Juvenile Chinook Migration and Survival in the Cedar River and Bear Creek

Washington Department of Fish & Wildlife
Science Division

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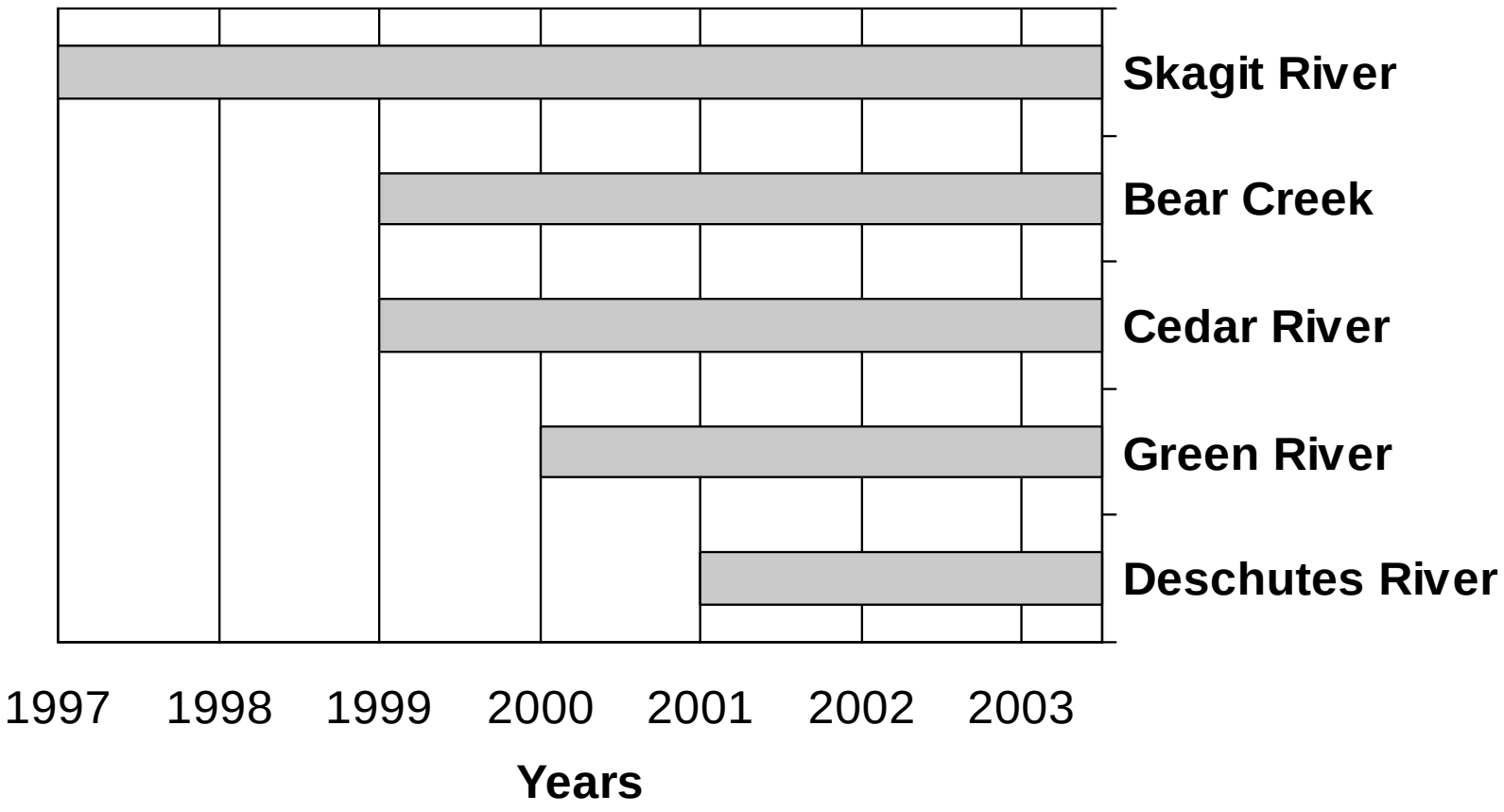
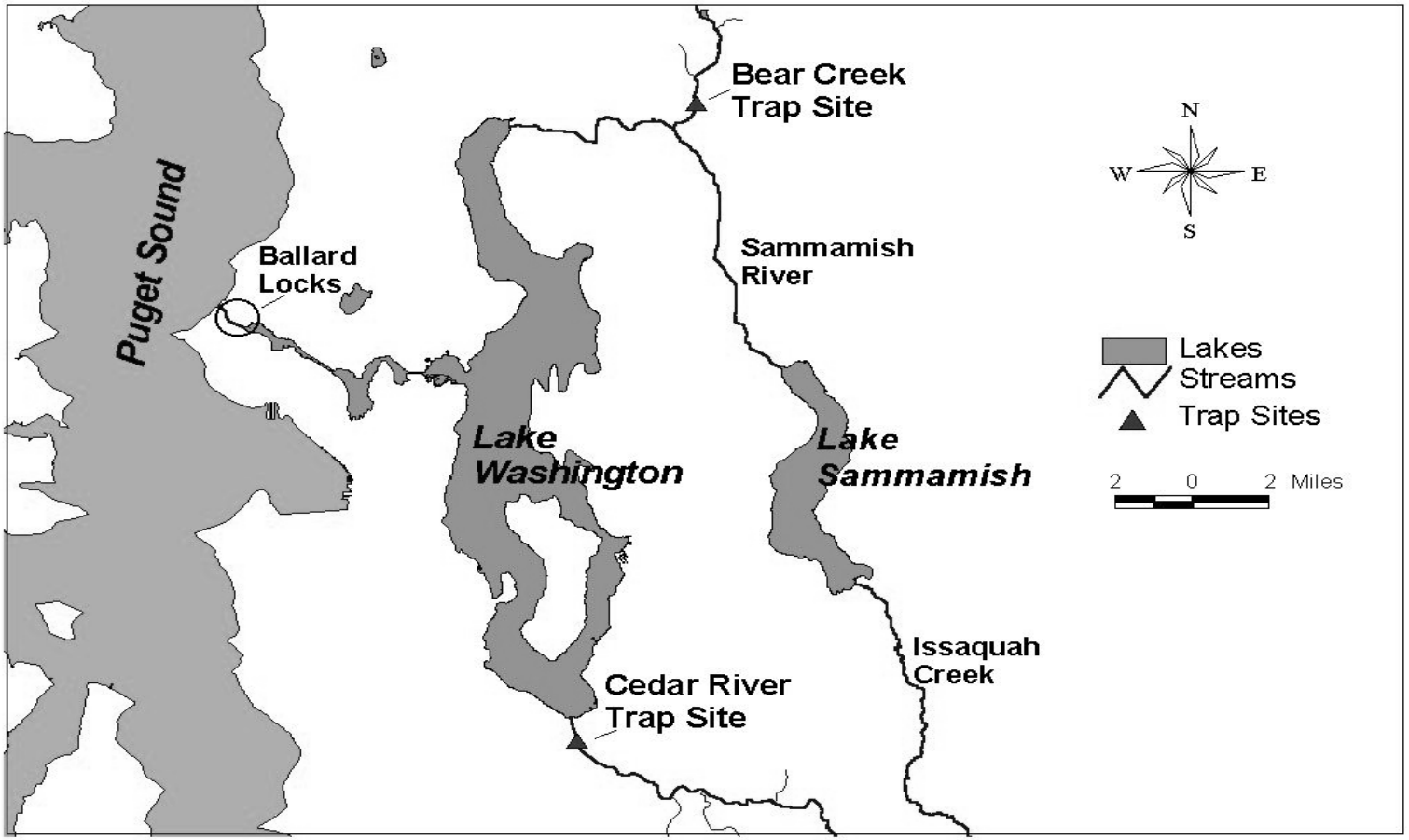
Funded by:
King County Wastewater Treatment Division
Seattle Public Utilities

Juvenile Chinook Production Monitoring



Location of the Cedar River and Bear Creek Trap Sites



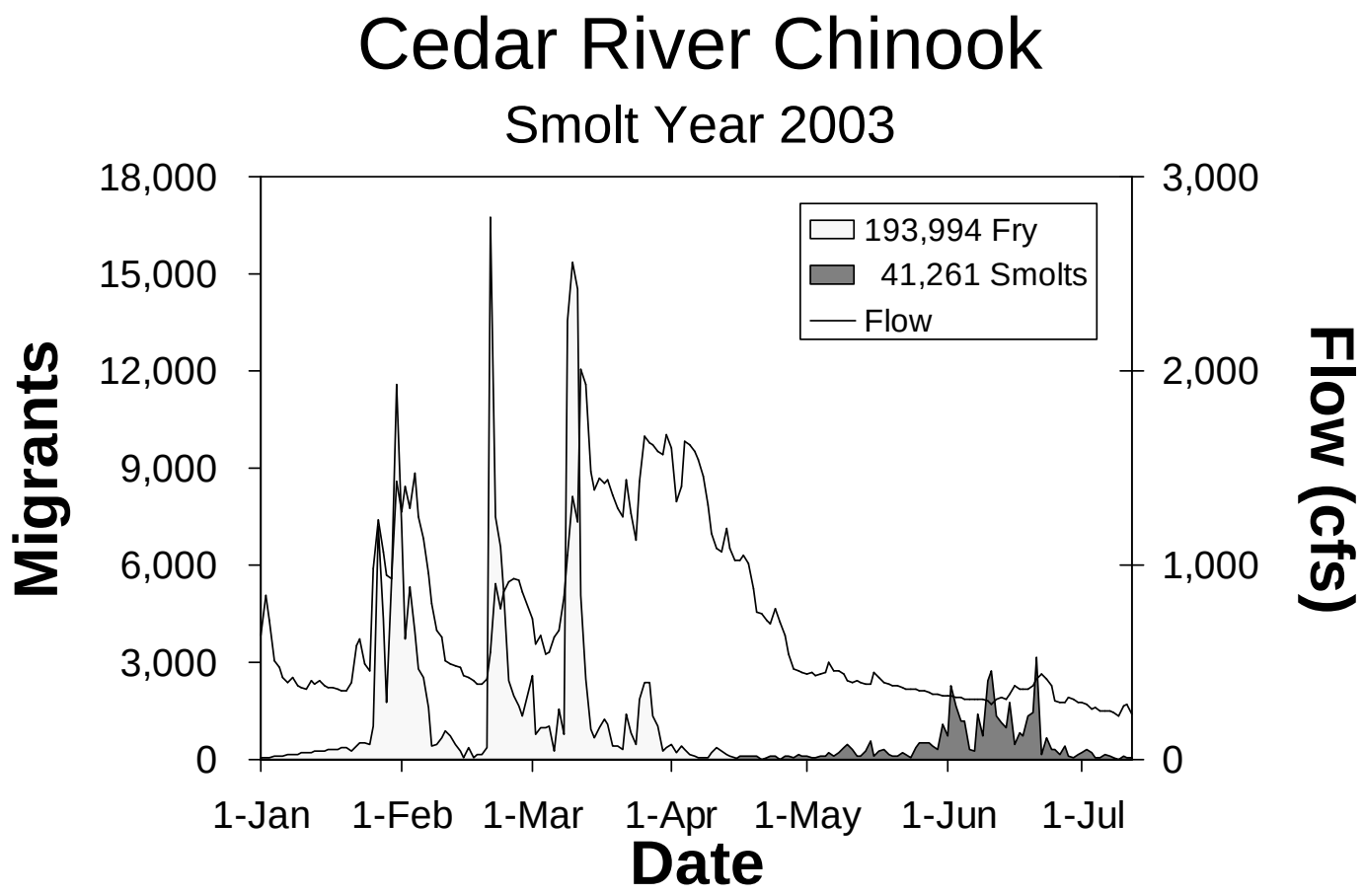
Cedar River

Big Bear Creek

Migration Timing

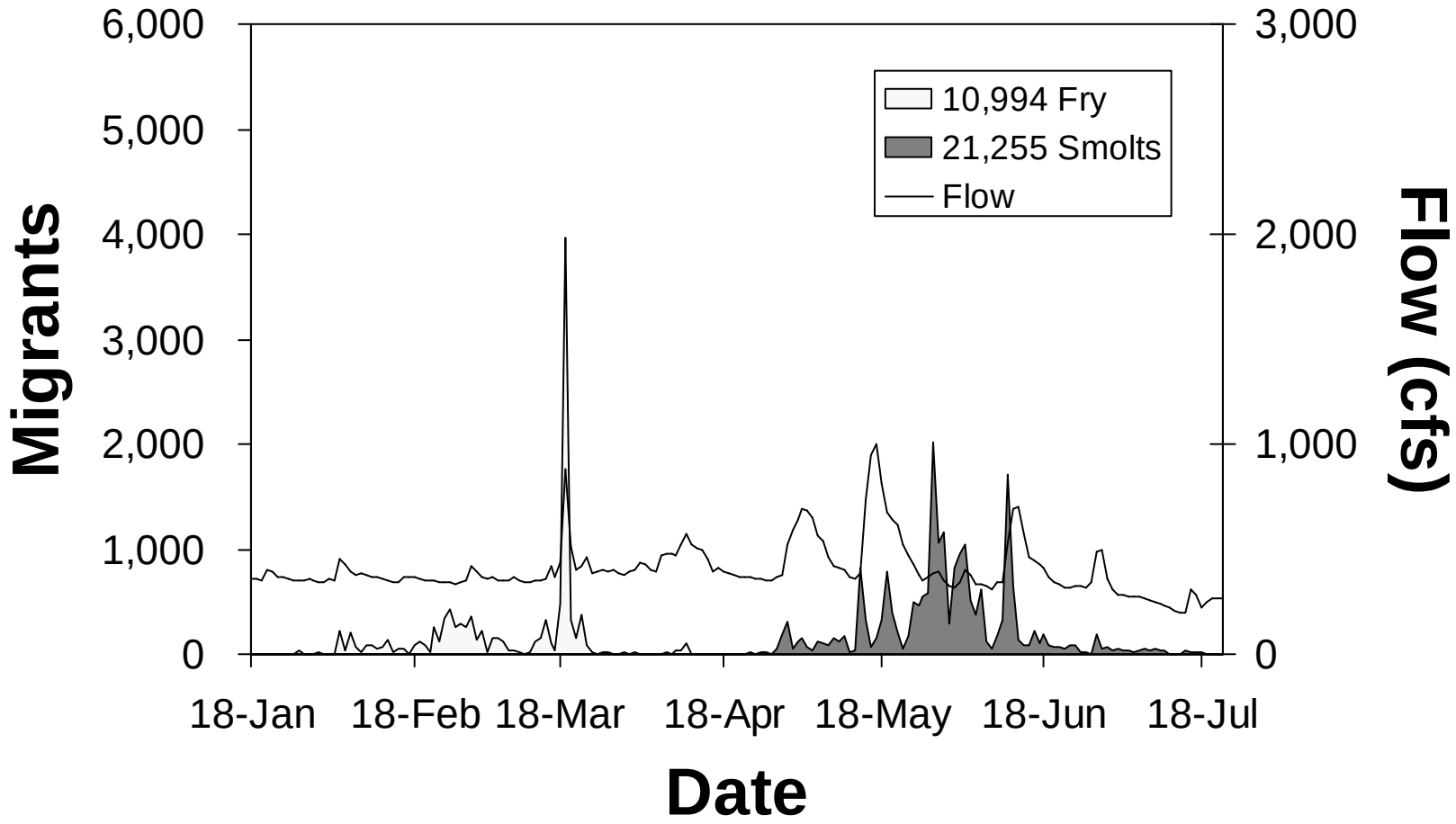
Bi-modal migration timing

- "Fry" migration from January to mid-April
- "Smolt" migration from mid-April to July
- Different proportions between years



Cedar River Chinook

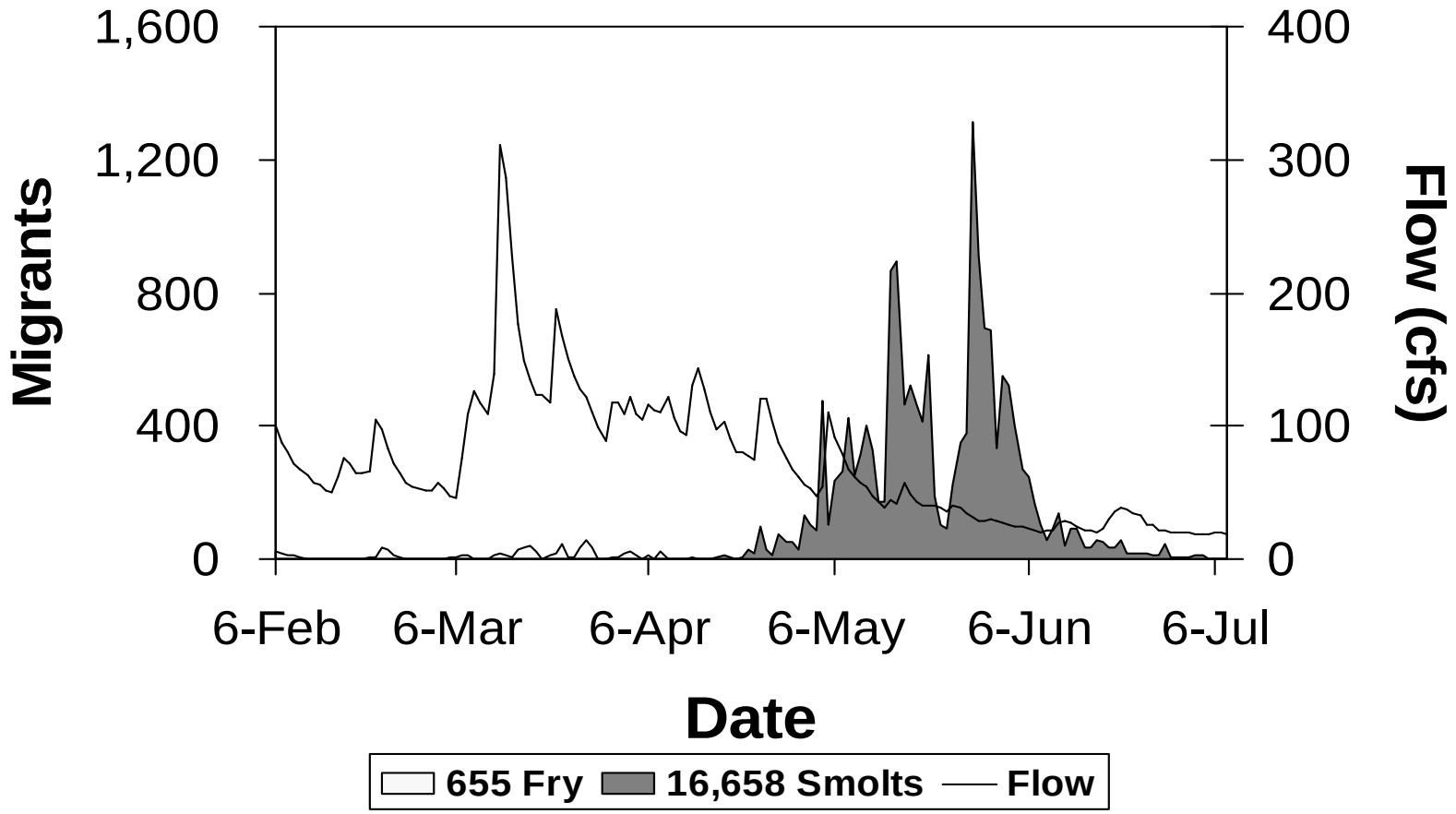
Smolt Year 2001



Extreme low flows result in the highest "smolt" proportion measured. Low escapement (120) and predation contributed to the low number of total migrants.

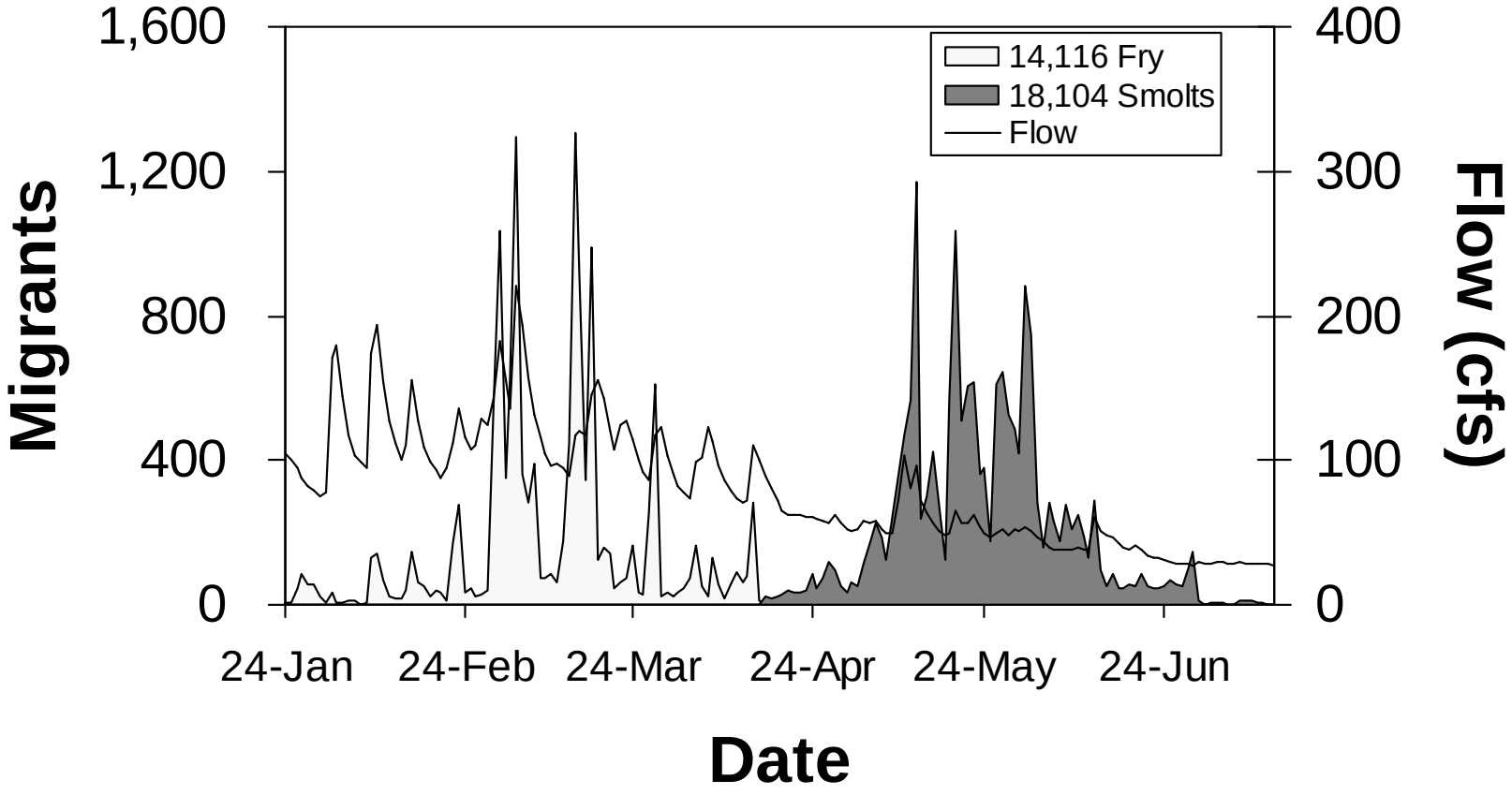
Bear Creek Chinook

Smolt Year 2003



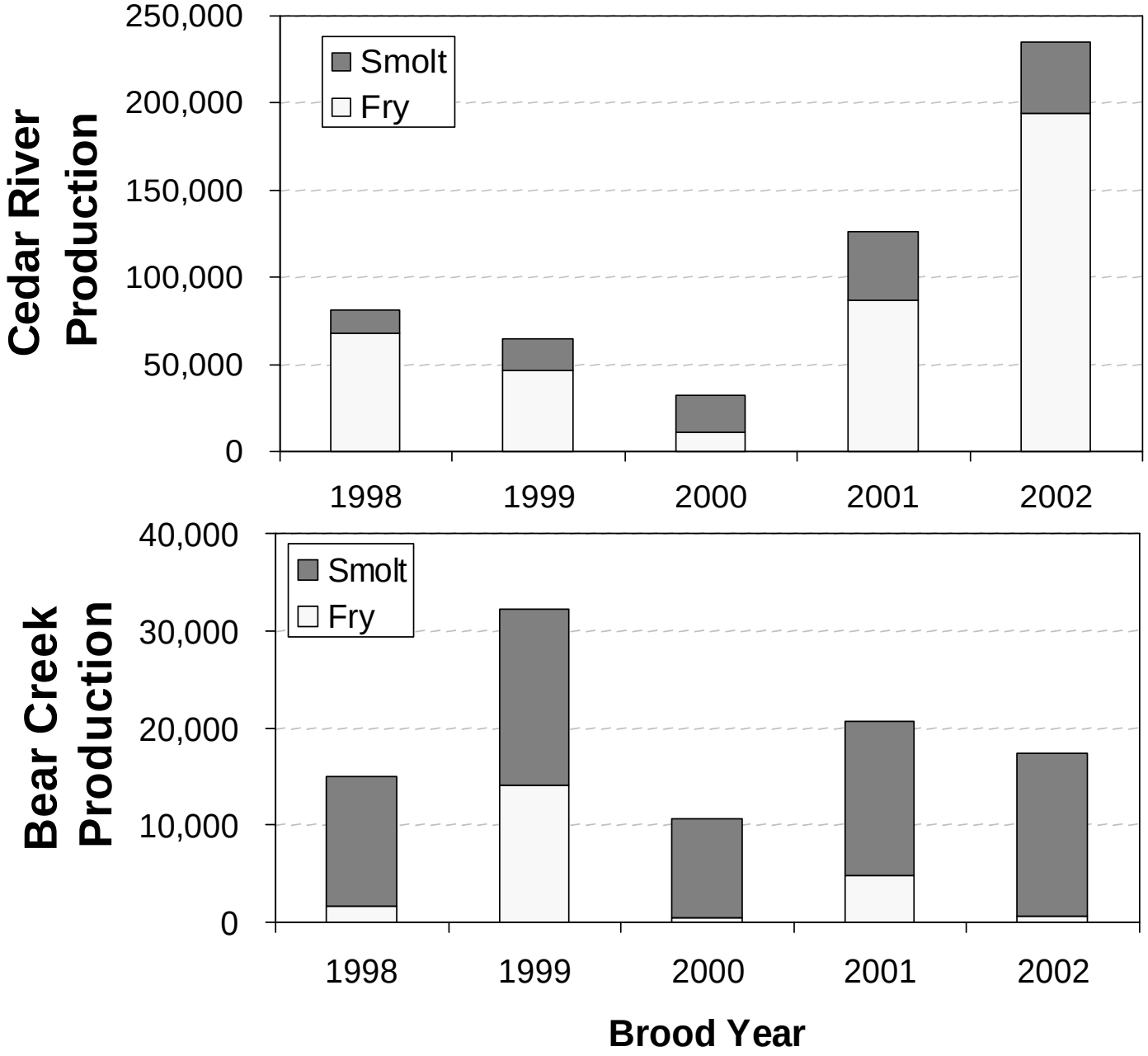
Bear Creek Chinook

Smolt Year 2000

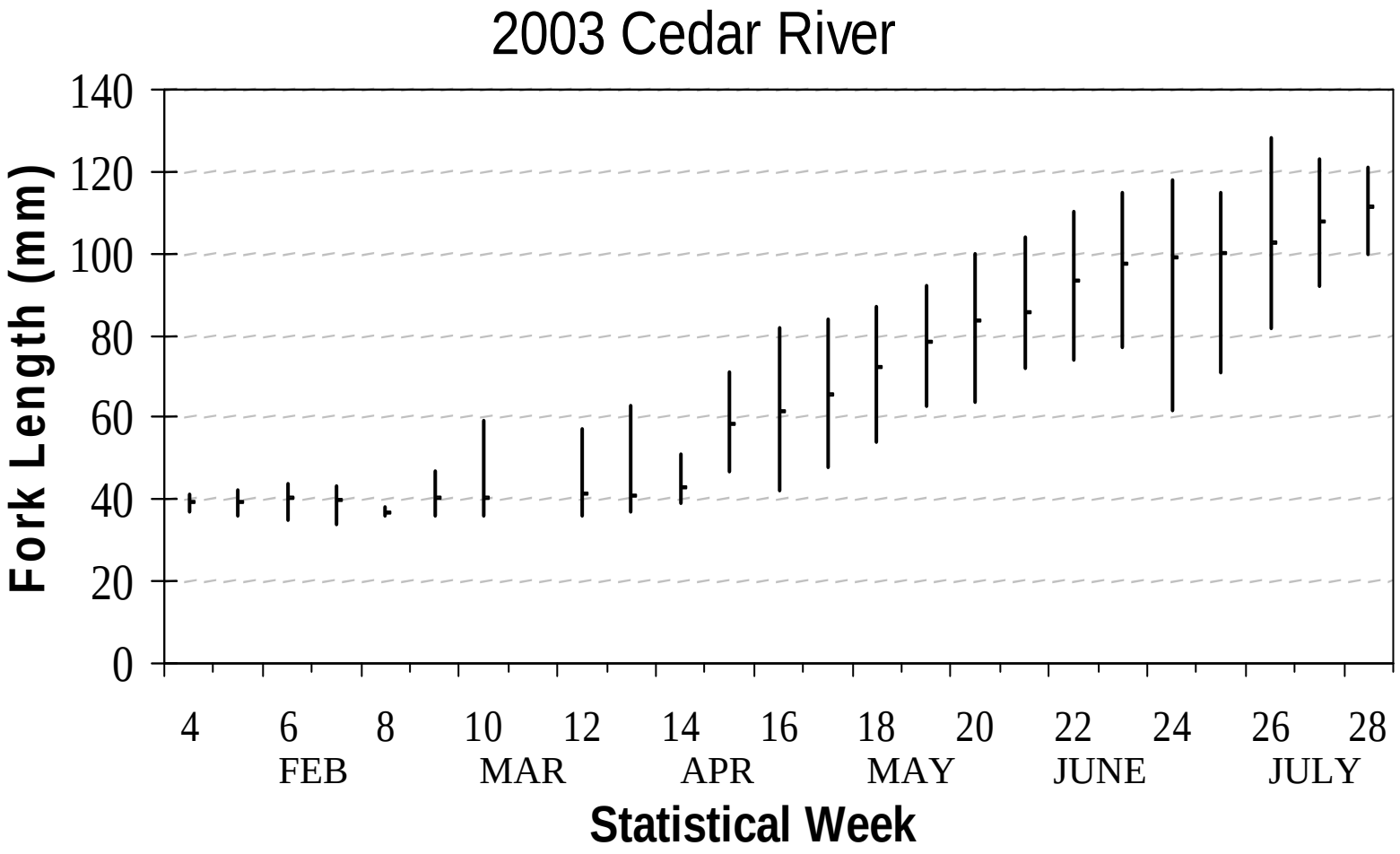


Good escapement (732) results in a higher proportion of fry being displaced downstream.

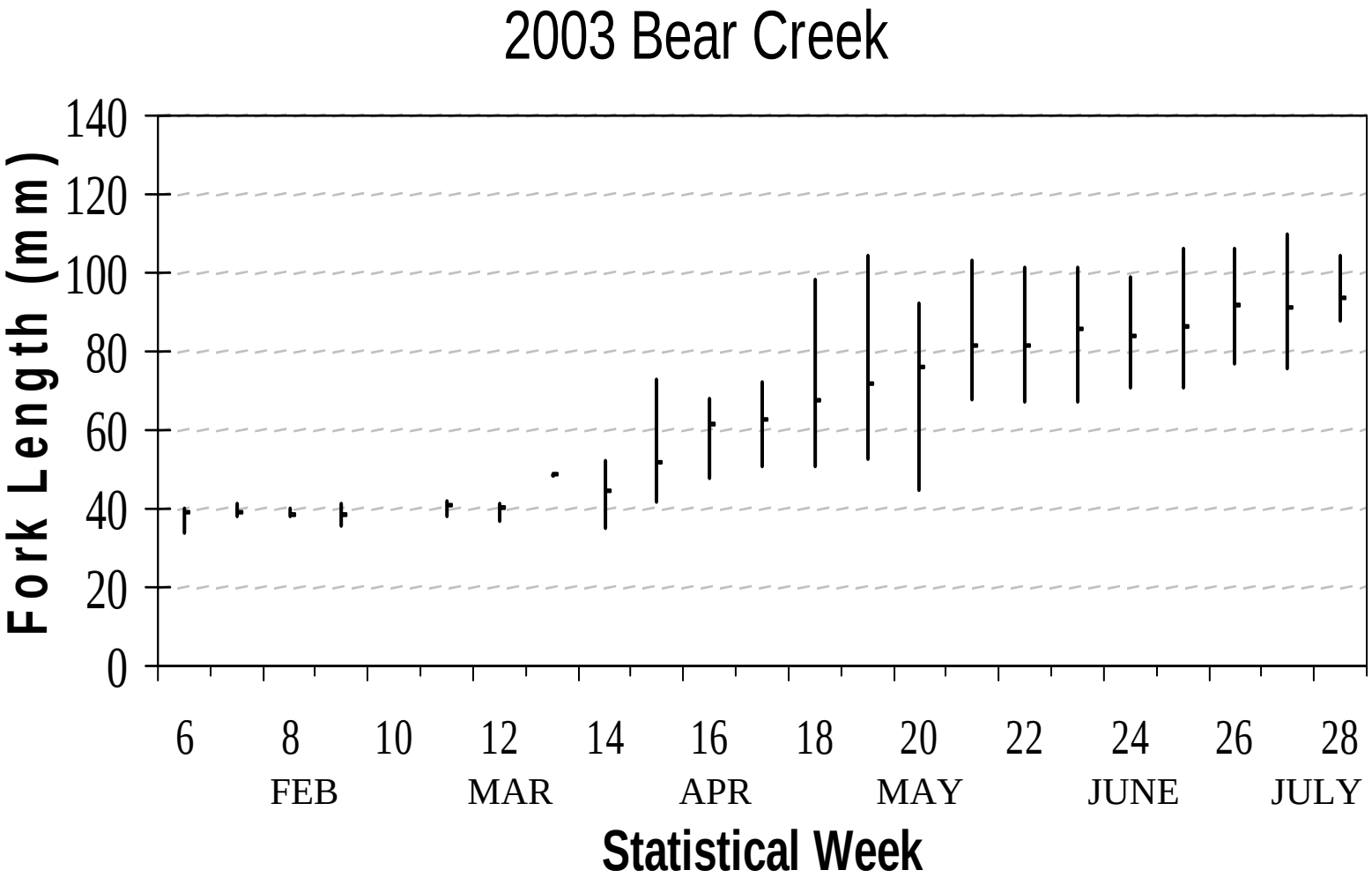
Chinook Production by Brood Year



Chinook Size at Time

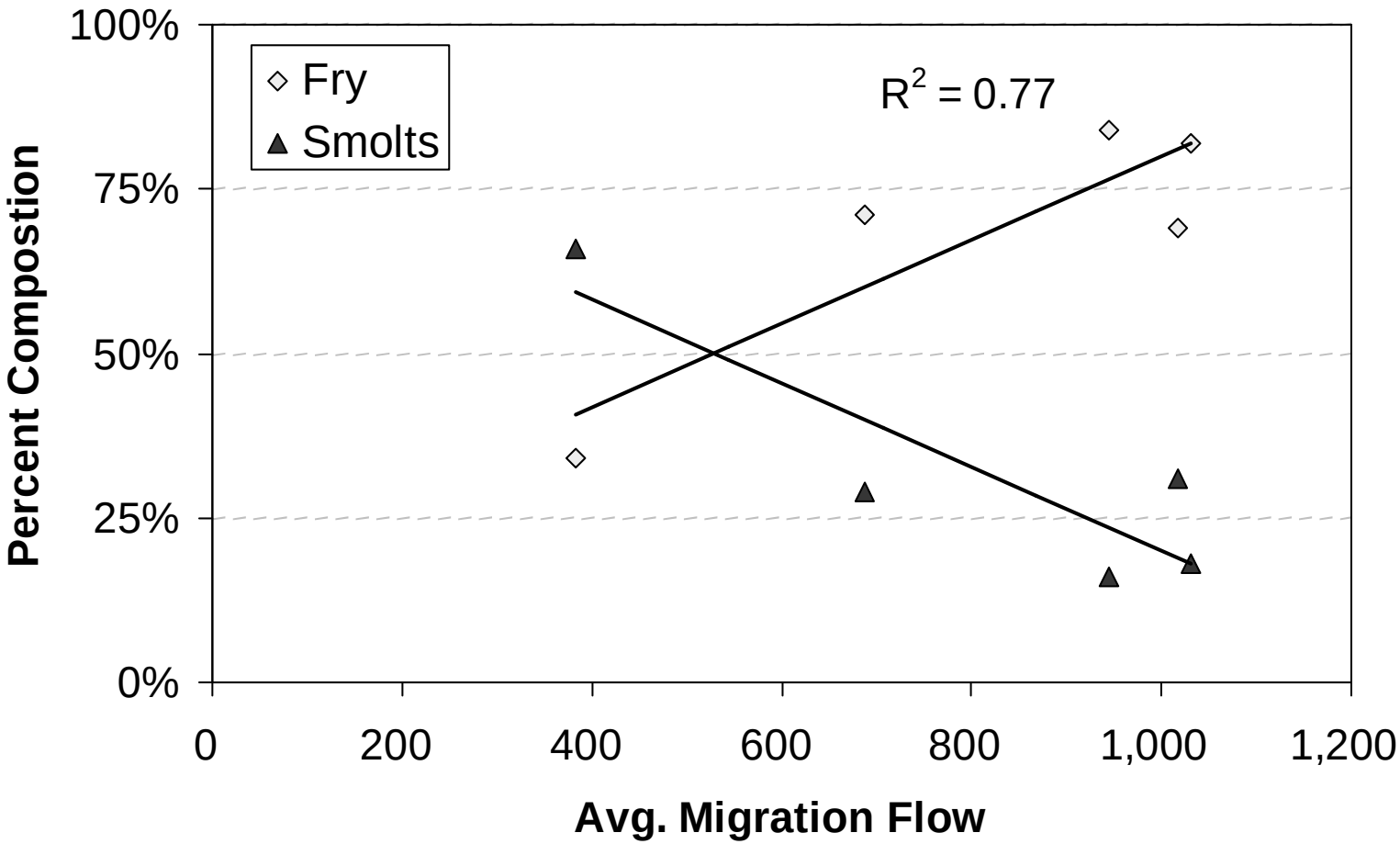


Chinook Size at Time

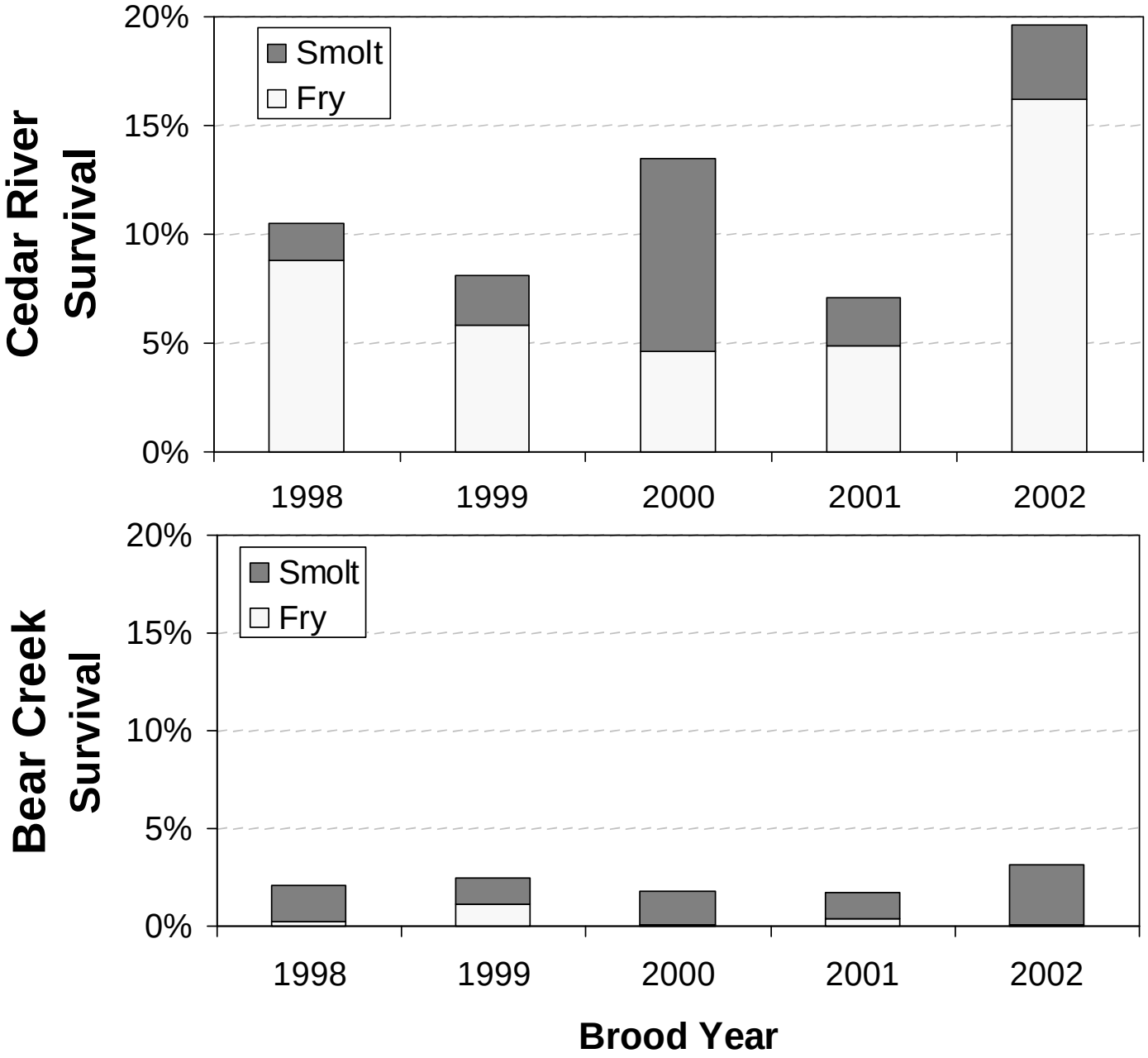


Percent Fry and Smolt Migration Composition Relative to Average Migration (Feb–March) Flow

Cedar River Chinook

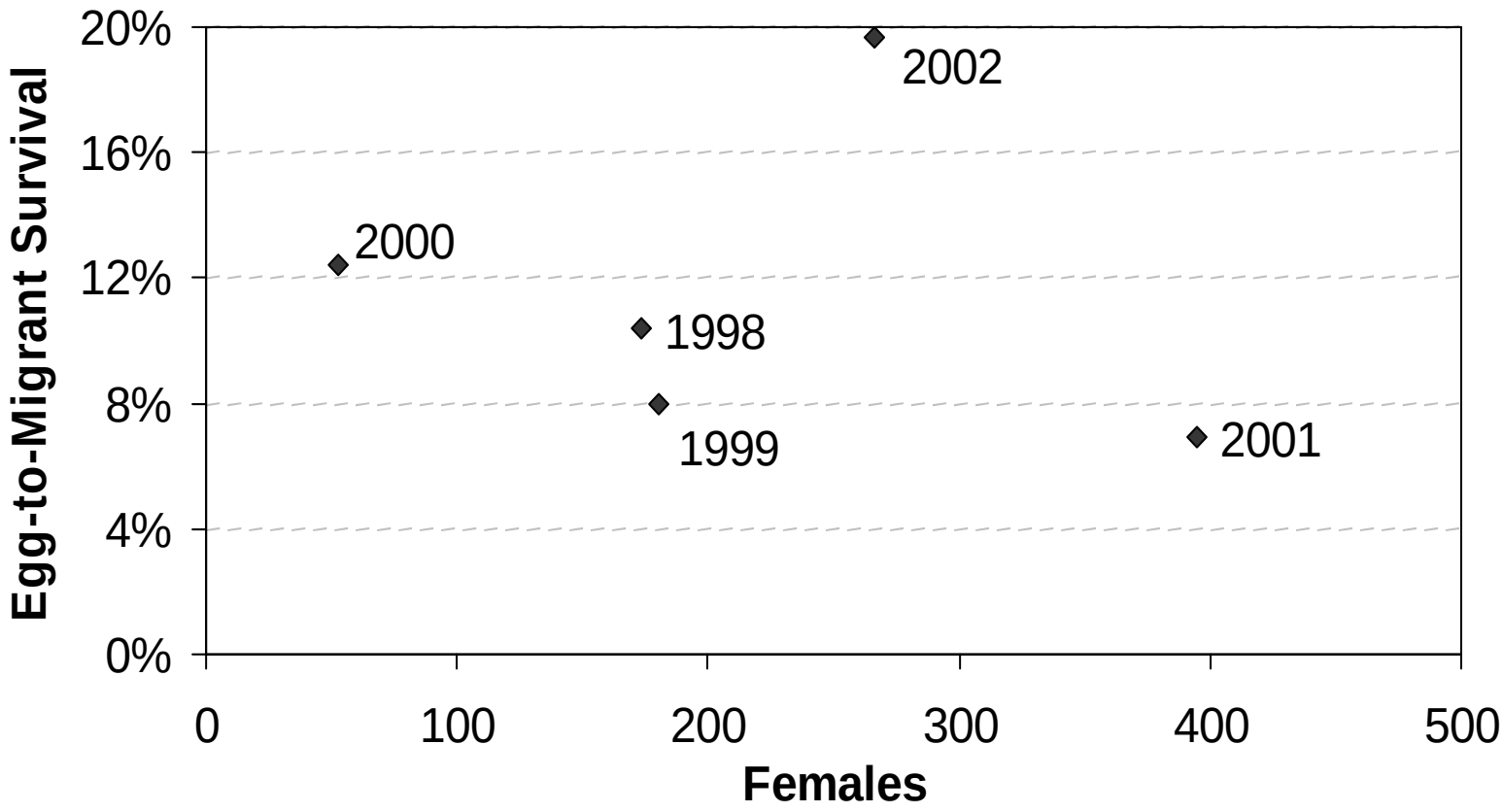


Chinook Egg-to-Migrant Survival by Brood Year



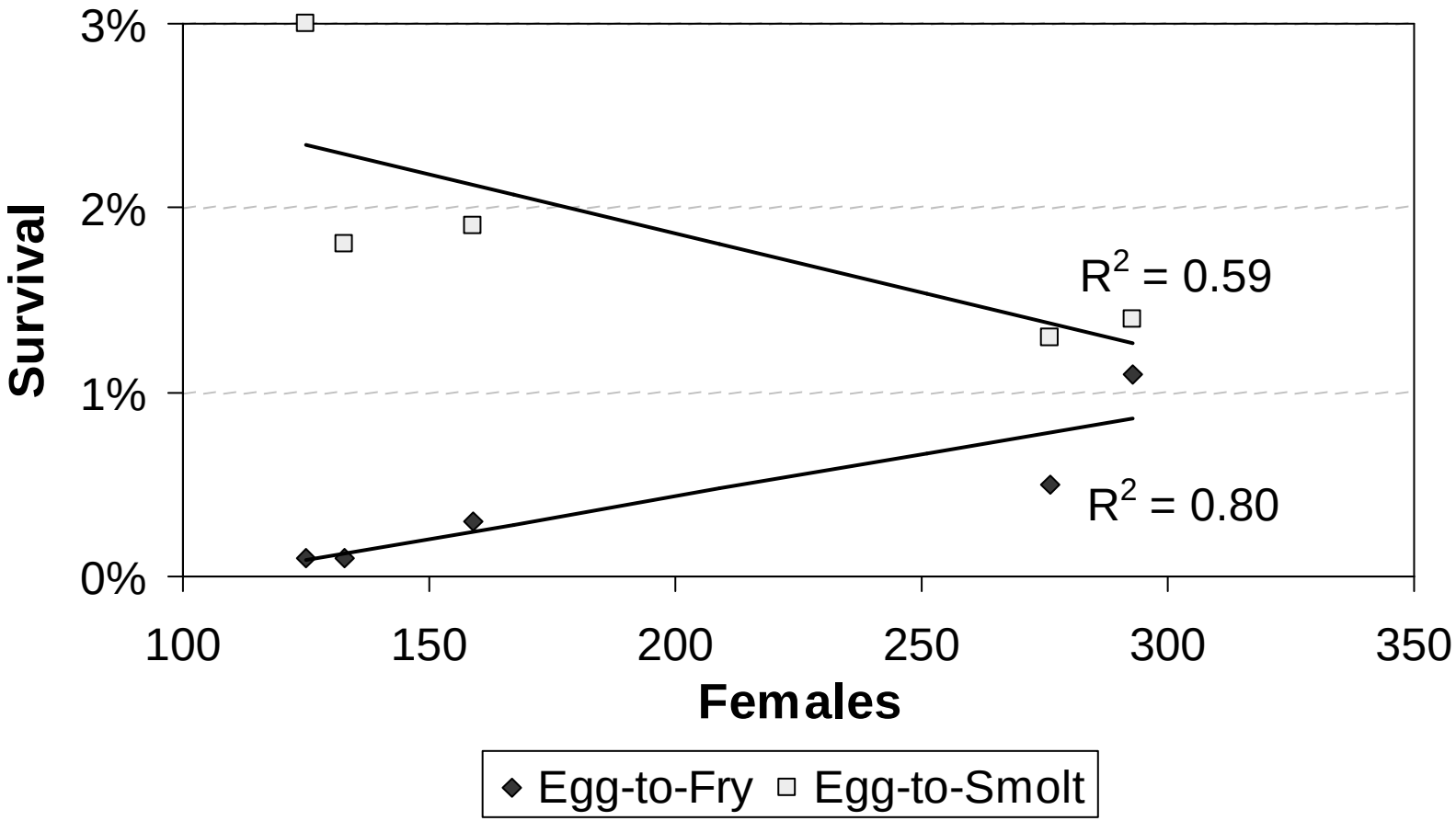
Egg-to-Migrant Survival Relative to Female Spawners

Cedar River Chinook Brood Years 1998-2002

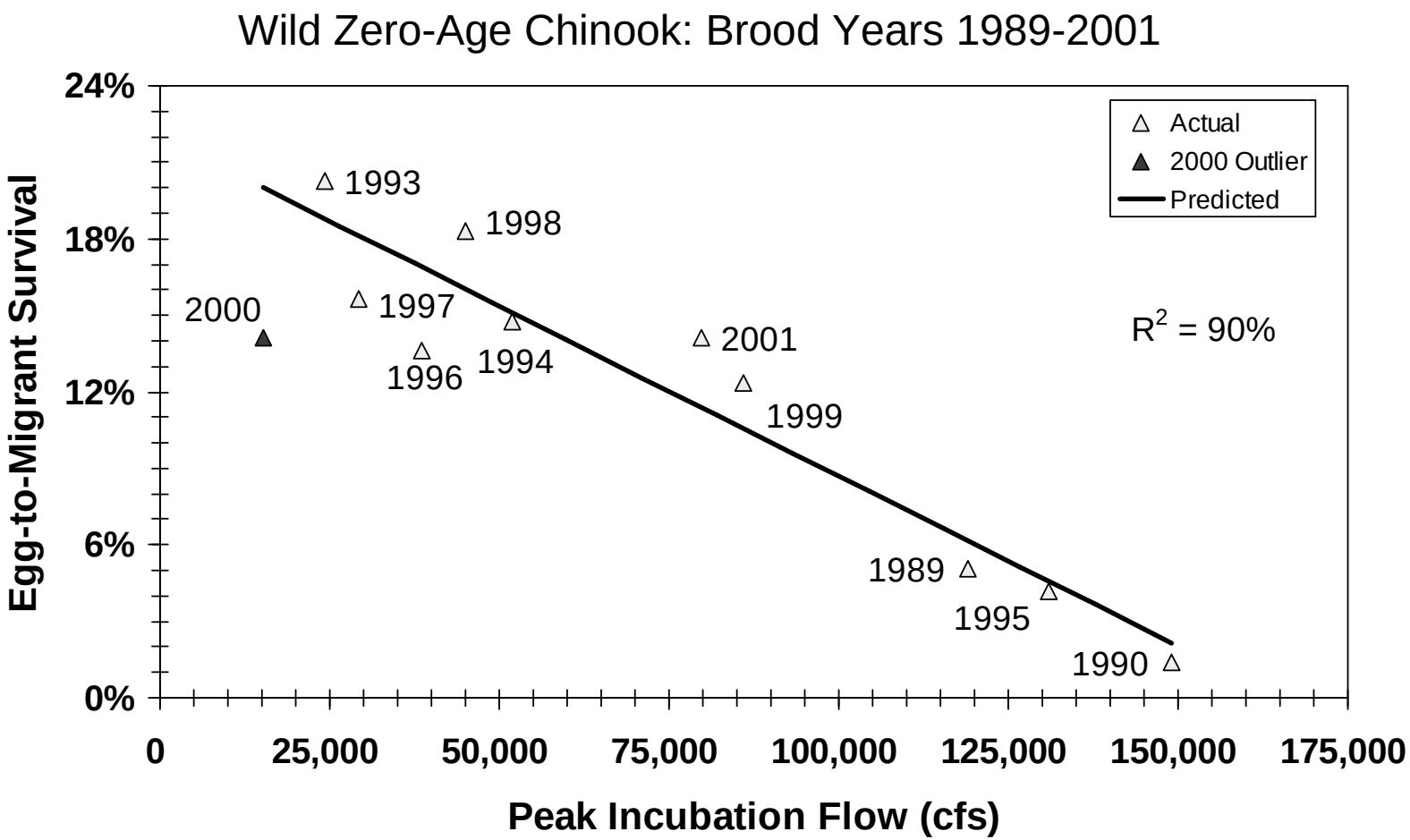


Survival of Fry and Smolt Chinook Migrants Relative to Female Spawners

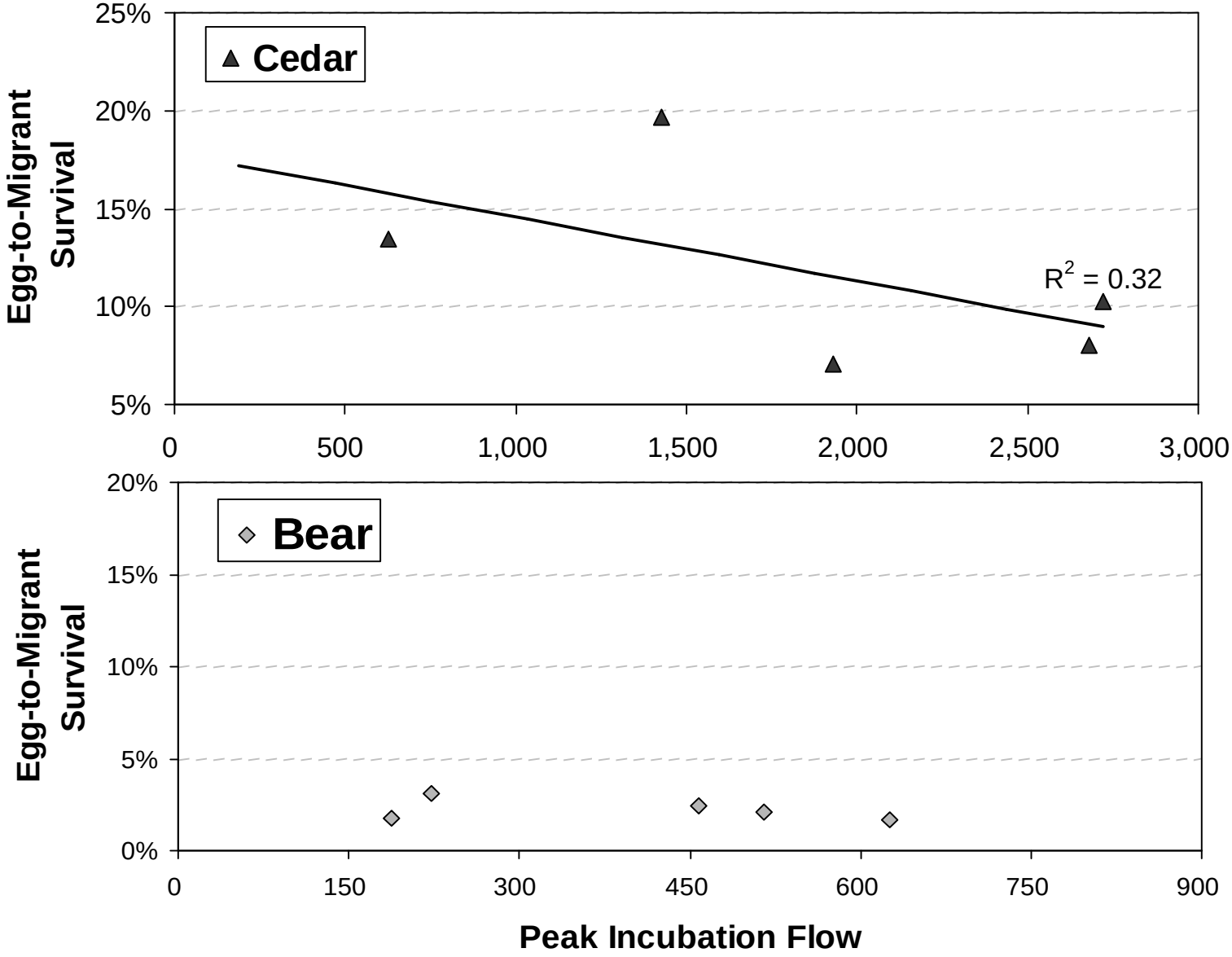
Bear Creek Chinook, Brood Years 1998-2002



Egg-to-Migrant Survival and Peak Flow in the Skagit River

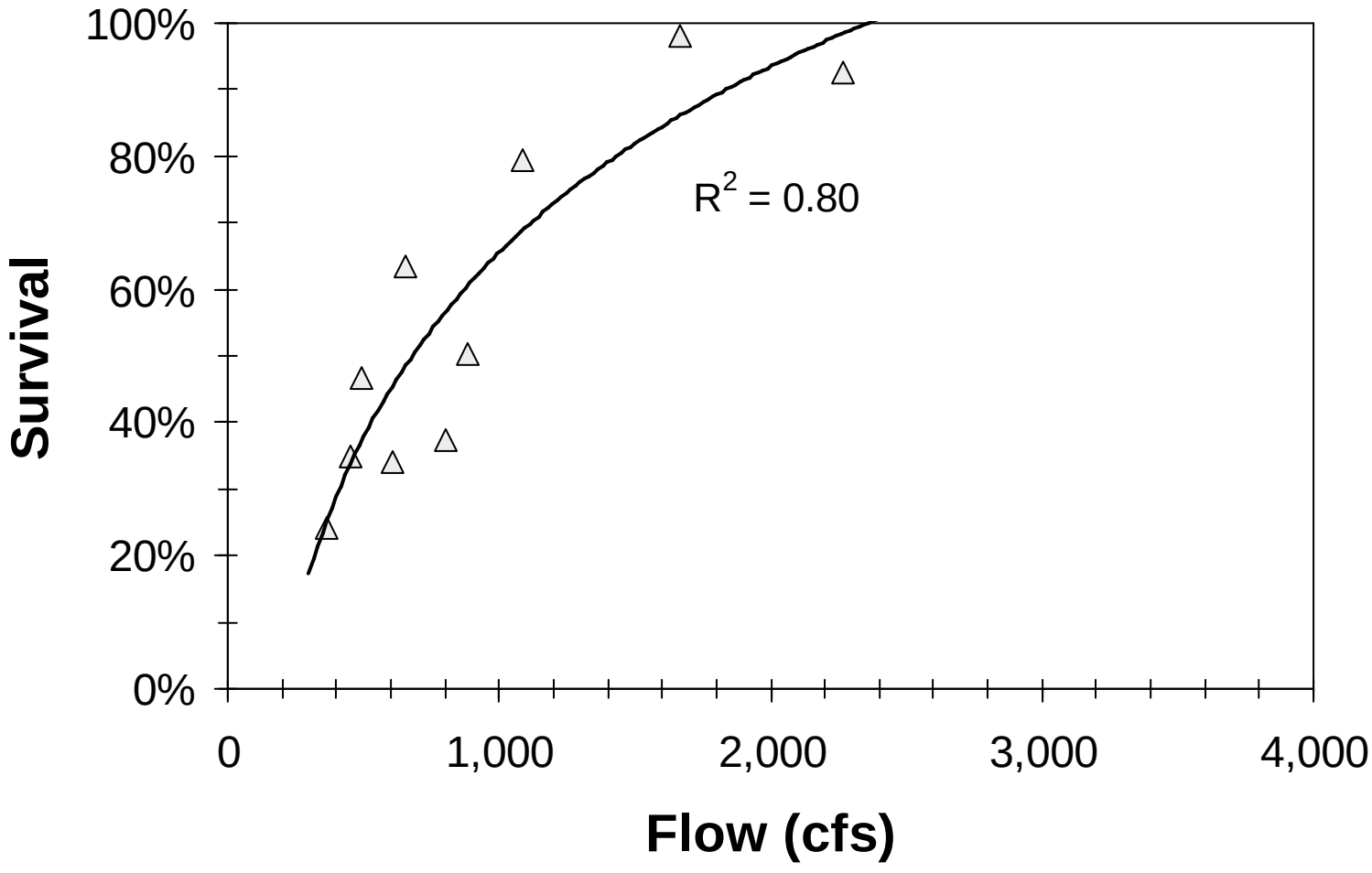


Egg-to-Migrant Survival Relative to Peak Incubation Flow



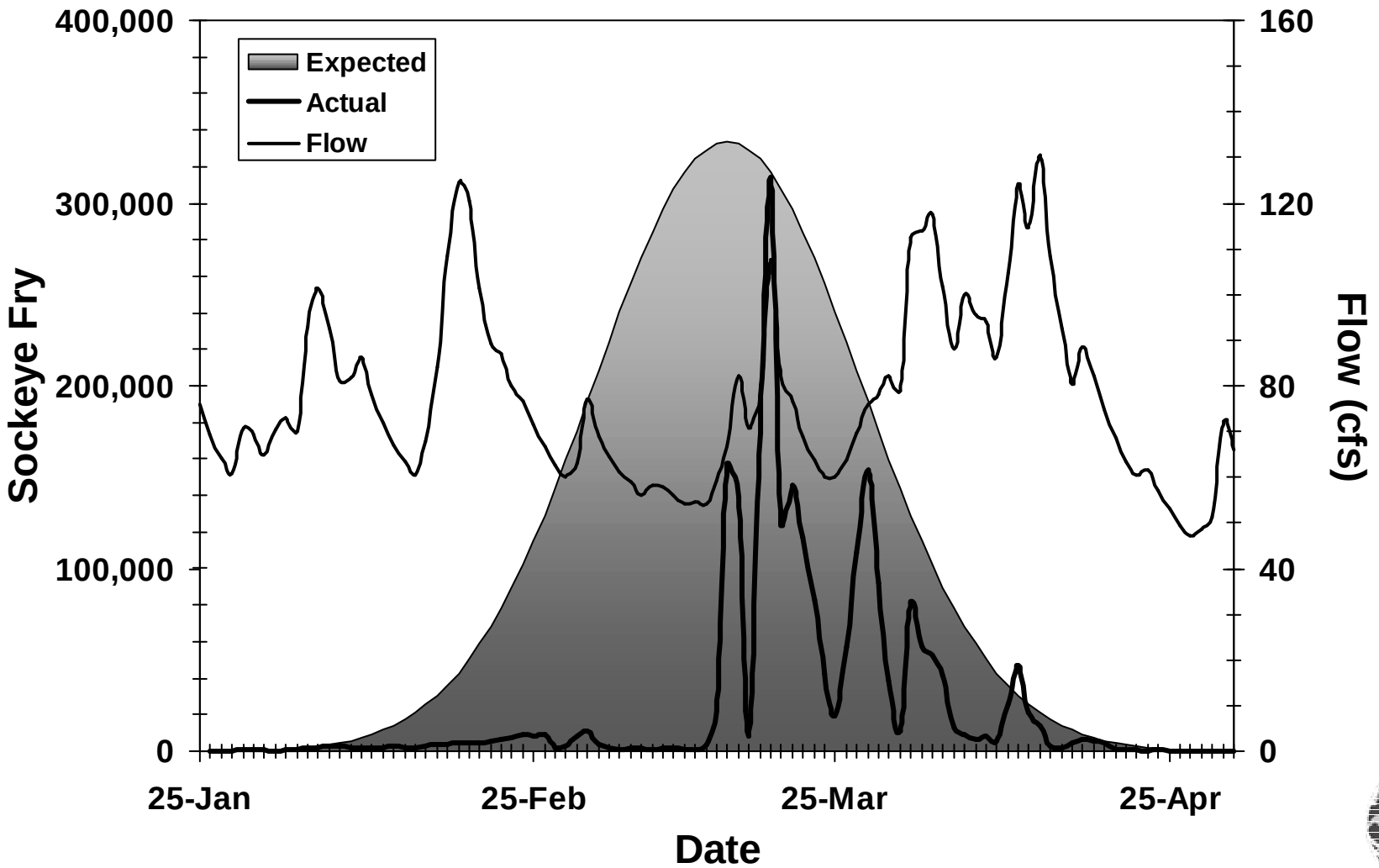
In-River Survival of Hatchery Sockeye Fry

Released at Landsburg Hatchery, Cedar River 1995

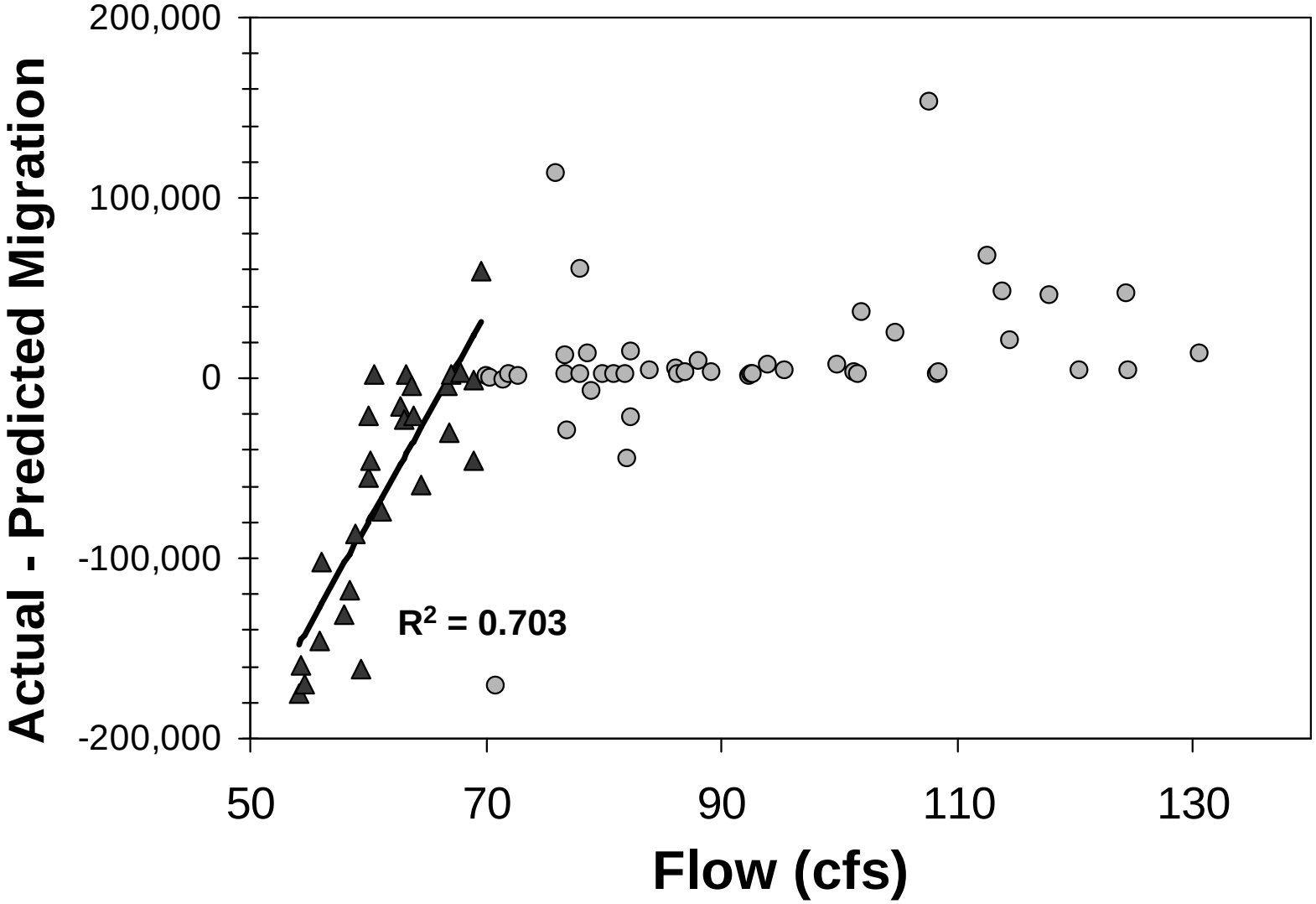


Bear Creek Sockeye Fry

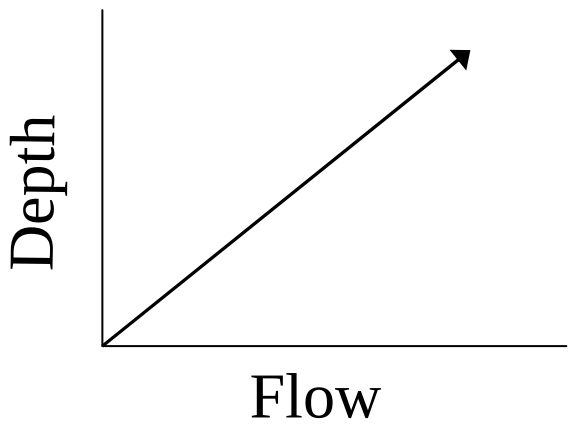
Expected & Actual Migration 2001

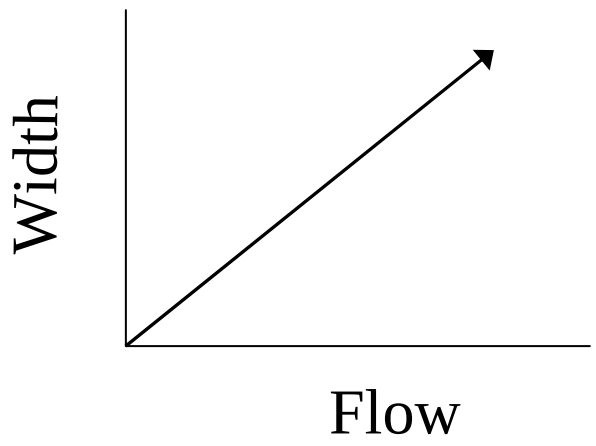


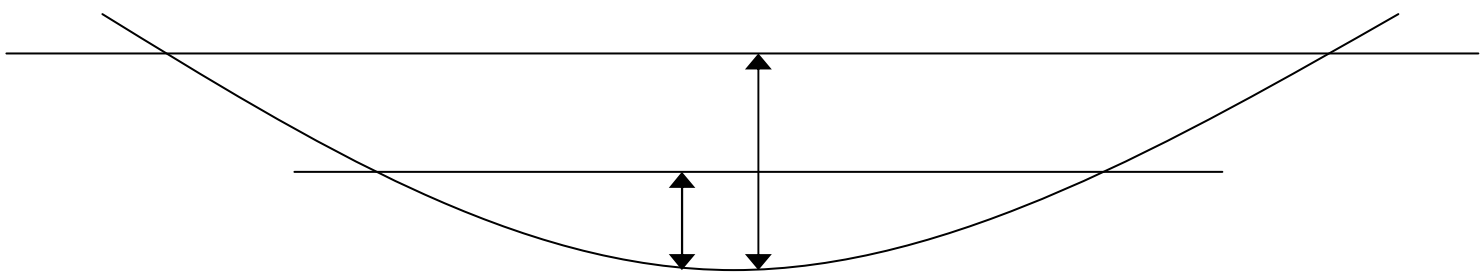
Bear Creek Sockeye Fry, 2001



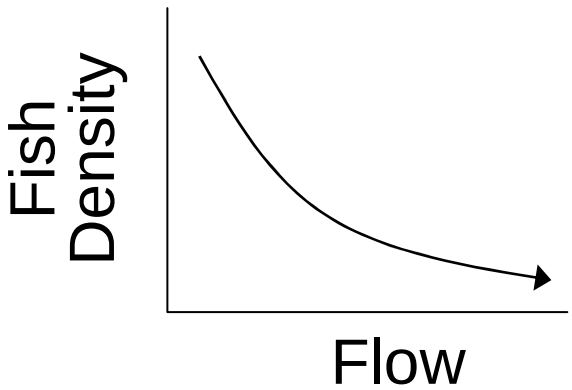
Cross-Sectional Area and Flow

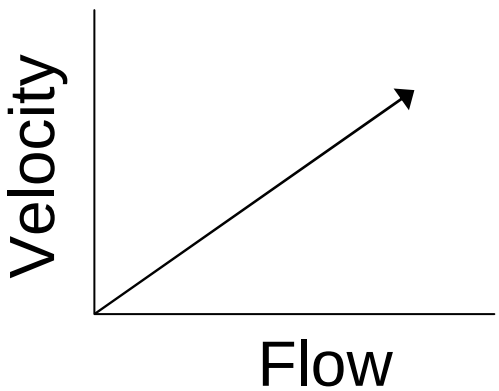


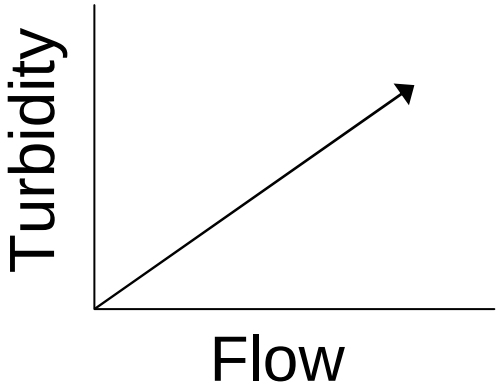




Flow Effects on Vulnerability to Predation







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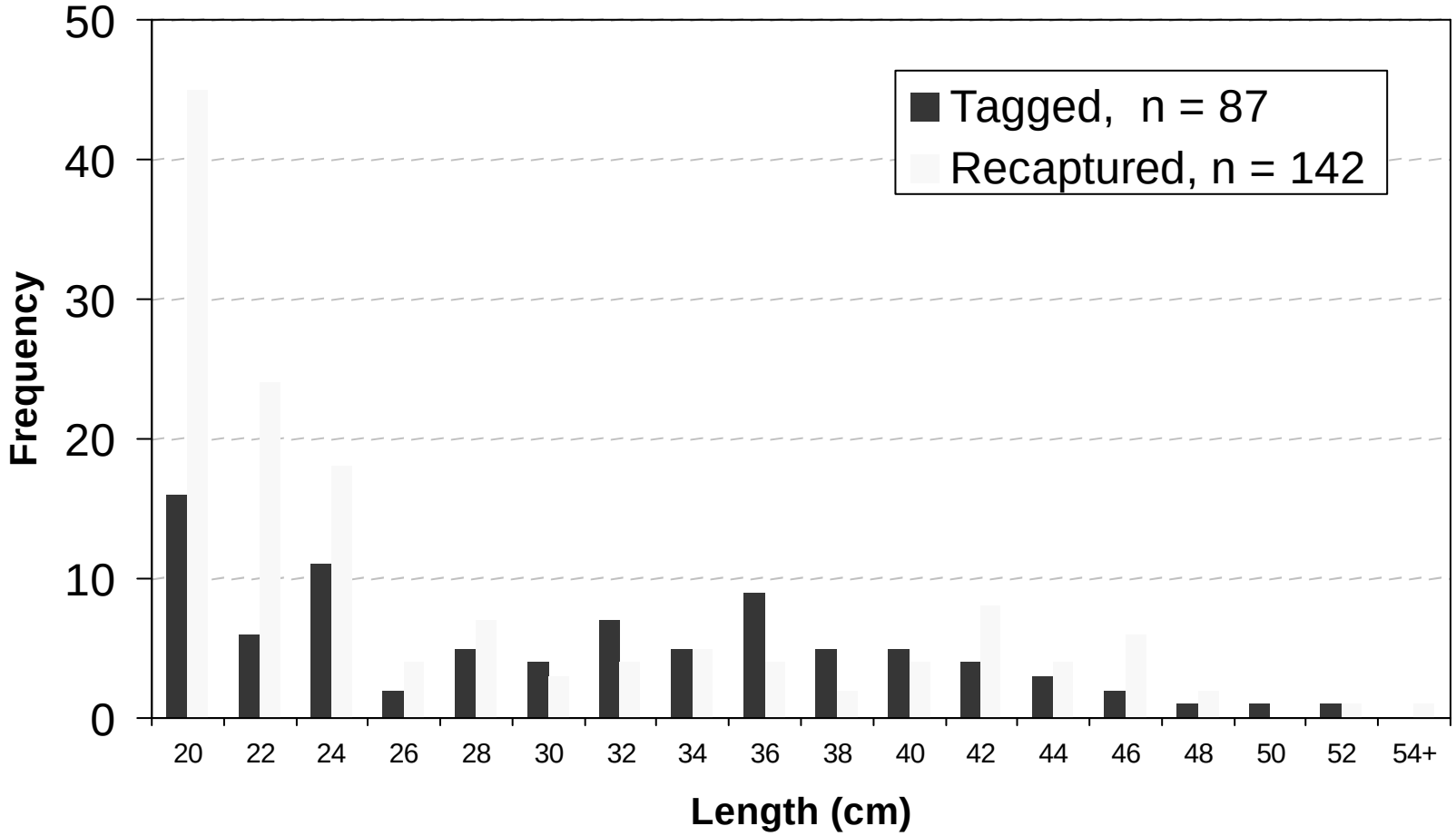
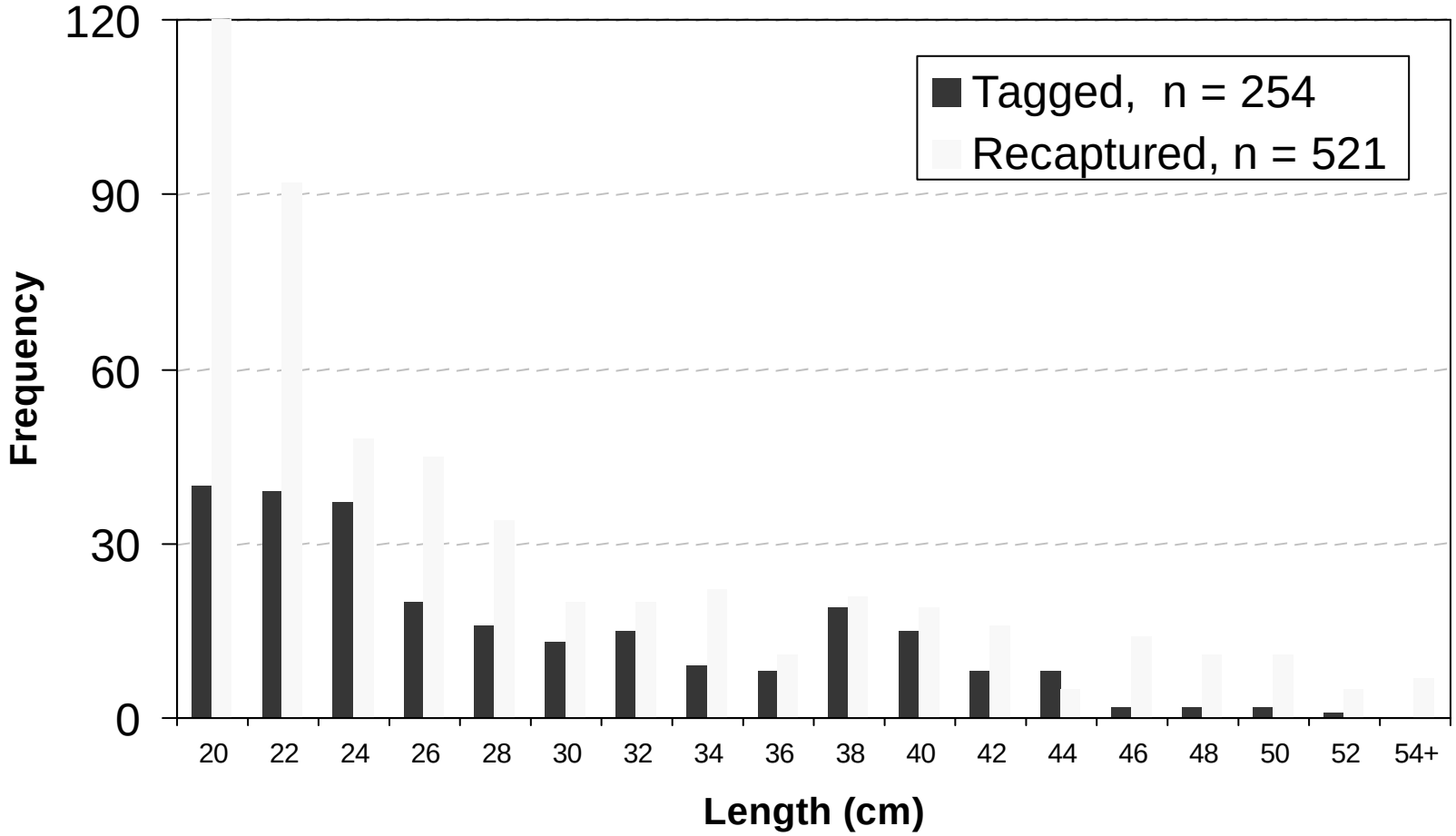
Cedar River Trout Population Estimates 2003

Species	Size Class	Number Marked	# Recaptured		Population Estimate
			Total	Marked	
Rainbow	200-279mm	136	305	3	9,741
	280-379mm	61	107	0	3,417
	+380mm	57	109	4	3,481
	Total	254	521	7	16,639
Cutthroat	200-279mm	35	91	1	1,344
	280-379mm	30	23	2	340
	+380mm	22	28	2	414
	Total	87	142	5	2,097

Cedar River Cutthroat Trout Length Frequencies, Summer 2003

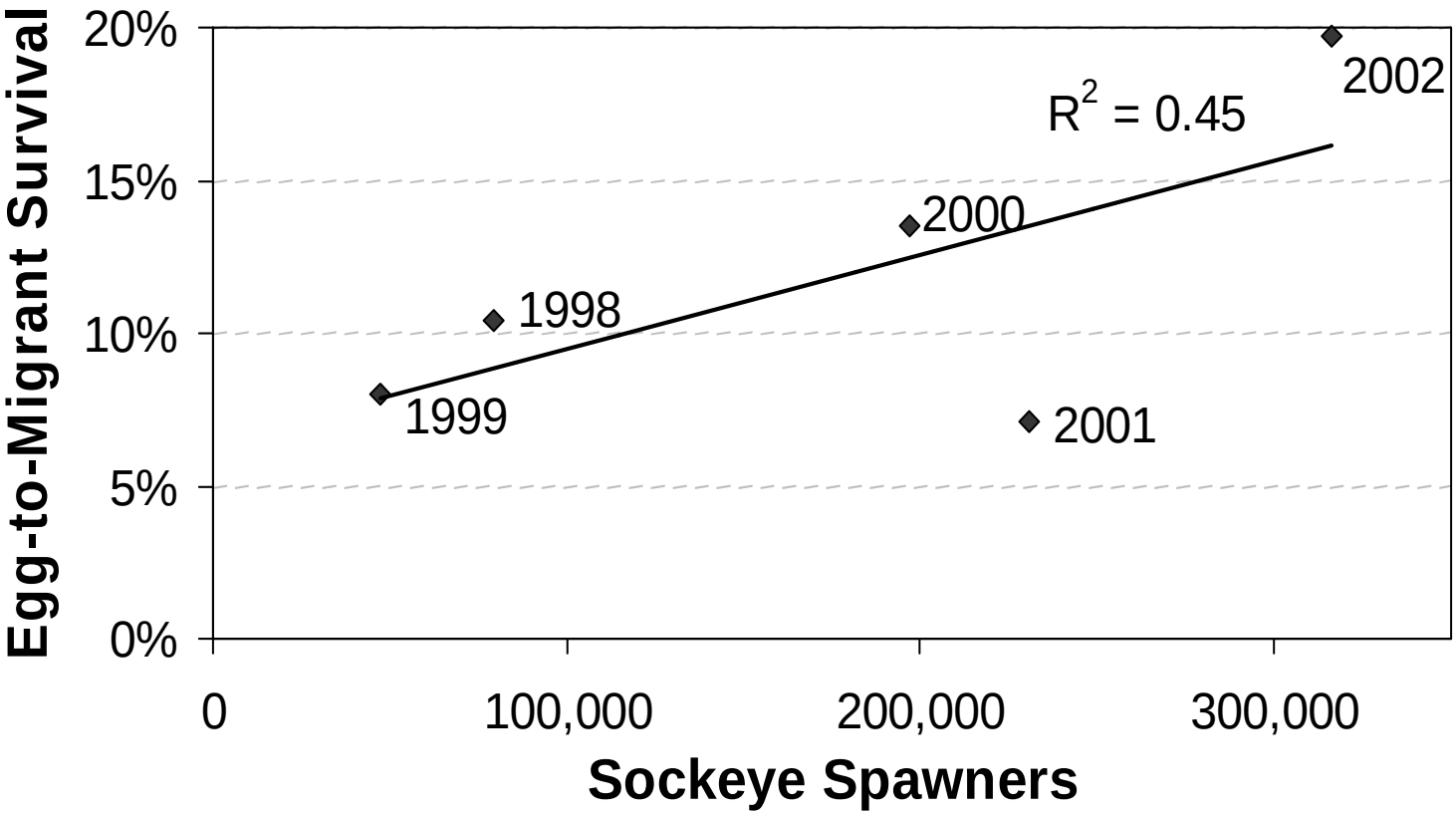


Cedar River Rainbow Trout Length Frequencies, Summer 2003



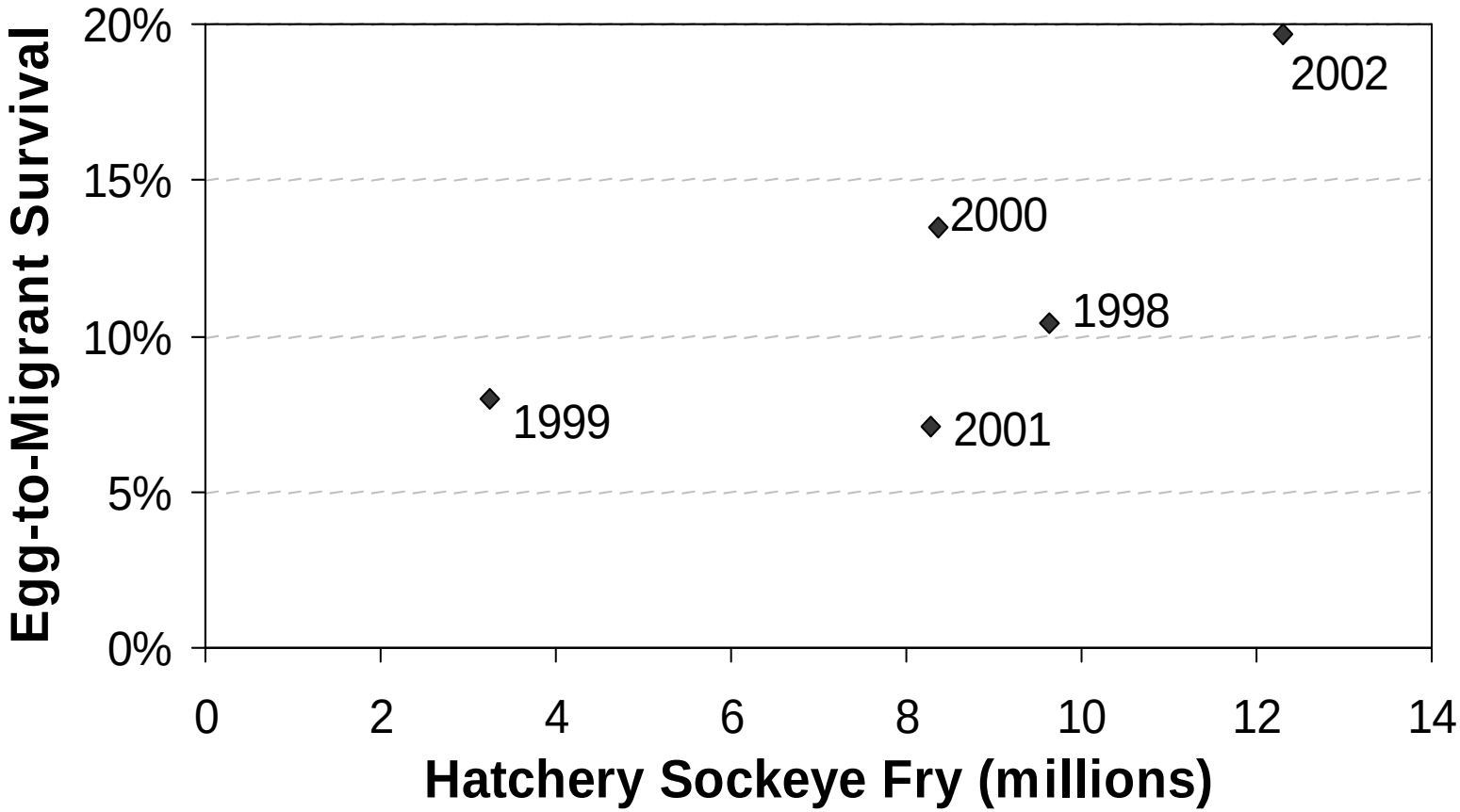
Survival of Chinook Migrants Relative to Sockeye Spawners

Cedar River Brood Years 1998-2002



Survival of Chinook Migrants Relative to Hatchery Sockeye Fry Released Upstream of the Trap

Cedar River Brood Years 1998-2002



Comparison of smolt population ratios from selected Western Washington river systems

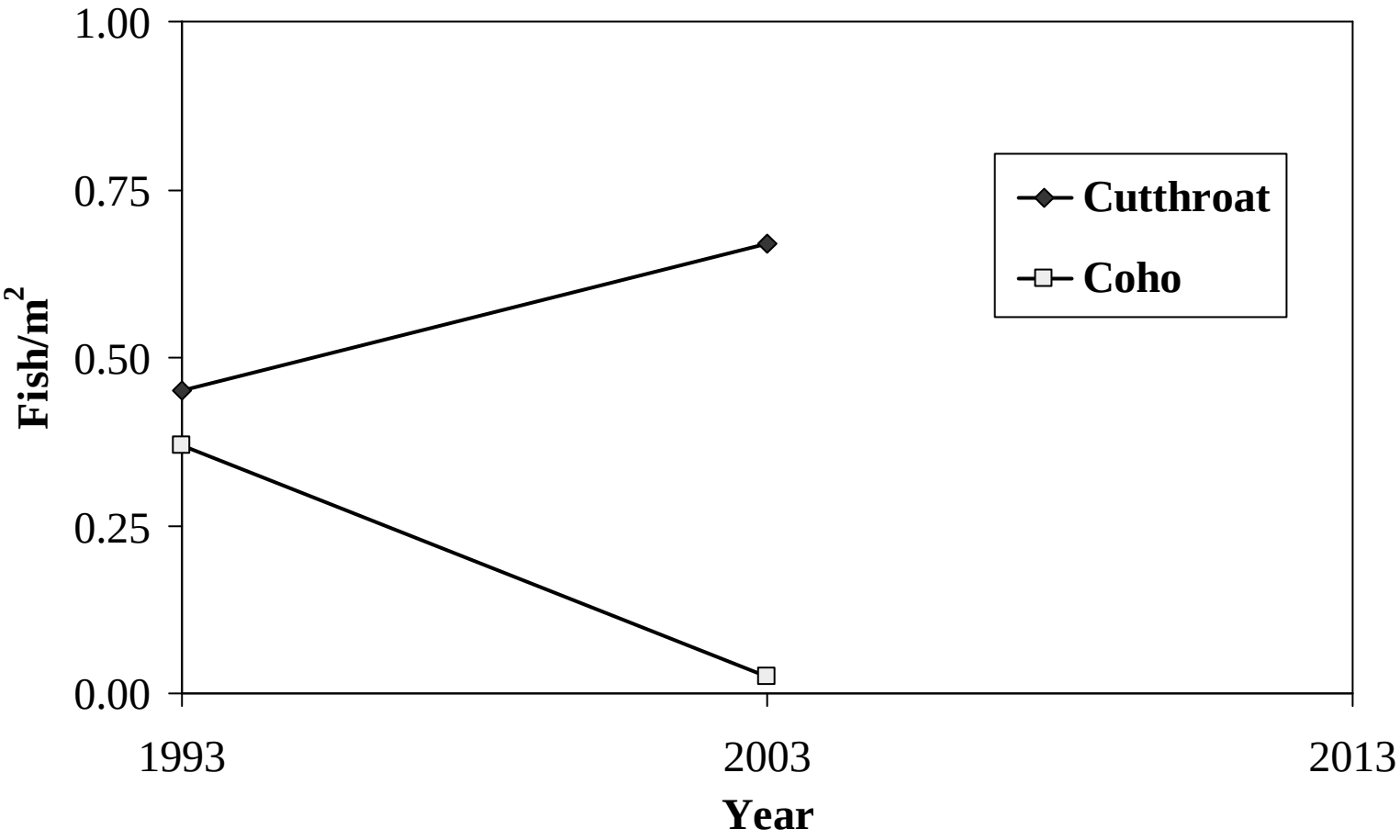
Downstream Migrant Data for Lake Washington Tributaries

Comparison Between 1970's & 2000's

	Stream	Trapping Years		Ratio		
		Span	#	Coho	Steelhead	Cutthroat
THEN	North Creek	1976-1978	3	81	3	1
	Little Bear Creek	1976-1978	3	88	2	1
	Total			85	3	1
NOW	Cedar River	1999-2002	4	13	1	1
	Big Bear Creek	1999-2002	4	11	0	1
	Issaquah Creek	2000	1	1	0	1
	North Creek*	August 2001		1	0	2
	Thornton Creek	2000-2002	3	1	0	6

* ½ mile reach in Bothell near HWY 405 & 522 was drained, and all fish were enumerated. Data provided by: Paul DeVries, George Pess, and Todd Bennett.

Cutthroat Density in Six Lake Washington Tributaries



Data provided by John Serl

PIT Tagging Studies