

FRED Reports

FRED 1983 ANNUAL REPORT
TO THE ALASKA STATE LEGISLATURE

Edited by
John C. McMullen
Jeffrey A. Hansen
Number 22



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 research into genetics, limnology, biology, fish culture, and pathology is providing important information about the State's fish resources. FRED encourages rehabilitation efforts by private nonprofit aquaculture corporations and provides technical services to them. During 1983, FRED released more than 256 million young salmon, an increase of 61 million over 1982 releases. Over 401 million eggs were taken for incubation during the year, representing an increase of over 113 million eggs from 1982. More than 2.3 million hatchery-bred salmon returned to the State's hatcheries and fisheries in 1983.		SUBJECT CATEGORY <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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INTRODUCTION

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

Statute Authorities

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

FRED's duties (AS 16.10.092) include the annual presentation of a comprehensive report to the Legislature. This report, along with a detailed budget request, satisfies these reporting requirements.

Functions and Services

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

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

The Private Nonprofit (PNP) Hatchery Program is administered by the Division, and duties include organizing the regional salmon planning teams, which are comprised of Department 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 provides engineering services to the Department. Projects include field facilities, hatcheries, and coordination with consultants, contractors, and land owners.

FRED PRODUCTION SUMMARY

PRODUCTION RESULTS, 1983

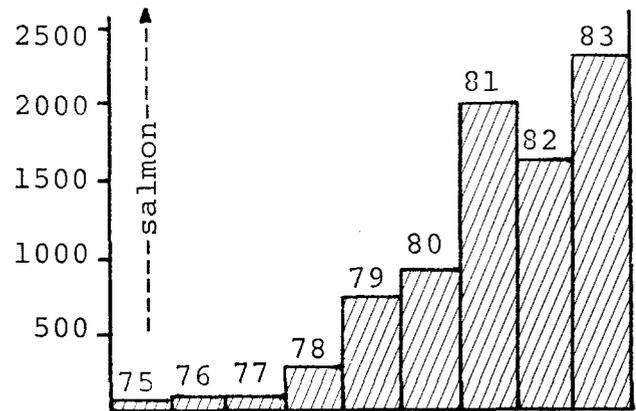
More adult salmon returned in 1983 as a result of FRED projects than ever before. Nearly 2.3 million FRED salmon returned, as opposed to 1.6 million in 1982 and 2 million in 1981. Of those 2.3 million, at least 1.7 million were harvested by commercial fishermen. An estimated 18,800 were taken by sport fishermen. FRED hatchery returns by species and facility appear in Table 1.

Releases of fish by FRED projects during 1983 totaled nearly 260 million, 64 million more than in 1982. Pink salmon was the predominant species (135 million fish). Releases by area, facility, and species appear in Tables 2 and 3. Hatchery survivals for all fish released in 1983 are shown in the tables in Appendix A, and release locations by species appear in Appendix B.

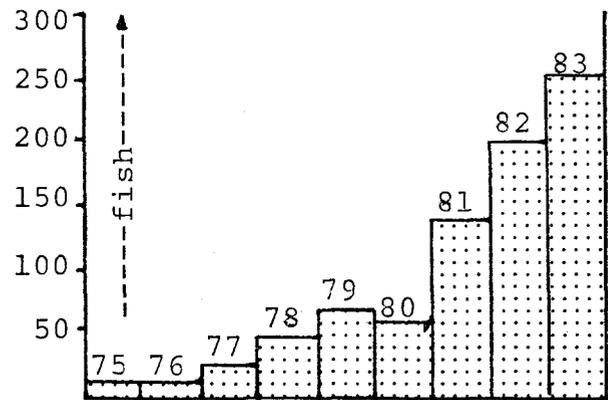
During 1983, FRED took more eggs and released more fish than ever before. FRED personnel took 401 million eggs, 113 million more than were taken in 1982. The predominant species were pink salmon (219 million eggs), chum salmon (90.7 million eggs), and sockeye salmon (67.9 million eggs). Egg takes by area, facility, and brood stock are shown in Table 4.

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

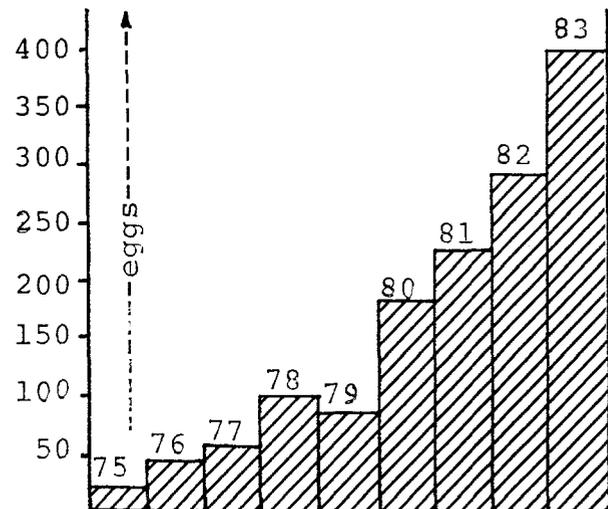
PRODUCTION AT A GLANCE . . .



Adult returns of FRED Hatchery salmon in thousands



Releases of young fish from FRED Hatcheries in millions



Eggs taken for FRED Hatcheries in millions

SOUTHEAST

The Fisheries

The Southeastern commercial salmon harvesters are comprised of 414 purse seine, 464 drift gillnet, and 939 power troll limited entry permit holders. In addition, about 1,800 hand trollers hold interim permits.

Since statehood, the fisheries have annually averaged about 308,000 chinook, 867,000 sockeye, 1,139,000 coho, 10,176,000 pinks in the odd years and 13,952,000 pinks in the even years, and 1,711,000 chums.

The seine fishery targets on pink salmon, which in straits and off capes are mixed with chum and sockeye salmon. Drift gillnet fisheries target on chums and sockeyes, but pink salmon are the dominant fish caught in years of high fish abundance. The troll fishery concentrates on coho and chinook salmon. Many of the chinook caught are not of Alaskan origin and are, therefore, one of the main points of controversy in the U.S./Canada treaty negotiations.

Surveys of the sport fish in 1982 revealed that anglers exerted 292,941 angling days in Southeastern waters. Freshwater angling accounted for more than half of the effort. About 138,500 salmon were caught in 1982, along with about 67,200 trout and char.

User Desires

The Southeastern Comprehensive Salmon Plan, as developed by two Regional Planning Teams comprised of Department of Fish and Game and Regional Aquaculture Association members, established production objectives for (State and private) salmon enhancement and rehabilitation programs. The 20-year enhancement objectives include the annual production of 222,000 chinook, 1,400,000 sockeye, 1,650,000 coho, 14,000,000 pink, and 8,000,000 chum salmon, for a total of 25,272,000 salmon. Total number of salmon desired for annual harvest, including those from natural stocks, will be 44,987,000 fishes. Therefore, fish production by enhancement techniques is expected to produce 56% of the total.

FRED Response to User Desires

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

Most cultured fishes in Southeast are released at the hatcheries. However, program plans include increased numbers of rehabilitation projects wherein coho, chinook, and sockeye salmon are to be stocked in lakes and streams for advanced rearing.

The State operates six salmon/trout hatcheries in Southeast. Three of those: (1) Snettisham, near Juneau; (2) Hidden Falls, on Chatham Strait at Baranof Island; and (3) Klawock, at Klawock, feature chum salmon. Each facility has a capacity of about 70 million eggs, with intended returns of about 1 million chums per year, each. The Snettisham and Hidden Falls Hatcheries, along with the Crystal Lake Hatchery at Petersburg and the Deer Mountain Hatchery at Ketchikan, also feature chinook salmon. This species is of special interest in Southeast, and program funding has been adjusted to emphasize chinook salmon brood-stock development and increased production.

The Beaver Falls Hatchery at Ketchikan was taken out of chum salmon production in 1983 and is scheduled to be reconstructed as a sockeye salmon facility for the purpose of delivering fry to lakes being treated with commercial fertilizer for the purpose of increased sockeye production.

Southeast Highlights

- Approximately 125,000 adult chums returned as a result of releases from Hidden Falls. This reflects an ocean survival of over 3% for the 1979 brood year.
- Hidden Falls released 21.6 million chums and took 31.8 million chum eggs during 1983. This is the largest release and egg take of chum salmon in the State.
- A total of 2.1 million chinook eggs were taken from returning adults at Deer Mountain Hatchery in Ketchikan. Eggs were sent to Southern Southeast Regional Aquaculture Association for the Neets Bay Hatchery and the Tamgas Hatchery near Metlakatla.
- The coho salmon return to Deer Mountain was 10,600 fish, which represents a 6.4% marine survival. This return prompted the Ketchikan Creek sport fishery to be opened for the first time since 1974.
- Returns of 2,000 coho to Ward Creek represented a 4% survival after fishery exploitation and provided 400 coho to sport fishermen on the Ketchikan road system.
- A total of 243,000 chinook salmon eggs were gathered from fish in the King Salmon River and Tahini River, which represent work on two Alaskan stocks for the Southeast chinook salmon development plan. Hatchery brood development and natural stock rehabilitation are the objectives of this work.
- About 398,000 coho smolts and 2,246,000 coho fry were released from the Crystal Lake Hatchery. About 1.5 million fry were placed in Irish Creek, above a waterfall, which is to be the site of a fishpass project in 1984. The released smolts should provide a return of about 20,000 coho adults.

- A fishpass at Bakewell Lake, south of Ketchikan, was completed, thus allowing about 2,000 adult coho salmon to enter the system to spawn. Sockeye production objectives for the Beaver Falls Hatchery include stocking sockeye above the Bakewell ladder for the next several years.

Southeast Returns

Estimated returns to Southeast hatcheries and projects in 1983 totaled over 203,000 salmon (Table 1), which was an increase of nearly 75,000 fish over the previous year. As mentioned, over 125,000 chum salmon returned to the Hidden Falls Hatchery, representing a better than expected ocean survival of over 3%. The commercial seine fishery caught nearly 83,000 of those chums, and the hatchery filled its brood-stock needs.

The recovery of tagged hatchery fish within the commercial and sport fisheries aided in the evaluation of salmon returns to coastal waters in Southeast. Many of the chinook, coho, and chum salmon have been tagged, prior to release, at most hatcheries. Statistical analysis of the relationship between numbers of fish tagged and released and of those recovered in the fisheries has provided preliminary estimates of hatchery contribution to the catch. For example, the Deer Mountain Hatchery contributed to the fisheries with about 7,600 of their cohos being taken in the commercial fisheries, and another 800 were caught by sport anglers. Crystal Lake Hatchery coho salmon also continued to contribute to the commercial fishery with an estimated 2,800 fish. The chinook salmon program at Crystal Lake is rebuilding from the time when the hatchery was disinfected and the chinook brood stocks were changed to eliminate diseases. Even so, an estimate of 1,800 Crystal Lake chinooks were accounted for in 1983.

Southeast Releases

Nearly 44 million chum fry and fingerings were released from Southeastern hatcheries in 1983, an increase of 15 million over 1982 (Table 2). Hidden Falls, located on the east coast of Baranof Island, accounted for nearly half this number with Klawock, Snettisham, and Beaver Falls being the other major contributors.

The number of chinook salmon released in Southeast increased again in 1983, totaling over 700,000 juveniles. Snettisham was the largest producer, with a release of 234,000 chinook smolts. Releases were also made from Deer Mountain, Crystal Lake, and Hidden Falls Hatcheries.

Over 3.4 million coho were released from facilities or projects in Southeast during 1983. Crystal Lake Hatchery accounted for over 2.6 million of these, with fry and smolt releases into Ohmer Creek and Crystal Creek. Fry were released into Sumner Creek and 1.5 million fry were planted into Irish Creek in order to establish a stock there. A fishway is to be completed on Irish Creek in 1984, which will allow the returning coho to ascend the barrier and return to the release site. Snettisham released 563,000 coho in 1983. Almost half of these were taken to the Indian Lake system, which empties into the Speel River, upstream from the Snettisham Hatchery. Coho were also released from Klawock and Deer Mountain Hatcheries.

Steelhead were released from three hatcheries in 1983 (Table 3). About 57,400 smolts were distributed from the Crystal Lake, Deer Mountain, and Klawock Hatcheries.

Southeast Egg Takes

Nearly 50 million chum eggs were taken for Southeastern facilities in 1983 (Table 4). Almost 32 million were taken from chums returning to the Hidden Falls Hatchery. Remote egg takes from Neka River, plus adults returning to the facility, enabled Snettisham to take over 12 million chum eggs. Next year, the returns to Snettisham should be sufficient enough to require that few or no eggs be taken from the Neka River.

Poor chum returns to Cholmondeley Sound and Klawock River resulted in low numbers of eggs for Klawock. Beaver Falls took nearly 3 million eggs from returns there and transferred them to the Klawock Hatchery. Beaver Falls is being reprogrammed to serve as a sockeye facility for use in stocking programs. Eggs taken from chum salmon returning to the Beaver Falls Hatchery in 1984, 1985, and 1986 will be transferred to Klawock. No releases of sockeye are planned at the Beaver Falls Hatchery.

Over 2 million chinook eggs were taken from adults returning to the Deer Mountain Hatchery. Of these, 671,000 went to Tamgas Hatchery near Metlakatla, and 627,000 went to Southern Southeast Regional Aquaculture Association under their Neets Bay permit. Chinook eggs were also taken from returns to Crystal Creek and from four remote sites, for a total Southeast chinook egg take of nearly 2.7 million.

Crystal Lake again provided the majority of coho eggs in Southeast with an egg take of 2.3 million. Klawock and Snettisham also took a substantial number of coho eggs. Deer Mountain took 73,000 eggs from returning adults; the resultant fry will be released into Ward Lake in 1984.

PRINCE WILLIAM SOUND

The Fisheries

The commercial fisheries of this Management Area include those of the Copper and Bering Rivers. Present data indicate that 259 seine, 531 drift gillnet, and 29 set gillnet entry permit holders had the opportunity to participate in the fisheries.

Since statehood, chinook salmon catches have averaged about 19,150 fish annually; nearly all were taken off the Copper River Delta. Sockeye catches have averaged about 764,500 fish, and that number was divided between fisheries off the river mouth and those caught in Prince William Sound (PWS). Coho salmon catches have averaged about 245,000 fish annually, with two-thirds taken off the Copper River Delta. Pink salmon catches in PWS have averaged between 5.2 million and 6.0 million fish for even and odd year stocks, respectively. Finally, an average of about 0.5 million chums have been caught annually in the Sound.

Sport fisheries in PWS center around towns and villages, and those areas which are accessible by air or boat. About 40,500 days of effort were recorded for PWS anglers in 1982. Those anglers caught about 29,800 salmon of which about 11,000 were coho salmon. The proliferation of sport boats in PWS indicates an imminent shift upward of sport angling effort.

User Desires

A comprehensive salmon plan was completed for the PWS - Copper River area in 1983. Planning team members were comprised of Department of Fish and Game and fishermen representing the Prince William Sound Aquaculture Corporation (PWSAC). This 20-year plan lists desired annual catches of 24,100 chinook salmon, 908,900 sockeyes, 262,100 coho salmon, 10,011,400 pinks, and 1,598,000 chum salmon.

The planning team estimated probable sport fishery minimum and maximum demands by the year 2002. Minimum expected catches include 8,600 chinook, 25,700 sockeye, 28,600 coho, 17,200 pink, and 8,600 chum salmon.

Response to User Desires

The FRED Division maintains a field office at Cordova and operates two hatcheries in the northwest part of the Sound and one sockeye streamside incubation facility on the Upper Copper River. Biologists from the Cordova office participate in determining potential for sockeye and coho salmon production by means of lake enrichment along the Copper River as well as in the Sound. Other studies deal with the development of salmon sport fisheries at Whittier and Valdez as well as the Copper River Flats.

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

The Copper River sockeye facility produces fish for the commercial fishery off the River's Delta and supplies fish to the upstream subsistence and personal use fisheries.

Prince William Sound Highlights

- Main Bay and Cannery Creek Hatcheries contributed a minimum of 711,000 pink salmon to commercial catches in PWS in 1983.
- Pink salmon production at Main Bay resulted in a commercial fishery in the Eshamy District, which has not been open to a commercial fishery in four years.
- The entire PWS set gillnet pink salmon catch consisted of fish produced by the Main Bay Hatchery.

- About 41% of the PWS drift gillnet pink salmon catch consisted of fish produced by Main Bay Hatchery.
- About 125 million salmon eggs were taken in 1983 for incubation at the State hatchery facilities.

Prince William Sound Returns

As mentioned, the FRED Division operates two hatcheries in PWS and one streamside incubation facility for sockeye on the upper Copper River. These projects provided a commercial harvest of at least 750,000 adults and returned over 210,000 salmon for brood stock and stream escapement (Table 1). The commercial harvest figure is an underestimation of the total contribution to the fisheries, because the number of fish that were intercepted outside the Northern District of the Sound were not determined. Liberal guesses estimate that as much as 79% of the hatcheries returning fish are intercepted in the commercial fisheries.

An estimated 408,000 pink salmon returned as a result of the 1982 releases from Cannery Creek, representing a 2.9% ocean survival. At least 500,000 pink salmon returned to Main Bay as a result of fry transported from Cannery Creek. The eggs originated from the Port San Juan Hatchery, which is operated by PWSAC.

Pink salmon fry transplanted to Hobo Creek, above the Forest Service fish ladder site in 1980 and 1981 produced adult returns that spawned in the system in 1981 and 1982. In 1983, an estimated 11,800 pink salmon returned to the system as a result of stream production from adults returning from the 1980 transplant. These original transplants have established a self-perpetuating run of pink salmon above the barrier falls.

The Gulkana streamside incubation project, which is intended to enhance the indigenous sockeye stocks for the Copper River fishery, produced an estimated 12,000 adult returns in 1983. This return is encouraging, considering that future returns will be from larger scale egg takes that have already occurred. This facility is expanding to a capacity of 20 million eggs, which could result in the return of over 100,000 adults per year.

Prince William Sound Releases

About 48 million emergent pink fry were released from Cannery Creek and Main Bay in 1983 (Table 2). Main Bay also released 8.6 million chum juveniles, which ranged from unfed fry to fingerling life stage. Approximately 181,000 unfed coho fry, originally from Cannery Creek, were released into two barren lake systems and Mile 18 Creek on the Copper River Flats. With the assistance of PWSAC and U.S. Forest Service personnel, growth and feeding studies were conducted on the fry released into the lakes through the fall of 1983. Smolt production from the transplants will be monitored in 1984.

Smolt were released into Cove Creek at Whittier again in 1983, with 112,000 chinook and 93,000 coho being transported from Elmendorf Hatchery at Anchorage. Returns from these releases are targeted to enhance marine sport fisheries in the Whittier area.

Approximately 9.7 million sockeye fry were produced by the Gulkana streamside incubation project in 1983. The adults from these fry are expected to contribute to the Copper River Delta gillnet fishery as well as up-river fisheries.

Prince William Sound Egg Takes

Nearly 125 million salmon eggs were taken at the three facilities in PWS in 1983 (Table 4). Pink salmon was the dominant species; over 88 million eggs were taken at Cannery Creek and Main Bay. In a cooperative effort between PWSAC and the Main Bay Hatchery, approximately 21.5 million chum eggs were taken from the Wells River. The eggs were incubated at Main Bay, where half of the resultant fry will be released. The rest of the fry will be transported to and released from Lake Bay on Esther Island. This is to build a brood stock that will return to the site of PWSAC's proposed Esther Lake Hatchery.

Slightly over 13 million sockeye eggs were taken for streamside incubation at Gulkana, and over 1 million chum eggs were taken from adults returning to Cannery Creek.

COOK INLET

The Fisheries

The Cook Inlet commercial salmon fisheries are comprised of 744 set gillnet, 554 drift gillnet, and 75 purse seine limited entry permit holders. Drift gillnetting is restricted to the central portion of Cook Inlet, while set net sites are located over a greater distance along both sides of Cook Inlet. Seining takes place in southern Cook Inlet and the Outer District of the Kenai Peninsula.

Since statehood, commercial fishermen in Cook Inlet have averaged about 14,400 kings, 1,254,900 sockeye, 260,100 coho, 764,400 chums, and 2,252,900 even-year and 1,021,300 odd-year pinks per year.

About 128,500, or 60%, of the 212,000 licensed sport anglers in Alaska live in the Cook Inlet basin, according to a 1982 sport fish survey. This group, plus the non-residents who fish there, account for an estimated 887,861 angler days of fishing effort in the Cook Inlet drainage sport fisheries. These anglers landed about 430,000 salmon that year. Cohos topped the list at 136,000 fish. About 46,300 chinook were caught, which topped the total sport catch of chinook in the Southeastern region by 20,000 fish.

The gillnet fisheries are targeted on sockeyes. Strong returns to the Kenai and Kasilof Rivers can result in added fishing time, which could result in greater than desired catches of the smaller stocks of upper Cook Inlet sockeyes and cohos and Kenai River chinooks.

Conversely, fishery restrictions, which allow adequate escapements of chinooks and cohos to the Kenai River and upper Inlet streams, may result in excess numbers of sockeyes in the Kenai and Kasilof Rivers and a large economic loss to the commercial fishery.

User Desires

A Regional Salmon Planning Team, comprised of Department of Fish and Game staff and members of fishery user groups, developed a comprehensive plan for Cook Inlet salmon and have established production objectives for both hatchery and natural stocks. The 10-year objectives for the enhancement program include 567,000 sockeyes, 1,700,000 pinks, 347,000 chums, 372,000 cohos, and 93,000 chinooks. Pink salmon are intended for harvest in the lower Inlet seine fishery, and the bulk of the other species will be directed toward the gillnet and sport fisheries.

FRED's Response to User Desires

The FRED Division maintains biological field offices at Big Lake, Soldotna, and Homer, and operates six hatcheries throughout the Cook Inlet drainage. The biological staff is involved in chinook, coho, and sockeye rehabilitation projects in upper and central Cook Inlet, which include determination of waters to be stocked, brood-stock acquisition, and evaluation of hatchery releases. In addition, the biological staff supervises fishery enhancement projects that feature smolt releases for the creation of saltwater sport fisheries, and fishpass development. Stocking studies to determine the feasibility of introducing chinook, coho, and sockeye salmon in unoccupied lakes also shows promise for production increases. Finally, the biological and engineering staffs are involved in special studies of the Kenai River system. The feasibility of expanded steelhead production on the Kenai Peninsula is also being investigated.

The six hatcheries serving the Cook Inlet area all provide fish for subsistence, sport, and commercial fisheries. The Big Lake Hatchery, near Wasilla, produces sockeye salmon for the Big Lake and Nancy Lake systems. Many of these fish are caught by Cook Inlet gillnetters. The hatchery also produces coho salmon, which are stocked in Knik Arm streams as well as the Little Susitna River and targeted for harvest in the sport fisheries. The Fort Richardson Hatchery at Anchorage operates on water heated by the military power plant. This new facility is coming on line and will feature rainbow trout for placement in over 75 lakes in Southcentral and Interior Alaska. Coho and chinook salmon smolts produced by this facility will be stocked at locations near Homer and Seward as well as Whittier and Valdez in Prince William Sound. The Elmendorf Hatchery presently carries the rainbow trout program, but is troubled with disease which will be absent from the Fort Richardson facility. Chinook and coho salmon produced at Elmendorf are presently stocked in

the Kasilof River (Crooked Creek), Kachemak and Resurrection Bays, and Whittier.

Three of the six salmon hatcheries in Cook Inlet are located on the Kenai Peninsula. The newest facility is at Trail Lakes, near Moose Pass. This facility can handle several species of salmonids without transfer of disease. Presently, sockeye, coho, and chinook salmon are the target species for stocking into the Kenai River and Sixmile Creek. The Kasilof Hatchery is the only sockeye facility that has not experienced IHN virus mortalities. This facility deals largely with Tustumena Lake sockeyes but provides sockeyes to other lakes such as Packers, Chenik, and Leisure, all in central and lower Cook Inlet. Chinook salmon eggs taken at this facility are utilized by the Elmendorf Hatchery 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 50% or more of the total pink salmon seine fishery harvest in the lower Inlet. In addition, sport anglers remove about 5,000 pinks per year from this hatchery stock.

Cook Inlet Highlights

- Ninety land locked lakes were stocked with rainbow trout for sport fisheries (Appendix B).
- An estimated 105,000 sockeyes of hatchery origin returned to Tustumena Lake.
- About 8,660 hatchery and naturally produced chinooks returned to the Kasilof River and Crooked Creek. The resultant sport fishery took 4,400 fish and supplied 24,000 angler days of recreation.
- About 8.1 million sockeye smolts were estimated to have migrated from Tustumena Lake in 1983. Mark recovery studies indicated that 25% of the smolts resulted from hatchery fry that were stocked in the lake.
- Salmon produced by FRED projects contributed 50% of the total commercial harvest of 1.2 million salmon in lower Cook Inlet.
- Over 3,000 sport fishermen, in about 1,000 boats, caught nearly 2,200 chinook salmon at Halibut Cove Lagoon, as a result of a State stocking project. The catch in 1983 was twice the number taken from the Kenai Peninsula's famous Anchor River.
- About 1,820 sport and personal use fishermen utilized the stock of sockeye salmon that has been produced by the FRED program at Leisure Lake in China Poot Bay. They caught about 6,200 sockeyes in 1983, while another 75,000 Leisure Lake sockeyes were landed by the commercial seine fishery.

Cook Inlet Returns

Nearly 200,000 sockeyes returned to Cook Inlet in 1983, as a result of Crooked Creek production. The largest group (105,000) returned from fingerlings released into Tustumena Lake (Table 1). It is estimated that about 75,000 hatchery sockeyes were harvested in the Kasilof commercial fishery. Another 75,000 sockeye were harvested in the China Poot commercial fishery, as a result of fry stocked into Leisure Lake. These returns also provided a dip net and sport fishery, which provided 6,400 sockeye to 1,800 fishermen. An additional 7,000 sockeye returned to Chenik Lake, where they had originally been stocked.

Although the 1983, pink salmon return to the Tutka Lagoon Hatchery was on the low end of the forecast range, at 644,500 fish, it still represented an ocean survival of 4.2% and contributed an estimated 66% of the total lower Cook Inlet pink salmon catch.

Chinook salmon returned to Crooked Creek and Halibut Cove Lagoon in numbers large enough to support substantial sport fisheries. Just under 2,200 chinook were harvested by 3,000 anglers at Halibut Cove Lagoon, where a total of over 3,000 chinook returned. A total of 8,666 chinook returned to Crooked Creek, of which 6,000 were a result of hatchery production. At least 3,200 of the hatchery produced chinook were harvested by sports fishermen.

Catches of rainbow trout from stocked lakes are not assessed by the FRED Division project leaders. That information will be presented later as part of the Sport Fish Division Statewide Harvest Report.

Cook Inlet Releases

Kasilof Hatchery released nearly 17 million sockeye fingerling into Tustumena Lake and 1.5 million sockeye fry into Leisure Lake in 1983 (Table 2). Big Lake and Trail Lakes Hatcheries also released sockeye juveniles into lakes in Central and Upper Cook Inlet. A total of 30 million sockeye were released from Cook Inlet facilities.

Chinook salmon were produced by the Kasilof and Elmendorf Hatcheries. Elmendorf released a total of 587,000 chinook into Crooked Creek, Box Canyon, Halibut Cove Lagoon, and Whittier's Cove Creek. Elmendorf also released over 1.2 million rainbow trout (Table 3) into 90 lakes in the Cook Inlet, Kodiak, Prince William Sound, and Interior areas (Appendix B). All the pink and chum salmon releases in Cook Inlet came from Tutka Hatchery, where in 1983, 15.4 million pink and 1.1 million chum juveniles were released.

The Big Lake Hatchery again was the leading producer of juvenile coho in the Cook Inlet area, with releases totaling over 2 million fish. These fingerling were released into nine lakes in the upper Cook Inlet area. Trail Lakes released 1.1 million coho fingerling into lakes in the central Cook Inlet area, and Elmendorf released a total of 390,000 coho into two central Cook Inlet lakes, Seward Lagoon, and Cove Creek in Whittier.

Cook Inlet Egg Takes

Sockeye salmon made up approximately half of the total number of eggs taken in Cook Inlet in 1983, with Big Lake taking 16 million, Kasilof taking 21.6 million, and Trail Lakes accounting for 1.9 million (Table 4).

More than 2.7 million chinook eggs were taken for Cook Inlet facilities. Almost 1.8 million of these came from Crooked Creek, and the rest came from four other sources including Willow Creek and the Kenai River.

Tutka Hatchery had its largest egg take to date in 1983, with 25.5 million pink eggs and 152,000 chum eggs. A total of nearly 5.4 million coho eggs were taken from nine sources in Cook Inlet in 1983. Big Lake took 2.2 million coho eggs, and Trail Lakes, Elmendorf, and Fort Richardson collectively accounted for the other 3.2 million.

KODIAK

The Fisheries

A recent report of the Commercial Fisheries Entry Commission indicated that 375 purse seine, 186 set net, and 34 beach seine permit holders are licensed to fish salmon in the Kodiak area.

Since statehood, the commercial fisheries have annually averaged about 1,200 chinook salmon, 849,300 sockeyes, 58,700 cohos, 5,200,000 odd-year and 9,600,000 even-year pink salmon, and about 775,000 chums.

Sport fishing is popular on Kodiak Island. The Sport Fish Division's Harvest Survey for 1982 indicates that 5,983 residents of the Kodiak Island complex were licensed anglers. They and non-resident anglers fished a total of 81,238 days in 1982. Catches of about 13,300 coho and 19,000 pink salmon and 24,000 Dolly Varden char dominated the sport fish catch.

User Desires

A Regional Planning Team, comprised of representatives of the Department's three fisheries divisions and three members of the Kodiak Fish and Game Advisory Committee, completed a comprehensive salmon plan for the Kodiak area in 1983. The 10-year objectives agreed upon for annual salmon catches included 1.9 million sockeye, 2 million chum, 543,000 coho, 7,000 chinook, and 13.5 million and 18.5 million pink salmon for odd and even years, respectively. Proposed supplemental production facilities and projects are projected to account for 9,685,000 harvestable salmon or approximately 47% of the total.

FRED Response to User Desires

The FRED Division maintains an area office at Kodiak, and operates a 100-million-egg salmon hatchery at Kitoi Bay on Afognak Island. This facility

also stocks salmon and trout at a variety of locations accessible to sports anglers.

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

ALASKA PENINSULA

The Fisheries

The Alaska Peninsula salmon resources are harvested by 207 purse seine, 156 drift gillnet, and 110 set gillnet entry permit holders. Another 90 purse seine permit holders fish the Chignik Salmon Registration area.

Between the years of 1960 and 1977, the Alaska Peninsula-Chignik salmon fisheries have caught an annual average of about 8,400 chinook, 1,455,000 sockeye, 60,600 coho, 840,000 chum, and 2,320,000 pink salmon.

User Needs

No regional planning team has been formed on the Alaska Peninsula. Therefore, the long-term harvest objectives included in the Department's 1975 Provisional Salmon Plan are utilized. That plan includes annual harvests of 2.5 million pink, 650,000 chum, and 1.5 million sockeye salmon from natural stocks. In addition, a long-term objective of 7 million chum and pink salmon was established for the supplemental production program.

The sport fisheries of the Alaska Peninsula are centered near towns. Remoteness and weather inhibit the development of the potential harvest to the extent that only about 2,000 salmon of all species were harvested west of the Bristol Bay lakes in 1982.

FRED Response to User Needs

The FRED Division operates a chum salmon hatchery at Russell Creek, near Cold Bay. That facility was originally intended to release about 45 million fed fry each year, which would return about 700,000 chum salmon to the fishery. However, major mechanical problems are preventing that hatchery from handling more than 14 million chum salmon eggs per year.

The FRED Division closed its biological field office at Cold Bay. The results are that most biological evaluations of the Russell Creek chum salmon project are no longer accomplished.

Kodiak and Alaska Peninsula Highlights

- Nearly 105 million pink eggs were taken at Kitoi Hatchery in 1983. This is the largest egg take at a State-operated facility ever.

- Chinook and coho eggs were taken for incubation at Kitoi to enhance the sport fisheries in the Kodiak area.
- Kitoi Hatchery pink salmon contributed approximately 53% of the commercial pink catch in the Izhut Bay area.

Kodiak and Alaska Peninsula Returns

Approximately 279,000 adult pink salmon returned in 1983, as a result of Kitoi Hatchery production (Table 1). This includes 130,000 pink salmon that were commercially harvested in the Kitoi Bay area. More pinks were expected back, but poor marine survival of hatchery fry released in 1982 (1/2% unfed fry and 1% for reared fry) depressed the run. In 1983, Karluk streamside incubation provided an estimated 20,000 sockeye to the Karluk system, and an undetermined number were harvested commercially. These returns contributed to the best sockeye return that has been recorded since statehood to the Upper Thumb River, which is tributary to Karluk Lake. Russell Creek Hatchery was expected to produce about 50,000 adult chum salmon for 1983, but since evaluation studies have ended there, the hatchery contribution to the total chum return was not estimated.

Fishpasses on Kodiak and Afognak Islands contributed an estimated minimum of 56,000 salmon to commercial fisheries in 1983. The large share of this catch was from sockeye returning to Frazer River fishpass. Approximately 160,000 salmon ascended the fishpass at Frazer River in 1983. Although this is the smallest return since 1979, the 86 chinook using the fishpass was the highest number in five years.

Kodiak and Alaska Peninsula Releases

The largest release of juvenile salmon from a State facility occurred at Kitoi Hatchery. The release of 72 million reared and emergent pink salmon fry in the spring of 1983 (Table 2) could result in the return of 1.1 million adult pink salmon in 1984. Juvenile chum, coho, and chinook were also released from Kitoi Hatchery in 1983. The coho and chinook raised at the hatchery were stocked in the Kodiak area to enhance roadside sports fisheries. The other releases include over 6.5 million chum released from Russell Creek and 12.3 million sockeye eyed eggs planted in the upper Thumb River from the Karluk streamside incubation project.

Kodiak and Alaska Peninsula Egg Takes

Kitoi Hatchery was also responsible for the largest egg take at a State facility in 1983. In fact, the 105 million pink salmon egg take represents the largest egg take ever from a State-operated facility in Alaska (Table 4). Kitoi also took 826,000 chum eggs and a total of 360,000 chinook and coho eggs to continue the sport fish stocking program for Kodiak.

The Karluk streamside incubation project took 15.3 million sockeye eggs, which is the largest egg take to date, for this seven-year-old project. Russell Creek Hatchery accounted for 14.4 million chum eggs in 1983. This facility was not intended to be operated this fiscal year, but is

funded and operated according to legislative intent which was included in the FY 84 free conference committee document.

ARCTIC-YUKON-KUSKOKWIM

The Fisheries

The northern areas in which the FRED Division has a presence are the Yukon River and Kotzebue Sound. In 1981, there were 123 fishwheel and 64 gillnet permits in effect for the upper Yukon River. Another 706 gillnet permits were authorized in the lower Yukon River, while the Kotzebue Sound salmon fishery was comprised of 211 gillnet permits.

The Yukon River commercial fisheries have caught an annual average of about 102,000 chinook, 15,700 coho, and 531,000 chum salmon since statehood. These commercial fisheries have developed over time, and the chum salmon fishery, for instance, increased to nearly 1.5 million fish in 1981.

Chum salmon catches in Kotzebue Sound averaged about 218,000 fish for the years 1961-1982. This, too, is a developing fishery, which might stabilize at about 500,000 fish annually, based on natural stock production.

The Department of Fish and Game has conducted surveys of subsistence fisheries along the Yukon and Kuskokwim Rivers since the early 1960's. The annual harvests ranged from 60,000 to 90,000 chinook and 250,000 to 800,000 other salmon, mostly chums.

The sport fisheries of the Interior are centered in the Tanana River watershed where about 151,000 angler days of fishing effort were recorded in 1982. Grayling dominated the catches, with about 82,000 fish being taken. Coho salmon and rainbow trout, which were stocked in lakes, contributed over 69,000 fish to creels. About 1,000 mature chinook and 700 chum salmon were also caught by sport anglers.

User Needs

There is no regional salmon planning team for the Arctic-Yukon-Kuskokwim areas. Therefore, the harvest objectives stated in the Department's 1975 provisional salmon fisheries plan are used. Long-term objectives list an annual commercial harvest of 3.4 million chum salmon and a subsistence use of 500,000 chums. Objectives for chinook salmon include an annual commercial harvest of 200,000 fish and a subsistence use of 60,000 fish. In addition, about 600,000 pink and 140,000 coho salmon are expected to be harvested annually.

FRED Response to User Needs

The FRED Division maintains an area project office at Fairbanks and fish hatcheries on the Tanana and Noatak Rivers. The Noatak facility is testing the feasibility of producing chum salmon, and if successful, would

eventually double the annual catch of chum salmon in Kotzebue Sound. The hatchery on the Tanana River is located near Anderson and is studying the feasibility of producing grayling, sheefish, and rainbow trout, in addition to chinook, chum, and coho salmon. Salmon tagged and released by the hatchery may provide important information on migration of Yukon River salmon stocks when those tags are recovered from high seas and coastal fisheries.

The biological staff at Fairbanks has completed fishing surveys that describe potentials for salmon enhancement projects and the subsistence fisheries of the Chandalar River system.

Arctic-Yukon-Kuskokwim Highlights

- Hatchery produced fish (327 chum salmon) returned to the Wood Creek weir near Clear Hatchery.
- Clear Hatchery personnel took over 4 million eggs in 1983, intended mostly for sport fisheries.
- Sikusuilaq Hatchery met its goal of 2 million chum eggs.
- The Sikusuilaq Hatchery serves as a stopover for winter travelers along the river.

Arctic-Yukon-Kuskokwim Returns

The hatchery at Clear Air Force Station produces salmon, trout, sheefish, and grayling as part of feasibility projects, which may lead to expanded production. Young salmon from Clear Hatchery are released in Clear Creek, which provides a location for the evaluation of adult returns. In 1983, 327 adult chum returned to Clear Hatchery's weir on Wood Creek (Table 1). This return is encouraging, and higher percent returns are expected in the future as the hatchery shifts to Wood Creek brood stock and releases larger fry.

Sikusuilaq Hatchery, on the Noatak River, expects the first returns to the facility in 1985 as three year olds.

Grayling, sheefish, and rainbow trout are released from Clear Hatchery into lakes and streams to benefit the sport fishery of the Tanana River area. Evaluation of survival of these releases is accomplished by the Sport Fisheries Division.

Arctic-Yukon-Kuskokwim Releases

The largest release in the area in 1983 was the release of over 1.3 million grayling from Clear Hatchery (Table 3). Most of these were released into lakes in the Interior as emergent fry, resulting from the eggs taken in 1983. Clear also released chum, coho, and rainbow trout. Sikusuilaq Hatchery achieved its first release ever with the release of 487,000 chum fry into the Noatak River in 1983 (Table 2).

Arctic-Yukon-Kuskokwim Egg Takes

Chum salmon accounted for nearly half of all eggs taken in this area in 1983. Sikusuilag Hatchery personnel overcame the flooding problems, which were experienced during the egg-take season last year, to exceed their objective of 2 million chum eggs (Table 4).

Clear Hatchery personnel added another 758,000 chum eggs to total nearly 3 million chum eggs from the AYK area in 1983. The Clear staff also took 436,000 coho and 200,000 chinook eggs to start that program again after no chinook eggs were taken in 1982. About 2,672,000 rainbow trout, sheefish, and grayling eggs were also taken and incubated at Clear for sport fish projects in the Interior.

Table 1. Estimates of the numbers of salmon, produced at FRED hatcheries, that returned as adults to the fisheries and facilities in 1983.

Hatchery or project	Species	Commercial catch	Sport catch	Brood stock/ escapement	Total
<u>SOUTHEAST</u>					
Beaver Falls	chum	4,300	--	3,600	7,900
Crystal Lake	chinook	120	440	1,240	1,800
	coho	2,800	--	2,550	5,350
Deer Mountain	chinook	1,000	230	1,260	2,490
	coho	7,600	800	2,200	10,600
Ward Lake	coho	--	500	1,500	2,000
Hidden Falls	chum	82,600	--	43,000	125,600
Klawock	coho	1,500	50	2,190	3,740
	chum	3,100	--	1,090	4,190
Snettisham	pink	18,000	--	18,300	36,300
	chum	1,580	--	1,580	3,160
	coho	60	--	60	120
	chinook	9	--	21	30
AREA TOTALS:		122,669	2,020	78,591	203,200
<u>PRINCE WILLIAM SOUND</u>					
Cannery Creek	pink	348,150	--	60,000	408,150
	chum	9,700	--	1,600	11,300
Gulkana	sockeye	7,800	--	4,200	12,000
Main Bay	pink	363,250	--	133,600	496,850
AREA TOTALS:		728,900	-0-	199,400	928,300
<u>COOK INLET</u>					
Big Lake	coho	--	--	450	450
Crooked Creek	chinook	--	3,200	2,800	6,000
Tustumena	sockeye	75,000	--	30,000	105,000
Leisure Lake	sockeye	75,000	6,400	600	82,000
Chenik Lake	sockeye	1,400	--	5,600	7,000
Ship Creek Complex	chinook	900	2,200	--	3,100
	coho	--	80	--	80
Tutka Bay	pink	577,200	4,900	62,400	644,500
AREA TOTALS:		729,500	16,780	101,850	848,130
<u>KODIAK-AK. PENINSULA</u>					
Kitoi Bay	pink	130,000	--	149,000	279,000
Karluk	sockeye	--	--	20,000	20,000
AREA TOTALS:		130,000	-0-	169,000	299,000
<u>ARCTIC-YUKON-KUSKOKWIM</u>					
Clear	chum	325	--	325	650
AREA TOTALS:		325	-0-	325	650
STATEWIDE TOTALS:		1,711,394	18,800	549,166	2,279,360

Table 2. Salmon released during 1983 that were produced at FRED facilities.

Facility	Brood year, Stock, Species	Salmon released
<u>SOUTHEAST</u>		
Beaver Falls	1982 Beaver Falls/Disappear., chum	3,940,000
	1982 Deer Mountain, chinook	60,200
Crystal Lake	1982 Crystal Creek, chum	60,000
	1981 Crystal Creek, coho	398,000
	1982 Crystal Creek, coho	2,250,000
	1981 Andrew/Crystal Creek, chinook	138,000
Deer Mountain	1981 Cripple Creek, chinook	147,000
	1982 Deer Mountain, chinook	20,600
	1982 Deer Mountain, coho	81,000
Hidden Falls	1982 Hidden Falls, chum	21,600,000
	1981 Andrew Creek, chinook	80,500
Klawock	1981 Klawock Lake, coho	101,000
	1982 Klawock Lake, coho	21,000
	1982 Klawock/Disappearance, chum	11,000,000
Snettisham	1981 Snettisham/Speel River, coho	563,000
	1982 Snettisham/Neka River, chum	7,280,000
	1981 Andrew Creek, Situk River & King Salmon River, chinook	234,000
	SOUTHEAST REGION TOTAL:	
<u>PRINCE WILLIAM SOUND</u>		
Cannery Creek	1982 Cannery Creek, pink	21,700,000
	1982 Mile 18, coho	178,000
Gulkana	1982 Gulkana River, sockeye	9,730,000
Main Bay	1982 PWSAC, pink	25,800,000
	1982 Wells River, chum	8,650,000
PRINCE WILLIAM SOUND TOTAL:		66,058,000
<u>COOK INLET</u>		
Big Lake	1982 Meadow Creek, coho	751,000
	1982 Fish Creek, coho	907,000
	1982 Little Susitna, coho	267,000
	1982 Cottonwood, coho	93,800
	1982 Meadow Creek, sockeye	6,280,000
	1982 Nancy Lake, sockeye	1,110,000
	1982 Fish Creek, sockeye	325,000
Kasilof	1982 Bear Creek, sockeye	9,030,000
	1982 Glacier Flat, sockeye	9,560,000
	1981 Crooked Creek, chinook	54,000
	1982 Crooked Creek, chinook	5,000

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Table 2. Continued

Facility	Brood year, Stock, Species	Salmon released
Elmendorf	1982 Crooked Creek, chinook	578,000
	1981 Seward-Bear Creek, coho	191,000
	1982 Seward-Bear Creek, coho	199,000
Trail Lakes	1982 Quartz Creek, coho	593,000
	1982 Crooked Creek, coho	462,000
	1982 Russian River, coho	27,300
	1982 Quartz Creek, sockeye	1,230,000
	1982 Ptarmigan Creek, sockeye	1,120,000
	1982 Hidden Lake, sockeye	1,090,000
Tutka	1982 Tutka Creek, pink	15,200,000
	1982 Tutka Creek, chum	1,120,000
COOK INLET TOTAL:		50,193,100
<u>KODIAK & AK. PENINSULA</u>		
Karluk	1983 Thumb River, sockeye(eyed egg)	12,300,000
Kitoi Bay	1982 Kitoi, pink	72,000,000
	1982 Sturgeon River, chum	105,000
	1982 Chignik, chinook	120,000
	1982 Pasagshak, chinook	37,400
	1982 Buskin River, coho	77,300
Russell Creek	1982 Russell Creek, chum	6,550,000
KODIAK & AK. PENINSULA TOTAL:		91,189,700
<u>ARCTIC-YUKON-KUSKOKWIM</u>		
Clear	1982 Clear Creek, chum	33,300
	1982 Clear Creek, coho	224,000
Sikusuilaq	1982 Noatak River, chum	487,000
ARCTIC-YUKON-KUSKOKWIM TOTAL:		744,300
SPECIES TOTALS		
Chinook:	1,474,700	
Coho:	7,384,400	
Sockeye:	51,775,000	
Chum:	60,825,300	
Pink:	134,700,000	
Total Salmon Release:	256,159,400	

Table 3. Numbers of rainbow trout, steelhead trout, and grayling planted by FRED in 1983.

Species	Brood stock	Size	Number planted	Location planted
Rainbow trout	1982 Elmendorf	catchable	114,000	Anchorage, Fairbanks, Kodiak, and Prince William Sound areas
	1983 Elmendorf	fingerling	1,111,000	
	1982 Swanson (Clear)	catchable	16,700	
	1982 Big Lake	catchable	8,900	
		Rainbow total:	<u>1,250,600</u>	
Steelhead trout	1981 Crystal Creek	smolt	29,600	Crystal, Falls, and Ohmer Creeks
	1982 Ketchikan Creek	fingerling	12,000	Talbot Lake
	1982 Klawock River	smolt	15,800	Klawock River
		Steelhead total:	<u>57,400</u>	
Grayling	1983 Moose Lake	emergent fry	902,000	Interior lakes and streams
	1983 Jack Lake	emergent fry	451,000	
	1983 Butte Lake	fingerling	2,500	
		Grayling total:	<u>1,355,500</u>	

Table 4. Estimates of the number of eggs taken by FRED during 1983.

Facility	Broodstock	Species	Eggs taken
<u>SOUTHEAST</u>			
Beaver Falls	Beaver Falls Return	chum	To Klawock
Crystal Lake	Crystal Creek	chum	65,700
	Crystal Creek	coho	2,320,000
	Crystal Creek	chinook	89,900
	Andrew Creek	chinook	138,000
	Farragut River	chinook	50,100
	Tahini River	chinook	107,000
	Falls Creek	steelhead	26,900
Deer Mountain	Deer Mountain Return	chinook	2,080,000
	Deer Mountain Return	coho	73,500
Hidden Falls	Hidden Falls Return	chum	31,800,000
	Andrew Creek	chinook	86,300
Klawock	Klawock River	steelhead	17,200
	Klawock Lake	coho	764,000
	Klawock River	chum	473,000
	Beaver Falls Return	chum	2,950,000
	Neets Bay	chum	591,000
	Disappearance Creek	chum	1,350,000
Snettisham	King Salmon River	chinook	136,000
	Snettisham Return	chinook	5,600
	Snettisham Return/Speel	coho	281,000
	Snettisham Return	chum	1,530,000
	Neka River	chum	10,700,000
SOUTHEAST TOTAL			55,635,200
<u>PRINCE WILLIAM SOUND</u>			
Cannery Creek	Cannery Creek	pink	33,500,000
	Cannery Creek	chum	1,360,000
Gulkana	Gulkana River	sockeye	13,000,000
Main Bay	Wells River	chum	21,500,000
	Main Bay	pink	55,000,000
PRINCE WILLIAM SOUND TOTAL			124,360,000

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Table 4. Continued

Facility	Broodstock	Species	Eggs taken
<u>COOK INLET</u>			
Big Lake	Meadow Creek	sockeye	16,100,000
	Cottonwood Creek	coho	25,800
	Little Susitna River	coho	547,000
	Meadow Creek	coho	987,000
	Fish Creek	coho	736,000
Kasilof	Glacier Flats	sockeye	11,300,000
	Bear Creek	sockeye	10,300,000
	Anchor River	steelhead	40,900
	Crooked Creek	chinook	160,000
Elmendorf	Elmendorf	rainbow	5,510,000
	Crooked Creek	chinook	1,010,000
	Ship Creek	chinook	172,000
	Seward	coho	1,140,000
Ft. Richardson	Willow Creek	chinook	307,000
	Little Susitna River	coho	55,900
	18 Mile Creek	coho	75,600
Trail Lakes	Crooked Creek	chinook	605,000
	Quartz Creek	chinook	381,000
	Kenai River	chinook	108,000
	Hidden Lake	sockeye	1,930,000
	Crooked Creek	coho	989,000
	Quartz Creek	coho	881,000
Tutka Bay	Tutka	pink	25,500,000
	Tutka	chum	152,000
COOK INLET TOTAL			79,013,200
<u>KODIAK & AK. PENINSULA</u>			
Karluk	Thumb River	sockeye	15,300,000
Kitoi Bay	Sturgeon River	chum	826,000
	Kitoi	pink	105,000,000
	Chignik	chinook	87,400
	Pasagshak	chinook	14,700
	Bushkin River	coho	30,000
	Little Kitoi	coho	228,000
Russell Creek	Russell Creek	chum	14,400,000
KODIAK & AK. PENINSULA TOTAL			135,886,100

-Continued-

Table 4. Continued

Facility	Broodstock	Species	Eggs taken
<u>ARTIC-YUKON-KUSKOKWIM</u>			
Clear	Moose Lake	grayling	1,030,000
	Jack Lake	grayling	783,000
	Salcha River	chinook	200,000
	Wood Creek	chum	262,000
	Delta River	chum	496,000
	Clear Creek	coho	436,000
	Yukon River	sheefish	572,000
	Koyukuk	sheefish	190,000
	Big Lake	rainbow	41,100
	Swanson	rainbow	55,600
Sikusuilaq	Noatak River	chum	2,210,000
ARCTIC-YUKON-KUSKOKWIM TOTAL			6,275,700
Egg Totals by Species:		1.Chinook:	5,738,000
		2.Chum:	90,665,700
		3.Coho:	9,569,800
		4.Pink:	219,000,000
		5.Sockeye:	67,930,000
		6.Grayling:	1,813,000
		7.Rainbow:	5,606,700
		8.Steelhead:	85,000
		9.Sheefish:	762,000
STATE TOTAL:			401,170,200

PROGRAM PROJECTIONS, 1984

The Department of Fish and Game's salmon program combines the strategies of three fisheries divisions for the purposes of maintaining and enhancing fisheries and stocks of fishes. The FRED Division utilizes several strategies, described elsewhere in this report, to increase the abundance of salmon that are available to users. Funding requests for the operation of hatcheries include statements of expected performance by which the proposed projects can be measured. Stated differently, definite numbers of salmonids are expected to be produced for specific amounts of money. The achievement of these objectives is dependent upon the rates of survival of the hatchery fish from the egg stage to their passage through existing fisheries and final disposition as mature adults. It is because the survival of hatchery-raised fish is so predictable (and generally favorable), that this strategy is utilized so extensively by the program.

Performance standards appropriate for fishpass projects, stream stocking projects, and habitat alteration projects are quite different than those used for hatcheries. Fish associated with those projects are subject to the vagaries of both the fresh and saltwater environments; therefore, results are not predictive to the extent that meaningful expectations of the following year's production can be included with projections of hatchery production.

Projected Returns, 1984

Adult salmon projected for return from releases of hatchery fish are presented as Table 5. A statewide total of 4,105,720 salmon represents an increase of over 1.5 million salmon that were projected for return in 1983. Pink salmon comprise the largest segment of the projected returns at nearly 3.5 million fish. These fish will be returning to historic pink salmon fisheries at Prince William Sound, lower Cook Inlet, and Kodiak. Chum salmon are returning to five release locations in Southeastern, with the largest group (165,000 fish) meeting the brood-stock needs at the Hidden Falls Hatchery and providing a commercial harvest in the terminal area. Another 23,900 chums are estimated to return to the Snettisham Hatchery, which will result in the first substantial egg take on site.

Coho salmon returns to 10 different hatchery projects are projected to total about 40,000 fish, which is an increase of 26,500 fish over the 1983 projections. Most of this increase is attributable to Southeastern projects, which are directed at the commercial and sport troll fisheries.

Chinook salmon, being longer lived than the other species of salmon, are increasing in numbers of returns more slowly. Chinooks are being cultured at four hatcheries in Southeastern. In the past, the relative unavailability of eggs from natural stocks has delayed advances. In Cook Inlet, a combined projected return of 3,800 chinooks to the Kasilof River (Crooked Creek) and Halibut Cove Lagoon in Kachemak Bay, indicate that those excellent sport fisheries will be maintained. Stocked chinooks are expected to return to the developing Whittier sport fishery.

Hatchery Objectives, Fiscal Year 1985

State operated hatcheries propose to handle nearly 388 million fish eggs in Fiscal Year 1985 (Table 6). This figure excludes the Russell Creek chum salmon hatchery at Cold Bay, which is not included in the Fiscal Year 1985 operating budget. Nearly half (193 million) of the eggs taken into hatcheries will be pink salmon, which will result in an eventual return of nearly 4.5 million adults. Total expected adult returns, as a result of Fiscal Year 1985 egg takes, will be about 8.2 million fish, including about 1.35 million rainbow trout which will be taken from about 90 stocked lakes.

Sockeye salmon production continues to expand at State hatcheries. This species is susceptible to a devastating viral disease, so is not utilized in hatcheries anywhere in North America, except Alaska. Careful culture practices and research on disease prevention have enabled the State to "farm around" this disease. As a result, over 72 million sockeye eggs will be handled at five facilities in 1983.

The salmon program is growing stronger. As previously mentioned, projected returns of about 8.2 million fishes of various age groups will result from Fiscal Year 1985 hatchery production. Also, the program has released fishes over sufficient numbers of years and now can expect multi-age returns in a single year.

Table 5. A projection of the number of salmon expected to return in 1984 as products of FRED hatcheries and projects (excluding fishways).

Return site	Numbers by species				
	Chinook	Coho	Sockeye	Chum	Pink
<u>SOUTHEAST</u>					
Beaver Falls	--	--	--	45,900	--
Crystal Lake	760	10,600	--	120	--
Ohmer Creek	--	10,000	--	--	--
Deer Mountain	1,800	--	--	--	--
Ward Creek	--	1,000	--	--	--
Hidden Falls	--	--	--	165,000	--
Klawock	--	3,000	--	31,100	--
Snettisham	490	3,000	--	23,900	--
Indian Lake	--	5,200	--	--	--
AREA TOTALS:	3,050	32,800		266,020	
<u>PRINCE WILLIAM SOUND</u>					
Cannery Creek	--	--	--	19,000	884,000
Gulkana	--	--	27,000	--	--
Main Bay	--	--	--	--	1,032,000
Whittier	1,100	900	--	--	--
AREA TOTALS:	1,100	900	27,000	19,000	1,916,000
<u>COOK INLET</u>					
Big Lake	--	1,300	27,800	--	--
Cottonwood Lake	--	4,400	5,300	--	--
Crooked Creek	1,800	--	--	--	--
Tustumena	--	--	65,400	--	--
Tutka	--	--	--	80	450,000
Halibut Cove	2,000	--	--	--	--
Leisure Lake	--	--	33,000	--	--
Paint River	--	--	--	--	3,000
AREA TOTALS:	3,800	5,700	131,500	80	453,000
<u>KODIAK-AK. PENINSULA</u>					
Karluk	--	--	21,000	--	--
Kitoi	--	--	--	--	1,125,000
Pasagshak	270	--	--	--	--
Russell Creek	--	--	--	98,000	--
AREA TOTALS:	270	--	21,000	98,000	1,125,000
<u>ARCTIC-YUKON-KUSKOKWIM</u>					
Clear	--	1,000	--	500	--
Sikusuilag	--	--	--	--	--
AREA TOTALS:	--	1,000	--	500	--
STATE TOTALS:	8,220	40,400	179,500	383,600	3,494,000
GRAND TOTAL: 4,105,720					

Table 6. Production potential for FRED hatcheries in FY 85.

Species	Egg objectives 1984 (thousands)	Expected adult returns from 1984 eggs (thousands) <u>a/</u>
Sockeye salmon	72,200.0	405.4
Chum salmon	101,000.0	1,558.4
Pink salmon	193,000.0	4,498.3
Chinook salmon	3,360.0	37.7
Coho salmon	10,100.0	134.4
Steelhead	160.0	9.2
Rainbow trout	5,620.0	1,351.3
Grayling	1,250.0	156.0
Sheefish	1,250.0	46.7
	387,940.0	8,197.4

a/ These adults will return over several years, beginning in 1986.

TECHNOLOGY AND DEVELOPMENT

General

The Division of FRED produces two items: "fish and information." In order to accentuate the rapidity of information dissemination, the Division, under the T&D Branch, launched its own report series called "FRED Reports." The series is primarily a vehicle for technical information, but can accommodate any material worthy of note. To date, 21 reports in this new series have been published. The reports are distributed to all State libraries in Alaska and to libraries and resource agencies in Washington, Oregon, and British Columbia. The series has been well received, and the requests from our colleagues for these reports remains high.

The biological investigations previously invested in hatchery evaluation have diminished because of budget restraints. While our information base on adult returns and marine survivals will shrink as a result, the data base that we have accumulated so far is solid. There is a pressing need to develop a rotational approach to hatchery evaluation, as opposed to trying to evaluate the survival of releases from every hatchery every year. This effort is underway.

Feeding experiments with our new fish food, Alaska Dry Pellet (ADP), were conducted at Deer Mountain, Snettisham, Hidden Falls, Cannery Creek, and Tutka Hatcheries. The results of these tests have prompted the Division to commence a gradual changeover to the new feed.

The lake fertilization program was fully funded during this fiscal year. With regard to funding, the program was virtually put on hold during the previous year. At this time, Beaver Falls Hatchery in Southeast Alaska is being converted from a chum hatchery to a small central incubation unit for sockeye. This hatchery will deliver sockeye fry to those fertilized lakes where natural recruitment has been very poor.

The Division is offering a fish culture workshop this year. In conjunction with the University of Alaska, Juneau, FRED principal scientists are organizing a week-long instructional program entitled, "Best Cultural Practices Workshop." This short course is aimed at public and private nonprofit hatchery employees and concentrates on fish pathology, physiology, nutrition, and growth.

The FRED Division's Fish Culture Manual was produced in 1983. Publication of the manual took more time and effort than any project mentioned so far. Initial work on this item commenced in 1979, but changed "hands" several times before being brought to completion. Whether or not a second edition will ever appear remains to be determined.

Coded Wire Tag Processing Laboratory

Coastwide fisheries investigators implant coded wire tags in salmon released from hatcheries as well as those captured and released during

the course of natural stock investigations. Department personnel recover fish containing these tags at processing facilities, hatcheries, and fish counting weirs. Salmon heads are sent to the Tag Lab for tag removal and decoding, after which the information gained, such as date and area of catch, is returned to appropriate agencies.

The 1983 season showed a dramatic increase in the number of tags decoded by the laboratory. There was a 52% overall increase in the number of heads processed by the lab over the 1982 level. As a means of comparison, the number of heads and samples processed during each of the past three seasons are listed below.

<u>Number Processed</u>	(Sitka)	<u>1981</u>	<u>1982</u>	<u>1983</u>
Commercial Heads		4,837	9,692	15,903
Sport Heads		8	216	542
Hatchery Rack Recoveries		0	3,129	3,375 (# to date)
Total Number Processed		4,845	13,037	19,820
Forms/Samples		3,434	6,700	7,104
% Error in Tag Reading		5%	<1%	Will not know this until spring, 1984

Because of greatly improved data processing programs, the lab was able to considerably improve its post season report generation record. Salmon heads from all sport and commercial recoveries were processed and data entered by October 20. Lab personnel are continuing to work on hatchery rack recoveries and late sport recoveries but expect to complete all heads by the end of December. Improved entry and edit programs ensure higher quality preliminary reports than were possible in past years. The post season report generation record for the past three seasons is summarized below.

<u>Type of Report</u>	<u>Month Generated</u>		
	<u>1981</u>	<u>1982</u>	<u>1983</u>
All Data Entered (Commercial)	2/82	10/82	10/83
Preliminary Listing of Recoveries	2/82	11/82*	11/83
Preliminary expanded Recoveries	2/82**	3/83	12/83
Prelim. Tape Sent to PMFC	11/82**	1/84	12/83
Final Tape Sent to PMFC	3/84	1/84	3/84
Alaska Trollers Assoc. Report	not done	5/83	12/83
Sport Recovery Report	not done	5/83	12/83

* This included only coho and chinook recoveries. Chum recoveries were hand-tabulated. Although computer generated expansion estimates were not generated until March, hand tabulated estimates were distributed in January.

** Incomplete data were forwarded to Pacific Marine Fisheries Commission.

In addition to the post season reports, the tag lab generated in-season weekly reports of tags recovered during each week. The goal is to process heads and report data within one week of head receipt at the lab for the purpose of providing information to fishery managers. In 1981, there was no real effort to disseminate in-season data. Tags were read within 12 weeks after receipt at the lab. In 1982, the lab was able to process heads and generate data on the average of two to three weeks after receipt. This year, for a variety of reasons, including a change in fishing patterns and the lack of adequate data processing equipment, it was impossible to improve upon this record. At one point, it took six weeks to process the heads and get the data out to the users.

In 1983, the lab instituted two new practices. Over 300 informative letters were sent to individual sport fishermen, and another 2,000 letters are being sent to commercial fishermen who participated in the 1983 sampling program. Each of these letters outline the recovery and release information for each fish recovered from these fishermen's sampled catches. Neither of these reports have been done in the past.

As in 1982, the tag processing lab provided assistance to all private nonprofit hatchery operators in decoding tags as requested. Many hours were spent answering information requests from a number of individuals, State and private agencies, and Canada.

The tag lab has documented and reported release information for all CWT/mark release data generated by all entities tagging fish in Southeast Alaska. The function of tag coordinator to the Pacific Marine Fisheries Commission (PMFC) becomes increasingly more time consuming and important as more groups begin to tag greater numbers of fish. This year alone, there was a two-fold increase over the 1982 level in the number of tag codes used in Southeast Alaska.

Limnology Laboratory

The Soldotna limnology lab has processed water and biological samples from:

<u>Area</u>	<u>Lake (no.)</u>	<u>Creek (no.)</u>	<u>Hatchery (no.)</u>
S. Southeast	16	3	1
N. Southeast	14	2	1
Prince Wm. Sound	26	0	0
Cook Inlet	20	13	1
Kodiak	4	8	0

Each sample is analyzed for conductivity, pH, alkalinity, calcium, magnesium, silicon, iron, total phosphates, filterable phosphates, reactive phosphate, Keldahl nitrogen, ammonium nitrate, nitrite-nitrate, organic carbon, organic nitrogen, organic phosphate, chlorophyll "a", sulfide, zooplankton, and phytoplankton.

The lake enrichment program includes many projects at various stages of development:

- Feasibility - Salmon Lake (Karta)
Kegan Lake
Bakewell/Badger Lakes
Larson Lake
- Prefertilization - Redoubt Lake (completed June 1984).
Eshamy Lake (completed June 1984).
Leisure lake (completed June 1984).
Lake Tokun (completed June 1984).
- Fertilization - Bear Lake (continuing)
McDonald Lake (continuing)
Hugh Smith Lake (continuing)
Falls Lake (continuing)
Packers Lake (continuing)

In addition, we operate cooperative lake stocking/limnology projects with the U.S. Forest Service (USFS), Prince William Sound Aquaculture Corporation (PWSAC), Northern and Southern Southeast Regional Aquaculture Associations (NSRAA and SSRAA), and the U.S. Fish and Wildlife Service (USFWS) at:

<u>Lakes</u>	<u>Species</u>	<u>Cooperators</u>
Otter Lake	(coho)	USFS & PWSAC
Culross Lake	(coho)	USFS & PWSAC
Banner Lake	(coho)	NSRAA & USFS
Elfendahl Lake	(coho)	NSRAA & USFS
Sea Lion Cove Lake	(coho)	NSRAA & USFS
Grant Lake	(coho)	USFS
Tustumena Lake	(sockeye)	USF&WS
Leisure Lake	(sockeye)	
Summit Lake	(sockeye)	
Hidden Lake	(sockeye)	
Caswell Lake	(chinook)	
Osprey Lake	(chinook)	NSRAA
Ptarmigan Lake	(chinook)	USFS
Bold Island Lake	(chinook)	

Special Projects:

Based at Soldotna

1. Nutrient degradation products from decomposing adult sockeye salmon carcasses at Hidden Lake (1981-1982).
2. The nutrient content of different life stages (fry to adult) of Pacific salmon throughout Alaska (1981-1982).
3. Food habits of juvenile coho salmon in Bear Lake (1983).

4. Comparison of food habits of juvenile sockeye salmon and threespine stickleback in Packers Lake (1983).
5. The use of hydroacoustic surveys to investigate rearing sockeye and coho salmon dynamics (1982-1983).

Based at Ketchikan

6. Food habits of juvenile sockeye salmon in McDonald Lake (1982-1984).
7. The use of hydroacoustic surveys to investigate rearing sockeye and coho salmon dynamics (1981-1983).

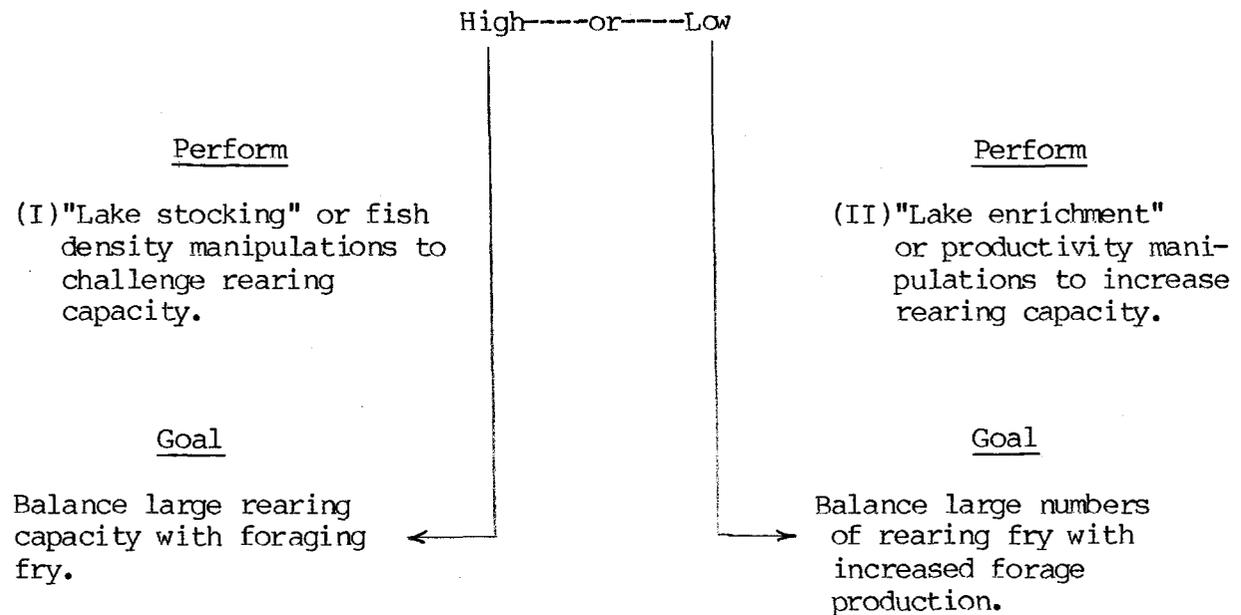
Other cooperating agencies include:

Cook Inlet Regional Aquaculture Association
 Valdez Fisheries Development Association
 U.S. Bureau of Land Management
 U.S. Geological Survey
 Alaska Department of Natural Resources, Division of Geological and Geophysical Survey
 Alaska Department of Fish and Game, Sport Fish Division

Further, our laboratory sample analysis is quality controlled by sample exchange with both the U.S. Geological Laboratory in Denver, and the U.S. Environmental Protection Agency in Cincinnati.

The lake enrichment and lake stocking programs are "driven" by the simple model --

Where Existing Rearing Capacity Is:



Anticipated production of sockeye from both enrichment and stocking is presented in Tables 7 and 8.

Table 7. Increase in sockeye salmon production anticipated as a result of FRED Division stocking programs.

Lake	Pre-stocking		Post-stocking		
	Smolt Produced	Adults Produced	Expected Smolt Produced	Adults Produced	Catch (No./Yr.)
Eshamy, PWS	200,000*	40,000	1,580,000	200,000	100,000
Hidden, CI	100,000*	25,000	2,244,000	285,000	143,000
Leisure, CI	0	0	500,000	75,000	45,000
Summit, UCR	0	0	3,500,000	352,000	176,000
Tustumena, CI	<4,000,000*	400,000	6,000,000	630,000	315,000
Bakewell/ Badger, SSE	0	0	704,000	90,000	45,000
Crosswinds, UCR	0	0	4,070,000	400,000	200,000

* Without hatchery contribution.

Table 8. Increases in sockeye salmon production anticipated as a result of FRED Division lake enrichment programs.

Lake	Pre-Enrichment		Post-Enrichment		
	Smolt Produced	Adults Produced	Expected Smolt Produced	Adults Produced	Catch (No./Yr.)
Hugh Smith, SSE	200,000	20,000	746,000	75,000	37,500
McDonald, SSE	N/A	65,000	1,600,000	160,000	80,000
Packers, CI	400,000	32,000	840,000	67,200	33,600
Tokun, LCR	350,000	16,000	1,710,000	170,000	85,000
Falls, NSE	125,000	12,500	516,000	51,600	25,800
Bear, CI ^{1/}	10,000	1,000	30,000	7,500	3,750
Larson, UCI	640,000	N/A	N/A	N/A	N/A

N/A - Not available at this time.

^{1/} - Coho salmon

Fish Genetics Laboratory

Genetic diversity is necessary to protect the reproductive potential of stocks, and hatchery practices can be changed if that diversity is found to be affected.

The fish genetics laboratory staff performs starch-gel electrophoretic analysis to develop genetic profiles of salmon stocks chosen for hatchery use. This procedure defines gene frequencies at all detectable, variable gene loci. These frequencies are then used in calculating various statistics for and about the populations analyzed. Most importantly, this analysis is used to determine if the genetic variation inherent in wild stocks of salmon is being maintained in hatchery brood stocks. Further, the interaction, if any, of hatchery stocks on neighboring wild stocks can be monitored.

Populations selected for screening are usually those most easily accessible, i.e., hatchery populations and the remote sites where eggs are taken. The best time to collect samples is during egg takes, because carcasses are readily available and even though the tissue is not in the best condition, it is more probable that a distinct population is being sampled.

Projects Underway:

Population Screening - Fifteen populations were screened in 1982: 10 chum salmon, one pink salmon, one king salmon, two sockeye salmon, and one sheefish population (Table 9).

Genetic Marking Tutka Pink Salmon - The second generation of selection for the variant AGP allele was completed. Neighboring populations were also sampled to be compared with Tutka.

Chum Salmon Population Studies:

Noatak River Project - Tissue samples were collected from populations in both the Noatak and Kobuk River drainages. These are now being screened in the laboratory.

Neets Bay Project - Tissue samples were also collected from three populations in the Ketchikan area, for a study of the chum salmon populations in the Neets Bay Hatchery and their interactions with local wild stocks.

Fish Pathology

While entire brood stocks of fish are being lost to various fish diseases in hatcheries along the Columbia River, we in Alaska are more fortunate. Good cooperation between hatchery operators in both the private nonprofit and public sectors and the fish pathology section of FRED Division is making possible some disease-free hatcheries. Many people do not understand that fish disease can prevent and seriously curtail hatchery production. While hatcheries do not actually produce disease in the first place, the stress encountered by the hatchery environment is, many times, a trigger that causes a naturally occurring disease to become a problem.

Table 9. Fish population screened for biochemical genetic variations by the Genetics Laboratory.

Species	YEAR				
	1979	1980	1981	1982	1983
PINK	--	Tutka Bay Lagoon Cannery Creek Kitoi Creek Klawock River	Seldovia River Humpy Creek Tutka Bay Lagoon	Tutka Bay Lagoon	Humpy Creek Tutka Bay Lagoon China Poot Creek Seldovia River Main Bay Cannery Creek Kitoi Bay
CHUM	Russell Creek Kizhuyak River Crooked Creek Delta River Crystal Lake	Sturgeon River Neka River Eaglek River Crooked Creek Klawock River Beaver Falls	Hidden Falls Kadashan River Russell Creek Noatak River Kelly Lake Big Salt C Delta River	Hidden Falls Wells River Tutka Creek Neka River Snettisham Tonsina Creek Spring Creek Noatak River Lagoon Creek Disappearance Creek	Tutka Creek Sturgeon River Naket Inlet Crystal Lake Beaver Falls Neets Bay Squirrel River Salmon River Kugururok River Kelly Lake Kiyak Creek Beaver Creek Selby River Slough Noatak River (N) Noatak River (S)
SOCKEYE	Nancy Lake Big Lake Francis Creek Snake River	East Creek Killian Creek Glacier Flats Creek	Quartz Creek Hidden Lake Gulkana River	Ptarmagin Creek Hidden Lake East Creek	Meadow Creek Bear Creek Glacier Flats Hidden Lake

Continued

Table 9. Continued.

SPECIES	YEAR				
	1979	1980	1981	1982	1983
COHO	Bear Creek Duncan S.C. Crystal Lake	Ketchikan Creek Speel Lake	Fish Creek Bear Creek Quartz Creek Hidden Lake	--	--
KING	Andrews Creek Unik River Chilkat River Tahini River	Crooked Creek	Andrews Creek Crystal Lake Cripple Creek Crooked Creek Quartz Creek	Benjamin Creek	--
OTHER SPECIES	--	--	STICKLEBACK Matanuska Lake Knik Lake	RAINBOWS Swanson River Meadow Creek SHEEFISH Koyakuk River	GRAYLING Scoter Lake

So, in order to be successful, strict adherence to sanitary procedures, good fish culture practices, and expert fish pathology consultation are all necessary ingredients. Next year, we will list those hatcheries that have achieved good to outstanding fish health track records.

The activities of the pathology section can be grouped into two categories: hatchery services and research. The Section was reorganized during the past year in an attempt to deliver better service to hatcheries. It must always be remembered, however, that everything we do comes out of research efforts by us or someone else: all the laboratory techniques, disease prevention, and disease control procedures have come from someone's research. The translation is simple and direct: better fish pathology services comes from new information.

Hatchery services includes diagnostics, and this entails pathogen screening or examination of fish tissue to see if disease agents are present. During the past year, 143 diagnostic cases were worked. This work involved thousands of laboratory tests for the common disease agents that we find:

<u>Disease Agent</u>	<u>Individual Tests</u>
Bacterial Kidney Disease	6,501
Furunculosis	1,440
IHN virus	4,981
Enteric Redmouth	535
Viral Erythrocytic Necrosis	25

Prerelease inspections were made for 129 stocks of fish in hatcheries prior to the release of these fish. These inspections are accomplished in order to ensure that diseased fish are not being released from hatcheries. Coupled with stock inspections are individual hatchery inspections. All hatcheries in the State were visited at least once by fish pathologists during the past year. Disease histories on all hatchery stocks are established and maintained as well as complete records of the transports of hatchery fish. A total of 2,250 pages of fish pathology documents and reports were microfiched during the past year, and an indexing system implemented to minimize storage space and aid in rapid document retrieval.

The Section continued its research in IHNV control. Iodophor water hardening experiments are being conducted utilizing sockeye eggs taken from Big Lake Hatchery. An outbreak of IHNV occurred in the sockeye at the Gulkana River incubation boxes. Virus sampling there was carried out relative to the effects of run timing and the possibility of horizontal transmission within a holding area. Results are not yet available. A representative group of Alaskan IHNV isolates was cultured as the initial step in an experiment designed to utilize the size of plaques formed in a standard plaque assay as a basis of isolate comparison.

Work continues on the use of erythromycin phosphate as a control measure for Bacterial Kidney Disease. Eggs from coho and wild rainbow trout are being tested by water hardening them in this solution.

The Section has five manuscripts in various stages of publication. The principal pathologist was recertified by the American Fisheries Society as a Fish Health Inspector.

Engineering

FRED provides engineering services to the Department. Where field facility and hatchery projects are concerned, the engineering staff is primarily responsible for coordination with consultants, contractors, and land owners. Engineering services also play an important role in the review of PNP permits and in assisting the private hatcheries in solving their engineering problems. While the engineering staff is much reduced from the period when the Division was constructing several new hatcheries, work presently centers on the operation and completion of existing facilities. Furthermore, the engineering section does all the design work for fishpass construction.

1983 was a year for follow-up, cleanup, and close out of projects that had been started in 1981 and 1982. For instance, in 1983, there was significant engineering work involved in making new hatchery facilities operational. At Main Bay, engineers worked on final adjustments to controls and to the lake level sensors and made the sewage treatment plant operational. At Trail Lakes, the major problem to rectify was the inoperable U.V. filter units. Follow-up warranty work was done at the new Fort Richardson Hatchery and on the hydroelectric unit at Hidden Falls Hatchery. Similar type start up projects were completed at Snettisham, Klawock, and Sikusuilaq. The engineers worked on about 42 separate projects, each requiring field work, design, or construction, with about 26 of those projects being active each month.

New projects in 1983 were:

- Russell Creek Hatchery - Prepared future development plans.
- Paint River Fishpass - Prepared conceptual plans.
- Derickson Creek Fishpass - Prepared conceptual plans for U.S.F.S.
- Bakewell Fishpass - Prepared construction plans for U.S.F.S.
- Fairbanks - Design and construction of bunkhouse to office conversion.
- Glennallen - Design and construction of office upgrade.
- Bethel - Design and construction of office to bunkhouse conversion.
- Cordova - Construction plans for office setup.
- Crooked Creek Hatchery - Design and construction of facility paving.
- Susitna River Fishway - Prepared feasibility report for 2 fishpasses.
- Kenai River - Initiated study concerning streambank erosion.
- Kodiak Island - Completed Terror Lake dam/hatchery feasibility study.
- Anchorage - Design and construction of Potter Marsh shooting range.

Technical Presentations

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THE PRIVATE NONPROFIT HATCHERY PROGRAM

Background

The Private Nonprofit Hatchery Program was created to provide private sector participation in rebuilding Alaska's depleted salmon fisheries. The 1974 Legislature passed a statute authorizing the Alaska Department of Fish and Game (ADF&G) to issue hatchery permits to qualified private nonprofit (PNP) corporations, and the 1976 Legislature authorized the creation of regional aquaculture associations.

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

- 1) Cook Inlet Aquaculture Association (CIAA)
- 2) Lower Yukon/Kuskokwim Regional Aquaculture Association (LY/KRAA)
- 3) Northern Southeast Regional Aquaculture Association (NSRAA)
- 4) Prince William Sound Aquaculture Corporation (PWSAC)
- 5) Southern Southeast Regional Aquaculture Association (SSRAA)
- 6) Imapik Regional Aquaculture Corporation (IRAC)
- 7) Kodiak Regional Aquaculture Association (KRAA)

Planning

In 1976, the Legislature directed the Commissioner of the Alaska Department of Fish and Game "to develop and amend as necessary a comprehensive salmon plan for each region, including provisions for public and private nonprofit hatchery systems." To accomplish this planning, the law established Regional Planning Teams (RPT's), comprised of three members from the regional associations and three members from the department. The teams have three specific functions in this planning process, as defined by statute:

- A) Development of a comprehensive salmon plan, including provisions for both public and private nonprofit hatchery systems (AS 16.10.375).
- B) Review of private nonprofit permit applications (AS 16.10.400[a]).
- C) Review of the proposed suspension or revocation of a permit (AS 16.10.430[a]).

The 1979 Legislature provided funding of \$400,000 to be distributed through the Commissioner of ADF&G to qualified regional associations for developing regional salmon plans in cooperation with the department. Contracts to issue the funds were negotiated with the four regional associations in existence at that time: CIAA, NSRAA, PWSAC, and SSRAA.

During FY 1984, the ADF&G has available \$214,000 to contract with the recognized regional aquaculture associations to support Regional Planning Teams' comprehensive planning activities. Through the use of these funds, staff and other support is provided to the RPT's. Experience has shown that the comprehensive salmon planning progresses in phases. Phase I sets the goals, objectives, and strategies for the area; Phase II is site specific and establishes criteria through which to evaluate enhancement and rehabilitation potentials of various sites.

Post Phase II planning has been termed "plan maintenance" and/or the "plan implementation" stage. Presently, planning activity, under the auspices of the Commissioner of ADF&G, is being conducted in five regions of the State.

The status of planning, by region, follows:

- 1) Northern Southeast and Southern Southeast - These two associations joint-ventured, under contract with ADF&G, in FY '81 to produce a Phase I regional plan which was the first to be completed in the State and approved by the Commissioner. The plan was produced and presented to the Commissioner by the RPT's, as required under AS 16.10.375.

Northern Southeast, through the RPT, produced a Phase II Comprehensive Salmon Plan which was approved by the Commissioner of ADF&G in August, 1982. The region has been actively engaged in the "plan maintenance, plan implementation" stage of the process since the Phase II plan was approved.

Southern Southeast submitted a Phase II Comprehensive Salmon Plan which was approved by the Commissioner in September, 1983. They are now proceeding into the "plan maintenance, plan implementation" stage of the process.

Comprehensive salmon planning has been initiated separately for the Yakutat area, even though this area has not been officially designated as a separate region. A draft Yakutat Comprehensive Salmon Plan has been completed and is awaiting final approval by the Commissioner.

- 2) Cook Inlet - This regional association, through the RPT, produced a Comprehensive Salmon Plan for the Cook Inlet region, which was approved by the Commissioner of ADF&G in February, 1982. This plan was different than previously approved plans because it incorporated some Phase II planning efforts with Phase I. The Association is presently engaged in Phase II planning efforts which addresses "plan maintenance" activities. This will culminate in an update and revision of the plan as originally approved.
- 3) Prince William Sound - This regional association, through the RPT, submitted a Comprehensive Salmon Plan for the Prince William Sound-Copper River Region to the Commissioner in July, 1983. This plan, which was the result of a major rewrite of an

original draft plan, was approved by the Commissioner in September, 1983. The corporation and the RPT have now proceeded into development of a Phase II Comprehensive Salmon Plan.

- 4) Lower Yukon/Kuskokwim - A report entitled, "Salmon Fisheries Status in the Lower Yukon/Kuskokwim Region" was completed by the RPT in June, 1983. The RPT is presently engaged in discussions to determine how full-scale comprehensive salmon planning can best be accomplished in this region.
- 5) Bristol Bay - The Imapik Regional Aquaculture Corporation and ADF&G have attempted to reactivate the regional planning team process in 1983, with limited success. Some work was performed by Imapik regarding comprehensive salmon planning, and through a contract between Imapik and the Fisheries Research Institute, a report was produced which identified rehabilitation and enhancement opportunities on the Kvichak River system and Nushagak Bay tributaries.
- 6) Kodiak - The Kodiak Regional Aquaculture Association was formed during 1983, and officially approved by the Commissioner in June, 1983. Additionally, a draft Kodiak Regional Comprehensive Salmon Plan was written by the Kodiak RPT. Final revisions to the plan are being incorporated, and the plan will be submitted to the Commissioner for review and possible approval in January, 1984.

Funding

In 1977, a Fisheries Enhancement Revolving Loan Fund was created within the Department of Commerce and Economic Development for the purpose of making loans to permit holders for the planning, construction, and operation of hatchery facilities. At that time, loans were limited to \$3 million for a hatchery constructed under a permit granted to a qualified regional association's nonprofit corporation, or to a local nonprofit corporation approved by a qualified regional association. A loan for any other nonprofit hatchery corporation project, a small "mom and pop" hatchery, for example, was limited to \$300,000.

The 1980 Legislature raised the loan amounts for regional associations to \$6 million with a payment period of up to 30 years. In 1982, the Legislature increased the loan amount to \$10 million for regional associations. Other PNP programs may borrow up to \$1 million. Payments on the loan can be deferred from 6 to 10 years. The interest rate is 9.5%. Cumulative State loans secured for capital construction and operations and hatchery revenues generated in 1983 by assessments and sales of fish are presented in Table 10. To date, just over \$30 million have been borrowed by PNP corporations.

Program Implementation

Since the inception of the PNP program, 20 PNP salmon hatchery permits have been issued and 25 applications have been denied or withdrawn.

Eleven applications are now pending. Seventeen of the permitted hatcheries are in operation, and 13 of these have already had returns of adult salmon.

Listings of permitted PNP hatcheries, pending PNP applications, and scientific/educational hatcheries are presented in Tables 11, 12, and 13, respectively.

Hatchery Production

The establishment and growth of PNP hatcheries are contributing to the State's effort to rehabilitate depleted and depressed salmon fisheries. In 1983, PNP corporations estimated that 4.1 million salmon, originally released as juveniles from PNP hatcheries, either returned to their facilities as adults or were captured in common property fisheries (Table 14). The Port San Juan Hatchery, operated by PWSAC, had most of these returns. PWSAC estimated that over 2.9 million of their returning pink salmon were caught in the commercial fishery.

Returns since 1977 are presented by species in Tables 15, 16, 17, and 18. The adults returning in 1977 from PNP hatchery releases were the result of egg takes by the only two hatcheries operated in 1975, NERKA and Sheldon Jackson. The tables indicate that the number of fish returning to PNP hatcheries has increased each year as new hatcheries became operational and egg take levels at existing hatcheries increased.

During 1983, over 170 million fish were released from PNP hatcheries (Table 19). That is an increase of 43 million fish over 1982 releases. PNP hatchery releases going back to 1976 are recorded by species in Tables 15-18.

Egg takes for PNP hatcheries totaled over 261 million in 1983 (Table 20). The 1982 egg take totaled approximately 235 million. The largest egg take this year was at Port San Juan Hatchery. More eggs were taken there--98.2 million--than at any other PNP hatchery. Total numbers of eggs taken since 1975 are recorded by species in Tables 15-18.

Most PNP hatcheries are still developing brood stock and, therefore, have not reached their permitted egg capacities. Permitted capacities at PNP hatcheries now total 875.5 million eggs (Table 21), which could result in releases of more than 700 million juvenile fish. This would represent almost a four-fold increase over current releases and could result in a similar increase in adult returns if current levels of marine survival are maintained. Approximately 66% of the permitted production for PNP hatcheries is for pink salmon, and approximately 32% for chum salmon.

Table 10. State loans secured for capital construction and operational costs and revenues generated by assessments and fish sales for 16 private nonprofit (PNP) hatcheries.

Region/(No. of Permits)	State Loans		Funds Generated by Assessments or Sale of Fish
	For Capital Construction	For Operations	
<u>NORTHERN SOUTHEAST</u>			
Northern Southeast Regional Aquaculture Association (2)	\$ 959,209	\$1,093,065	\$ 902,272 ^{a/} \$ 250 ^{c/}
Burro Creek Farms, Inc. (1)	\$ 191,375	\$ 92,000	
Kake Nonprofit Fisheries Development Corp. (1)	\$ 364,900	\$ 288,500	
Douglas Island Pink and Chum Corp. (2)	\$ 568,000	\$ 864,000	\$ 12,300 ^{c/}
Sheldon Jackson College (1)	\$ 177,254	\$ 61,370	\$ 54,500 ^{c/}
Tlingit and Haida Fisheries Development Corp. (1)	\$ 1,553,860		
Armstrong-Keta, Inc. (1)	\$ 474,045	\$ 200,000	
<u>SOUTHERN SOUTHEAST</u>			
Southern Southeast Regional Aquaculture Association (2)	\$ 8,718,000	\$1,434,600	\$1,077,222 ^{a/} \$ 56,000 ^{c/}
Alaska Aquaculture Foundation, Inc. (1)	\$ 388,230	\$ 469,295	
Meyers Chuck Aquaculture Association (1)	\$ 10,000		
<u>PRINCE WILLIAM SOUND</u>			
Prince William Sound Aquaculture Corp. (1)	\$ 6,972,539		\$ 477,668 ^{c/} \$ 135,656 ^{b/}
Valdez Fisheries Development Corp. (1)	\$ 2,582,530	\$ 758,000	\$ 85,000 ^{c/}
<u>COOK INLET</u>			
Cook Inlet Regional Aquaculture Association (1)	\$ 1,348,881	\$ 444,755	\$ 704,186 ^{a/}
TOTALS	\$24,308,823	\$5,705,585	\$3,505,054

^{a/} 3% mandatory assessment tax collected from fishermen.

^{b/} 2% voluntary assessment tax collected from fishermen (through December 15, 1983).

^{c/} Revenue from sales of fish harvested at hatchery in 1983.

Table 11. Permitted private nonprofit hatcheries, December 1983.

Permit #	Corporation/Facility location	Status	Egg capacity
1	NERKA, Inc. Perry Island, Prince William Sound	Operational, Permit Issued 9/19/75	3 million pink & chum
2	Prince William Sound Aquaculture Corporation Port San Juan, Evans Island	Operational, Permit Issued 7/1/76	150 million pink 13 million chum
3	Sheldon Jackson College Aquaculture Program Indian River, Sitka	Operational, Permit Issued 4/29/75	16 million pink & chum .2 million coho .1 million chinook
4	Tlingit & Haida Central Council Maksoutof River, Baranof Island	Operational, Permit Issued 12/18/75	25 million pink & chum
5	Alaska Aquaculture Foundation, Inc. Burnett Inlet, Etolin Island, Wrangell	Operational, Permit Issued 4/28/76	5 million pink 5 million chum
6	Douglas Island Pink & Chum, Inc. Kowee Creek, Juneau	Operational, Permit Issued 7/30/76	6 million pink & chum
7	Kake Nonprofit Fishery Development Corporation Gunnuk Creek, Kake	Operational, Permit Issued 4/1/77	1 million pink 2 million chum
8	Southern Southeast Regional Aquaculture Association Whitman Lake, Ketchikan	Operational, Permit Issued 3/9/78	31.8 million chum 3.4 million coho .4 million chinook
9	Fish Fry, Inc. Salmon Creek, Juneau	Not Operational, Permit Voluntarily Returned to Department	N/A
10	Meyers Chuck Aquaculture Association Meyers Creek, Meyers Chuck	Operational, Permit Issued 7/22/79	5 million pink 1 million coho

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Table 11. Continued.

Permit #	Corporation/Facility location	Status	Egg capacity
11	Douglas Island Pink & Chum, Inc. Sheep Creek, Juneau	Operational, Permit Issued 9/18/79	25 million pink 5 million chum
12	Burro Creek Farms Burro Creek, Skagway	Operational, Permit Issued 5/23/80	10 million pink & chum
13	Armstrong-Keta, Inc. Port Armstrong, Baranof Island	Operational, Permit Issued 2/23/81	11 million pink & chum
14	Northern Southeast Regional Aquaculture Association Salmon Creek, Juneau	Operational, Permit Issued 4/17/81	30 million pink & chum .8 million coho
15	Valdez Fisheries Development Corp. Solomon Gulch, Valdez	Operational, Permit Issued 6/26/81	50 million pink 18 million chum 1 million coho
16	Northern Southeast Regional Aquaculture Association Medvejie Creek, Sitka	Operational, Permit Issued 8/17/81	20 million chum 3.3 million coho .3 million chinook
17	Cook Inlet Aquaculture Association Eklutna River, Cook Inlet	Operational, Permit Issued 2/8/82	10 million pink & chum .1 million coho .1 million chinook
18	Angoon Aquaculture Association, Inc. Favorite Bay, Angoon	Not Operational, Permit Issued 8/15/82	7.5 million pink 20 million chum 1.5 million coho
19	Southern Southeast Regional Aquaculture Association Neets Bay, Behm Canal	Operational, Permit Issued 6/17/83	60 million chum 5 million coho 2 million chinook
20	Prince William Sound Aquaculture Corporation Esther Lake, Esther Island	Not Operational, Permit Issued 6/17/83	211 million pink 111 million chum 1 million coho 1 million chinook

Table 12. Proposed private nonprofit hatcheries, December 1983.

Organization/Facility location	Status	Requested egg capacity
1. Pelican Cold Storage Pelican Creek, Pelican	Preliminary Application Inactive 11/24/81	At start-up: 350,000 pink & chum At capacity: 2.2 million chum
2. Twin Creek Salmon Ranch, Inc. Twin Creek, Petersburg	PNP Preliminary Application Inactive 12/14/81	At start-up: .5 million pink
3. Irreantum, Inc. Tonsina Bay, Cook Inlet	Preliminary Application Inactive 3/22/82	At capacity: 2 million pink 9 million chum
4. Aquaculture, Inc. Crittenden Creek, Wrangell	PNP Preliminary Application Accepted 4/23/82	At start-up: 1 million pink 1 million chum At capacity: 12 million chum 3 million pink
5. Southern Southeast Regional Aquaculture Association Tyee Lake, Wrangell	PNP Preliminary Application Accepted 5/10/82	At capacity: 40 million pink & chum 4 million coho 2 million king
6. Gro Fish, Inc. Santa Anna Creek, Ernest Sound	PNP Final Application Submitted 12/20/82	At start-up: 1 million pink .15 million chum At capacity: 3 million pink 10 million chum
7. Southern Southeast Regional Aquaculture Association Virginia Lake, Wrangell	PNP Preliminary Application Submitted 2/18/83	At capacity: 40 million chum 4 million coho 2 million chinook 4 million sockeye
8. Eric Twelker Peterson Creek, Juneau	PNP Preliminary Application Submitted 7/5/83	At capacity: 20 million pink 8 million chum

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-Continued-

Table 12. Continued.

Organization/Facility location	Status	Requested egg capacity
9. Douglas Island Pink & Chum, Inc. Fish Creek, Juneau	PNP Preliminary Application Accepted 8/11/83	At capacity: 60 million pink 10 million chum Undetermined trout
10. Lawrence McCutcheon Port Nellie Juan, Prince William Sound	PNP Preliminary Application Submitted 10/13/83	At capacity: 30 million pink Undetermined chum
11. Irreantum, Inc. Chugach Bay, Cook Inlet	PNP Preliminary Application Submitted 12/5/83	At capacity: 11 million pink & chum .1 million coho

Table 13. Permitted scientific/educational hatcheries, December 1983.

Organization/Facility location	Type of program	Permitted egg capacity
1. Kake City Schools Gunnuk Creek, Kake	Educational	40,000 pink
2. Petersburg High School Petersburg	Educational	55,000 chum
3. Sheldon Jackson College Aquaculture Program Indian River/Sitka	Educational	Miscellaneous Species including invertebrates
4. Skagway High School Pullen Creek, Skagway	Educational	200,000 pink & 6,000 chum
5. Sand Point JOM Parent Committee Humboldt Creek, Sand Point	Educational	200,000 pink & coho
6. Unalaska City School Unalaska	Educational	25,000 pink 58,500 coho

Table 14. Estimated 1983 adult returns for PNP hatcheries as reported by hatchery operators.

Facility	Pink	Chum	Coho	Chinook
SSRAA - Whitman Lake	-	64,000	19,257	872 ^{b/}
SSRAA - Neets Bay	-	56,478	52,509	-
NSRAA - Salmon Creek	7,000	600	-	-
AAFI - Burnett Inlet	1,850	756	-	-
SJC - Indian River	160,000	250	15	-
BCF - Burro Creek	2,000	-	-	-
DIPAC - Kowee Creek	16,000	500	-	-
DIPAC - Sheep Creek	90,000	250	-	-
NERKA - Perry Island	100	-	-	-
PWSAC - Port San Juan	3,722,502 ^{a/}	4,180	-	-
MCAA - Meyers Chuck	100	-	-	-
VFDA - Solomon Gulch	87,000	-	-	-
CIAA - Eklutna	-	68	-	-
TOTAL	4,086,552	126,783	71,781	872

^{a/} Represents 5.3% marine survival.

^{b/} These were male jacks that returned the year after they were released.

Table 15. Summary of pink salmon production from PNP hatcheries.

Year	Eggs taken	Fry released	Total return ^{a/}	Special harvest ^{b/}	Value of harvest
1975	8,002,395				
1976	16,251,456	3,653,666			
1977	35,383,112	12,093,184	160,147	108,718	\$ 130,726
1978	34,851,807	25,732,238	160,397	114,188	\$ 141,799
1979	46,582,015	28,204,674	356,498	244,555	\$ 309,612
1980	98,030,000	31,690,000	1,504,878	346,168	\$ 436,171
1981	188,000,000	78,800,000	2,491,345	838,037	\$1,200,000 ^{c/}
1982	185,170,000	102,550,000	5,253,378	1,354,732	\$1,084,806
1983	185,520,000	126,890,000	4,086,552	701,399	\$ 613,618
Total	797,790,785	409,613,762	14,013,195	3,707,797	\$3,916,732

^{a/} Based on unverified estimates of contributions of common property fisheries.

^{b/} Harvest by the hatchery.

^{c/} Estimated.

Table 16. Summary of chum salmon production from PNP hatcheries.

Year	Eggs taken	Fry released	Total return ^{a/}	Special harvest ^{b/}	Value of harvest
1975	77,000				
1976	347,275	66,075			
1977	1,614,574	264,068			
1978	1,684,930	1,064,000	543		
1979	6,782,864	924,400	3		
1980	26,850,000	3,340,000	1,588		
1981	32,400,000	21,900,000	20,518	6,115	\$ 24,460
1982	46,130,000	23,590,000	22,133	378	\$ 302
1983	68,790,000	41,770,000	126,783	35,099	\$ 37,120
Total	184,676,643	92,918,543	171,568	41,592	\$ 61,882

^{a/} Based on unverified estimates of contribution to common property fisheries.

^{b/} Harvest by the hatchery.

Table 17. Summary of coho salmon production from PNP hatcheries.

Year	Eggs taken	Presmolts released	Smolts released	Total return ^{a/}	Special harvest	Value of harvest
1975	12,000					
1976	24,150	8,000				
1977	10,500	0	3,102			
1978	809,430	0	0	27		
1979	931,000	0	2,700	0		
1980	666,500	0	557,200	0		
1981	2,800,000	0	900,000	52,050	6,141	\$ 50,000 ^{b/}
1982	2,870,000	0	700,000	61,709	11,500	\$ 80,500
1983	<u>6,200,000</u>	<u>0</u>	<u>1,570,000</u>	<u>71,781</u>	<u>7,396</u>	<u>\$ 19,100</u>
Total	14,323,580	8,000	3,733,002	185,567	25,037	\$149,600

^{a/} Based on unverified estimates of contributions to common property fisheries.

^{b/} Estimated.

Table 18. Summary of chinook salmon production from PNP hatcheries.

Year	Eggs taken	Presmolts released	Smolts released	Total return	Special harvest	Value of harvest
1980	194,000					
1981	400,000					
1982	220,000	0	150,000	3,500	3,500	
1983	<u>800,000</u>	<u>0</u>	<u>140,000</u>	<u>872</u>	<u>872</u>	Unknown ^{b/}
Total	1,614,000	0	290,000	4,372 ^{a/}	4,372	

^{a/} Return to date composed of one and two ocean jacks.

^{b/} Fish were sold on consignment and price was unavailable.

Table 19. 1983 releases from PNP hatcheries in millions.

REGION/LOCATION	Pink	Chum	Coho	Chinook
SOUTHERN SOUTHEAST				
SSRAA - Whitman L.	-	22.34	1.29	.14
AAFI - Burnett In.	4.00	.60	-	-
MCAA - Meyers Chuck	.01	-	-	-
NORTHERN SOUTHEAST				
NSRAA - Salmon Cr.	.88	3.36	.16	-
- Medvejie Cr.	-	2.47	.12	-
DIPAC - Kowee Cr.	3.28	.32	-	-
- Sheep Cr.	14.53	.74	-	-
SJC - Indian R.	10.00	.93	.003	-
BCF - Burro Cr.	.70	-	-	-
KFDC - Bunnuk Ck.	.04	.009	-	-
PRINCE WILLIAM SOUND				
PWSAC - Port San Juan	87.00	9.50	-	-
VFDC - Solomon Gulch	6.40	.60	-	-
NERKA - Perry Is.	.05	-	-	-
COOK INLET				
CIAA - Eklutna	-	.90	.0006	-
TOTAL	126.89	41.77	1.57	.14

Note: Pink and chum releases are from 1982 brood year, coho from 1981 and 1982 brood years, and chinook from 1981 brood year.

Table 20. 1983 egg takes for PNP hatcheries in millions.

REGION/LOCATION	Pink	Chum	Other
SOUTHERN SOUTHEAST			
SSRAA - Whitman L.	-	3.60	1.00 coho .03 chinook
- Neets Bay	-	28.60	4.30 coho .73 chinook
AAFI - Burnett In.	4.60	2.00	-
MCAA - Meyers Chuck	.01	-	-
NORTHERN SOUTHEAST			
NSRAA - Salmon Cr.	4.96	3.54	.45 coho
- Medvejie Cr.	-	2.64	.24 coho .04 chinook
DIPC - Kowee Cr.	6.60	.32	-
- Sheep Cr.	34.21	.99	-
SJC - Indian R.	15.60	.78	.02 coho
BCF - Burro Cr.	1.25	.10	-
THCC - Sandy Bay	6.00	.75	-
KNFDC - Gunnuk Cr.	1.04	1.07	-
A-K - Port Armstrong	9.00	-	-
PRINCE WILLIAM SOUND			
PWSAC - Port San Juan	89.75	8.49	-
- Esther Lake	-	10.78 ^{a/}	-
VFDC - Solomon Gulch	12.50	2.40	.14 coho
COOK INLET			
CIAA - Eklutna	-	1.50	.05
TOTAL	185.52	68.79	7.00

^{a/} Incubated at Main Bay Hatchery.

Table 21. Permitted egg capacities, in millions, of PNP hatcheries within the planning regions, 1983.

Region	Pink	Chum	Coho	Chinook	Total
<u>Southern S. E.</u>					
Association Facility	-	91.8	8.4	2.4	102.6
Non-Association Facilities	10.0	5.0	1.0	-	16.0
Total	10.0	96.8	9.4	2.4	118.6
<u>Northern S. E.</u>					
Association Facility	30.0*	20.0	4.1	0.3	54.4
Non-Association Facilities	101.5*	20.0	1.7	0.1	123.3
Total	131.5	40.0	5.8	0.4	177.7
<u>Prince William Sound</u>					
Association Facility	361.0	124.0	1.0	1.0	487.0
Non-Association Facilities	53.0*	18.0	1.0	-	72.0
Total	414.0	142.0	2.0	1.0	559.0
<u>Cook Inlet</u>					
Association Facility	20.0*	-	0.1	0.1	20.2
Total	20.0	-	0.1	0.1	20.2
STATEWIDE TOTAL	575.5	278.8	17.3	3.9	875.5

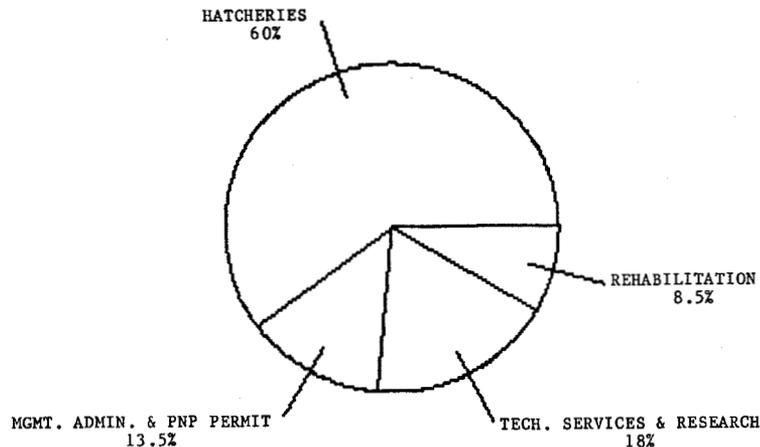
* Pink and/or chum (to be totaled once).

PROGRAM EXPENDITURES

The FRED Division operates a multifaceted program, and is best known for its hatcheries and incubation facilities. The Division also maintains 23 fishpasses on coastal streams. Lake fertilization, habitat improvement, and stock introductions are other strategies which are balanced statewide. The Division operates four biological laboratories, which serve the Department's programs, as well as those of the private aquaculture associations. These laboratories offer specialties in Fish Pathology, Fish Genetics, Limnology, and Tagged Fish Recovery.

Fiscal Year 1984 Operating Budget

The FRED Division was authorized an operational budget of \$12,213.7 for Fiscal Year 1984. That budget is partitioned in the following manner:



During the course of the 1983 session, the Legislature passed Committee Substitute for Senate Bill 156, relating to the sale, lease, or grant of State hatchery facilities. Simultaneously, the Fiscal Year 1984 budget was reduced by \$718.3, which represented six months' operational funding for the four hatcheries intended for transfer to private nonprofit corporations. It is the intent of the Legislature that if the hatcheries cannot be transferred, the Department should submit a request for a supplemental appropriation required for the operation of the four subject hatcheries.

The Governor vetoed CSSB 156 for the reasons stated in his July 19, 1983 letter to the Senate President. In that letter, he stated that a policy determination is yet to be made as to whether the transfer of State hatcheries would serve the public interest. The Governor further stated that the hatchery transfer bill fragments the line of accountability in state government by requiring that regional, private nonprofit aquaculture associations approve of state hatchery transfers to nonassociation, private nonprofit operators. As a result, the State did not transfer

any hatcheries in FY 84, and has been operating all its facilities as if they were fully funded. A supplemental appropriation request for FY 84 will be submitted as per legislative intent.

Fiscal Year 1985 Operating Request

The FRED Budget Request Unit (Adjusted Base) for Fiscal Year 1985 is \$13,582.5. That amount includes full funding for those hatcheries which were the subject of transfer this year.

The Governor's FY 85 request for the FRED Budget Request Unit is \$14,356.1. This budget reestablishes habitat improvement and fishpass operation projects in the Kodiak, Cook Inlet, and Southeastern regions. In addition, the Statewide lake fertilization program, which is funded at the \$862.7 level in FY 84, is transferred from the Capital Improvement budget to the FY 85 Operational budget.

The Russell Creek Hatchery, at Cold Bay, is not included in the FY 85 budget request.

ECONOMIC ANALYSIS OF PUBLIC FISHERY
ENHANCEMENT PROGRAM: A PROGRESS REPORT

With the existence of many thousands of stocks of salmon and thousands of miles of coastline in Alaska, there are many opportunities for fishery enhancement in the state. The existence of such a large set of site choices and techniques in salmon and trout aquaculture complicates the process of choosing optimum enhancement alternatives. At the same time, it is apparent that public investment resources are limited. If our resources are to be used efficiently to maximize the net benefits to society, then projects must be capable of passing rigorous economic feasibility tests. These formal tests must evaluate not only the monetary and social opportunity costs of public investment activity, but also the economic consequences of that activity. One tool which has been used by public sector investment analysts to help evaluate these choices is benefit-cost analysis.

The application of benefit-cost analysis used by the FRED Division consists of a computer model which projects future fish harvest from an enhancement facility and an accounting of the value of the fish output, based on private benefits and costs, and public (government) costs. The valuation process for a salmon hatchery involves accounting of increased salmon harvests over a very long time horizon. It is, therefore, necessary for the economic portion of the model to use a discount rate, which accounts for the real change in the value of goods with time. This approach is similar to that of other applications of benefit-cost analyses, such as the Susitna Hydro Feasibility Study of 1982.

A general discussion of the methodology of this analysis technique was presented in the 1982 FRED Annual Report. The formal documentation called "Hatchery Broodstock Development and Facility Benefit-Cost Models for Public Fisheries Enhancement" (Hartman and Rawson) will be published in the FRED Report Series by February, 1984. A second report which evaluates a \$5 million capital investment at specific facilities in the hatchery program will also be published by February. This FRED report will be entitled, "An Analysis of Net Benefits from Proposed Capital Improvement Investments in State Salmon Hatcheries" (Lindauer and Hartman).

ACKNOWLEDGEMENTS

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We also thank Zodi Cardinal for the task of manuscript preparation through the draft stage to final copy.

APPENDIX A

Table 1. Survival summary of chinook salmon released in 1983 from Southeast Region FRED Division facilities.

Facility	Brood year, Brood stock	Green eggs	Eyed eggs (90%) (Percent survival goals from previous stage)	Emergent (95%)	Fry (95%)	Smolt (72%)
Beaver Falls	1982 Ketchikan Creek/ Cripple Creek				74,826a/	60,218b/ (80.4%)
Crystal Lake	1981 Crystal Creek	1,207,040	766,438c/ (63.5%)	361,543 (77.9%)		137,868d/ (38.1%)
Deer Mountain	1981 Cripple Creek	105,590	102,955 (96.6%)	84,508e/ (82.1%)		146,570d/ (68.7%)
	1981 Little Port Walter		142,366	128,756e/ (90.4%)		
	1982 Ketchikan Creek	281,426	246,030 (87.4%)	226,671e/ (92.1%)		20,633f/
	1982 Cripple Creek	51,758	40,471 (78.2%)	34,779e/ (85.9%)		
Hidden Falls	1981 Andrew Creek	175,084	133,587 (76.3%)	130,786 (97.9%)		80,375d/ (61.5%)

-Continued-

Table 1. Continued

Facility	Brood year, Brood stock	Green eggs	Eyed eggs (90%) (Percent survival goals from previous stage)	Emergent (95%)	Fry (95%)	Smolt (72%)
Snettisham	1981 Situk River	18,400	18,103 (98.4%)	18,033e/ (99.6%)		
	1981 King Salmon River	20,000	17,738 (88.7%)	16,221e/ (91.4%)		234,113d/ (49.9%)
	1981 Andrew Creek/ Crystal Creek	159,102	441,595c/ (87.4%)	435,266e/ (98.6%)		

a/ Transferred from Deer Mountain.

b/ Released after about 3 months salt water rearing.

c/ 302,611 eyed eggs were shipped to Snettisham from Crystal Lake.

d/ Number released.

e/ Combined for rearing.

f/ Released from Thomas Basin as zero check smolts. The remainder are still being reared.

Table 2. Survival summary of chinook salmon released in 1983 from Central Region FRED Division facilities.

Facility	Brood year, Brood stock	Green eggs	Eyed eggs (90%) (Percent survival goals from previous stage)	Emergent (95%)	Fingerling (90%)	Smolt (80%)
Kasilof	1981 Crooked Creek	172,783	157,375 (91.1%)	152,841 (97.1%)		53,741a/ (35.2%)
	1982 Crooked Creek	163,000	153,000 (93.9%)	147,000 (96.1%)	109,000b/ (74.1%)	
Elmendorf	1982 Crooked Creek	752,634	675,397 (89.7%)	648,255 (96.0%)		578,403a/ (89.2%)
Kitoi	1982 Chignik	219,311	123,817 (56.5%)	120,040 (96.9%)	119,529a/ (99.6%)	
	1982 Pasagshak	50,977	39,253 (77.0%)	37,730 (96.1%)	37,459a/ (99.3%)	

a/ Number released.

b/ 5,000 were released as fingerling. The remainder will be reared to smolt stage.

Table 3. Survival summary of coho salmon released in 1983 from Southeast Region FRED Division facilities.

Facility	Brood year, Brood stock	Green eggs	Eyed eggs (90%) (Percent survival goals from previous stage)	Emergent (95%)	Fry (95%)	Smolt (72%)
Crystal Lake	1982 Crystal Creek	3,318,880	3,029,600 (91.3%)	2,845,987a/ (93.9%)	762,505b/ (90.1%)	
	1981 Crystal Creek	460,355	431,931 (93.8%)	425,934 (98.6%)		398,075c/ (93.5%)
Deer Mountain	1982 Ketchikan Creek	93,344	84,110 (90.1%)		80,993c/ (96.3%)	
Klawock	1982 Klawock River	1,200,000	1,115,393 (92.9%)	1,141,926 (102.4%)d/	1,122,304e/ (98.3%)	
	1981 Klawock River	123,595	118,430 (95.1%)	116,430 (98.3%)		100,724c/ (86.5%)
Snettisham	1981 Speel Lake/ Snettisham	924,347	885,544 (95.8%)	869,519 (98.2%)		563,067b/ (64.8%)

a/ 1,500,000 were released as emergent fry, 750,000 were released as unfed fry.

b/ 246,000 were released as fed fry. The remainder are still being reared.

c/ Number released.

d/ Sampling error.

e/ 21,048 were released as fry into Klawock Lake. The remainder are still being reared.

Table 4. Survival summary of coho salmon released in 1983 from Central Region FRED Division facilities.

Facility	Brood year, Brood stock	Green eggs	Eyed eggs (90%) (Percent survival goals from previous stage)	Emergent (95%)	Fingerling (90%)	Smolt (80%)
Cannery Creek	1982 Mile 18	190,187	182,001 (95.7%)	177,986a/ (97.8%)		
Clear	1982 Clear Creek	307,173	302,854 (98.6%)	295,284 (97.5%)	224,282a/ (76.0%)	
Big Lake	1982 Meadow Creek	1,081,979	1,031,627 (95.3%)	925,476 (89.7%)	750,719a/ (81.1%)	
	1982 Fish Creek	1,710,878	1,561,433 (91.3%)	1,429,416 (91.5%)	906,658a/ (63.4%)	
	1982 Little Susitna	500,775	477,339 (95.3%)	353,440 (74.0%)	266,508a/ (75.4%)	
	1982 Cottonwood Creek	232,332	223,834 (96.3%)	207,644 (92.8%)	93,824a/ (45.2%)	
Elmendorf	1981 Seward-Bear Creek	2,003,700	1,903,200 (95.0%)	1,899,588 (99.8%)	1,208,094b/ (63.6%)	191,330a/
	1982 Seward-Bear Creek	1,179,762	875,595 (74.2%)	845,865 (96.6%)	377,145c/ (44.6%)	
Kitoi	1982 Bushkin River	122,583	79,714 (65.0%)	78,556 (98.5%)	77,348a/ (98.5%)	

-Continued-

Table 4. Continued.

Facility	Brood year, Brood stock	Green eggs	Eyed eggs (90%)	Emergent (95%)	Fingerling (90%)	Smolt (80%)
(Percent survival goals from previous stage)						
Trail Lakes	1982 Quartz Creek	726,522	659,175 (90.7%)	609,349 (92.4%)	593,052a/ (97.3%)	
	1982 Crooked Creek	620,693	557,950 (89.9%)	622,975d/	462,451a/ (82.9%)	
	1982 Russian River	30,749	27,894 (90.7%)	27,694 (99.3%)	27,327a/ (98.7%)	

a/ Number released.

b/ 1,019,708 were released as fingerlings in 1982. The remainder were released as smolts.

c/ 199,000 were released as fingerlings. The remainder are still being reared.

d/ Sampling error.

Table 5. Survival summary of pink salmon released in 1983 from Central Region FRED Division facilities.

Facility	Brood year, Brood stock	Green eggs	Eyed eggs: (90%) (Percent survival goals from previous stage)	Emergent (95%)	Fry (95%)	Fingerling (90%)
Kitoi	1982 Kitoi	85,675,680	78,279,736 (91.4%)	72,109,834a/ (92.1%)		6,215,936b/ (99.1%)
Tutka	1982 Tutka Creek	18,996,533	15,484,336 (81.5%)	15,366,061c/ (99.2%)		11,008,131b/ (98.9%)
Main Bay	1982 PWSAC	31,684,918	31,684,918	25,751,531b/ (81.3%)		
Cannery Creek	1982 Cannery Creek	23,758,984	22,460,743 (94.5%)	21,748,758b/ (96.8%)		

a/ 65,838,160 released as emergent fry. The remainder were released as fed fry or fingerling.

b/ Number released.

c/ 3,725,000 released as emergent fry. The remainder were released as fed fry or fingerling.

Table 6. Survival summary of chum salmon released in 1983 from Central Region FRED Division facilities.

Facility	Brood year, Brood stock	Green eggs	Eyed eggs (90%) (Percent survival goals from previous stage)	Emergent (95%)	Fry (95%)	Fingerling (90%)
Clear	1982 Clear Creek	42,185	39,631 (93.9%)	33,593 (84.8%)		33,330a/ (99.2%)
Kitoi	1982 Sturgeon River	145,046	118,313 (81.6%)	107,680 (91.0%)		105,058a/ (97.6%)
Main Bay	1982 Wells River	9,859,274	8,539,565 (86.6%)	8,700,919b/	6,670,318a/	1,857,767a/ (99.3%)
Russell Creek	1982 Russell Creek	8,774,949	6,952,663 (79.2%)	6,604,141 (95.0%)	1,095,149a/	5,453,057a/ (99.2%)
Sikusuilag	1982 Noatak River	531,409	522,598 (98.3%)	513,787 (98.3%)	480,531a/	6,242a/ (94.7%)
Tutka	1982 Tutka Creek	1,294,083	1,187,174 (91.7%)	1,139,859 (96.0%)	36,228a/	1,081,517a/ (98.1%)

a/ Number released.

b/ 116,095 were released as unfed fry. The remainder were released as fed fry or fingerling.

Table 7. Survival summary of chum salmon released in 1983 from Southeast Region FRED Division facilities.

Facility	Brood year, Brood stock	Green eggs	Eyed eggs (90%) (Percent survival goals from previous stage)	Emergent (95%)	Fry (95%)	Fingerling (90%)
Beaver Falls	1982 Beaver Falls/Dis- appearance Creek	7,935,389	7,313,937 (92.2%)	3,976,350 (54.4%)	284,650a/	3,659,676a/ (99.1%)
Crystal Lake	1982 Crystal Creek	76,214	66,920 (87.8%)	61,862 (92.4%)		60,017a/ (97.0%)
Hidden Falls	1982 Hidden Falls	23,224,924	22,304,747 (96.0%)	21,777,272b/		18,909,761a/ (99.3%)
Klawock	1982 Klawock/Disap- pearance Creek	13,802,680	11,685,758 (84.7%)	11,574,594 (99.0%)	5,229,906a/	5,754,145a/ (90.7%)
Snettisham	1982 Neka/Snettisham	10,802,846	10,492,760 (97.1%)	8,675,211 (82.7%)		7,284,159a/ (84.0%)

a/ Number released

b/ 2,726,310 were released as emergent fry. The remainder were released as fingerlings.

Table 8. Survival summary of sockeye salmon released in 1983 from Central Region FRED Division facilities.

Facility	Brood year, Brood stock	Green eggs	Eyed eggs (90%) (Percent survival goals from previous stage)	Emergent (95%)	Fry (95%)	Fingerling (90%)
Big Lake	1982 Meadow Creek	8,102,553	6,353,002 (78.4%)	6,279,605 (98.8%)	6,276,477a/ (99.9%)	
	1982 Fish Creek	522,109	343,093 (65.7%)	325,032 (94.7%)	324,932a/ (99.9%)	
	1982 Nancy Lake	2,921,451	1,303,077 (44.6%)	1,119,078 (85.9%)	1,114,528a/ (99.6%)	
Karluk	1983 Thumb River	15,255,000	12,284,000b/ (80.5%)			
Kasilof	1982 Bear Creek	10,042,223	9,385,119 (93.5%)	9,512,174	1,530,000a/	7,500,000a/ (94.0%)
	1982 Glacier Flats	10,322,178	9,769,070 (94.6%)	9,752,542 (99.8%)		9,558,279a/ (98.0%)
Gulkana	1982 Gulkana River	10,931,889		9,726,007a/ (89.0%)		
Trail Lakes	1982 Quartz Creek	1,713,210	1,370,514 (80.0%)	1,118,788 (81.6%)		1,225,382a/
	1982 Ptarmigan Creek	1,528,525	1,108,331 (72.5%)	1,049,558 (94.7%)		1,118,541a/
	1982 Hidden Lake	1,751,562	1,252,160 (71.5%)	1,079,786 (86.2%)	1,092,684a/	

a/ Number released.

b/ Number of eyed eggs planted.

Table 9. Survival summary of rainbow trout released in 1983 from Central Region FRED Division facilities.

Facility	Brood year, Brood stock	Green eggs	Eyed eggs (90%) (Percent survival goals from previous stage)	Emergent (90%)	Fingerling (77%)	Catchables (75%)
Elmendorf	1982 Elmendorf	4,843,646	4,238,000 (87.5%)	3,837,000 (90.5%)	1,541,043a/ (40.2%)	114,002b/ (67.3%)
	1983 Elmendorf	5,512,207	4,108,286 (74.5%)	3,558,948 (86.6%)	1,218,280c/ (34.2%)	
Clear	1982 Big Lake	23,589	17,517 (74.3%)	16,868 (96.3%)		14,200d/ (84.2%)
	1982 Swanson	43,029	37,501 (87.2%)	36,950 (98.5%)		35,500e/ (96.1%)

a/ 1,371,759 were released in 1982, the remainder were reared to catchable size.

b/ Number released.

c/ 1,111,402 were released in 1983, the remainder are being reared.

d/ 8,916 were released in 1983, the remainder are being reared.

e/ 16,693 were released in 1983, the remainder are being reared.

Table 10. Survival summary of steelhead trout released in 1983 from Southeast Region FRED Division facilities.

Facility	Brood year, Brood stock	Green eggs	Eyed eggs (90%) (Percent survival goals from previous stage)	Emergent (95%)	Fingerling (90%)	Smolt (72%)
Crystal Lake	1981 Crystal Creek	45,664	33,669 (73.7%)	32,970 (97.9%)		29,560a/ (89.7%)
Deer Mountain	1982 Ketchikan Creek	19,214	14,013 (72.9%)	13,069 (93.3%)	12,036a/ (92.1%)	
Klawock	1981 Klawock River	32,759	28,031 (85.6%)	19,612 (70.0%)		15,778a/ (80.5%)

a/ Number released.

APPENDIX B

Table 1. Pink salmon stocked by FRED Division in 1983.

Stocking Location	Area	Hatchery	Life Stage	Number Stocked
Cannery Creek	PWS	Cannery Creek	Emergent Fry	21,700,000
Main Bay	PWS	Main Bay	Emergent Fry	25,800,000
Paint River	LCI	Tutka	Emergent Fry	502,000
Tutka Bay	LCI	Tutka	Emergent Fry	3,730,000
Tutka Bay	LCI	Tutka	Fingerling	11,100,000
Kitoi Bay	KOD	Kitoi	Emergent Fry	65,800,000
Kitoi Bay	KOD	Kitoi	Fingerling	6,220,000

Table 2. Chum salmon stocked by FRED Division in 1983.

Stocking Location	Area	Hatchery	Life Stage	Number Stocked
George Inlet	SEA	Beaver Falls	Emergent Fry	285,000
George Inlet	SEA	Beaver Falls	Fingerling	3,660,000
Crystal Creek	SEA	Crystal Lake	Fingerling	60,200
Kasnyku Bay	SEA	Hidden Falls	Emergent Fry	2,730,000
Kasnyku Bay	SEA	Hidden Falls	Fingerling	18,900,000
Klawock River	SEA	Klawock	Unfed Fry	5,480,000
Klawock River	SEA	Klawock	Fingerling	5,500,000
Speel Arm	SEA	Snettisham	Fingerling	7,280,000
Main Bay	PWS	Main Bay	Unfed Fry	116,000
Main Bay	PWS	Main Bay	Fed Fry	6,670,000
Main Bay	PWS	Main Bay	Fingerling	1,860,000
Tutka Bay	LCI	Tutka	Fed Fry	36,000
Tutka Bay	LCI	Tutka	Fingerling	1,080,000
Kitoi Bay	KOD	Kitoi	Fingerling	105,000
Russell Creek	AKP	Russell Creek	Fed Fry	1,100,000
Russell Creek	AKP	Russell Creek	Fingerling	5,450,000
Clear Creek	AYK	Clear	Fingerling	33,300
Noatak River	AYK	Sikusuilag	Fed Fry	481,000
Noatak River	AYK	Sikusuilag	Fingerling	6,240

Table 3. Chinook salmon stocked by FRED Division in 1983.

Stocking Location	Area	Hatchery	Life Stage	Number Stocked
George Inlet	SEA	Beaver Falls	0 check smolt	60,200
Crystal Creek	SEA	Crystal Lake	Smolt	138,000
Ketchikan Creek	SEA	Deer Mountain	Smolt	107,000
Thomas Basin	SEA	Deer Mountain	Smolt	39,100
Thomas Basin	SEA	Deer Mountain	0 check smolt	20,600
Kasnyku Bay	SEA	Hidden Falls	Smolt	80,400
Speel Arm	SEA	Snettisham	Smolt	234,000
Cove Creek	PWS	Elmendorf	Smolt	112,000
Crooked Creek	CCI	Kasilof	Fingerling	5,000
Crooked Creek	CCI	Kasilof	Smolt	53,700
Crooked Creek	CCI	Elmendorf	Smolt	211,000
Box Canyon	CCI	Elmendorf	Smolt	54,500
Halibut Cove	LCI	Elmendorf	Smolt	201,000
Lake Rose Tead	KOD	Kitoi	Fingerling	157,000

Table 4. Sockeye salmon stocked by FRED Division in 1983.

Stocking Location	Area	Hatchery	Life Stage	Number Stocked
Gulkana River	PWS	Gulkana	Emergent Fry	9,730,000
Blodgett Lake	UCI	Big Lake	Fed Fry	2,390,000
Meadow Lake	UCI	Big Lake	Fed Fry	4,210,000
Nancy Lake	UCI	Big Lake	Fed Fry	1,114,000
Tustumena Lake	CCI	Kasilof	Fingerling	17,000,000
Ptarmigan Creek	CCI	Trail Lakes	Fingerling	1,120,000
Quartz Creek	CCI	Trail Lakes	Fingerling	1,230,000
Hidden Lake	CCI	Trail Lakes	Fed Fry	1,090,000
Leisure Lake	LCI	Kasilof	Fed Fry	1,530,000
Upper Thumb River	KOD	Karluk	Eyed Egg	12,300,000

Table 5. Coho salmon stocked by FRED Division in 1983.

Stocking Location	Area	Hatchery	Life Stage	Number Stocked
Crystal Creek	SEA	Crystal Lake	Smolt	197,000
Ohmer Creek	SEA	Crystal Lake	Smolt	201,000
Ohmer Creek	SEA	Crystal Lake	Emergent Fry	250,000
Summer Creek	SEA	Crystal Lake	Emergent Fry	250,000
Irish Creek	SEA	Crystal Lake	Emergent Fry	1,500,000
Crystal Creek	SEA	Crystal Lake	Fed Fry	246,000
Ward Lake	SEA	Deer Mountain	Fingerling	81,000
Klawock River	SEA	Klawock	Smolt	101,000
Klawock Lake	SEA	Klawock	Fingerling	21,000
Speel Arm	SEA	Snettisham	Smolt	295,000
Indian Lake	SEA	Snettisham	Smolt	268,000
Cove Creek	PWS	Elmendorf	Smolt	93,500
Lake 478A	PWS	Cannery Creek	Unfed Fry	94,700
Otter Lake	PWS	Cannery Creek	Unfed Fry	29,300
Mile 18 Creek	PWS	Cannery Creek	Unfed Fry	54,000
Anderson Lake	UCI	Big Lake	Fingerling	51,900
Cornelius Lake	UCI	Big Lake	Fingerling	15,800
Cottonwood Lake	UCI	Big Lake	Fingerling	96,800
Kings Lake	UCI	Big Lake	Fingerling	47,200
Meadow Creek	UCI	Big Lake	Fingerling	1,380,000
Nancy Lake	UCI	Big Lake	Fingerling	267,000
Niklason Lake	UCI	Big Lake	Fingerling	30,800
Wasilla Lake	UCI	Big Lake	Fingerling	129,500
Echo Lake	UCI	Trail Lakes	Fingerling	7,000
Lucille Lake	UCI	Trail Lakes	Fingerling	28,700
Memory Lake	UCI	Trail Lakes	Fingerling	25,200
Rocky Lake	UCI	Trail Lakes	Fingerling	17,500
Victor Lake	UCI	Trail Lakes	Fingerling	6,800
Crooked Creek	CCI	Trail Lakes	Fingerling	32,900
Engineer Lake	CCI	Trail Lakes	Fingerling	45,000
Grant Lake	CCI	Trail Lakes	Fingerling	518,000
Lower Russian Lake	CCI	Trail Lakes	Fingerling	27,300
Six Mile Lake	CCI	Trail Lakes	Fingerling	299,000
Tern Lake	CCI	Trail Lakes	Fingerling	37,000
Quartz Creek	CCI	Trail Lakes	Fingerling	38,200
Grouse Lake	CCI	Elmendorf	Smolt	49,900
Seward Lagoon	CCI	Elmendorf	Smolt	48,000
Bear Lake	CCI	Elmendorf	Fingerling	199,000
Boy Scout Lake	KOD	Kitoi	Fingerling	4,000
Buskin Lake	KOD	Kitoi	Fingerling	37,400
Genevieve Lake	KOD	Kitoi	Fingerling	36,000
Birch Lake	AYK	Clear	Fingerling	10,000
Clear Creek	AYK	Clear	Fingerling	168,000
Quartz Lake	AYK	Clear	Fingerling	46,500

Table 6. Rainbow trout stocked by FRED Division in 1983.

Stocking Location	Area	Hatchery	Life Stage	Number Stocked
Bluff Cabin	PWS	Elmendorf	Fingerling	10,000
Buffalo Lake	PWS	Elmendorf	Fingerling	2,090
David Lake	PWS	Elmendorf	Fingerling	10,000
Hallie Lake	PWS	Elmendorf	Fingerling	5,000
Katherine Lake	PWS	Elmendorf	Fingerling	9,000
Mary Lou Lake	PWS	Elmendorf	Fingerling	5,000
Rainbow Lake	PWS	Elmendorf	Fingerling	24,000
Tolsona Lake	PWS	Elmendorf	Fingerling	20,650
Worthington Lake	PWS	Elmendorf	Fingerling	10,000
Beach Lake	UCI	Elmendorf	Catchable	2,110
Big No Luck Lake	UCI	Elmendorf	Fingerling	14,100
C Street Lake	UCI	Elmendorf	Catchable	4,220
Campbell Point Lake	UCI	Elmendorf	Fingerling	12,100
Campbell Point Lake	UCI	Elmendorf	Catchable	4,000
Cheney Pond	UCI	Elmendorf	Fingerling	17,300
Cheney Pond	UCI	Elmendorf	Catchable	7,250
Clunie Lake	UCI	Elmendorf	Catchable	8,350
Chrystal Lake	UCI	Elmendorf	Fingerling	25,400
Delong Lake	UCI	Elmendorf	Fingerling	10,300
Delong Lake	UCI	Elmendorf	Catchable	4,072
Derby Pond	UCI	Elmendorf	Catchable	1,060
Dishno Lake	UCI	Elmendorf	Catchable	861
Elmendorf Golf Course	UCI	Elmendorf	Fingerling	1,020
Finger Lake	UCI	Elmendorf	Fingerling	72,900
Fire Lake - lower	UCI	Elmendorf	Fingerling	19,500
Fire Lake - upper	UCI	Elmendorf	Catchable	3,720
Fish Lake	UCI	Elmendorf	Catchable	2,110
Florence Lake	UCI	Elmendorf	Fingerling	6,250
Green Lake	UCI	Elmendorf	Catchable	5,000
Gwen Lake	UCI	Elmendorf	Catchable	4,340
Hillberg Lake	UCI	Elmendorf	Catchable	3,830
Irene Lake	UCI	Elmendorf	Fingerling	1,800
Jewell Lake	UCI	Elmendorf	Fingerling	15,500
Jewell Lake	UCI	Elmendorf	Catchable	16,200
Johnson Lake	UCI	Elmendorf	Fingerling	16,100
Junction Lake	UCI	Elmendorf	Fingerling	4,360
Junction Lake	UCI	Elmendorf	Catchable	978
Kepler Bradly Lake	UCI	Elmendorf	Fingerling	11,600
Knik Lake	UCI	Elmendorf	Fingerling	20,100
Knik Lake	UCI	Elmendorf	Catchable	4,930
Little No Luck Lake	UCI	Elmendorf	Fingerling	3,500
Marion Lake	UCI	Elmendorf	Fingerling	10,600
Matanuska Lake	UCI	Elmendorf	Fingerling	24,600
Matanuska Lake	UCI	Elmendorf	Catchable	5,870

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Table 6. Continued.

Stocking Location	Area	Hatchery	Life Stage	Number Stocked
Mirror Lake	UCI	Elmendorf	Catchable	13,500
Otter Lake	UCI	Elmendorf	Fingerling	11,700
Otter Lake	UCI	Elmendorf	Catchable	8,720
Ravine Lake	UCI	Elmendorf	Fingerling	2,460
Reed Lake	UCI	Elmendorf	Fingerling	3,900
Sand Lake	UCI	Elmendorf	Fingerling	24,500
Sand Lake	UCI	Elmendorf	Catchable	4,830
Seymore Lake	UCI	Elmendorf	Fingerling	21,500
Six Mile Lake-lower	UCI	Elmendorf	Catchable	1,200
Six Mile Lake-upper	UCI	Elmendorf	Catchable	1,660
Slipper Lake	UCI	Elmendorf	Fingerling	1,820
South Rolley Lake	UCI	Elmendorf	Fingerling	21,600
Spring Lake	UCI	Elmendorf	Catchable	1,680
Thompson Lake	UCI	Elmendorf	Catchable	900
Tigger Lake	UCI	Elmendorf	Fingerling	3,540
Triangle Lake	UCI	Elmendorf	Catchable	1,680
Walby Lake	UCI	Elmendorf	Fingerling	10,800
Weiner Lake	UCI	Elmendorf	Fingerling	2,070
Wishbone Lake	UCI	Elmendorf	Fingerling	12,400
"X" Lake	UCI	Elmendorf	Fingerling	9,000
"Y" Lake	UCI	Elmendorf	Fingerling	7,900
Vagt Lake	CCI	Elmendorf	Fingerling	9,150
Barbara Lake	CCI	Elmendorf	Fingerling	9,000
Cabin Lake	CCI	Elmendorf	Fingerling	11,500
Carter Lake	CCI	Elmendorf	Fingerling	9,500
Jerome Lake	CCI	Elmendorf	Fingerling	3,000
Island Lake	CCI	Elmendorf	Fingerling	12,500
Tirmore Lake	CCI	Elmendorf	Fingerling	11,000
Upper Jean Lake	CCI	Elmendorf	Fingerling	11,000
Abercrombie Lake	KOD	Elmendorf	Fingerling	3,700
Aurel Lake	KOD	Elmendorf	Fingerling	3,000
Big Lake	KOD	Elmendorf	Fingerling	3,600
Caroline Lake	KOD	Elmendorf	Fingerling	1,400
Cascade Lake	KOD	Elmendorf	Fingerling	3,300
Dolgoi Lake	KOD	Elmendorf	Fingerling	5,150
Heitman Lake	KOD	Elmendorf	Fingerling	3,250
Lee Lake	KOD	Elmendorf	Fingerling	1,830
Lilly Pond	KOD	Elmendorf	Fingerling	1,600
Long Lake	KOD	Elmendorf	Fingerling	4,060
Tanignak Lake	KOD	Elmendorf	Fingerling	10,600
Big Donna Lake	AYK	Elmendorf	Fingerling	15,900
Birch Lake	AYK	Clear	Subcatchable	19,500

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Table 6. Continued

Stocking Location	Area	Hatchery	Life Stage	Number Stocked
Campbell Creek	AYK	Clear	Catchable	2,520
Spencer Lake	AYK	Clear	Catchable	3,610
Birch Lake	AYK	Elmendorf	Fingerling	125,000
Chena Lake	AYK	Elmendorf	Fingerling	30,600
Ft. Greely #7 pond	AYK	Elmendorf	Fingerling	600
Ft. Greely #8 pond	AYK	Elmendorf	Fingerling	600
Ft. Greely #9 pond	AYK	Elmendorf	Fingerling	600
Geskamina Lake	AYK	Elmendorf	Fingerling	10,000
Koole Lake	AYK	Elmendorf	Fingerling	34,500
Little Donna	AYK	Elmendorf	Fingerling	12,500
Mark Lake	AYK	Elmendorf	Fingerling	4,800
North Twin Lake	AYK	Elmendorf	Fingerling	4,000
Quartz Lake	AYK	Elmendorf	Fingerling	233,000
Robertson Lake	AYK	Elmendorf	Fingerling	1,400
Spencer Lake	AYK	Elmendorf	Fingerling	5,100

Table 7. Steelhead trout stocked by FRED Division in 1983.

Stocking Location	Area	Hatchery	Life Stage	Number Stocked
Crystal Creek	SEA	Crystal Lake	Smolt	10,000
Ohmer Creek	SEA	Crystal Lake	Smolt	9,100
Falls Creek	SEA	Crystal Lake	Smolt	10,500
Talbot Lake	SEA	Deer Mountain	Fingerling	12,000
Klawock River	SEA	Klawock	Fingerling	15,800

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