DIVISION OF FISHERIES REHABILITATION ENHANCEMENT AND DEVELOPMENT

Report to the 1977 Legislature

F. R. E. D.

ALASKA
Hammond, Governor
DEPARTMENT OF FISH AND GAME
W. Brooks, Commissioner

Robert S. Roys, Director F. R. E. D.

Graphics by
Information and Education Section
Alaska Department of Fish and Game

Cover Photo:

HANDFUL--F.R.E.D. personnel caring for this coho smolt along with thousands in facilities throughout the state are adding to the fishery resource for the benefit of both sport and commercial fishermen.

ADFG photo by Russ Dixon.

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introduction

A TOTAL of 50 million 700 thousand salmon eggs was collected by the Division of Fisheries Rehabilitation, Enhancement and Development (F.R.E.D.) in 1976 for incubation throughout the State, as compared to 22 million 500 thousand eggs taken in 1975 and 6 million 800 thousand in 1974. These eggs are incubated and reared in F.R.E.D. facilities from Bristol Bay to Southeastern Alaska. Hatchery section shares responsibility for the operation of the Kitoi hatchery and that section also incubates and rears king salmon and coho fry at the Fire Lake and Crystal Lake complexes where heated water is available for accelerating fish growth. The Hatchery section will be integrated into the F.R.E.D. Division in the near future.

A $29.2 million bonding authorization for salmon enhancement and related projects was passed in the 1976 general election. Funds were provided for eight new incubation and rearing facilities, three fishways, and improvement for several existing facilities. Site selection and engineering studies have progressed to the point where construction will start on several of the incubation facilities during 1977.

The 1971 Legislature created the Division of Fisheries Rehabilitation, Enhancement and Development (F.R.E.D.). Prior to this time the salmon research and management program of the A.D.F.&G. was primarily directed toward obtaining and applying knowledge to regulate commercial, sport and subsistence harvests without jeopardizing future production. This program attempted to secure annual optimum escapements for each salmon species in each management area through regulation of harvests by a variety of methods.

Because Alaska has vast natural spawning and rearing areas, management based upon "optimum escapement" may yield major catches of salmon when the environment is favorable. However, poor catches are inevitable if the natural environment is unfavorable as may have occurred during the past several years.

Salmon are unique as they migrate to sea, and to a high degree, return to their river of origin or as recent data has demonstrated, to the area of release. Alaska possesses myriads of lakes and streams that are capable of producing salmon, and it is possible by developing and applying salmon husbandry technology to substantially increase the allowable harvest of salmon.

Furthermore, because of this homing instinct it is practical to invest time, effort, and money in projects in specific areas of the state and have the benefit (adult salmon) return to the investment area to meet needs of commercial, sport or subsistence fishermen.

The Division of Fisheries Rehabilitation, Enhancement and Development (F.R.E.D.) has been charged with the following statutory obligations (AS 16.05.092):

1. Develop and continually maintain a comprehensive, coordinated state plan for the orderly present and long range rehabilitation, enhancement and development of all aspects of the state's fisheries for the perpetual use, benefit, and enjoyment of all citizens, and revise and update this plan annually;

2. Encourage the investment by private enterprise in the technological development and economic utilization of the fisheries resources;

3. Through rehabilitation, enhancement and development programs do all things necessary to ensure perpetual and increasing production and use of the food resources of Alaska waters and continental shelf areas; and

4. Make a comprehensive annual report to the legislature containing detailed information regarding its accomplishments under this section and proposals of plans and activities for the next fiscal year, not later than 20 days after the convening of each regular session.

Since 1971 F.R.E.D. Division has been engaged in the following activites which were prerequisites to launching a major effort (which was launched with the passage of the Bond Bill in 1976).

1. Securing a staff of highly trained personnel in the fields of biology, salmon husbandry, fish pathology, engineering (plus the use of consultants for design) and in FY77 genetics who are thoroughly familiar with environmental parameters in Alaska. (See FY76 legislative report for further details.)

2. Monitoring the development of salmon technology in other areas of the world for possible application in Alaska.

3. Testing and refining technology to fit Alaskan environmental parameters and potentials.

4. Construction of fish pass facilities throughout the State.

5. Establishing inventory and assessment teams for site investigation and evaluation of possible enhancement and rehabilitation opportunities. This includes industrial spin-off opportunities such as power developments.

6. Laying the groundwork for the development of a long range coordinated rehabilitation and enhancement plan based upon cost effective technology, the needs of the people and the emerging private nonprofit hatcheries. A salmon plan was developed in 1976 and should be available in early 1977.

The intent of this annual report is neither to assail the legislature with a mass of data that is difficult to assimilate nor to discuss scientifically the details of each project and probable implications of specific results. Project specifics will be made available on request.

The intent is rather to present to the Legislature a highly summarized version of the Division's activities and achievements during the past six years in a manner that should yield a firm, clear understanding of the status of non-regulatory salmon rehabilitation and enhancement programs in the State.

BIOLOGICAL OVERVIEW

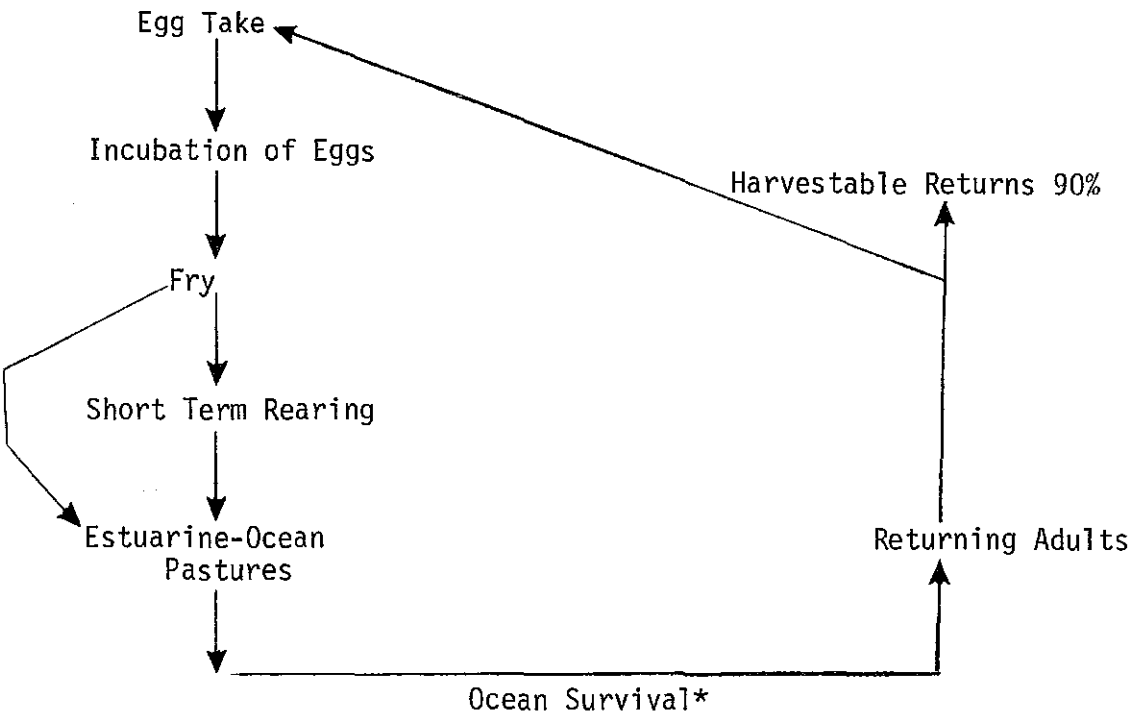
PINK AND CHUM SALMON

IN ALASKA pink and chum salmon spawn from June to October. In the spring when the fry emerge from freshwater or intertidal spawning beds, they migrate immediately to an estuarine and marine environment. Adult chum salmon return after spending two to four years in the ocean. Pink salmon adults return after about a year in the ocean.

Because pink and chum salmon are capable of adapting to the marine environment as fry, production facilities can be developed that are simpler in design and less costly to operate than those facilities required for long term rearing of coho and king salmon.

Compactness of facilities is essential in Alaska where remote construction and operational costs are high. Heating of buildings is essential in many areas of Alaska. Heat is expensive and minimizing the amount of non-fish producing space may increase benefit/cost ratios.

PHASES OF PINK-CHUM SALMON AQUACULTURE PROGRAM



*Short term rearing facility may be used to coordinate release timing with optimum estuarine productivity and may double average ocean survival from 1 to 2%.

COHO AND KING SALMON

COHO AND KING salmon spawn in the gravel of freshwater streams. Unlike pink or chums, when the fry emerge from the gravel, the coho and king fry must either stay in the stream or migrate to a lake where they rear for one, two or more years prior to migrating to sea as smolts. After outmigration as smolts coho rear in the marine environment about a year while kings remain at sea from two to five years before returning as adults.

Since coho and king salmon, for physiological reasons, must reside in freshwater for one to two years prior to migration to the sea, artificially reared fry must also achieve smolt size prior to migration. This can be accomplished at hatcheries, but the size of facilities and cost of food may become a prohibiting factor for producing large numbers of fish. Low cost alternatives to long term rearing are now being examined. Producing smolts at a reduced cost can be accomplished by any of the following methods:

1. Rearing for a period in estuarine or saltwater rearing pens.

2. Placing in barren or underpopulated streams where there are suitable environmental niches;

3. Planting in accessible lakes which have been rehabilitated to remove predators and competitors and then managed as a single species production area;

4. Planting in lakes or streams above impassable barriers which may be laddered or which may be used only for freshwater rearing areas;

5. Planting natural or semi-natural ponds and lagoons where fish may be fed and/or subsist on natural food.

All of these methods have been or are being used successfully to produce coho and king salmon both in Alaska and other areas.

OPTIONAL PHASES OF COHO-KING SALMON AQUACULTURE PROGRAM

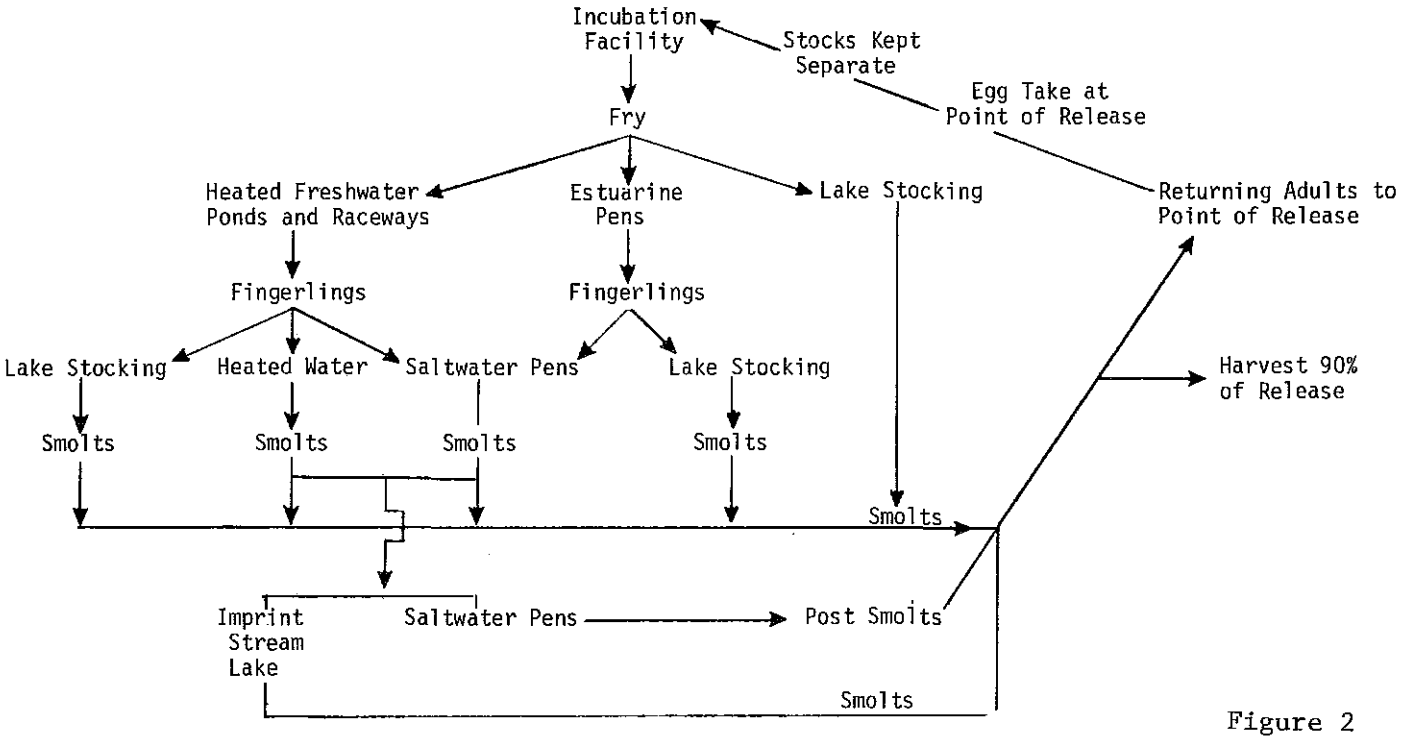


Figure 2

SOCKEYE SALMON

SOCKEYE SALMON lay their eggs in the gravel of a freshwater stream or lake bed. Fry emerging from the gravel generally rear in a lake from one to three years and then migrate to sea as smolts. Adults usually return after spending one to three years in the ocean.

In Alaska there are major lakes where:

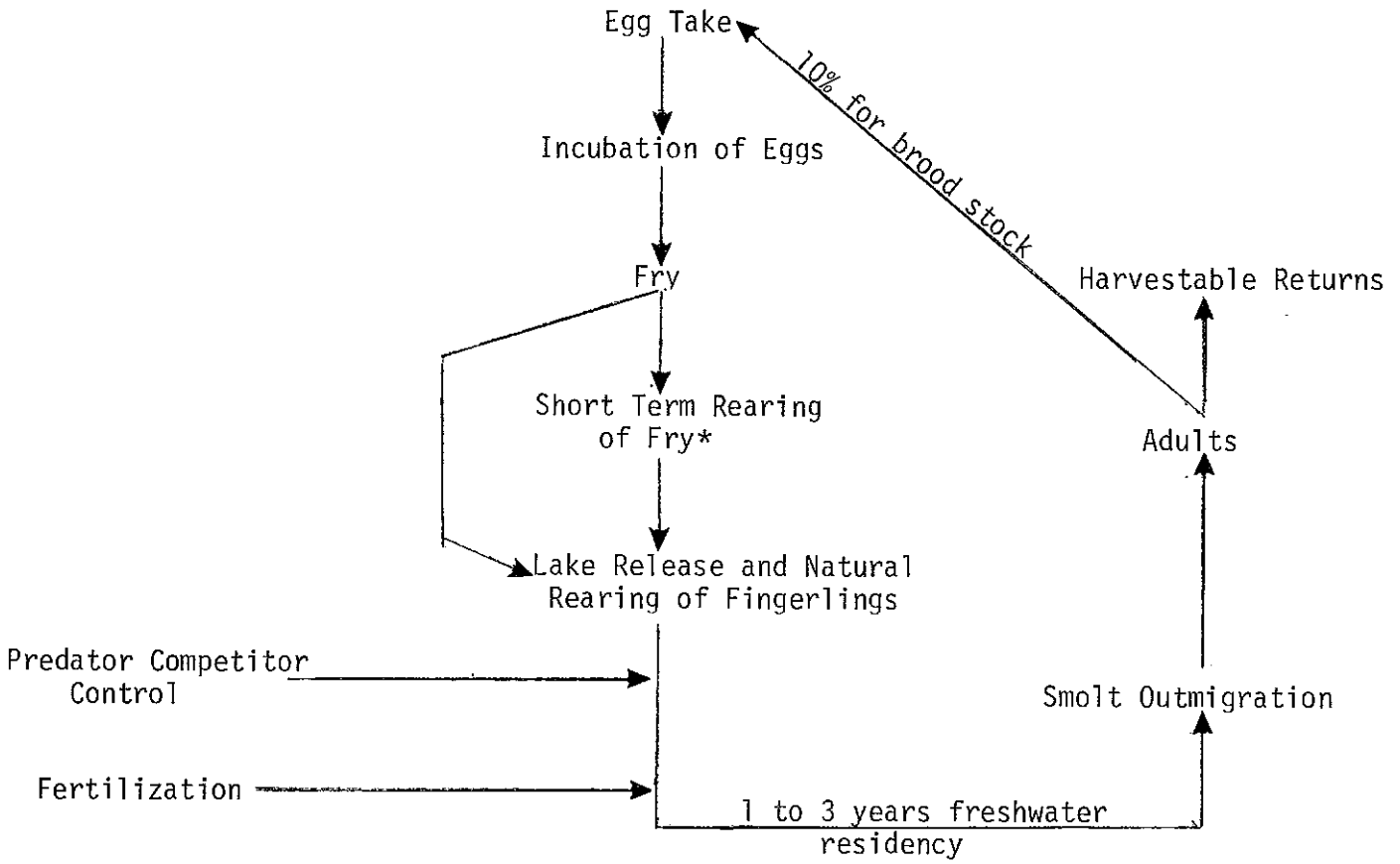
(a) large scale fry deficits occur because of total absence of sockeyes, limited spawning area, or chronic poor escapements;

(b) populations of predators and competitors significantly affect smolt production, and

(c) the carrying capacity for sockeye fry and fingerlings is limited because of lack of sufficient basic nutrient material that governs the production of plankton.

F.R.E.D. Division's approach is to systematically develop, test, evaluate and apply production methods of sockeye enhancement and rehabilitation in a manner that will not create significant competitor or predator user conflicts or interfere with natural sockeye production.

PHASES OF SOCKEYE SALMON AQUACULTURE PROGRAM



*Short term rearing may be used to coordinate release timing with optimum lake productivity.

Figure 3

PRODUCTION SUMMARY and SURVIVALS

PRODUCTION SUMMARY AND STATEWIDE SURVIVALS BY PRODUCTION PHASE

Comparison of brood years: The number of eggs taken, fry produced, fry released or stocked in lakes, and smolt produced (estuarine, saltwater, and lake production) in F.R.E.D. facilities. For species breakdowns and adult returns see Appendix. Note the upward trends since brood year 1972 in all categories. A tremendous increase is expected in fry production for brood year 1976.

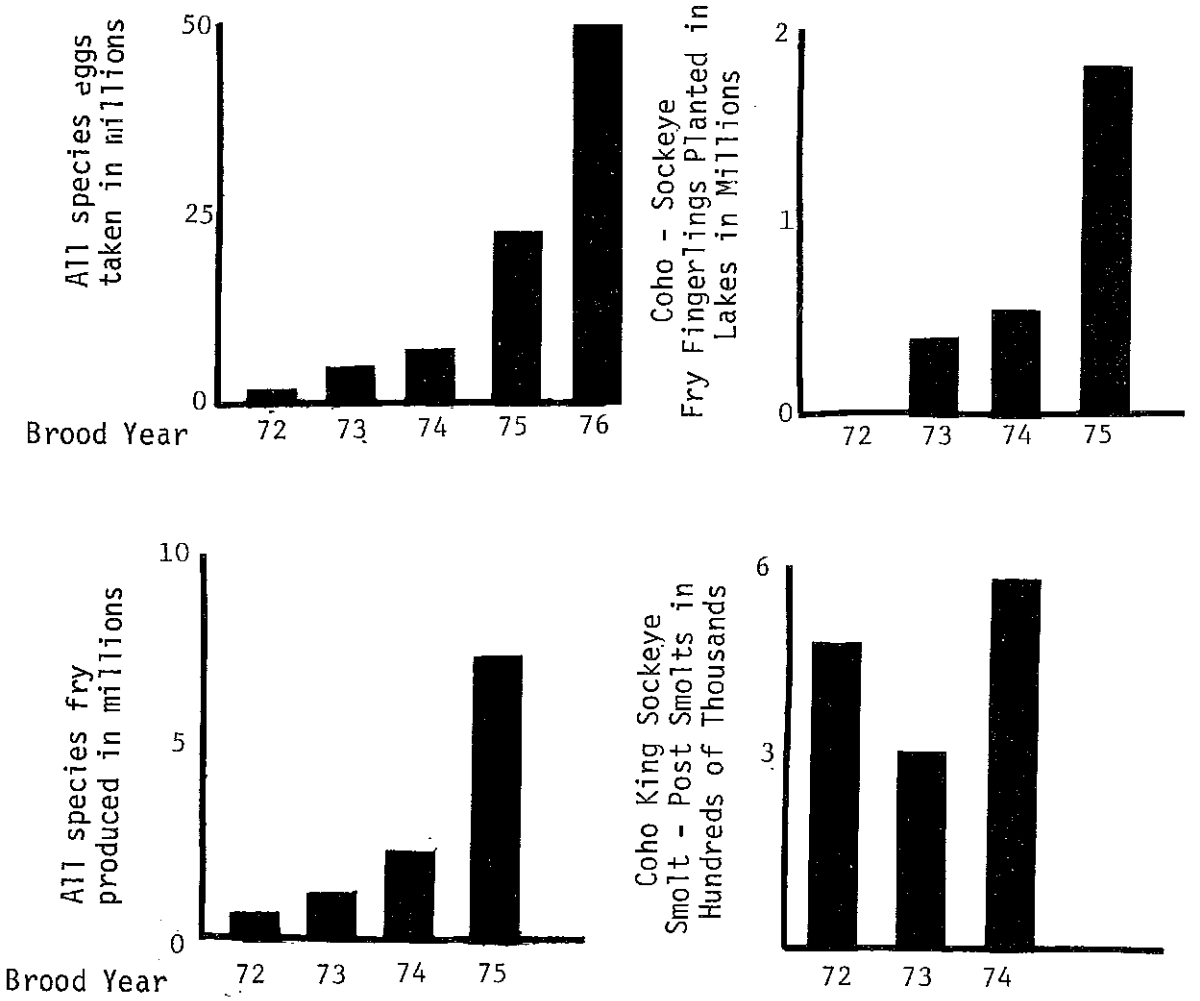


Figure 4

Figure 4 illustrates the rapid increase in eggs taken and the subsequent production of fry, fingerlings, smolts and post smolts from F.R.E.D. operated or principally funded facilities. Species breakdowns are

listed in the appendix. Adult return data by species has been accumulating and may be reviewed in the appendix.

Since Brood Year 1972:

Egg takes have increased by 6000%.

Fry fingerling production by 1000% (we expect a dramatic increase in fry production from Brood Year 1976).

Fry, fingerling transplants into lakes increased by 450%.

Smolt production increased by 24% which will increase substantially when outmigration or release data is available for Brood Years 75 and 76.

Passage of the 1976 Bond proposal requires that F.R.E.D. Division personnel take an additional 300 million eggs (500% increase over Brood Year 1976) in order to meet program objectives. An intensive fish culture training program has already been launched as an adjunct to facility development schedules.

Cost effective application of salmon husbandry technology requires that each key phase of the production system be analyzed separately and compared against acceptable standards. Analyses performed on entire systems where performance is substandard does not point out where specific problems lie. Phase analyses is an extremely important concept that until recently was not conducted in hatcheries. Recent phase analyses and subsequent research into production limiting problems throughout the world has culminated in successful application of salmon husbandry programs.

F.R.E.D. Division has rapidly expanded in terms of personnel and facilities. During this expansion numerous experiments have been conducted under a variety of conditions, highly trained personnel have been hired, and others have been trained and have gained experience.

The results of F.R.E.D. efforts in terms of overall survivals for various life history stages (check points on operating success) by facility and husbandry technique are illustrated in Figures 5 through 8. In the early years considerable research was conducted under a variety of conditions (through Brood Year 1975) that initially yielded highly variable results. A clear picture has since evolved relative to the Division's ability to conduct a major salmon rehabilitation and enhancement program in terms of personnel and application of key husbandry technology.

Figure 5 shows survival of green to eyed egg brood years 1974 through 1976. In Brood Year 1974 green egg to eyed egg survivals ranged between 6% and 90%. Brood year 1975 reflected a higher survival range (45% to 90%) after systems were refined and personnel began to perfect egg taking techniques. By Brood Year 1976 green egg to eyed egg survival at all housed facilities was above 80%. Achievement of those survivals was based upon egg take training and perfecting eyeing systems under a variety of conditions. It is possible to achieve over 90% green to eyed egg survival.

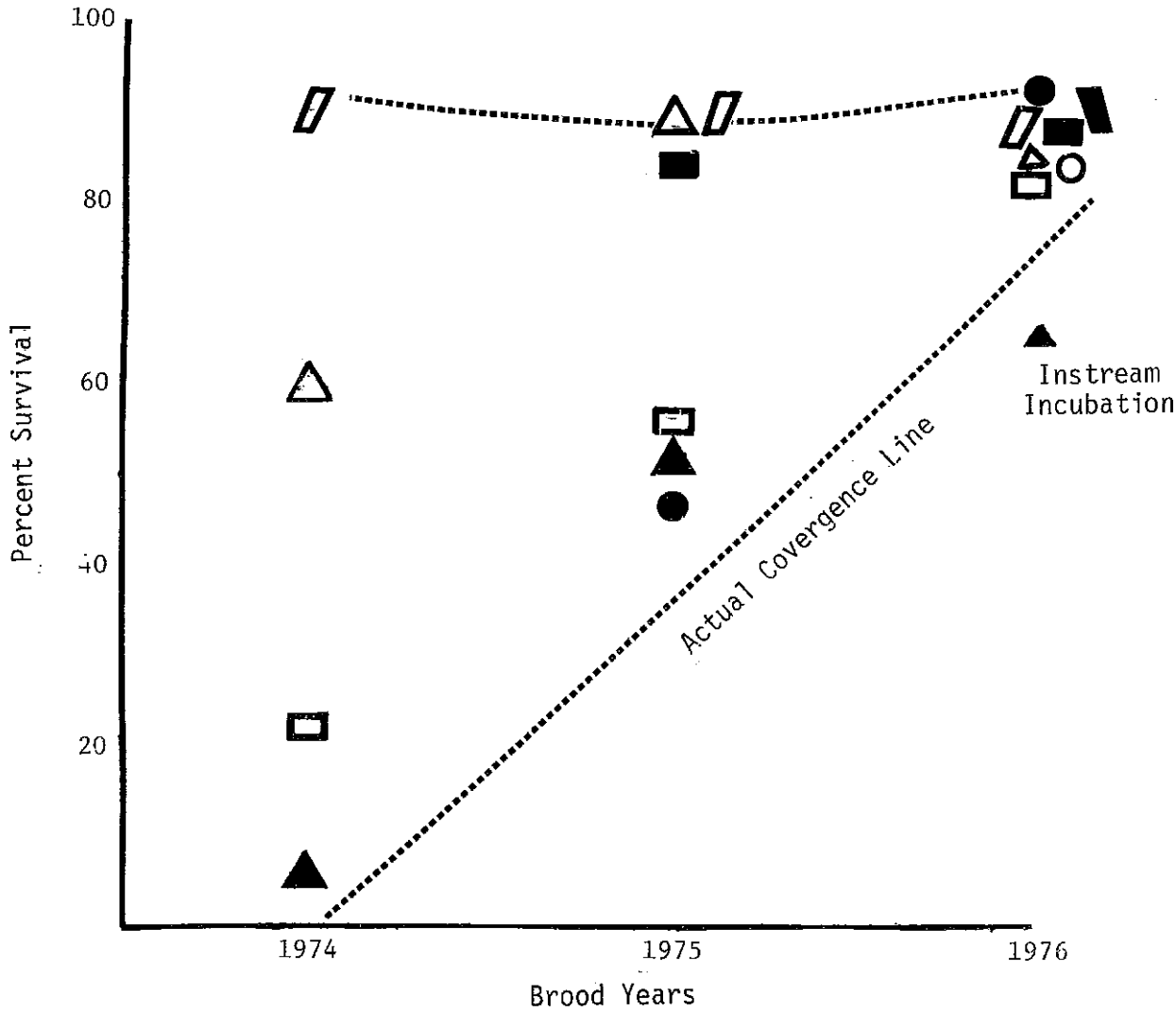


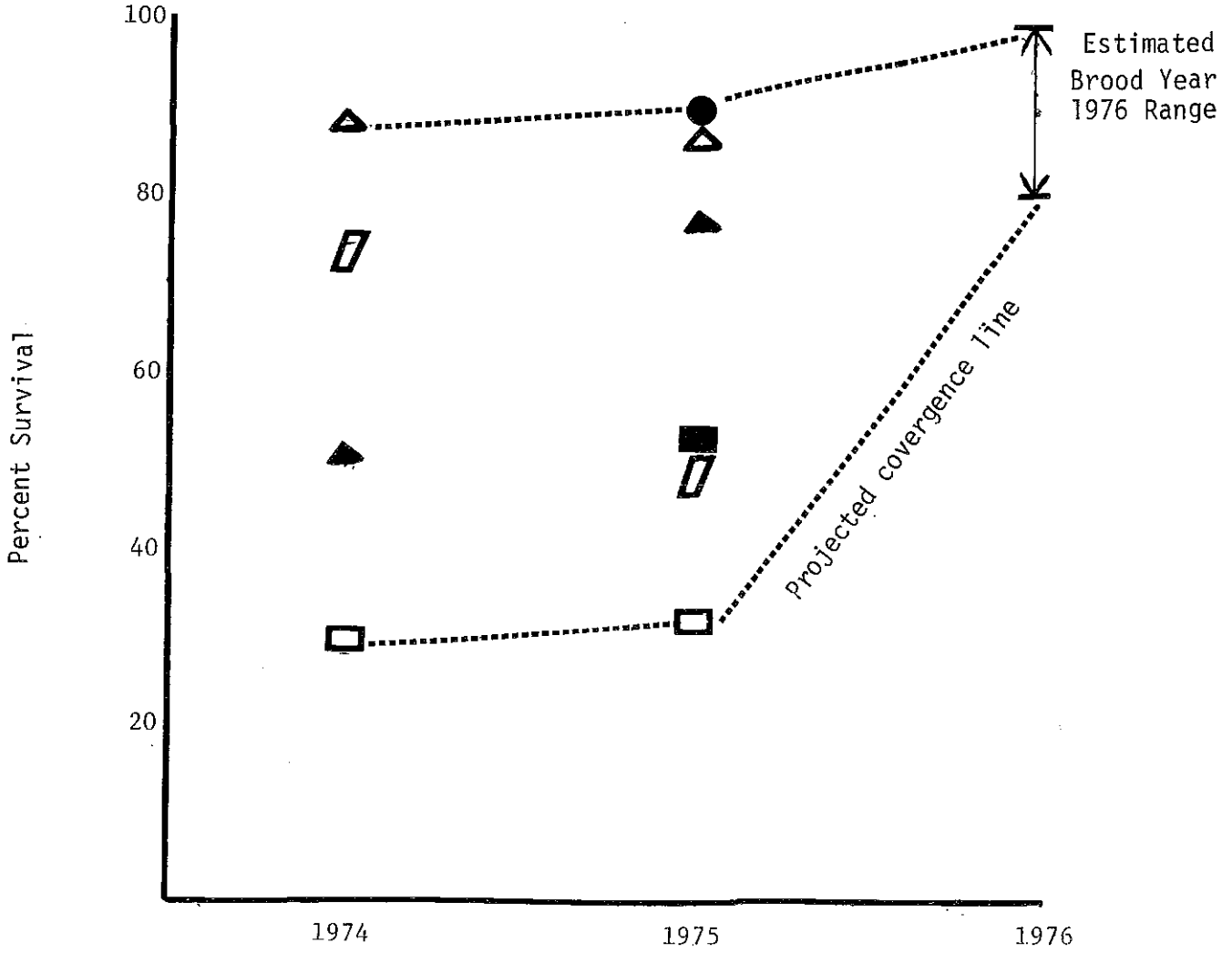
Figure 5

Key

- Kitoi Bay
- Kasilof
- Big Lake
- East Creek (Brood year '76 data not year available)
- Tutka
- Starrigavin
- Beaver Falls
- Snettisham

Salmon green egg to eyed egg survival at F.R.E.D. facilities for three (3) brood years. Species combined. Note the concentration of high survivals in brood year 1976 after two years of testing and perfecting water systems, egg taking techniques, training of personnel and procurement of trained personnel. We believe it is possible to achieve green to eyed egg survival of above 90% at each facility in the near future.

Figure 6 shows survival of eyed egg to the fry stage originating from eyed egg incubation experiments at all facilities. Improvement will occur in the spring of 1977 because the results of previous experiments were incorporated into the design and operation of the facilities in Brood Year 1976.



Key

- Kitoi Bay
- Kasilof
- Big Lake
- East Creek
- Starrigavin
- Beaver Falls

Figure 6

Eyed salmon egg to fry survival at F.R.E.D. facilities for three (3) brood years. Species combined. Note: many experiments have been conducted and detailed results were incorporated into brood year 1976 operations and the 1976 designs of Bond Facilities.

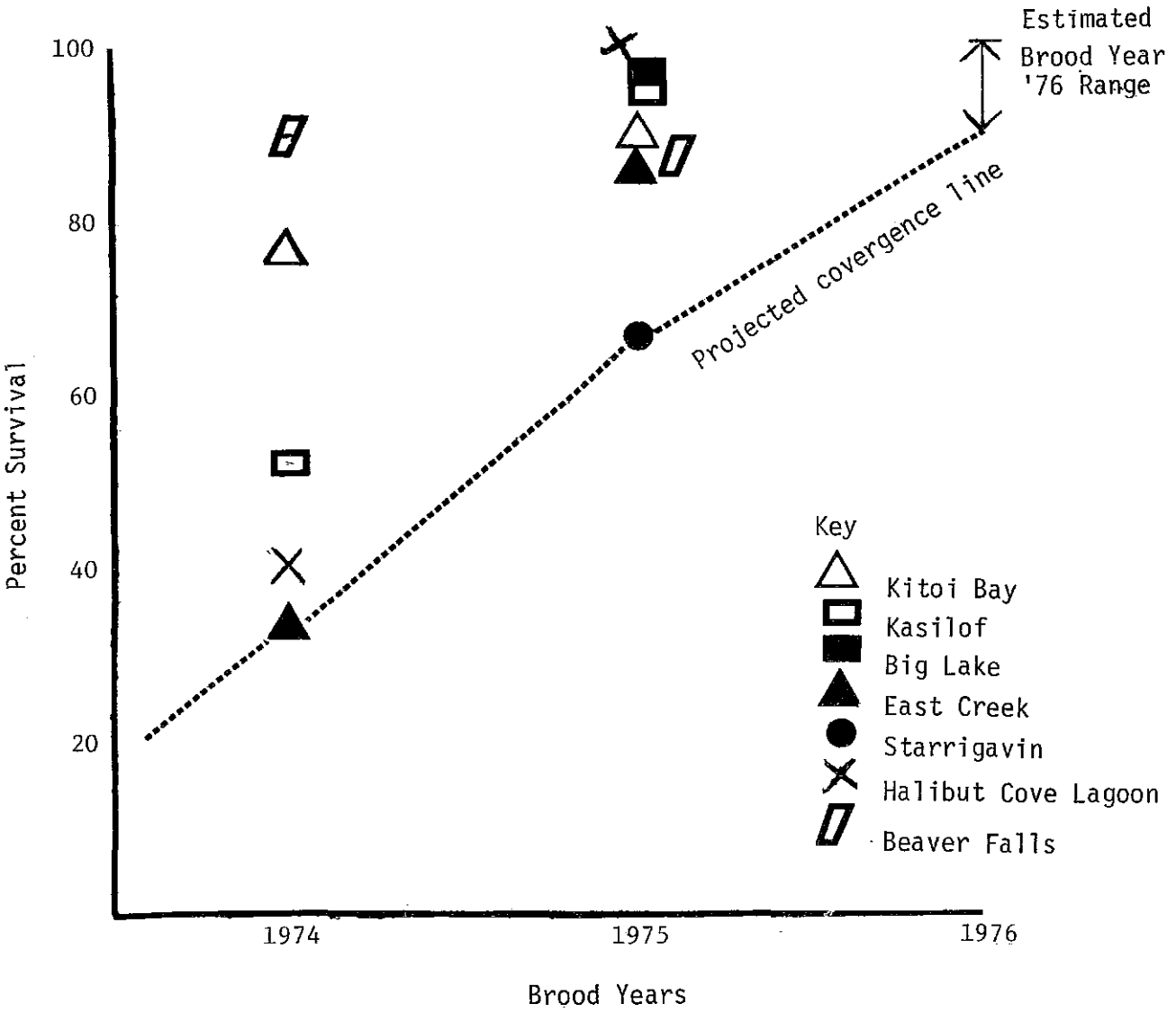


Figure 7

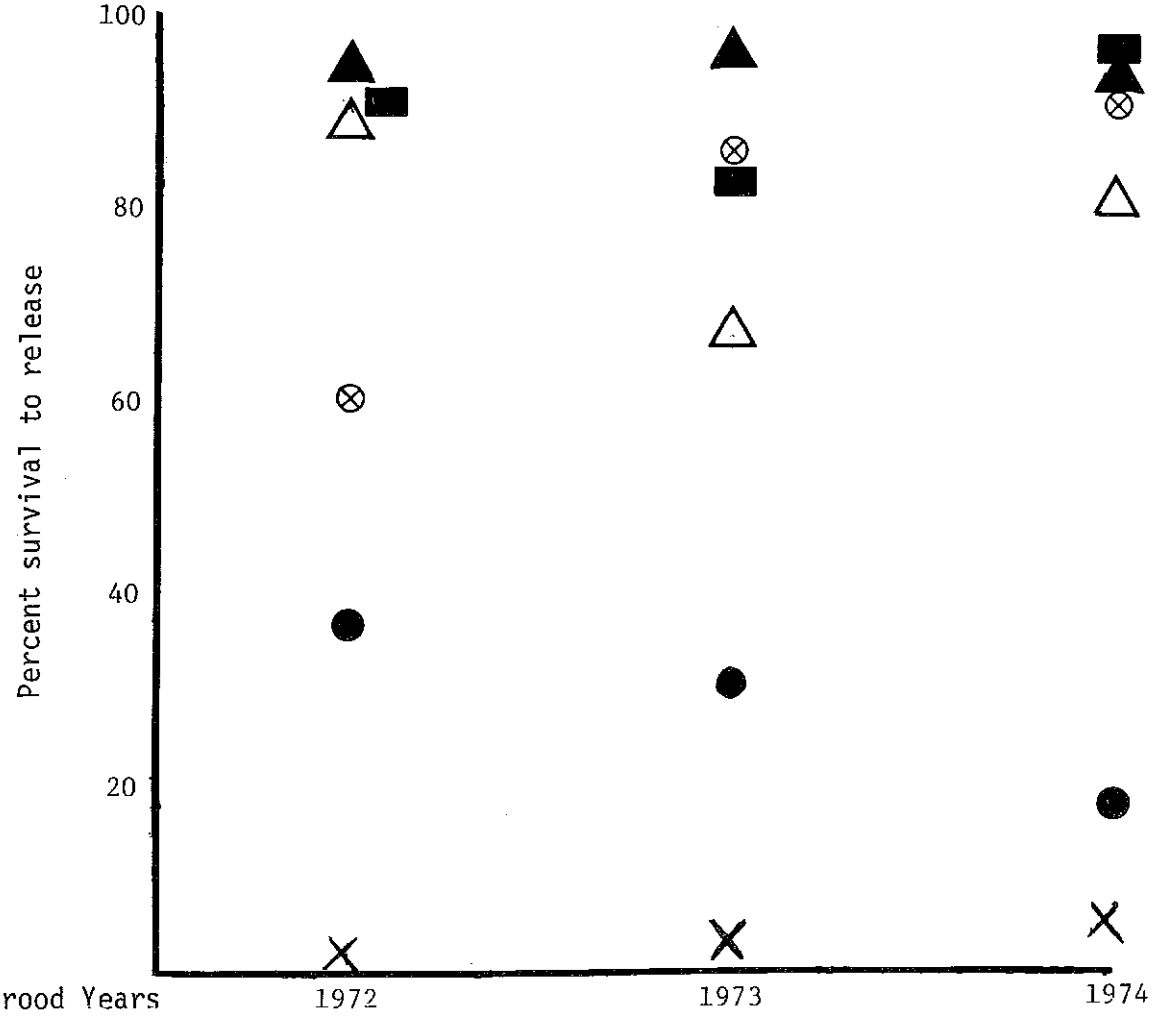
Salmon Fry to Fingerling survival after short-term rearing (up to 2 months). Species combined.

Short term rearing of fry may be an important phase of salmon husbandry program. As demonstrated by Figure 7 we are in the process of perfecting short term rearing techniques of fry for all species in fresh, estuarine, and saltwater environments.

Pre smolt to post smolt rearing of cohos and kings in floating saltwater pens has proven to be highly successful in terms of rearing survival at all facilities. (Figure 8)

Results from saltwater rearing experiments conducted at Fish Creek and Halibut Cove Lagoon have demonstrated that significant numbers of adults will return (appendix) to the saltwater rearing area where released. Application of this concept permits the development of new salmon fisheries in areas where little if any fishery previously existed. The Whittier project (FY76 Bond) will be a floating pen culture system for coho and king salmon and the adult returns to this facility will provide a saltwater angling experience for the Whittier sportsmen.

Over-winter estuarine rearing (Figure 8) of fry to the smolt stage has been extremely successful at Little Port Walter, but unsuccessful at Halibut Lagoon. Starrigavan production has been unacceptable, primarily because of design problems. Those problems have been eliminated and fry to smolt survivals should approach those levels observed at Little Port Walter.



Key

- Halibut Cove - overwinter. Estuarine Pen Rearing Fry to Smolt
- Halibut Cove - Pre Smolt to Post Smolt Rearing - Saltwater
- Starrigavin - overwinter. Estuarine Pen Rearing Fry to Smolt
- Little Port Walter - overwinter. Estuarine Pen Rearing Fry to Smolt
- Little Port Walter - Pre Smolt to Post Smolt Rearing - Saltwater
- Fish Creek - Pre Smolt to Post Smolt Rearing - Saltwater

Figure 8

Summary of salmon survivals for estuarine pen rearing (overwinter) and pre smolt to post smolt rearing at Halibut Cove, Starrigavan, and Little Port Walter (co-op with National Marine Fisheries Service).

Note: Halibut Lagoon overwinter rearing experiments terminated in October 1976. Starrigavan re-designed in 1976.

PATHOLOGY

A CENTRAL fish disease laboratory is maintained by F.R.E.D. in Anchorage and is the base of operations for the statewide disease prevention and control program. Numerous diseases have been and will be encountered during fish propagation. The success of controlled salmon propagation will depend to a great extent on the effectiveness of the disease prevention and control program.

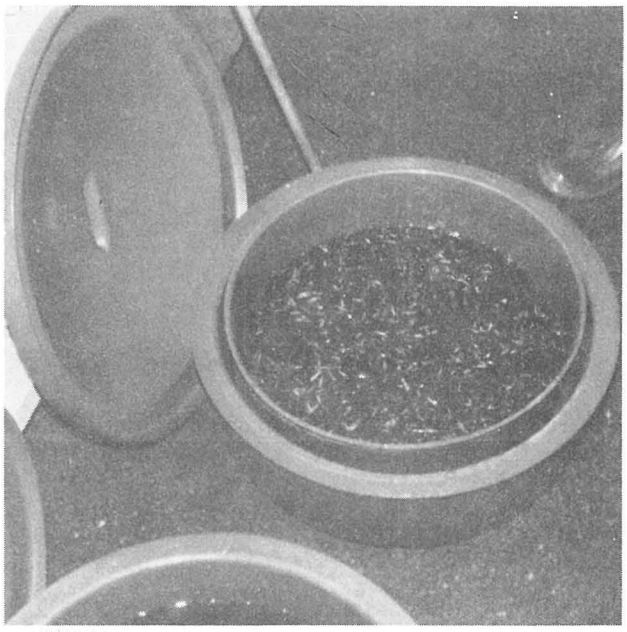
The statewide program is designed to assist in diagnosis and treatment of disease problems, to monitor the health of fish populations in order to anticipate potential problems, and to prevent the spread of fish diseases from one locality to another through a stock certification program.

Detailed disease research has been conducted on these objectives. Since IHNV (Infectious Haematopoietic Necrosis Virus) is capable of causing almost total mortality of fry, fingerlings, and smolts of sockeye salmon, studies and surveys have been continued to determine the distribution of the virus among populations of sockeye salmon in Alaska. No IHNV problems were detected for Brood Year 1975 sockeyes at Big Lake, East Creek, and Kasilof Hatcheries.

Comparative methods of IHNV detection were started during 1976. Cooperative research with the Western Fish Disease Laboratory in Seattle, was conducted at Big Lake hatchery to develop methods of controlling IHNV in hatchery reared sockeye. In addition, two private companies are developing an IHNV vaccine.

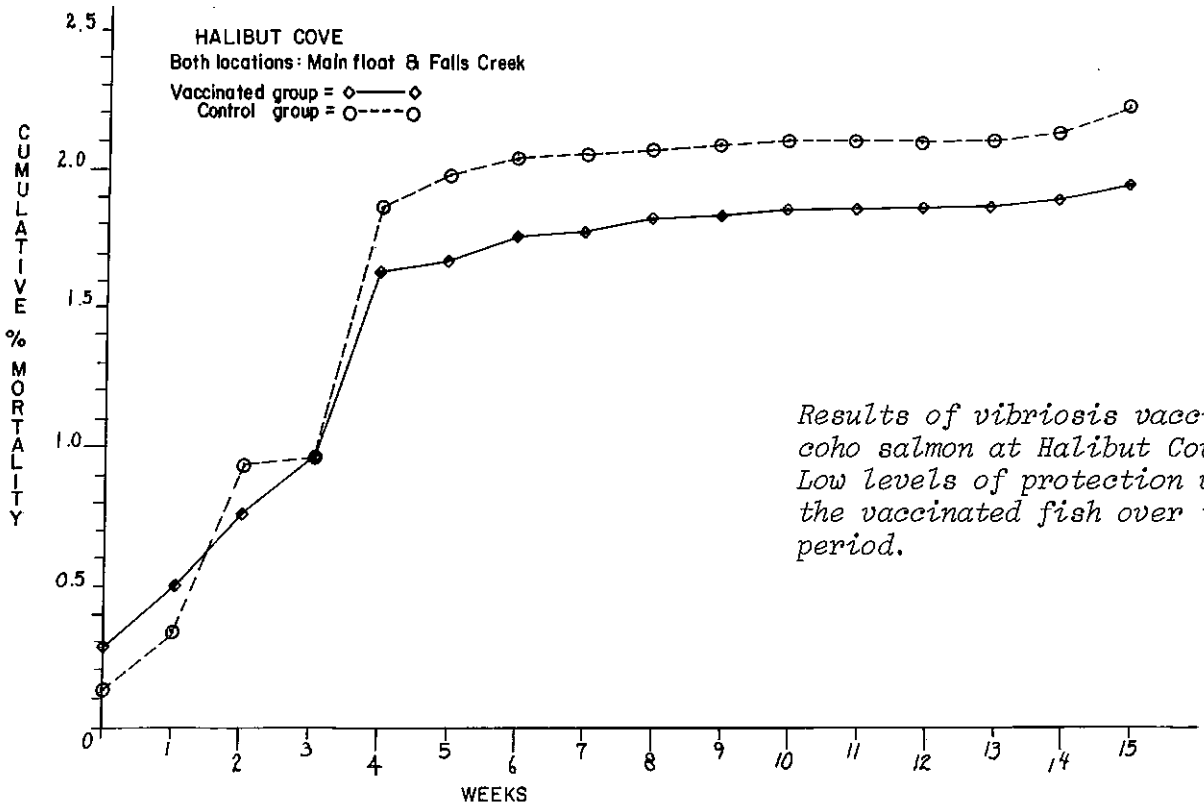
In spring and early summer 1976, vibriosis vaccinations were prepared and administered to salmon at certain hatcheries in Alaska. Vaccination against this disease is an important step in disease prevention. One commercial vaccine for vibriosis is available and will be tested in the near future.

Many other research projects are in progress at the Anchorage Fish Pathology Laboratory, not only with salmon but on disease problems associated with northern pike, arctic char and king crab.

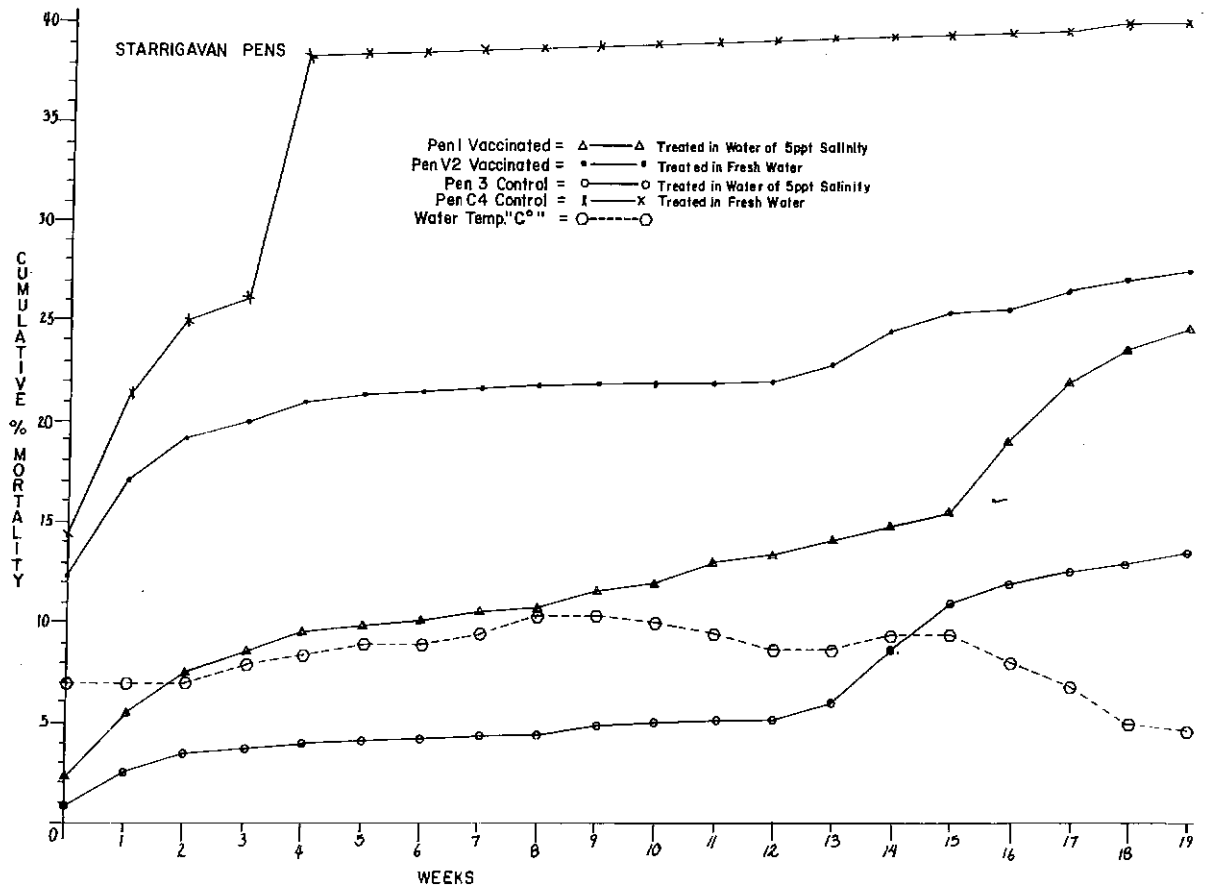


ADFG photo

A FISH VACCINATION IMMERSION UNIT--the inner container is a rigid net which holds fish but no liquid when raised. During vaccination this container is immersed into the outer container which holds the liquid. The fish are immersed in salt solution then into a bacterin. The lid (to the left) is placed over the unit while the fish are immersed. The bacterin enters through the lateral line and hence into the blood system.



Results of vibriosis vaccination of coho salmon at Halibut Cove Lagoon. Low levels of protection were afforded the vaccinated fish over the 15 week period.



Results of vibriosis vaccination at Starrigavan pens using coho salmon in fresh water and reduced salinities. The group vaccinated in freshwater showed substantial protection over the control lot. No protection was afforded when fish were vaccinated under reduced salinity conditions. The onset of mortalities was precipitated by the temperature increase. Temperature reductions subsequently did not reduce mortalities.

REGIONAL ACTIVITIES

Southeastern Region

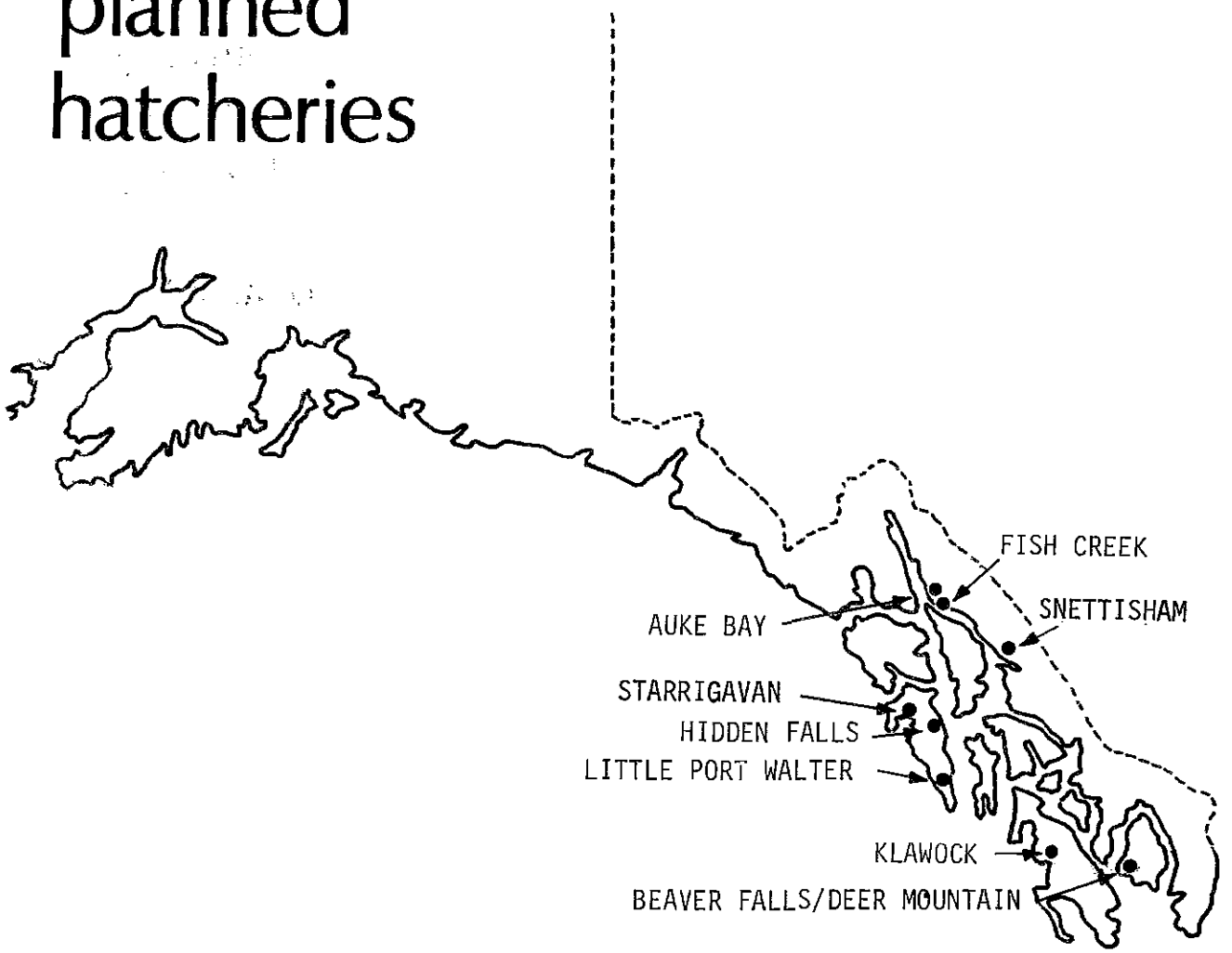
Central Region

Northern Region

Western Region

SOUTHEASTERN REGION

operational and planned hatcheries



		STATUS
Beaver Falls/Deer Mountain	chum	Operational 1976
Starrigavan estuarine rearing	coho/king	Operational 1976
Fish Creek estuarine rearing	coho	Operational 1976
Little Port Walter (NMFS)	coho/king	Operational 1976
Auke Bay (NMFS)	pink	Operational 1976
Snettisham	chum	Feasibility Study
Hidden Falls	chum/coho	Under Design
Klawock	chum/coho	Under Design

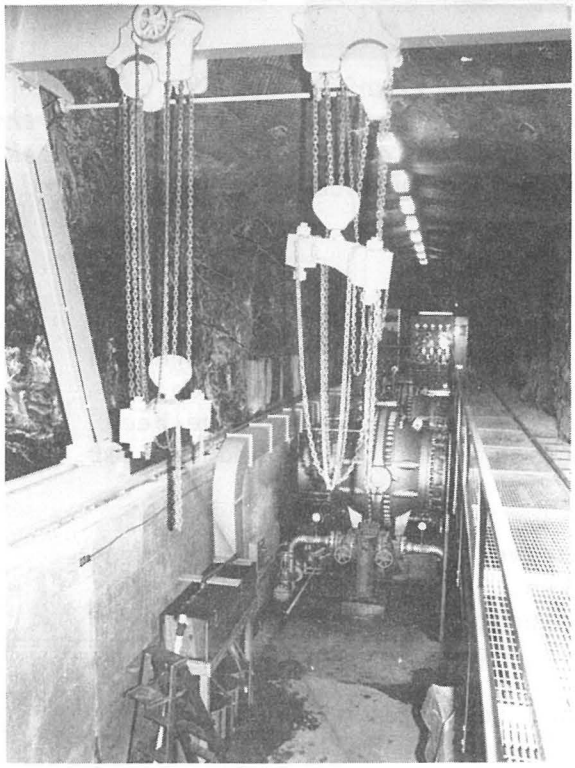
southeastern region

THERE ARE THREE F.R.E.D. Division facilities operating in the Southeast region: Beaver Falls in George Inlet near Ketchikan, Starrigavan near Sitka, and Fish Creek near Juneau.

A feasibility study is in progress at the Snettisham Power Project south of Juneau, in cooperation with the Alaska Power Administration. This study will indicate whether the constant 41 degree water at the power plant is suitable for production of salmon. Phase II which is scheduled to start July 1, 1977 will produce the design necessary for a large scale enhancement facility.

F.R.E.D. participates in cooperative research at two locations in southeast with the National Marine Fisheries Service (NMFS). At Auke Bay, various incubation concepts are tested and evaluated for production of high quality pink fry and compared to adult returns. Results are also compared to wild fry production and wild adult returns to Auke Creek.

To assist in meeting the needs for improved chinook salmon brood stock development in southeast Alaska NMFS and F.R.E.D. began a cooperative program in 1976 to utilize the NMFS research facilities at Little Port Walter. Approximately 65,000 king salmon eggs were taken in the Chickamin and Unuk Rivers and are being incubated and reared at Little Port Walter.



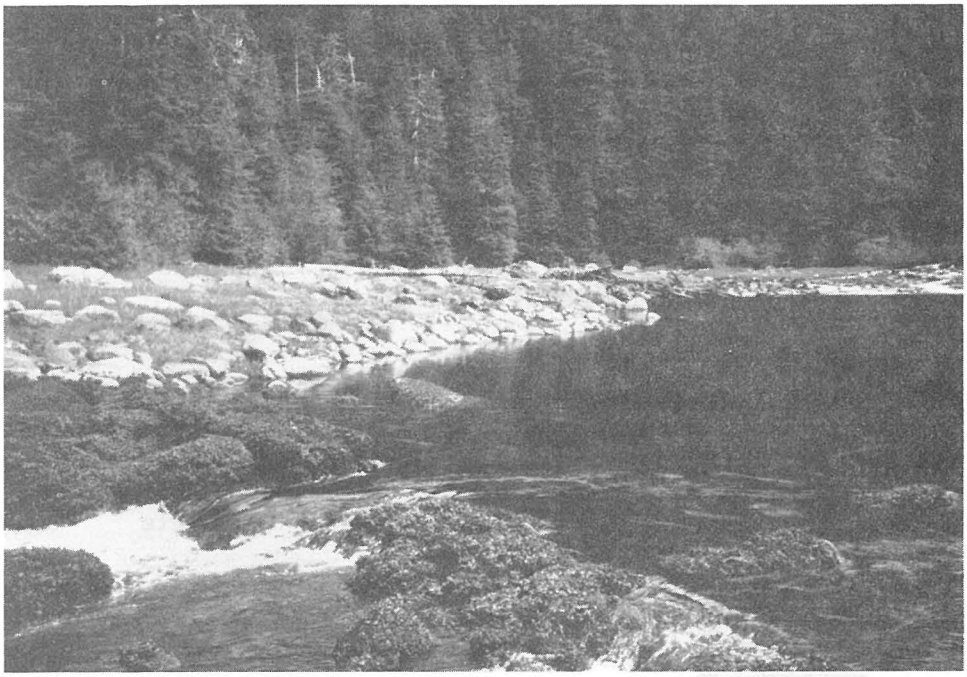
ADFG photo

HEADBOX-WATER SUPPLY ABOVE INCUBATORS-- Four containers of chum salmon alevins are dwarfed by the turbines in the background. Approximately 40,000 eggs were initially seeded in these incubators as part of the feasibility study on use of the Snettisham Power Project's excess water.

The 1976 bond issue provides for two new incubation facilities in Southeastern Alaska. A site has been selected in Kasnyku Bay at Hidden Falls on the east coast of Baranof Island. It will be capable of producing 47 million chum fry and 3 million coho fingerlings.

Klawock Lake on Prince of Wales Island is being considered as the second site and the facility will have a capacity similar to that at Hidden Falls.

The Department of Public Works is assisting the F.R.E.D. staff in developing designs and engineering studies. Bids will be requested for construction to begin on these facilities in 1977 if possible.



Bob Lium photo

LOCATION--The Hidden Falls incubation and rearing facility will be located at the upper end of the lagoon. Chum salmon returning to this facility will enhance the commercial fisheries in Southeastern Alaska. Coho salmon produced at this facility may enhance sports, troll and gillnet fisheries.

BEAVER FALLS

THE BEAVER FALLS facility commenced operations in 1974 and is designated as an applied research station for the investigation of chum salmon aquaculture technology. Results obtained since its inception have been applied to the design of large scale production facilities scheduled for initial construction in 1977.

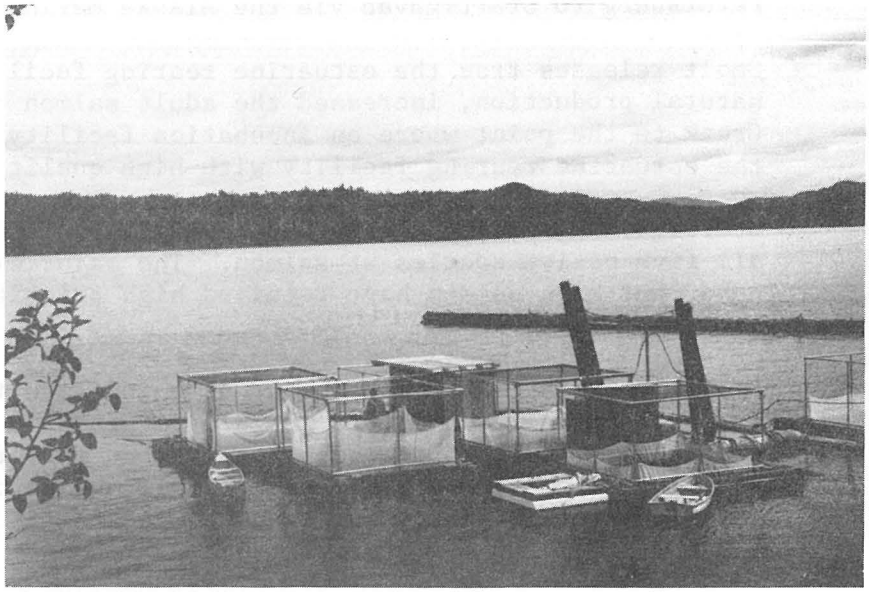
In addition to the incubation facility at Beaver Falls, the Deer Mountain hatchery is leased from the city of Ketchikan. This past fall over 6 million chum salmon eggs were taken at Disappearance Creek on Prince of Wales Island and are being incubated at both facilities.

Evaluation of F.R.E.D. salmon enhancement and rehabilitation projects involves marking and tagging a percentage of the fish released from facilities, fish stocked in natural areas and wild outmigrant fingerling as well as those migrating to sea as smolts. Coded wire tags as well as fin clips have been used to mark coho and king salmon smolt. In the

spring of 1976 a new marking program was initiated at Beaver Falls, the first of its kind in the world. Coded wire tags were adapted for use on chum fry approximately two inches long and weighing one gram.

Catch sampling the fishery and stream recoveries will provide data on the returning stocks. Marked fish recovery will also occur at the Beaver Falls facility. The first returns are expected in the fall of 1977. These will be the three year olds from the first release made in the spring of 1975.

Pat Roppel photo



SALTWATER PENS--Once fry are hatched, a percentage are released directly to the ocean and the remainder are fed in saltwater rearing pens. A comparison of adult returns yields the relative ocean survival of each group.

Successful application of coded wire tags to chum salmon will permit discrete identification of many more groups of fish than was possible with just fin clip marks. Availability of many marks will enable more timely evaluation of numerous culture techniques.

Pat Roppel photo

INCUBATORS--Beaver Falls Modified Deep Matrix Box incubators are used in chum salmon research. Research and development facilities such as Beaver Falls engage in research to either corroborate findings obtained elsewhere in the world (such as those methods used in Japan), or to modify technology to meet Alaskan conditions. New technology may also be developed. Survivals of fry will vary dependent on success of the technology being tested.

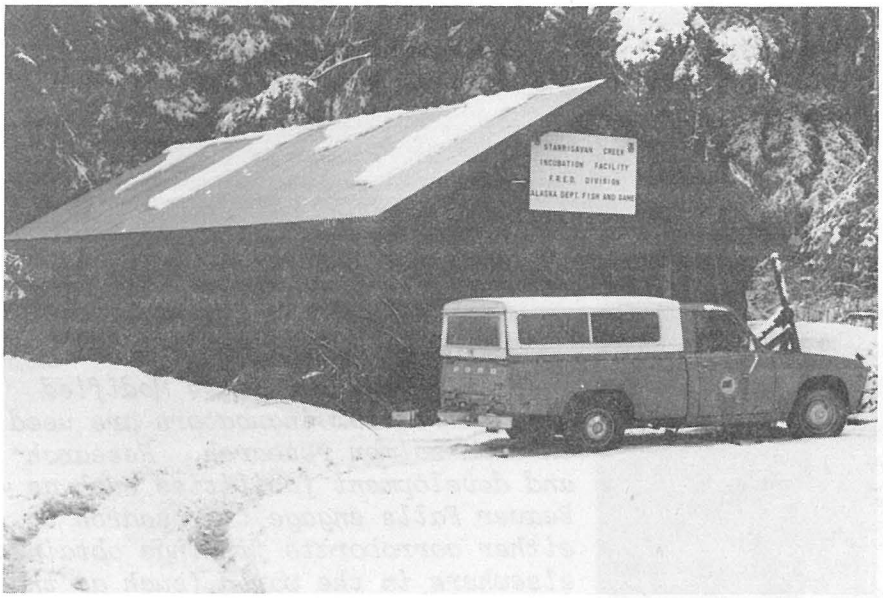
STARRIGAVAN

THE ESTUARINE REARING facility located in Starrigavan Bay, seven miles north of Sitka was one of the original projects constructed in 1972 by F.R.E.D. Division. Because there were insufficient local runs of salmon, the fish reared in the estuarine rearing pens were acquired from Fire Lake Hatchery. In 1972 the fry were flown from Anchorage to Starrigavan with the aid of a National Guard transport plane. From 1973 until 1975 fish were ferried from Crystal Lake Hatchery near Petersburg to Starrigavan via the Alaska Marine Highway System.

Smolt releases from the estuarine rearing facility, plus favorable natural production, increased the adult salmon return to Starrigavan Creek to the point where an incubation facility was built to supply the estuarine rearing facility with high quality fry.

Starrigavan facilities have the capability of incubating and rearing all five native species of salmon. The major emphasis has been on coho, but king salmon have received high priority whenever brood stock has been available.

Preliminary catch and escapement data indicate that more than 2 percent of the coho smolts released in 1974 returned in the fall of 1976. At present 125,000 coho are being fed in the estuarine rearing pens. In addition, king salmon fry from Crystal Lake Hatchery will be sent to Starrigavan this winter for rearing. At the incubation facility 900,000 coho eggs are being incubated.



ADFG photo

STARRIGAVAN FACILITY--In the fall of 1975 the construction of the egg incubator made the estuarine rearing facility at Starrigavan a self-sustaining unit. Salmon can be raised from egg to fry stage in the incubation facility and transported the short distrance to the estuarine pens, where they are reared until time of release. Returning adults are captured at the incubation facility.

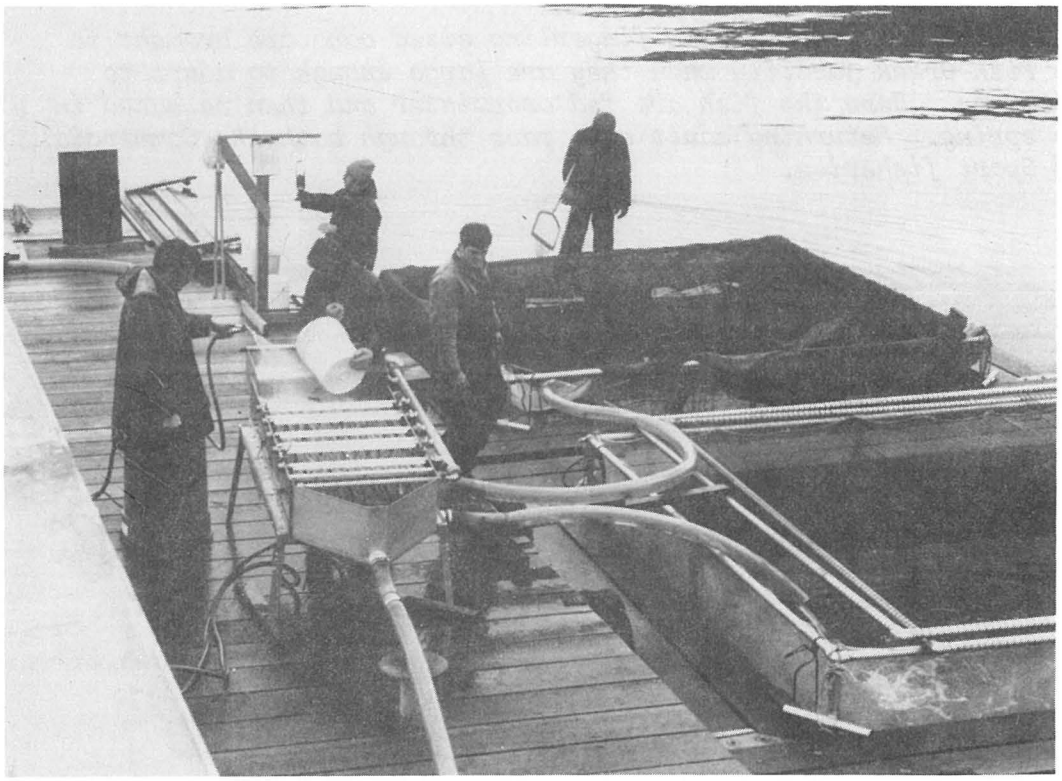
FISH CREEK

ANOTHER F.R.E.D. STATION is the Fish Creek estuarine rearing pen complex near Juneau which has been devoted to rearing coho fingerlings since October, 1974. Coho salmon eggs are taken at the Mendenhall ponds and incubated at Crystal Lake Hatchery in Petersburg. Fry are returned to the Mendenhall ponds where they are fed until they can adapt to the estuarine environment. Fish are then transferred to Fish Creek, overwintered, and released the following spring.

The facility is scheduled for expansion by the addition of more pens.

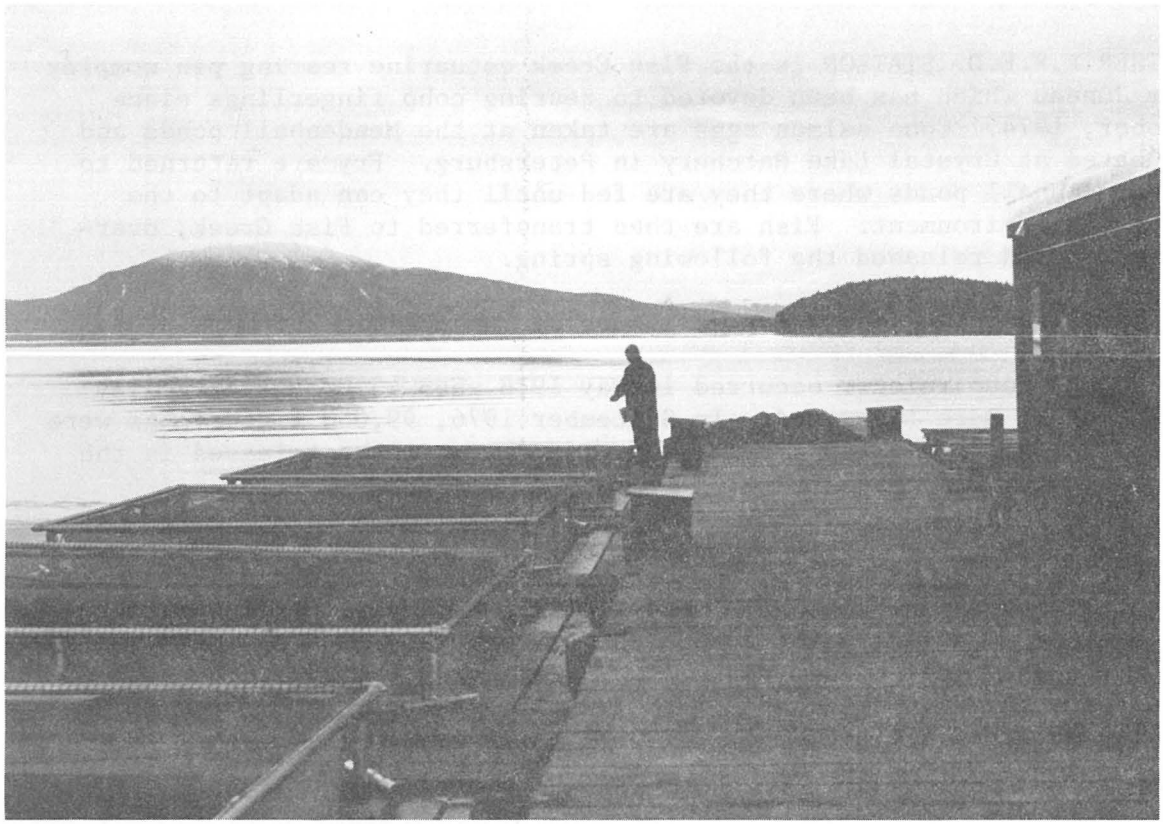
The second coho release occurred in May 1976 when 43,000 magnetically tagged smolt were liberated. In September 1976, 99,000 fingerlings were placed in the pens for overwintering, and they will be released in the spring of 1977.

In addition to providing salmon for the Juneau area fisheries, these fish are providing data which will improve efficiency. Application of magnetically coded wire tags prior to release allows evaluation of adult survival, harvest and evaluation of technology. Preliminary catch and escapement data from the adult returns in 1976 indicates 2.6 percent of the first release survived to adulthood.



ADFG photo

SORTING--A fish grader was in use at the Fish Creek facility. Fingerling can be sorted by size. Fish of the same size can then be released in each pen for rearing. Cannibalism is reduced to a minimum when fish are of the same size.

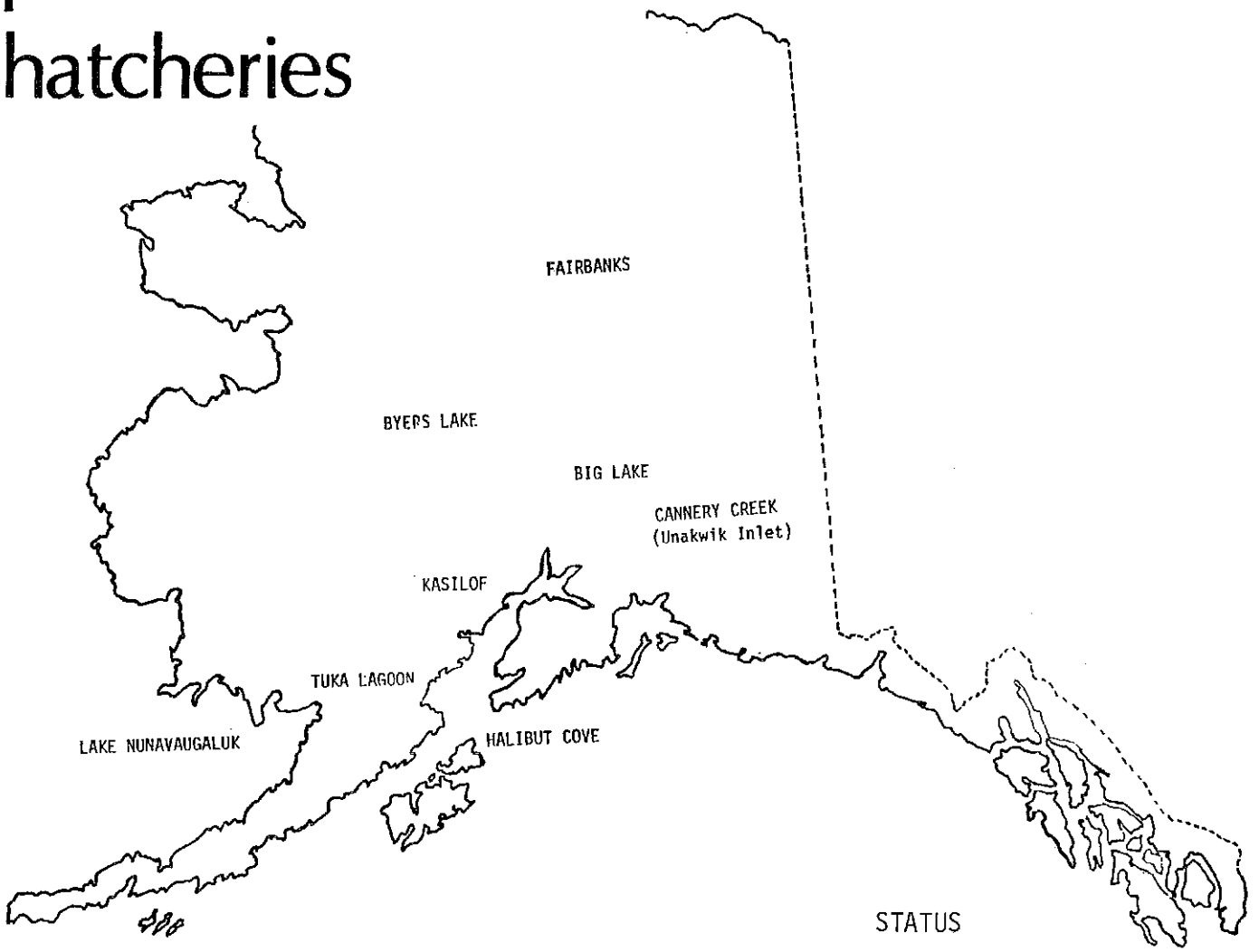


ADFG photo

SALTWATER REARING PENS--The fingerling sized coho are brought to the Fish Creek facility when they are large enough to adapt to saltwater. Here the fish are fed overwinter and then released in the spring. Returning adult coho pass through both the Commercial and Sport fisheries.

CENTRAL & NORTHERN REGIONS

operational and planned hatcheries



		STATUS
Big Lake	sockeye	Operational 1976
Kasilof	king/coho/sockeye	Operational 1976
Tutka Lagoon	pink	Operational 1976
Halibut Cove	coho/king/pink	Operational 1976
Lake Nunavaugaluk	sockeye	Operational 1976
Cannery Creek	chum/pink/coho	Design Study
Kenai Peninsula - Site A.	sockeye/coho	Design Study
Byers Lake - Site B.	coho/king/chum/pink	Design Study
Fairbanks - Interior	king	Site Investigations

central region

THE CENTRAL REGION includes Cook Inlet area, Kenai Peninsula, Bristol Bay and Prince William Sound. In this region there are four incubation facilities which are located at Big Lake, Kasilof, Tutka Lagoon and Lake Nunavaugaluk (East Creek) and one estuarine saltwater rearing facility at Halibut Cove Lagoon.

The passage of the 1976 bond issue provided funds for three additional facilities in this region. In Cook Inlet and the Kenai Peninsula, biological and engineering proposals are being developed for new facilities which will accommodate about 31.5 million pink and chum eggs, 24 million sockeye eggs, and 20 million coho and king salmon eggs. Specific sites are now being analyzed in detail in preparation for design.

In Prince William Sound an incubation facility will be located at Cannery Creek in Unakwik Inlet. It will be capable of producing and releasing 30 million salmon fry of which 20 million will be pink salmon fry, 9 million chum fry and 1 million coho fry. Coho fry produced will be reared in freshwater and will be transplanted to the Whittier area for short term rearing and imprinting in saltwater. Adults are expected to return to the imprinting location and enter the sports fishery there. Construction under contract will start in 1977. The United States Forest Service is preparing an Environmental Impact Statement to be completed by the end of July 1977.

BIG LAKE

THE BIG LAKE incubation facility was completed in spring 1976 and is located on Meadow Creek near Wasilla. This lake has historically been a large producer of sockeye but is now in a depleted state. The 1976 egg take filled the new facility to capacity of 10 million sockeye eggs. Expansion to a 20 million egg capacity is expected with planned production aimed at achieving an annual run of 50,000 to 250,000 adult salmon to the Big Lake system.

A temporary incubation unit was operated on the site in 1975 thus providing a full year's incubation experience and insight into the system prior to initiation of production.

Severe winter conditions on Meadow Creek during the 1975 winter caused a large mortality to the eggs and fry which were laid in the stream gravel by a natural run of sockeye. Therefore, the 80,000 fry released by the Big Lake facility in spring 1976 contributed 30 percent of the fry migrating from that stream.

In the first attempt to reestablish a run of king salmon to Fish Creek the main outlet stream of Big Lake, 100,000 king salmon fry are being reared over winter at the Big Lake facility.

There is an excellent opportunity to incubate and rear Rainbow trout for the increasing sports fishing interests in the area. 5,000 trout were substrate incubated and reared at Big Lake during the summer of 1976. These fish showed excellent growth during this experimental research, but were lost when the water delivery system malfunctioned.

MONITORING CONDITIONS--Environmental conditions were monitored in the major natural spawning areas in the Big Lake system throughout the year. Data obtained through this work is being applied at the facility to maintain environments as close as possible to that found in natural incubation areas. (Brood Year 1975).

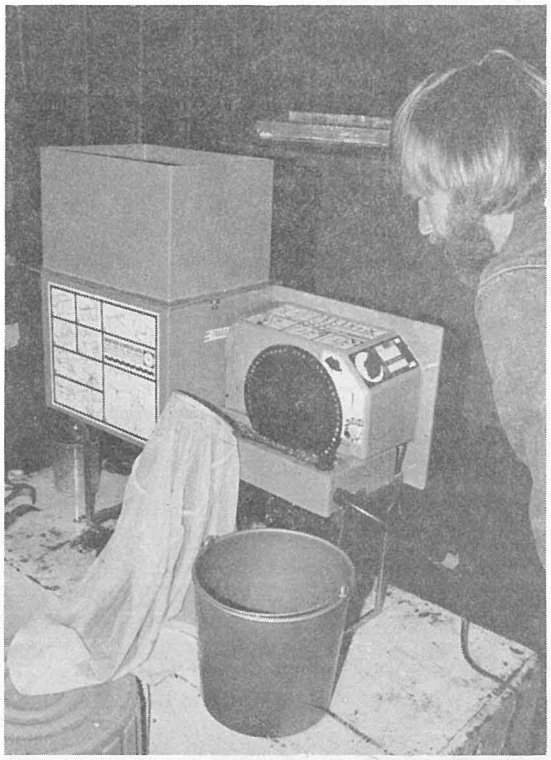
SOCKEYE PLANTS--In early October 1976, 500,000 eyed sockeye eggs were planted in Lucille Creek and Little Meadow Creek in order to reestablish sockeye runs. Both streams are tributaries of Meadow Creek and once supported large runs of sockeye. (Brood Year 1976).

TUTKA LAGOON

A NEW INCUBATION facility at Tutka Lagoon located on lower Kenai Peninsula was completed in the spring of 1976. Full production was initiated this fall when 10 million pink salmon eggs were taken. The facility has the capability of expansion to accommodate 20 million pink eggs thus serving as a center for the rehabilitation of several lower Kenai Peninsula pink and chum salmon stocks.

Eggs taken in 1975 at Tutka Creek were incubated at Kasilof and 300,000 fry were returned to Tutka in the spring of 1976. These were short-term reared prior to marking and release.

Studies conducted in the Tutka Bay area for the past two years have increased knowledge of the natural history and environment of wild pink salmon fry and the seasonal changes in productivity that naturally occur in the estuary. This information will be used to time releases of pink salmon for best ocean survival.



EGG PICKER--An automatic egg picker photo-electrically selects and sorts live and dead eggs at a rate of 100,000 per hour. The opaque dead eggs are rejected into the bucket while the translucent live eggs are collected in the fine mesh net. The alternative to using an automatic egg picker is to remove dead eggs by hand.

REHABILITATION CENTER--The Tutka facility has the capability of expansion to accommodate 20 million eggs. Thus the facility will serve as a center for the rehabilitation of several lower Kenai Peninsula pink and chum salmon stocks.

ADFG Photo by Russ Dixon

HALIBUT COVE LAGOON

ABOUT 6.0 PERCENT of the pink salmon fry released at Halibut Cove Lagoon rearing station returned as adults in the fall of 1976. This is one of the highest percentages of adult return for pink salmon recorded in Alaska. This phenomenal return was from 50,000 pink fry which had been reared and released in August, 1975. Eggs from Kenai River stock were incubated at the Kasilof facility and the fry reared in estuarine pens at Halibut Cove Lagoon.

About 300,000 coho salmon and 100,000 sockeye salmon were reared at Halibut Cove Lagoon in 1976.

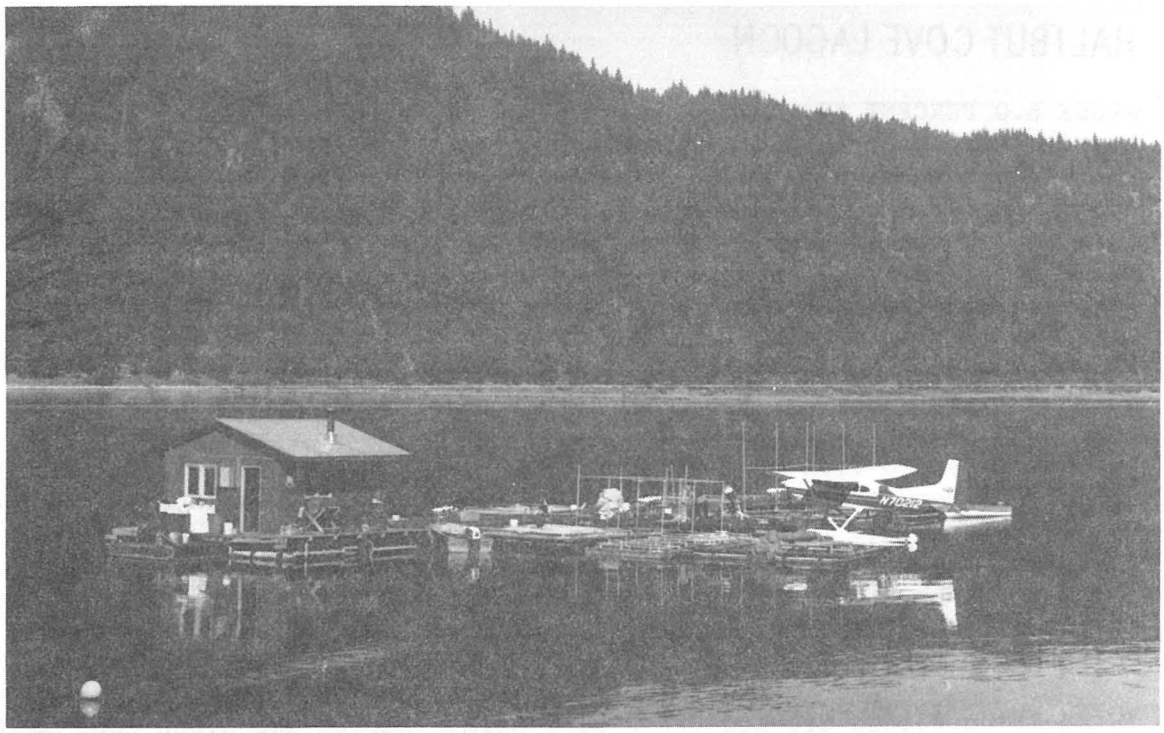
Estuarine reared fish from Halibut Cove Lagoon are transported to local lakes for overwintering where they feed upon the natural food in the lake until they migrate to sea. As they leave the lake, smolts will be captured and marked so that adult returns can be identified and evaluated. Since the lake stocking program will continue to expand, a number of lakes in lower Cook Inlet were examined in 1976 for suitable coho and king rearing habitat.

In addition 25,000 Crooked Creek king salmon smolts and 5,000 coho smolts were delivered from heated water ponds at Anchorage for saltwater rearing and release.

In the future at Halibut Cove Lagoon, it is the intention to expand the program of imprinting king and coho smolts which have been reared in heated water in Anchorage.

ADFG photo

SPECIAL SEINE FISHERY--Over 3,000 returning adult pink salmon were caught by seine fishermen in 1976 after being reared and released at Halibut Cove Lagoon in 1975. A special seine fishery was opened in August to harvest pink salmon from the lagoon which is normally not open to commercial fishing. Salmon bound for the lagoon could have also been intercepted elsewhere suggesting the possibility that ocean survival rates may have exceeded 6 percent.



ADFG Photo by Russ Dixon

SALMON PRODUCTION--A net-pen rearing facility at Kachemak Bay has been operated since 1973 to produce salmon for the developing sport fishery and existing commercial fishery and to build brood stocks at Halibut Cove Lagoon where none originally existed.

KASILOF

THE KASILOF FACILITY is located on Crooked Creek twelve miles south of Soldotna. Almost 10 million sockeye eggs were taken in the fall of 1976 from Tustumena and Hidden Lakes and fry are scheduled to be returned to those locations following incubation and short term rearing.

In addition to sockeye, emphasis has been on rearing king salmon for the Cook Inlet fishery.

A good run of king salmon to Crooked Creek in 1976 made it possible to take 800,000 eggs. Since only 100,000 eggs can be handled at Kasilof, the remaining 700,000 eggs were transported to Fire Lake Hatchery near Anchorage for incubation. In May 1975 about 15,000 Crooked Creek king salmon smolts were airlifted to Halibut Cove Lagoon saltwater rearing facility and then released after a two week period of rearing and imprinting. About 85,000 Crooked Creek king salmon smolts which were reared in Hatchery section's heated ponds in Anchorage were returned in May 1976 for tagging, fin clipping and release in Crooked Creek.

To help establish runs to the local fisheries in Southeastern Alaska 350,000 of the Crooked Creek king salmon eggs were sent to Crystal Lake Hatchery in Petersburg. Smolts will be reared in saltwater rearing facilities at Starrigavan and Fish Creek.

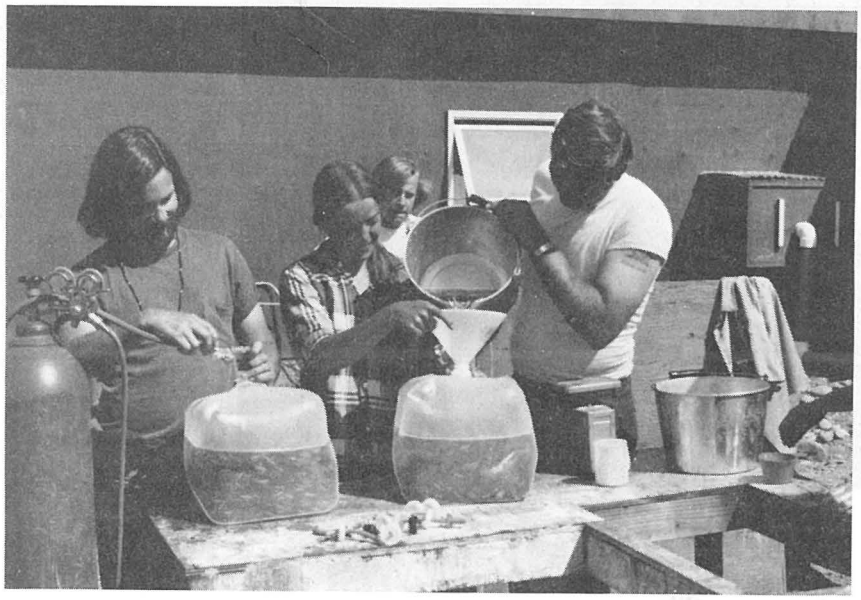
Presently the main water supply to the Crooked Creek hatchery is stream water which is pumped from an open pipe lying on the stream bottom. It is necessary to develop a water intake system which utilizes a means of filtering the stream water. Improvement of water quality is a primary objective in 1977.

Studies are underway to investigate the life history of king salmon in Central Alaska for each month of the year to learn the natural rearing areas and carrying capacities. Artificial incubation can then be combined with natural rearing in streams and lakes for full utilization of all potential rearing areas. Fry and fingerling salmon stocked in underutilized lakes and streams will feed on natural food and then as smolts, migrate to the ocean.

This original work on the freshwater life of king salmon will aid our enhancement projects and associated fisheries. Another natural value of the stream work is that it will increase the department's ability to manage natural salmon populations through the assessment of juvenile fish rather than continue to rely on catch statistics as an after the fact method of management.

ADFG photo

PRODUCTION FACILITY--Kasilof is one of the first facilities built by F.R.E.D. and after three years of investigations, it has become a production facility. Unfiltered water is drawn directly from the creek. This water system must be altered to include filters and a new stream intake. In addition, well water is now mixed with stream water which improves water quality and also permits a trial rearing program for king and coho salmon fingerlings.



ADFG Photo

TRANSPORT CONTAINERS--Sockeye fry are loaded into transport containers so that they can be returned to Tustumena Lake and Hidden Lake where the eggs were taken. Transport and release from Kasilof to Tustumena Lake took about one hour.

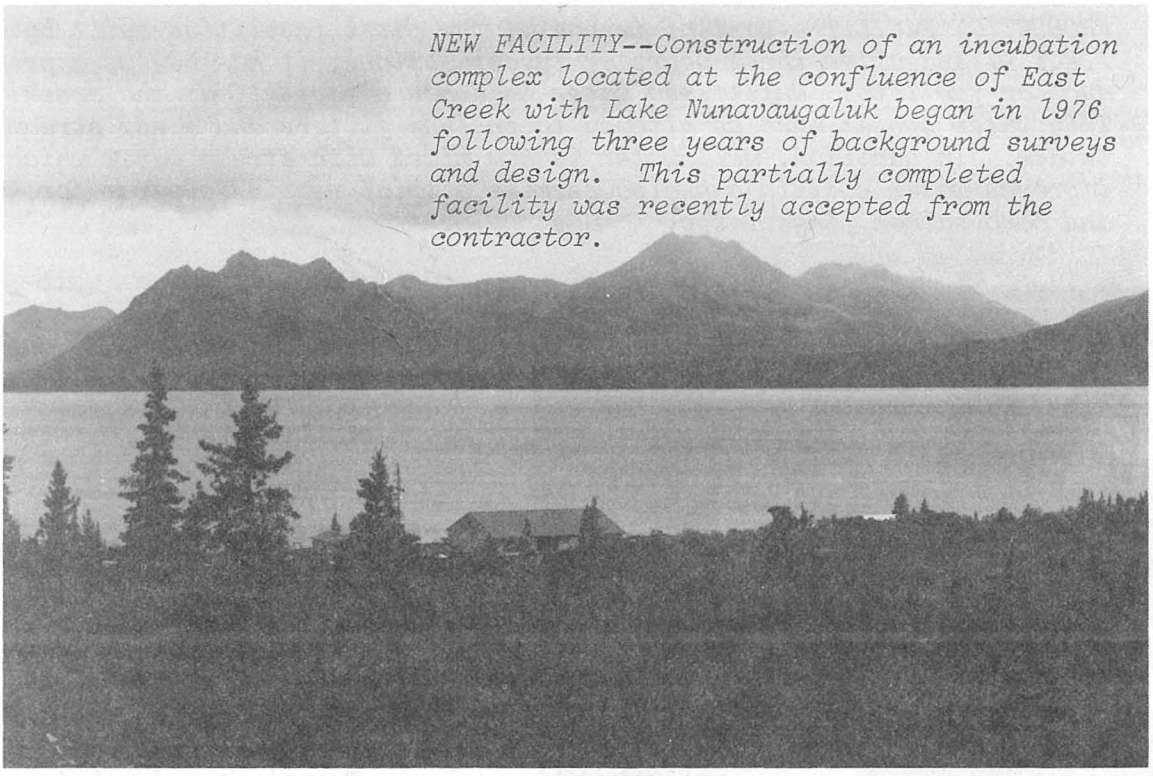
LAKE NUNAVAUGALUK

SOCKEYE SALMON produced in the lakes and river systems discharging into Bristol Bay in Western Alaska traditionally have comprised almost one half of the total American harvest of this species. But within these systems there are underutilized natural rearing areas that can be developed for the rearing of sockeye fry and fingerlings. One such area is Lake Nunavaugaluk where a facility has been constructed to produce high quality sockeye fry to supplement natural production in the lake.

The Lake Nunavaugaluk incubation building was recently accepted from the contractor and will incubate 15 million sockeye eggs when developed to capacity. At present 3.2 million sockeye eggs are in instream incubators at natural spring fed headwaters in East Creek, a tributary of the lake. Returning adults from the 1977 release and a release of 360,000 sockeye fry made in 1976 will aid in the development of a hatchery brood stock.

Completion of the new facility will require installation of the 15 million substrate egg incubation system, housing for permanent employees, and improvements to the 9 mile access road. Funds have been requested for the completion of this facility.

Much of the prerequisite data and knowledge for successful lake stocking of artificially produced sockeye salmon fry and fingerlings is being developed at Lake Nunavaugaluk. Detailed productivity and fry carrying capacity research is underway through a cooperative agreement with the National Marine Fisheries Service.



NEW FACILITY--Construction of an incubation complex located at the confluence of East Creek with Lake Nunavaugaluk began in 1976 following three years of background surveys and design. This partially completed facility was recently accepted from the contractor.

Photo by Russ Dixon

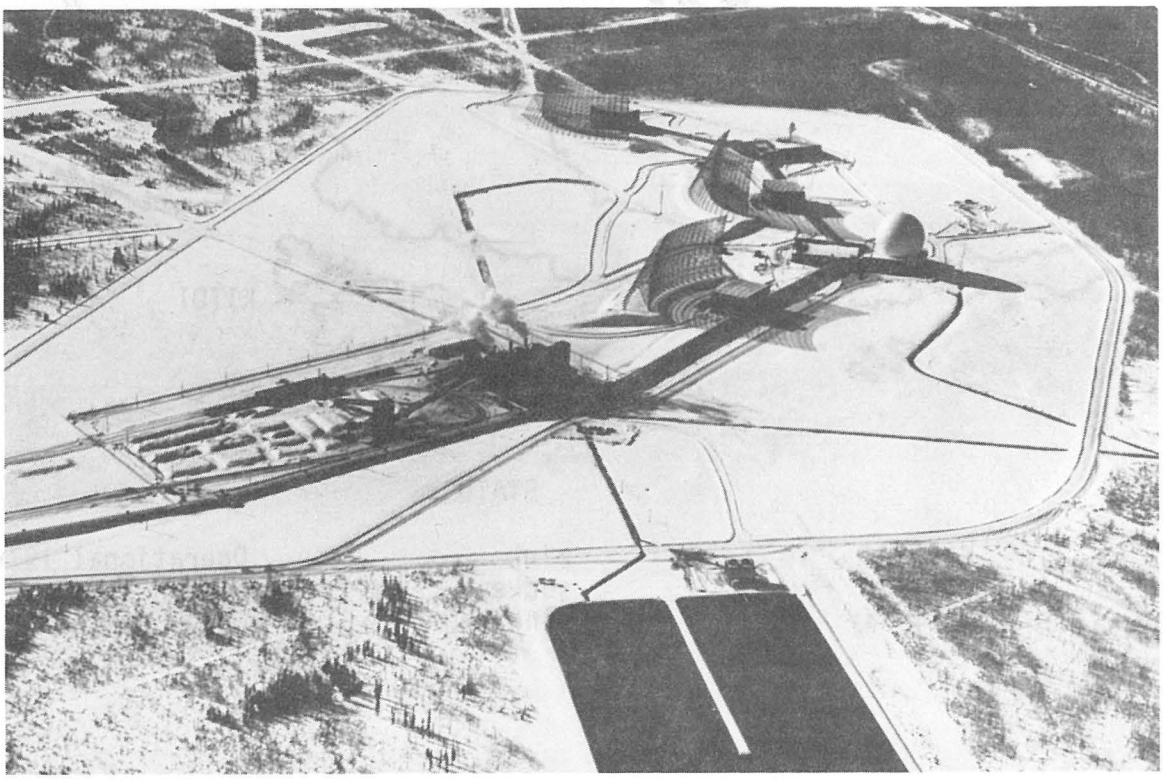
northern region

F.R.E.D. OPENED an office in Fairbanks in the fall of 1976 to begin development of a program for king salmon enhancement. The Interior's climatic conditions for rearing king salmon may involve different methods than those used in other parts of the state. However, obvious methods of incubating and rearing salmon will be explored prior to the development of entirely new concepts. Heated water from diesel power plants is available at Fairbanks and on outlying military bases. Tentative plans are being developed to evaluate the use of waste heat for rearing salmon in a manner similar to that conducted by the Hatcheries Section at Anchorage.

Part of the research on king salmon will be conducted under a federal grant from the Alaska Energy Office for a feasibility study on the use of geothermal water sources in rearing king salmon. Sites of geothermal activity particularly in the Interior and on the Alaska Peninsula will be included in the study.

The bond issue provides money for a research facility to produce sheefish, grayling, trout and king salmon, with the emphasis on king salmon.

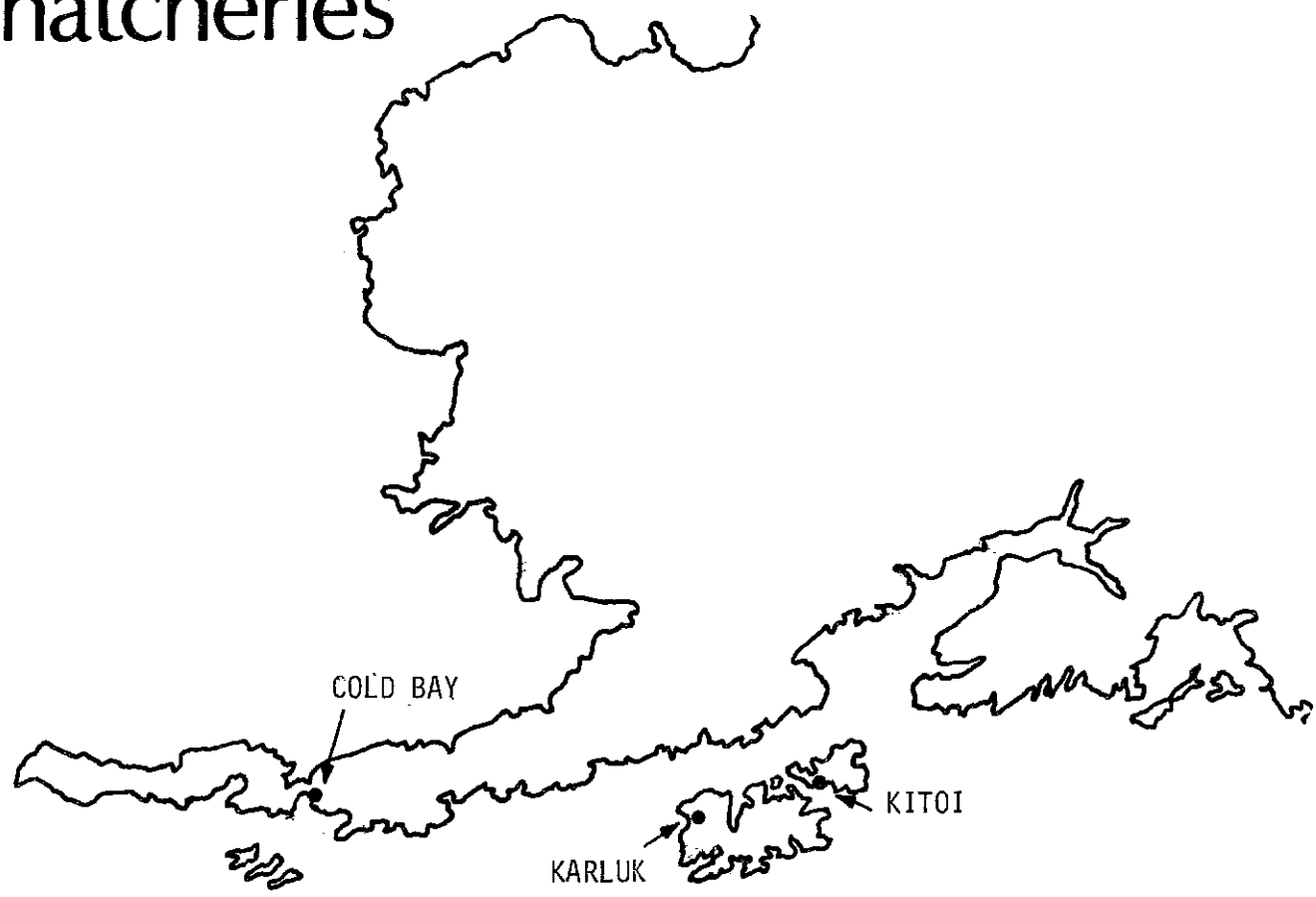
WARM WATER--A search for a site for a salmon hatchery and rearing facility in Interior Alaska has focused on areas near power plants where large amounts of water are used for cooling the plants' turbines. King and coho salmon may be reared at an accelerated rate in warm water, which can greatly increase the facility's productivity.



(U.S. Air Force photo)

WESTERN REGION

operational and planned hatcheries



		STATUS
Kitoi	pink	Operational 1976
Karluk	sockeye	Design Study
Cold Bay	pink/chum	Under Design

western region

THIS REGION encompasses the operations on Kodiak and Afognak Islands and on the Alaska Peninsula. One facility at Kitoi, which is operated in conjunction with the Hatchery section, is in production.

The bond issue has made funds available for a major rehabilitation at Karluk Lake, which was once the greatest producer of sockeye salmon in the world in relation to lake size. An incubation facility for 25 million sockeye eggs is planned to reestablish sockeye stocks in underutilized spawning and rearing areas in this system. The dates are indefinite for construction of a facility at Karluk Lake because of access restrictions on federal lands. We are informed that an Environmental Assessment or Environmental Impact Statement may necessarily precede any project development there.

A 50 million egg pink and chum salmon incubation facility was also funded by the bond issue. This will be located at Russell Creek near Cold Bay. The Department of Public Works has contracted with an engineering firm and preliminary design work and well drilling are underway. Plans are scheduled to be let for bid in early 1977 and construction should begin during summer 1977.

KITOI BAY

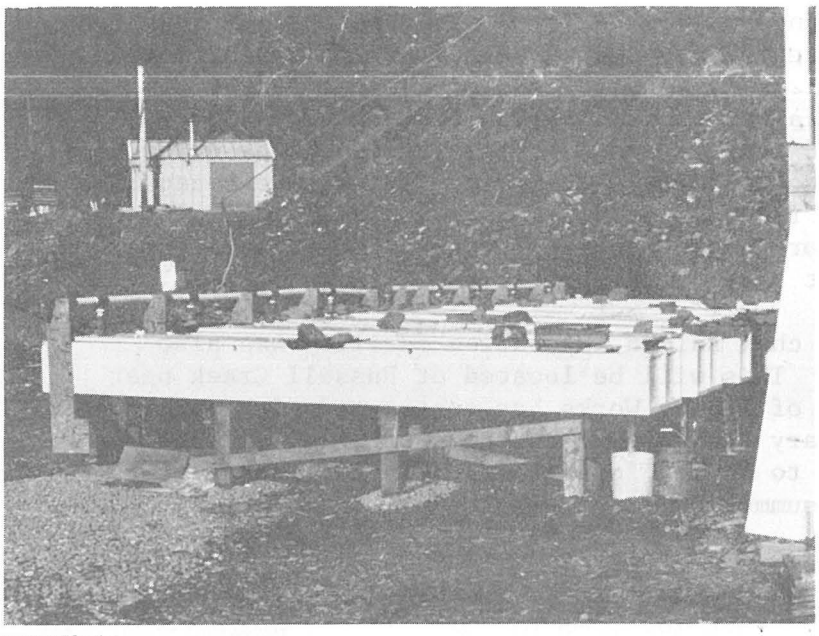
THE KITOI BAY HATCHERY has been in existence since the mid-1950's as a pink and sockeye salmon research station. It was remodeled in 1976 and 160 new production substrate incubators were installed increasing capacity to 20 million fry. The incubation system is being tested during the 1976-77 winter by incubating 7.9 million pink salmon eggs. Full production is anticipated in 1977.

In past years, the primary objectives at Kitoi were to test and modify various types of incubators until maximum survival of high quality salmon fry had been achieved. Development of the "Kitoi Incubator" is based upon successfully tested concepts as well as a design for practical operations and maximum production per square foot of floor space.

The final evaluation of hatchery production is the return of adult salmon to the fishery. Increasingly greater releases of hatchery fry annually have bolstered the natural Kitoi run from a few thousand fish to about 14,000 in the last two years. A return of 44,000 to 49,000 salmon is forecast for Kitoi Bay in 1977. The hatchery is expected to contribute approximately 66 percent of this return.

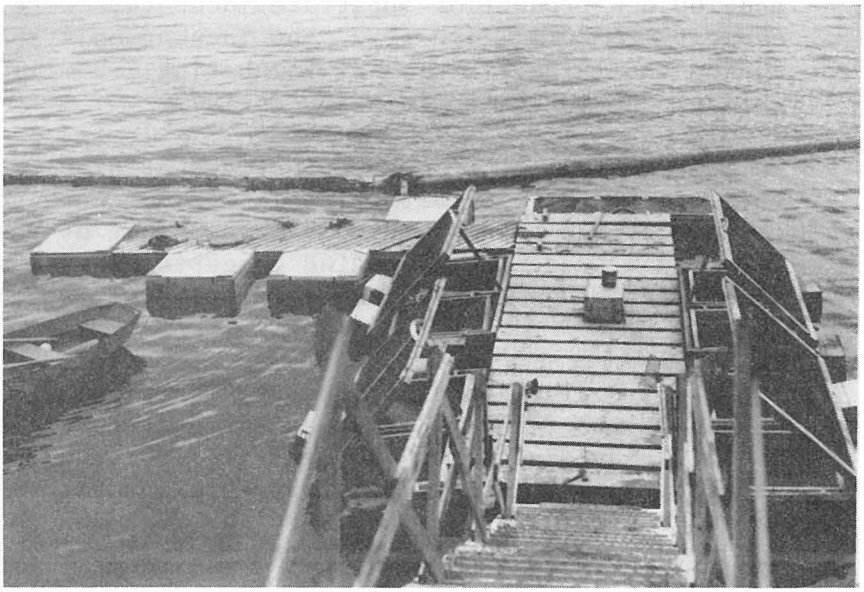
Fry incubated at the Kitoi hatchery are being returned to Seal Bay Creek on Afognak Island to establish a run above a fish ladder installed in 1972. In the spring of 1976, 778,000 pink salmon fry were transported by helicopter from Kitoi Hatchery to Seal Bay Creek for release.

A large sockeye run has been developed in Frazer Lake above a 210 foot long fish pass which provides access to new spawning grounds. Eggs and fry were planted above the fish pass to increase the run and a dramatic increase in escapement occurred. An escapement of 744 sockeye was recorded between 1956 and 1960, and this fall 119,321 sockeye were counted over the fish pass.



ADFG Photo

EYEING TROUGHS--Adult pink salmon returning to the Kitoi weir are examined for marks and either released into Big Kitoi Creek or artifically spawned. Fertilized eggs are placed in these outside troughs until eggs have become eyed.



ADFG Photo

HEAD START--Short-term saltwater rearing of pink salmon in pens at Kitoi increases growth rate and gives the fish a head start over fish released directly into the estuary. Release of fry from the pens can be timed to coincide with abundant food in the ocean.

HABITAT MAINTENANCE and IMPROVEMENT

HABITAT MAINTENANCE AND IMPROVEMENT

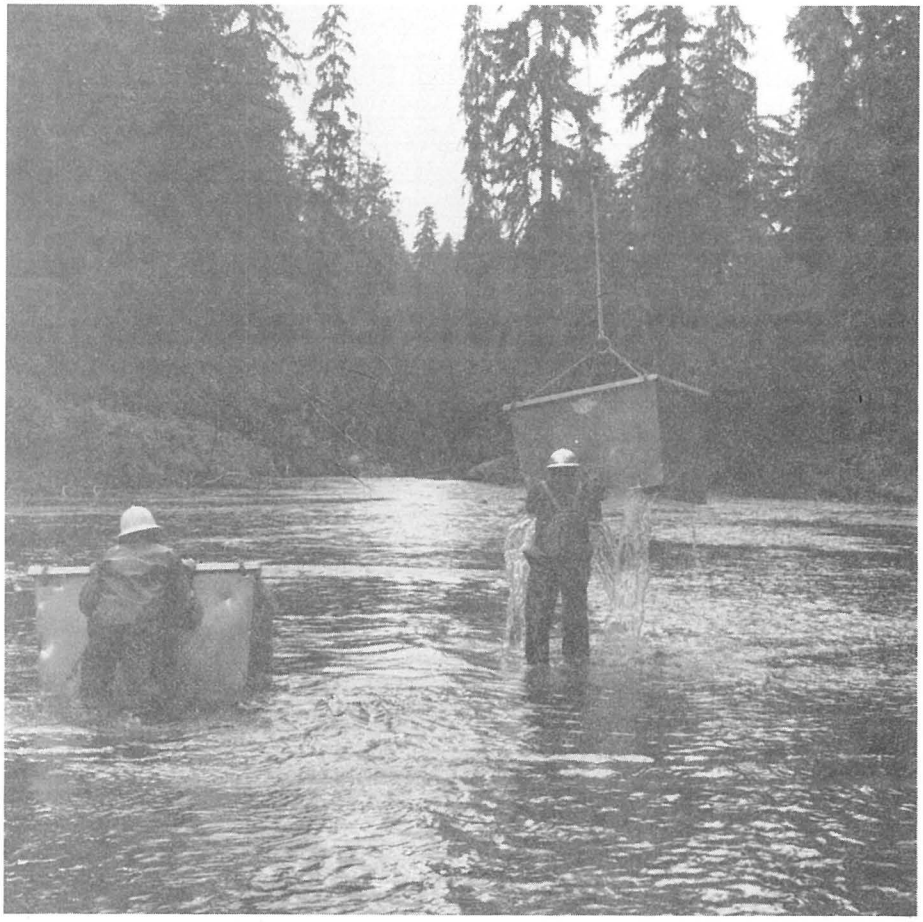
IN ADDITION TO salmon incubation and rearing, F.R.E.D. Division is engaged in other activities to enhance and rehabilitate salmon resources. Among these activities are the construction of fishpasses over migration barriers which allow spawner access to new areas and the counteraction of debilitating effects of man or nature on natural spawning areas.

The 1976 bond authorization will provide funds for three new fish passages. During periods of high water on the Russian River, Kenai Peninsula, sockeye are blocked from ascending a falls. A fishpass is presently being designed to solve this problem.

With money from the bond issue the fishpass at Frazer Lake on Kodiak Island will be doubled in size. This is necessary because of the large runs which have been developed above the present 210 foot long fish pass. An escapement of 744 sockeye was recorded between 1956 and 1960 and this fall 119,321 sockeye were counted over the fishpass.

Construction will start on the Anan Creek fishpass south of Wrangell in Southeastern Alaska. Fish cannot ascend the falls on Anan Creek during periods of high water. This past summer it was necessary to move salmon above the falls by helicopter to enable the fish to reach their spawning grounds. Consequently a fish passage has been designed and will be constructed in 1977.

ADFG Photo by Russ Dixon



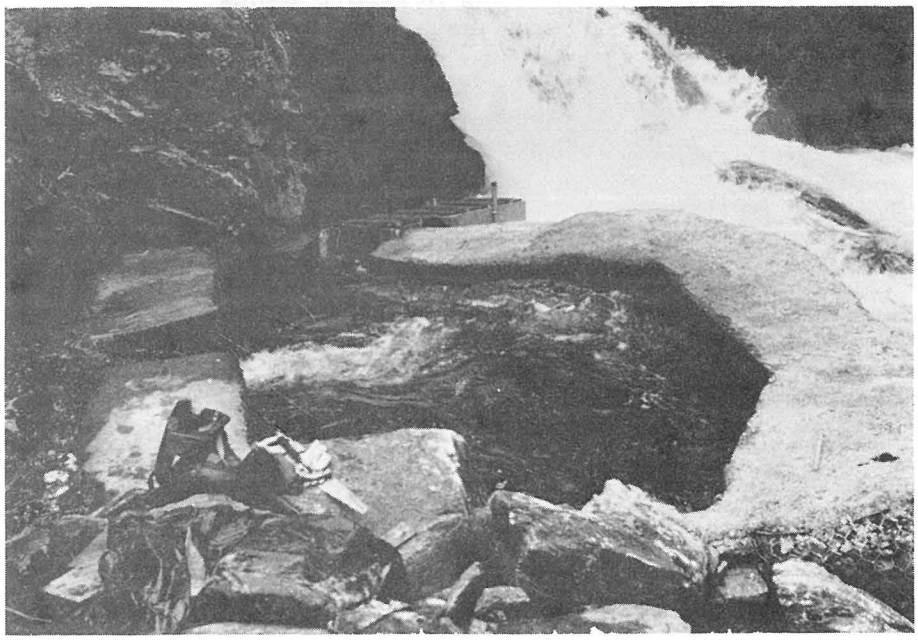
BRAILING OPERATION--Salmon were brailed into containers or totes below the falls at Anan Creek and were then moved by helicopter above the falls where they were released. A new fishpassage will provide means whereby salmon can ascend the falls no matter what the water flows are.

A fishpass will be constructed on Ketchikan Creek during the spring of 1977 thus enabling the 1977 return to utilize the pass.

Studies are being undertaken to design a fish passage for Irish Creek on Kuiu Island in Southeastern. By making it possible for salmon to ascend a 23 foot falls, approximately 45 miles of spawning grounds will be opened.

F.R.E.D. Division is responsible for cleaning and maintaining fish passes throughout Alaska. In Southeastern Alaska such maintenance is carried out on fish passages at Bakewell Arm, Pavlof, Navy Creek and Falls Creek. In the other regions of the state fishpasses are maintained at Paul's Lake on Afognak Island, Frazer River on Kodiak Island, and Control and Shrode Creek in Prince William Sound.

Stream clearance is performed when it is determined beyond doubt that spawning and/or rearing areas are jeopardized. The stream clearance program in the Upper Cook Inlet Area is designed to clear beaver dams and other obstructions which may impede migrating salmon. Salmon sometimes are adversely effected by beaver dams and in other cases, beaver dams are beneficial to salmon stocks. This is why each case is judged separately. Dams were removed from Eagle River, Fish Creek on Redshirt Lake, Shell Creek, and Lake Creek on Nancy Lake.



NEW ENTRANCE--A new gabion, concrete entrance pool and 10 foot steeppass section were constructed at Paul's Lake Ladder in 1976. The new pool eliminates an entrance problem that delayed passage of 26,000 sockeye the previous year.

ADFG Photo

FORMER BLOCKAGE--On Shell Creek in upper Cook Inlet 340 prespawning adult sockeye died attempting to jump a waterfall. The blockage problem was remedied by clearing the large boulders from the falls and constructing rock steps over the steeper areas of the falls so that salmon could pass. With the completion of the work, salmon began moving upstream immediately. Of 700 live salmon holding below the falls that day, 160 moved to the lake within 6 hours after work was completed. Fishermen in Cook Inlet have contributed money to the Cook Inlet program.

APPENDIX

SUMMARY OF F.R.E.D. ACTIVITIES BY BROOD YEAR 1972 TO 1976

Figures In Millions

	BROOD YEARS				
	1972	1973	1974	1975	1976
Egg Takes in Millions					
King	-	-	-	.61	.87
Coho	-	-	.16	1.74	1.57
Sockeye	.26	3.43	.38	6.91	23.22
Pink	.57	.56	5.02	8.38	18.35
Chum	-	-	1.42	4.89	6.77
TOTAL	.83	3.99	6.98	22.5	50.78
Fry Production in Millions					
King	-	-	-	-	-
Coho	-	-	-	.26	-
Sockeye	.16	.77	.11	1.51	-
Pink	.49	.45	1.37	3.68	-
Chum	-	-	.97	2.00	-
TOTAL	.65	1.22	2.45	7.45	-
Estuarine Rearing Smolt and Post Smolt Production					
King	.06	.01	.01	-	-
Coho	.42	.14	.38	-	-
Sockeye	-	-	.02	-	-
TOTAL	.48	.15	.41	-	-
Lake Stocking - Fry/Fingerling					
King	-	-	-	-	-
Coho	-	-	.42	.24	-
Sockeye	-	.33	-	1.57	-
TOTAL	-	.33	.42	1.81	-

Egg takes, fry and smolt production not the direct responsibility or better than 50% funded by F.R.E.D. are not included.

SUMMARY OF F.R.E.D. PINK AND CHUM SALMON FRY AND FINGERLING PRODUCTION BY REGION AND FACILITY

EGGS AND FRY IN MILLIONS

ADULT RETURNS IN THOUSANDS

AREA	FACILITY	SPECIES	BROOD YEARS 1974 NUMBER EGGS TAKEN	1974 NUMBER FRY PRODUCED	1974 NUMBER ADULT RETURNED	1975 NUMBER EGGS TAKEN	1975 NUMBER FRY PRODUCED	1975 NUMBER ADULT RETURNED	1976 NUMBER EGGS TAKEN	1976 NUMBER FRY PRODUCED	1976 NUMBER ADULT RETURNED
Southeastern	Beaver Falls	Chum	1.42	.97		4.89	2.0		6.73		
	Inc.			.87			.56				
	Str.			.09			1.43				
	Snettisham								.04		
Cook Inlet	Kasilof	Pink	2.74	.15		2.92	.31		-		
	Inc.			.10	.4	-	-		-		
	Str.			.05	3.3	-	.28				
	Tutka	Pink							10.41		
Kodiak	Kitoi Bay	Pink	2.28	1.22		5.46 1/	3.37		7.94		
	Inc.			1.07	11.8		2.27				
	Str.			.15	.7		.99 2/				
	TOTALS	Chum	1.42	.97		4.89	2.0		6.77		
		Pink	5.02	1.37	16.2	8.38 1/	3.68 2/		18.35		

NOTES: 1/ 1.24 million eyed eggs planted in Seal Bay.
2/ .78 short term reared transported to Seal Bay.
Inc.- Released as Buttoned Fry.
Str.- Released as fingerling after short term rearing

Chum returns from Brood Year 1974 not expected until 1977 as 3 year olds.

SUMMARY OF F.R.E.D. COHO, KING FRY/FINGERLING PRODUCTION BY AREA AND FACILITY

EGGS, FRY AND FINGERLINGS IN MILLIONS

AREA	FACILITY	SPECIES	BROOD YEARS 1974 NUMBER EGGS TAKEN	1974 NUMBER FRY PRODUCED	1974 NUMBER FRY/FINGERLING RELEASED	1975 NUMBER EGGS TAKEN	1975 NUMBER FRY PRODUCED	1975 NUMBER FRY/FINGERLING RELEASED	1976 NUMBER EGGS TAKEN	1976 NUMBER FRY PRODUCED	1976 NUMBER FRY/FINGERLING RELEASED
Southeastern	Starrigavan	Coho				1.593	.367	.25	.968		
	Beaver Falls	Coho				.020	.011	.010			
Cook Inlęt	Kasilof	Coho							.168		
	Big Lake	Coho							.074		
	Halibut Lagoon	Coho				.123	Trans. to HS		.360	Trans. to HS	
Southeastern	Deer Mt. (Nakina)	King				.016	.013	Trans. to HS			
	Nakina	King				.177	Trans. to HS				
	Chickamin	King				.043	Trans. to HS		.027	Trans. NMFS	
	Nakina	King				.040	Trans. NMFS				
	Unuk	King							.038	Trans. NMFS	
Cook Inlet	Kasilof	King	.155	Trans. to HS		.328	Trans. to HS		.100		
									.100	Trans. BL	
									.600	Trans. to HS	
	TOTALS	Coho				1.613	.378	.260	1.210		
						.123	Trans. .		.360	Trans.	
	TOTALS	King	.155	Trans. to HS		.016	.013	Trans.	.200		
						.588	Trans.		.665	Trans.	

NOTE: Trans HS - Transferred to Hatchery Section.
Trans NMFS - Transferred to National Marine Fisheries Service.
Trans BL - Transferred to Big Lake Hatchery (F.R.E.D.).

SUMMARY OF F.R.E.D. SOCKEYE FRY/FINGERLING PRODUCTION BY AREA AND FACILITY

EGGS, FRY AND FINGERLINGS IN MILLIONS

AREA	FACILITY	SPECIES	BROOD YEAR 1974 NUMBER EGGS TAKEN	1974 NUMBER FRY PRODUCED	1974 NUMBER FRY/FINGERLING RELEASED	1975 NUMBER EGGS TAKEN	1975 NUMBER FRY PRODUCED	1975 NUMBER FRY/FINGERLING RELEASED	1976 NUMBER EGGS TAKEN	1976 NUMBER FRY PRODUCED	1976 NUMBER FRY/FINGERLING RELEASED
	Kasilof	Sockeye	.29	.11	.11	5.90	1.18	1.14	9.90		
	Big Lake	Sockeye				.18	.08	.07	10.14 1/		
	East Creek 2/	Sockeye	.19	.007	3/	.83	.35	.30	3.18		
	TOTALS	Sockeye	.38	.17	.11	6.91	2.61	1.51	23.22		

1/ Includes 500,000 eyed egg planted in spawning streams.
2/ Instream incubators and short term rearing tests.
3/ Fry destroyed because of possible IHNV - later determined not to be dying of IHNV.

SUMMARY OF F.R.E.D. SOCKEYE, COHO, KING SALMON PRODUCTION FROM ESTUARINE REARING FACILITIES BY LOCATION

FRY, FINGERLING, SMOLTS IN MILLIONS — ADULTS IN THOUSANDS

AREA	FACILITY	SPECIES	BROOD YEARS 1972 NUMBER FRY/FINGERLING STOCKED	1972 SMOLT PRODUCTION	1972 ADULT PRODUCTION	1973 NUMBER FRY/FINGERLING STOCKED	1973 SMOLT PRODUCTION	1973 ADULT PRODUCTION	1974 NUMBER FRY/FINGERLING STOCKED	1974 SMOLT PRODUCTION	1974 ADULT PRODUCTION	1975 NUMBER FRY/FINGERLING STOCKED	1975 SMOLT PRODUCTION	1975 ADULT PRODUCTION
	Little Port Walter	Coho	.174	.161	14.030	-	-	-	.475 1/	.161		.129 7/		
		Sockeye	-	-	-	.024	.016	-	-	-		-		
	Starrigavan	Coho	.684	.227	.35	.392	.121	1.07	.605	.103		.246		
		King	.093	.062	<10	.001	< .001		.003	.002				
	Halibut Cove	Coho	.327	.002		.383 2/	.002	.22 3/	.274 4/	.007		.200 5/		
		Sockeye							.024	.006		.116 6/		
	TOTALS	Coho	1.185	.390	14.380	.775	.123	1.29	1.354	.271		.575		
		Sockeye	-	-	-	.024	.016	-	.024	.002		.116		
		King	.093	.062	<10	.001	< .001	-	.003	.006				

1/ 275,000 (.275) Coho stocked July 1975 Osprey Lake.
2/ 302,000 (.302) Coho released during October storm of 1974.
3/ Analysis not yet complete for % of adults that are fall releases.
4/ 141,000 (.141) Coho stocked Caribou Lake October of 1975. Smolt production should occur 1,2,3 years after stocking.
5/ 80,000 (.080) Coho stocked Seldovia Lake in October 1976. 60,000 (.060) released October 1976.
6/ 60,000 (.060) Sockeye stocked China Pool Lake October 1976.
7/ 5,000 (.007) released fall of 1976, and 7,000 (.007) released as accelerated spring and fall.

SUMMARY OF F.R.E.D. COHO, KING SALMON PRODUCTION FROM SALTWATER REARING FACILITIES BY LOCATION

PRE SMOLTS, SMOLTS, POST SMOLTS IN THOUSANDS ADULTS IN THOUSANDS

AREA	FACILITY	SPECIES	BROOD YEARS 1972 NUMBER PRE SMOLTS SMOLTS STOCKED	1972 SMOLT POST SMOLTS PRODUCTION	1972 ADULT PRODUCTION	1973 NUMBER PRE SMOLTS SMOLTS STOCKED	1973 SMOLT POST SMOLTS PRODUCTION	1973 ADULT PRODUCTION	1974 NUMBER PRE SMOLTS SMOLTS STOCKED	1974 SMOLT POST SMOLTS PRODUCTION	1974 ADULT PRODUCTION	1975 NUMBER PRE SMOLTS SMOLTS STOCKED	1975 SMOLT POST SMOLTS PRODUCTION	1975 ADULT PRODUCTION
South-eastern	Fish Creek	Coho	14.7	12.6	.383	14.4	11.6	.242	46.0	43.6		99.4		
	Little Port Walter	Coho	12.5	11.9	.713	-	-	-	2.5	2.4		5.1	4.9 1/	
Cook Inlet	Halibut Lagoon	Coho	9.9	5.9	.090	9.7	8.1	.037	10.1	9.5		-	-	
	"	King				8.7	7.9	< .001	7.6	7.1		23.6	16.1 1/	
	TOTALS	Coho	37.1	30.4	1.186	24.1	19.7	.279	58.6	55.5		104.5	4.9	
		King	-	-	-	8.7	7.9	< .001	7.6	7.1		23.6	16.1	

NOTE: Adult returns for coho's expected 3 years after brood year.
Adult returns for king salmon expected 4 to 6 years after brood year.
Little Port Walter operated cooperatively with the National Marine Fisheries Service.

Accelerated rearing.

SUMMARY OF F.R.E.D. SOCKEYE, COHO SALMON PRODUCTION FROM NATURAL LAKE REARING FACILITIES AND BY LOCATION

FRY, FINGERLING, SMOLTS IN MILLIONS ADULTS IN THOUSANDS

AREA	LAKE FACILITY	SPECIES	BROOD YEARS 1973 NUMBER FRY/FINGERING STOCKED	1973 SMOLT PRODUCTION	1973 ADULT PRODUCTION	1974 NUMBER FRY/FINGERING STOCKED	1974 SMOLT PRODUCTION	1974 ADULT PRODUCTION	1975 NUMBER FRY/FINGERLING STOCKED	1975 SMOLT PRODUCTION	1975 ADULT PRODUCTION	1976 NUMBER FRY/FINGERLING STOCKED	1976 SMOLT PRODUCTION	1976 ADULT PRODUCTION
Southeastern	Osprey	Coho				.275	.189 1/							
Cook Inlet	Packer's	Sockeye	.327	.151 2/										
	Tustemena	Sockeye							1.140					
	Big Lake	Sockeye							.071					
	Caribou	Coho				.141			.156					
	China Pool	Sockeye							.060					
	Seldovia	Coho							.080					
Bristol Bay	Nunavauga-luk	Sockeye							.301					
	TOTALS	Sockeye	.327	.151					1.572					
		Coho				.416	.189		.236					

NOTE: Smolt production (or outmigration) usually will occur 2-4 years after the brood year - varies with species and age at stocking.
Adult production (or returns) may be 3-5 years after the brood year - varies with species and age of release.
Osprey Lake cooperative project with National Marine Fisheries Service.

1/ 44,000 (.044 emigrated the fall of 1975).
2/ Predominantly from artificial transplants.

CURRENT SOUTHEASTERN REGION CAPITAL AND BOND PROJECTS

Project Name	Principle Species	Type Project	Year Operational	Authorization In Thousands	Expended & Encumbered 12/31/76	Projected Expenditures 1977-1978	Responsibilities
Survey & Inventory	All	Water Investigation	1974	61.0	8.8	40.0	FRED, USGS
Survey & Inventory	All	Water Investigation & Equipment	1977	50.0	12.4	25.0	FRED, USGS
Snettisham	All	Feasibility	1976	20.0	13.0	7.0	FRED
Pavlof	Coho	Fish Pass	1974	40.0	38.2	0 (lapse 7/1/77)	FRED
Anan Creek	Pink	Fish Pass	1977	655.0 (FY77)	-	655.0	FRED
S.E. Fish Ladders	Pink, Chum	Fish Pass	1977	120.0	20.4	35.0	FRED
Starrigavan	Coho, King	Estuarine Rearing	1972	157.5 (FY77)	44.5	113.0	FRED
Fish Creek	Coho, King	Saltwater Rearing	1975	200.0	193.6	6.4 (lapse 7/1/77)	FRED
Borodino, Osprey	Coho	Lake Stocking	1975	124.4	116.8	7.6 (lapse 7/1/77)	NMFS
King Salmon Egg Take	King	System Devel.	1975	95.8	63.4	32.4 (lapse 7/1/77)	FRED, SFD
Beaver Falls	Chum	Hatchery	1974	100.0	98.6	1.4 (lapse 7/1/77)	FRED
Deer Mountain	Chum, King	Hatchery	1974	30.0	1.9	28.1	FRED
Sitka (Starrigavan)	Coho	Hatchery	1975	30.0	26.5	3.5 (lapse 7/1/77)	FRED
Klawock	Chum, Coho	Hatchery	1978 (74&76 G.O. Bond)	4400.0	Project Activated	4400.0	FRED, DPW
Beaver Falls	Chum	Hatchery	1974 (76 G.O. Bond)	105.0	Project Activated	105.0	FRED
Hidden Falls	Chum, Coho	Hatchery	1978 (74&76 G.O. Bond)	4000.0	Project Activated	4000.0	FRED, DPW
TOTALS				10,188.7	638.1	9,459.4	

KEY
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- CFD - Division of Commercial Fisheries
- SFD - Division of Sport Fish
- DPW - Department of Public Works
- NMFS - National Marine Fisheries Service
- USGS - U.S. Geological Survey

CURRENT CENTRAL REGION CAPITAL AND BOND PROJECTS

Project Name	Principle Species	Type Project	Year Operational	Authorization In Thousands	Expended & Encumbered 12/31/76	Projected Expenditures 1977-1978	Responsibilities
Survey & Inventory	All	Water Investigation	1976	60.0	17.7	42.3	FRED, USGS
Russian River	Sockeye	Fish Pass	1978 (Capital & 76 GO Bond)	340.0	2.6	337.4	FRED
Control Creek	Pink, Chum	Fish Pass	1974	25.0	11.3	13.7	FRED, USGS
Chester Creek	Ducks	Habitat Imp.	1976	25.0	14.0	11.0	Habitat Section
Jean Lake	Sockeye	Feasibility	1973	35.0	28.0	7.0 (lapse 7/1/77)	FRED, CFD
Kenai Rearing	Coho, Sockeye King	Lake Stocking	1975	120.0	72.1	47.9	FRED
Willow Creek	King	Stream Improvement	1976	40.0	.3	Project Activated	FRED
Cannery Creek Whittier	Pink, Chum, Coho	Hatchery	1978 (Capital & 74&76 GO Bond)	3600.0	45.0 Project Activated	3555.0	FRED, DPW
Tutka	Pink, Chum	Hatchery	1976 (74&76 GO Bond & Capital)	650.0	648.0	2.0 (lapse 7/1/77)	FRED
Tutka Expansion	Pink, Chum	Hatchery	1978	420.0	27.0	397.0	FRED
Big Lake	Sockeye, King	Hatchery	1976	550.0	550.0	-	FRED
Big Lake Housing	Sockeye, King	Hatchery	1976	129.0	129.0	-	FRED
Big Lake Expansion	Sockeye, King	Hatchery	1978	315.0	114.0	215.0	FRED
Kasilof Expansion	Sockeye, King	Hatchery	1978	340.0	92.0	248.0	FRED
Kasilof Building	Sockeye, King	Hatchery	1975	75.0	71.0	4.0 (lapse 7/1/77)	FRED
Hidden Skilak	Sockeye, Trout	Hatchery	1978 (1976 GO Bond)	3200.0	18.0 Project Activated	3188.0	FRED, DPW
Cook Inlet	Coho, King	Hatchery	1978 (1976 GO Bond)	3675.0	Project Activated	3675.0	FRED, DPW
East Creek	Sockeye	Hatchery	1977 (Capital Disaster Funds)	1743.0	1743.0	-	
East Creek				360.0 (EDA)	90.0	270.0	FRED
Bristol Bay Rehabilitation	Sockeye, Char	Char Control Fertilization	1974	600.0	525.0	75.0 (lapse 7/1/77)	CFD, SFD, FRED, FRI
Kachemak Bunkhouse	King, Coho	Estuarine, Saltwater Rearing	1977	25.0	24.9	.1 (lapse 7/1/77)	FRED
TOTALS				16,327.0	4,222.9	12,088.4	

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- USGS - U.S. Geological Survey
- FRI - Fisheries Research Institute

CURRENT NORTHERN REGION CAPITAL AND BOND PROJECTS

Project Name	Principle Species	Type Project	Year Operational	Authorization In Thousands	Expended & Encumbered 12/31/76	Projected Expenditures 1977-1978	Responsibilities
Tanana, Salcha Goodpaster	King	Feasibility	1975	45.0	12.2	32.8	SFD (FRED 1977)
Kobuk, Noatak	Chum	Water Inv.	1975	25.0	24.4	.9 (lapse 7/1/77)	CFD
Birch Lake	Coho, Trout	Lake Rehab.	1976 (74 GO Bond)	23.5	-	23.5	SFD
Lost & Little Harding	Coho, Trout, Sheefish	Lake Rehab.	1976 (74 GO Bond)	57.5	8.0	49.5	SFD
Interior Res. & Devel.	King, Chum	Hatchery	1976 (74&76 GO Bond)	929.0	4.9 Project Activated	924.1	FRED, DPW
TOTALS				1080.0	49.5	1030.8	

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- USGS - U.S. Geological Survey

CURRENT WESTWARD REGION CAPITAL AND BOND PROJECTS

Project Name	Principle Species	Type Project	Year Operational	Authorization In Thousands	Expended & Encumbered 12/31/76	Projected Expenditures 1977-1978	Responsibilities
Karluk	Sockeye	Feasibility	1975	55.0	35.0	20.0	FRED, USGS
Kitoi Outlet	Sockeye	Repair	1975	10.0	7.5	2.5 (lapse 7/1/77)	FRED
Tractor	Sockeye, Pink	Purchase	1974	25.0	20.0	5.0 (lapse 7/1/77)	FRED
Akalura	Sockeye	Lake Rehab.	1975	220.0	75.5	50.0	FRED
Frazier	Sockeye	Fish Pass.	1963 (1976 GO Bond)	315.0	2.0	313.0	FRED
Frazier	Sockeye	Fish Pass Design	1963 (1976 Capital)	25.0	23.0	2.0 (lapse 7/1/77)	FRED
Paul's Lake	Sockeye	Fish Pass Modifications	1958	15.0	14.0	1.0 (lapse 7/1/77)	FRED
Afognak	Sockeye, Pink	Fish Passes	1972	17.7	.5	17.2	FRED
Apollo, Middle	Pink, Chum	Fish Passes	1977	170.0	17.0	153.0	FRED
Kitoi	Pink	Hatchery	1976 (1974 GO Bond)	212.8	110.0	102.8	FRED, Hatcheries
Karluk	Sockeye	Hatchery	1978 (74&76 GO Bond)	2791.0	Project Activated	2791.0	FRED, DPW
Russell Creek	Pink, Chum	Hatchery	1978 (74&76 GO Bond)	4780.0	Project Activated	4780.0	FRED, DPW
TOTALS				8636.5	304.5	8237.5	

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- USGS - U.S. Geological Survey

9-940	Statewide Salmon Development Project	$1,385,134	1976 GO Bond

FY 78 Request for CIP Projects	Request
East Creek Housing	$512,000
East Creek Incubators	202,000
Tutka Lagoon Housing	420,000
Starrigavin EPR Expansion	341,100
Beaver Falls Rearing Expansion	47,400
Vessel Acquisition	69,000
Coded Microwire Tagging Machines	32,400
Pathology Lab and Equipment	64,600
Snettisham Incubation	272,500

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