

FEDERAL AID IN SPORT FISH RESTORATION

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Elmendorf Hatchery  
by  
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recreational-fishing opportunities. The heated water from the power plant is utilized by the hatchery to maintain a year-round rearing program primarily for accelerated-growth age-0.0 chinook salmon, *Oncorhynchus tshawytscha*, and for age-1.0 coho salmon, *Oncorhynchus kisutch*, smolts. Elmendorf Hatchery is considered a centralized incubation and rearing facility since nearly all of the fish produced by its programs are transported to serve other areas.

Historically, the broodstocks used for the incubation and rearing programs at Elmendorf Hatchery have had a history of disease, including bacterial kidney disease and furunculosis. Consequently, good fish-cultural practices in the hatchery must be carefully applied to avoid the disease problems. As a result of these practices, there have been no major disease outbreaks in the past four years and the production programs have provided many hours of recreational angling.

#### Physical Plant

Elmendorf Hatchery has nineteen 3.0-m-wide x 21.0-m-long x 1.0-m-deep (volume = 63.0 m<sup>3</sup>) concrete production raceways. A water reaeration and reuse system was added to the facility in 1986 to increase the production capacity. The reuse system is utilized during the winter and early spring when low stream flows limit the hatchery's carrying capacity. Other physical facilities include: (1) a 58-m<sup>2</sup> water-intake and mixing building, (2) a 74-m<sup>2</sup> operations and incubation building, (3) a 167-m<sup>2</sup> shop, (4) a 77-m<sup>2</sup> water-treatment sump covered with a weather port, (5) a 20-kw standby generator, and (6) a 3- x 4-m walk-in freezer. There are two residences on the site: both the hatchery manager and assistant hatchery manager live there to provide 24-hour standby duty to respond to emergencies.

## Water Supply

Ship Creek, immediately adjacent to the facility, provides the water for the rearing programs at Elmendorf Hatchery. The volume of water available for rearing fish ranges from 8,340 to 15,120 liters/min between February and April to 30,300 liters/min during the summer. The volume of heated water (26°C) from the power plant varies from 5,280 liters/min at night to 18,960 liters/min during the day. A small well provides 360 liters/min of clean water which is used to incubate eggs and fill fish-transport tanks.

Under normal operations, creek water is mixed with heated water and pumped through the aeration towers in the water-treatment sump to stabilize the dissolved gasses. Because the main water source is an open creek, siltation and clogged screens are a frequent problem during high-water periods, particularly in the spring and fall.

## GOALS AND OBJECTIVES

The primary objective for Elmendorf Hatchery is to provide good-quality chinook and coho salmon smolts for sport-fisheries enhancement projects. Because the hatchery uses broodstocks that have a history of disease, some new stocking locations are restricted. However, there are already more approved projects for the fish from this facility than can be accommodated.

Production goals for FY 1988 included anadromous releases of chinook salmon smolts into Crooked Creek near Kasilof; Homer Spit, Halibut Cove Lagoon, and Seldovia, in Kachemak Bay; Six-Mile Creek, in Turnagain Arm; Seward Lagoon and Lowell Creek, in Seward; and, Ship Creek, in Anchorage (Table 1). Chinook salmon presmolts were scheduled for stocking into landlocked lakes near

Table 1. Fish production at Elmendorf Hatchery during Fiscal Year 1988.

Production goals				Actual Production	
Species	Location	Number	Average size (g)	Number	Average size (g)
chinook	Crooked Creek	210,000	16.0	240,000	15.9
chinook	Halibut Cove Lagoon	105,000	16.0	94,000	15.9
chinook	Homer Spit	210,000	16.0	219,000	15.9
chinook	Seldovia Harbor	105,000	16.0	111,000	15.9
chinook	Seward Lagoon	105,000	16.0	109,000	15.9
chinook	Lowell Creek	105,000	16.0	96,000	15.9
chinook	Six-mile Creek	105,000	16.0	131,000	15.9
chinook	Ship Creek	105,000	16.0	116,000	14.6
chinook		1,050,000		1,116,000	
coho	Resurrection Bay	180,000	22.0	182,547	22.5
coho	Whittier	120,000	22.0	107,000	22.5
coho	Homer Spit	60,000	22.0	63,000	21.8
coho	Ship Creek	50,000	22.0	59,000	20.2
coho		410,000		411,547	
coho	Landlocked lakes	240,000	5.0	255,000	3.8
coho	Landlocked lakes	36,000	10.0	72,000	8.8
coho	Landlocked lakes	60,000	65.0	to be stocked, fall 1988	
coho	Ship Creek (in 1989)	60,000	2.0	67,140	1.8

Fairbanks. Coho salmon smolts were scheduled for anadromous release sites in Whittier, at Homer Spit, Seward Lagoon, Lowell Creek, and Ship Creek. Coho salmon fingerlings were to be released into Matanuska Valley landlocked lakes.

Elmendorf Hatchery produces fish to enhance or create sport fisheries, but it supports a nonconsumptive use as well. Many visitors are attracted to the facility because of its proximity to Anchorage and the high visibility of salmon runs in Ship Creek. Consequently, the public-relations and informational services provided by the staff have become increasingly important.

## PERFORMANCE

### Production

The 1987 brood year (BY) chinook salmon eggs were taken at Crooked Creek and at Ship Creek in mid-July and placed in the hatchery Heath<sup>®</sup>-stack incubators. The eggs for the smolt programs were incubated at 12°C and the resultant fry were transferred to raceways in early October when their yolk weighed 15.3% of their body weight. Chinook salmon eggs for the fingerling and post-smolt programs were incubated at cooler water temperatures and transferred to raceways in late-November. The green-egg-to-eyed-egg survival rate was 92.8%, and eyed-egg-to-emergent-fry survival was 97.8%. The chinook salmon for the smolt programs were reared at 11.5°C until they reached a size of 6.3 g in January, when the rearing water temperature was dropped to 7°C. Then the temperature was gradually increased to 8°C by release time in June. Survival from fry to smolt was 94%. Average size at release was 15.9 g. Chinook salmon for the post-

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<sup>®</sup> Mention of commercial products and trade names does not constitute endorsement by ADF&G, FRED Division.

smolt program were kept in the hatchery and reared until they are released into Anchorage urban lakes at 72.3 g in September 1988. This program was carried out in 1986 and provided for a good winter ice fishery.

A feeding trial was carried out with the Crooked Creek chinook salmon. One lot of fish was fed Alaska Dry Pellet<sup>®</sup> (ADP) and the rest were fed our standard diet of Oregon Moist Pellet<sup>®</sup> (OMP IV and OMP II). Food conversions (i.e., weight of food fed/body weight gained) for the fish fed OMP were 1.31-1.0 and, for the fish fed ADP, 1.13-1.0. Fish in both lots grew well and converted food to body weight better than average. Final evaluation of the feeds, however, will depend on the survival rates to adult.

Coho salmon fingerlings (Bear Lake and Crooked Creek stock) were received from Trail Lakes Hatchery in September 1987 at 2.7 g each. These fish were reared at 7°C to 8°C and released as 22.5-g smolts in late-May and early-June. Survival rate from fingerling to smolt was 99% and food conversion was 1.1-1.0. Ship Creek coho salmon fingerlings from the 1986 brood were also reared to smolts and released.

Each year several lots of smolts are subjected to a "sea water challenge test" to assess smolt readiness before they are released. Average values of sodium ions in smolt blood serum were higher than usual this year, possibly because of an unusually long period of turbid water this spring (Figure 1). Turbid water occurred at the hatchery beginning the second week of May and continued through mid-June. As seen in past years, the sodium-ion concentrations increased during this period among the coho salmon smolts and especially among the chinook salmon smolts. Hopefully, smolts released in spite of the high readings will survive well. Before release, these fish exhibited other good smolt characteristics; i.e., silvery coloration, active movement, deciduous scales, and downstream movement. At release

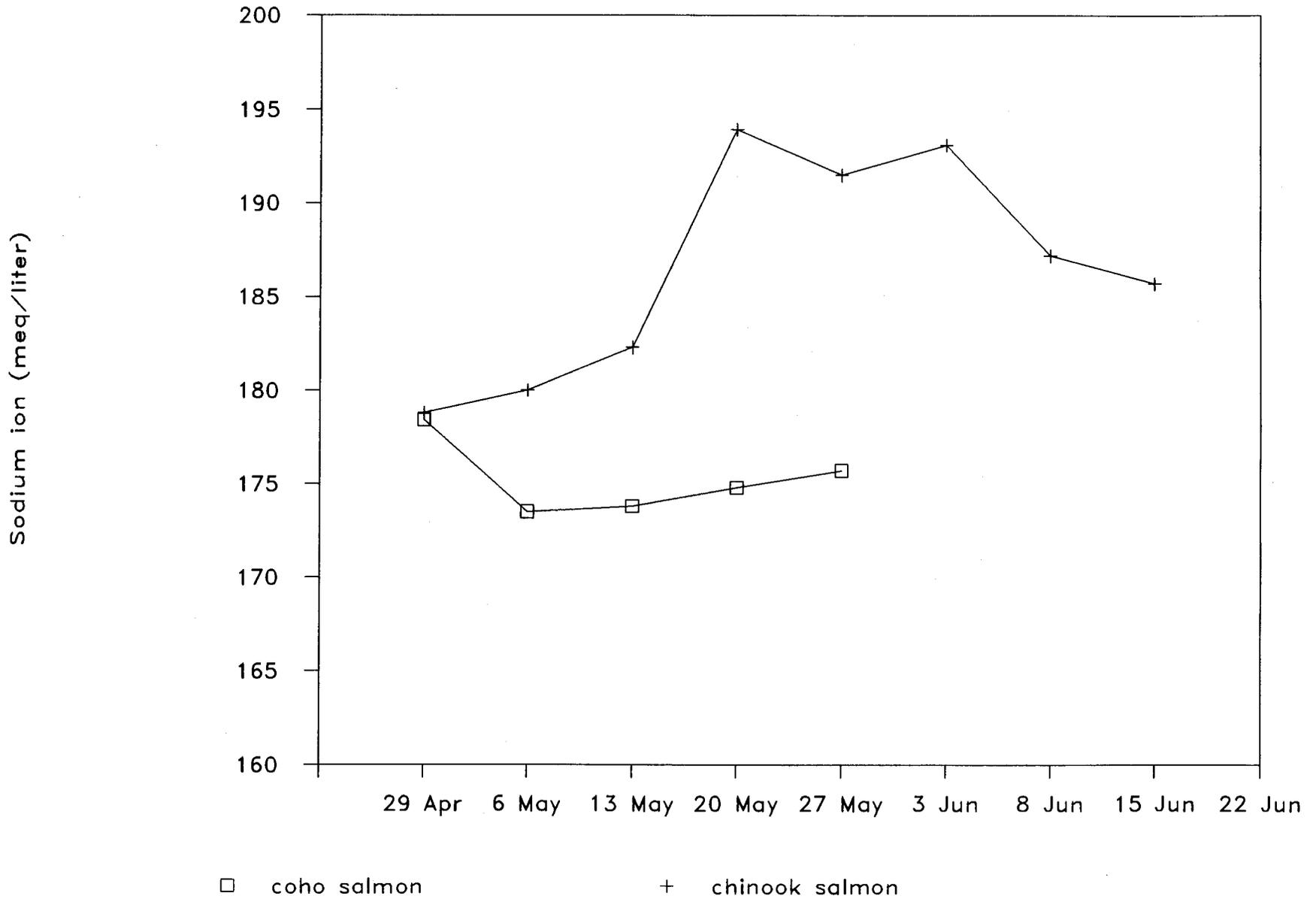


Figure 1. Sodium-ion concentration in the blood serum of coho and chinook salmon released from Elmendorf Hatchery in 1988. Rearing water was turbid from 13 May to 15 June.

sites where the smolts were held in net pens in salt water for 3 to 7 days after transport, mortality was negligible and fish were observed feeding vigorously.

Coho salmon fingerlings raised for release into Matanuska Valley freshwater lakes were incubated at 8.0°C and were transferred to raceways in early January. Soon after ponding, these fry developed gas bubble disease (GBD), even though their water supply had been passed through vacuum-degasser towers. These degassing towers had successfully eliminated GBD among coho salmon fry reared last year. An oxygen contactor was added to the water supply and the GBD was eliminated. The fingerlings were released in early-May at 3.8 g.

Ship Creek coho salmon eggs were taken, incubated, reared to 1.8-g fingerlings, and held over for FY 1989 release.

A personnel-counting device was installed at the visitor area next to the hatchery-intake dam. A total of 48,000 visitors came to the hatchery, mostly to view the returning Ship Creek chinook salmon. The year-end audit of the hatchery shows that expenditures are within the FY 1988 budget of \$476,100. A total of 5.4 man-years were spent for hatchery operation during FY 1988.

#### PROJECTS AND EVALUATIONS

The estimated sport-fishing effort at Crooked Creek during May and June 1988 was 116,751 angler-hours. An estimated 11,400 returning adult chinook salmon were harvested by sport fishermen; 10,100 of these were harvested by the shore-based anglers and 1,300 by anglers in guided drift boats (Gary Kyle<sup>1</sup>, personal communication). Last year 35% of the total catch were fish from

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<sup>1</sup> ADF&G, FRED Division, Soldotna, Alaska.

Elmendorf Hatchery releases. This year's catch data have not yet been analyzed, but 50% to 60% are expected to be from Elmendorf Hatchery releases.

Approximately 2,050 chinook salmon were harvested at Halibut Cove Lagoon by 2,600 anglers in 900 boats; this fishery is accessed only by boat. The Homer Spit chinook salmon fishery continued to be a popular shore-based fishery. Approximately 7,000 angler-days were spent harvesting 3,300 chinook salmon. Also, the first age-0.1 chinook salmon returned to Seldovia this year. Approximately 800 jacks were harvested. All three of these fisheries depend entirely on hatchery releases.

Hatchery-produced chinook salmon returning to Resurrection Bay sustained a shore-based fishery. This year an estimated 1,300 returning adults were harvested. Many anglers participated in the Ship Creek urban chinook salmon fishery. Again, no creel census was conducted but an estimated 300 fish were harvested. This was slightly fewer than last year's estimated harvest of 500 fish, but approximately 1,000 chinook salmon were in the Ship Creek escapement which provided visitors an opportunity to view fish in their natural habitat.

Adult coho salmon return between August and October; consequently, 1988 adult returns are not yet available. Last year's adult coho salmon returns from 1986 smolt releases, however, made significant contributions. An estimated 8,000 adult coho salmon (7.6% smolt-to-adult survival rate) returned from hatchery-produced smolts released at Whittier. Approximately 5,000 of these fish were caught by sport fishermen. In Resurrection Bay, an estimated 7,848 hatchery-produced coho salmon (7.5% smolt-to-adult survival rate, excluding escapement) were harvested by sport fishermen.

Table 2 shows projected returns from all FY 1988 releases.

Table 2. Numbers of adults forecasted to return from anadromous fish release in 1988 from Elmendorf Hatchery

Production goals				Forecasted	
Species	Stocking Location	Number	Average size (g)	Survival rate %	Number of adults
chinook	Crooked Creek	210,000	16.0	4.0	8,400
chinook	Halibut Cove Lagoon	105,000	16.0	3.0	3,150
chinook	Homer Spit	210,000	16.0	3.5	7,350
chinook	Seldovia Harbor	105,000	16.0	3.0	3,150
chinook	Seward Lagoon	105,000	16.0	2.0	2,100
chinook	Lowell Creek	105,000	16.0	2.0	2,100
chinook	Six-mile Creek	105,000	16.0	3.5	3,675
chinook	Ship Creek	105,000	16.0	4.0	4,200
chinook		1,050,000			34,125
coho	Resurrection Bay	180,000	22.0	5.0	9,000
coho	Whittier	120,000	22.0	5.0	6,000
coho	Homer Spit	60,000	22.0	4.0	2,400
coho	Ship Creek	50,000	22.0	4.3	2,150
coho		410,000			19,550

## SUMMARY

In FY 1988 Elmendorf Hatchery produced and released chinook and coho salmon to create and enhance sport-fishing opportunities. The chinook and coho salmon smolts were released at anadromous sites throughout the Kenai Peninsula and Prince William Sound. Though the seawater challenge tests were not as low as desired, the chinook salmon appeared vigorous after they were released into ocean net pens. Coho and chinook salmon fingerlings were released into Matanuska Valley and Interior freshwater lakes. All fish were healthy and were released on time and within budget.

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