the 1987 Prince William Sound seine fishery.
- The joint FRED/PWSAC effort at Cannery Creek Hatchery filled the hatchery to capacity with 108 million pink salmon eggs.
- An estimated 68,000 chum salmon and 328,000 pink salmon from Main Bay Hatchery were caught in Prince William Sound fisheries in 1987.
- Fry resulting from the 10.5 million sockeye salmon eggs taken at Coghill Lake for Main Bay Hatchery will be divided between smolt production and lake stocking.
- In 1987 an estimated 102,000 adult sockeye salmon resulted from earlier releases at Gulkana Hatchery. Of these, 59,400 (60%) were harvested in the commercial fishery.
- The 1987 Gulkana Hatchery sockeye salmon egg take of 33.3 million eggs set a modern Alaska hatchery record for sockeye salmon egg takes.
- Sport fishermen harvested an estimated 11,000 adult coho salmon resulting from FRED releases at Whittier and Cordova.
- In a cooperative effort with PWSAC, approximately 41,000 pink salmon worth \$50,963 were harvested and sold by PWSAC to recover some operating expenses for the Cannery Creek Hatchery.

Prince William Sound Returns and Fishery Contributions

An estimated 2.7 million fish returned in 1987 as a result of FRED Division projects in Prince William Sound (Table 1). This more than doubles the returns of 1986. Nearly 84% (1.8 million) of the pink salmon destined for the Cannery Creek Hatchery were commercially harvested. This return and commercial catch met expectations, in contrast to what occurred in many pink salmon production areas across the state in 1987. No pink salmon were utilized as brood for Main Bay Hatchery during 1987, so all 328,000 returning salmon were harvested. The chum salmon return to Main Bay Hatchery contributed 68,000 fish to the commercial fishery. The Gulkana streamside incubation facility contributed over 61,000 fish to the commercial fisheries for a total return of 101,000 sockeye salmon.

The return of pink salmon to Prince William Sound was a singular bright spot in pink salmon returns across the state. Pink salmon returns in 1987 were the lowest in many years for most parts of the state.

Sport fisheries harvested over 12,000 coho, chinook, and sockeye salmon and rainbow trout from Prince William Sound projects in 1987. This includes the harvest of chinook and coho salmon from projects designed to produce sport fish for fishermen in the urban areas of the Prince William Sound area. An estimated 11,000 coho salmon were harvested by fishermen from Cordova and Whittier from these projects. Gulkana was responsible for over 700 sport-caught sockeye salmon.

Prince William Sound Releases

Prince William Sound FRED projects released over 142 million fish in 1987 (Table 2), an increase of more than 20 million fish above the 1986 release. Both pink salmon-producing facilities had diminished pink salmon production, moderately for Cannery Creek, but dramatically for Main Bay. Gulkana had a slight decrease in the number of sockeye salmon released in 1987. The decreases in pink and sockeye salmon were more than made up for by the 68 million increase in chum salmon released at Main Bay.

The coho salmon smolt-planting program continued in 1987 with Whittier receiving 55,000 smolts and Cordova receiving 58,000 smolts. The chinook salmon program also continued with Whittier receiving a smolt plant of over 50,000.

The Gulkana streamside incubation facility released over 22 million fry in 1987, slightly less than their record-breaking release of the prior year. A 10% loss of fry to infectious hematopoietic necrosis virus (IHNV) was the major problem. Almost 10 million fry were released at the incubation site, while over 12 million were released at Summit Lake. Fry were not planted at Crosswind Lake as planned because of budget reductions and loss of fry to disease.

Prince William Sound Egg Takes

Over 153 million eggs were taken at the three FRED facilities in Prince William Sound during 1987 (Table 3). This decrease of nearly 10 million eggs was primarily due to the program change at Main Bay which precluded chum salmon egg takes there. In 1986, Main Bay took over 86 million chum salmon eggs, whereas none were taken in 1987. The decrease in eggs taken was not as dramatic as it might have been because Cannery Creek more than doubled the number of pink salmon eggs by taking 108 million compared to 44 million last year. Gulkana had a very successful sockeye salmon egg take, setting a hatchery record at over 33 million eggs for remote-site sockeye salmon egg takes. The sockeye salmon program at Main Bay got off to a good start with an egg take of over 11 million from Coghill Lake. Gulkana took chinook and sockeye salmon eggs for its new East Fork facility as well.

COOK INLET

Summary of FRED Projects

The Fred Division maintains field offices at Big Lake, Soldotna, and Homer and operates six hatcheries in the Cook Inlet area (Figure 3). In 1987, the biological staff was involved in rehabilitation projects, including determination of waters to be stocked, broodstock acquisition, and evaluation of hatchery releases. In addition, the biological staff supervises fishery enhancement projects that create and maintain chinook and coho salmon sport fisheries in the Anchorage and Matanuska/Susitna Valley areas. Sport fishing effort in the Cook Inlet area has increased dramatically in the last 10 years. With this increased fishing effort, however, has come increasingly restrictive management to maintain adequate spawner escapement. A number of systems have been regulated as "weekend-only" sport fishing, because the demand exceeds the availability of natural stocks. Consequently, supplemental production of chinook and coho salmon by the FRED Division has become an important tool to provide additional sport fishing opportunities in northern Cook Inlet.

The six state 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 planting in the Big Lake and Nancy Lake systems. Many of these fish are harvested by Cook Inlet gillnetters. The hatchery also produces coho salmon, which are planted in Knik Arm streams as well as in the Little Susitna River, and are targeted for sport fish harvest. The Fort Richardson Hatchery in Anchorage operates on water heated by a military power plant. This facility features rainbow trout for planting in over 100 lakes in southcentral and interior Alaska. Juvenile coho and chinook salmon reared to a large size in the warm water of this facility are released at locations in upper Cook Inlet as well as at Whittier, Cordova,

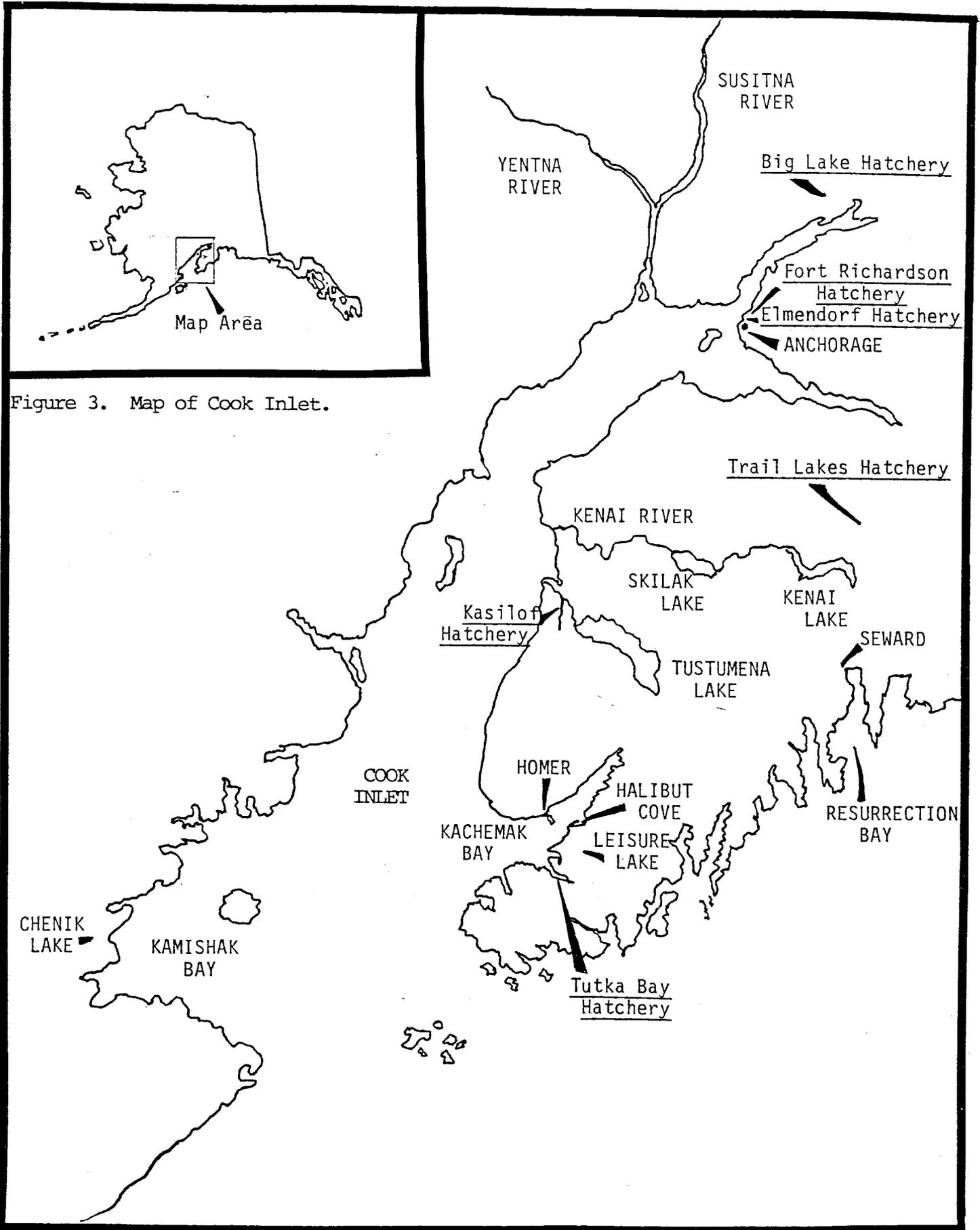


Figure 3. Map of Cook Inlet.

and Valdez, and are targeted primarily at sport fisheries in those urban areas. Chinook and coho salmon produced at Elmendorf Hatchery in Anchorage are presently released to provide fisheries in the Kasilof River, Kachemak and Resurrection Bays, Whittier, and in many landlocked lakes throughout southcentral Alaska.

Three of the Cook Inlet area state hatcheries are located on the Kenai Peninsula. The newest facility is at Trail Lakes, near Moose Pass. This facility is designed to culture several species and/or stocks of salmonids in isolation to prevent the transmittal of disease, primarily IHNV. Sockeye, coho, and chinook salmon are the primary species produced at Trail Lakes and are for stocking Kenai Peninsula lakes and streams for both commercial and sport fish purposes. The Crooked Creek Hatchery, which has also been called Kasilof Hatchery, is the only sockeye salmon facility that has not experienced IHNV-related epizootics. This facility produces sockeye salmon for Tustumena Lake and for 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 harvest in lower Cook Inlet. In addition, sport anglers catch nearly 5,000 pink salmon each year from this hatchery stock.

Cook Inlet Highlights

- An experimental release of coho salmon presmolts was made into Big Lake in an attempt to evaluate the success of this enhancement strategy.
- Hatchery-produced coho salmon comprised an estimated 31% of the smolts emigrating from Big Lake and 92% of those emigrating from Nancy Lake.
- An estimated 32% of the fish harvested from the Little Susitna River were of hatchery origin.
- Preliminary results in 1987 indicate that the Willow Creek chinook salmon fishery will be enhanced substantially in the future by hatchery-produced fish.
- An estimated 80%-90% of the approximately 1 million sockeye salmon smolts emigrating annually from the Big Lake drainage are hatchery-produced.
- Over 650,000 chinook salmon eggs and 6.6 million coho salmon eggs were taken for northern Cook Inlet enhancement projects; of these, 6 million coho salmon eggs were taken for Big Lake Hatchery, a new state record.
- Approximately 20 million sockeye salmon eggs were taken for the Big Lake enhancement project.

- FRED projects accounted for over 36% of the \$2.7 million ex-vessel value of the lower Cook Inlet salmon harvest.
- The Chenik and Leisure Lake stocking projects provided 50% of the total lower Cook Inlet sockeye salmon harvest in 1987.
- In 1987, pink salmon returns to Tutka Lagoon Hatchery and Halibut Cove Lagoon accounted for 40% of the entire lower Cook Inlet pink salmon harvest.
- In recent years, over 90% of the salmon harvested by Kachemak Bay anglers is estimated to have originated from FRED enhancement projects.

Cook Inlet Returns and Fishery Contributions

The Cook Inlet state hatcheries had major impacts on 1987 returns in the area (Table 1). Crooked Creek Hatchery projects produced over 564,000 returning sockeye salmon to Tustumena, Leisure, and Chenik Lakes. As estimated from marked escapement, Crooked Creek Hatchery produced over 28% of the 1.5 million commercial sockeye salmon harvest in 1987. As a result of the higher prices paid in 1987, the ex-vessel value of the 355,000 hatchery-produced Tustumena sockeye salmon in 1987 (\$2.85 million) nearly matched the \$3.0 million ex-vessel value of the 496,000 hatchery-produced sockeye salmon caught in 1986. A record return of 13,000 chinook salmon to Crooked Creek was estimated for 1987. In 1987 and for perhaps the first time ever, a substantial chinook salmon sport fishery occurred at Seward. The estimated catch of 1,000 chinook salmon was probably underestimated because there was only a limited harvest survey. At Big Lake, an estimated 30% of the drainage's 3,900 coho salmon escapement were of hatchery origin. In 1987, 1,856 or 32% of the coho salmon caught in the Little Susitna River were fish from Big Lake Hatchery, as indicated by recovery of marked fish. The 22,402 coho salmon caught in the boat fishery at Resurrection Bay in 1987 was second only to the record harvest (22,932) reported in 1968. However, 45% (10,081) of the total number of coho salmon caught in the 1987 boat sport fishery were hatchery-produced. Including the shore fishery, a total of 11,600 coho salmon of the 23,947 coho salmon total harvest in the shore and boat fisheries was attributed to hatchery fingerling and smolt releases. In 1987, Hidden Lake received the greatest sockeye salmon escapement (43,500) since the project began in 1976. The smolt-to-adult survival for the estimated 1987 total return (44% survival; 174,000 total return) was one of the highest rates observed for this project. The resulting 103,600 hatchery-produced sockeye salmon that were estimated to have been commercially harvested in 1987 had an ex-vessel value of nearly \$750,000. Sockeye salmon made up the largest portion of the 1987 commercial salmon harvest in lower Cook Inlet with as much as 50% of these resulting from enhancement projects. Pink salmon made up the next highest harvest, followed by chum, coho, and chinook salmon. Usually, pink salmon

make up the majority of the annual salmon harvest in lower Cook Inlet; however, there was a very poor pink salmon return to lower Cook Inlet in 1987. In fact, at 200,840 fish, it was the sixth lowest return since 1936. Exact reasons for this return are unknown at this time. The Tutka Lagoon Hatchery return, estimated at only 79,220 pink salmon, was the lowest return and survival rate (0.3%) in the facility's history. However, the hatchery return still contributed 26% and 67% of the total lower Cook Inlet area and southern district pink salmon harvests, respectively. FRED Division projects provided 34% (210,700 fish) of the total 1987 lower Cook Inlet commercial harvest (621,160 fish). The Chenik and Leisure Lake sockeye salmon projects produced approximately 50% (124,140) of the total lower Cook Inlet sockeye salmon harvest of 248,280 fish in 1987.

Cook Inlet Releases

In 1987, FRED Division Cook Inlet projects released 73.7 million juvenile fish in 1987 (Table 2). Of these, almost 5.6 million were rainbow and steelhead trout. The remainder were salmon, with sockeye and pink salmon releases at 35.9 and 24.5 million, respectively. Coho salmon releases totaled nearly 6.3 million. Chinook and chum salmon releases were 0.7 and 4 million fish, respectively. Hatchery-produced coho salmon contributed an estimated 31% of the 100,000 fish emigration from Big Lake and 92% of the 400,000 fish emigration from Nancy Lake. The preponderance of these fish will return as adults in 1988. A pilot program involving the planting of coho salmon presmolts was begun in 1987. The strategy is to rear fish to a size such that smolting will likely occur during the spring following a fall release. If successful, this will improve the use of existing rearing space at Big Lake Hatchery.

Crooked Creek, with releases of over 22 million sockeye salmon, continued its record of the largest sockeye salmon releases in the area. The Big Lake Hatchery release of 11.9 million sockeye salmon into Meadow Creek made it the second largest producer of sockeye salmon in the Cook Inlet area in 1987. That facility also released over 2.6 million coho salmon fingerlings at eight sites in the northern Cook Inlet area.

Elmendorf Hatchery released chinook and coho salmon and rainbow trout in 1987. The Crooked Creek stock of chinook salmon reared at Elmendorf Hatchery were released at seven sites in Cook Inlet and Prince William Sound, primarily to contribute to sport fisheries in those areas. Coho salmon from Elmendorf were released at Lowell Creek, Seward Lagoon, and Ship Creek to provide sport fisheries in the Prince William Sound and Anchorage areas. Rainbow trout from Elmendorf Hatchery were planted in over 25 lakes in the Alaska-Yukon-Kuskokwim and Cook Inlet areas.

Crooked Creek Hatchery released coho salmon and steelhead trout in 1987 in addition to the 2.2 million-plus sockeye salmon. Coho salmon releases, including fingerlings and smolts, totaled almost

68,000. Approximately 70,000 steelhead trout were planted in Crooked and Six Mile Creeks.

Tutka Lagoon Hatchery released pink and chum salmon in 1987. Pink salmon were released in Tutka Bay, Tutka Creek, Halibut Cove Lagoon, and Homer Spit in lower Cook Inlet and Ingram Creek in northern Cook Inlet. Chum salmon were released at the hatchery.

Fort Richardson Hatchery in Anchorage released coho salmon and rainbow trout, totaling 828,000 and 5.3 million, respectively. Coho salmon were released in Nancy Lake, Culross Lake, Caswell Creek, Fleming Spit, Surprise Cove, and the Little Susitna River. Rainbow trout were distributed to over 100 sites in southcentral and interior Alaska.

Trail Lakes Hatchery released chinook, coho, and sockeye salmon and steelhead trout in 1987. Over 3.7 million Trail Lakes sockeye salmon went into Hidden Lake. Approximately 2.5 million coho salmon from Trail Lakes were planted in 33 lakes and streams in the Cook Inlet area. Trail Lakes chinook salmon were planted in Summit Lake and in Bench and Granite Creeks.

Cook Inlet Egg Takes

Over 51 million of the 89 million eggs taken by FRED Division at Cook Inlet facilities in 1987 were sockeye salmon eggs (Table 3). Big Lake, Crooked Creek, and Trail Lakes Hatcheries are the primary producers of sockeye salmon in this area. Over 20 million sockeye salmon eggs were collected by Big Lake and Crooked Creek Hatcheries.

Over 2.5 million chinook salmon eggs from six brood sources were collected for Elmendorf and Fort Richardson Hatcheries. The chinook salmon egg take scheduled at Willow Creek for Fort Richardson Hatchery was hampered by vandalism; however, an estimated 453,000 and 121,000 eggs were collected from Willow and Montana Creeks, respectively.

Coho salmon eggs are part of the program of Big Lake, Elmendorf, Fort Richardson, and Trail Lakes Hatcheries. Almost 7.3 million coho salmon eggs were taken in the Cook Inlet area, with Big Lake Hatchery accounting for a record 6 million.

Of all the Cook Inlet area hatcheries, pink and chum salmon eggs are found only at the Tutka Lagoon Hatchery. The hatchery staff took 4.5 and 15.3 million pink and chum salmon eggs, respectively, in 1987.

Over 7.1 million rainbow trout eggs were taken in 1987 for the Fort Richardson Hatchery.

KODIAK AND ALASKA PENINSULA

Summary of FRED Projects

The FRED Division maintains an area office in Kodiak and operates two hatcheries in the Kodiak and Alaska Peninsula areas (Figures 4 and 5). Biologists assigned to the Kodiak office serve as FRED Division contacts for the local area and are involved in hatchery evaluation studies, lake stocking and fertilization studies, hatchery feasibility studies, logistical support for local mariculture operations, and aid to private scientific/educational facilities. Kitoi Bay Hatchery is a major pink salmon production facility located on Afognak Island near Kodiak. Russell Creek Hatchery at Cold Bay on the Alaska Peninsula was originally designed to enhance chum salmon returns to the area. The original design was inadequate and major remedial work was done. The goal for Russell Creek Hatchery has been changed to pink and coho salmon enhancement.

Other projects in the Kodiak and Alaska Peninsula areas in 1987 included Karluk Lake rehabilitation and fertilization for sockeye salmon, prestocking studies of Frazer, Akalura, and Afognak Lakes for sockeye salmon enhancement, prestocking studies of Hidden and Crescent Lakes for coho salmon, the Terror/Kizhuyak River study for pink and chum salmon, the Pillar Creek Hatchery feasibility study for sockeye salmon, and the Ouzinkie educational hatchery and hydroelectric facility for coho salmon production.

In addition, mariculture feasibility studies were initiated in the Kodiak area during 1987. Nine culturists are active in scallop, mussel, and oyster propagation and activities are coordinated through the FRED Division Kodiak Area Office. Additionally, considerable time was spent in planning and preparing for the Japan-Alaska feasibility study of scallop spat collection. The addition of four ADF&G technicians and three Japanese scientists and technicians in Kodiak increased both the clerical workload and the time and effort spent by the area biologist.

Overall, 1987 was a very productive year. Community and fishermen support for more sockeye salmon enhancement projects grows stronger each year as the success of the Karluk Lake rehabilitation project becomes more apparent. The Kodiak Regional Aquaculture Association (KRAA) has obtained voluntary contributions of \$60,000 in matching funds that the Kodiak Island Borough committed to lake fertilization projects. The relative stability and high value (\$1.50/lb. in 1987) of sockeye salmon is a great incentive for continuing these projects and initiating other sockeye salmon projects in the area, such as at Afognak and Spiridon Lakes.

The feasibility studies of the Pillar Creek and Little Kitoi Lake sites for an experimental sockeye salmon hatchery are promising. Recent advances in sockeye salmon culture and the discovery of a healthy population of zero-check sockeye salmon in Upper Station

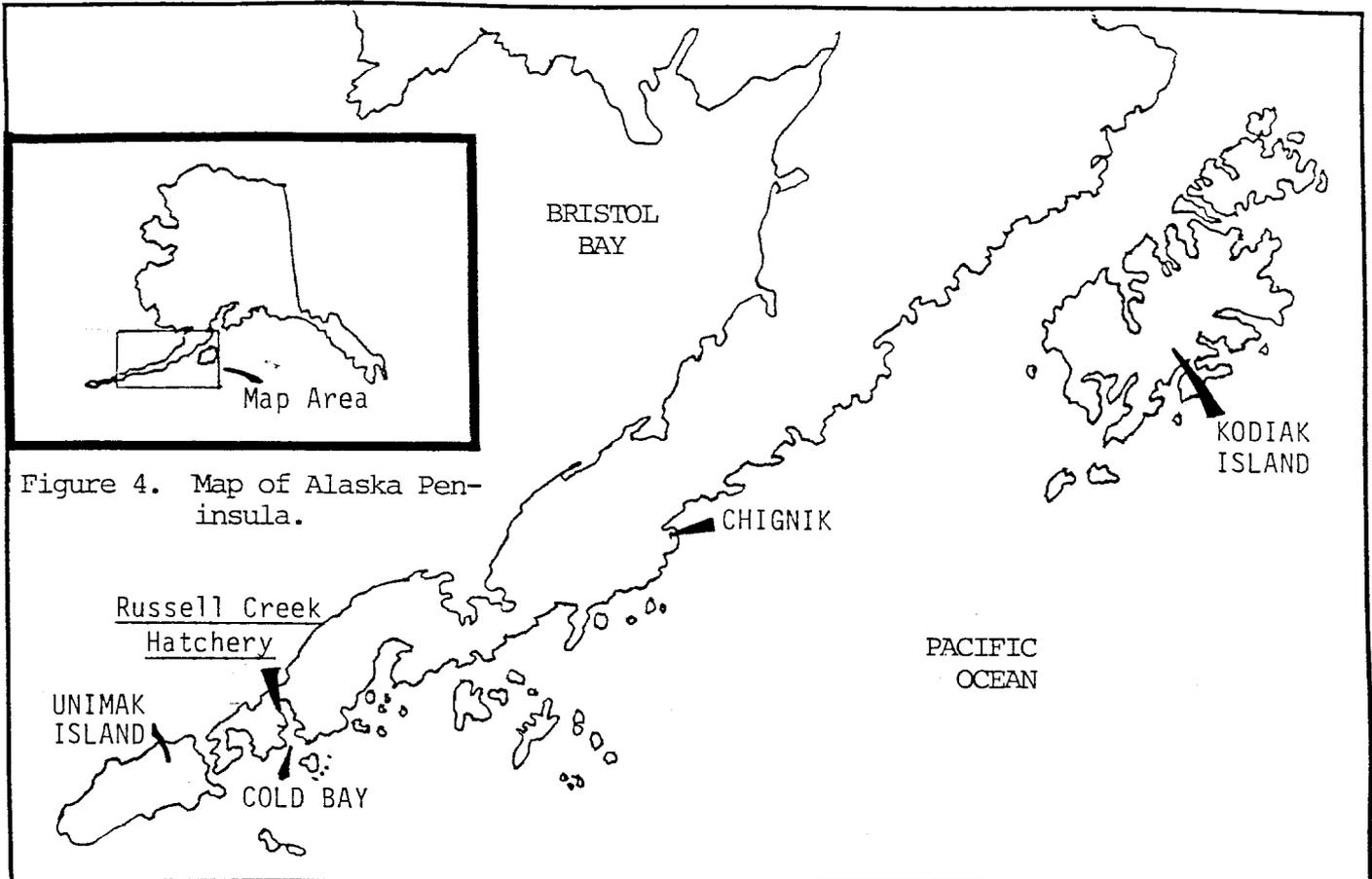


Figure 4. Map of Alaska Peninsula.

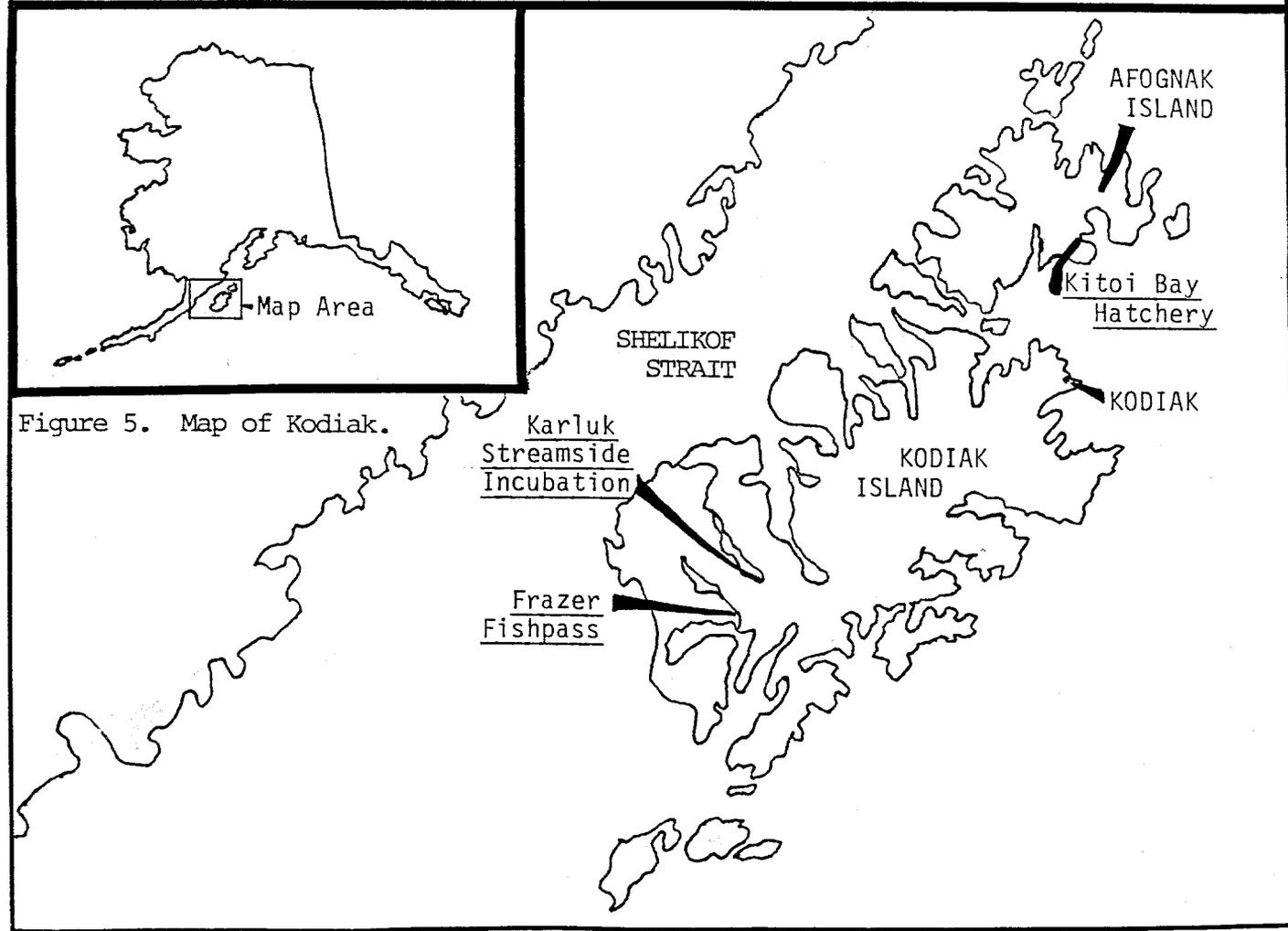


Figure 5. Map of Kodiak.

Lakes in Olga Bay encourage the concept of supplemental production.

The cost-recovery program at Kitoi Bay was an important first step in the participation of the fishermen in the operation of the state-owned hatchery. The \$124,000 obtained in the cooperative program with KRAA will be used to purchase net pens essential for this hatchery to operate efficiently and produce more adult salmon.

The successful application of fertilizer to Karluk Lake, cost recovery at Kitoi Bay, and \$60,000 of voluntary contributions for lake fertilization at Frazer Lake all point to a growing involvement of this new nonprofit organization.

Kodiak and Alaska Peninsula Highlights

- Approximately 1,215,000 pink salmon returned to Kitoi Bay Hatchery: the commercial catch was 895,800; cost recovery, 165,700; broodstock; 140,300; and escapement, 13,200.
- The chum salmon return to the Kitoi Bay Hatchery was 10,100 adult salmon.
- A record number of sockeye salmon returned to the Karluk Lake system (1.1 million) with an escapement of 766,000 and a catch of 354,000 fish valued at \$3.3 million (ex-vessel). This is the third consecutive year that Karluk Lake sockeye salmon returns exceeded one million.
- This was the fifth consecutive year of increased sockeye salmon spawner returns (57,800) to Upper Thumb River.
- A salmon hatchery development project was initiated at the Village of Ouzinkie by planting 24,000 coho salmon fry for broodstock development.
- Approximately 97.4 million pink salmon and 6.1 million chum and coho salmon eggs were taken for continuation of salmon enhancement projects at Kitoi Bay.
- Nearly 6,000 adult coho salmon returned from sport fisheries enhancement projects.
- Rehabilitation of the sockeye salmon of Upper Thumb River of Karluk Lake was successful and closure of the facility was accomplished with minimal costs through a cooperative venture with labor by the State Department of Corrections' minimal security prisoners.
- The application of 96 tons of fertilizer to Karluk Lake (within the National Wildlife Refuge) to increase survival of sockeye salmon was completed in cooperation with the U.S.

Fish and Wildlife Service (USF&WS), KRAA, and additional funding support from the Kodiak Island Borough.

- Prefertilization studies at Frazer Lake were completed, resulting in the decision by ADF&G staff to fertilize Frazer Lake in 1988.
- Prefertilization and prestocking assessments at Akalura, Afognak, Hidden, and Crescent Lakes in the Kodiak area were initiated.
- Sockeye salmon hatchery site investigations continued at Pillar Creek and Little Kitoi Lake.
- Sockeye salmon broodstock screening for enhancement and rehabilitation in the Kodiak area was initiated.
- A tagging study at Karluk River clearly showed that the Upper Thumb River stock is well mixed in the June escapement as are fish from other tributary systems.
- In-stream spawner distribution studies at Terror and Kizhuyak Rivers were initiated.
- The Alaska/Japan OFCF cooperative project on the feasibility of scallop spat collection in the Kodiak area began in 1987.
- The patenting of the Kitoi Incubator is ongoing. If approved, it will be the first patent (public domain) issued to the state for an employee invention.
- The Kodiak area Phase II salmon enhancement plan was completed by the regional planning team, accompanied by increased activity by KRAA.
- A successful cost-recovery program was negotiated with KRAA to net \$124,000 for KRAA and the Kitoi Bay Hatchery.

Kodiak and Alaska Peninsula Returns and Fishery Contributions

Returns to FRED projects on the Alaska Peninsula increased by more than 50% in 1987 (Table 1). Over 1.5 million salmon were produced by area projects in 1987, compared with just over 1 million in 1986. The vast majority of the production was attributed to the Kitoi Bay Hatchery which had a pink salmon return of over 1.2 million. This more than doubled the previous year's return. Of the 1.5 million fish returning to this area in 1987, over 1.1 million (72%) were caught commercially with an additional 57,500 harvested by sport/subsistence fishermen.

Karluk Lake continued its record of increasing returns with over twice the number of sockeye salmon produced by the Thumb River project in 1987.

Fishpasses, including the Frazer River pass and those on Afognak Island, contributed sockeye and pink salmon to the commercial fisheries of the area, as well as a limited number of coho and chinook salmon.

Russell Creek Hatchery had a broodstock escapement of 35,000 chum salmon; however, evaluation of the fishery contribution was not funded. Returns to the Russell Creek Hatchery in 1987 were not expected to be great because of construction problems and remodeling efforts.

Kodiak and Alaska Peninsula Releases

Again in 1987, Kitoi Bay Hatchery released more juvenile salmonids than any other state facility. The release of 90 million pink salmon fry, while lower than in 1986, is still enough fish to continue Kitoi Bay's release record. In addition to the pink salmon released, Kitoi Bay released chum and coho salmon and rainbow trout. No fish were released from Russell Creek Hatchery in 1987 because reconstruction and high-water conditions precluded egg takes in 1986.

With five years of returns to the Upper Thumb River of over 20,000 spawners, that project was closed during 1987; no fish were released.

Kodiak and Alaska Peninsula Egg Takes

The hatchery crew at Kitoi Bay Hatchery took over 97.4 million pink salmon eggs and over 6 million chum salmon eggs in 1987. With this egg take, the broodstock development for chum salmon continues to increase. In addition to pink and chum salmon eggs taken for release at the hatchery, over 600,000 coho salmon eggs were taken to continue sport fish stocking projects in the Kodiak area.

ARCTIC-YUKON-KUSKOKWIM

Summary of FRED Projects

The FRED Division maintains an area office in Fairbanks and two fish hatcheries in the Arctic-Yukon-Kuskokwim (AYK) area. Clear Hatchery is located on the Tanana River south of Fairbanks, and Sikusuilaq Hatchery is located on the Noatak River north of Kotzebue (Figure 6). Clear Hatchery will be producing coho salmon, grayling, Arctic char, and rainbow and lake trout for commercial, subsistence, and sport fisheries in the Interior. Chum and chinook salmon programs have been lost to budget cuts. The Clear Air Force Base site for this facility was chosen primarily because the waste-heated water allows a flexible rearing program. Sikusuilaq Hatchery is the northernmost hatchery in the

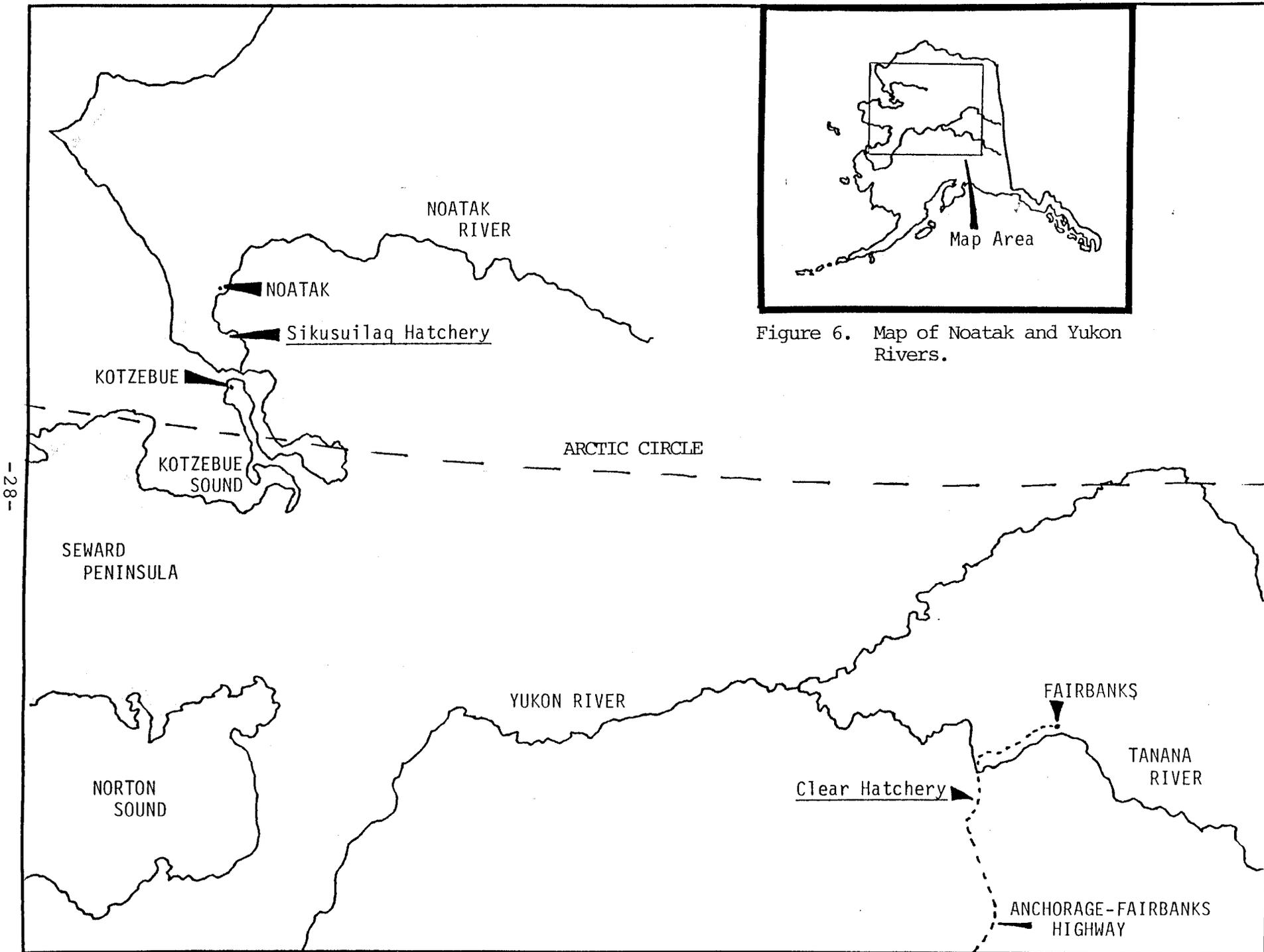


Figure 6. Map of Noatak and Yukon Rivers.

United States. It was developed in 1980 to test the feasibility of enhancement hatcheries in extreme conditions and to contribute chum salmon to the Kotzebue Sound commercial and subsistence fisheries. It was designed to handle 2 million chum salmon eggs, but has since proven to have enough water for approximately 40 million eggs. Additional incubators and outside rearing tanks were added in 1987 to allow egg takes and fry rearing of up to 10 million.

Arctic-Yukon-Kuskokwim Highlights

- Clear Hatchery personnel took lake trout eggs for the first time in 1987.
- Returns of chum salmon to Clear Hatchery indicated a continuing marine survival average of around 1%.
- Approximately 146,000 8-gram chinook salmon and 560,000 coho salmon were released from Clear Hatchery this year. The average size for chinook salmon was twice as large as previous releases in an attempt to increase survival.
- Approximately 5% of the commercially intercepted chum salmon in the Kotzebue Sound fishery were produced by Sikusuilaq Hatchery. The excellent hatchery return was in marked contrast to the record low return of wild stocks.
- More than half the chum salmon eggs taken into Sikusuilaq this year were from hatchery returns.

Arctic-Yukon-Kuskokwim Returns and Fishery Contributions

A very significant return of 8,750 chum salmon returned to the Sikusuilaq Hatchery in 1987; of these, 5,540 were harvested in commercial fisheries, while an additional 1,770 were taken in personal-use fisheries (Table 1). The significance of this return is increased because the natural stocks suffered a record low return to this area. This return and the proven availability of sufficient water and technology was the basis for a decision to increase the capacity of the Sikusuilaq Hatchery. Coho and chinook salmon returns to Clear Hatchery were less than anticipated in 1987. Chum salmon returns indicated a continuing marine survival of about 1%; in line with past returns and expected 1987 returns.

Arctic-Yukon-Kuskokwim Releases

In 1987, Clear Hatchery released 6 species totaling over 4.7 million juveniles. Over 2.5 million of those were grayling fry that were planted in over 50 sites throughout southcentral and interior Alaska. Clear Hatchery personnel also planted 1,060,000 rainbow trout, 248,000 sheefish, 4,150 char, and 300,000 coho

salmon in numerous lakes in the region. For a complete listing of the stocking location, see Appendix B. Releases of chinook and coho salmon were also made at Clear Hatchery. At the Sikusuilaq Hatchery, 1.4 million chum salmon fry were released into the Noatak River.

Arctic-Yukon-Kuskokwim Egg Takes

Over 9.6 million eggs were taken by the two facilities in this area (Table 3). At Clear Hatchery, over 5 million eggs were taken from five species, including the first lake trout eggs. Sikusuilaq Hatchery began its new development phase by taking over 4.1 million chum salmon eggs, doubling its original design capacity.

Table 1. Estimated contribution of fish by FRED hatcheries and projects in 1987.

Hatchery or Project	Species	Commercial Catch	Sport A/ Catch	Brood Stock/ Escapement	Total	Comments
SOUTHEAST REGION						
Bakewell	coho	150	--	100	250	Fishpass near Ketchikan. A/
Beaver Falls	chum	700	--	--	700	Hatchery near Ketchikan.
Chilkat Ponds	coho	1,000	--	250	1,250	Habitat improvement project near Haines. A/
Crystal Lake	chinook	9,100	1,200	6,300	16,600	Hatchery near Petersburg
	coho	4,500	20	2,967	7,487	
	chum	350	--	280	630	
	steelhead	--	--	122	122	
Ohmer Creek	chinook	--	--	--		Remote release site near Petersburg. A/
Irish Creek	coho	2,500	--	2,500	5,000	Fishpass near Petersburg. A/
Deer Mountain	chinook	95	200	550	845	Hatchery in Ketchikan.
Fish Creek-Hyder	chum	35,000	--	40,000	75,000	Cooperative spawning channel project with USFS. Catch based on escapement.
Hidden Falls	chinook	400	120	115	635	Hatchery on the east side of Baranof Island.
	chum	456,000	--	87,000	543,000	
Ketchikan Creek	pink	21,000	--	80,000	101,000	Fishpass in Ketchikan.
Klawock	chum	60,000	--	3,706	63,706	Hatchery near Klawock on Prince of Wales. A/
	coho	43,000	170	9,120	52,290	
	steelhead	--	1,000	50	1,050	
McDonald Lake	sockeye	36,000	--	65,000	101,000	A/
Snettisham	chinook	1,220	900	633	2,753	Hatchery 40 miles SE of Juneau.
	coho	200	0	130	330	
	chum	39,100	--	62,500	101,600	
Indian Lake	coho	570	80	570	1,220	
Juneau/DJ	coho	50	--	50	100	Includes Dredge Lake and Salmon Creek A/
Twin Lakes	coho	--	6,000	--	6,000	Land locked sport harvest
Sunny Creek	pink	11,000	--	40,000	51,000	Fishpass on Prince of Wales. A/
Southeast Totals:		721,935	9,690	401,943	1,133,568	
PRINCE WILLIAM SOUND						
Cannery Creek	pink	1,800,000	--	350,000	2,150,000	Hatchery in Unakwik Inlet.
Hobo Creek	pink	2,220	--	740	2,960	Fishpass 20 miles NE of Whittier. A/
Eaglik Bay	pink	13,800	--	4,600	18,400	A/
Derickson	pink	15,000	--	5,000	20,000	A/
Ft. Rich/Elmendorf Hatcheries located near Anchorage.						
Whittier	coho	3,000	5,000	--	8,000	A/
	chinook	B/	300	--	300	B/
Cordova	coho	--	6,000	--	6,000	
Valdez	chinook	100	--	--	100	A/
PWS Lakes	rainbow	--	41,500	--	41,500	Based upon survival and harvest assumptions.
Clear	grayling	--	19,000	--	19,000	Based upon survival and harvest assumptions.
Gulkana	sockeye	61,000	800	39,200	101,000	Streamside incubation facility near Paxson.
Main Bay	pink	328,000	--	--	328,000	Hatchery SE of Whittier.
	chum	68,000	--	60,000	128,000	
PWS TOTALS:		2,291,120	72,600	459,540	2,823,260	

-Continued-

Table 1. Continued

Hatchery or Project	Species	Commercial Catch	Sport Catch	Brood Stock/ Escapement	Total	Comments
COOK INLET						
Big Lake	sockeye	175,000	3,000	90,000	268,000	Hatchery near Wasilla.
	coho	3,840	975	2,160	6,975	Includes adjustment for tag loss.
Landlocked Lakes	coho	--	84,000	--	84,000	A/
Cottonwood Creek	coho	1,470	375	830	2,675	
Little Susitna	coho	1,680	670	700	3,050	Includes adjustment for tag loss.
Crooked Creek	chinook	--	4,500	3,400	7,900	Hatchery located on Crooked Creek.
	coho	40	1,250	2,600	3,890	
Tustumena Lake	sockeye	355,000	5,700	71,000	431,700	Stocking location on Kenai Peninsula.
Leisure Lake	sockeye	21,500	2,200	--	23,700	Stocking location in Kachemak Bay.
Chenik Lake	sockeye	102,000	--	10,000	112,000	Stocking location in Kamishak Bay.
Crooked Creek	steelhead	--	40	185	225	
Ft. Rich/Elmendorf						
Hatcheries also produced fish in PWS.						
Halibut Cove	chinook	500	1,250	--	1,750	Remote release location in Kachemak Bay.
Homer Spit	chinook	B/	2,000	--	2,000	Remote release location in Kachemak Bay.
Ship Creek	chinook	--	400	800	1,200	
Willow Creek	chinook	170	880	1,130	2,180	
Little Susitna	coho	8,200	3,300	3,400	14,900	Includes adjustment for tag loss.
Cook Inlet lakes	rainbow	--	288,000	--	288,000	Based upon survival and harvest assumptions.
	chinook	--	26,000	--	26,000	Based upon survival and harvest assumptions.
Resurrection Bay	chinook	--	1,000	350	1,350	
Resurrection Bay	coho	B/	11,600	6,000	17,600	
Clear	grayling	--	14,000	--	14,000	Based upon survival and harvest assumptions.
Trail Lakes						
Hatchery north of Seward on Kenai Peninsula.						
Hidden Lake	sockeye	104,000	3,000	34,600	141,600	Release location on Kenai Peninsula.
Grant Lake	coho	B/	--	880	880	Catch estimated from escapement.
Caribou Lake	coho	B/	1,200	300	1,500	Release location. A/
Seldovia Lake	coho	B/	1,000	50	1,050	Release location. A/
Six Mile	coho	B/	100	1,900	2,000	Release location. A/
	chinook	--	130	400	530	A/
Cook Inlet lakes	coho	--	32,000	--	32,000	Based upon survival and harvest assumptions.
Tutka	pink	56,000	500	4,000	60,500	Hatchery located in Kachemak Bay.
	chum	2,200	B/	200	2,400	
Halibut Cove	pink	28,500	150	--	28,650	
COOK INLET TOTALS:		860,100	489,220	234,885	1,584,205	

-Continued-

Table 1. Continued

Hatchery or Project	Species	Commercial Catch	Sport Catch	Brood Stock/ Escapement	Total	Comments
KODIAK/ALASKA PENINSULA						
Kitoi Bay	pink	1,060,000	--	153,000	1,213,000	Hatchery located on Afognak Island.
	chum	3,860	--	6,270	10,130	
Kodiak Lakes	coho	--	4,400	8,800	13,200	A/
	rainbow	--	9,000	--	9,000	
Landlocked lakes Lake Rose Tead	coho	--	44,000	--	44,000	
	chinook	B/	100	73	173	
Karluk	sockeye	8,700	--	57,800	66,500	Streamside incubation on Thumb River.
Frazer fishpass	sockeye	8,737	--	48,956	57,693	Fishpass on Kodiak Island.
	chinook	105	--	103	208	
Afognak Fishpasses (combined)	coho	4,552	--	9,500	14,052	A/
	pink	22,402	--	41,300	63,702	A/
	sockeye	476	--	13,729	14,205	A/
Russell Creek	chum	B/	--	35,000	35,000	A/
KODIAK/AK PEN TOTALS:		1,108,832	57,500	374,531	1,540,863	
ARCTIC-YUKON-KUSKOKWIM						
Clear	coho	363	--	645	1,008	Hatchery located south of Fairbanks.
	chum	--	4,500	1,530	6,030	
	chinook	80	--	20	100	
Interior lakes	coho	--	63,000	--	63,000	Based upon survival and harvest assumptions.
	rainbow	--	200,000	--	200,000	Based upon survival and harvest assumptions.
	grayling	--	20,000	--	20,000	Based upon survival and harvest assumptions.
	sheefish	--	20	--	20	Based upon survival and harvest assumptions.
	char	--	3,000	--	3,000	
	chinook	--	5,000	--	5,000	
Sikusuilag	chum	5,540	1,770	1,440	8,750	Hatchery on the Noatak River.
AYK TOTALS:		5,983	297,290	3,635	306,908	
STATE TOTALS:		4,987,970	926,300	1,474,534	7,388,804	
BY SPECIES:		chinook	69,624	steelhead	1,397	
		coho	393,707	rainbow	538,500	
		chum	974,946	sheefish	20	
		sockeye	1,308,290	grayling	53,000	
		pink	4,037,212	char	3,000	
		Salmon Subtotal	6,783,779	Non-salmon Subtotal	595,917	

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

B/ Evaluation not funded

Table 2. Number of fish released during 1987 by FRED facilities.

Facility	Brood year, Stock	Species	Released
<u>SOUTHEAST</u>			
Beaver Falls	1986 Hugh Smith	sockeye	250,000
Crystal Lake	1985 Crystal Creek	chinook	684,000
	1986 Harding River	chinook	31,000
	1985 Crystal Creek	coho	362,000
	1986 Crystal Creek	coho	463,000
	1984 Falls Creek	steelhead	8,600
Deer Mountain	1985 Ketchikan Creek	chinook	42,000
	1986 Ketchikan Creek	chinook	302,000
Hidden Falls	1986 Hidden Falls	chum	40,140,000
	1985 H.F./Tahini	chinook	26,000
	1985 Crystal Creek	chinook	46,000
	1985 Tahini River	chinook	25,000
Klawock	1986 Klawock	chum	3,990,000
	1985 Klawock River	coho	926,000
	1986 Klawock River	coho	199,000
	1986 Klawock River	steelhead	91,000
Snettisham	1986 Snettisham	chum	25,460,000
	1984 Snettisham	coho	16,400
	1985 Snettisham	coho	779,000
	1986 Snettisham	coho	104,000
	1985 King Salmon River	chinook	86,000
	1985 Crystal Creek	chinook	961,000
SOUTHEAST REGION TOTAL:			74,992,000
<u>PRINCE WILLIAM SOUND</u>			
Cannery Creek	1986 Cannery Creek	pink	42,600,000
	1986 Cannery Creek	chum	35,000
Gulkana	1986 Gulkana River	sockeye	21,400,000
Main Bay	1986 Main Bay	pink	2,130,000
	1986 Main bay	chum	76,500,000
PRINCE WILLIAM SOUND TOTAL:			142,665,000
<u>COOK INLET</u>			
Big Lake	1986 Meadow Creek	sockeye	11,900,000
	1986 Big Lake	coho	2,688,000
Elmendorf	1986 Crooked Creek	chinook	684,000
	1985 Bear Creek	coho	179,000
	1985 Ship Creek	coho	56,500
	1986 Swanson River	rainbow	181,000
Crooked Creek	1986 Glacier Flats	sockeye	12,500,000
	1986 Bear Creek	sockeye	7,510,000
	1985 Crooked Creek	steelhead	70,000
	1985 Crooked Creek	coho	67,900
Tutka	1986 Tutka Lagoon	pink	24,500,000
	1986 Tutka Creek	chum	50,400
	1986 Westside Creek	chum	395,000

-Continued-

Table 2. Continued

Facility	Brood year, Stock	Species	Released
Ft. Richardson			
	1985 Little Susitna	coho	584,000
	1985 Caswell Creek	coho	32,000
	1985 18 Mile Creek	coho	108,000
	1986 Eyak Lake	coho	104,000
	1986 Big Lake	rainbow	156,000
	1987 Big Lake	rainbow	407,000
	1986 Swanson River	rainbow	1,038,000
	1987 Swanson River	rainbow	3,700,000
Trail Lakes			
	1986 Crooked Creek	chinook	268,000
	1986 Crooked Creek	coho	1,700,000
	1986 Bear Creek	coho	796,000
	1986 Hidden Lake	sockeye	3,720,000
	1986 Coghill	sockeye	318,000
	1986 Anchor River	steelhead	35,600
COOK INLET TOTAL:			73,748,400
KODIAK & AK. PENINSULA			

Kitoi Bay			
	1986 Kitoi Bay	pink	90,000,000
	1986 Sturgeon River	chum	529,000
	1986 Big Kitoi	chum	164,000
	1986 Little Kitoi	coho	297,000
	1986 Big Kitoi	rainbow	10,000
KODIAK & AK. PENINSULA TOTAL:			91,000,000
ARCTIC-YUKON-KUSKOKWIM			

Clear			
	1986 Wood Creek	char	4,150
	1986 Clear Creek	chinook	146,000
	1986 Wood Creek	coho	564,000
	1987 Swanson River	rainbow	1,060,000
	1987 Moose Lake	grayling	1,290,000
	1986 Moose Lake	grayling	1,100,000
	1986 Goodpaster Lake	grayling	106,000
	1987 Goodpaster River	grayling	59,100
	1986 Clear/Koyukuk	sheefish	248,000
Sikusuilag			
	1986 Noatak River	chum	1,440,000
ARCTIC-YUKON-KUSKOKWIM TOTAL:			6,017,250
SPECIES TOTALS			
	Chinook:		3,301,000
	Coho:		10,025,800
	Sockeye:		57,598,000
	Chum:		148,703,400
	Pink:		159,230,000
	Steelhead:		205,200
	Rainbow Trout:		6,552,000
	Grayling:		2,555,100
	Sheefish:		248,000
	Arctic Char:		4,150
TOTAL RELEASE:			388,422,650

Table 3. Estimated number of eggs taken by FRED Division in 1987.

Facility	Broodstock	Species	Eggs Taken
<u>SOUTHEAST</u>			
Beaver Falls	Karta River	sockeye	387,000
	Heckman Lake	sockeye	3,590,000
	Hugh Smith	sockeye	2,870,000
Crystal Lake	Crystal Creek	steelhead	115,000
	Crystal Creek	chinook	2,460,000
	Snettisham		2,760,000
	Medvejie		1,040,000
	Hidden Falls		165,000
	Sheldon Jackson		100,000
	Burnett Inlet		265,000
	Crystal Creek	coho	831,000
Deer Mountain	Ketchikan Creek	chinook	158,000
	Little Port Walter	chinook	164,000
	Reflection Lake	coho	328,000
Hidden Falls	Hidden Falls	chum	73,500,000
	Snettisham		6,850,000
	Hidden Falls	chinook	199,000
	Tahini River	chinook	55,000
Klawock	Crystal Creek	chinook	165,000
	Klawock River	steelhead	96,000
Snettisham	Klawock River	sockeye	1,440,000
	Cable Creek	coho	70,000
	Klawock River	coho	1,061,000
	King Salmon River	chinook	111,000
	Snettisham	chinook	1,440,000
	Snettisham, Chum	chum	47,000,000
	Peterson Creek	steelhead	8,000
Pavlof River	coho	48,000	
Plotnikov Lake	coho	25,000	
Snettisham	Snettisham	coho	138,000
SOUTHEAST		TOTAL	147,439,000
<u>PRINCE WILLIAM SOUND</u>			
Cannery Creek	Cannery Creek	pink chum	108,000,000 487,000
Gulkana	Gulkana River East Fork	sockeye	33,300,000
		sockeye	310,000
		chinook	13,400
Main Bay	Coghill	sockeye	11,100,000
PRINCE WILLIAM SOUND		TOTAL	153,210,400
<u>COOK INLET</u>			
Big Lake	Meadow Creek	sockeye	20,400,000
	Big Lake	coho	3,000,000
	Little Susitna	coho	3,000,000
Elmendorf	Crooked Creek	chinook	1,290,000
	Ship Creek	chinook	135,000
	Ship Creek	coho	48,100
	Bear Creek	coho	284,000
Crooked Creek	Tustumena	sockeye	20,000,000
	Crooked Creek	steelhead	130,000

-Continued-

Table 3. Continued

Facility	Broodstock	Species	Eggs Taken
Ft. Richardson	Deshka River	chinook	218,000
	Montana Creek	chinook	121,000
	Ninilchik River	chinook	292,000
	Willow Creek	chinook	453,000
	Swanson River	rainbow	6,290,000
	Big Lake	rainbow	876,000
	Fleming Spit	coho	208,000
	Anchor River	steelhead	49,000
Tutka	Tutka Lagoon	chum	15,250,000
	Westside Creek	pink	4,500,000
Trail Lakes	Crooked Creek	coho	722,000
	Hidden Lake	sockeye	7,060,000
	Crooked Creek	coho	815,000
	Packers Lake	sockeye	4,000,000
	COOK INLET	TOTAL	89,141,100
KODIAK & AK. PENINSULA			
Kitoi Bay	Kitoi Bay	pink	97,400,000
	Kitoi Bay	chum	6,140,000
	Kitoi Bay	coho	600,000
	KODIAK & AK. PENINSULA	TOTAL	104,140,000
ARCTIC-YUKON-KUSKOKWIM			
Clear	Moose Lake	grayling	2,580,000
	Good Paster River	grayling	220,000
	Wood Creek	coho	652,000
	Swanson River	rainbow	1,810,000
	Wood River	arctic char	167,014
	Paxson Lake	lake trout	89,100
	Broodstock	sheefish	1,390,879
Sikusuilag	Noatak River	chum	4,140,000
	ARCTIC-YUKON-KUSKOKWIM	TOTAL	11,048,993
Egg Totals by Species:			
	Chinook:		11,604,400
	Chum:		153,367,000
	Coho:		11,830,100
	Pink:		209,900,000
	Sockeye:		104,457,000
	Grayling:		2,800,000
	Rainbow:		8,976,000
	Steelhead:		398,000
	Lake Trout:		89,100
	Arctic Char:		167,014
	Sheefish		1,390,879
	STATE TOTAL:		504,979,493

PROGRAM PROJECTIONS FOR 1988

The FRED Division utilizes many strategies for rehabilitation, enhancement, and development of fisheries other than hatcheries. Several of these strategies, including operation of fish ladders to allow salmon to reach unutilized spawning areas, lake fertilization, habitat improvement, and fish-planting programs are much more difficult to evaluate than standard hatchery production. With lake fertilization and fish-planting projects, tagging and use of sonar fish counters, allows for evaluation, often on a par with hatchery evaluation, but at a much greater cost. Fish ladders and habitat improvement projects are difficult to evaluate; i.e., estimate the increased number of fish attributable to the project. In many cases, if evaluation is biologically feasible, it is cost prohibitive. 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 reason, the forecast values shown in Tables 4 and 5 are based only on hatchery production. This, however, is a gross underestimation of actual FRED production.

The numbers of salmon that returned in 1987 as a result of FRED hatchery operations met or exceeded many of the projected values. The obverse was equally true; some of the projected values were not met. In Southeast, chinook salmon returns exceeded the projected 15,000 by nearly 30%, while only 50% of the projected coho salmon actually returned. Approximately 80% of the projected chum salmon returned. Pink salmon returned in numbers nearly as expected to the Prince William Sound facilities. At Tutka, the total pink salmon run was very low. The hatchery had its lowest marine survival and return ever, while the natural stocks also were extremely low. Sikusuilaq Hatchery had 93% of its projected return of chum salmon when natural chum salmon stocks in Kotzebue Sound hit all-time lows.

Projected Returns for 1988

A statewide total of over 7 million salmon is expected to return in 1988 from prior releases of hatchery fish (Table 4). This is a decrease of approximately 0.5 million fish from the number projected to return in 1987. This decrease is largely due to: changing emphasis from pink and chum salmon to coho, sockeye, and chinook salmon; effects of decreasing revenues; and severe climatic conditions that have potentially affected certain pink and coho salmon runs.

Although the projection is about 1 million fish less than last year, pink salmon again comprise the largest segment of the projected returns in 1988. Major contributions will be made to the Prince William Sound, Kodiak, and lower Cook Inlet fisheries. As reflected in the estimate of slightly over 4 million returning pink salmon, the outlook for some of the 1988 pink salmon returns is not as bright as in past years.

Both sockeye and chum salmon are projected to return at levels exceeding 1 million fish in 1988. Sockeye salmon returns will be from numerous lake-stocking projects, including Tustumena, Hidden, Culross, Leisure, Seldovia, and Karluk Lakes. Chum salmon production will be centered around Hidden Falls, Klawock, Snettisham, Main Bay, and Russell Creek Hatcheries.

Hatchery returns of chinook salmon continue to increase dramatically with projections of 1988 returns at over 65,000 fish, compared to the 40,000 projected for 1987. Crystal Lake Hatchery in Petersburg is projected to continue to be among the top chinook salmon producers in the state. Cook Inlet, with its many stream-stocking programs designed to produce sport fisheries, is projected to produce approximately two-thirds of the chinook salmon returning to FRED facilities in 1988. Klawock Hatchery is again expected to produce the most coho salmon of any FRED facility in 1988, with the Southeast Region nudging Cook Inlet in total coho salmon production.

Hatchery Objectives for Fiscal Year 1989

FRED Division has prepared a budget request for FY 89 that reflects an innovative plan for continuing levels of production from the most outstanding hatcheries that are now under state operation, while allowing General Fund dollars to be reallocated within the FRED program to bring other facilities up to maximal capacity and more efficient operation. This plan will entail contracting to the private sector operations, partially or totally, of four of the facilities that FRED Division has brought to efficient, productive operation. These hatcheries include Hidden Falls, Cannery Creek, Kitoi Bay, and Trail Lakes. The former two facilities will be completely transferred, operationally, while the latter pair will have a portion of their operations funded by the private sector.

Funds freed by this series of operational transfers will be used to augment chum salmon production at Snettisham Hatchery by 75 million eggs, which will bring that facility to greater than design capacity and will have a tremendous impact on chum salmon production in Southeast. Some of these freed funds will be used to enhance sockeye salmon projects across the state, and to run Tutka Hatchery at full bore.

The primary objective of the FRED Division program in FY 89 is to institute a program that will allow for more efficient operation and maximum production of all its facilities, while continuing its contributions to all aspects of the statewide fisheries enhancement program. Economic studies completed during 1987 revealed that full funding of FRED Division hatcheries in FY 89 would result in jobs for over 850 Alaskans and \$27 million in resident wages and income. This is 2-4 times the level of impacts that would result from an equivalent expenditure from other state operating or capital budgets.

Table 4. A projection of the number of salmon expected to return in 1988 as a result of FRED hatcheries and projects (excluding fishways).

Return site	Chinook	Coho	Numbers by species Sockeye	Chum	Pink	Steelhead
SOUTHEAST						
Crystal Lake	13,450	21,250	---	---	---	75
Ohmer Creek	1,645	---	---	---	---	---
Irish Creek	---	5,000	---	---	---	---
Petersburg	---	250	---	---	---	---
Deer Mountain	1,623	---	---	---	---	---
Hidden Falls	1,550	---	---	478,000	---	---
Klawock	---	77,000	---	382,500	---	3,000
Snettisham	1,855	6,000	---	92,000	---	---
Indian Lake	---	1,650	---	---	---	---
Earl West Cove	590	---	---	---	---	---
Farragut River	1,050	---	---	---	---	---
Brennan Lake	1,046	---	---	---	---	---
Bold Island Lakes	280	---	---	---	---	---
Tunga Inlet	---	11,700	---	---	---	---
Ward Creek	---	---	---	---	---	2,000
Juneau/DJ	---	2,000	---	---	---	---
Chilkat Ponds	---	1,250	---	---	---	---
Marx Creek	---	---	---	100,000	---	---
Badger/Bakewell	---	---	1,850	---	---	---
Hugh Smith Lake	---	---	---	---	---	---
McDonald Lake	---	---	---	---	---	---
AREA TOTALS:	23,089	126,100	1,850	1,052,500	0	5,075
PRINCE WILLIAM SOUND						
Cannery Creek	---	---	---	---	1,700,000	---
Cordova	---	2,900	---	---	---	---
Culross Lake	---	500	---	---	---	---
Gulkana	---	---	118,000	---	---	---
Main Bay	---	---	---	197,000	---	---
Whittier	1,000	2,000	---	---	---	---
Valdez	---	500	---	---	---	---
Surprise Cove	---	200	---	---	---	---
AREA TOTALS:	1,000	5,400	118,000	197,000	1,700,000	0
COOK INLET						
Big Lake	---	10,620	124,400	---	---	---
Cottonwood Drainage	---	34,590	---	---	---	---
Willow Creek	23,890	---	---	---	---	---
Little Susitna	---	39,160	---	---	---	---
Crooked Creek	8,000	2,600	---	---	---	600
Chenik Lake	---	---	100,000	---	---	---
Tustumena	---	---	360,000	---	---	---
Grant Lake	---	2,000	---	---	---	---
Six Mile Creek	2,500	2,000	---	---	---	---
Hidden Lake	---	---	121,500	---	---	---
Tutka	---	---	---	1,300	650,000	---
Halibut Cove	2,600	---	---	---	125,000	---
Homer Spit	3,200	---	---	---	11,800	---
Leisure Lake	---	---	86,900	---	---	---
Seldovia Lake	200	1,200	---	---	---	---
Caribou Lake	---	1,500	---	---	---	---
Resurrection Bay	2,700	15,000	---	---	---	---
Caswell Creek	---	3,177	---	---	---	---
Ingram Creek	---	500	---	---	1,000	---
AREA TOTALS:	43,090	112,347	792,800	1,300	787,800	600

-Continued-

Table 4. Continued

Numbers by species						
Return site	Chinook	Coho	Sockeye	Chum	Pink	Steelhead
KODIAK-AK. PENINSULA						
Karluk	--	--	118,000	--	--	--
Kitoi	173	--	--	10,000	1,693,000	--
Kodiak Lakes	--	5,550	--	--	--	--
Russell Creek	--	--	--	216,000	--	--
AREA TOTALS:	173	5,550	118,000	226,000	1,693,000	0
ARCTIC-YUKON-KUSKOKWIM						
Clear	105	1,000	--	9,640	--	--
Sikusuilag	--	--	--	11,360	--	--
AREA TOTALS:	105	1,000	0	21,000	0	0
STATE TOTALS:	67,457	250,397	1,030,650	1,497,800	4,180,800	5,675
	GRAND TOTAL:		7,032,779			

Table 5. Production potential for FRED hatcheries in Fiscal Year 1989.

Species	1988 Egg take objectives a/	Expected adult returns from 1988 eggs b/
Sockeye Salmon	147,132,581	2,870,600
Chum Salmon	207,400,000	4,402,717
Pink Salmon	248,480,031	5,949,219
Chinook Salmon	13,184,796	264,752
Coho Salmon	14,637,606	514,325
Steelhead Trout	474,000	11,418
Rainbow Trout	5,471,908	3,321,204
Grayling	1,841,667	116,000
Sheefish	400,000	50,000
Lake Trout	62,500	25,000
TOTAL	639,085,089	17,525,235

a/ Assumes funding of FRED Division at full request.

b/ These adults will return over several years, beginning in 1990.

TECHNOLOGY AND DEVELOPMENT

Sockeye salmon has been at the fore of activities during the past year. The FRED Division leads the world in the culture and lake-rearing dynamics of this species. The Chief of Technology and Development teamed with the PNP Hatchery Program manager and led the sockeye salmon enhancement planning for all of southeast Alaska last winter. Out of this effort came consensus that a central incubation facility for sockeye salmon should be constructed at the existing Snettisham Hatchery. Completion of this construction project will allow the application of sockeye salmon enhancement technology in northern southeast Alaska.

Lake enrichment and investigations into rearing dynamics of sockeye salmon are resulting in significant increases in numbers of sockeye salmon to the commercial fisheries. Next year, these two thrusts will account for an additional 1,183,000 sockeye salmon to various fisheries around the state. At approximately \$10 per fish, this equals \$11 million. Comparing this amount to the total costs for these technical programs yields an approximate benefit/cost ratio of 29:1! A great investment.

Considerable time and effort was spent on instilling new awareness and appreciation for safety in our laboratories. Industrial hygienists from the Department of Labor provided us with their services. Each lab was inspected, evaluated, and then modified to bring it into compliance with acknowledged safety procedures and practices. This will be an ongoing effort.

A very bold step was taken last spring when the division decided to convert Main Bay Hatchery to a sockeye salmon smolt production facility. This is the very first attempt, anywhere, anytime, to extend the culture process through to the smolt stage, while all-the-while holding the animals in fresh water. This experiment has attendant risks, but the rewards that might accrue, if it proves workable, are very great. So far, all the fish being held are okay.

Coded-Wire Tag Laboratory

In 1987, the Coded-Wire Tag (CWT) Laboratory processed approximately 31,000 marked fish from throughout the state. This total is approximately 5,000 more heads than were processed in 1986. As in years past, the majority of these fish came from southeast Alaska's commercial fishery sampling program. A dramatic increase was seen in the number of heads received from areas outside Southeast--4,500 heads were received from Prince William Sound's commercial fishery sampling program. In 1986, 6% of the heads received were from outside Southeast. This year, over 25% were caught north of Yakutat. The number of heads processed by the lab from each sample source is the following:

<u>SAMPLE SOURCE</u>	<u>NUMBER</u>	<u>% OF TOTAL</u>
Commercial	21,934	71
Cost Recovery	1,641	5
Escapement Survey	422	1
Rack Return	5,140	17
Sport	1,785	6
Subsistence	65	<1
Test Fishery	<u>13</u>	<1
TOTAL	31,000	

Again, this year all heads from commercial and sport fisheries were processed within one week of head receipt at the lab. A new in-season catch estimation program was written by the Commercial Fisheries Division on the CWT Laboratory's computer. Catch estimates were entered directly into the system by area biologists. Catch estimates combined with sampling information and tag-code data permitted more complete calculations of contributions to southeast Alaska's commercial fisheries every time data were updated. Entry of sampling information and tag-code data never fell behind entry of the catch statistics for the same week. Fishery managers were able to access this information and use it for in-season management purposes. The information provided by the lab permitted the department to take in-season advantage of the "add-on provision" of the U.S./Canada Pacific Salmon Treaty.

The CWT database is accessible to many on-line users. The lab continued to generate and print several of the 28 standard production reports each week. These reports were widely distributed to state, federal, and PNP personnel. Also processed were approximately 400 ad hoc requests for information. In the future, more people will be introduced to the on-line ad hoc reporting capabilities to the computer system. Over 1,700 letters were sent to individual sport fishermen who caught an adipose-clipped fish in Alaskan waters. Prior to the end of the year, letters will be sent to every commercial fisherman who participated in the CWT recovery program.

As a member of a Pacific Salmon Commission's Working Group on CWT Data Sharing, Bill Johnson, programmer/analyst at the lab, took a very active role in defining the standards for coastwide CWT data. A great deal of time and energy has been expended to evaluate options and recommend a system for sharing data coastwide. As part of its commitment to this process, the CWT Laboratory has retrofitted its database to comply with coastwide requirements.

This year for the first time, the CWT Laboratory reported all statewide CWT releases to the Pacific Marine Fisheries Commission (PMFC) on magnetic tape. This was a major advancement. The file for Alaskan releases has been greatly expanded to include detailed release information for each group of fish tagged in Alaska. This more detailed information can include comments

about the experimental design, description of the type of experiment, specific release dates, name of the project leader, and other details not easily accessible in the past. Detailed tagging and release records now exist for tagged fish released in 1986 and 1987. Similar information for recent years prior to 1986 will eventually be added.

By the end of the year, we hope to have converted all recovery data accumulated since 1980 into identical formats. As soon as 1985 recovery data are reformatted, all recovery data for years 1980 through 1987 will be accessible by identical programs.

Limnology/Lake Fertilization

Since January 1987, the Limnology Laboratory has conducted nearly 30,000 individual analyses of water quality and zooplankton samples collected from lakes statewide. In addition to laboratory services provided to various state and federal agencies and PNP groups for the analysis of lake and hatchery water samples, the lab has contracted work from the City of Juneau for the chemical analysis of 'wetlands' samples and from Woodward-Clyde Consultants for the analysis of low-level nitrogen and phosphorus as part of a hydrocarbon treatability study. As in the past, quality assurance was maintained by participation in the U.S. Geological Survey Standard Water Reference Program.

Eight lakes across the state were fertilized. Limnology surveys in support of fertilization and/or stocking were completed on 40 lakes. Hydroacoustic surveys of numbers of rearing juveniles has, in most cases, replaced smolt weirs and emigrant smolt counting. Thirty-six hydroacoustic surveys were completed on 22 lakes during the past year.

All of the projects conducted are cooperative. That is, each one shares project funding, responsibilities, and manpower with other agencies and/or other divisions within the department. None of the projects, including the laboratory, could or would have operated on General Fund monies alone. Highlights from several projects follow.

Highlights:

McDonald Lake: This year, we installed ten 2,200-gallon fertilizer storage tanks and 2,600 feet of pipeline to allow us to pump fertilizer from a tidewater location to the lake, thereby avoiding the use of expensive helicopter time. This arrangement also allows us to store enough fertilizer for two seasons, further reducing transport charges. However, the big news is the total production of returning adults. This is the first return year where all adults were reared as juveniles under fertilized conditions, and it is the highest return on record--200,000 fish. We also evaluated the use of in-lake incubators, since conditions were ideal for this type of experiment.

Klawock Lake: We coded-wire-tagged 20,000 'wild' sockeye salmon smolts this spring, as well as completed the limnological and hydroacoustic surveys.

Badger Lake: We coded-wire-tagged 13,000 planted sockeye salmon smolts and 5,000 'wild' coho salmon smolts this spring. In addition, we completed the required limnological and hydroacoustic surveys.

Karluk Lake: "Unbelievable." That is and was the description of the massive numbers of emigrating smolts from Karluk Lake this spring. For the first time in the long history of Karluk Lake sockeye salmon, we may have finally been able to align smolt emigrations to numbers of parent-year spawners. This is the second year of the fertilization program and the first year age-two smolts have been reared under fertilized conditions.

Leisure Lake: This year's smolt emigration totaled nearly 1 million sockeye salmon for an all-time record. That is, the number of smolts produced after fertilization was nearly four-fold greater than that achieved prior to nutrient enrichment at equal stocking densities.

Packers Lake: Because of the excess forage produced by the lake enrichment program, an egg take was held for the first time this fall to produce fry to plant in the lake. As Packers Lake has become spawning-area limited, the higher numbers of fry achieved via the hatchery program will begin to match the lake's expanded carrying capacity.

Mountain-Situk Lakes: Our preliminary evaluation of the rearing environment of these two systems suggests that the escapement goal of 90,000 to 100,000 adults is too high. The number of rearing fry produced from escapements of this magnitude appear to be overwhelming the rearing capacity. Our density-dependent rearing model suggests that escapements in the 40,000 to 45,000 range would be more appropriate.

Tatsamenie Lake: We began our preliminary evaluation of the rearing area quality of this large Canadian lake. Our data suggest that the lake suffers from a lack of spawners or spawning area. In contrast, the rearing capacity appears to be of high quality, as the plankton are abundant and undergrazed.

Redoubt Lake: Considerable effort was spent this spring modifying the smolt/adult weir on this lake. Our efforts appear to be successful; however, there appear to be some problems when the outflow of the lake is very low. The sockeye salmon smolt sizes continue to exceed those measured prior to the lake enrichment program. Such increases in smolt size suggest that both freshwater and marine survivals have increased, leading to more adult production.

Pathology Laboratory

During 1987, the pathology staff handled 168 cases (requests for analytical services) and conducted approximately 15,500 individual laboratory procedures in support of this case work. Inspections were conducted at 43 fish hatcheries across the state, and 128 requests for the movement of fish for aquaculture purposes were reviewed.

The duties of the statewide Fish Pathology Review Committee have been completed. Alaska statutes and fish-disease policies have been revised with several changes recommended as specified in a written document, part of which will be sent to the Board of Fisheries for consideration. This document is the result of a major effort on the part of the committee, taking approximately 2.5 years to complete.

This past year saw the opening of a badly needed Pathology Laboratory in Juneau (in addition to the Anchorage facility). A hatchery building on the shores of Twin Lakes in Juneau was purchased from the Northern Southeast Regional Aquaculture Association and remodeled to accommodate a finfish/shellfish pathology laboratory. The lab was completed in early April 1987 and operational by the end of July. The building contains 2,000 square feet and is equipped to provide diagnostic service in all disciplines of aquatic animal medicine, including virology, bacteriology, serology (fluorescent antibody testing and Enzyme Linked Immunoabsorbent Assay (ELISA)), parasitology, histology, and ultrastructural studies involving preparation of case material for viewing with transmission electron microscopy.

This lab will serve two purposes: (1) to accommodate the logistical problem of obtaining quality samples from the many Southeast finfish and shellfish facilities requiring diagnostic service; and (2) to provide a training facility for graduate students from the University of Alaska-Southeast in the field of aquatic animal pathology. An integral part of this concept was the establishment of a joint fish pathologist position by FRED Division and the University. This professional will spend 5 months at the University as a faculty member and 7 months in the FRED Southeast laboratory as a fish pathologist. Graduate students will have access to the Pathology Laboratory through the split-appointment faculty member. This position has been filled and is on line for FY 88.

Additionally, during 1987 the fish pathology staff set in place a statewide infectious hematopoietic necrosis virus (IHNV) control monitoring and evaluation program. The outline of this program is provided below.

I. Five Major Objectives

1. Establish a database for IHNV in Alaskan sockeye salmon.

2. Maintain and improve upon the sockeye salmon policy regarding egg takes, incubation, and rearing.
3. Yearly monitoring of IHNV prevalence and titers in broodstock.
4. Rapid diagnosis and containment of IHNV outbreaks within any salmonid species at production facilities.
5. IHNV research.

II. IHNV Database

1. Three hundred fifty-two entries encompassing 83 stocks from 1973 to present. Represents over 20,000 virus assays.
2. Database average percent prevalence IHNV = 32.3%, geometric mean titer = 7.5×10^5 .
3. IHNV has been detected in all broodstocks.
4. Prevalences range from 0% to 100% in the ripe or post-spawning female fish.
5. Identification of high-risk sockeye salmon stocks.

III. Sockeye Salmon Policy in Effect - Prophylaxis

1. IHNV-free water source for incubation and rearing.
2. Stringent disinfection procedures regarding utensils, facilities, field clothing, personnel, and external surfaces of brood fish.
3. Stringent external egg disinfection and water hardening in iodophor for 60 minutes after fertilization.
4. As much compartmentalization as possible of egg lots and fry during incubation and rearing phases.

IV. Yearly Monitoring of IHNV in Broodstocks

1. Routine samples of ovarian fluids from 60 ripe female fish used in the egg take; reflects the amount of virus brought into the facilities.
2. Prevalence and titer is determined and added to the database.
3. Ovarian fluids from post-spawning fish are used to establish a disease history on a new stock.

V. Fish Health Service to Diagnose IHNV Outbreaks in Fry

1. Representative samples of fry are submitted for at least two five-fish pools for each lot or incubator of affected fish. Test may take from 2 to 5 days for positive cultures to appear (longer in subclinical cases).
2. Clinical signs of preemergence, hemorrhage, coagulated yolks, cephalic bumps, and/or significant mortality are presumptive of IHNV. If these signs occur, fish are often destroyed to contain an outbreak before virus confirmation is completed.
3. Virus confirmation results in destruction of affected lots if not destroyed already.

VI. Research

1. Examination of IHNV titers and prevalence in selected broodstocks.
 - a. Prevalence and titers in post-spawned vs. ripe females.
 - b. Variations of prevalence and titers in female ripe and post-spawned fish throughout the course of the run.
 - c. Variations of prevalence and titers in female fish from year-to-year.
 - d. Variations of prevalence and titers in male vs. female fish--the role of males in IHNV transmission.
 - e. Variations of prevalence and titers of seminal fluids vs. organs in male fish. Which sample type to use for assays and what is the significance to the egg take regarding virus levels in the hatchery?
 - f. Results may not apply to all stocks.
2. Examination of the ELISA as a new method for more rapid and sensitive detection of IHNV.

FRED Division sockeye salmon policies and disease monitoring were able to contain fry losses due to IHNV to only 5.7 million sockeye salmon from a total of 100 million eggs incubated. The Pathology Laboratory has results from the FY 87 samples for the research portion of the program and has the second set of samples for this year in hand. Three years of samples are planned on which to draw some conclusions on the questions proposed in the summary.

The second annual IHN Virus Workshop was held at Big Lake Hatchery. Thirty-four attendees dealt with the newest techniques of virus disease control, the historic importance of sockeye salmon, fish culture improvements with that species, chemical use, and 1986/1987 screening results.

Miscellaneous accomplishments include:

1. Preliminary establishment of a sheefish cell line by Jill Follett. This work will be in partial fulfillment for her Master's Degree at the University of Alaska-Anchorage.
2. Additional "bitter crab" research continues regarding distribution of the disease in Alaskan Tanner crab populations. Laboratory experiments conducted at the National Marine Fisheries Service's Auke Bay Laboratory have been successful in transmitting the disease (parenterally) to uninfected Tanner crabs, but not to the red king crab. A publication summarizing all the work to date is in press in the journal, "Diseases of Aquatic Organisms."
3. The Fish Health Services Program has developed the capability to perform a new diagnostic assay for bacterial kidney disease (BKD) known as the ELISA. To this end, three pieces of necessary ELISA equipment have been purchased and installed in the new Juneau Fish Pathology Laboratory. Because ELISA is routinely done in the Seattle Fish and Wildlife Service Laboratory, two of their scientists pioneering the work with BKD were invited to the Juneau lab. For 2 days these people trained Pathology Laboratory personnel on our own equipment using kidney samples from Alaskan fish stocks. The workshop was very successful in identifying the nuances of the assay and emphasized the greater degree of sensitivity and rapidity of detection possible when compared to the fluorescent antibody technique (FAT) now used. FRED pathology will continue to use FAT in the future, but eventually only as a cross-check against the ELISA assay and for smaller sample numbers that are not practical for ELISA testing.

We are on the cutting edge of BKD diagnostics and have laid the groundwork for a very valuable cooperative relationship in fish disease work with the U.S. Fish and Wildlife Service's Sand Point Laboratory in Seattle.

Biology/Fish Culture

During 1987, this office was heavily involved in biological and fish cultural research--the goal being to increase the efficiency

by which additional fish are produced for harvest. Much time was spent on the continuing studies and refinements of the Alaskan-produced fish feed, Alaska Dry Pellet (ADP), research proposals and report generation, data analysis, review of hatchery methods, and locating remote sites to release hatchery-produced fish.

The following are some of the accomplishments for 1987:

Fish Food (ADP): Use of this Alaskan-made fish feed increased in 1987 with excellent results in most cases. This was the first year that substantial amounts of ADP were used by PNP fish culturists who were very satisfied with the results. The volume now used is economically viable for the manufacturer, and with the potential increase in sales during the next few years, a possibility exists that an additional feed plant will be built in Petersburg to supply southeast Alaska hatcheries. This would allow substantial savings in shipping costs and result in lower operational costs for hatcheries.

A report summarizing state and PNP experience with feeding the various available fish feeds was completed and sent to all hatchery management staff. With this information, managers could compare results to determine if their operations were as efficient as possible.

In two out of three cases, ADP-fed chinook salmon juveniles have returned at higher rates than those fed an imported diet (Oregon Moist Pellet (OMP)). In the third case, there appears to be no difference in survival.

A serious latent mortality problem with rainbow trout in previous years appears to have been greatly reduced. The improvement is coincident with a change in diet from OMP to either ADP or a diet imported from Oregon.

Analysis of the cost of feeding OMP or ADP at six Southcentral Region II FRED Division hatcheries indicates that up to \$130,000 per year could be saved by switching entirely to ADP. This does not include its use for pink salmon, which requires additional research.

Reports: A record number of reports were reviewed, edited, and completed. The larger volume was due largely to the reporting requirements of Dingell-Johnson (D-J) projects performed by FRED Division. Federal D-J coordinators twice commended the division for the quality of its reports.

Hatchery Production Efficiency: Years of data were analyzed and the results presented at the 1987 Northeast Pacific Pink and Chum Salmon Workshop in a report entitled, "Benefit-Cost Differences Caused by the Effects of Rearing and Time of Release of Hatchery-Produced Pink and Chum Salmon." This was the first time all the available data were brought together in an attempt to identify the most efficient operational methods for hatcheries to use.

To increase efficiency of chum salmon production by the Snettisham Hatchery, potential sites for remote releases of chum salmon juveniles were surveyed and evaluated. This was a task that was accomplished only by a concerted interdivisional effort.

Analysis of data indicate that the King Salmon River stock of chinook salmon released from Snettisham Hatchery are harvested at a much higher rate in the Juneau and adjacent areas than the Andrew Creek chinook salmon strain also released at Port Snettisham. This information corroborates the decision to change from the Andrew Creek strain to the King Salmon River strain. A telephone census immediately after the 1987 Golden North Salmon Derby produced information indicating that these and other state hatchery stocks produced fish winning 32 out of the 100 prizes.

Other Accomplishments: A database of statewide survivals of hatchery fish was completed after reviewing the results of a questionnaire. Approximately 140 fish transport permits were reviewed, all project plans were reviewed and altered so that they more logically reflected the work to be done and the best methods to use, a computer program was modified so that PCs could be used to estimate water and space needs for hatchery production, new specifications for the ADP contract awarded this year were written and, finally, a document on mariculture, regional fishery plans, an economic model of enhancement projects, mariculture regulations, and pathology policy were reviewed and edited by this office.

New findings by other FRED Division biologists include the following:

Imprinting: The return of adult chinook salmon to a Homer Spit lagoon provided conclusive evidence that chinook salmon smolts will imprint to a saltwater lagoon having no surface stream entering it.

Smoltification: A new device to more easily measure blood salt concentrations was successfully tested. Blood-sodium analyses have proven their value as demonstrated by the observed correlations of blood-sodium concentrations to chinook salmon smolt survival and growth in marine pens. Presumably, the use of these tests are also resulting in increased survival of chinook and coho salmon smolts released from FRED Division hatcheries.

Smolt Age vs. Survival: Results to date indicate that, in southeast Alaska, chinook salmon juveniles released during their first year of rearing (zero-check) return as adults at rates usually less than 1% of those released. This means that with present technology and methodology, release of yearling smolts in Southeast is probably the most effective strategy. This does not apply to southcentral Alaska, where heated water is used to produce zero-check smolts as large or larger than yearling smolts in Southeast.

Genetics Laboratory

The Genetic Selection Program initiated in 1986 at the Rainbow Trout Broodstock Development Center at Fort Richardson Hatchery continued with the 1987 egg takes. The goal of this program is the production of 2-gram fingerlings for release by mid-July. These production goals have been established as optimal by Sport Fish Division field studies. To reach this goal, fish are being selected for characteristics related to growth and survival. Efforts are also underway to shift spawning time from early May to early March through genetic selection. Earlier spawning will allow a longer period of development and growth for fry to reach the target size by mid-July. Field tests have indicated that these larger fish released earlier will result in better survivals and, consequently, provide more fish to the sport anglers.

Fertility studies were conducted at the Broodstock Development Center in 1987. The purpose of these studies is to determine if early egg and fry mortalities are attributable to either the male or the female parent. This study should also give insight into the question of whether these early mortalities are the result of genetic or environmental factors.

Tissue samples were again collected from sockeye salmon spawning in seven Tustumena Lake tributaries. The purpose of this study is to determine if genetic differences can be detected between these spawning populations. The U.S. Fish and Wildlife Service is concerned that the division's enhancement program may eliminate possible stock differences. Results are not yet available.

Economics

The fish hatcheries and other enhancement activities of the FRED Division and of the PNP hatchery system have been the subject of a variety of economic studies designed to determine the economic consequences of the program. These economic studies have been undertaken to ensure that maximal social and economic benefits are derived from the state's investment in the extensive application of salmon enhancement technology.

Of the collection of public investments available to Alaska, salmon enhancement is one of the very few that improves the level of economic activity in the state by expanding the total output of the economy. Dollars invested in salmon enhancement and rehabilitation improved economic return as well as positive impacts that were produced by increasing the level of economic activity. Preliminary studies undertaken by ADF&G indicate that the FRED program is having significant net benefits and impacts not only in the salmon industry, but throughout the regional economies of Alaska.

Current estimates by officials of ADF&G suggest that the program will ultimately generate net state benefits of \$90 million (over a 25-year period) for the commercial fishery portion of the

program (in 1984 dollars). This results in an overall benefit/cost ratio of 1.4:1. This means that \$1.40 in fish values will be generated for each \$1.00 expended, measuring all benefits and costs in dollars of equal value and discounting them as required to take into account the time at which they occur.

Decision makers are often interested in how fisheries investments, or management policy, may affect economic stability or economic development in various regions of the state. Economic impact models are often used to determine the economic development that would occur from a change in gross sales of fisheries products from such activities as an increase in catch or change in market prices. These economic impact models approximate the local economics by expressing economic relationships among business sectors of the economy. In 1986, this new analytical procedure was applied to the state's fishery enhancement program to aid in the planning and budgeting process. This was a first-of-its-kind project analysis of resident employment resulting from the state's investments in salmon ranching. The model was designed and contracted through a cooperative effort with the Institute of Social and Economic Research (ISER).

The results of the studies project large personal income and employment impacts from the state-owned hatchery program. A recent simulation of the impacts of proposed FRED budgets for the FY 88 revealed that the full-funding request of \$10 million would result in the existence of over 850 resident jobs and \$27 million in resident wages and income. This is 2 to 4 times the level of impacts that result from other equivalent expenditures from the state operating or capital budget.

In 1987, the FRED Division began coordinating a new and greatly enhanced phase of the fishery enhancement impact analysis. The impact data collection and modeling effort has included the biological, fishery, and economic analysis of over 170 state enhancement projects (including the recreational fishery component), and PNP Program component. The endeavor includes four (completed) computer-generated databases that are used in the design (ongoing) of two new impact models. This analysis has involved a multiagency data collection effort, and coordination with FRED Division staff and the PNP Program, the Department of Commerce and Economic Development's enhancement loan office, the Sport Fish Division, and ISER (ISER is making some of the model revisions under contract).

The enhancements in the 1987 FRED impact model allow an improved resolution of direct impacts to the commercial fishery and processing sector in the Alaskan economy. The FY 89 budget impacts for FRED Division result in approximately \$35 million in personal resident income to Alaskans and over 1,000 jobs. The analysis of the PNP Program impacts resulting from brood year 1988 are preliminary at this time. The preliminary estimates project approximately \$40 million in personal income and 1,100 resident Alaskan jobs. Evaluation of the additional personal

income impacts of recreational fishery projects are to be completed early in 1988.

In 1987, the FRED economist has also served as economic advisor and conducted staff assignments on economic matters for an ongoing legislative intent assignment (known as the Enhancement Funding Work Group). Assistance was provided to the economic study efforts by other divisions within the department. The Division of Commercial Fisheries studied the full personal income and employment impacts of commercial fisheries in Alaska. Study of the impacts for the 1984 fishing year was carried out through a contract with ISER. This study included all major fisheries. The economist was also involved with the Southeast Recreational Fishing Economic Study (RFP), solicited by the Division of Sport Fish in 1987.

Mariculture

1987 saw the enactment of Senate Bill 294--a compromise bill that allowed for bivalve shellfish mariculture and placed a moratorium on finfish cage culture. FRED staff, working with others in ADF&G as well as with the Department of Natural Resources, the Department of Environmental Conservation, and the Governor's Division of Governmental Coordination, wrote regulations and permit procedures that will set the stage for mariculture of shellfish and sea vegetables.

In the meantime, interest in sea farming is growing. New farms are being started in southeast Alaska, Cook Inlet, Prince William Sound, and Kodiak. Focus at this time is on oysters and mussels, but development work is proceeding at several locations on scallops and giant kelp. An interesting phase of this program development is the formation of local citizens' groups directed at sea farming development for their part of Alaska. FRED Division is working closely with these groups, as well as with the industry's larger organization, "Alaska Mariculture Association."

The joint feasibility study done in cooperation with Japan's OFCF has yielded many scallops, but few of the target species, Weathervane scallops. As the study goes into year number two, goals will be to expand the sampling base and to examine the possibility of species alternative to the Weathervane.

Engineering

Minimal staff, combined with continual problem solving, kept the division's two engineers extremely busy during the past year. In southeast Alaska, the requirement for additional enhancement production viz a viz the U.S./Canada Pacific Salmon Treaty and the associated enhancement facility proposals occupied much of the time of the regional engineer. Other major projects completed include construction of duplex housing at Hidden Falls

Hatchery, completion of the studies on the Medvejie Creek Hatchery water supply, and construction of a float house for the Commercial Fisheries Division.

The regional engineer for Southcentral concentrated on installation of raceways at our northernmost facility--Sikusuilag Hatchery, completion of the heat exchange system at Fort Richardson Hatchery, and conversion of the Main Bay Hatchery to handle the production of sockeye salmon smolts.

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THE PRIVATE NONPROFIT HATCHERY PROGRAM

Background

The 1974 Alaska State Legislature authorized the Commissioner of ADF&G to issue permits to PNP corporations for the operation of salmon hatcheries for ocean ranching. The intent of the program was to allow private ownership of salmon hatcheries that would contribute to the state's salmon fisheries. The cost of constructing and operating these hatcheries was to be derived from the sale of a portion of the returning fish.

The PNP Program is administered by ADF&G, FRED Division, in cooperation with the department's fisheries management divisions, to carry out statutory and regulatory responsibilities pertaining to public and private aquaculture in Alaska.

The PNP Program is responsible for:

- o strategic salmon production planning;
- o administration of the permitting process for PNP salmon hatcheries, scientific/educational aquaculture programs, and private shellfish farms;
- o development of annual operations management plans for all public and private salmon hatcheries;
- o administration and coordination of the statewide fish transport permit system;
- o coordination of technical assistance to PNP hatcheries; and
- o coordinating the development of and ADF&G relations with qualified regional aquaculture associations.

Regional Associations

The 1976 Alaska State Legislature authorized creation of regional aquaculture associations by the Commissioner of ADF&G. 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. Bristol Bay Regional Aquaculture Association (BBRAA)
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 have been mandated in a formal charter from the Commissioner. The responsibilities of the RPTs in developing regional comprehensive salmon plans, including provisions for public involvement in the planning process, are described in regulations. 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 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.

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.

* Indicates inactive regional association

4. Prince William Sound

The Prince William Sound regional plans have been approved. 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 given primary consideration in this planning process.

6. Kodiak

The Kodiak regional plans have been approved and the RPT has proceeded into the plan-maintenance process.

7. Bristol Bay

The Bristol Bay RPT has completed the final draft of the comprehensive salmon plan for Bristol Bay. 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 fish habitat and effective management practices.

8. Lower Yukon/Kuskokwim

No formal salmon planning activities are presently occurring in the Lower Yukon/Kuskokwim region.

PNP Hatchery Funding

Since 1977, funding necessary for the implementation of salmon rehabilitation and enhancement activities by PNP corporations has been obtained primarily 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 1987. The maximal loan amount available for an individual project is \$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 rehab-

ilitation 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, loans related to PNP hatchery operations, or other rehabilitation and enhancement activities.

Table 6 presents cumulative state loans secured by corporations for capital construction and operations, cumulative enhancement funds returned to the regional aquaculture associations, and revenue generated during 1987 by corporate sales of returning hatchery fish. Through July 1987, \$54.5 million has been borrowed by PNP corporations. Another \$20.1 million has been generated through assessments. In 1987, PNP operators sold fish worth more than \$6.5 million to recover the cost of building and operating their hatcheries.

Program Implementation

The application procedures and standards for issuance of PNP salmon hatchery permits are defined by regulations issued in 1985.

These 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 the 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 that 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, 25 salmon hatchery permits have been issued, and 33 applications have been either denied or withdrawn. Eighteen of the permitted PNP hatcheries are in operation and 15 had returns of adult salmon during 1987. Currently, there are eight preliminary or final applications for PNP hatchery permits under consideration. In addition, 31 scientific/educational permits for PNP research projects or

school district aquaculture programs were issued in 1987 by the Commissioner. These permits are administered by the PNP Program.

Regulations and application forms for shellfish farm permits are in the final stage of development.

Locations of operational PNP programs and remote release sites are illustrated in Figures 7, 8, and 9.

Hatchery Production

In 1987, PNP corporations estimated that 19.1 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 PNP hatcheries were estimated by the operators to have contributed over 12.6 million pink salmon to the commercial fishery. SSRAA estimates its hatcheries at Neets Bay and Whitman Lake contributed over 280,000 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 common-property harvests of the 1987 return were over 13.4 million fish. This represents a 200% increase over 1986 in common-property harvests. 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 1987, fry and smolt releases increased to 461 million juvenile fish, an increase of over 80 million (or 21%) from 1986 levels (Table 14). 1987 egg takes for PNP hatcheries totaled over 868 million green eggs, up 346 million (or 66%) from 1986 levels. The largest egg take of 1987 was at Esther Lake Hatchery where over 314 million green pink, chum, coho, chinook, and sockeye salmon eggs were taken for incubation (Table 15). This was followed by the Valdez Fisheries Development Association's (VFDA) Solomon Gulch Hatchery with over 167 million pink, chum, and coho salmon eggs, and the PWSAC's Armin F. Koernig Hatchery with over 125 million pink salmon eggs. In southeast Alaska, the SSRAA took nearly 82 million eggs of all five species for its three hatcheries, and DIPAC took nearly 62 million pink, chum, and coho salmon eggs for its three facilities.

Significant progress was made in initiating hatchery-originated sockeye salmon production from PNP hatcheries. Releases of juvenile sockeye salmon totaled 750,000 in 1987. Sockeye salmon egg takes totaled 1.3 million eggs, an increase of 270,000 over 1986 levels. Significant increases in pink, chum, and coho

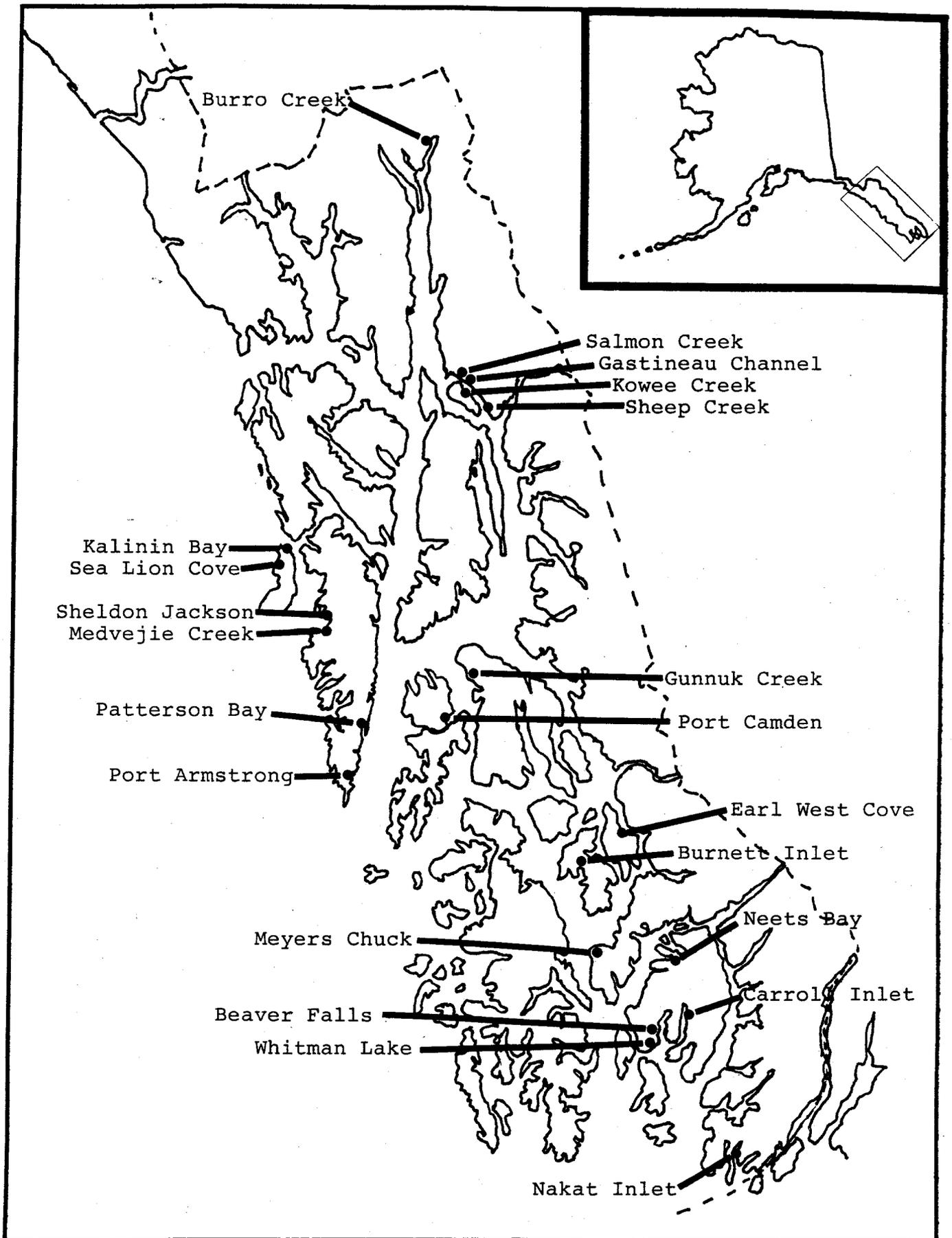


Figure 7. Locations of operational PNP hatcheries and remote release sites in southeast Alaska.

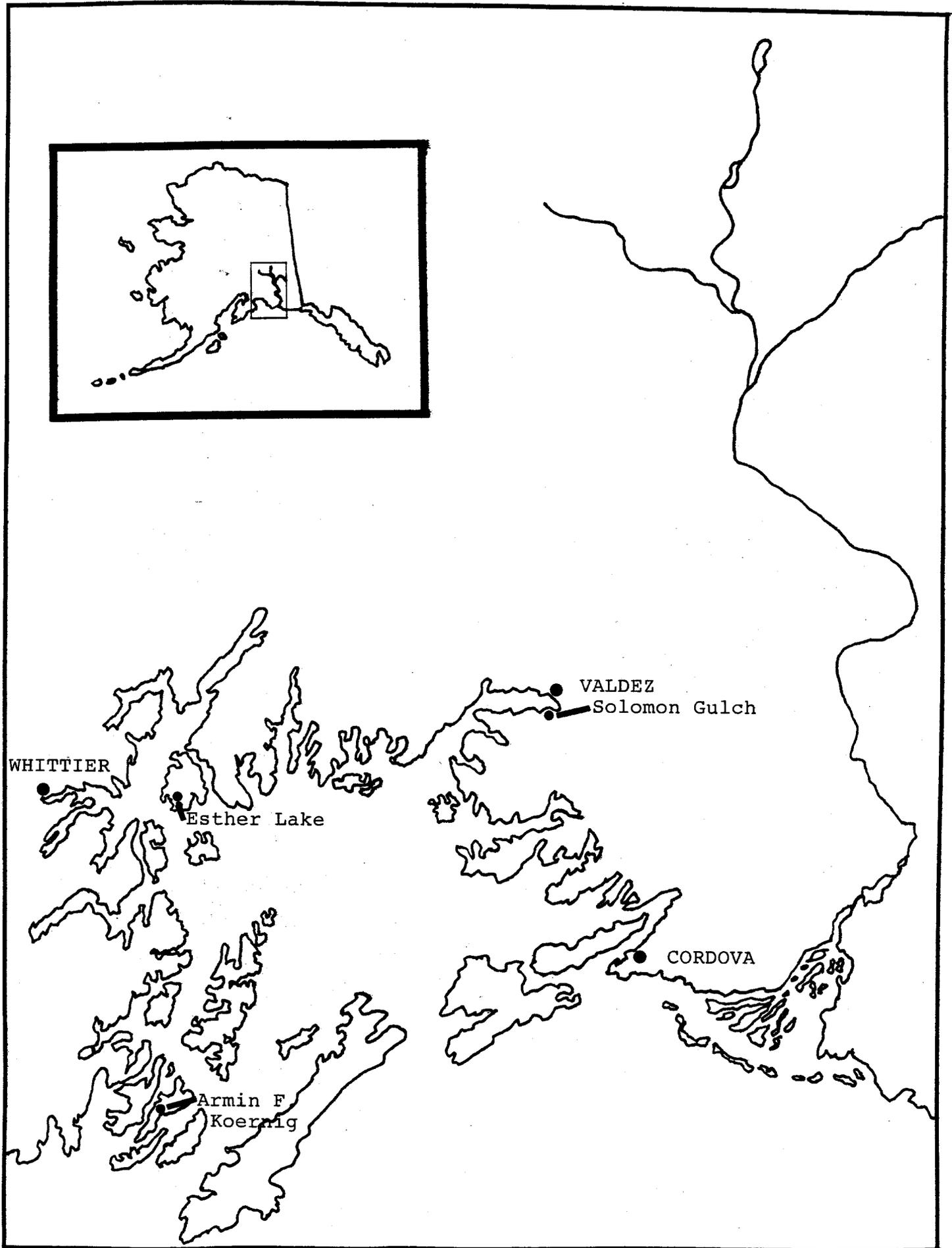


Figure 8. Locations of operational PNP hatcheries and remote release sites in Prince William Sound.

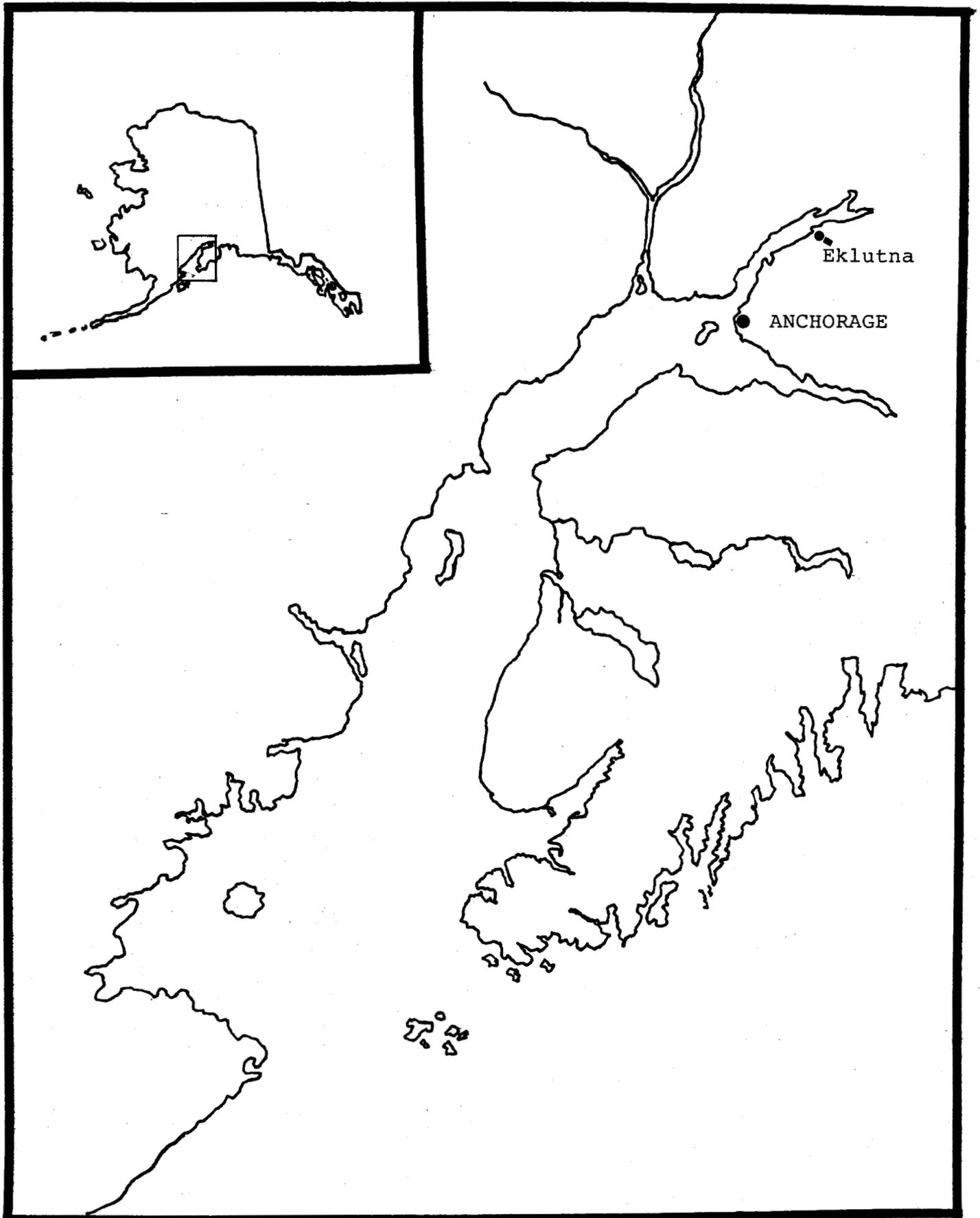


Figure 9. Location of operational PNP hatcheries in Cook Inlet.

salmon production also were made in 1987. Pink salmon egg takes increased by 293 million or 90% over 1986 levels as the Esther Lake, Solomon Gulch, and DIPAC facilities came up to capacity. Chum salmon egg takes increased by 53 million, or 29%, over 1986 levels; coho salmon egg takes increased by nearly 1.0 million, or 11%, over 1986 levels. Chinook salmon egg takes decreased for the first time in five years due to poor egg-take conditions in southeast Alaska.

Many PNP hatcheries are currently in the process of broodstock development and, consequently, have not reached their permitted capacities. Permitted capacities for PNP hatcheries now total over 1.26 billion eggs, an increase of over 129 million from 1986 levels (Table 16). Potential returns from statewide PNP hatchery-originated production at the 1.3 billion-egg level should exceed 20 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 52% of hatchery capacity is scheduled for pink salmon, 43% for chum salmon, and 5% for sockeye, coho, and chinook salmon.

For the 1988 season, projected returns to PNP facilities in southeast Alaska are expected to include approximately 43,000 chinook salmon, 240,000 coho salmon, 1,446,000 chum salmon, and 663,000 pink salmon, assuming standard survival conditions. Returns to PNP facilities in Prince William Sound are projected at 13,500,000 pink salmon, 343,000 chum salmon, and 14,500 coho salmon for 1988.

Significant hatchery special harvests are expected at the Armin F. Koernig, Esther Lake, Solomon Gulch, Sheldon Jackson College, Sheep Creek, Neets Bay, Port Armstrong, Burnett Inlet, and Medvejie Creek Hatcheries. Common-property terminal harvests by commercial gear groups are expected at the Neets Bay and Whitman Lake (Nakat Inlet, Carroll Inlet, and Earl West 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 1988 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 broodstock 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 6. Cumulative state loans and enhancement funds returned to associations (through July 31,1987), and annual fish sales for 20 private nonprofit (PNP) hatcheries (through Dec. 31, 1987).

Region/Corporation (number of permits)	State Loans		Cumulative Enhancement Funds Generated through Assessments, Returned to Associations via Contract	Estimated Revenue From 1987 Sales of Fish Returning to Special Harvest Areas
	For Capital Construction	For Operations		
SOUTHERN SOUTHEAST				
Southern Southeast Regional Aquaculture Association-SSRAA (2)	\$9,093,000.00	\$2,848,942.00	\$7,253,942.00 (note 1)	\$1,302,648.00
Alaska Aquaculture, Inc.-AAI (1)	\$1,053,285.00	\$1,601,208.00	N/A	\$140,246.20
Meyers Chuck Aquaculture Association-MCAA (1)	\$10,000.00	\$0.00	N/A	\$0.00
NORTHERN SOUTHEAST				
Northern Southeast Regional Aquaculture Association-NSRAA (2)	\$2,714,405.00	\$1,351,573.00	\$4,460,471.00 (note 1)	\$449,217.47
Armstrong-Keta, Inc.- AKI (1)	\$1,152,145.00	\$1,190,500.00	N/A	\$362,749.09
Burro Creek Farms, Inc.-BCF (1)	\$27,500.00	\$255,875.00	N/A	\$1,516.00
Douglas Island Pink and Chum Inc.-DIPAC (2)	\$843,000.00	\$1,782,000.00	N/A	\$415,146.14
Kake Nonprofit Fisheries Corp.-KNFC (1)	\$993,241.00	\$1,127,802.00	N/A	\$16,916.83
Sheldon Jackson College-SJC (1)	\$362,254.00	\$61,370.00	N/A	\$69,581.99
Tlingit and Haida Fisheries Development Corp.-THFDC (1)	\$1,464,000.00	\$89,860.00	N/A	\$0.00
PRINCE WILLIAM SOUND				
Prince William Sound Aquaculture Corp.-PWSAC (2)	\$17,638,539.00	\$1,085,500.00	\$4,450,639.00 (note 2)	\$2,391,068.96
Valdez Fisheries Development Assoc.-VFDA (1)	\$3,193,830.00	\$2,750,543.00	N/A	\$1,402,226.46
COOK INLET				
Cook Inlet Regional Aquaculture Assoc.-CIAA (1)	\$1,348,881.00	\$444,755.00	\$3,903,976.00 (note 3)	\$7,629.40
STATEWIDE TOTALS	\$39,894,080.00	\$14,589,928.00	\$20,069,028.00	\$6,558,946.54

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 from commercial fishermen.

Table 7. 1987 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		46,278	22,120	936	69,334	(note 1)
- Neets Bay		637,745	87,802	7,423	732,970	(note 1)
NSRAA - Salmon Creek	0	27,932	0		27,932	(note 1)
- Medvejie Creek		132,403	23,094	284	155,781	(note 1)
AAI - Burnett Inlet	192,848	13,691	323		206,862	(note 1&2)
A-K - Port Armstrong	289,775	101			289,876	(note 2)
BCF - Burro Creek	9,497	462			9,959	(note 2)
DIPAC - Sheep Creek	1,124,007	4,100	-		1,128,107	(note 3&4)
- Kowee Creek	24,750	7			24,757	(note 3)
KNFC - Gunnuk Creek	56,222	417			56,639	(note 2)
MCAA - Meyers Chuck	0	-			0	
SJC - Indian River	66,100	4,300	1,158	-	71,558	(note 1&3)
THCC - Sandy Bay	-	0			0	
SOUTHEAST TOTALS	1,763,199	867,436	134,497	8,643	2,773,775	
PRINCE WILLIAM SOUND						
FWSAC - Armin F. Koernig	8,134,710	16,765			8,151,475	(note 4)
- Esther Lake	2,321,312	54,969	15,605	-	2,391,886	(note 4)
VFDC - Solomon Gulch	5,744,564	6,476	14,409	-	5,765,449	(note 4)
PWS TOTALS	16,200,586	78,210	30,014	0	16,308,810	
COOK INLET						
CIAA - Eklutna	0	9,648	4,638	0	14,286	(note 2)
COOK INLET TOTALS	0	9,648	4,638	0	14,286	
STATEWIDE TOTALS	17,963,785	955,294	169,149	8,643	19,096,871	

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
1987	868,250,000	461,170,000	19,096,871	4,172,700	\$6,557,877.16
Cumulative hatchery revenue from special harvest:					\$16,100,461.61

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
1987	234,500,000	149,790,000	955,294	487,605	\$1,162,578.50

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
1987	1,570,000	750,000	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
1987	618,350,000	299,260,000	17,963,785	3,624,586	\$4,711,068.00

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
1987	9,280,000	5,440,000	169,149	58,333	\$625,546.65

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
1987	4,550,000	5,940,000	8,643	2,176	\$58,684.00

N/A = information not available

Table 14. 1987 releases from PNP hatcheries in millions.

REGION/LOCATION	Pink	Chum	Coho	Chinook	Sockeye	TOTAL
<u>SOUTHEAST</u>						
SSRAA - Whitman Lake		8.82	0.44	1.60	*	10.86
- Neets Bay		31.13	3.14	3.46		37.74
- Beaver Falls					0.13	0.13
NSRAA - Salmon Creek	*	*	*			0.00
- Medvejie Creek	0.10	27.52	0.84	0.23		28.69
- Port Camden		0.20				0.20
AAI - Burnett Inlet	8.81	4.45	0.01	*		13.27
A-K - Port Armstrong	12.35	1.98	*	0.15		14.48
BCF - Burro Creek	0.67	0.56				1.23
DIPAC - Kowee Creek	7.16	-				7.16
- Sheep Creek	1.20	18.90	0.06	0.03		20.19
KNFC - Gunnuk Creek	2.87	10.81	*			13.68
MCAA - Meyers Chuck	*	*	*			0.00
SJC - Indian River	14.20	1.60	0.11	0.47		16.38
THCC - Sandy Bay	*	*				0.00
SOUTHEAST TOTALS	<u>47.37</u>	<u>105.96</u>	<u>4.61</u>	<u>5.94</u>	<u>0.13</u>	<u>164.00</u>
<u>PRINCE WILLIAM SOUND</u>						
PWSAC - Armin F. Koernig	116.18	*				116.18
- Esther Lake	75.93	37.67	0.38	*	0.62	114.60
VFDC - Solomon Gulch	59.74	3.42	0.31	*		63.47
PWS TOTALS	<u>251.85</u>	<u>41.09</u>	<u>0.68</u>	<u>0.00</u>	<u>0.62</u>	<u>294.24</u>
<u>COOK INLET</u>						
CIAA - Eklutna	0.04	2.74	0.15	*		2.93
COOK INLET TOTALS	<u>0.04</u>	<u>2.74</u>	<u>0.15</u>	<u>0.00</u>		<u>2.93</u>
STATEWIDE TOTALS	<u>299.26</u>	<u>149.79</u>	<u>5.44</u>	<u>5.94</u>	<u>0.75</u>	<u>461.17</u>

Note 1: * indicates permitted species but no releases this season.

Note 2: individual hatchery releases may not add up to the regional or statewide because of rounding.

Table 15. 1987 egg takes for PNP hatcheries in millions.

REGION/LOCATION	Pink	Chum	Coho	Chinook	Sockeye	TOTAL	Comments:
<u>SOUTHEAST</u>							
SSRAA - Whitman Lake		20.79	2.70	1.24	*	24.73	(note 1)
- Neets Bay	0.62	53.69	1.07	1.27		56.64	
- Beaver Falls					0.40	0.40	
NSRAA - Salmon Creek	*	*	*			0.00	(note 1)
- Medvejie Creek	0.10	28.65	0.98	1.34		31.07	
- Port Camden		0.61				0.61	
AAI - Burnett Inlet	11.86	10.03	0.05	0.28		22.23	(note 1)
A-K - Port Armstrong	20.96	1.51	*	0.13		22.59	
BCF - Burro Creek	2.53	0.56	0.02			3.11	(note 1)
DIPAC - Kowee Creek	9.05	*				9.05	
- Sheep Creek	19.65	19.75	0.04			39.44	
- Gastineau	13.50	*	*	*		13.50	
KNFC - Gunnuk Creek	4.50	10.86				15.36	
MCAA - Meyers Chuck	3.00	*				3.00	(note 1)
SJC - Indian River	14.78	0.69	0.13	0.10		15.71	
THCC - Sandy Bay	*	*				0.00	(note 1)
SOUTHEAST TOTALS	100.55	147.15	4.97	4.36	0.40	257.44	(note 2)
<u>PRINCE WILLIAM SOUND</u>							
PWSAC - Armin F. Koernig	125.95	*				125.95	(note 1)
- Esther Lake	227.95	82.71	2.62	0.19	1.17	314.63	
VFDC - Solomon Gulch	163.89	1.63	1.56	*		167.08	(note 1)
PWS TOTALS	517.80	84.33	4.18	0.19	1.17	607.66	(note 2)
<u>COOK INLET</u>							
CIAA - Eklutna	*	3.02	0.13	*		3.14	(note 1)
COOK INLET TOTALS	0.00	3.02	0.13	0.00		3.14	(note 2)
STATEWIDE TOTALS	618.35	234.50	9.28	4.55	1.57	868.25	
						ALL SPECIES TOTAL: 866,800,000	

Note 1: * indicates permitted species but no egg take this season.

Note 2: individual hatchery egg takes may not add up to the regional or statewide totals because of rounding.

Table 16. Permitted egg capacities, in millions, of PNP hatcheries within the planning regions, 1987.

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	57.00	4.10	2.00		76.20
Non-Association Facilities	106.00	184.50	3.22	0.38		294.10
total	119.10	241.50	7.32	2.38	0.00	370.30
YAKUTAT (no PNP facilities)						
total	0.00	0.00	0.00	0.00	0.00	0.00
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						
	657.10	542.30	20.07	9.78	33.80	1263.05

Table 17. FRED Division FY88 operating budget (all funding sources)

Function	Budget <u>A</u> /	Percent
Management/Administration (headquarters & regional offices)	1956.6	13
Private Nonprofit Hatchery Coordination & Regional Planning	207.3	1
Hatchery Production Statewide (facility operating budgets)	7877.4	54
Biological Projects & Staff (planning , operations , assessments)	608.4	4
Lake and Stream Improvement/Stocking (fishpasses, habitat and stocking projects)	525.1	3
Technical Supervision/Quality Control (biology, fish culture, engineering, maintenance, library, mariculture, economics)	885.4	6
Fish Pathology Services (statewide fish health services)	542.9	3
Genetics Laboratory (statewide genetics services)	84.4	0
Limnology (principal scientist and project leaders)	181.5	1
Lake Fertilization/Stocking (field projects statewide and limnology lab support)	200.5	1
Tagged Fish Recovery Laboratory (CWT) (statewide and US/Canada concerns)	361.7	2
Biometrics/Data Processing	166.7	1
Special Projects (cooperative funding projects)	694.7	4
C.I.P. Costs	265.1	1
TOTAL	14557.7	1

A/ In thousands

PROGRAM EXPENDITURES

Fiscal Year 1988 Operating Budget

The FRED Division, as a Budget Request Unit (BRU), requests operating funds in three components. Approximately 93% of the FY 88 authorized budget is in the FRED component, which includes nearly all of 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, or receive funds from other sources, such as interagency receipts. Much of the monies received for special projects during FY 88 were 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 88 budget for the FRED Division BRU was \$14.7 million. The General Fund portion of the FY 88 funding decreased by nearly 13.5% from the FY 87 authorized budget.

The FRED Division can be partitioned by function for the purpose of examining the BRU's involvement in the state's fisheries program. Table 17 presents such an analysis of the various services the FRED Division performs for Alaska's fisheries enhancement program.

Fiscal Year 1989 Operating Budget

The current Governor's Budget Request for FRED Division in FY 89 is \$14.97 million, which includes approximately a 1% increase in general funds from the FY 88 authorized budget. In response to legislative intent, FRED Division has initiated a team comprised of representatives from agencies involved in fishing and enhancement activities in Alaska to work toward alternative funding plans for state enhancement facilities. A report from this team will be delivered to the Legislature in 1988. As an interim measure, FRED Division is in the process of arranging to transfer, fully or partially, the operation of four hatcheries to the private sector for FY 89. These facilities include Hidden Falls, Cannery Creek, Kitoi Bay, and Trail Lakes Hatcheries. The FY 89 FRED budget is based upon using monies thus freed to address identified program deficiencies.

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<u>Report Section</u>	<u>Contributor</u>
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APPENDIX A

Life-Stage Survival Summaries for Fish Released in 1987

Table I. FRED Region I 1987 Life Stage Survival Report

1987 Survival by Facility										
			Adjusted		% surv	Fry	% surv	Fish	% surv	
			green eggs	Eyed eggs	to eyeup	emerged	to emerge	released	to release	
Beaver Falls	Sock	86	Hugh Smith L.	478,000	262,000	54.9%	250,000 1)	95.2%		
Beaver Falls	Sock	86	Klawock River	1,220,000	908,000	74.5%	809,000 1)	89.1%		
Crystal Lake	chin	85	Crystal Creek	2,099,000	1,500,000	71.8%	1,171,000	78.3%	684,410	58.5%
Crystal Lake	chin	86	Harding River	48,000	40,000	83.4%	30,523 2)	99.0%	30,500	98.4%
Crystal Lake	chum	86	Crystal Creek	347,000	204,000	58.7%	196,000 3)	95.9%		
Crystal Lake	coho	85	Crystal Creek	1,660,000	1,510,000	90.8%	1,490,000	99.0%	362,000	68.4%
Crystal Lake	coho	86	Crystal Creek	770,000	606,000	78.6%	595,000	98.3%	463,000 4)	
Crystal Lake	coho	86	St. John's Cr	1,700	1,600	93.1%	15,600	99.6%	15,337 4)	99.6%
Crystal Lake	coho	86	Slippery Cr.	77,000	66,000	86.0%	65,000	99.0%	64,000 4)	97.9%
Crystal Lake	steel	85	Crystal Creek	88,000	78,000	88.5%	21,000	27.3%	8,600	40.6%
Deer Mountain	chin	85	Ketchikan Cr.	165,000	71,000	42.9%	69,000	97.3%	42,000	61.0%
Deer Mountain	chin	86	Ketchikan Cr.	813,000	679,000	83.5%	604,000	90.0%	302,000 5)	44.5%
Hidden Falls	chum	86	Hidden Falls	64,600,000	43,100,000 6)	94.6%	40,600,000	95.9%	40,100,000 7)	99.1%
Hidden Falls	chin	85	C.C./Tahini	339,000	295,000	87.0%	285,000	96.1%	279,000	97.6%
Klawock	chum	86	Klawock River	3,780,000	3,490,000	92.1%	3,990,000 8)	114.0% 9)		
Klawock	coho	85	Klawock River	1,630,000	1,520,000	93.2%	1,460,000	97.1%	1,110,000 10)	75.2%
Klawock	coho	86	Klawock River	2,240,000	2,100,000	93.7%	1,740,000	82.9%	199,000 11)	
Klawock	coho	86	Cable Creek	8,000	7,000	93.7%	6,500	82.9%	6,000	?????????
Klawock	steel	86	Klawock River	130,000	128,000	98.6%	109,000	86.7%	91,000	82.9%
Snettisham	chum	86	Snettisham	28,700,000	27,000,000	97.0%	26,100,000	93.7%	25,500,000	97.4%
Snettisham	chin	85	Crystal Creek	5,050,000	3,110,000	61.6%	2,830,000 12)	91.2%	961,000	66.1%
Snettisham	chin	85	King Salmon R	143,000	136,000	97.0%	126,000	93.1%	86,000	68.0%
Snettisham	coho	84	Snettisham	721,000	696,000	96.6%	688,000	98.8%	16,000	39.2%
Snettisham	coho	85	Snettisham	1,720,000	1,570,000	91.1%	1,480,000 13)	94.4%	799,000 14)	60.8%
Snettisham	coho	85	Montana/KSR	244,000	213,000	87.5%	211,000	99.1%	130,000	61.5%
Snettisham	coho	86	Snettisham	1,600,000	1,550,000	96.7%	1,480,000	95.9%	104,000 15)	
Snettisham	steel	84	Peterson Cr.	9,500	6,100	64.2%	3,000	50.0%	2,400	77.1%

- | | |
|---|---|
| 1) Stocked as emergent fry | 8) Stocked as emergent fry |
| 2) Stocked as fed fry fry | 9) Survival over 100% due to errors in estimation procedur |
| 3) Stocked as emergent fry | 10) 184,000 were release as fingerlings in 1986 |
| 4) Stocked as fingerlings | 11) Stock as fingerling, remaining fish retained for releas |
| 5) These fish were released as zero check smolt | 12) 911,000 were stocked in 1986 as fed fry |
| 6) 18.0 M were transfered to PNP facilities | 13) 120,000 were stocked as in 1986 as fed fry |
| 7) 19.0 M were released as fed fry at Takatz by SSRAA | 14) About 175,000 were retained for stocking in 1988 |
| | 15) Stocked as emergent fry |

Table 2. FRED Division Region II 1987 Life Stage Survival Report

		1986 Survival by Facility							
		Adjusted green eggs	Eyed eggs	% surv to eyeup	Fry emerged	% surv to emerge	Fish released	% surv to release	
Big Lake	Coho 86 Big Lake	3,180,000	2,930,000	92.14	2,810,000	95.90	2,680,000	95.37	
Big Lake	Coho 86 Little Susitna	18,000	17,000	94.44	15,000	88.24			
Big Lake	Sock 86 Fish Cr	1,300,000	1,090,000	83.85					
Big Lake	Sock 86 Meadow Cr	16,800,000	15,400,000	91.67	11,900,000	77.27	11,900,000	100.00	
Cannery Creek	Chum 86 Cannery Creek	41,500	38,400	92.53	35,000	91.15	35,000	100.00	
Cannery Creek	Pink 86 Cannery Creek	44,200,000	40,900,000	T 92.53	42,600,000	104.16	42,600,000	100.00	
Clear	Char 86 Wood R	20,600	8,250	40.05	7,150	86.67	4,150	58.04	
Clear	Chin 86 Clear Creek	209,000	165,000	78.95	160,000	96.97	146,000	91.25	
Clear	Coho 86 Wood Cr	641,000	619,000	96.57	606,000	97.90	564,000	93.07	
Clear	Gray 86 Goodpaster R	198,000			118,000		106,000	89.83	
Clear	Gray 86 Moose L	1,900,000			1,740,000		1,100,000	63.22	
Clear	Gray 87 Goodpaster R	220,000			131,000		59,100	45.11	
Clear	Gray 87 Moose L	2,580,000			1,550,000		1,290,000	83.23	
Clear	Rain 87 Swanson R	1,810,000	1,530,000	84.53	1,480,000	96.73	1,060,000	71.62	
Clear	Shee 86 Clear H/Koyukuk	1,200,000			360,000	0.00	248,000	0.00	
Crooked Creek	Coho 85 Crooked Cr				70,400	R	67,900	96.45	
Crooked Creek	Sock 86 Bear Creek	8,040,000	7,730,000	96.14			7,510,000		
Crooked Creek	Sock 86 Glacier Flats	13,500,000	12,500,000	92.59			1,250,000		
Crooked Creek	Stee 85 Crooked Cr	81,600	75,100	92.03	75,100	100.00	70,000	93.21	
Crooked Creek	Stee 86 Crooked Creek	127,000	105,000	82.68	98,000	93.33			
Elmendorf	Chin 86 Crooked Cr	787,000	733,000	93.14	715,000	97.54	684,000	95.66	
Elmendorf	Coho 85 Bear Cr				181,000	R	179,000	98.90	
Elmendorf	Coho 85 Ship Cr	68,000	62,000	91.18	61,000	98.39	56,500	92.62	
Elmendorf	Coho 86 Ship Cr	63,000	59,700	94.76	58,900	98.66			
Elmendorf	Rain 86 Swanson R				183,000	R	181,000	98.91	
Ft Richardson	Chin 86 Deshka River	290,000	229,000	T 78.97					
Ft Richardson	Coho 85 18 Mile	188,000	119,000	63.30	116,000	97.48	108,000	93.10	
Ft Richardson	Coho 85 Caswell Creek	54,400	35,100	64.52	33,500	95.44	32,000	95.52	
Ft Richardson	Coho 85 Little Susitna	517,000	517,000	100.00	517,000	100.00	504,000	97.49	
Ft Richardson	Coho 86 Eyak L	284,000	178,000	R 62.68	176,000	98.88	104,000	59.09	
Ft Richardson	Coho 86 Little Susitna	550,000	540,000	98.18	540,000	100.00		T	
Ft Richardson	Rain 86 Big Lake	969,000	416,000	42.93	296,000	71.15	156,000	52.70	
Ft Richardson	Rain 86 Swanson R	3,900,000	2,450,000	T 62.82	1,390,000	56.73	1,038,000	T 74.68	
Ft Richardson	Rain 87 Big Lake	876,000	782,000	89.27	676,000	86.45	407,000	60.21	
Ft Richardson	Rain 87 Swanson R	6,290,000	5,530,000	T 87.92	3,740,000	67.63	3,700,000	98.93	
Gulkana	Sock 86 Gulkana R	28,700,000			21,400,000		21,400,000	100.00	
Karluk	Sock 86 Thumb R - early	23,400,000	19,800,000	84.62			19,800,000		

Note: T = fish/eggs transferred out, R = fish/eggs received

-continued-

Table 2. FRED Division Region II 1987 Life Stage Survival Report

		1986 Survival by Facility						
		Adjusted green eggs	Eyed eggs	% surv to eyeup	Fry emerged	% surv to emerge	Fish released	% surv to release
Kitoy Bay	Chum 86 Big Kitoy	210,000	172,000	81.90	169,000	98.26	164,000	97.04
Kitoy Bay	Chum 86 Sturgeon R	632,000	578,000	91.46	553,000	95.67	529,000	95.66
Kitoy Bay	Coho 86 Little Kitoy	397,000	378,000	95.21	316,000	83.60	297,000	93.99
Kitoy Bay	Pink 86 Kitoy Bay	100,600,000	98,156,000	98.38	90,000,000	91.69	90,000,000	100.00
Main Bay	Chum 86 Main Bay	84,600,000	80,000,000	94.56	76,800,000	96.00	76,500,000	99.61
Main Bay	Pink 86 Main Bay	3,020,000	2,720,000	T 90.07	2,660,000	97.79	2,130,000	80.08
Main Bay	Sock 86 Coghill				318,000	R		
Sikusuilag	Chum 86 Noatak R	1,930,000	1,570,000	81.35	1,480,000	94.27	1,440,000	97.30
Trail Lakes	Chin 86 Crooked Creek	427,000	378,000	88.52	374,000	98.94	268,000	71.66
Trail Lakes	Coho 86 Bear Creek	892,000	764,000	85.65	741,000	96.99	796,000	T 107.42
Trail Lakes	Coho 86 Crooked Creek	1,920,000	1,770,000	92.19	1,720,000	97.18	1,700,000	98.84
Trail Lakes	Sock 86 Coghill				321,000	R	318,000	T 99.07
Trail Lakes	Sock 86 Hidden L	4,670,000	3,910,000	83.73	3,720,000	95.14	3,720,000	100.00
Trail Lakes	Stee 86 Anchor River	46,300	37,400	T 80.78	36,600	97.86	35,600	97.27
Tutka Bay	Chum 86 Tutka Cr	56,000	50,400	90.00			50,400	
Tutka Bay	Chum 86 Westside Cr	821,000	617,000	75.15	399,000	64.67	395,000	99.00
Tutka Bay	Pink 86 Tutka Lagoon	31,500,000	28,800,000	91.43	25,700,000	89.24	24,500,000	95.33

Note: T = fish/eggs transferred out, R = fish/eggs received

APPENDIX B

Stocking Location by Species for Fish Released in 1987

Table 1. Salmonids stocked by FRED Division Region II in 1987

Includes all releases as of 30 Oct 1987

Stocking Location	Area	Species	Hatchery	Life Stage	Broodstock	Number Stocked
DONNELLY L	AYK	ARCTIC CHAR	CLEAR	FINGERLING	WOOD CR	4,153
BOLIO L	AYK	CHINOOK	CLEAR	FINGERLING	CLEAR CR	21,718
DONNELLY L	AYK	CHINOOK	CLEAR	FINGERLING	CLEAR CR	6,000
L HARDING L	AYK	CHINOOK	CLEAR	FINGERLING	CLEAR CR	10,000
WOOD CR	AYK	CHINOOK	CLEAR	FINGERLING	CLEAR CR	100,511
CROOKED CR	CCI	CHINOOK	ELMENDORF	SMOLT	CROOKED CR	206,179
LOWELL CR	CCI	CHINOOK	ELMENDORF	SMOLT	CROOKED CR	95,963
SUMMIT L	CCI	CHINOOK	TRAIL LAKE	FINGERLING	CROOKED CR	118,400
HALIBUT COVE LG	LCI	CHINOOK	ELMENDORF	SMOLT	CROOKED CR	94,100
HOMER SPIT	LCI	CHINOOK	ELMENDORF	SMOLT	CROOKED CR	103,860
SELDOVIA HARBOR	LCI	CHINOOK	ELMENDORF	SMOLT	CROOKED CR	80,420
BENCH CR	NCI	CHINOOK	TRAIL LAKE	FINGERLING	CROOKED CR	77,677
GRANITE CR	NCI	CHINOOK	TRAIL LAKE	FINGERLING	CROOKED CR	72,302
SHIP CR	NCI	CHINOOK	ELMENDORF	SMOLT	CROOKED CR	53,212
ESTHER HATCHERY	PWS	CHINOOK	FT RICHARDSON	EYED EGGS	DESHKA R	185,643
WELLS PASSAGE	PWS	CHINOOK	ELMENDORF	SMOLT	CROOKED CR	50,143
NOATAK R	AYK	CHUM	SIKUSUILAQ	FED FRY	NOATAK R	1,441,429
KITOI BAY	KOD	CHUM	KITOI	FINGERLING	STURGEON R	693,176
TUTKA CR	LCI	CHUM	TUTKA BAY	EYED EGGS	TUTKA CR	50,400
TUTKA LAGOON	LCI	CHUM	TUTKA BAY	FINGERLING	WESTSIDE CR	395,300
CANNERY CR	PWS	CHUM	CANNERY CREEK	EMERGENT FRY	CANNERY CR	34,000
MAIN BAY	PWS	CHUM	MAIN BAY	EMERGENT FRY	MAIN BAY	76,536,738
28 MILE PIT	AYK	COHO	CLEAR	FINGERLING	WOOD CR	500
31 MILE PIT	AYK	COHO	CLEAR	FINGERLING	WOOD CR	500
8 MILE L	AYK	COHO	CLEAR	FINGERLING	WOOD CR	10,000
BIRCH L	AYK	COHO	CLEAR	FINGERLING	WOOD CR	40,000
CHENA L	AYK	COHO	CLEAR	FINGERLING	WOOD CR	30,000
CLEAR CR	AYK	COHO	CLEAR	FINGERLING	WOOD CR	80,817

Table 1. Salmonids stocked by FRED Division Region II in 1987

Includes all releases as of 30 Oct 1987

Stocking Location	Area	Species	Hatchery	Life Stage	Broodstock	Number Stocked
DUNE L	AYK	COHO	CLEAR	FINGERLING	WOOD CR	20,000
GESKAMINA L	AYK	COHO	CLEAR	FINGERLING	WOOD CR	20,000
HANGER PIT	AYK	COHO	CLEAR	FINGERLING	WOOD CR	2,600
JOHNSON PIT #1	AYK	COHO	CLEAR	FINGERLING	WOOD CR	500
JUNE L	AYK	COHO	CLEAR	FINGERLING	WOOD CR	38,000
LONG POND	AYK	COHO	CLEAR	FINGERLING	WOOD CR	700
LOST L	AYK	COHO	CLEAR	FINGERLING	WOOD CR	10,000
MANCHU L	AYK	COHO	CLEAR	FINGERLING	WOOD CR	5,000
MOOSE L	AYK	COHO	CLEAR	FINGERLING	WOOD CR	8,000
QUARTZ L	AYK	COHO	CLEAR	FINGERLING	WOOD CR	168,489
ROUND POND	AYK	COHO	CLEAR	FINGERLING	WOOD CR	400
SANSING L	AYK	COHO	CLEAR	FINGERLING	WOOD CR	200
WOOD CR	AYK	COHO	CLEAR	FINGERLING	WOOD CR	79,023
ARC L	CCI	COHO	TRAIL LAKE	FINGERLING	CROOKED CR	5,000
AURORA L	CCI	COHO	TRAIL LAKE	FINGERLING	CROOKED CR	2,000
BEAR L	CCI	COHO	TRAIL LAKE	FINGERLING	BEAR L	225,985
BORDER L	CCI	COHO	TRAIL LAKE	FINGERLING	CROOKED CR	15,000
BOX CANYON CR	CCI	COHO	TRAIL LAKE	FINGERLING	BEAR L	257,461
CENTENNIAL L	CCI	COHO	TRAIL LAKE	FINGERLING	CROOKED CR	5,000
CROOKED CR	CCI	COHO	TRAIL LAKE	FINGERLING	CROOKED CR	238,540
CROOKED CREEK	CCI	COHO	TRAIL LAKE	FINGERLING	CROOKED CR	282,600
ENGINEER L	CCI	COHO	TRAIL LAKE	FINGERLING	CROOKED CR	40,000
INST MARINE SCI	CCI	COHO	ELMENDORF	SMOLT	BEAR CR	1,011
LOWELL CR	CCI	COHO	ELMENDORF	SMOLT	BEAR CR	57,232
LYON CR	CCI	COHO	CROOKED CR	FINGERLING	CROOKED CR	107,649
PORTAGE L	CCI	COHO	TRAIL LAKE	FINGERLING	CROOKED CR	5,000
SCOUT L	CCI	COHO	TRAIL LAKE	FINGERLING	CROOKED CR	19,000
SEWARD LAGOON	CCI	COHO	ELMENDORF	SMOLT	BEAR CR	65,514
SUMMIT L	CCI	COHO	TRAIL LAKE	FINGERLING	CROOKED CR	110,000
UNION L	CCI	COHO	TRAIL LAKE	FINGERLING	CROOKED CR	17,000
WIK L	CCI	COHO	TRAIL LAKE	FINGERLING	CROOKED CR	30,000
BARRY L	KOD	COHO	KITOI	FINGERLING	L KITOI L	19,050
DARK L	KOD	COHO	KITOI	FINGERLING	L KITOI L	7,500
ISLAND L	KOD	COHO	KITOI	FINGERLING	L KITOI L	22,500
KALSIN L	KOD	COHO	KITOI	FINGERLING	L KITOI L	21,174
L KITOI L	KOD	COHO	KITOI	FINGERLING	L KITOI L	171,103
MAYFLOWER L	KOD	COHO	KITOI	FINGERLING	L KITOI L	6,500
MISSION L	KOD	COHO	KITOI	FINGERLING	L KITOI L	10,000
ORBIN L	KOD	COHO	KITOI	FINGERLING	L KITOI L	7,500
PONY L	KOD	COHO	KITOI	FINGERLING	L KITOI L	2,100
POTATOE L	KOD	COHO	KITOI	FINGERLING	L KITOI L	7,500
CARIBOU L	LCI	COHO	TRAIL LAKE	FINGERLING	CROOKED CR	150,000

Table 1. Salmonids stocked by FRED Division Region II in 1987

Includes all releases as of 30 Oct 1987

Stocking Location	Area	Species	Hatchery	Life Stage	Broodstock	Number Stocked
SELDOVIA L	LCI	COHO	TRAIL LAKE	FINGERLING	CROOKED CR	45,000
BEAR PAW L	NCI	COHO	TRAIL LAKE	FINGERLING	CROOKED CR	4,500
BENKA L	NCI	COHO	TRAIL LAKE	FINGERLING	CROOKED CR	12,300
BLODGETT L	NCI	COHO	BIG LAKE	FINGERLING	BIG L	213,566
CASMELL CR	NCI	COHO	FT RICHARDSON	SMOLT	CASMELL CR	31,767
CHRISTENSEN L	NCI	COHO	TRAIL LAKE	FINGERLING	CROOKED CR	35,800
CORNELIUS L	NCI	COHO	BIG LAKE	FINGERLING	BIG L	44,268
COTTONWOOD L	NCI	COHO	BIG LAKE	FINGERLING	BIG L	156,173
ECHO L	NCI	COHO	TRAIL LAKE	FINGERLING	CROOKED CR	4,600
ELMENDORF	NCI	COHO	TRAIL LAKE	FINGERLING	CROOKED CR	560,024
FINGER L (ANAD)	NCI	COHO	TRAIL LAKE	FINGERLING	CROOKED CR	72,400
FISH CR	NCI	COHO	BIG LAKE	FINGERLING	BIG L	206,684
GRANITE CR	NCI	COHO	TRAIL LAKE	FINGERLING	CROOKED CR	300,145
INGRAM CR	NCI	COHO	TRAIL LAKE	FINGERLING	CROOKED CR	160,000
JUNCTION L	NCI	COHO	TRAIL LAKE	FINGERLING	CROOKED CR	2,200
KATMAI CR	NCI	COHO	KITOI	FINGERLING	L KITOI L	22,349
L SUSITNA R	NCI	COHO	FT RICHARDSON	SMOLT	L SUSITNA R	98,156
LOON L	NCI	COHO	TRAIL LAKE	FINGERLING	CROOKED CR	10,800
LUCILLE L	NCI	COHO	TRAIL LAKE	FINGERLING	CROOKED CR	36,200
MEADOW CR	NCI	COHO	BIG LAKE	FINGERLING	BIG L	1,766,120
MEMORY L	NCI	COHO	TRAIL LAKE	FINGERLING	CROOKED CR	8,300
NANCY L	NCI	COHO	FT RICHARDSON	SMOLT	L SUSITNA R	203,011
PRATOR L	NCI	COHO	TRAIL LAKE	FINGERLING	CROOKED CR	9,800
ROCKY L	NCI	COHO	TRAIL LAKE	FINGERLING	CROOKED CR	5,800
SHIP CR	NCI	COHO	ELMENDORF	SMOLT	SHIP CR	56,473
STEPAN L	NCI	COHO	BIG LAKE	FINGERLING	BIG L	58,397
TRAIL L	NCI	COHO	TRAIL LAKE	FINGERLING	CROOKED CR	50,000
TWIN LAKES	NCI	COHO	BIG LAKE	FINGERLING	BIG L	117,468
VICTOR L	NCI	COHO	TRAIL LAKE	FINGERLING	CROOKED CR	4,400
WASILLA L	NCI	COHO	BIG LAKE	FINGERLING	BIG L	115,475
WOLF L	NCI	COHO	TRAIL LAKE	FINGERLING	CROOKED CR	12,400
CULROSS L	PWS	COHO	FT RICHARDSON	FINGERLING	EYAK L	42,516
FLEMING SPIT	PWS	COHO	FT RICHARDSON	SMOLT	18 MILE CR	58,213
STRELNA L	PWS	COHO	CLEAR	FINGERLING	WOOD CR	41,462
SURPRISE CV #1	PWS	COHO	FT RICHARDSON	FINGERLING	EYAK L	21,605
SURPRISE CV #2	PWS	COHO	FT RICHARDSON	FINGERLING	EYAK L	40,158
WELLS PASSAGE	PWS	COHO	ELMENDORF	SMOLT	BEAR CR	55,546
17 MILE L	AYK	GRAYLING	CLEAR	EMERGENT FRY	MOOSE L	60,000
BATHING BEAUTY	AYK	GRAYLING	CLEAR	FINGERLING	MOOSE L	1,000
BOLID L	AYK	GRAYLING	CLEAR	EMERGENT FRY	MOOSE L	20,000
CHENA HS #32.9	AYK	GRAYLING	CLEAR	FINGERLING	MOOSE L	1,000
CHENA HS #42.8	AYK	GRAYLING	CLEAR	FINGERLING	MOOSE L	1,000

Table 1. Salmonids stocked by FRED Division Region II in 1987

Includes all releases as of 30 Oct 1987

Stocking Location	Area	Species	Hatchery	Life Stage	Broodstock	Number Stocked
CHENA HS #45.5	AYK	GRAYLING	CLEAR	FINGERLING	MOOSE L	10,000
DELTA/CLEARWA R	AYK	GRAYLING	CLEAR	FINGERLING	GOODPASTER R	10,050
DUNE L	AYK	GRAYLING	CLEAR	FINGERLING	MOOSE L	5,000
ENGINEER L	AYK	GRAYLING	CLEAR	EMERGENT FRY	MOOSE L	25,000
GOODPASTER R	AYK	GRAYLING	CLEAR	FINGERLING	GOODPASTER R	7,989
GRAYLING L	AYK	GRAYLING	CLEAR	FINGERLING	MOOSE L	1,000
HARDING L	AYK	GRAYLING	CLEAR	EMERGENT FRY	MOOSE L	640,000
JOHNSON PIT #1	AYK	GRAYLING	CLEAR	EMERGENT FRY	MOOSE L	10,000
JOHNSON PIT #2	AYK	GRAYLING	CLEAR	FINGERLING	MOOSE L	1,000
LEFT OP L	AYK	GRAYLING	CLEAR	EMERGENT FRY	GOODPASTER R	15,088
SANSING L	AYK	GRAYLING	CLEAR	SUBCATCHABLE	MOOSE L	1,019
SHEEFISH L	AYK	GRAYLING	CLEAR	EMERGENT FRY	MOOSE L	10,000
STEESE HWY 29.5	AYK	GRAYLING	CLEAR	EMERGENT FRY	MOOSE L	10,000
STEESE HWY 30.6	AYK	GRAYLING	CLEAR	EMERGENT FRY	MOOSE L	8,000
STEESE HWY 31.6	AYK	GRAYLING	CLEAR	FINGERLING	MOOSE L	1,000
STEESE HWY 33.0	AYK	GRAYLING	CLEAR	FINGERLING	MOOSE L	2,000
STEESE HWY 34.6	AYK	GRAYLING	CLEAR	FINGERLING	MOOSE L	1,000
STEESE HWY 35.8	AYK	GRAYLING	CLEAR	FINGERLING	MOOSE L	400
STEESE HWY 36.5	AYK	GRAYLING	CLEAR	EMERGENT FRY	MOOSE L	10,000
UNIV OF AK FAIR	AYK	GRAYLING	CLEAR	FINGERLING	MOOSE L	12,300
WALDEN POND	AYK	GRAYLING	CLEAR	EMERGENT FRY	MOOSE L	15,000
WEST POND	AYK	GRAYLING	CLEAR	EMERGENT FRY	GOODPASTER R	25,000
AUREL L	KOD	GRAYLING	CLEAR	EMERGENT FRY	MOOSE L	20,000
CASCADE L	KOD	GRAYLING	CLEAR	EMERGENT FRY	MOOSE L	20,000
CICELY L	KOD	GRAYLING	CLEAR	EMERGENT FRY	MOOSE L	10,000
HEITMAN L	KOD	GRAYLING	CLEAR	EMERGENT FRY	MOOSE L	20,000
"Y" L	NCI	GRAYLING	CLEAR	FINGERLING	MOOSE L	7,940
BRUCE L	NCI	GRAYLING	CLEAR	FINGERLING	MOOSE L	5,270
CANDE L	NCI	GRAYLING	CLEAR	FINGERLING	MOOSE L	4,240
DELTA UNNAMED	NCI	GRAYLING	CLEAR	FINGERLING	MOOSE L	500
FARMER L	NCI	GRAYLING	CLEAR	FINGERLING	MOOSE L	4,200
FINGER L	NCI	GRAYLING	CLEAR	FINGERLING	MOOSE L	12,558
JUNCTION L	NCI	GRAYLING	CLEAR	FINGERLING	MOOSE L	2,180
KEPLER-BRADLY L	NCI	GRAYLING	CLEAR	FINGERLING	MOOSE L	5,800
KNIK L	NCI	GRAYLING	CLEAR	FINGERLING	MOOSE L	10,080
LONG L	NCI	GRAYLING	CLEAR	EMERGENT FRY	MOOSE L	64,000
LOWER FIRE L	NCI	GRAYLING	CLEAR	FINGERLING	MOOSE L	20,000
LUCILLE L	NCI	GRAYLING	CLEAR	FINGERLING	MOOSE L	12,558
MATANUSKA L	NCI	GRAYLING	CLEAR	FINGERLING	MOOSE L	6,100
MEIRS L	NCI	GRAYLING	CLEAR	FINGERLING	MOOSE L	20,060
PARKS HWY M180	NCI	GRAYLING	CLEAR	FINGERLING	MOOSE L	3,000
SLIPPER L	NCI	GRAYLING	CLEAR	FINGERLING	MOOSE L	1,580
SLIVER L	NCI	GRAYLING	CLEAR	FINGERLING	MOOSE L	1,440
WILLOW L	NCI	GRAYLING	CLEAR	FINGERLING	MOOSE L	28,600

Table 1. Salmonids stocked by FRED Division Region II in 1987

Includes all releases as of 30 Oct 1987

Stocking Location	Area	Species	Hatchery	Life Stage	Broodstock	Number Stocked
ARIZ FISH GAME	OUT	GRAYLING	CLEAR	EYED EGGS	MOOSE L	528,500
MOOSE CR	PWS	GRAYLING	CLEAR	EMERGENT FRY	MOOSE L	50,000
MOOSE L	PWS	GRAYLING	CLEAR	FINGERLING	MOOSE L	33,500
THOMPSON L	PWS	GRAYLING	CLEAR	EMERGENT FRY	MOOSE L	10,000
TOLSONA L	PWS	GRAYLING	CLEAR	EMERGENT FRY	MOOSE L	80,000
KITOI BAY	KOD	PINK	KITOI	FINGERLING	KITOI BAY	90,017,823
HALIBUT COVE LG	LCI	PINK	TUTKA BAY	EMERGENT FRY	TUTKA LAGOON	3,001,400
HOMER SPIT	LCI	PINK	TUTKA BAY	FED FRY	TUTKA LAGOON	295,000
TUTKA BAY	LCI	PINK	TUTKA BAY	FED FRY	TUTKA LAGOON	16,745,000
TUTKA CR	LCI	PINK	TUTKA BAY	EMERGENT FRY	TUTKA LAGOON	3,789,000
INGRAM CR	NCI	PINK	TUTKA BAY	EMERGENT FRY	TUTKA LAGOON	259,200
CANNERY CR	PWS	PINK	CANNERY CREEK	EMERGENT FRY	CANNERY CR	42,653,000
MAIN BAY	PWS	PINK	MAIN BAY	EMERGENT FRY	MAIN BAY	2,660,000
31 MILE PIT	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	500
BACKDOWN L	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	500
BATHING BEAUTY	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	500
BIRCH L	AYK	RAINBOW	CLEAR	CATCHABLE	SWANSON R	34,039
BLUFF CABIN	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	10,000
BULLWINKLE L	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	800
CHENA HS #45.5	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	1,000
CHENA L	AYK	RAINBOW	ELMENDORF	CATCHABLE	SWANSON R	19,316
CHET L	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	1,000
CLEAR HATCHERY	AYK	RAINBOW	FT RICHARDSON	EYED EGGS	SWANSON R	1,556,700
CRAIG L	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	4,000
DOC L	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	1,500
DONNA L	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	11,600
DUNE L	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	10,000
FOREST L	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	7,000
GESKAMINA L	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	10,000
GHOST L	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	1,000
GRAYLING L	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	500
HARDING L	AYK	RAINBOW	FT RICHARDSON	FED FRY	SWANSON R	1,183,093
JAN L	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	8,800
JOHNSON PIT #1	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	500

Table 1. Salmonids stocked by FRED Division Region II in 1987

Includes all releases as of 30 Oct 1987

Stocking Location	Area	Species	Hatchery	Life Stage	Broodstock	Number Stocked
KENS POND	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	600
KOOLE L	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	30,000
L DONNA L	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	9,400
LES'S L	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	750
LISA L	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	10,000
LITTLE HARDING L	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	1,000
LOST L	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	1,000
MANCHU L	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	10,000
MARK L	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	4,000
MONTE L	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	20,000
N TWIN L	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	4,000
NICKEL L	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	1,000
NO MERCY L	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	1,500
PILEDRIIVE SL-BB	AYK	RAINBOW	ELMENDORF	CATCHABLE	SWANSON R	24,495
PILEDRIIVE SL-FP	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	10,000
PILEDRIIVE SL-SR	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	25,500
QUARTZ L	AYK	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	417,917
RAINBOW L	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	25,000
ROCKHOUND L	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	1,500
ROY'S L	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	10,000
S JANS L	AYK	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	20,041
S JOHNSON L	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	1,400
S TWIN L	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	4,000
SANSING L	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	620
WEASEL L	AYK	RAINBOW	CLEAR	FINGERLING	SWANSON R	2,000
CABIN L	CCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	11,700
CECILE L	CCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	2,000
COOPER L	CCI	RAINBOW	FT RICHARDSON	FED FRY	SWANSON R	505,900
DOUGLAS L	CCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	18,000
ENCELEWSKI L	CCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	20,000
JEROME L	CCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	3,000
LONGMARE L	CCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	34,000
MERIDIAN L	CCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	4,000
QUINTIN L	CCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	3,000
SPORT L	CCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	15,000
STORMY L	CCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	24,800
SUMMIT L	CCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	63,950
SUSAN L	CCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	1,612
TROUT L	CCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	38,970
AUREL L	KOD	RAINBOW	FT RICHARDSON	FINGERLING	BIG L	3,000
BIG L	KOD	RAINBOW	FT RICHARDSON	FINGERLING	BIG L	3,600
BULL L	KOD	RAINBOW	FT RICHARDSON	FINGERLING	BIG L	2,000
CAROLINE L	KOD	RAINBOW	FT RICHARDSON	FINGERLING	BIG L	1,400
CASCADE L	KOD	RAINBOW	FT RICHARDSON	FINGERLING	BIG L	3,300

Table 1. Salmonids stocked by FRED Division Region II in 1987

Includes all releases as of 30 Oct 1987

Stocking Location	Area	Species	Hatchery	Life Stage	Broodstock	Number Stocked
CICELY L	KOD	RAINBOW	FT RICHARDSON	FINGERLING	BIG L	1,150
DOLGOI L	KOD	RAINBOW	FT RICHARDSON	FINGERLING	BIG L	5,150
DRAGONFLY L	KOD	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	2,050
HEITMAN L	KOD	RAINBOW	FT RICHARDSON	FINGERLING	BIG L	3,250
HORSESHOE L	KOD	RAINBOW	FT RICHARDSON	FINGERLING	BIG L	1,000
JACK L	KOD	RAINBOW	FT RICHARDSON	FINGERLING	BIG L	1,000
JUPITER L	KOD	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	6,000
LEE L	KOD	RAINBOW	FT RICHARDSON	FINGERLING	BIG L	2,800
LILLY POND	KOD	RAINBOW	FT RICHARDSON	FINGERLING	BIG L	1,600
LONG L	KOD	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	4,600
LUPINE L	KOD	RAINBOW	FT RICHARDSON	FINGERLING	BIG L	1,600
MARGARET L	KOD	RAINBOW	FT RICHARDSON	FINGERLING	BIG L	1,600
TANIGNAK L	KOD	RAINBOW	FT RICHARDSON	FINGERLING	BIG L	6,000
TWIN L	KOD	RAINBOW	FT RICHARDSON	FINGERLING	BIG L	4,500
"X" L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	10,950
"Y" L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	7,940
BARLEY L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	5,200
BEACH L	NCI	RAINBOW	ELMENDORF	CATCHABLE	SWANSON R	4,810
BEAR PAW L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	4,578
BEVERLY L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	BIG L	8,400
BIG BEAVER L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	BIG L	10,200
BIG NO LUCK	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	6,812
CAMPBELL CR	NCI	RAINBOW	ELMENDORF	CATCHABLE	SWANSON R	10,281
CAMPBELL PT L	NCI	RAINBOW	ELMENDORF	CATCHABLE	SWANSON R	5,067
CARPENTER L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	33,038
CHENEY L	NCI	RAINBOW	ELMENDORF	CATCHABLE	SWANSON R	10,000
CLUNIE L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	30,361
CRYSTAL L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	13,170
DAWN L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	3,100
DELONG L	NCI	RAINBOW	ELMENDORF	CATCHABLE	SWANSON R	7,228
DERBY POND	NCI	RAINBOW	ELMENDORF	CATCHABLE	SWANSON R	760
DIAMOND L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	55,600
DISHNO L	NCI	RAINBOW	ELMENDORF	CATCHABLE	SWANSON R	950
E TWIN L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	8,404
EKLUTNA L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	1,380,314
FISH L	NCI	RAINBOW	ELMENDORF	CATCHABLE	SWANSON R	500
FLORENCE L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	5,460
GREEN L	NCI	RAINBOW	ELMENDORF	CATCHABLE	SWANSON R	1,161
GWEN L	NCI	RAINBOW	ELMENDORF	CATCHABLE	SWANSON R	4,956
HILLBERG L	NCI	RAINBOW	ELMENDORF	CATCHABLE	SWANSON R	1,199
HONEYBEE L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	5,800
IDA L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	8,019
IRENE L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	3,600
JEWEL L	NCI	RAINBOW	ELMENDORF	CATCHABLE	SWANSON R	9,996
KALMBACK L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	BIG L	13,000
KASHWITNA L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	30,400

Table 1. Salmonids stocked by FRED Division Region II in 1987

Includes all releases as of 30 Oct 1987

Stocking Location	Area	Species	Hatchery	Life Stage	Broodstock	Number Stocked
KEPLER-BRADLY L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	11,563
KNIK L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	10,000
LAKE OTIS	NCI	RAINBOW	ELMENDORF	CATCHABLE	SWANSON R	1,683
LALEN L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	BIG L	9,600
LAZY L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	BIG L	2,300
LITTLE LONELY L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	12,007
LONG L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	11,958
LOON L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	7,030
LORRAINE L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	13,450
LOWER FIRE L	NCI	RAINBOW	ELMENDORF	CATCHABLE	SWANSON R	4,740
LUCILLE L	NCI	RAINBOW	ELMENDORF	CATCHABLE	SWANSON R	15,609
LYNDA L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	BIG L	2,050
LYNNE L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	7,000
MARION L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	11,300
MATANUSKA L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	17,020
MEMORY L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	8,300
MIRROR L	NCI	RAINBOW	ELMENDORF	CATCHABLE	SWANSON R	10,151
MORVO L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	37,200
N FRIEND L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	16,600
OTTER L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	30,141
PORTAGE VALLY L	NCI	RAINBOW	ELMENDORF	CATCHABLE	SWANSON R	4,910
PRATOR L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	9,800
RAVINE L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	3,706
REED L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	5,850
ROCKY L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	5,897
S FRIEND L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	12,800
SAND L	NCI	RAINBOW	ELMENDORF	CATCHABLE	SWANSON R	5,404
SCHEELE L	NCI	RAINBOW	FT RICHARDSON	FED FRY	BIG L	106,800
SEYMOUR L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	BIG L	45,800
SHULIN L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	103,973
SIX MILE CR	NCI	RAINBOW	ELMENDORF	CATCHABLE	SWANSON R	1,140
SIX MILE L	NCI	RAINBOW	ELMENDORF	CATCHABLE	SWANSON R	1,222
SLIPPER L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	1,800
SOUTH ROLLY L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	10,800
SPRING L	NCI	RAINBOW	ELMENDORF	CATCHABLE	SWANSON R	713
STEPAN L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	BIG L	6,020
TAKU CAMPBELL L	NCI	RAINBOW	ELMENDORF	CATCHABLE	SWANSON R	5,065
THOMPSON L	NCI	RAINBOW	ELMENDORF	CATCHABLE	SWANSON R	1,915
TIGGER L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	1,897
TRIANGLE L	NCI	RAINBOW	ELMENDORF	CATCHABLE	SWANSON R	579
TWIN ISLAND L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	30,714
TWIN LAKES	NCI	RAINBOW	FT RICHARDSON	FINGERLING	BIG L	6,310
VERA L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	36,600
VISNAW L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	BIG L	17,300
W BEAVER L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	BIG L	10,200
WALBY L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	5,434
WEINER L	NCI	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	4,140

Table 1. Salmonids stocked by FRED Division Region II in 1987

Includes all releases as of 30 Oct 1987

Stocking Location	Area	Species	Hatchery	Life Stage	Broodstock	Number Stocked
BUFFALO L	PWS	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	800
CARIBOU L	PWS	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	9,897
LONG L	PWS	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	3,001
MIRROR L	PWS	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	9,000
PEANUT L	PWS	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	2,400
SCULPIN L	PWS	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	28,336
TOLSONA L	PWS	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	30,024
TOLSONA MTN L	PWS	RAINBOW	FT RICHARDSON	FINGERLING	SWANSON R	15,716
HARDING L	AYK	SHEEFISH	CLEAR	FINGERLING	KOYUKUK R	246,909
SILVER FOX L	AYK	SHEEFISH	CLEAR	FINGERLING	KOYUKUK R	400
WEIGH STATION-1	AYK	SHEEFISH	CLEAR	FINGERLING	KOYUKUK R	200
WEIGH STATION-2	AYK	SHEEFISH	CLEAR	FINGERLING	KOYUKUK R	400
BEAR CR	CCI	SOCKEYE	CROOKED CR	FED FRY	BEAR CR	7,510,000
GLACIER FLATS	CCI	SOCKEYE	CROOKED CR	FED FRY	GLACIER FLATS	7,922,000
HIDDEN L	CCI	SOCKEYE	TRAIL LAKE	FED FRY	HIDDEN L	3,718,311
CHENIK L	LCI	SOCKEYE	CROOKED CR	FED FRY	GLACIER FLATS	1,005,000
KERSHNER L	LCI	SOCKEYE	CROOKED CR	FED FRY	GLACIER FLATS	866,700
LEISURE L	LCI	SOCKEYE	CROOKED CR	FED FRY	GLACIER FLATS	2,022,000
PORT DICK L	LCI	SOCKEYE	CROOKED CR	FED FRY	GLACIER FLATS	704,900
MEADOW CR	NCI	SOCKEYE	BIG LAKE	FINGERLING	MEADOW CR	11,865,972
GULKANA R	PWS	SOCKEYE	GULKANA	EMERGENT FRY	GULKANA R	9,300,000
MAIN BAY HATCHE	PWS	SOCKEYE	TRAIL LAKE	FINGERLING	COGHILL L	318,468
SUMMIT L	PWS	SOCKEYE	GULKANA	EMERGENT FRY	GULKANA R	12,100,000
CROOKED CR	CCI	STEELHEAD	CROOKED CR	SMOLT	CROOKED CR	19,400
JOHNSON L	CCI	STEELHEAD	TRAIL LAKE	FINGERLING	ANCHOR R	25,571
SIX MILE CR	CCI	STEELHEAD	CROOKED CR	SMOLT	CROOKED CR	50,300
BRIDGE CANYON R	LCI	STEELHEAD	TRAIL LAKE	FINGERLING	ANCHOR R	9,973

Table 1B. Salmonids stocked by FRED Division Region I in 1987

includes all releases as of 30 October 1987

Stocking Location	Area	Species	Hatchery	Life Stage	Brood Stock	Number Stocked
Hugh Smith Lake	SSE	Sockeye	Beaver Falls	SWIMUP FRY	Hugh Smith Lake	184,000
Hugh Smith Lake	SSE	Sockeye	Beaver Falls	SWIMUP FRY	Hugh Smith Lake	66,000
Klawock Lake	SSE	Sockeye	Beaver Falls	SWIMUP FRY	Klawock/3 Mile Creek	462,000
Klawock Lake	SSE	Sockeye	Beaver Falls	SWIMUP FRY	Klawock/3 Mile Creek	298,000
Klawock Lake	SSE	Sockeye	Beaver Falls	SWIMUP FRY	Klawock/3 Mile Creek	49,000
Earl West Cove	SSE	chinook	Crystal Lake	SMOLTS	Crystal Creek	45,000
Earl West Cove	SSE	chinook	Crystal Lake	SMOLTS	Crystal Creek	866
Earl West Cove	SSE	chinook	Crystal Lake	SMOLTS	Crystal Creek	206,000
Crystal Creek	SSE	chinook	Crystal Lake	SMOLTS	Crystal Creek	80,000
Crystal Creek	SSE	chinook	Crystal Lake	SMOLTS	Crystal Creek	40,000
Crystal Creek	SSE	chinook	Crystal Lake	SMOLTS	Crystal Creek	307,000
Crystal Creek	SSE	chinook	Crystal Lake	SMOLTS	Crystal Creek	5,544
Harding River	NSE	chinook	Crystal Lake	FEED FRY	Harding River	6,949
Harding River	NSE	chinook	Crystal Lake	FEED FRY	Harding River	12,043
Harding River	NSE	chinook	Crystal Lake	FEED FRY	Harding River	11,531
Crystal Creek	SSE	chum	Crystal Lake	SWIMUP FRY	Crystal Creek	24,000
Crystal Creek	SSE	chum	Crystal Lake	SWIMUP FRY	Crystal Creek	106,000
Crystal Creek	SSE	chum	Crystal Lake	SWIMUP FRY	Crystal Creek	66,000
Crystal Creek	SSE	coho	Crystal Lake	SMOLTS	Crystal Creek	354,000
3 Mile Creek	SSE	coho	Crystal Lake	SMOLTS	Crystal Creek	2,000
Nordic Dr. Creek	SSE	coho	Crystal Lake	SMOLTS	Crystal Creek	2,000
Hammer Slough	SSE	coho	Crystal Lake	SMOLTS	Crystal Creek	2,000
Sandy Beach Creek	SSE	coho	Crystal Lake	SMOLTS	Crystal Creek	2,000
Crystal Creek	SSE	coho	Crystal Lake	SWIMUP FRY	Crystal Creek	463,000
St. John's Creek	NSE	coho	Crystal Lake	FINGERLINGS	St. John's Creek	15,337
Slippery Creek	NSE	coho	Crystal Lake	FINGERLINGS	Slippery Creek	31,000
Slippery Creek	NSE	coho	Crystal Lake	FINGERLINGS	Slippery Creek	33,000
Crystal Creek	SSE	steelhead	Crystal Lake	SMOLTS	Crystal Creek	8,600
Ketchikan Creek	SSE	chinook	Deer Mountain	SMOLTS	Ketchikan Creek	42,000
Thorne Bay	SSE	chinook	Deer Mountain	ZERO CHECKS	Ketchikan Creek	83,000
Craig/Crab Bay	SSE	chinook	Deer Mountain	ZERO CHECKS	Ketchikan Creek	48,000
Murphy's Landing	SSE	chinook	Deer Mountain	ZERO CHECKS	Ketchikan Creek	55,000
Murphy's Landing	SSE	chinook	Deer Mountain	ZERO CHECKS	Ketchikan Creek	33,000
Murphy's Landing	SSE	chinook	Deer Mountain	ZERO CHECKS	Ketchikan Creek	28,000
Murphy's Landing	SSE	chinook	Deer Mountain	ZERO CHECKS	Ketchikan Creek	55,000

(LL) = Land Locked Lake

Table 1B. Salmonids stocked by FRED Division Region I in 1987

includes all releases as of 30 October 1987

Stocking Location	Area	Species	Hatchery	Life Stage	Brood Stock	Number Stocked
Kasnyku Bay	NSE	chum	Hidden Falls	FED FRY	Hidden Falls	14,300,000
Kasnyku Bay	NSE	chum	Hidden Falls	FED FRY	Hidden Falls	6,840,000
Takatz Bay	NSE	chum	Hidden Falls	FED FRY	Hidden Falls	19,000,000
Kasnyku Bay	NSE	chinook	Hidden Falls	SMOLTS	CrystalCreek	16,688
Kasnyku Bay	NSE	chinook	Hidden Falls	SMOLTS	CrystalCreek	8,496
Kasnyku Bay	NSE	chinook	Hidden Falls	SMOLTS	CrystalCreek	20,953
Kasnyku Bay	NSE	chinook	Hidden Falls	SMOLTS	Tahini River	25,373
Kasnyku Bay	NSE	chinook	Hidden Falls	SMOLTS	Tahini River/ H.F.	26,474
Klawock River	SSE	chum	Klawock	SWIMUP FRY	Klawock River	3,990,000
Klawock Lake	SSE	coho	Klawock	PRE-SMOLTS	Klawock River	833,000
Klawock Lake	SSE	coho	Klawock	PRE-SMOLTS	Klawock River	34,000
Klawock Lake	SSE	coho	Klawock	PRE-SMOLTS	Klawock River	27,000
Klawock Lake	SSE	coho	Klawock	PRE-SMOLTS	Klawock River	32,000
Tunga Lake	SSE	coho	Klawock	FINGERLINGS	Klawock River	199,000
Klawock Lake	SSE	steelhead	Klawock	SMOLTS	Klawock River	34,000
Montana Creek	NSE	steelhead	Klawock	SMOLTS	Klawock River	27,000
Ward Lake Creek	SSE	steelhead	Klawock	SMOLTS	Klawock River	28,687
Klawock River	SSE	steelhead	Klawock	SMOLTS	Klawock River	1,100
Doty's Cove	NSE	chum	Snettisham	FED FRY	Snettisham	2,760,000
Snettisham	NSE	chum	Snettisham	FED FRY	Snettisham	11,800,000
Snettisham	NSE	chum	Snettisham	FED FRY	Snettisham	10,900,000
Snettisham	NSE	chinook	Snettisham	SMOLTS	Crystal Creek	278,000
Fish Creek Ponds	NSE	chinook	Snettisham	SMOLTS	Crystal Creek	31,479
Auke Creek	NSE	chinook	Snettisham	SMOLTS	Crystal Creek	50,522
Fish Creek Ponds	NSE	chinook	Snettisham	SMOLTS	Crystal Creek	31,205
Montana Creek	NSE	chinook	Snettisham	SMOLTS	Crystal Creek	30,703
Auke Creek	NSE	chinook	Snettisham	SMOLTS	Crystal Creek	24,972
Snettisham	NSE	chinook	Snettisham	SMOLTS	Crystal Creek	31,422
Sheep Creek	NSE	chinook	Snettisham	SMOLTS	Crystal Creek	31,112
Snettisham	NSE	chinook	Snettisham	SMOLTS	Crystal Creek	437,000
Auke Creek	NSE	chinook	Snettisham	SMOLTS	Crystal Creek	15,038
Snettisham	NSE	chinook	Snettisham	SMOLTS	King Salmon River	32000
Snettisham	NSE	chinook	Snettisham	SMOLTS	King Salmon River	32000
Snettisham	NSE	chinook	Snettisham	SMOLTS	King Salmon River	11000
Snettisham	NSE	chinook	Snettisham	SMOLTS	King Salmon River	11000

(LL) = Land Locked Lake

Table 1B. Salmonids stocked by FRED Division Region I in 1987

includes all releases as of 30 October 1987

Stocking Location	Area	Species	Hatchery	Life Stage	Brood Stock	Number Stocked
Twin Lakes (LL)	NSE	coho	Snettisham	SMOLTS	Snettisham	10,000
Twin Lakes (LL)	NSE	coho	Snettisham	SMOLTS	Snettisham	2,300
Twin Lakes (LL)	NSE	coho	Snettisham	SMOLTS	Snettisham	4,100
Snettisham	NSE	coho	Snettisham	SMOLTS	Snettisham	518,000
Salmon Creek	NSE	coho	Snettisham	SMOLTS	Snettisham	101,000
Fish Creek	NSE	coho	Snettisham	SMOLTS	Snettisham	53,000
Dredge Lake	NSE	coho	Snettisham	SMOLTS	Snettisham	53,000
Snettisham	NSE	coho	Snettisham	SMOLTS	Snettisham	54,000
Snettisham	NSE	coho	Snettisham	SMOLTS	Montana Creek	86,000
Snettisham	NSE	coho	Snettisham	SMOLTS	King Salmon River	44,000
Indian Lake	NSE	coho	Snettisham	FED FRY	Snettisham	104,000
Montana Creek	NSE	steelhead	Snettisham	SMOLTS	Peterson Creek	2,353

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