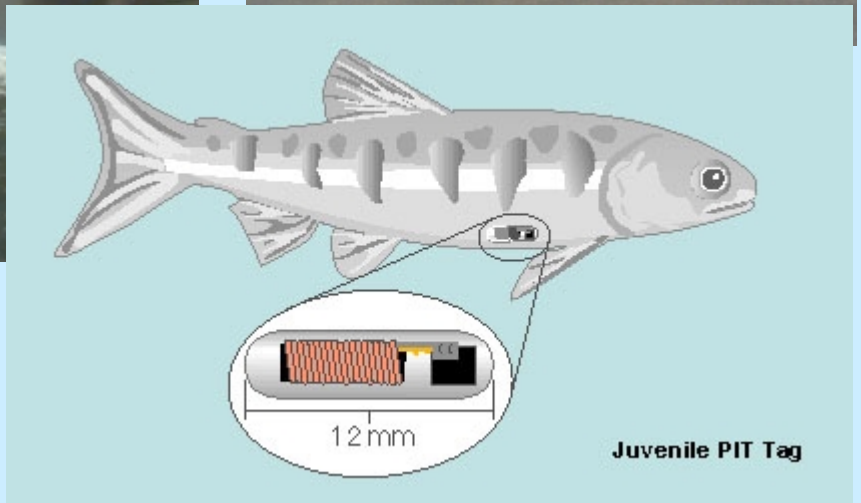
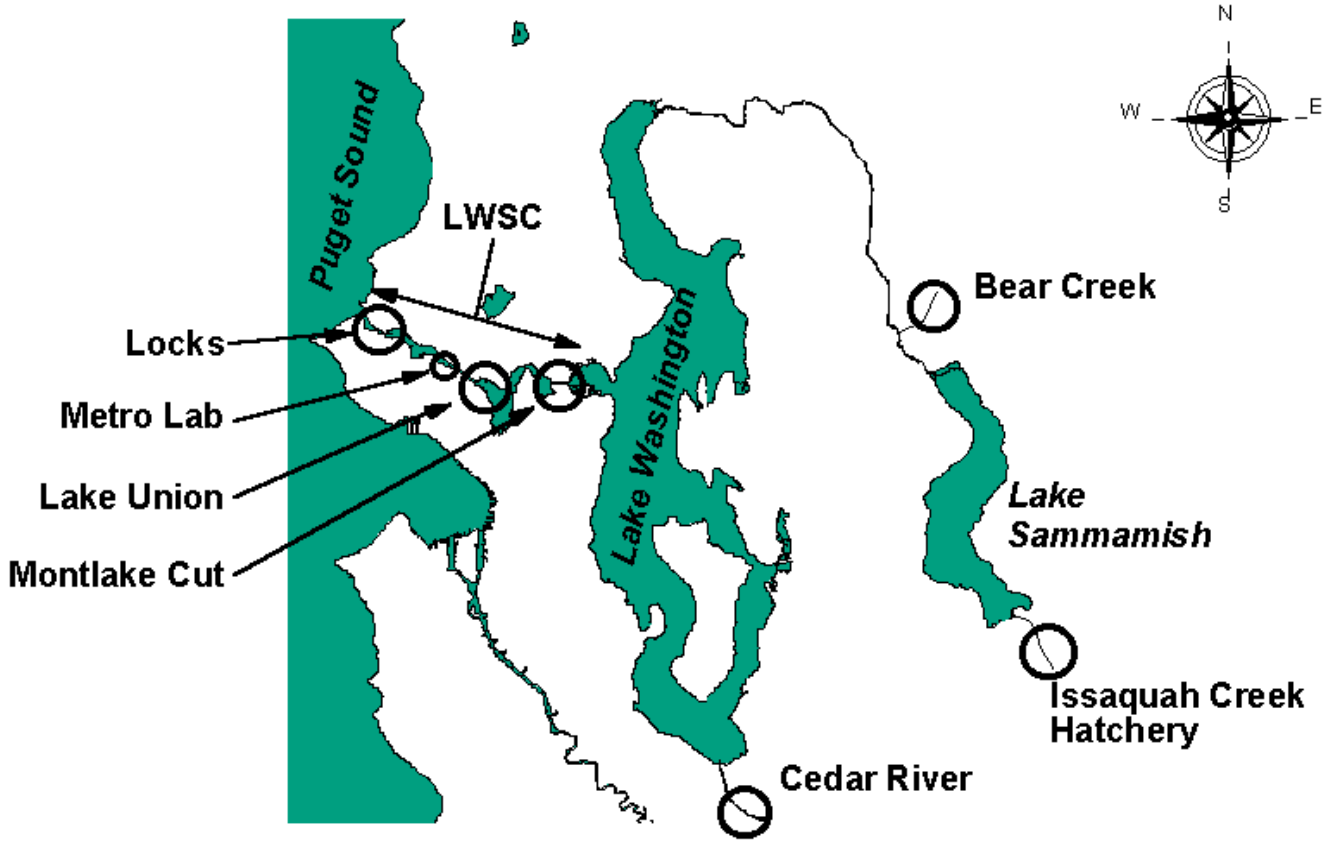
MIGRATION CHARACTERISTICS OF JUVENILE CHINOOK

PIT Tag Study Analyses

by P. DeVries, R2 for USACE
with F. Goetz, K. Fresh, D. Seiler, C. Simenstad
(and many others)

PIT Tag Detection




N
W
E
S
Puget Sound
LWSC
Locks
Metro Lab
Lake Union
Montlake Cut
Lake Washington
Bear Creek
Lake Sammamish
Issaquah Creek Hatchery
Cedar River

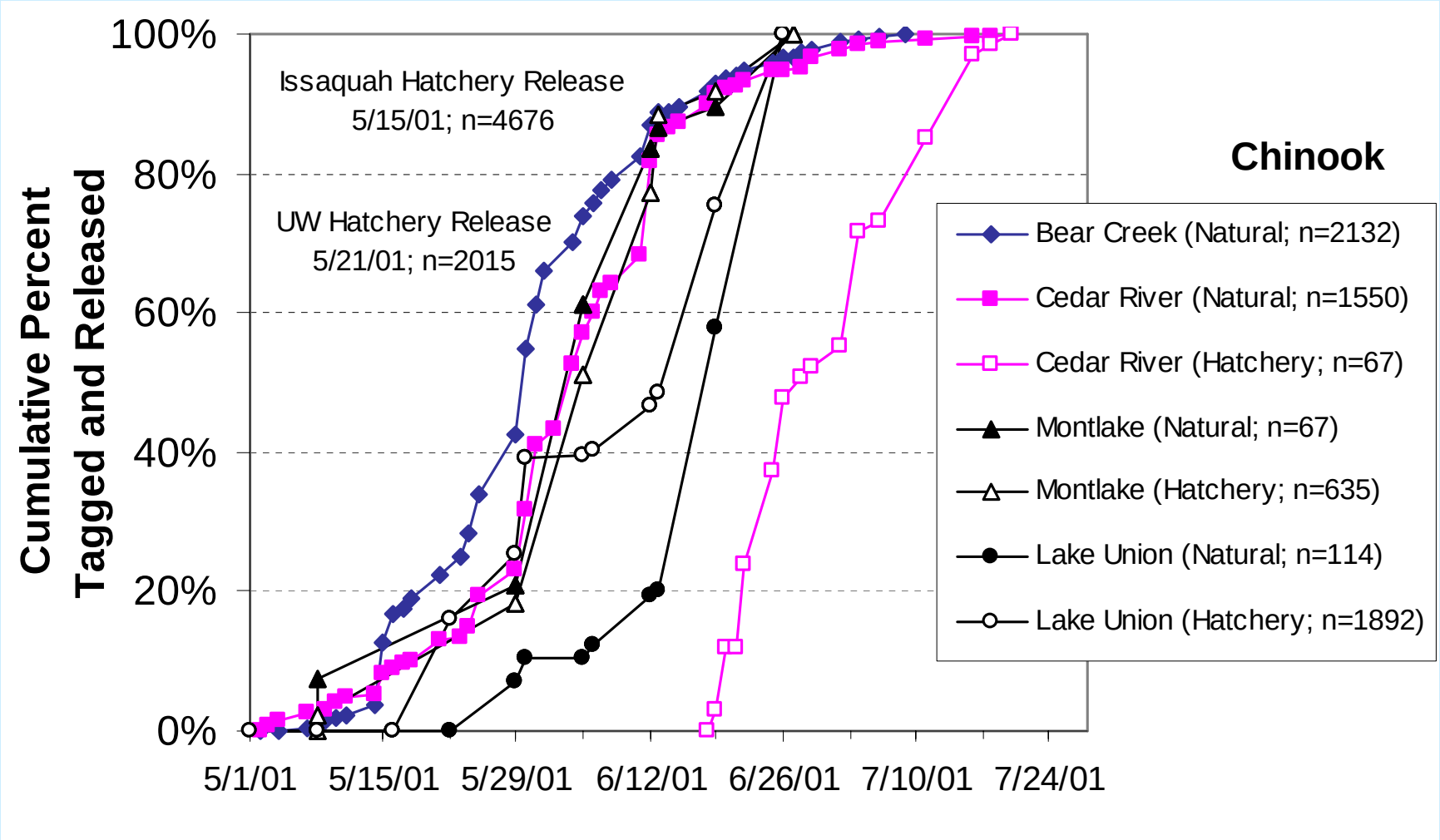
Tagging Numbers: All Species

Species	Origin	Issaquah Creek Hatchery	Bear Creek	Cedar River	Montlake	UW Hatchery	Lake Union	Metro Laboratory
				Total Numbers Tagged and Released:				
Chinook	**Natural**	--	2132	1550	67	--	114	--
	Hatchery	4676	--	67	635	2015	1892	204
Coho	**Natural**	--	1011	1235	37	--	239	--
	Hatchery	--	12	--	5	--	333	--
Sockeye	**Natural**	--	--	8	164	--	2219	--
Steelhead	**Natural**	--	3	22	--	--	3	--

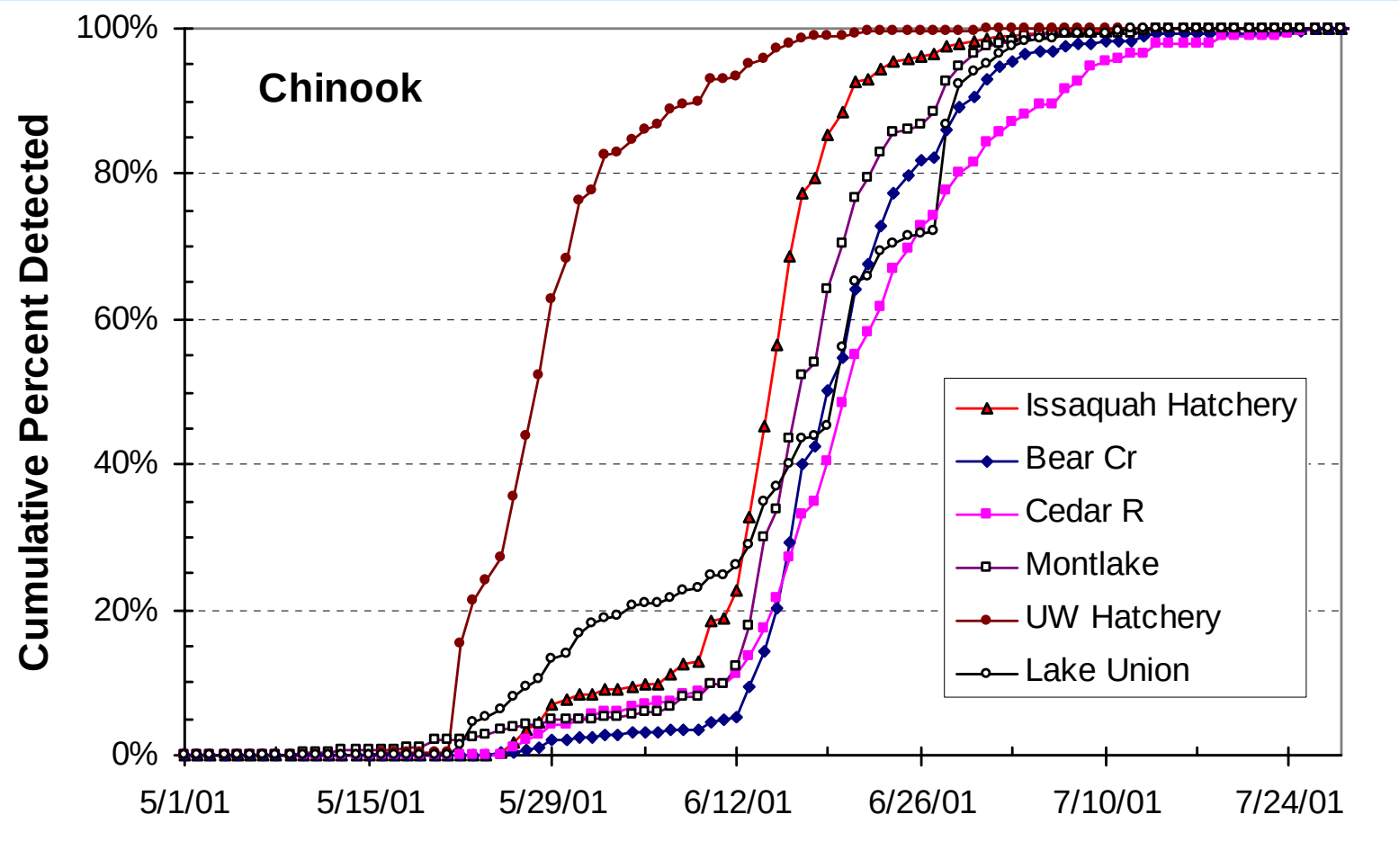
Chinook Tagging/Detection Numbers

	Issaquah Hatchery	Bear Creek	Cedar River	Montlake	UW Hatchery	Lake Union	Metro Lab
				Total Numbers Tagged and Released:			
Natural	--	2132	1550	67	--	114	--
Hatchery	4676	--	67	635	2015	1892	204
				Total Numbers Detected in Smolt Flumes:			
Natural	--	249	413	19	--	41	--
Hatchery	1630	--	4	235	996	593	21
				Estimated Total Numbers Passing Through Smolt Flumes:			
Natural	--	270	446	20	--	45	--
Hatchery	1762	--	4	252	1073	643	22
				Estimated Percent Passing Through Smolt Flumes:			
Natural	--	13%	29%	30%	--	39%	--
Hatchery	38%	--	6%	40%	53%	34%	11%

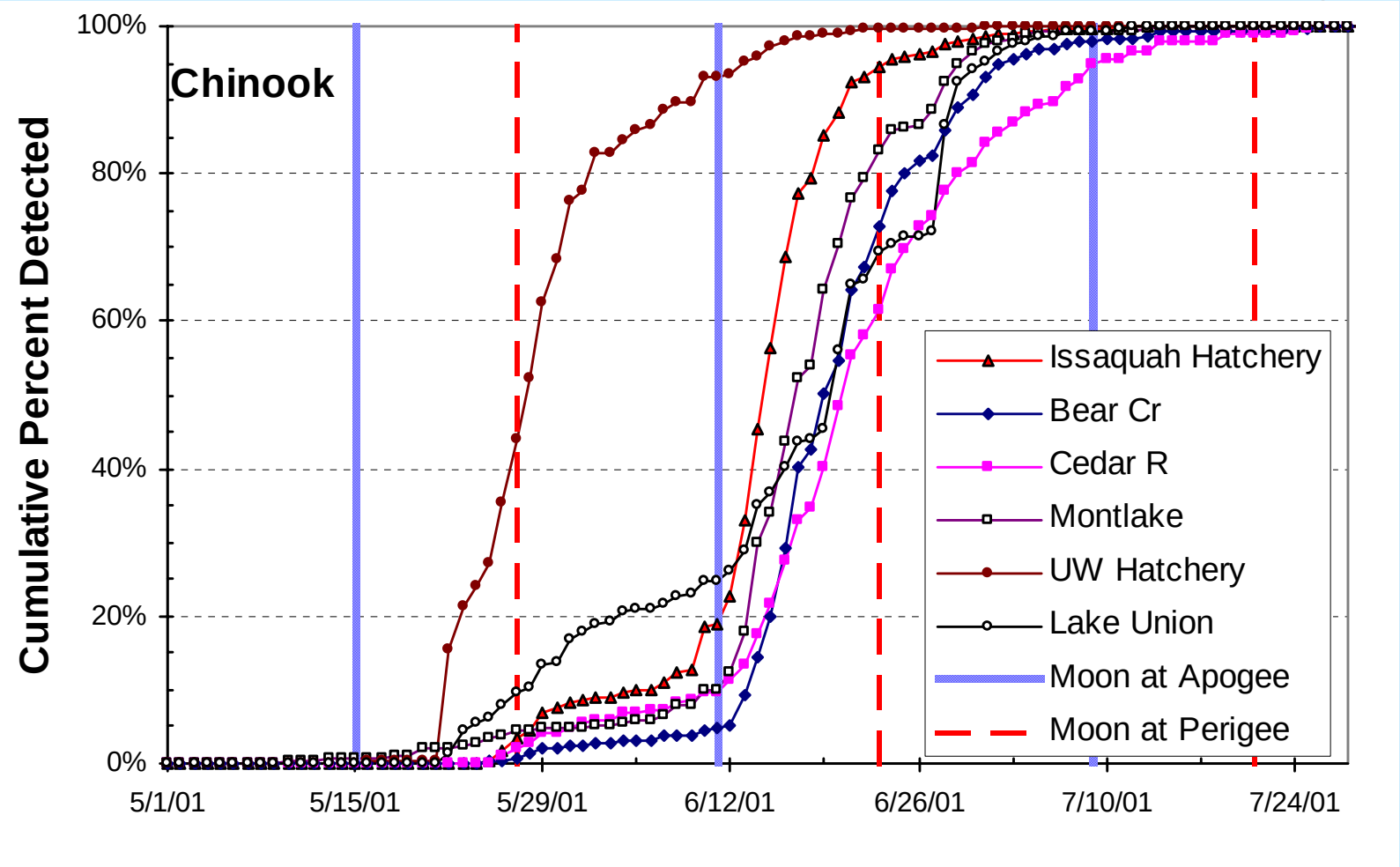
Tag & Release Dates



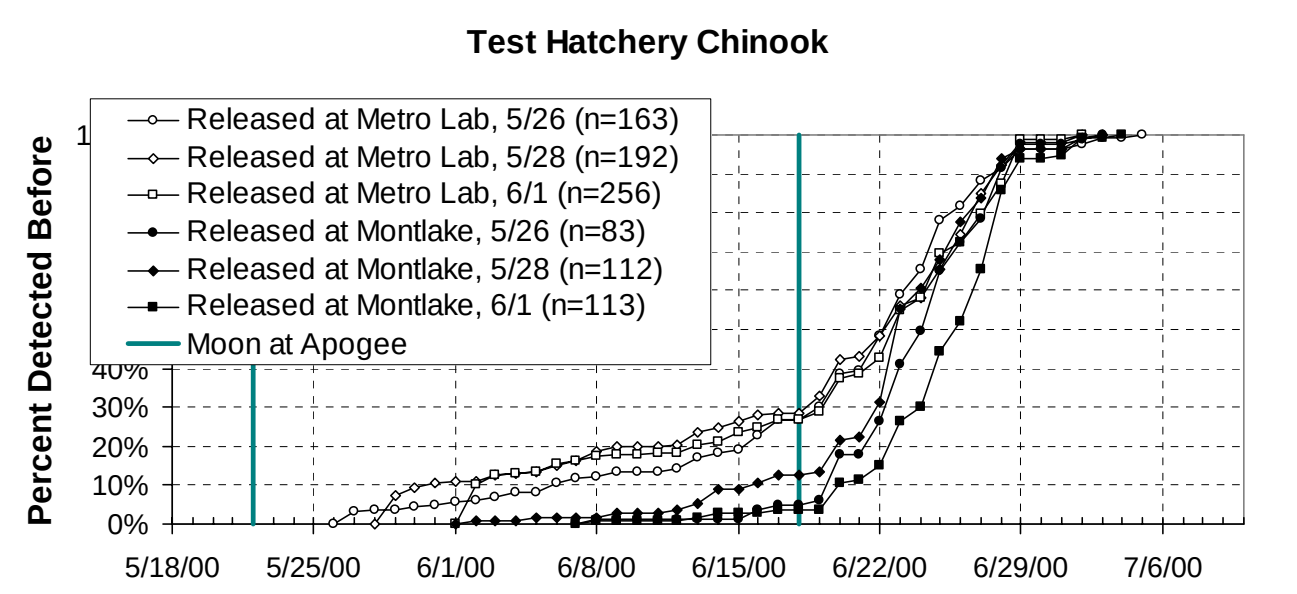
Passage Timing at Locks

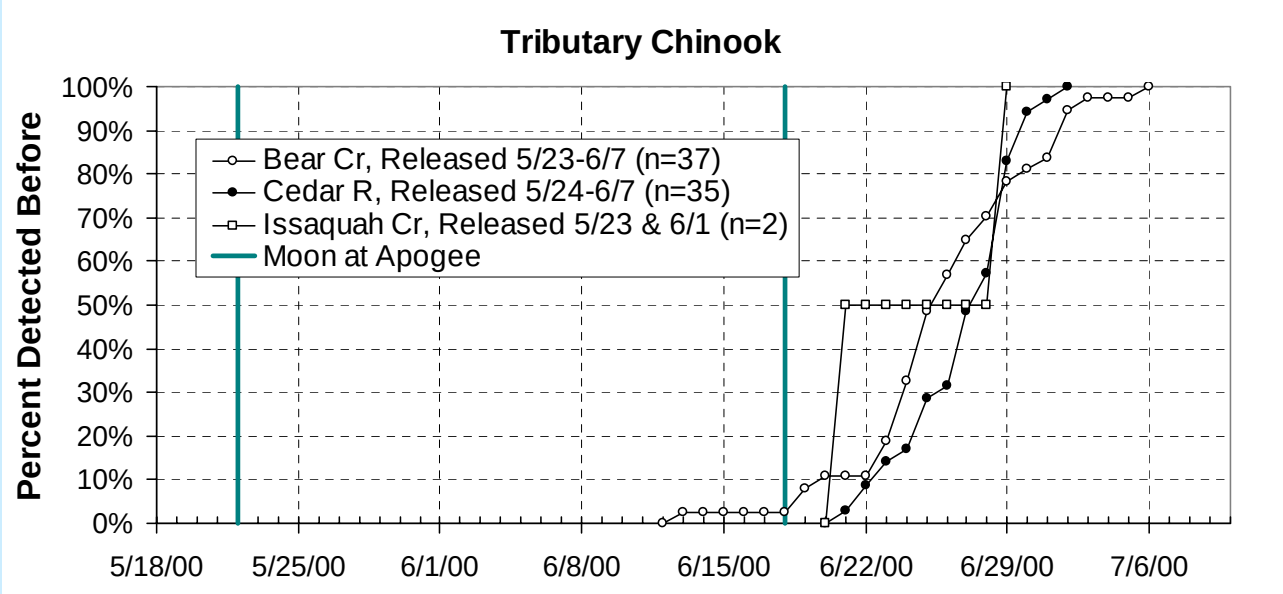


Passage Timing & Lunar Cycle

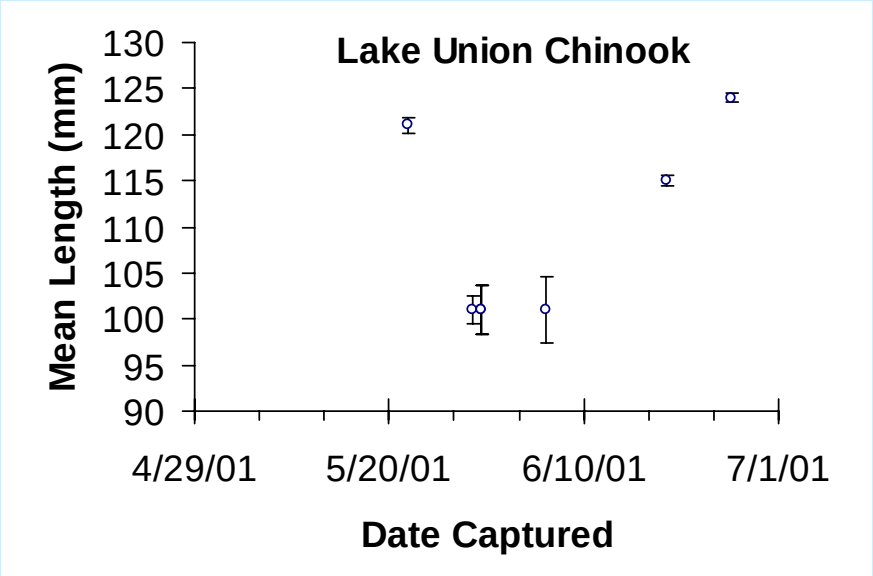


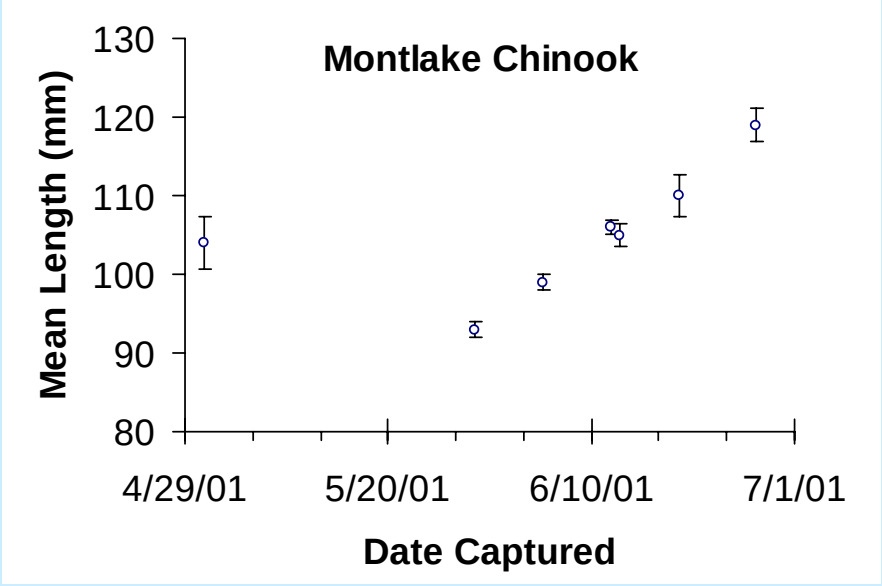
Passage Timing & Lunar Cycle: 2000

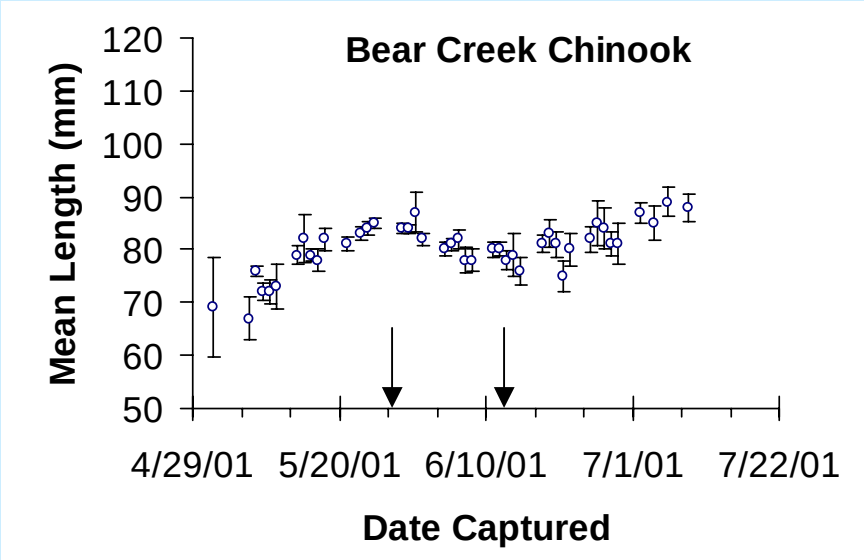


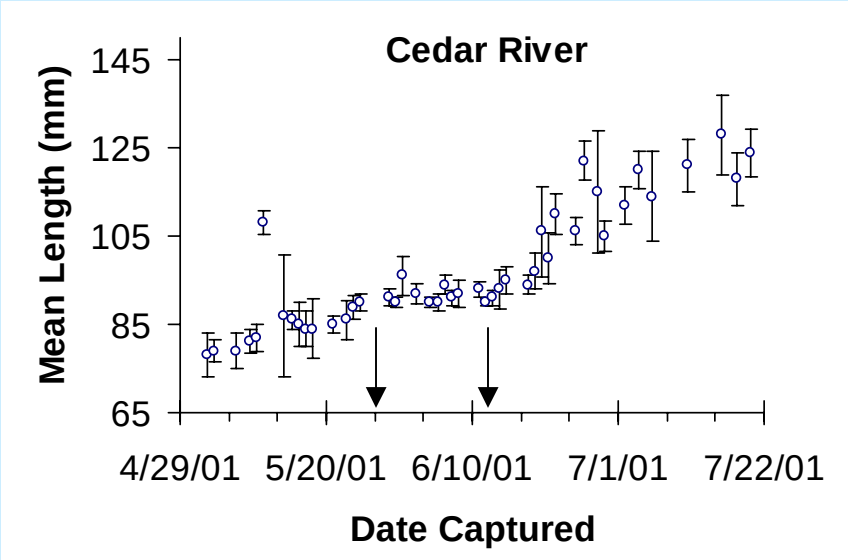


Fish Growth - 2001

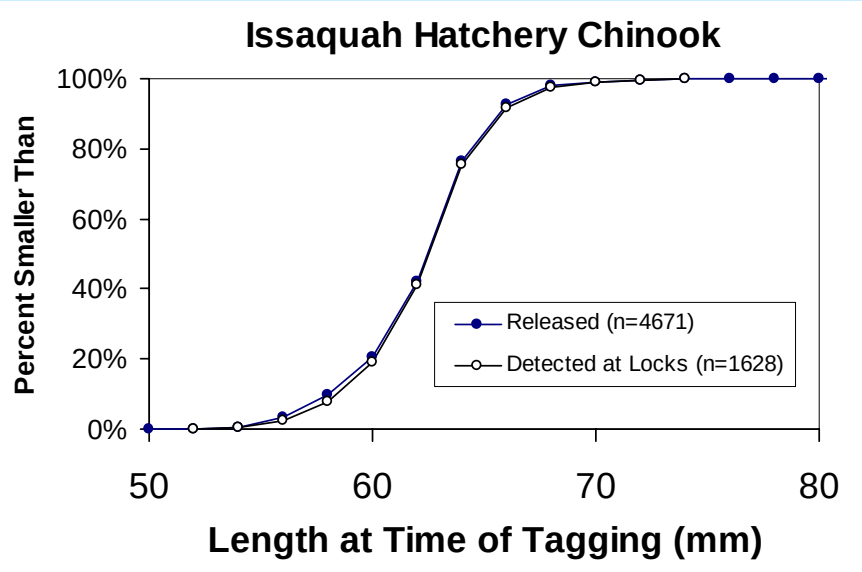


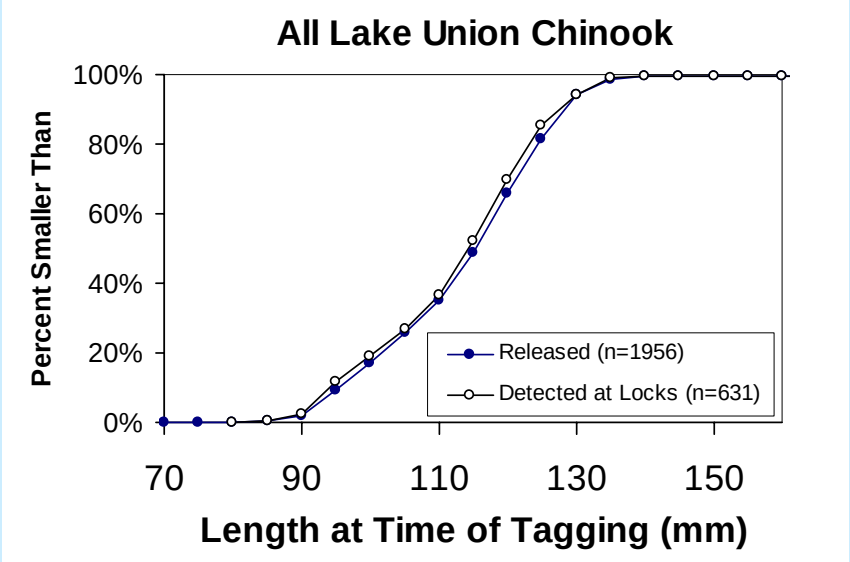


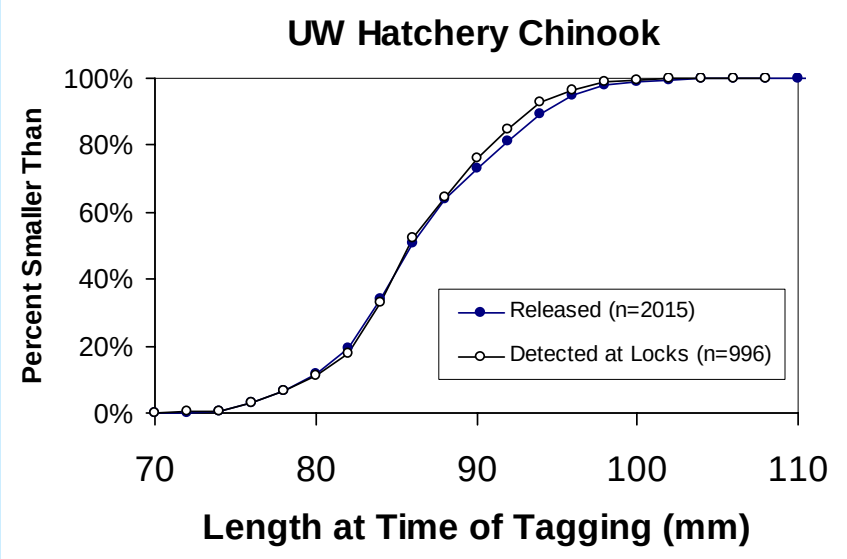


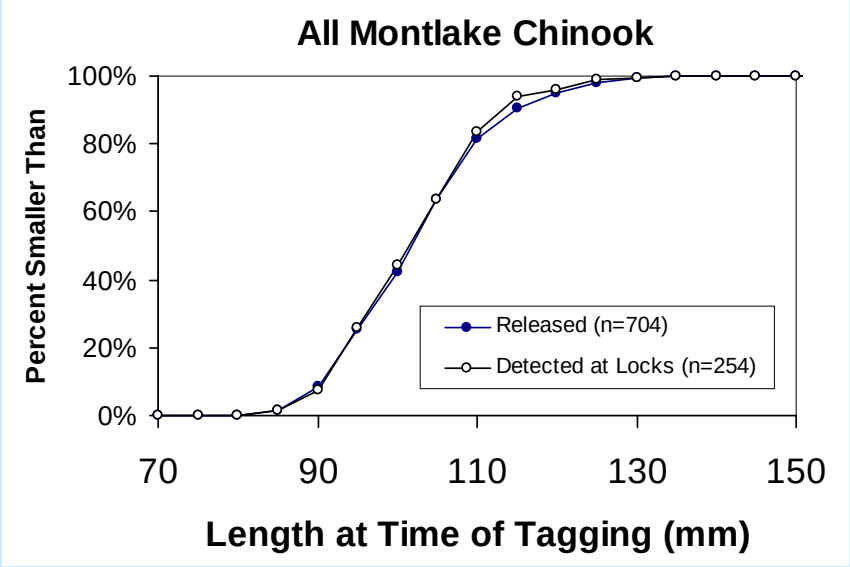


Fish Size & Passage - 2001

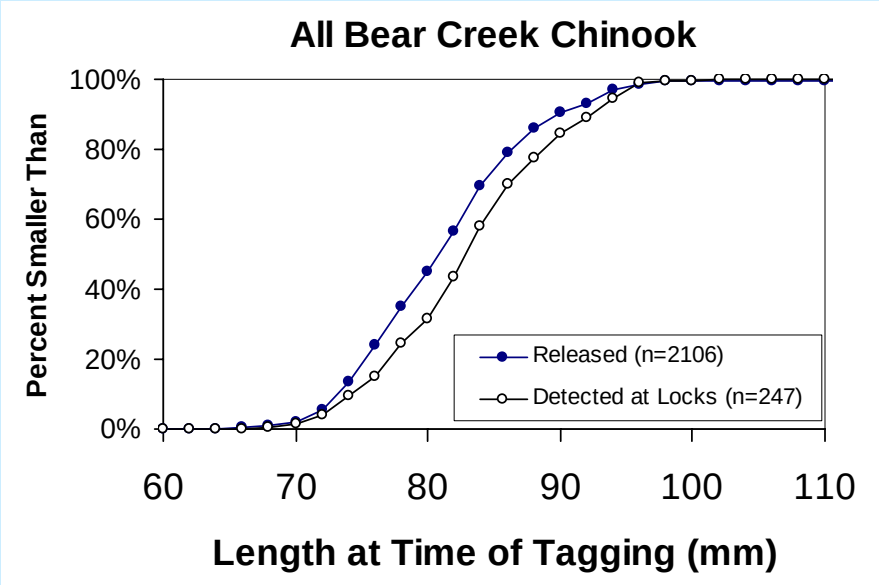


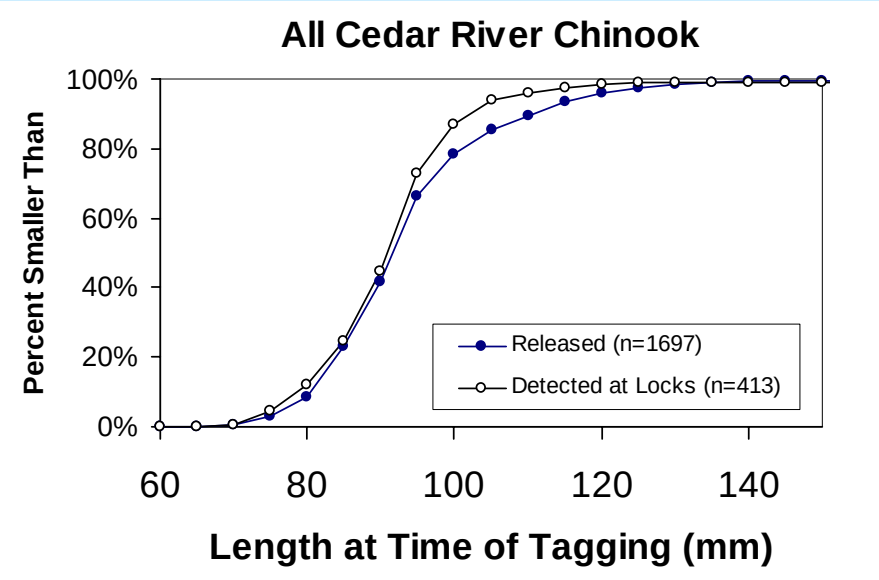






Fish Size & Passage - 2001





Detected L > Released L

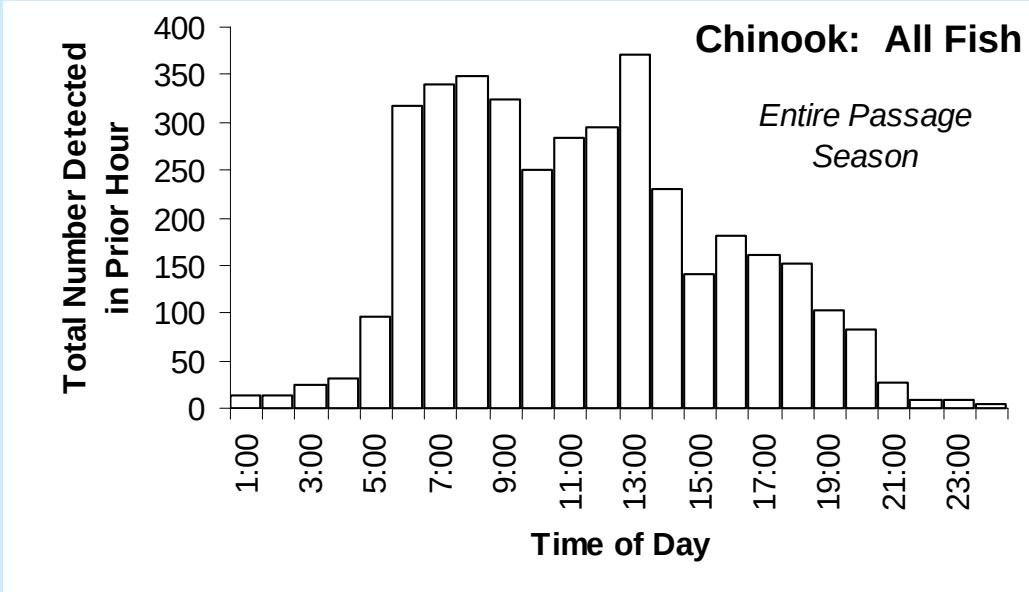
Pattern Generally Consistent Through 6/12/01 Release Group
(only 1 fish detected from later releases)

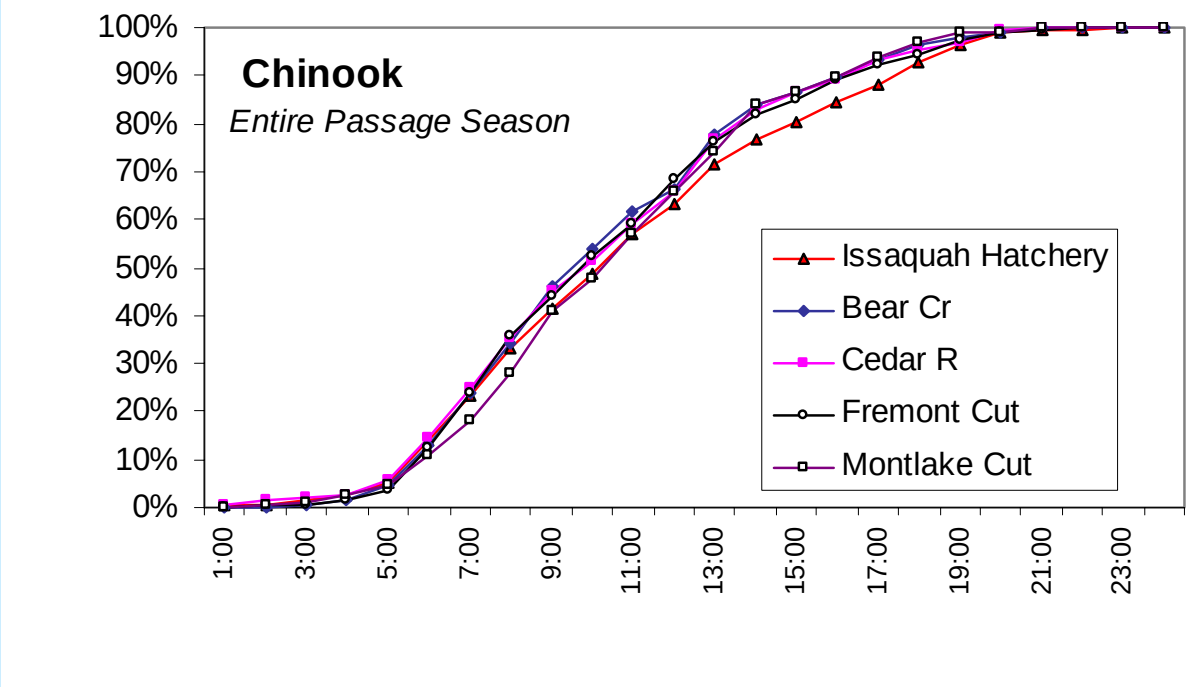
< 5/27/01: Detected L < Released L

5/27-6/12: Detected L > Released L

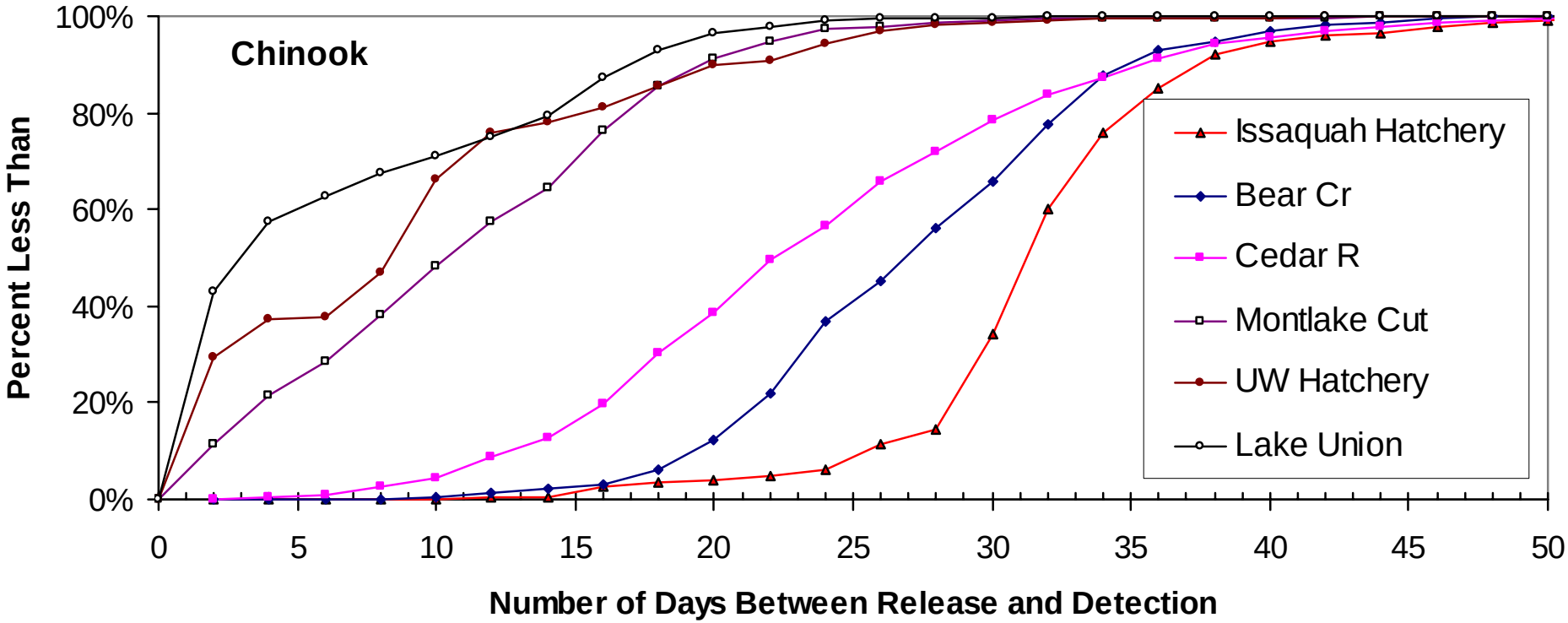
> 6/12/01: Detected L ~ Released L

Diurnal Variation in Passage at Ballard Locks

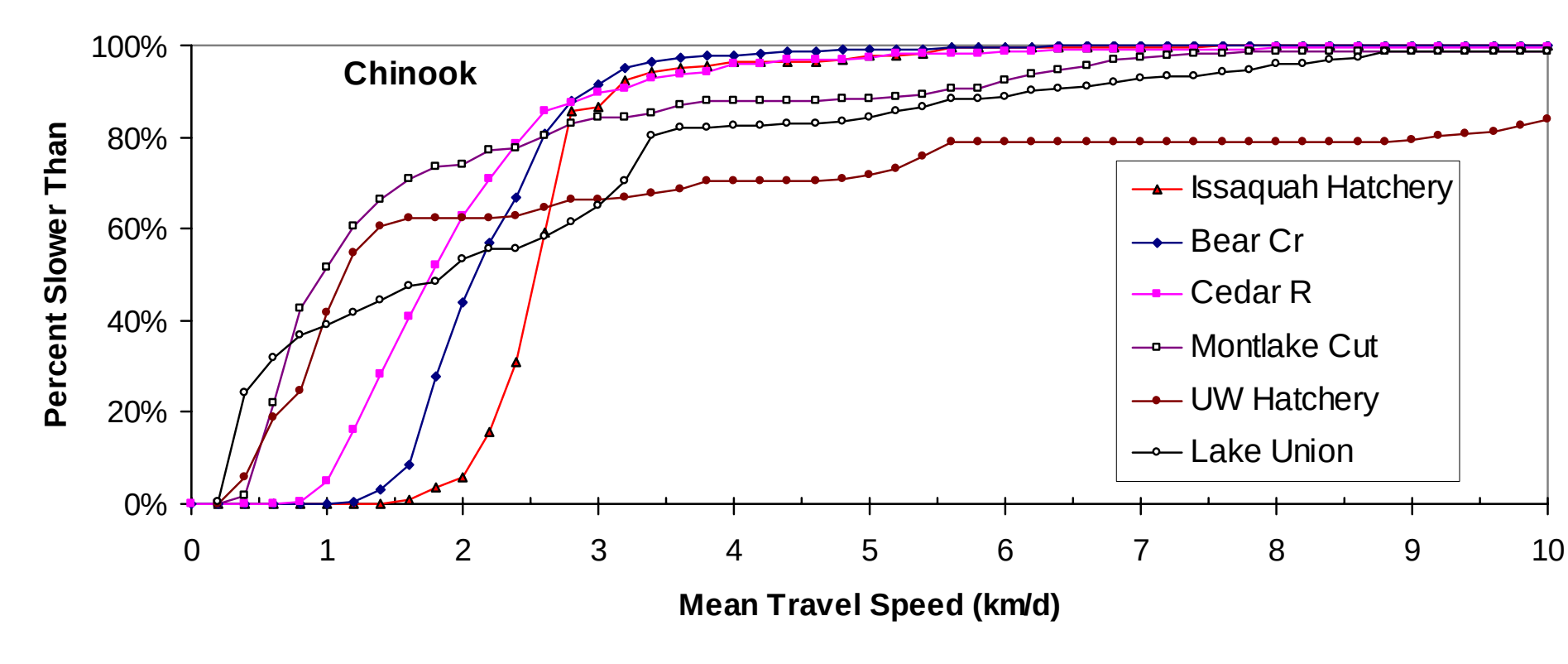




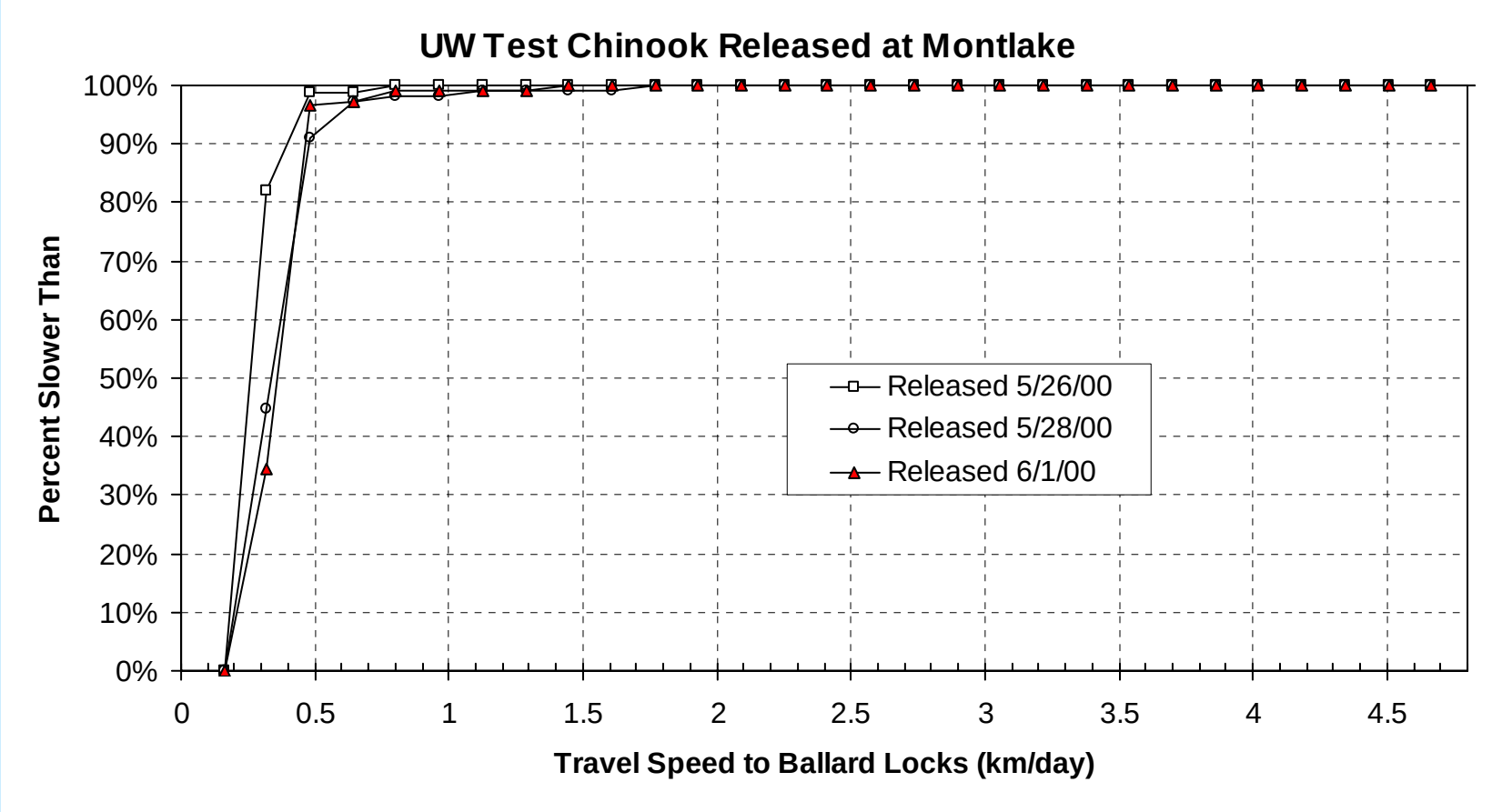
Migration Time



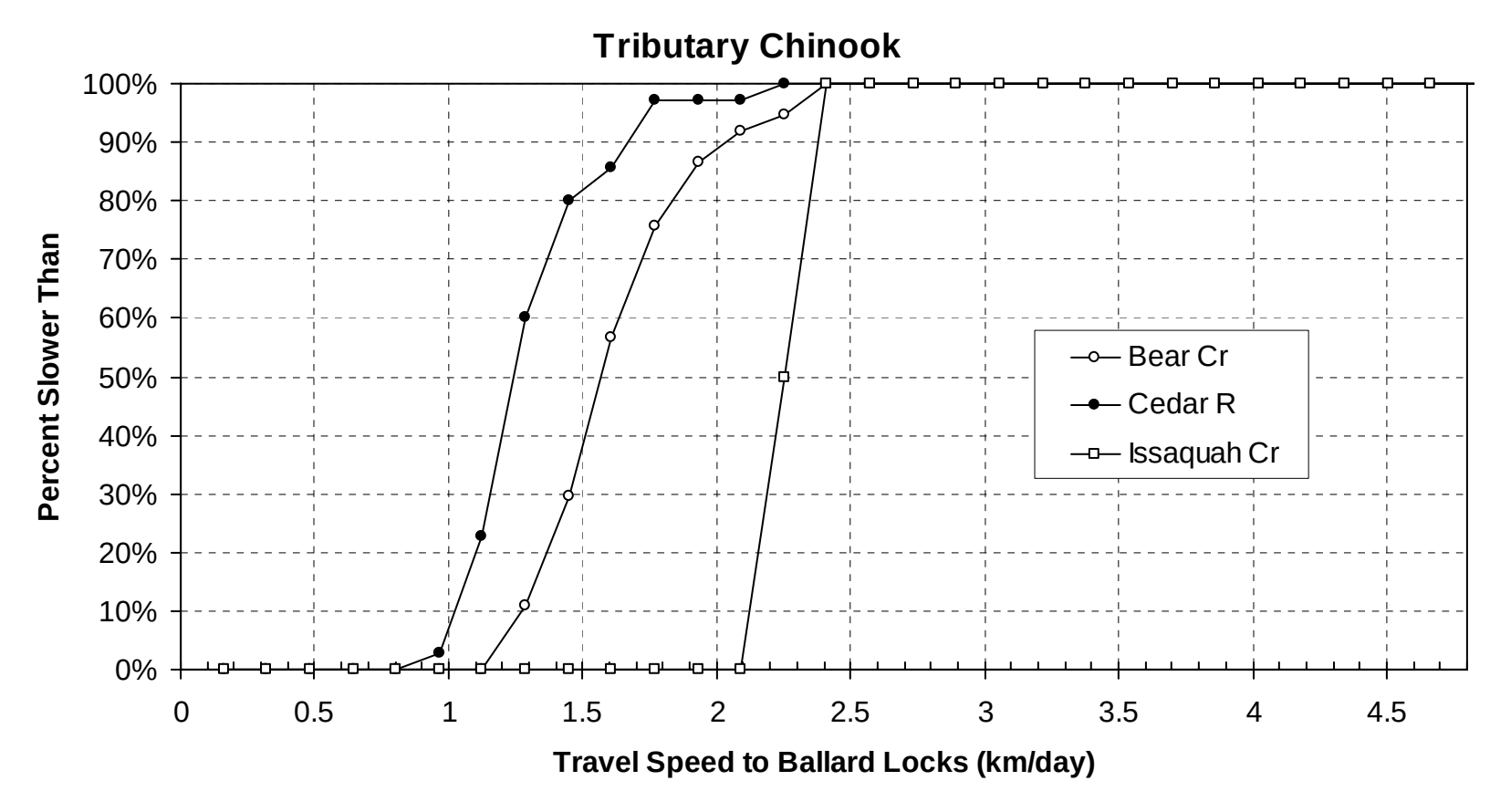
Average Migration Rate
2001 Data



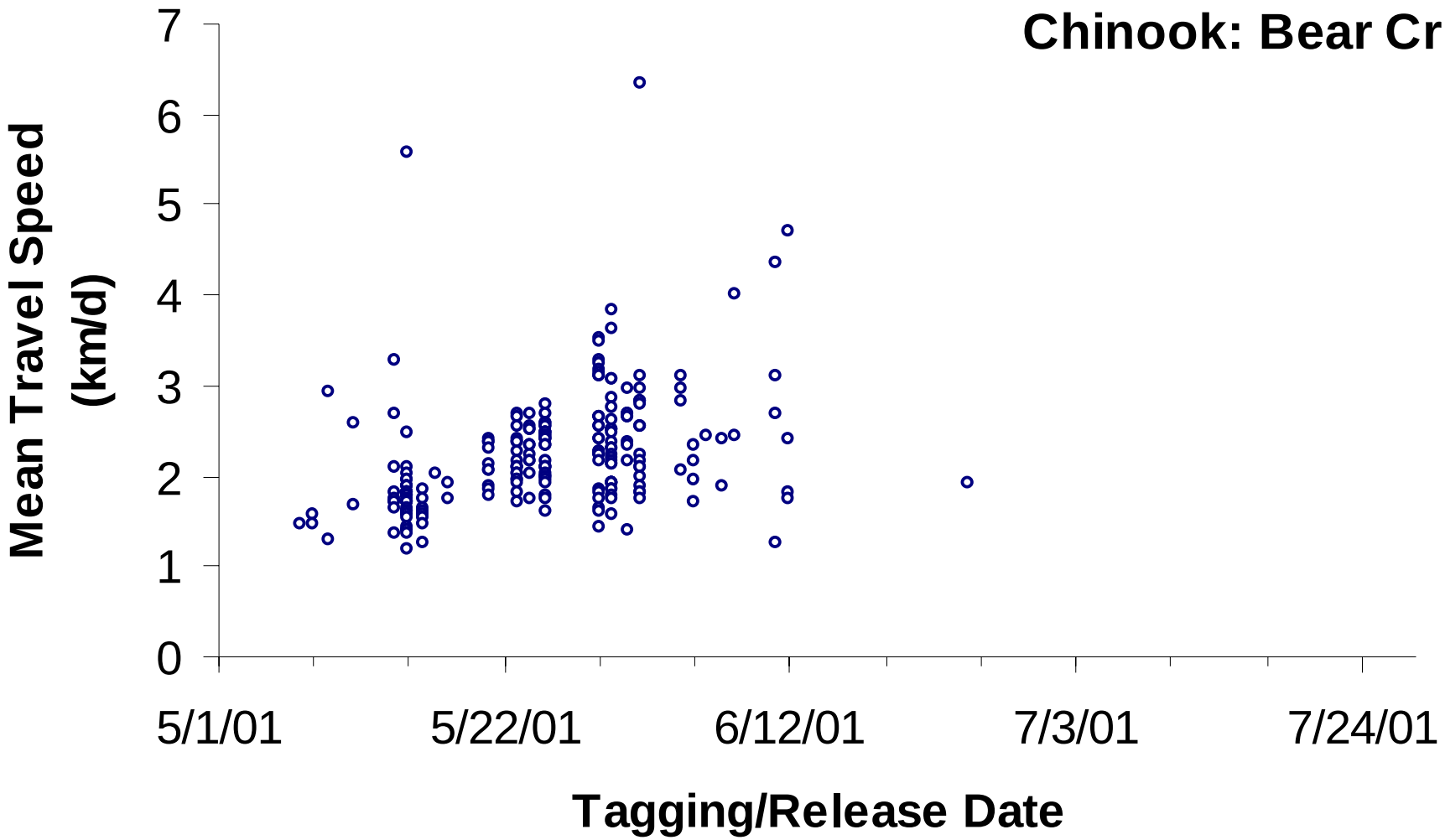
Average Migration Rate 2000 Data



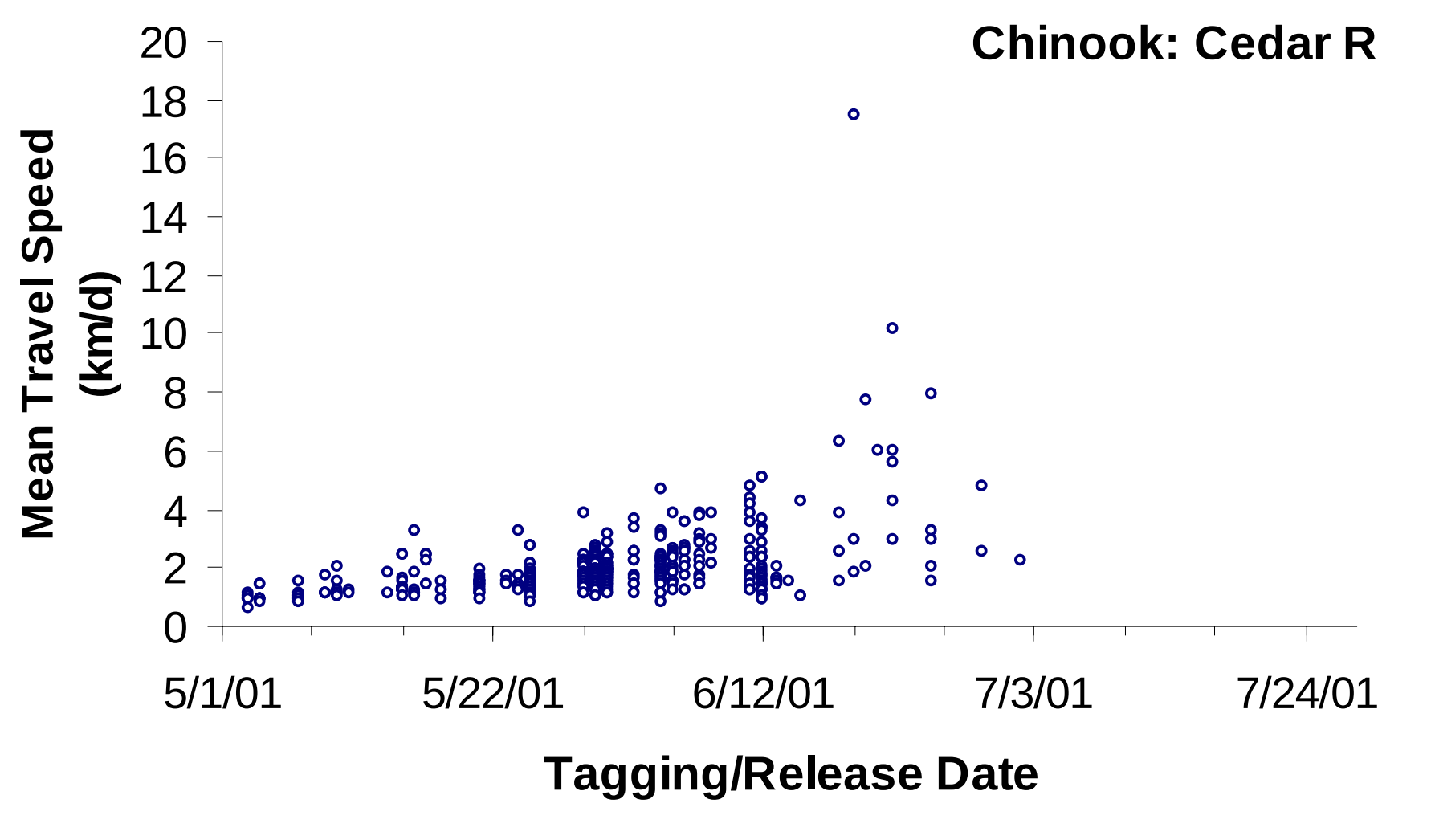
Average Migration Rate 2000 Data



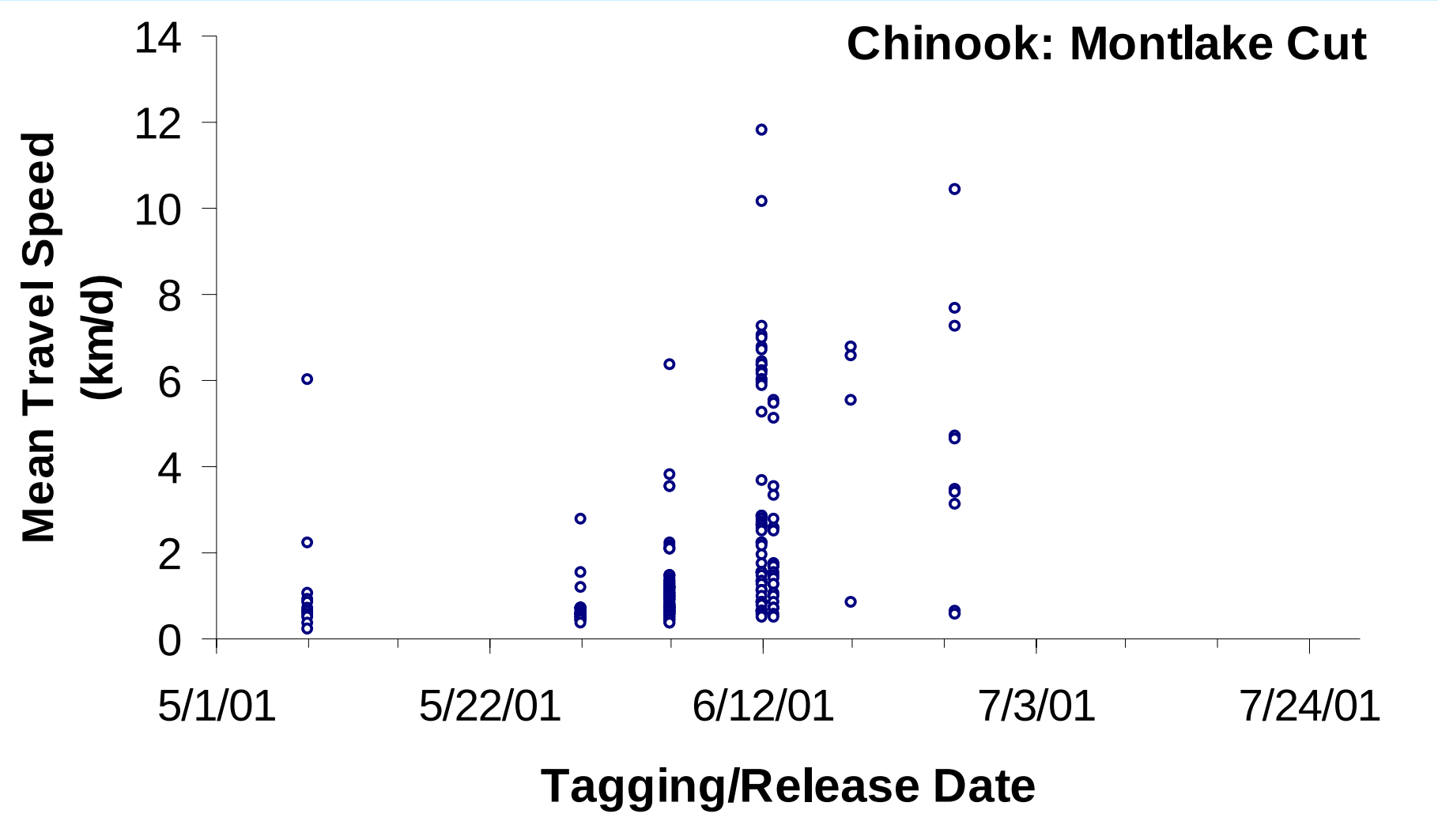
Average Migration Rate



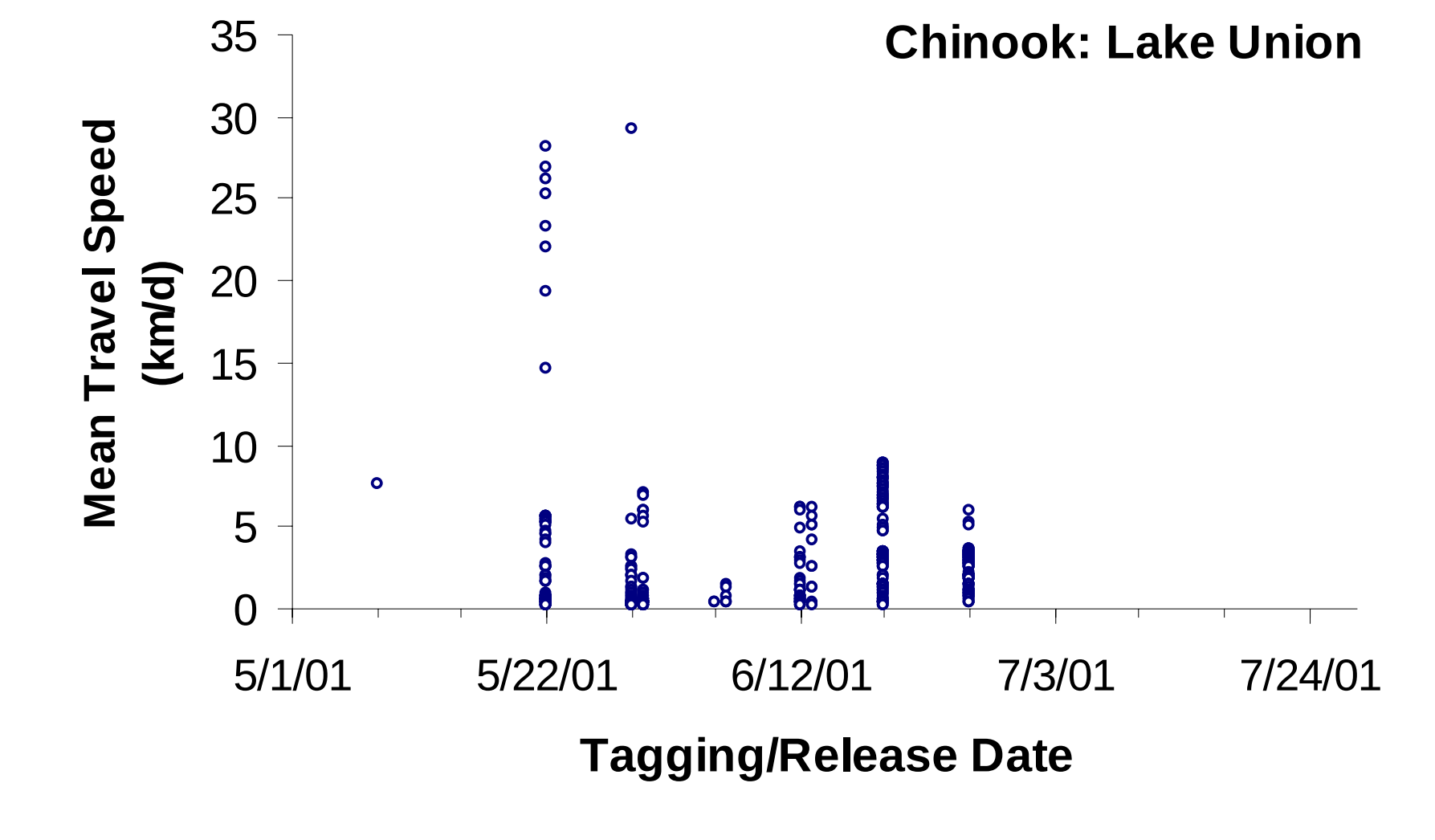
Average Migration Rate



Average Migration Rate



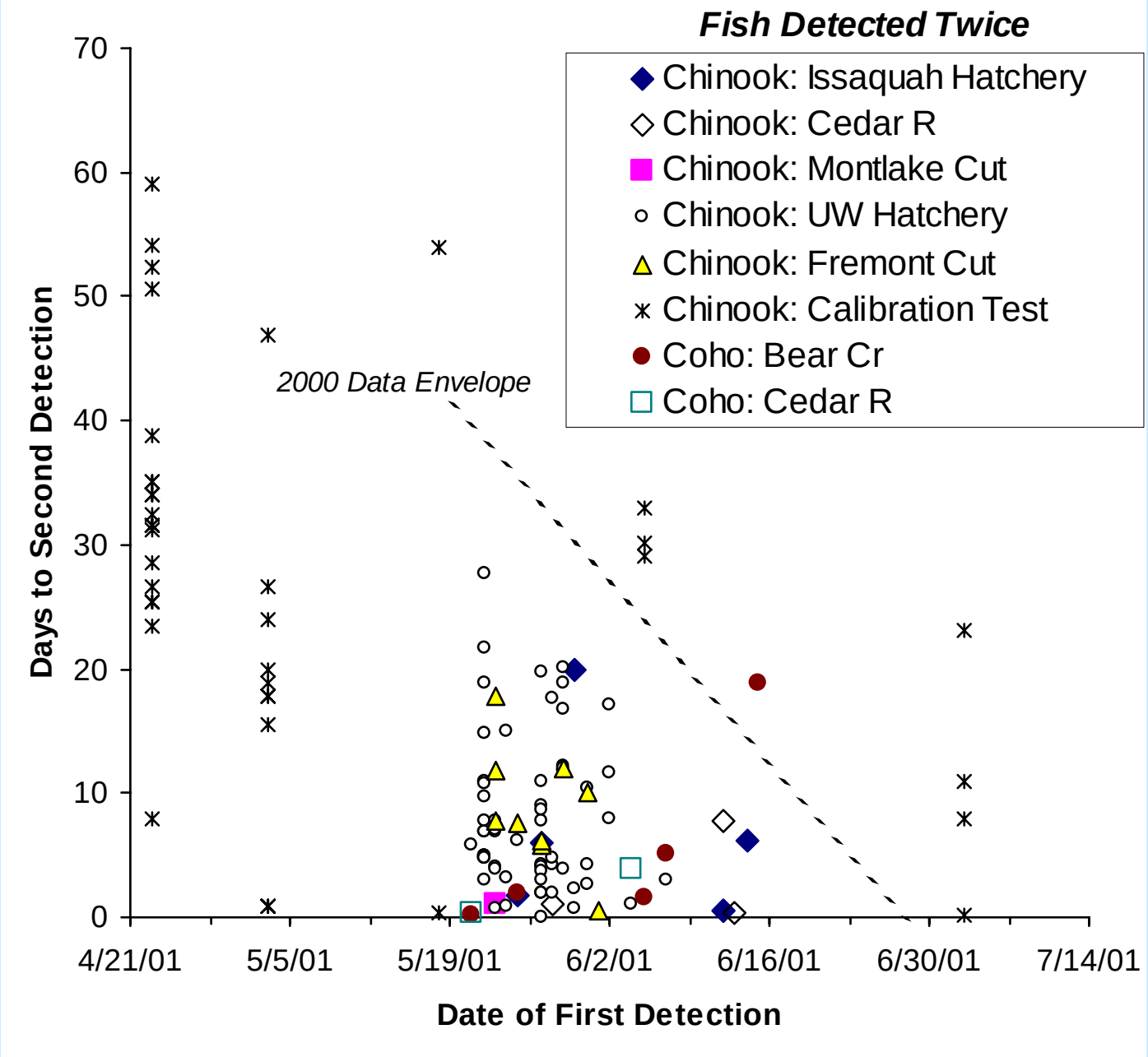
Average Migration Rate



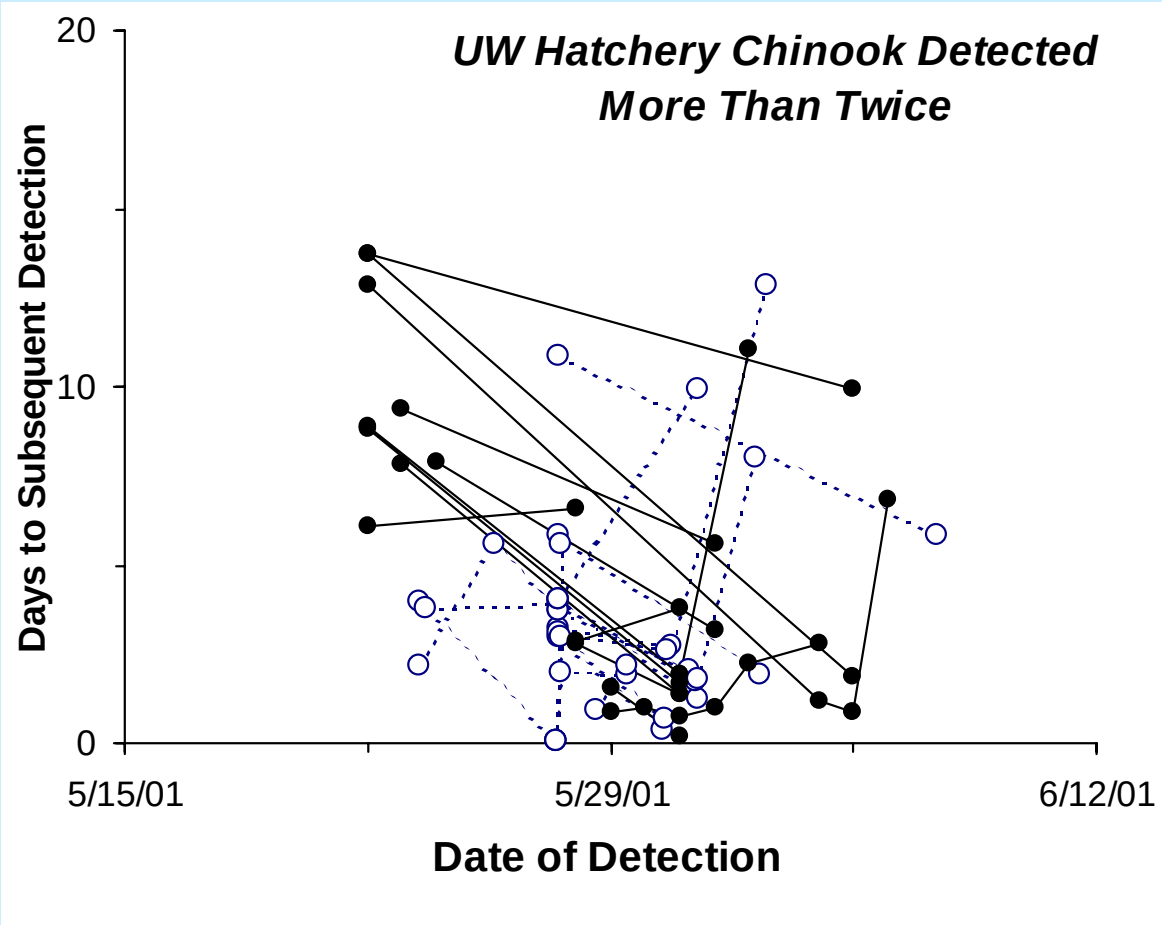
Freshwater Recapture Data

		Location of:		Migration Between Release and Recapture Locations					Subsequent Migration to Locks	
Species	**Origin**	**Tagging/Release**	**Recapture**	**Release Date**	**Days to Recapture**	**Approx. Travel Distance (km)**	**Average Migration Rate (km/d)**	**Average Growth Rate (mm/d)**	**Days**	**Average Migration Rate (km/d)**
Chinook	H	Issaquah Hatchery	Lake Union	05/15/01	14.3	73	5.1	0.7	12.0	0.5
	H	Issaquah Hatchery	Lake Union	05/15/01	14.3	73	5.1	0.6	*Not Detected at Locks*	
	H	Issaquah Hatchery	Lake Union	05/15/01	28.0	73	2.6	0.9	*Not Detected at Locks*	
	H	Issaquah Hatchery	Sammamish R near Redmond	05/15/01	6.6	24	3.7	-	*Handheld Reader Failed; Tag No.Unknown*	
	H	Issaquah Hatchery	Sammamish R near L. Bear Cr	05/15/01	8.7	33	3.8	0.6	*Not Detected at Locks*	
	W	Bear Creek	Montlake Cut	05/15/01	14.0	45	3.2	1.1	18.8	0.6
	W	Bear Creek	Lake Union	05/30/01	20.3	50	2.5	1.5	*Not Detected at Locks*	
	W	Bear Creek	Lake Union	05/25/01	25.2	50	2.0	0.5	*Mortality During Handling*	
	W [1]	Cedar River	Lake Union	05/15/01	14.1	33	2.3	0.7	1.7	3.8
	W [1]	Cedar River	Lake Union	06/11/01	8.4	33	3.9	1.3	0.6	10.9
	W	Cedar River	Cedar River	05/31/01	1.6	0	-	-	23.3	1.7
	W	Cedar River	Lake Union	05/25/01	32.4	33	1.0	1.2	*Not Detected at Locks*	
	H	UW Hatchery	Lake Union	05/21/01	0.8	3.5	4.4	0.5	*Not Detected at Locks*	
	H	Lake Union	Lake Union	06/12/01	7.0	0	-	-	*Not Detected at Locks*	
Coho	W	Cedar River	Lake Union	05/03/01	26.6	33	1.2	1.1	1.1	5.9
	W	Cedar River	Lake Union	05/21/01	22.3	33	1.5	1.4	0.7	8.4
	W	Cedar River	Lake Union	05/23/01	21.0	33	1.6	1.1	0.1	48.3
	W	Bear Creek	Bear Creek	05/09/01	1.2	0	-	-	33.0	1.7
	W	Bear Creek	Bear Creek	05/23/01	1.0	0	-	-	24.2	2.3
	W	Cedar River	Montlake Cut	05/21/01	22.4	28	1.3	1.3	*Not Detected at Locks*	

Recycling at Locks



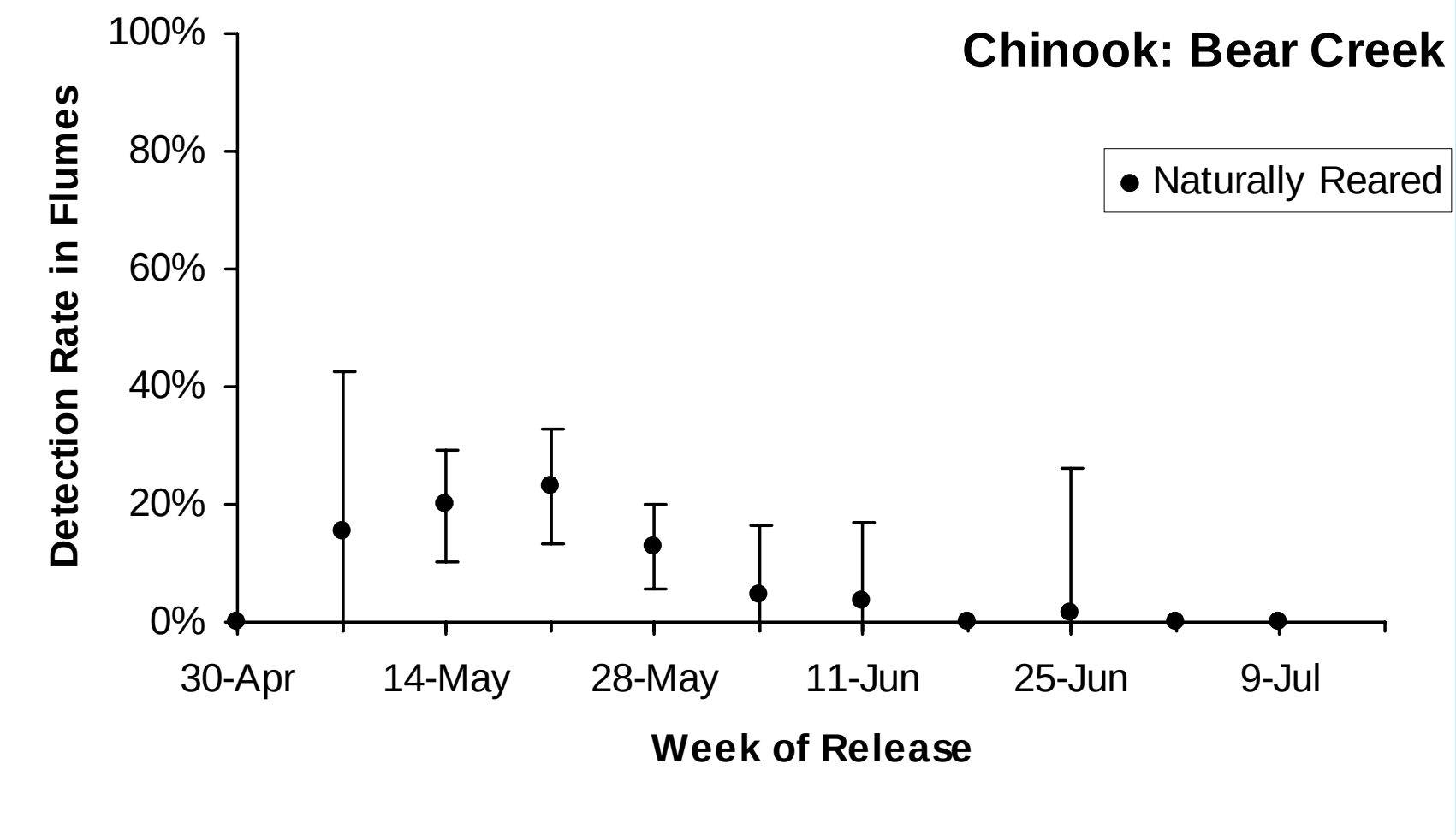
Multiple Recycling at Locks



Large Lock Recaptures: Chinook

Release Location	No. Caught	% Detected in Flumes	
Calib. Test	6	17%	
Issaquah Hatchery	8	0%	
Montlake	1	100%	
UW Hatchery	12	58%	*3 recycled (2x, 3x, 5x)*
Lake Union	8	0%	

Weekly Variation in Detection Rate in Smolt Flumes



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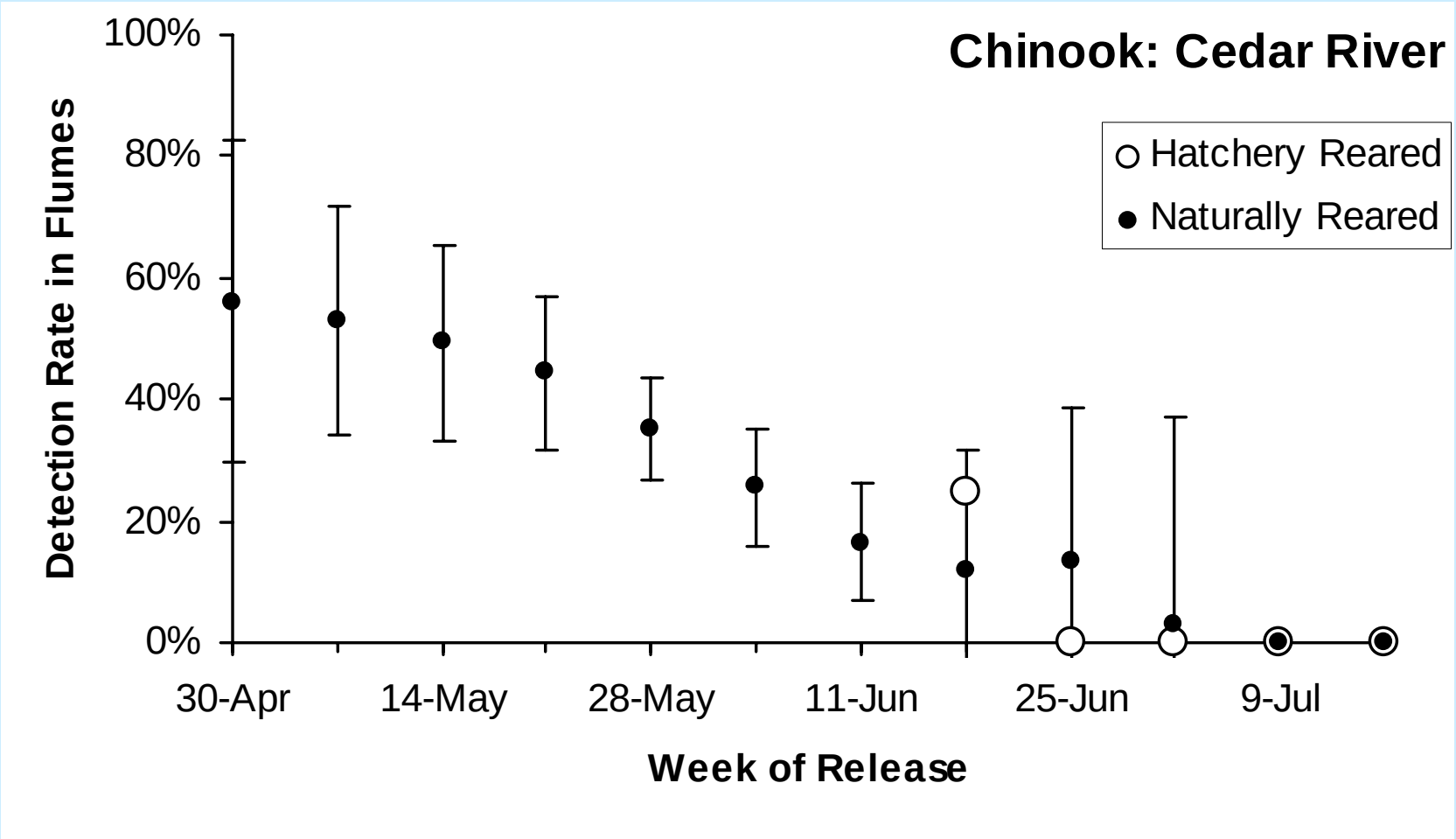
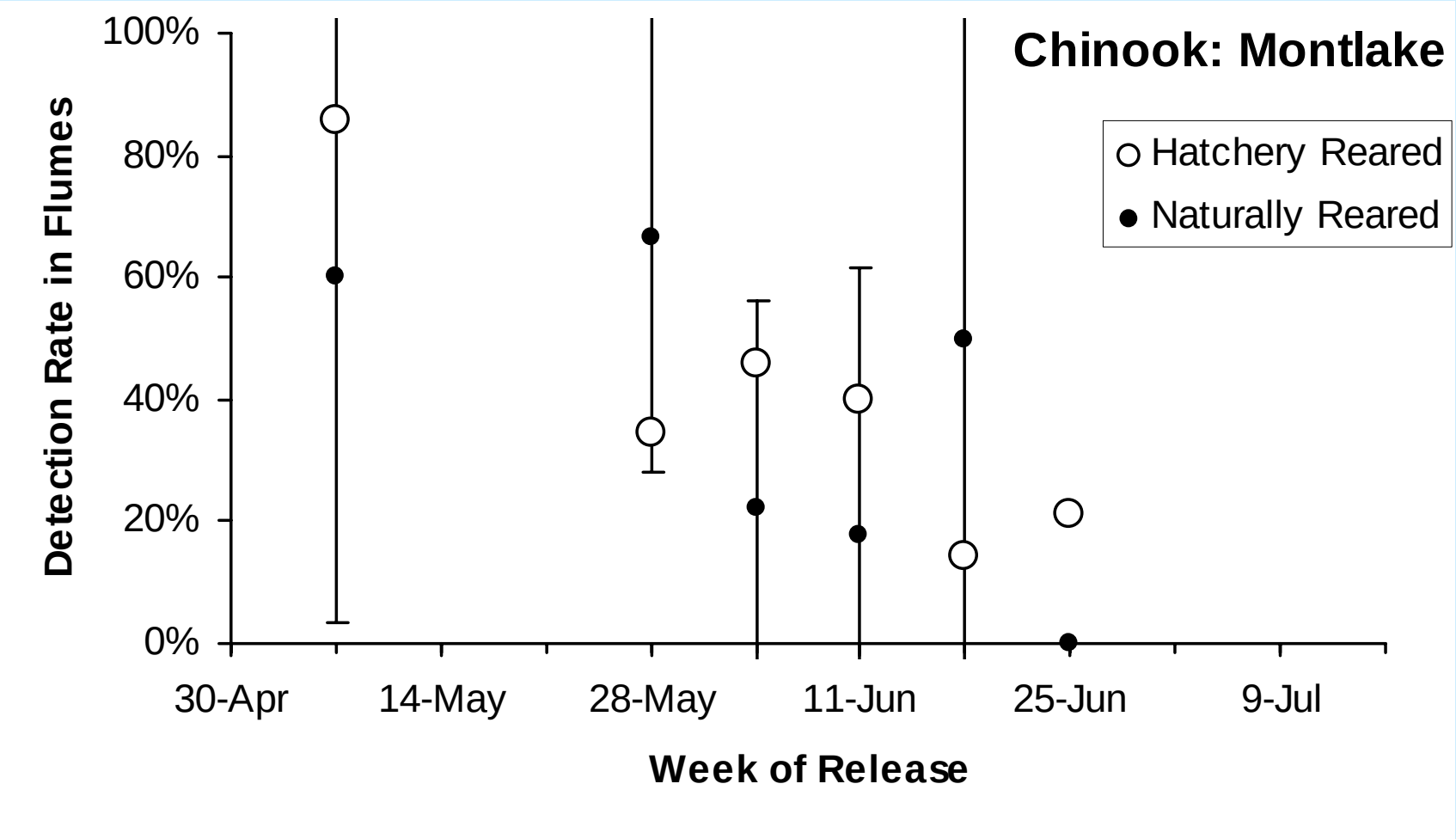


Weekly Variation in Detection Rate in Smolt Flumes



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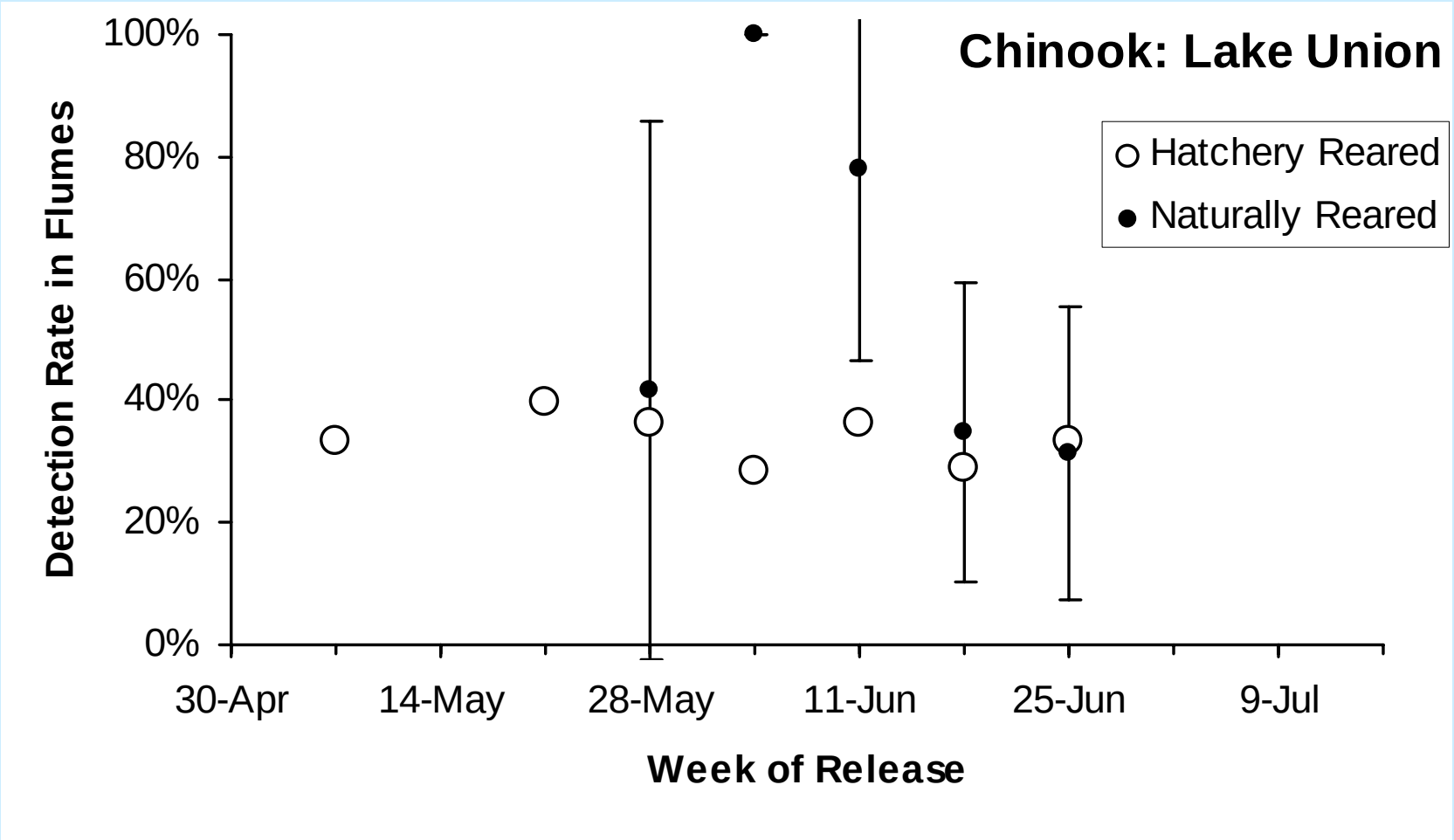
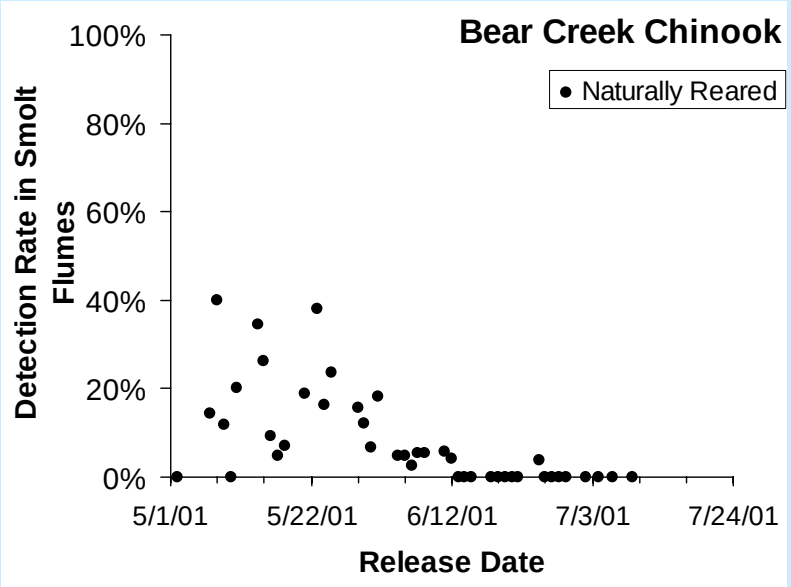
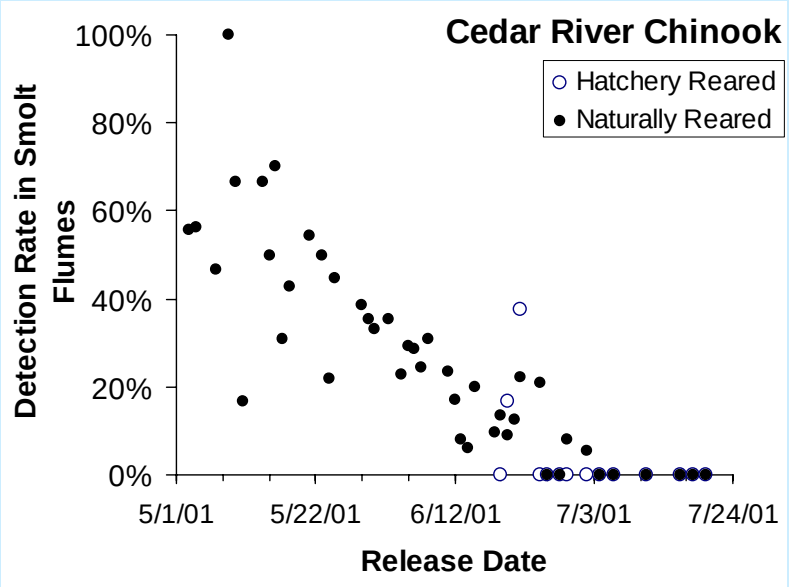
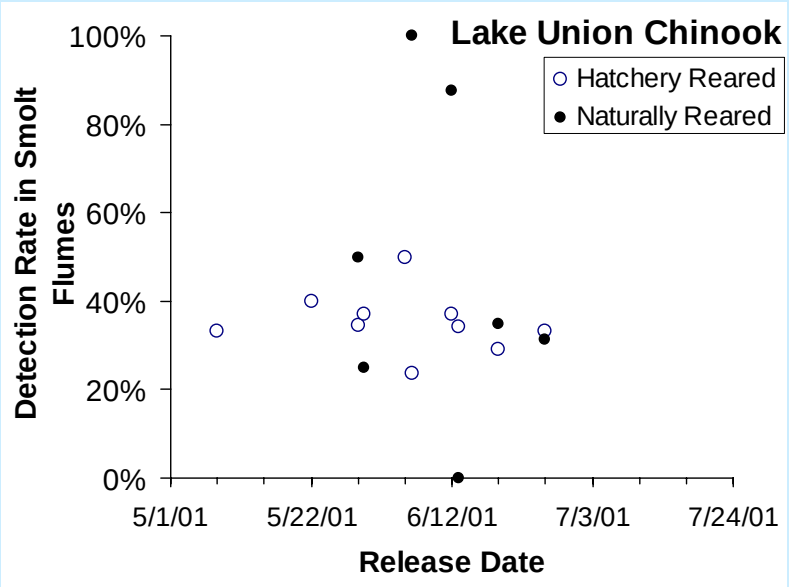
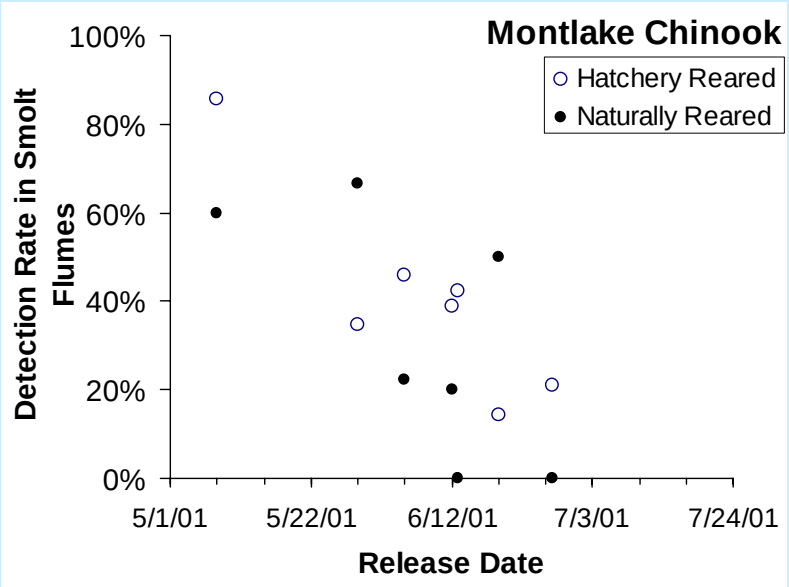


Variation in Detection Rate: All Groups

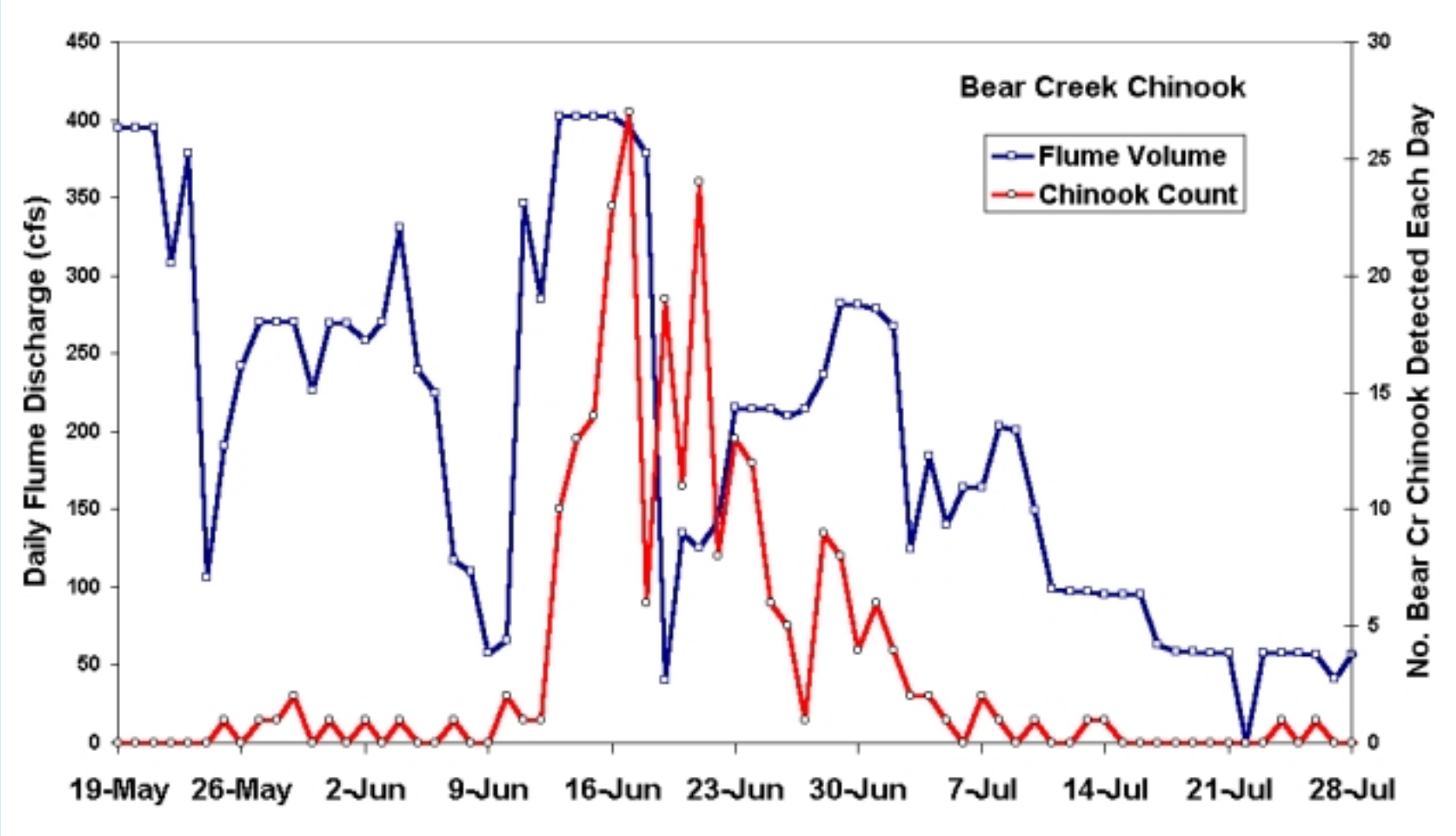








Flume Discharge & Passage



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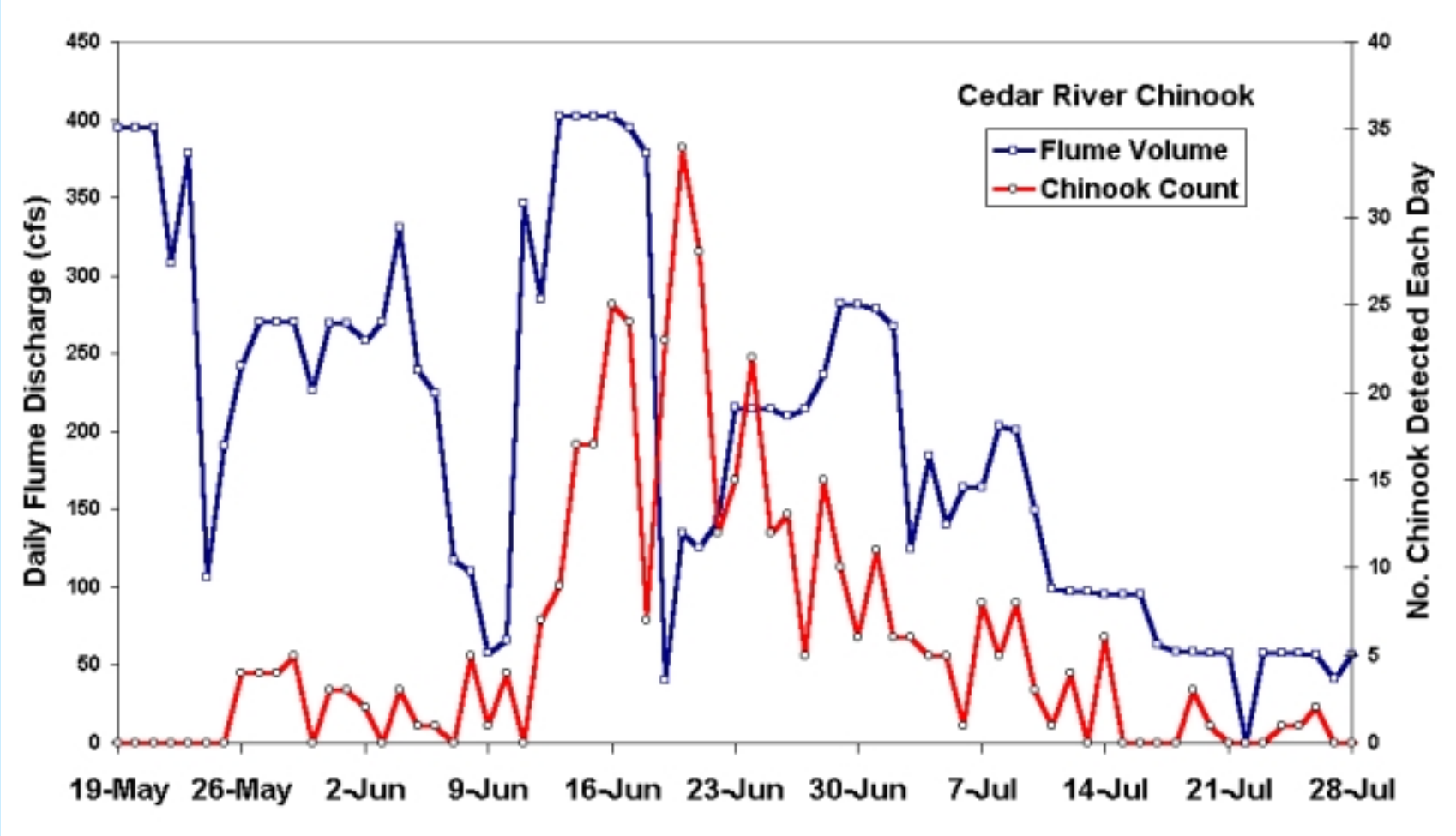
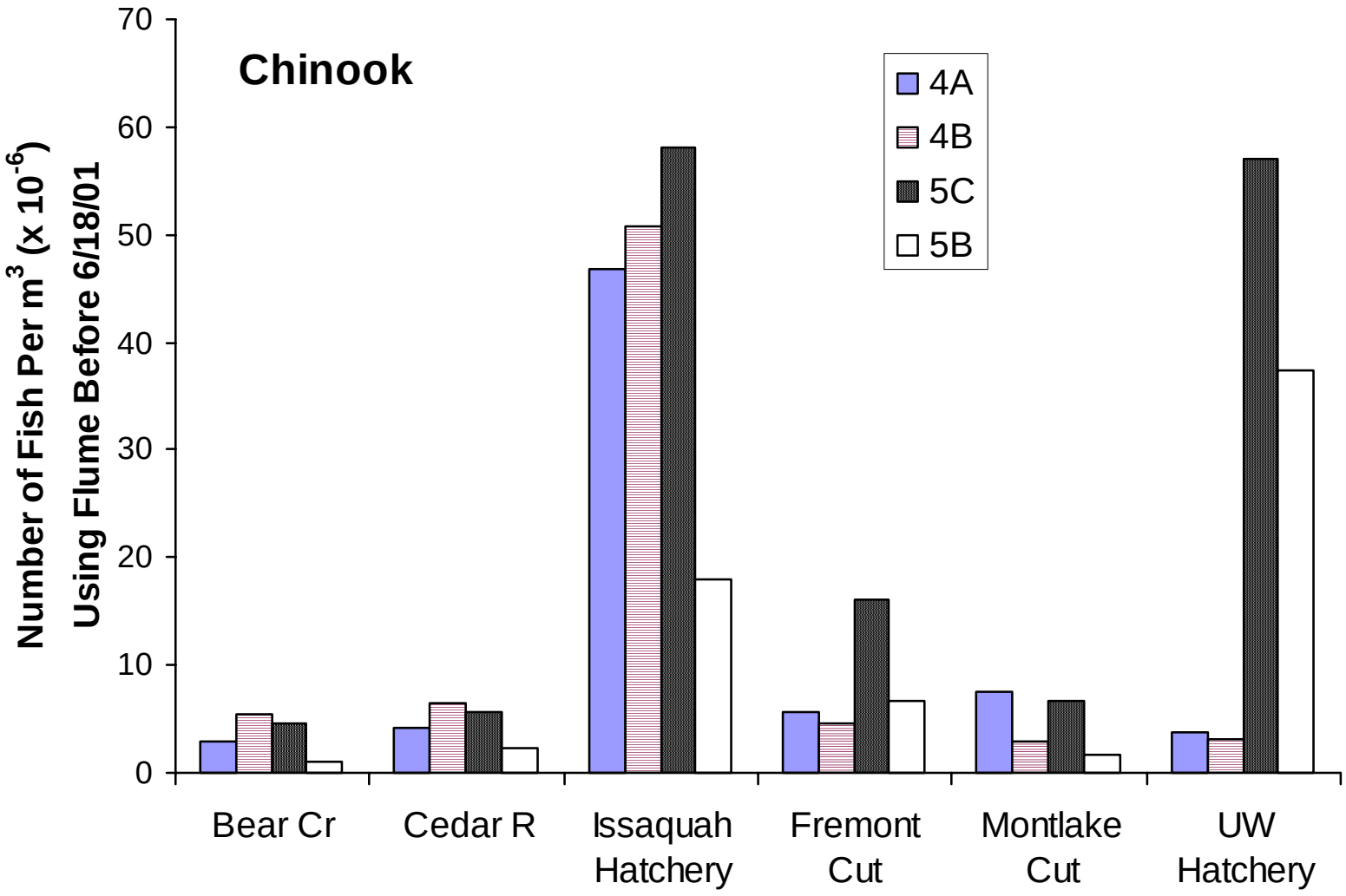


Flume Comparisons



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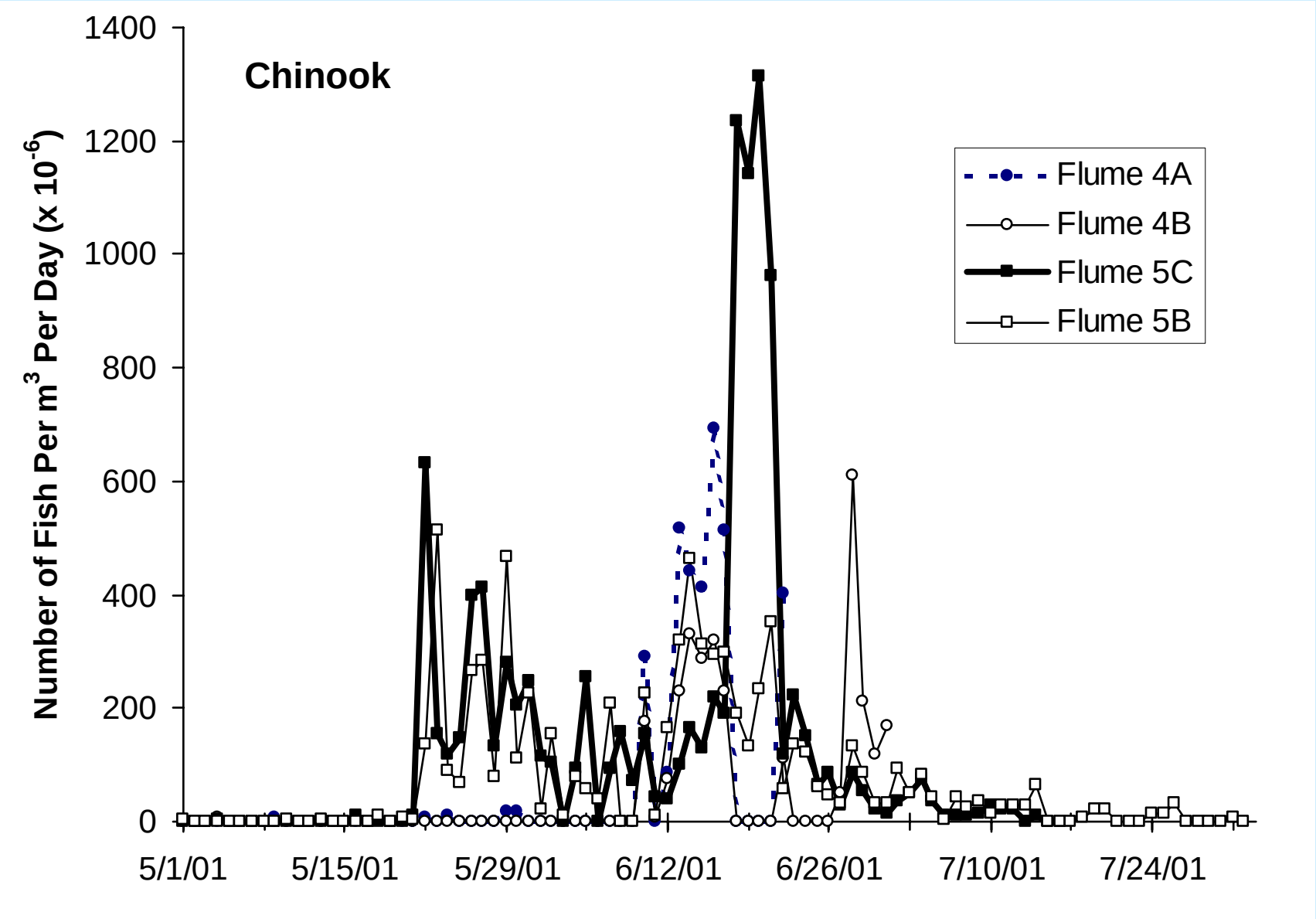

Saltwater Recaptures

Species	Release Location	Saltwater: Capture Location	Saltwater: Date Captured	Saltwater: Salinity (ppt)	Saltwater: Days in Saltwater	Hatchery / Natural
Chinook	Bear Cr	Railroad	6/18/01	15.9	0.8	N
	"	Railroad	6/19/01	-	0.00	N
	Lake Union	Statue of Liberty	6/18/01	22.9	2.9	H
	"	Piling Beach	6/22/01	-	4.0	H
	Montlake	Dolphin 8	6/18/01	27.8	-	H
	"	Railroad	6/21/01	-	-	N
	UW Hatchery	Statue of Liberty	6/6/01	-	6.1	H
Coho	Bear Cr	Groundswell	6/13/01	-	0.7	N
	"	Groundswell	6/20/01	20.5	8.3	N
	Cedar R	Railroad	6/19/01	-	0.03	N
	"	Groundswell	6/20/01	-	6.4	N
	Lake Union	Railroad	6/18/01	-	-	H

+ 21 Calibration Test Chinook; 3 captured 2x, 1 recycled through Locks