FARRO, MITCH 1993

PACIFIC COAST
FISH,
WILDLIFE &
WETLANDS
RESTORATION
ASSOCIATION
PO BOX 4574 ARCATA CA 95521

Prairie Creek Salmon Restoration
1992/'93 Season

Performed as mitigation for CalTrans
Contract #01E026

4 years

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September 29, 1993

Preliminary Report

In early October of 1992 the Pacific Coast Fish, Wildlife, and Wetlands Restoration Association was contacted by California Dept. of Fish and Game (CDF&G) and California Dept. of Transportation (CALTRANS) personnel following their decision to continue emergency measures to salvage adult salmon and Steelhead returning to spawn in the Prairie Creek drainage of Humboldt County. This decision was determined necessary due to extensive sedimentation of spawning habitat during construction of a new section of U.S. Highway 101 bypassing state and federal parklands. Since October of 1989, when initial sediment deposition occurred, there has been a lack of flushing flows and impacts on survival of salmonid eggs during incubation within the gravel has been observed.(see RNP Documents).

PCFWWRA was asked to participate by trapping and spawning adult salmon, to incubate the resulting eggs, then rear to a suitable release size the fry after hatching. This was all accomplished at remote facilities in Prairie Creek State Park. A contract for reimbursement of actual expenses was negotiated with the California Dept. of Transportation (CALTRANS) to perform the work recommended by CDF&G. CALTRANS Fisheries Biologist Mark Moore was designated as the contract supervisor and was to oversee all work undertaken.

After an upgrade of the filter systems and expansion of the incubation capacity in early fall, the facilities were cleaned and ready for the season. The trap and weir were set in place as Prairie Cr. flows increased from rainfall during early November. After a moderate storm on the 16th and 17th the trap was made operational. Adult salmon were trapped almost immediately and trapping effort was continuous on all permissible flows until an adequate number of adults were captured in mid December. The trapping was then spaced over time to capture representing the full run timing of the salmon returning to Prairie Cr. (see Trapping Schedule and Results)

The 1992/'93 winter was the first in six or more years with normal or better than normal precipitation. The rain came in moderate storms and produced very stable stream conditions for the salmon to access spawning reaches of

Prairie Cr. No flood flows above the annual high water flow event were observed during the winter. Because of these conditions the salmon were able to migrate upstream based on their own timing and were not held up by extreme low flows as in the past several years.

All adult salmon in good condition were transferred to the remote facilities where they were held separately until fully mature and then spawned. All spawning was done with the procedures and personnel normally used by PCFWWRA with good results on other salmon restoration projects. This includes a very cautious effort to maintain the maximum genetic variation during spawning of adults. Eggs were placed into specially constructed hatchbox type incubators and monitored daily. All emerging fry were reared in pools using all means available to duplicate, to the extent possible, the conditions they would normally experience in a stream environment.

Unlike previous years, the fertility of the adult salmon captured at the weir was not negatively affected by long delays in migration due to drought affected stream flows. Because of this, the spawning fertility,(measured as survival to eyed stage) was considerably better than in previous years.(see Spawning Records)

In spite of all efforts to protect the eggs and fry from losses while they are under our care, these facilities are, as are all other fish culture facilities, vulnerable to human error. In early March somewhere between 8,000 to 10,000 Chinook alevins were lost due to a valve being bumped on a hatchbox. The flows were inadvertently reduced in one chamber of a multi chambered hatchbox and alevins died off until their numbers were in equilibrium with the reduced flow. During the spawning season one adult male Chinook, used previously for spawning, and an un-used jack Chinook were also lost due to the large male pushing both holding tubes into a vertical head down position which caused both fish to drown.

A means of evaluating the results of the releases was to be developed as part of the original program. PCFWWRA purchased tags and made arrangements for equipment in order to tag all fish with Coded Wire Tags before release. It was determined after discussion with CDF&G and CALTRANS to release the Coho un-tagged so that all the Chinook could be held to a size to allow tagging. Tagging took place between June 14th and 30th and all Chinook were released by July 3rd.(see Fish Planting Info.)

PCFWWRA also cooperated in monitoring efforts being conducted by Redwood National Park (RNP) biological staff to assess survival of salmonid eggs in the spawning gravels of Prairie Creek. Approximately 1,200 green eggs from a coded

wire tagged Coho salmon spawned by PCFWWRA were given to RNP for placement in artificial redds. Control groups were maintained by PCFWWRA at the rearing facilities as part of the evaluation process.

Due to the continued high flows it wasn't until mid May that downstream migrant traps could be installed in Prairie Creek by PCFWWRA to assess the survival of Chinook salmon smolts produced by naturally spawning salmon. The location of installation was at the lower boundary of RNP at the lower end of the bypass. This location was just below the section of stream normally surveyed for spawning adults by RNP biological staff. Due to the use of this location in previous years, and the priority of spawning counts above this point, it was regarded as the best site to use this season. Because of the good water conditions most of the Chinook spawning the previous winter should have taken place above this location. The traps were washed out from Memorial Day to mid June due to a late winter type storm, and then remained operating through August.(see Downstream Migrant Trapping Info.)

Overall this season appears to be one of the best in several years for salmon, Chinook particularly, in Prairie Cr. and other coastal streams. Good numbers of adults had excellent flow conditions for migration and spawning, followed by a wet Spring and a cool Summer. Better than 43% of the returning adult Coho were tagged, identifying them as successful results of this project. The 1992/'93 Chinook runs in Prairie Cr. were primarily the progeny of years before the sedimentation event of 1989. The presence of two year old jack Chinook gives hope that there will be some adults returning to Prairie Cr. over the next couple of years. At this time it cannot be determined if they are the result of this program, from the Humboldt County Hatchery, or of wild spawning parents. We sincerely hope conditions have improved when they do return to spawn.

Submitted by

Mitch Farro

Mitch Farro
Project Director
PCFWWRA

1992/'93 TRAPPING SCHEDULE AND RESULTS

TRAP IN	TRAP OUT	HOURS TRAPPED	SPECIES	TRAP CATCH
11/18 9:00 AM	11/19 5:00 PM	32.0 hrs.	Coho	2M, 1Gr.
11/20 3:00 PM	11/22 12:00 AM	33.0 hrs.	Coho	3M, 2F
12/2 8:00 AM	12/4 10:30 AM	50.5 hrs.	Coho	2M(1ad),2F(1ad),1Gr.
			Chinook	2Gr.
12/6 6:00 PM	12/10 7:30 AM	85.5 hrs.	Coho	14M(9ad),8F(4ad) 8Gr.(3ad)
			Chinook	11M, 1F, 2Gr.
			Steelhead	1M(hatchery)
12/11 1:00 PM	12/14 2:00 PM	73.0 hrs.	Coho	4M(1ad),3F(1ad) 8Gr (3ad)
			Chinook	13M,12F, 3Gr.
12/28 12:00 PM	12/29 9:00 PM	33.0 hrs.	Coho	0M, 1F, 4GR.
			Chinook	3M, 4F, 2Gr.
1/7 3:00 PM	1/9 4:30 PM	49.5 hrs.	Coho	1M, 2F(2ad), 1Gr.
			Chinook	6M, 2F, 1Gr.

Total Time Trapped Nov.18 thru Jan. 9 = 356.5 hrs.
Time Trap Removed Nov 18 thru Jan. 9 = 923 hrs.

Trap Result Totals

Coho

	Male	Female	Grilse
Held	13	10	3
Released	13	8	20
Combined	26	18	23
Ad Clipped	11	8	3

Chinook

	Male	Female	Grilse
Held	28	18	6
Released	5	1	4
Combined	33	19	10

Steelhead 1 Male released of Pr. Cr. Hatchery origin

1992/'93 Chinook Spawning Records

Date Spawned	Date Trapped	Fk Length in cm	Eggs/ oz.	oz./ Female	Eggs/ Female
12/9/92	12/8/92	70	80	40	3200
12/16/92	12/12/92	98	50	120	6000
12/16/92	12/12/92	93	47	112	5264
12/18/92	12/12/92	76	67	40	2680
12/18/92	12/11/92	74	60	42.5	2550
12/20/92	12/12/92	75	70	56	3920
12/20/92	12/14/92	89	46	86	3956
12/21/92	12/13/92	85	59	86	5074
12/21/92	12/11/92	91	50	96	4800
12/22/92	12/12/92	90	59	86	3956
12/22/92	12/12/92	95	51	100	5100
12/23/92	12/14/92	92	55	104	5720
12/23/92	12/13/92	94	56	76	4256
12/30/92	12/29/92	90	51	92	4692
1/2/93	12/29/92	96	60	104	6240
1/7/93	12/29/92	91	43	94	4042
1/9/93	1/8/93	104	53	128	6784
1/9/93	1/9/93	88	58	100	5800

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Total Chinook egg take for the season was 84,034. Fertility,(survival to eyed), ranged between 66.4% and 98.8% with an overall average of 86.7%. Total eyed eggs =72,898.

= 4669 Eggs/♀

1992/'93 Coho Spawning Records

Data Spawned	Date Trapped	Fk Length in cm	Eggs/ oz.	oz./ Female	Eggs/ Female
11/23/92	11/22/92	69	71	31	2201
11/23/92	11/22/92	67	77	25	1925
12/8/92	12/3/92	61	76	22	1672
12/8/92	12/7/92	68	74	39	2886
12/10/92	12/8/92	61	76	19	1444
12/14/92	12/8/92	61	82	34	2788
12/14/92	12/13/92	64	67	34	2278
12/16/92	12/11/92	66	68	30	2040
12/23/92	12/9/92	64	66	34	2244
1/13/93	1/9/93	(ad) 70	70	46	3220
				Given to RNP	-1200

Total Coho Egg Take For the season was 21,498.
Fertility,(survival to eyed),ranged between 59.4% and 97.6% with an overall average of79.8%. Total eyed eggs = 17,168.

Prairie Creek 1993
Fish Planting Information

Chinook

June 17	13,380 @ 161 per lb. released in Prairie Cr. at Elk Prairie Campground access
July 2	28,470 @ 89 per lb. released in Prairie Cr. at site 300' below Streetlow Cr.(below 101 Bypass interchange)
July 3	20,560 @ 86 per lb. released in Prairie Cr. at site 100' above Streetlow Cr.(below 101 Bypass interchange)

All Chinook releases were coded wire tagged with tag # 06-01-05-01-03. The shed rate on tags was 7.8% overall at time of release.
The total Chinook release of 62,410. This represents 85.6% of the eyed eggs, and 74.3% of the total egg take.

Coho

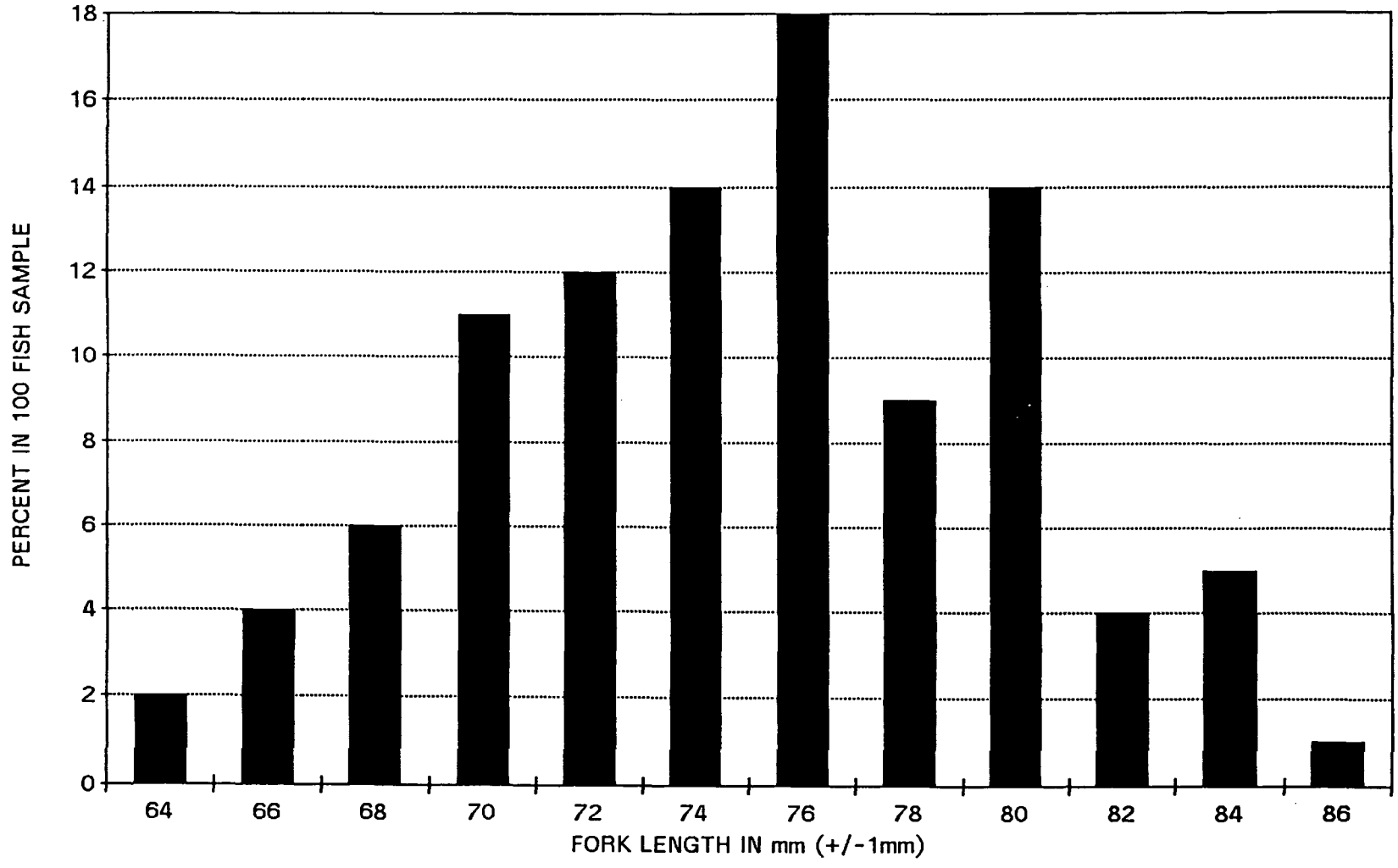
April 29	6,440 @ 161 per lb. released in upper Prairie Cr. from above Hwy. 101 crossing downstream
April 29	3,180 @ 161 per lb. released in May Cr. from 101 Bypass access Rd. downstream
May 12	2,990 @ 193 per lb. released in Brown's Cr. and S. Fk. Brown's Cr.
May 12	2,990 @ 193 per lb. released in both forks of Boyes Cr. from sediment catch basins downstream
May 13	1,500 @ 193 per lb. released in Big Tree Cr. from trail crossing downstream
May 13	630 @ 193 per lb. released in Ten Tapo Cr. from sediment catch basin downstream
May 13	480 @ 193 per lb. released in Hope Cr. from trail crossing downstream
May 14	520 @ 190 per lb. released in CREA Cr. from trail crossing downstream

May 14	475 @ 190 per lb. released in Worn Grove Cr.. from trail crossing downstream
May 14	190 @ 190 per lb. released in Cr. @ rearing site from 1/4 mi. above intakes downstream
May 14	95 @ 190 per lb. released in Little Cr. from trail crossing downstream

All Coho releases were un-tagged. The total Coho release of 17,430 represents 101.5% of the estimated eyed eggs, and 581.1% of the total egg take. Less than 200 Coho mortalities were observed from emergence to release and the discrepancy between eyed and release is due to the accuracy of egg counts.

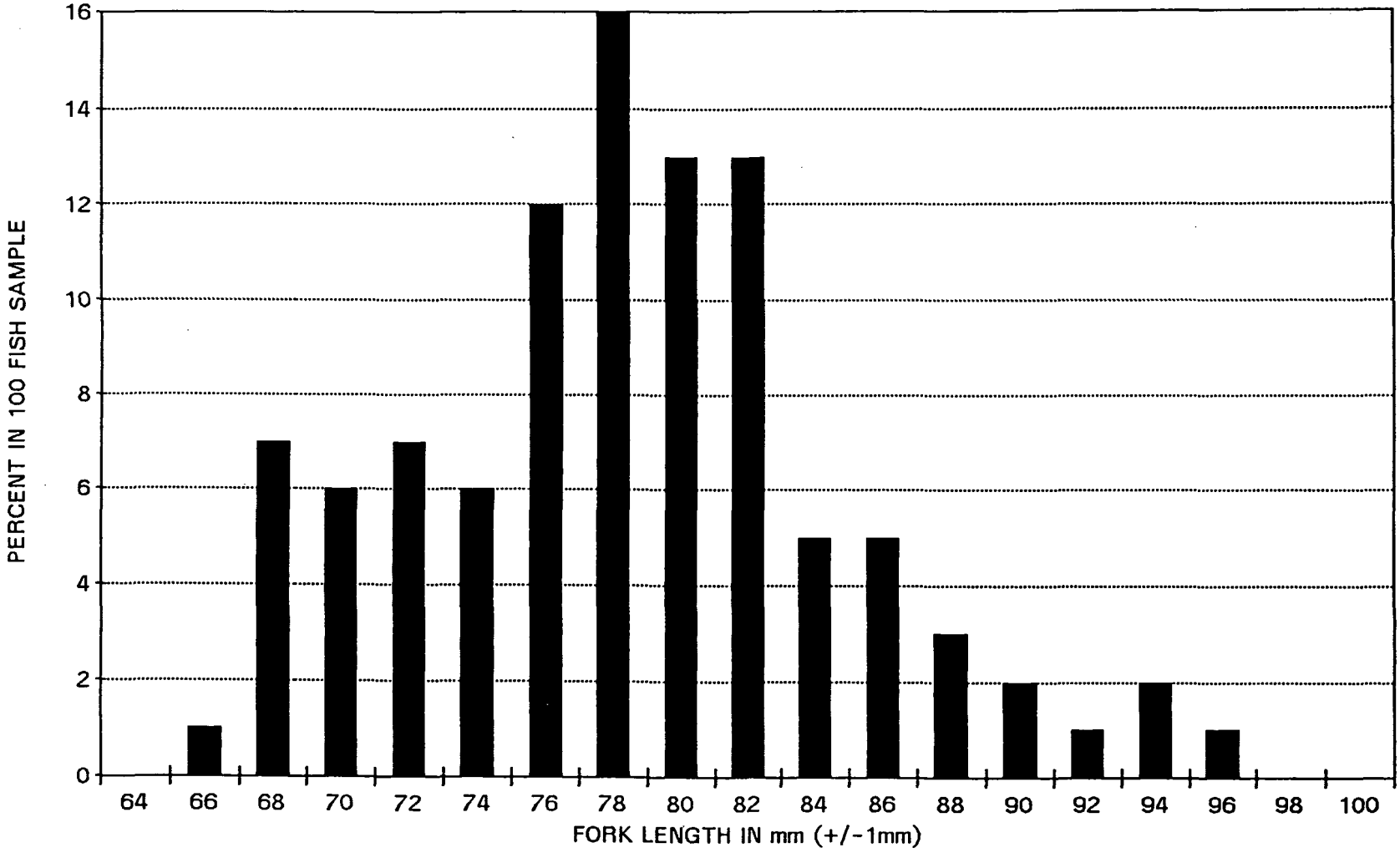
CHINOOK RELEASE LENGTH FREQUENCIES

LENGTH AT RELEASE ON 6/17/93



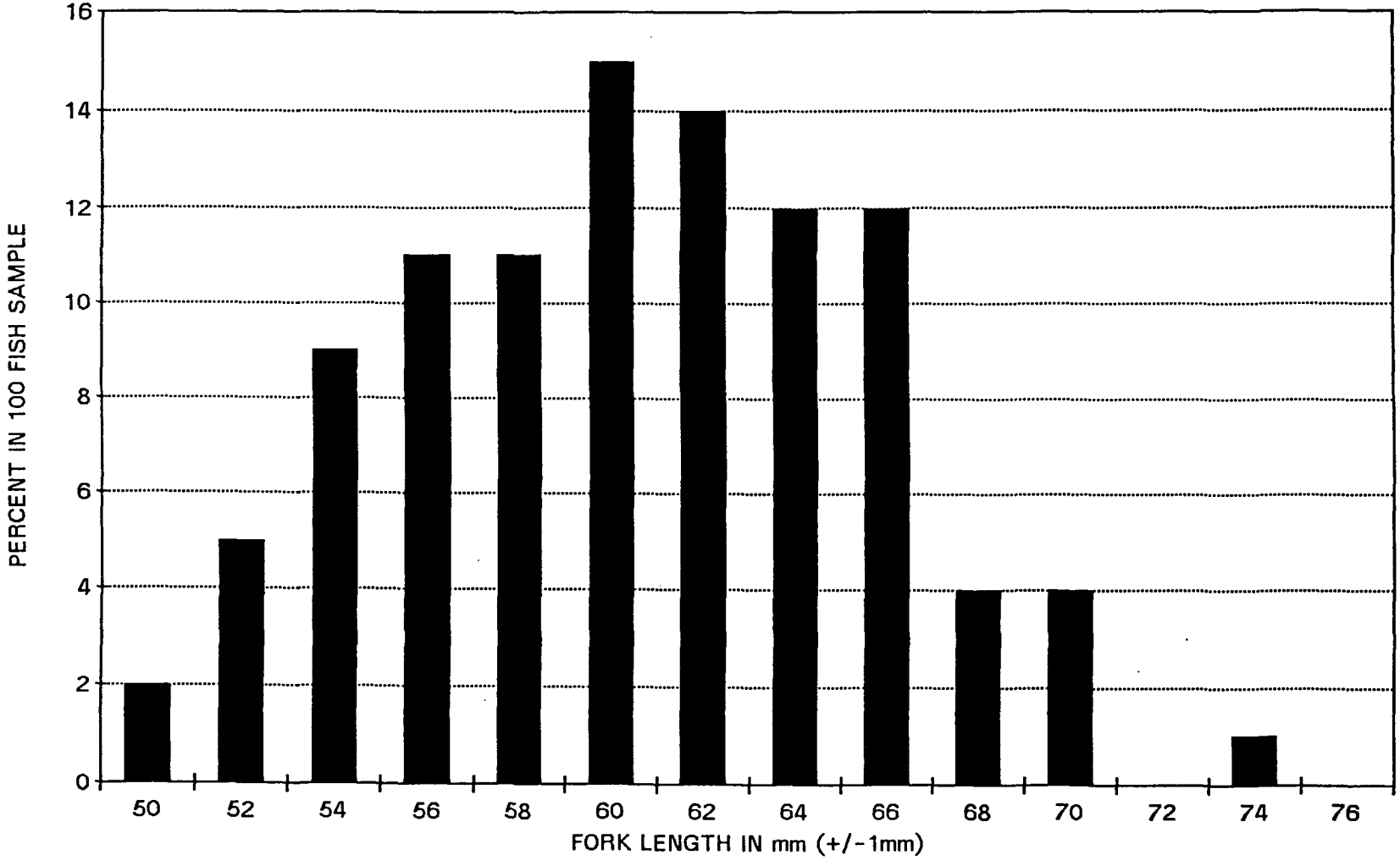
CHINOOK RELEASE LENGTH FREQUENCIES

LENGTH AT RELEASE ON 7/2/93



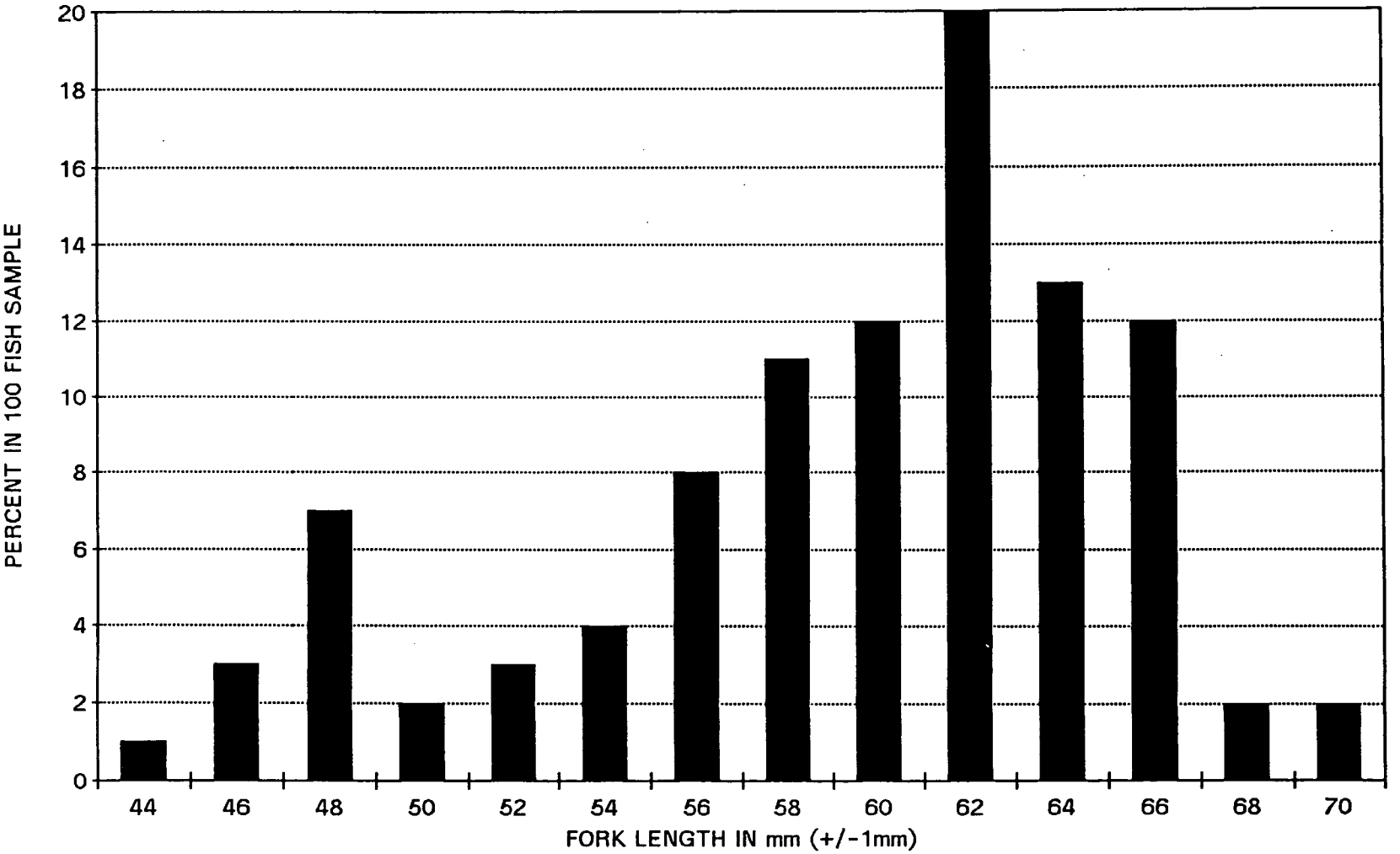
COHO RELEASE LENGTH FREQUENCIES

LENGTH AT RELEASE ON 4/29/93



COHO RELEASE LENGTH FREQUENCIES

LENGTH AT RELEASE ON 5/12/93



Downstream Migrant Trapping Information
Prairie Creek 1993

The winter of 1992/'93 was the end of six years of drought in the West with nearly 125% of normal rainfall in Humboldt County. The effect of a wet spring on top of a normal winter was prolonged high flows in Prairie Cr. through early May. In mid May PCFWWRA installed two downstream migrant traps of a pipe design into Prairie Cr. in order to help assess Chinook egg to smolt survival for the '92/'93 brood year. Both traps were located just below the section of stream surveyed by RNP staff for spawning activity during the winter spawning period. The traps were attended daily until a large winter type storm rendered them ineffective on Memorial Day weekend and were removed. After June 15th the traps were re-installed and operated through August. The traps were removed at the end of August due to the low numbers of Chinook smolts migrating. *Relatively high numbers of juvenile Chinook could still be seen residing in larger pools at this time.*

All fish were classified as to species and measured to within 1 millimeter of fork length. Any mortalities were noted as well as any visually observable irregularities in health condition.

In order to provide a means to extrapolate from observed numbers to an estimate of total numbers of smolts, several attempts were made at calibrating the efficiency of the traps. A mark/recapture methodology utilizing a slight caudal fin clip was used on four separate occasions under varying flow conditions to assess trap efficiency. *This method was selected as the best practicable but may tend to overestimate the total population due to trap avoidance by previously captured fish.*

The efficiency of the two traps combined increased from 25% in mid May, to 45% at the end of June, and 52% and 54% in late July and mid August respectively. The increase in trap efficiency is related to flow volume and increases as flows decrease during summer.

A total of 4,328 migrating Chinook smolts were observed during this time period. Of this number, 262 were in May. The trap efficiency calculated for May was based on one test with low numbers of fish which gave a 25% efficiency and expands the estimate of migrants to 1,048 for this period.

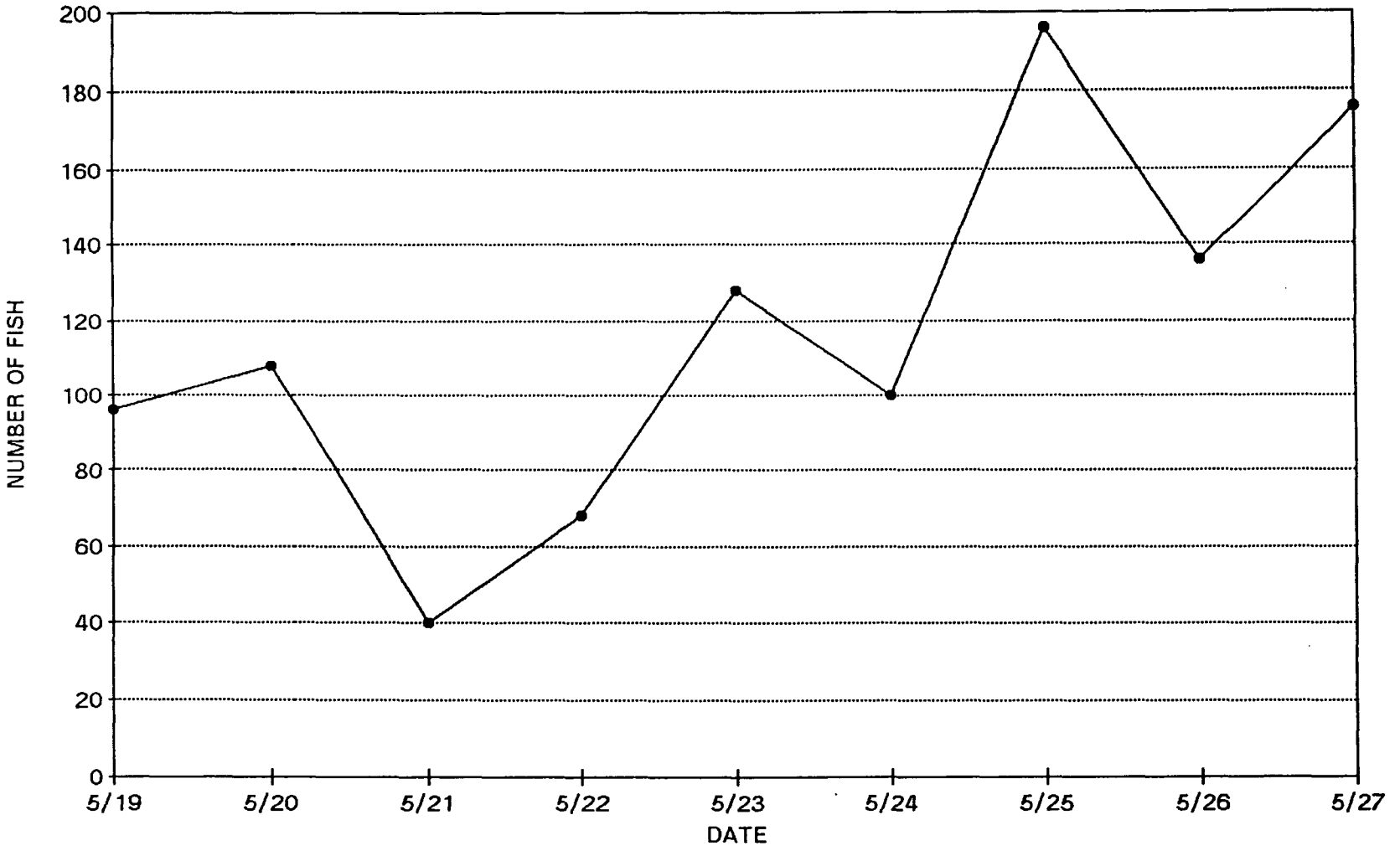
Of the remaining 4,061 observed from June 17th through August, a total of 2,687 or 66.2% were coded wire tagged

from a release of 13,380 on June 14th & 15th. A total of 1,374, or 33.8% were the product of wild spawning fish.

The observed numbers were expanded by the trap efficiency curve to 5,420 cwt smolts, and 2,835 wild produced smolts. These numbers should not be used as an estimate of total Chinook smolt production for the year due to the probability of significant migration prior to trap installation and during the early June high flows when the trap was inoperable. The opportunity to estimate the smolt production during periods when the trap was inoperable may exist by comparing Prairie Creek to a rotary trap in Little River which was able to operate in higher flows.

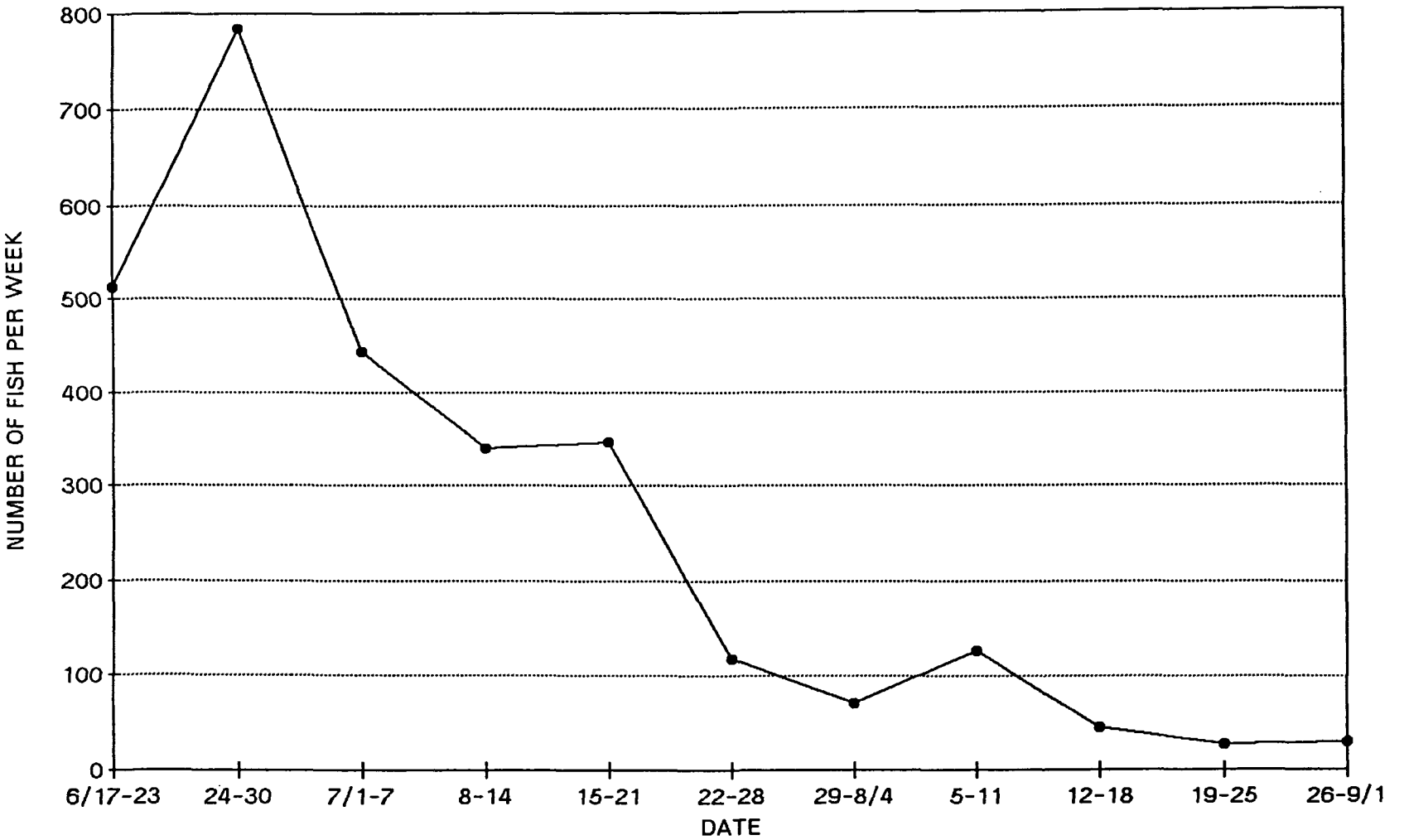
EXPANDED NUMBER WILD CHINOOK MIGRANTS

DOWNSTREAM MIGRANT TRAP 1993



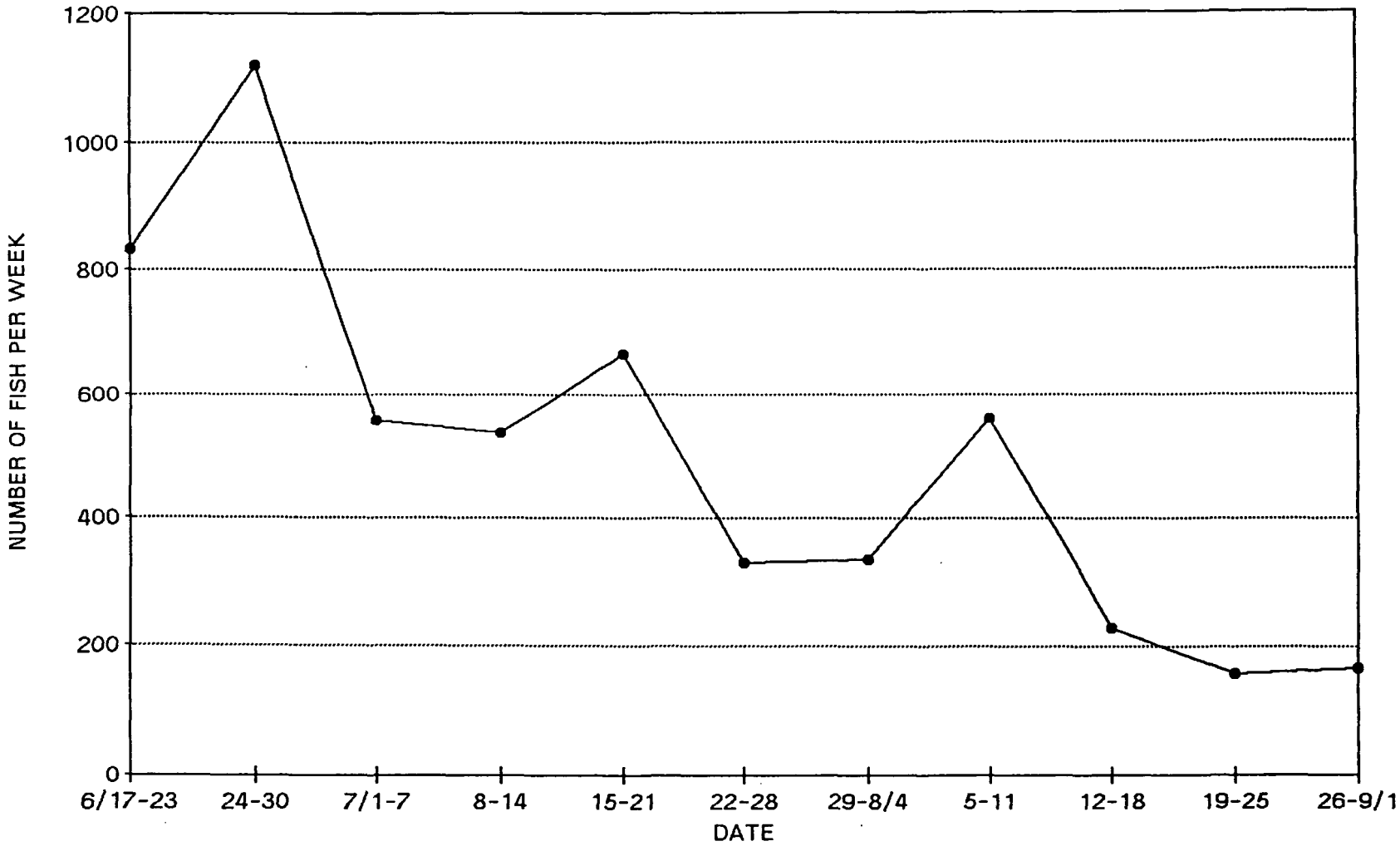
EXPANDED NUMBER WILD CHINOOK MIGRANTS

DOWNSTREAM MIGRANT TRAP 1993



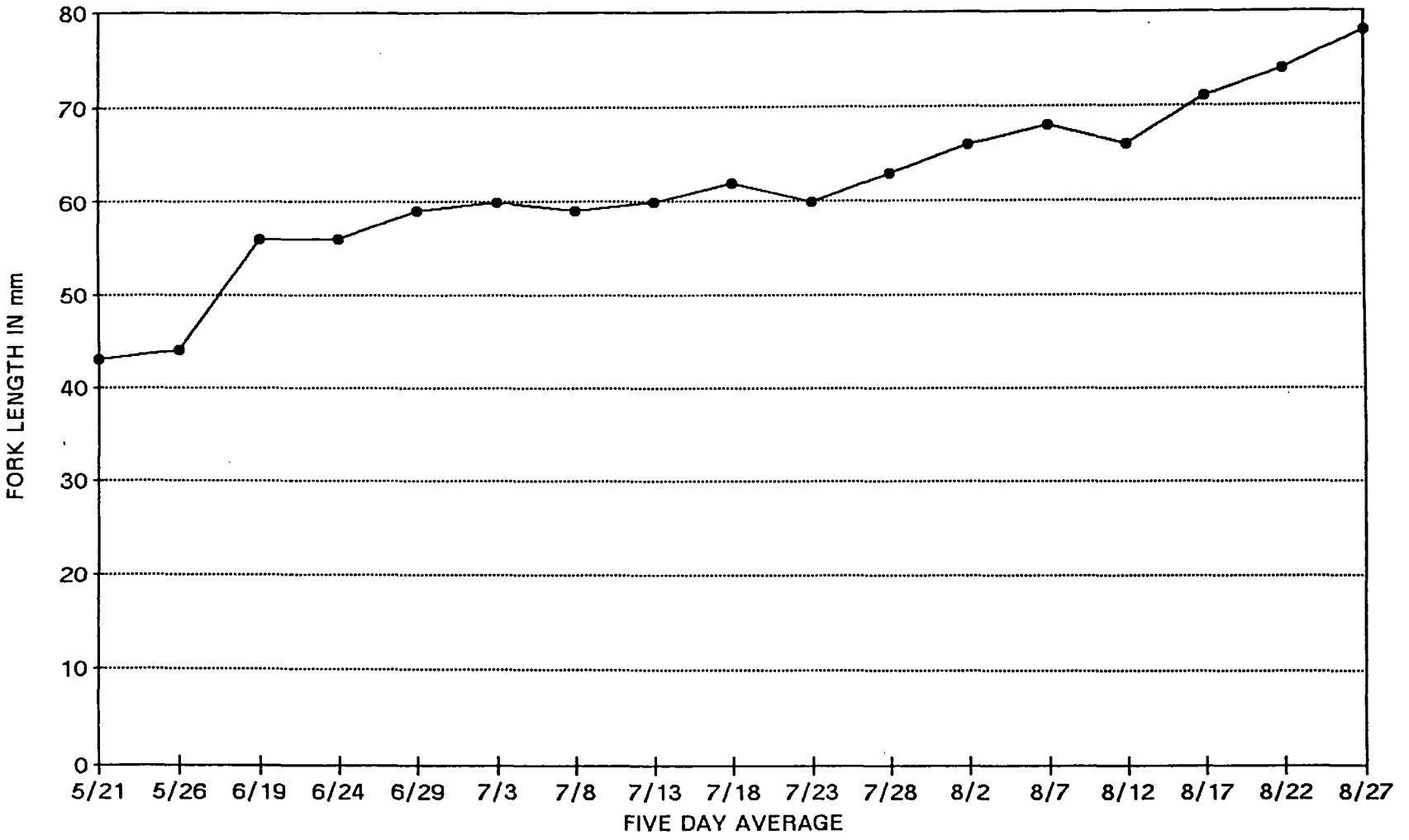
EXPANDED AD CLIP CHINOOK MIGRANTS

DOWNSTREAM MIGRANT TRAP 1993



FORK LENGTH OF WILD CHINOOK

DOWNSTREAM MIGRANT TRAP 1993



FORK LENGTH OF AD CLIP CHINOOK

DOWNSTREAM MIGRANT TRAP 1993