Idaho LSRCP Program

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Idaho once produced 45% of all summer chinook, 40% of all spring chinook and 55% of all summer steelhead in the Columbia River Basin. The Lower Snake River Compensation Plan (LSRCP) was established to mitigate for productivity lost due to the construction and operation of the lower Snake River dams. Proposed adult returns from LSRCP facilities will contribute significantly to Idaho's proposed hatchery production plan (IDFG Anadromous plan 1985-90) (Figure 1 and 2). Idaho's portion of the LSRCP is responsible for returning 8,000 summer chinook, 40,500 spring chinook and 39,200 summer steelhead to Idaho (Figures 3 and 4). Six hatcheries and attending satellites were deemed necessary to meet the adult return goals (Table 1, Figure 5). Clearwater hatchery, still under construction, is scheduled to begin production in 1991.

STEELHEAD

Production targets for Hagerman National and Magic Valley Hatcheries have essentially been met since the inception of the LSRCP program (Figures 6 and 7). Water quantity limits production slightly at HNFH. Fish are presently being reared to a target size of 5 fpp. We are in the process of testing fish sizes of 3 vs 4 fpp at HNFH based on existing data.

Adult Returns

Adult returns have been variable (Figure 8). In the two best seasons we approached our goal. Harvest plus rack return estimates (total in Figure 8) account for about 60-80% of fish crossing Lower Granite Dam. The last two years for which we have data show returns decreasing substantially. Poor flow conditions for emigrating juvenile and immigrating adults are in part responsible. Mortality on returning adults can be as high as 50% under poor flow conditions.

Smolt to Adult Survival Rates (SAR)

Smolt (release) to adult survival rates, which have been as high as 2.5% for A-Run steelhead, remain well above replacement level for both strains (Figure 9). The decline of survival rates in the past four years is cause for close observation. Again, these rates may be a reflection of flow conditions and may not represent a continuing trend. Existing data suggest that size of release can influence adult return rates (Figure 10).

Summary

The steelhead program has met with some success and shows potential for continuing in this vein. We believe that this potential reflects the species somewhat positive response to barging. Fish health, size and the inherent properties of the species contribute to successful transport of steelhead.

CHINOOK

Chinook production has been on target at McCall and Dworshak hatcheries but is faltering at Sawtooth and the East Fork Facilities (Figures 11,12,13 and 14). Adult returns have not increased sufficiently to provide adequate egg take for the Sawtooth-East Fork program. Fish health, specifically BKD, has been a continuing problem at Sawtooth while BKD at Dworshak has abated somewhat.

Adult Returns

Adult return rates remain well below the goal levels at all facilities, although returns to McCall and Dworshak have been sufficient to maintain production at the prescribed levels (Figures 15 and 16). Note that McCall, Sawtooth, and East Fork returns include an unspecified number of naturally produced fish. Dworshak returns are primarily of hatchery origin and do not include harvest estimates which were about 500 in 1989 and 1000 in 1990. All hatchery programs display similar early building of runs followed by stabilization or decline.

Smolt to Adult Survival Rates (SAR)

Smolt to adult survival rates show similar trends of initial increase followed by a sharp decline (Figures 17, 18, and 19). Estimates, based on CWTs and total returns, are at or approaching replacement levels for the most recent data. This is cause for immediate concern. Survival rates may depend on distance from transportation facilities and the ocean.

Summary

Flows, fish health, and possibly genetics, are the major factors interacting to stifle the chinook program. Recent data demonstrates that flows exert a major impact on SARs (Charlie Petrosky, IDFG, pers. comm., Figure 20). Survival rates of 0.3-0.4 are attainable for hatchery chinook salmon under adequate outmigration flow conditions (wild fish survive at rates of 1.2% under similar flows). Survival at this level would support viable hatchery programs and provide limited harvest opportunities. Discharge also effects smolt migration rates (Buettner, IDFG pers. comm., Figure 21).

Identifying hatchery operations which improve smolt to adult survival is one objective of LSRCP hatchery evaluation studies. Fish health, especially in relation to BKD, is being addressed from two perspectives. Potential benefits of reduced rearing densities are being tested at Sawtooth and Dworshak Fish hatcheries. Secondly, all chinook juveniles are being treated with erythromycin twice a year, fall and spring to reduce BKD levels.

Other research in progress under Idaho's hatchery evaluation study includes a marking/handling effects study at McCall hatchery and an LSRCP-funded U of I study of behavioral and biological differences between hatchery and natural chinook. There are still uncertainties regarding optimum time and size of release for juveniles; we are conducting a literature review to summarize available information.

An effort is underway to document existing knowledge of Idaho's hatchery program and identify research needs. Areas identified for future study include genetics of hatchery and natural stocks, natural rearing benefits, predator avoidance and physical conditioning of juveniles.

In short, the success of Idaho's hatchery programs depends on acquiring adequate flow conditions, conducting an aggressive hatchery program geared to producing high quality smolts, and discovering optimum release strategies.

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Table 1. Lower Snake River Compensation Plan Hatchery production targets and adult return goals. Original production schemes in parentheses.

Facility	Number of pounds	X fpp	= Number of smolts	X SAR % *	= Number of Adults	Number of Females to Produce **
SUMMER CHINOOK						
McCall	50,000	20	1,000,000	0.80	8,000	267
	(61,300	15	919,000	0.87)		
SPRING CHINOOK						
Dworshak	90,000	20	1,800,000	0.51	9,135	480
	70,000	20	1,400,000	0.65		
	(70,000	15	1,050,000	0.87)		
Clearwater	91,300	25	2,282,500	0.52	11,915	608
		20	1,826,000	0.65		
		(15	1,369,500	0.87)		
Red River	15,000	20	300,000	0.85	2,553	80
		20	300,000	0.65	1,950	
		25	375,000	0.52		
Crooked R.	40,000	20	800,000	0.85	6,809	200
		20	800,000	0.65	5,200	
		25	1,000,000	0.52		
Powell	15,000	20	300,000	0.85	2,553	80
		20	300,000	0.65	1,950	
		25	375,000	0.52		
	(17,000	15	255,000	1.00)		
Sawtooth	149,000	20	2,980,000	0.65	19,445	
		(15	2,235,000	0.87)		795
Sawtooth	102,333	20	2,046,660	0.65	13,355	546
		(15	1,534,995	0.87)		
East Fork	46,667	20	933,340	0.65	6,090	249
		(15	700,005	0.87)		
STEELHEAD						
Clearwater	350,000	5	1,750,000	0.82	14,000	467
		(8	2,800,000	0.50)		
Hagerman	340,000	5	1,700,000	0.80	13,600	453
		(8	2,720,000	0.50)		
Magic Valley	349,800	5	1,749,000	0.67	11,660	466
	291,500	(8	2,332,000	0.50)		

* Smolt to adult return rate

** Assumes 5,000 eggs/female and 75% egg to smolt survival.

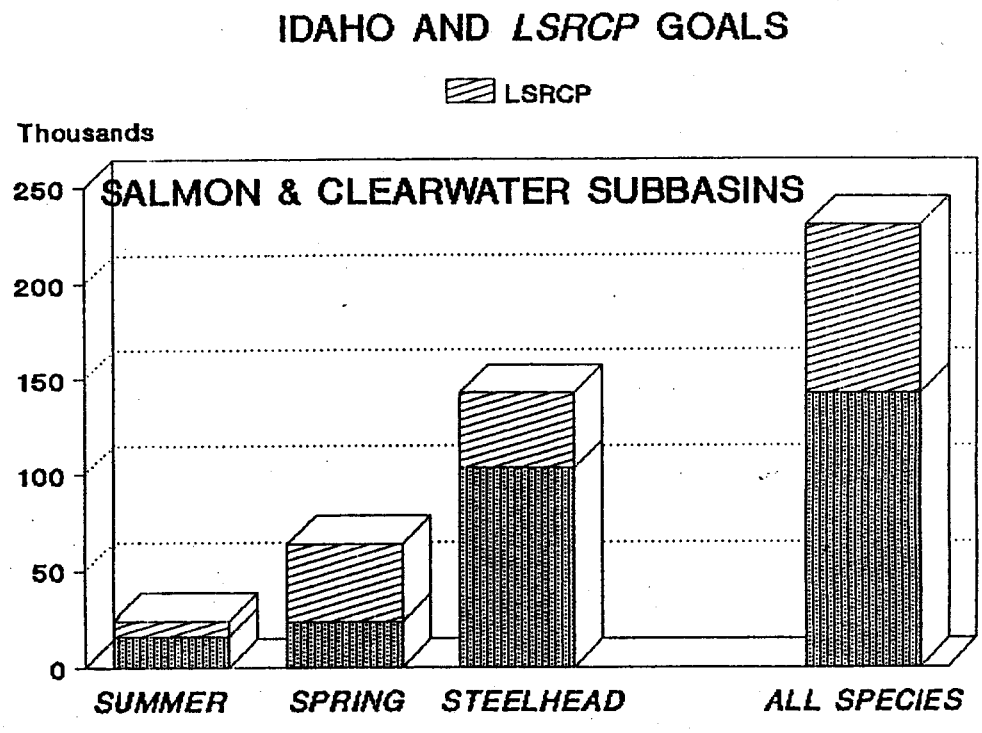


Figure 1. Idaho anadromous hatchery goals for combined Clearwater and Salmon subbasins.

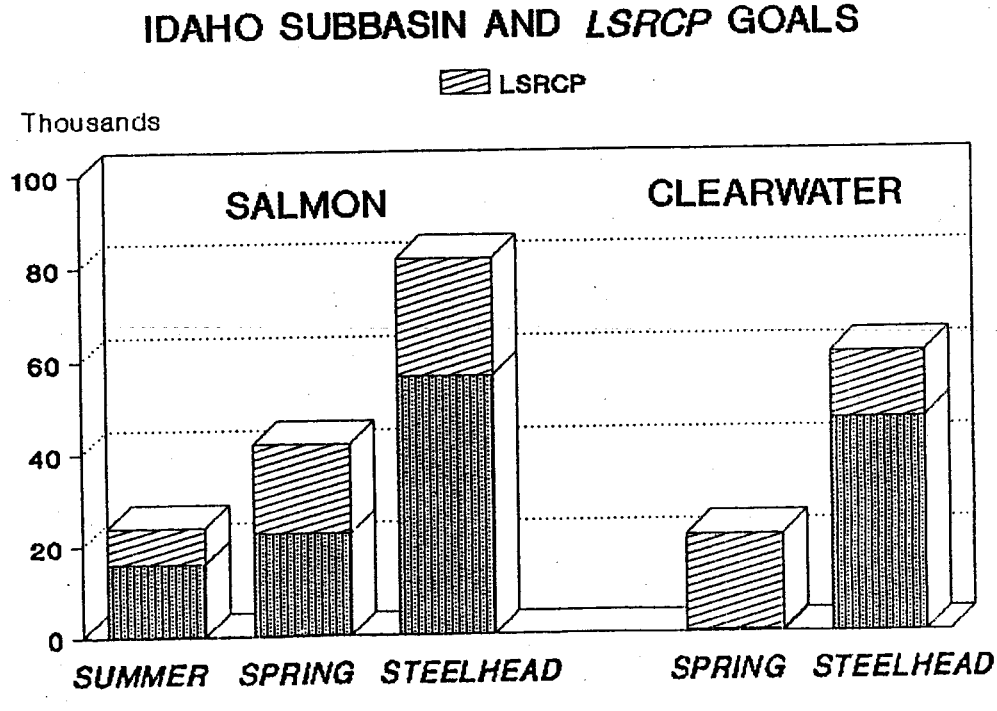


Figure 2. Idaho anadromous hatchery production goals for the Clearwater and Salmon subbasins.

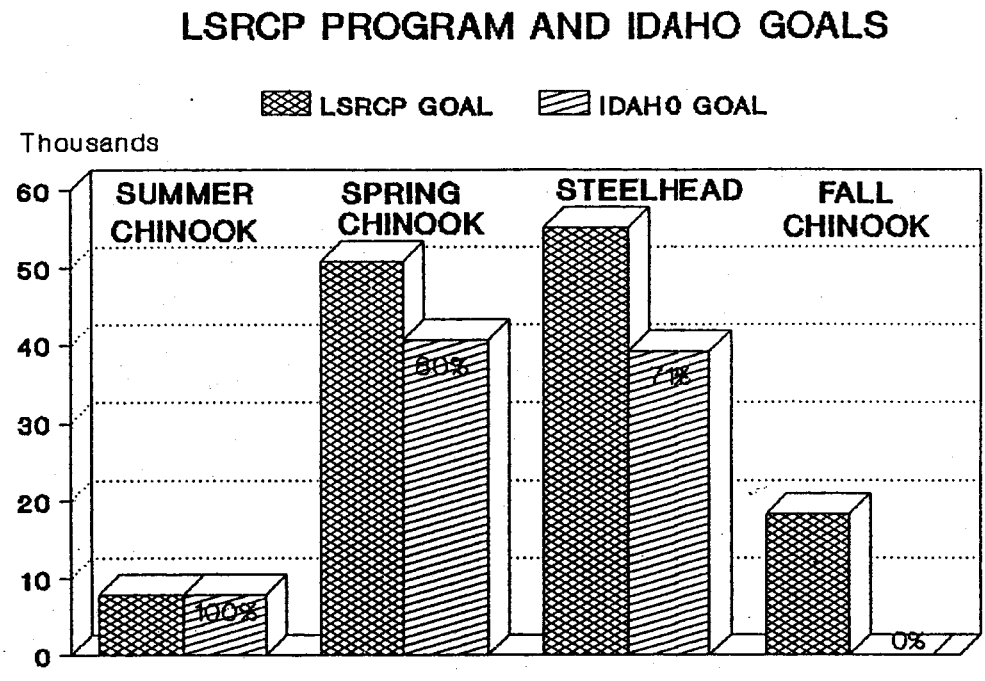


Figure 3. Relationship of LSRCP program and Idaho adult return goals.

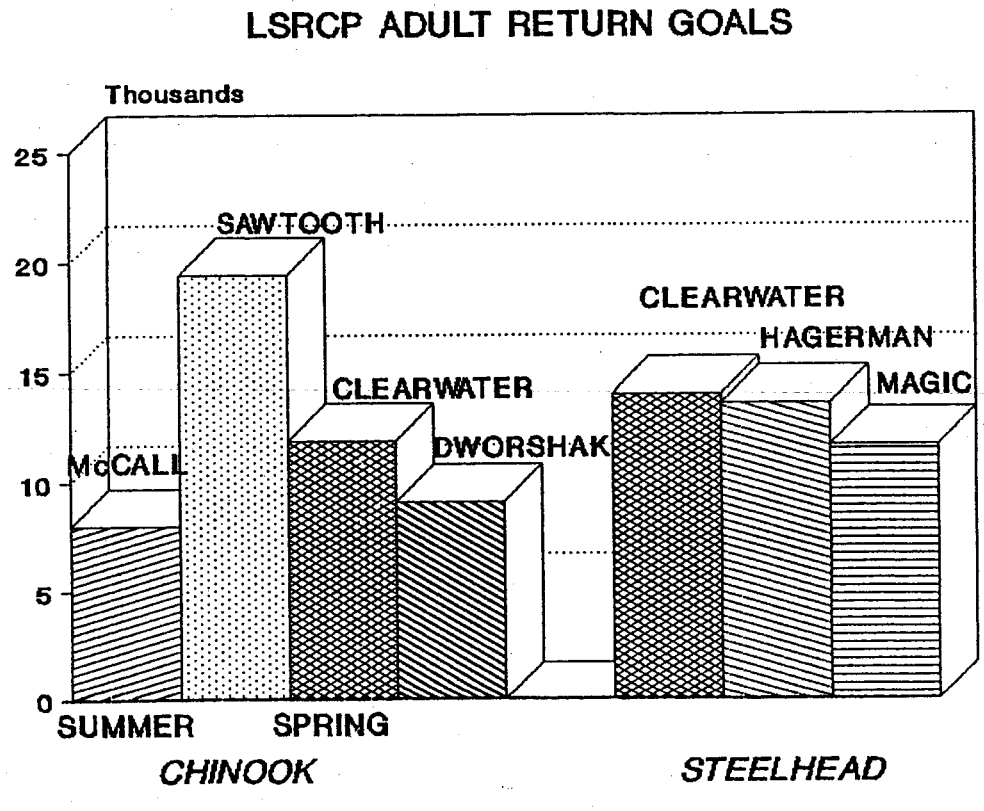


Figure 4. Idaho LSRCP adult return goals.

IDAHO LOWER SNAKE HATCHERY FACILITIES

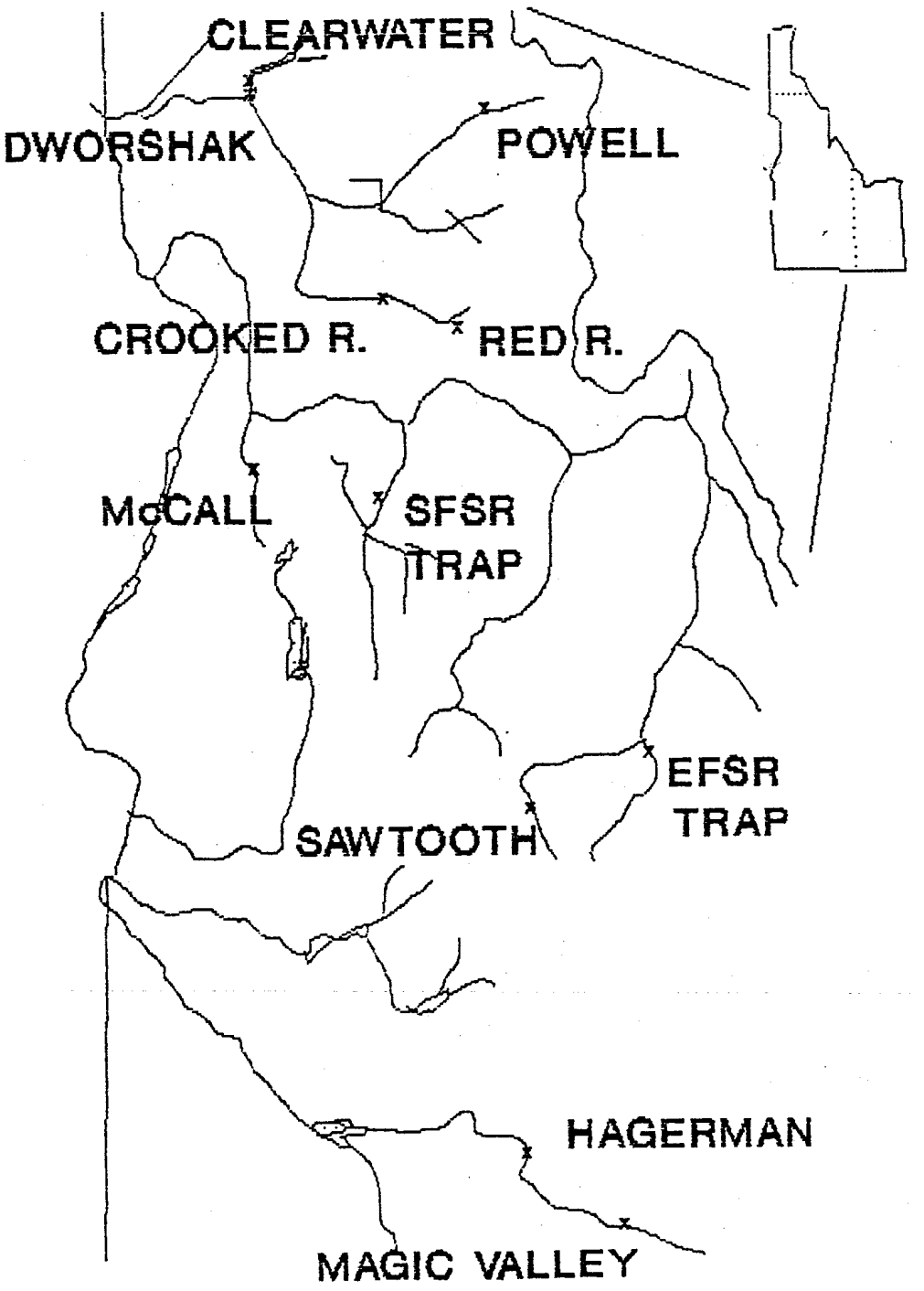


Figure 5. Location of Idaho LSRCP hatchery facilities.

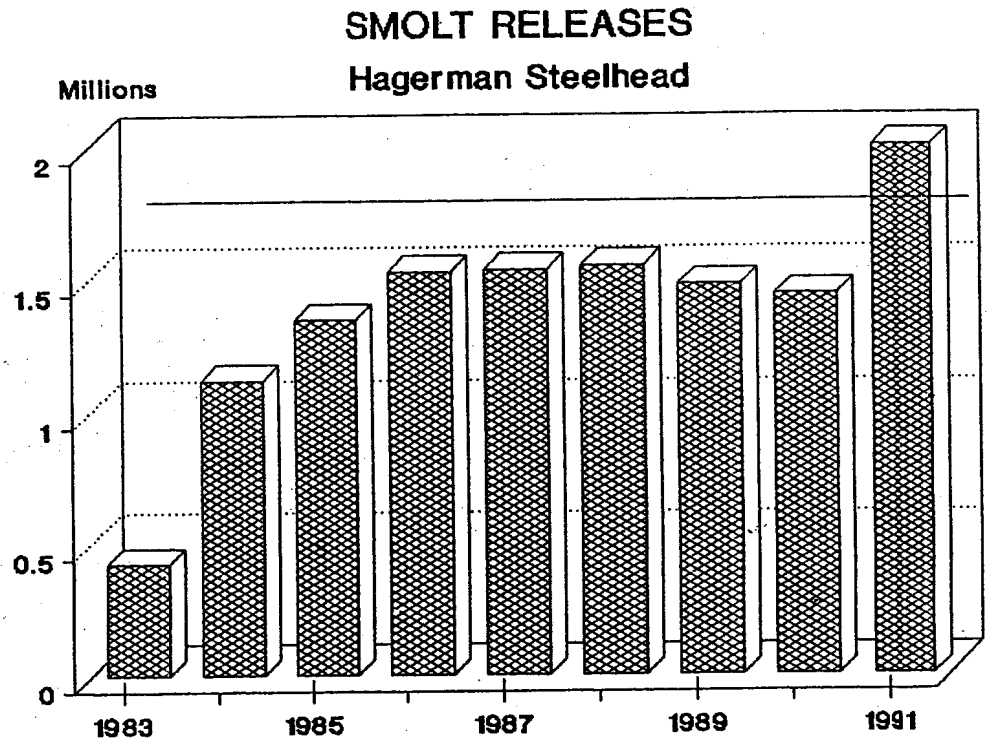


Figure 6. Smolt releases from Hagerman National fish hatchery, 1983-1991.

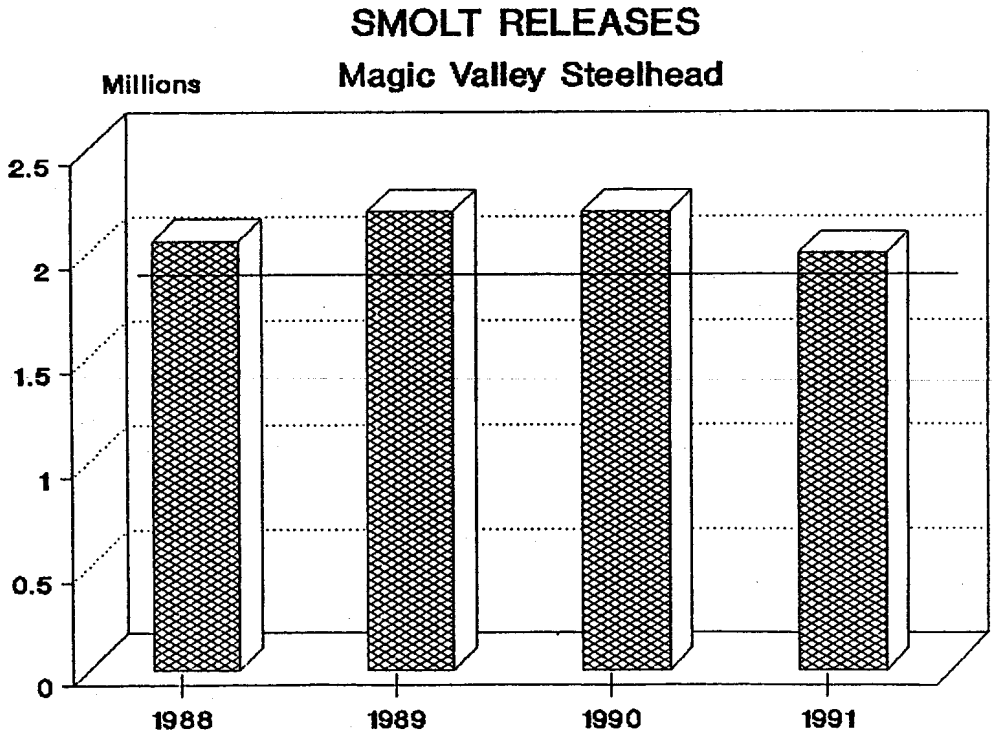


Figure 7. Smolt releases from Magic Valley steelhead hatchery, 1988-1991.

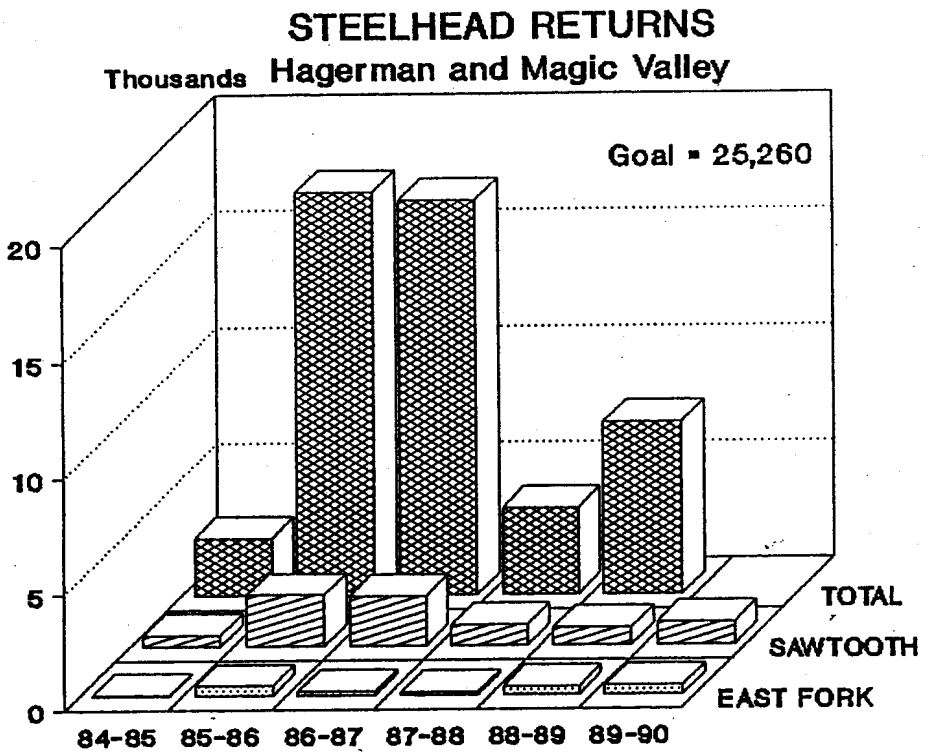


Figure 8. Adult steelhead returns from LSRCP releases.

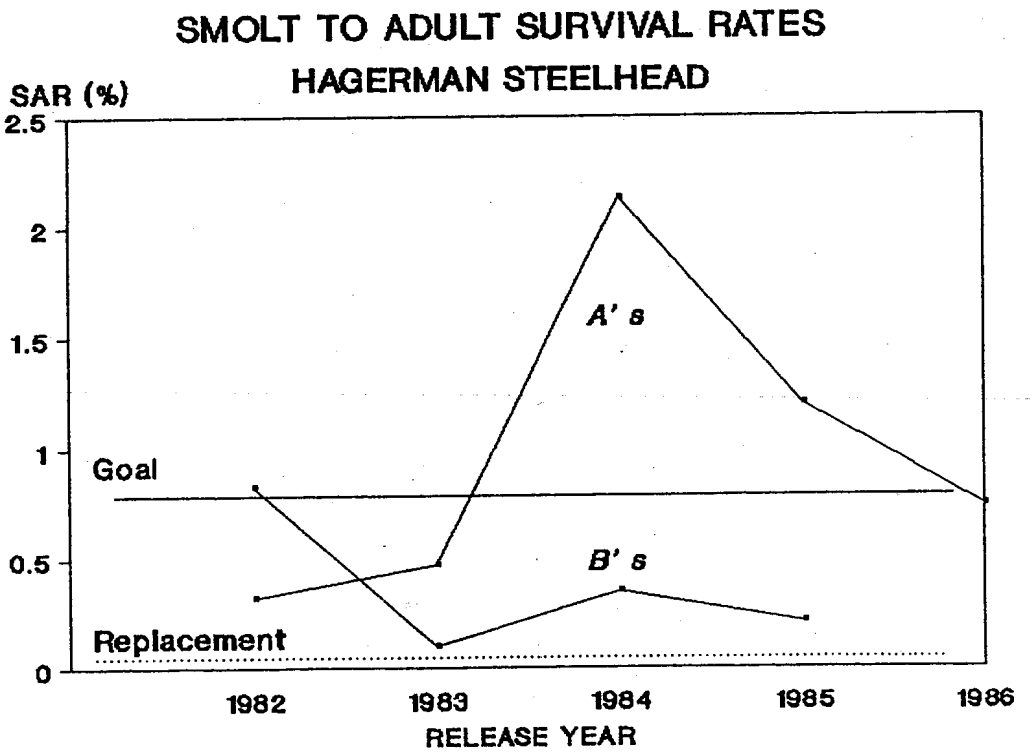


Figure 9. Smolt to adult survival rates for A-run and B-run steelhead from LSRCP releases.

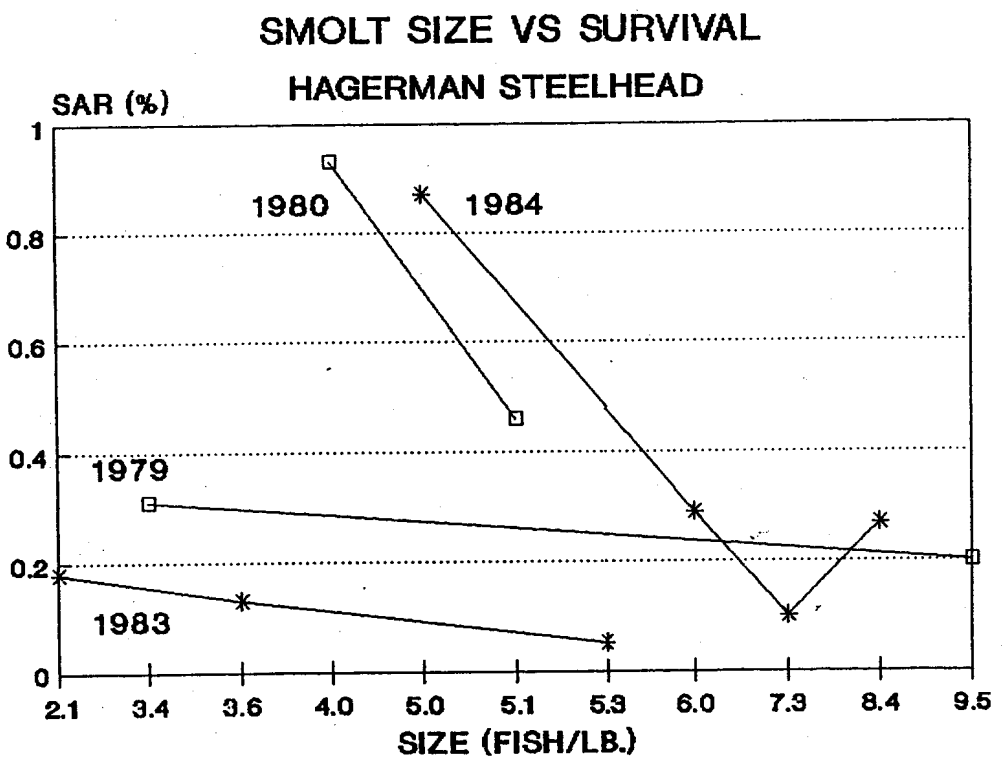


Figure 10. Size of release versus survival rate for steelhead trout reared at Hagerman National fish hatchery.

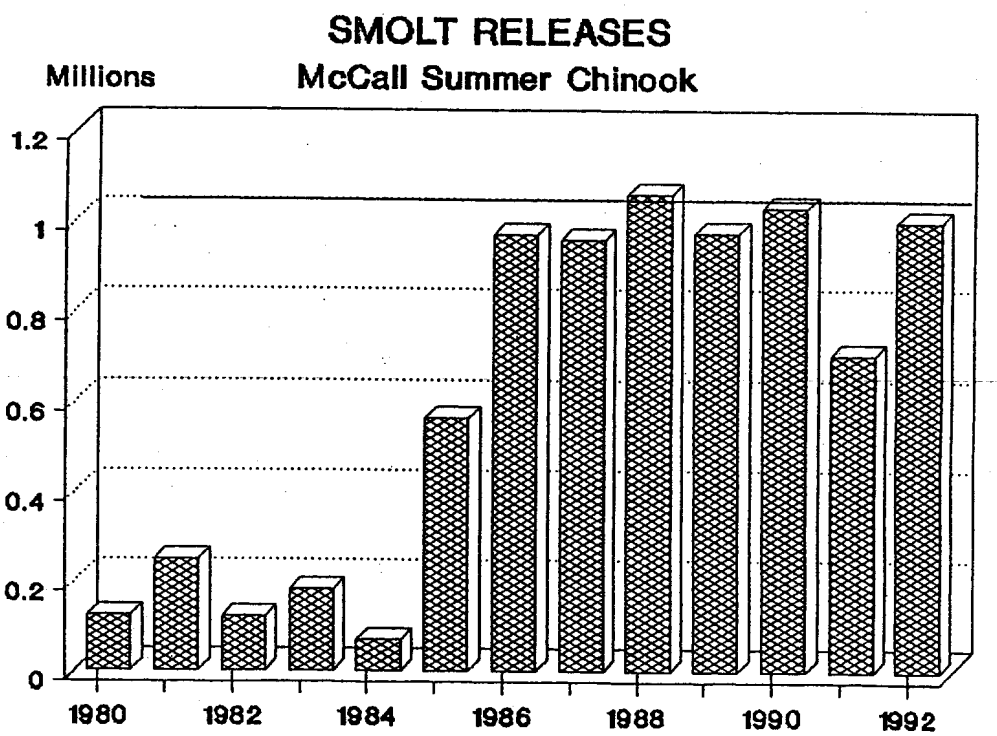


Figure 11. Smolt releases from McCall fish hatchery, 1980-1992.

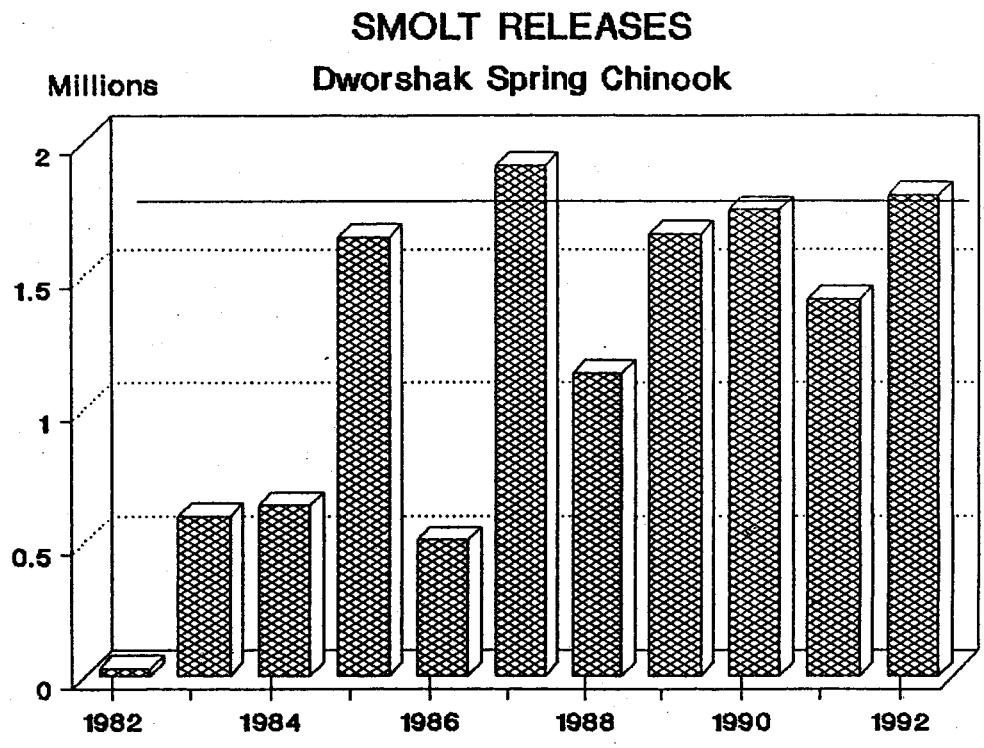


Figure 12. Smolt releases from Dworshak National fish hatchery, 1982-1992.

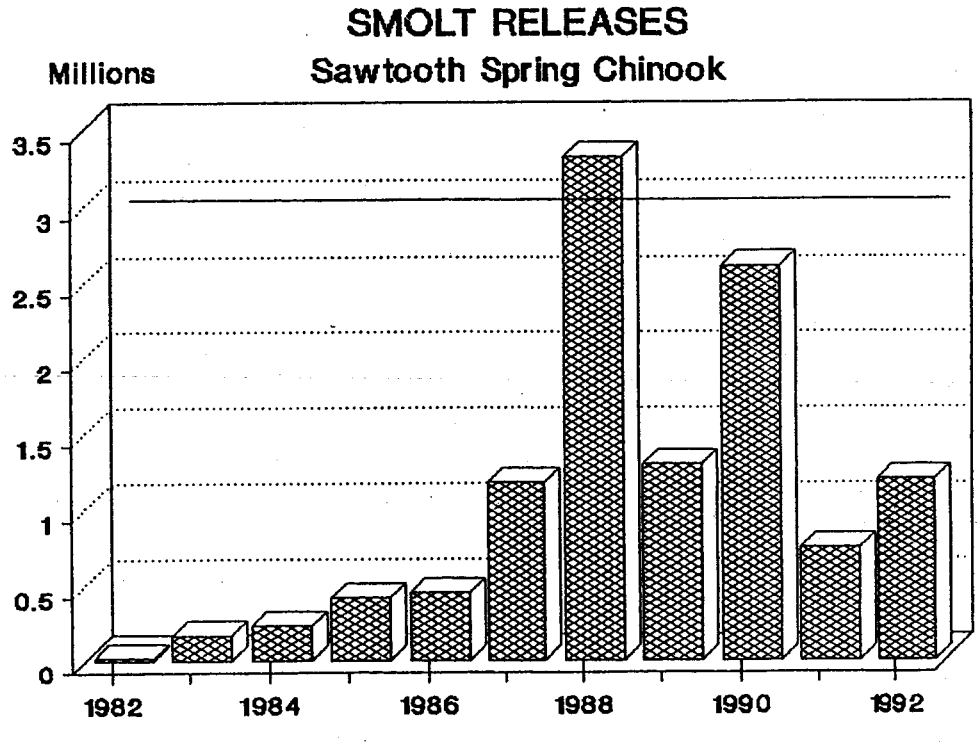


Figure 13. Smolt releases from Sawtooth fish hatchery, 1982-1992.

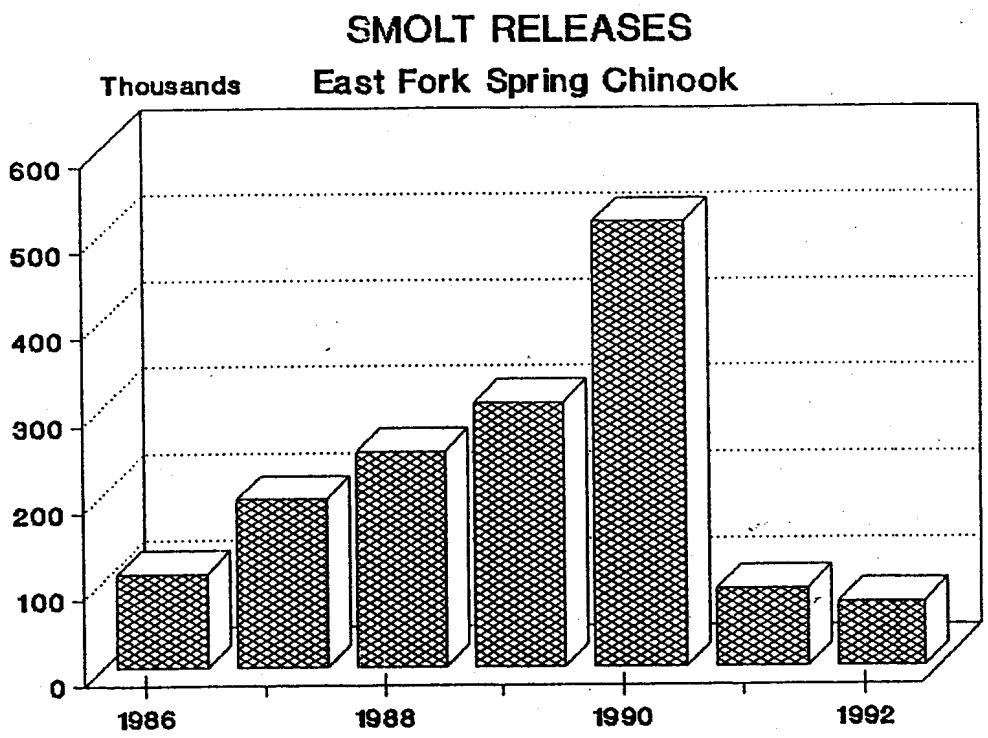


Figure 14. Smolt releases from East Fork satellite facility, 1986-1992.

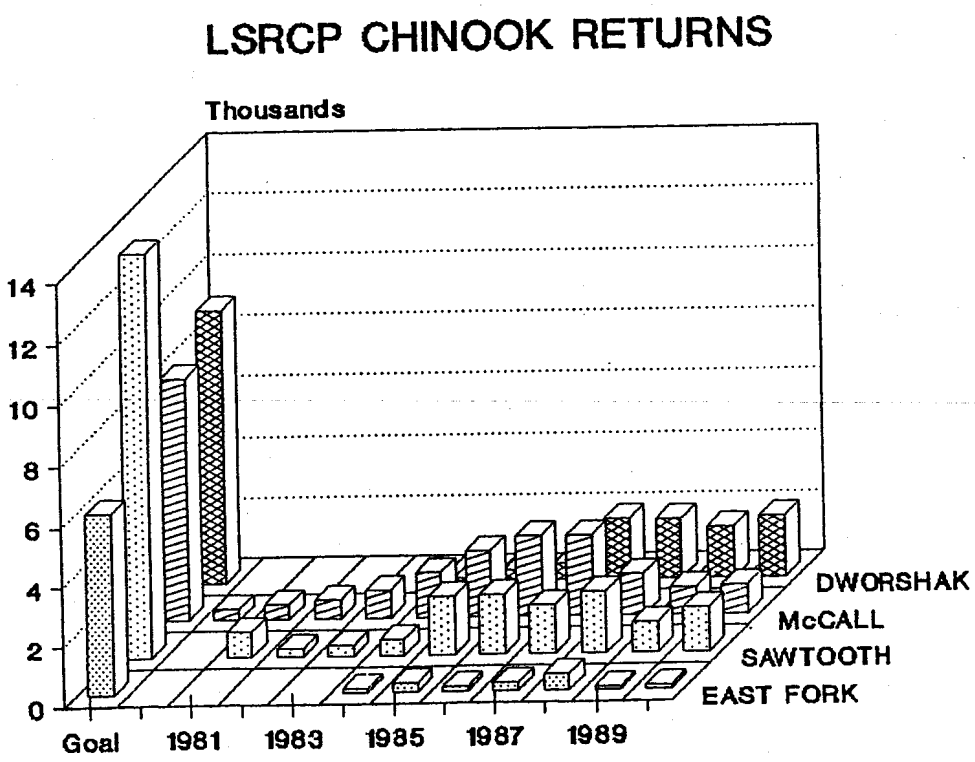


Figure 15. Adult chinook salmon returns from LSRCP releases.

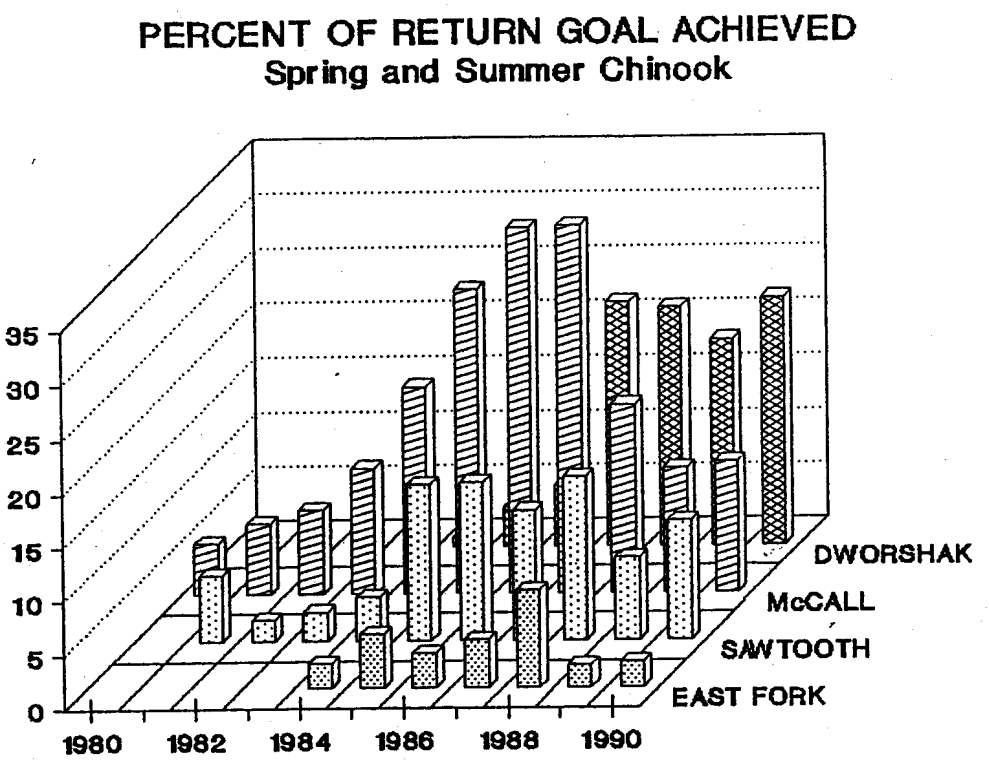


Figure 16. Percent of adult chinook salmon goals achieved by Idaho LSRP programs.

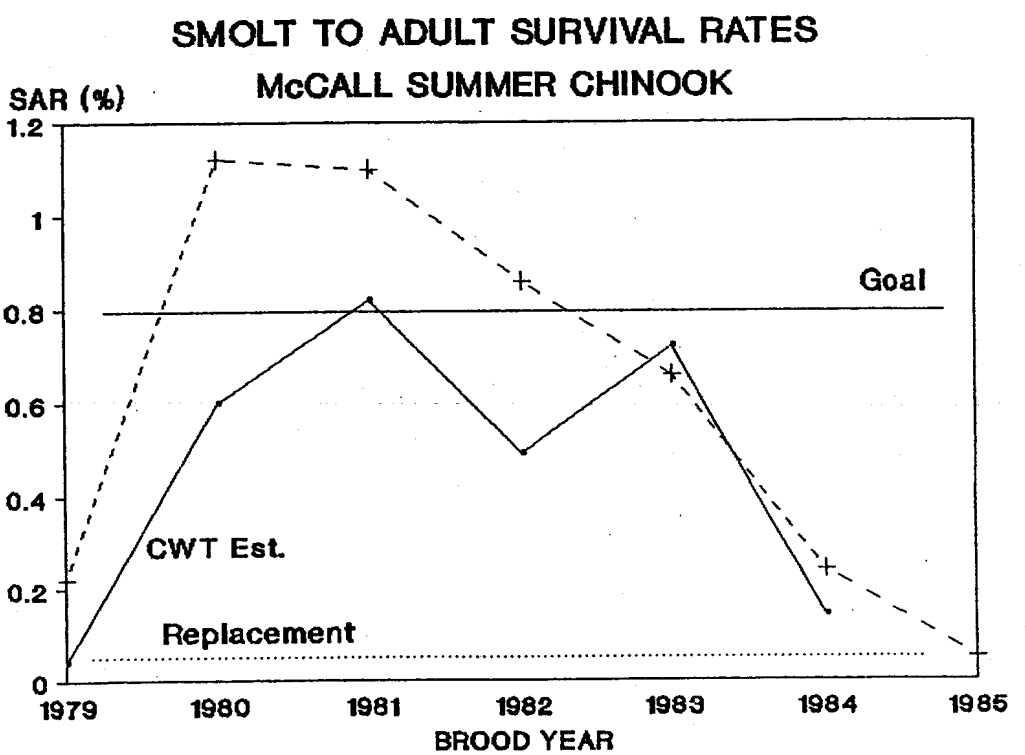


Figure 17. Smolt to adult survival rates for McCall fish hatchery summer chinook salmon.

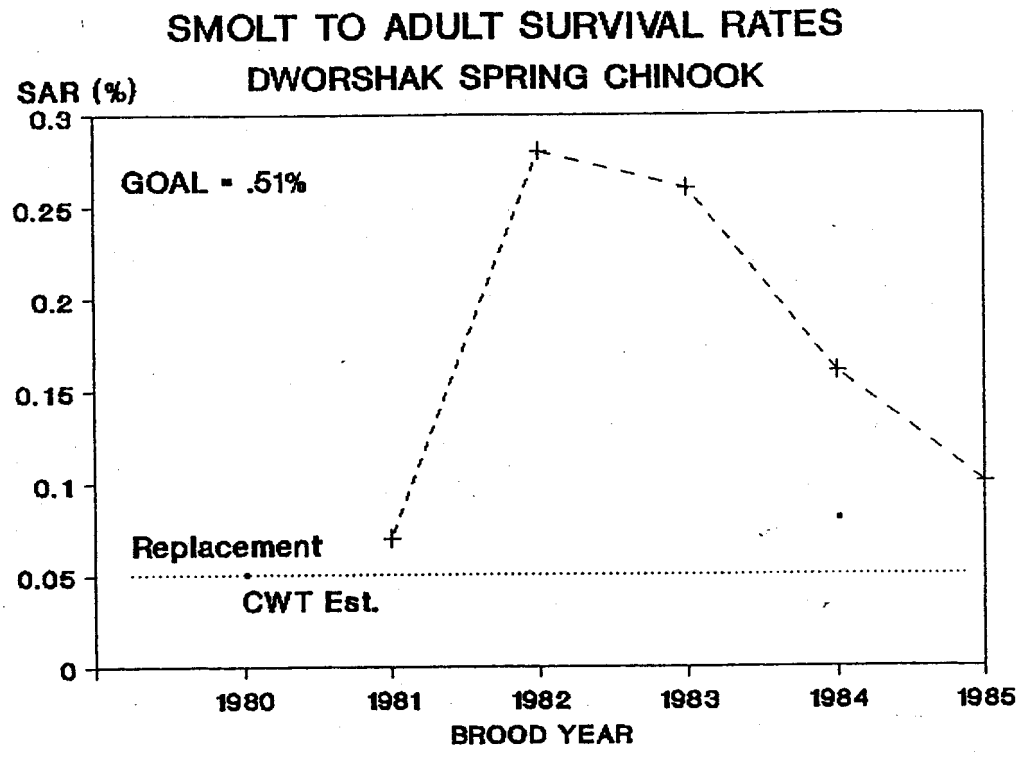


Figure 18. Smolt to adult survival rates for Dworshak National fish hatchery.

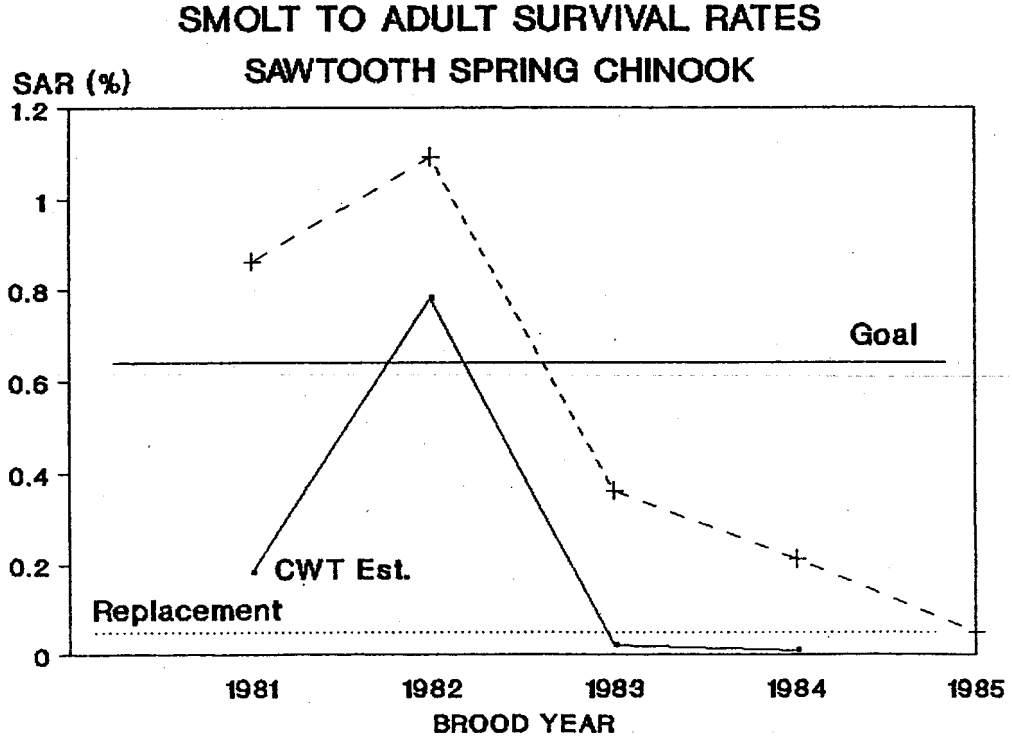
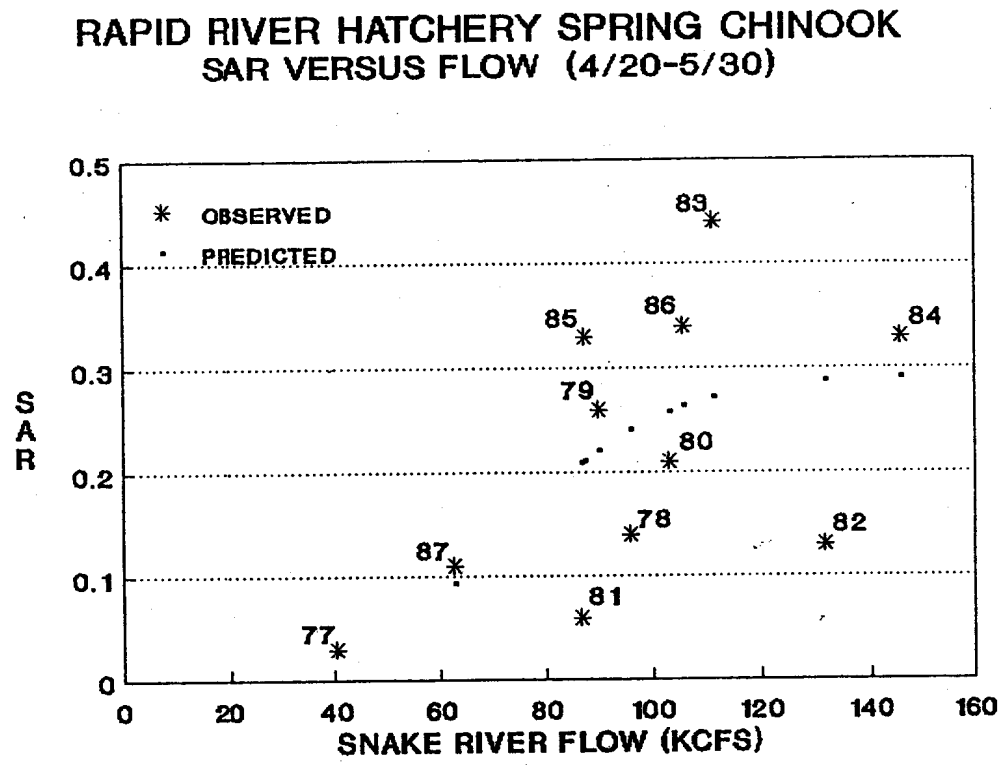


Figure 19. Smolt to adult survival rates for Sawtooth fish hatchery spring chinook salmon.



Includes est. tribal and sport harvest

Figure 20. Smolt to adult survival versus flow for Rapid River hatchery spring chinook salmon.

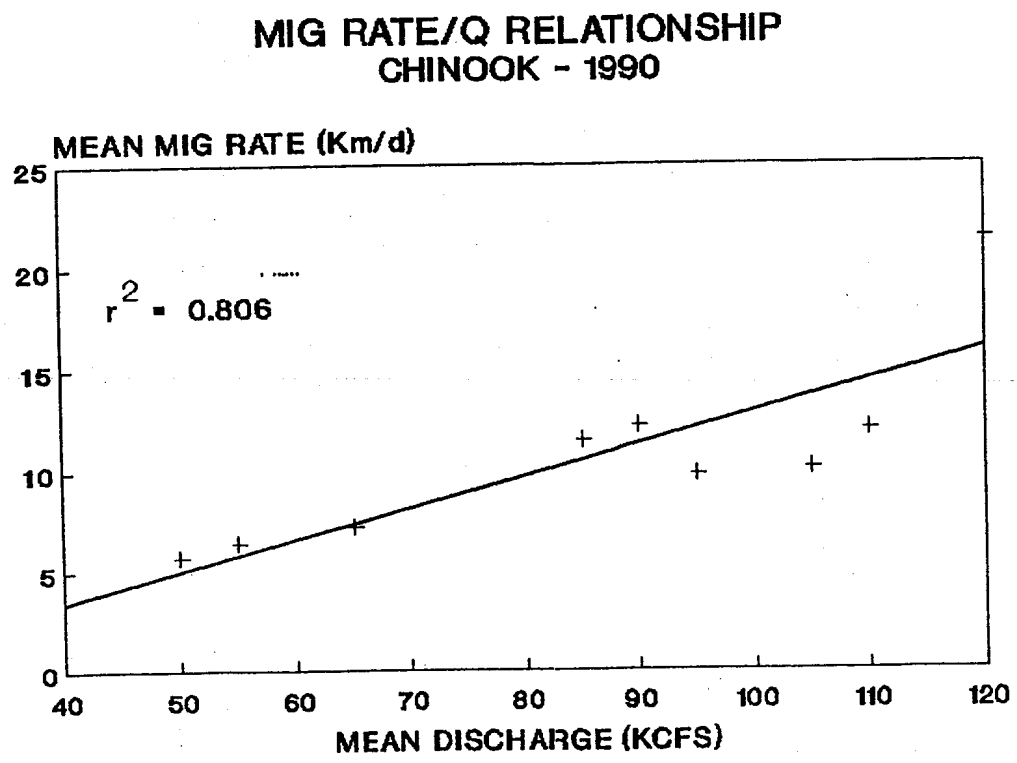


Figure 21. Migration rate versus discharge for Snake River chinook salmon smolts.