EVALUATION OF PINNIPED PREDATION IN THE BONNEVILLE DAM TAILRACE, 2002-2005

US Army Corps of Engineers ®
Portland District

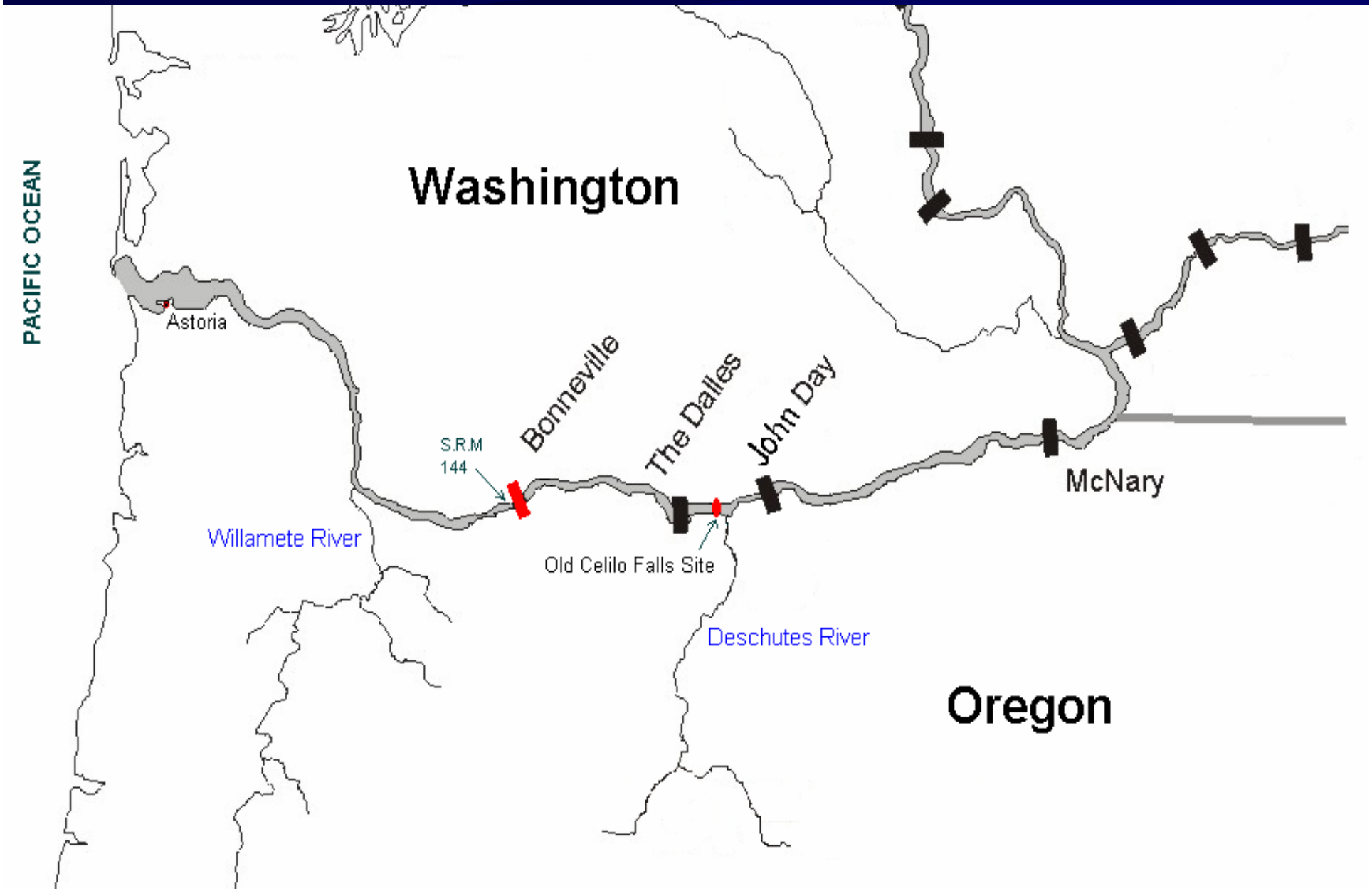
Fisheries Field Unit

National Marine Fisheries Service

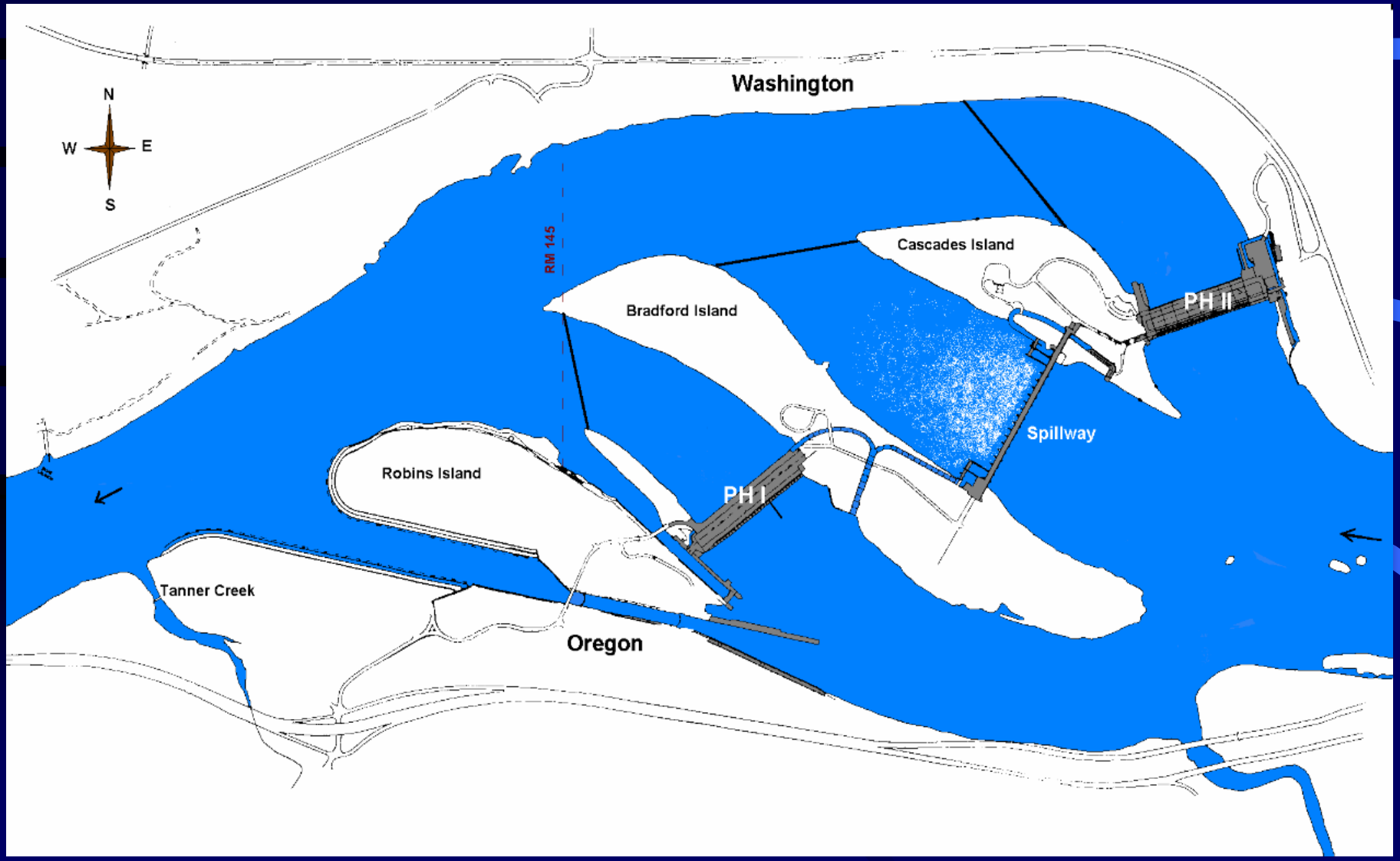
University of Idaho

OREGON Fish & Wildlife

Bonneville Dam, 144 Miles up the Columbia River



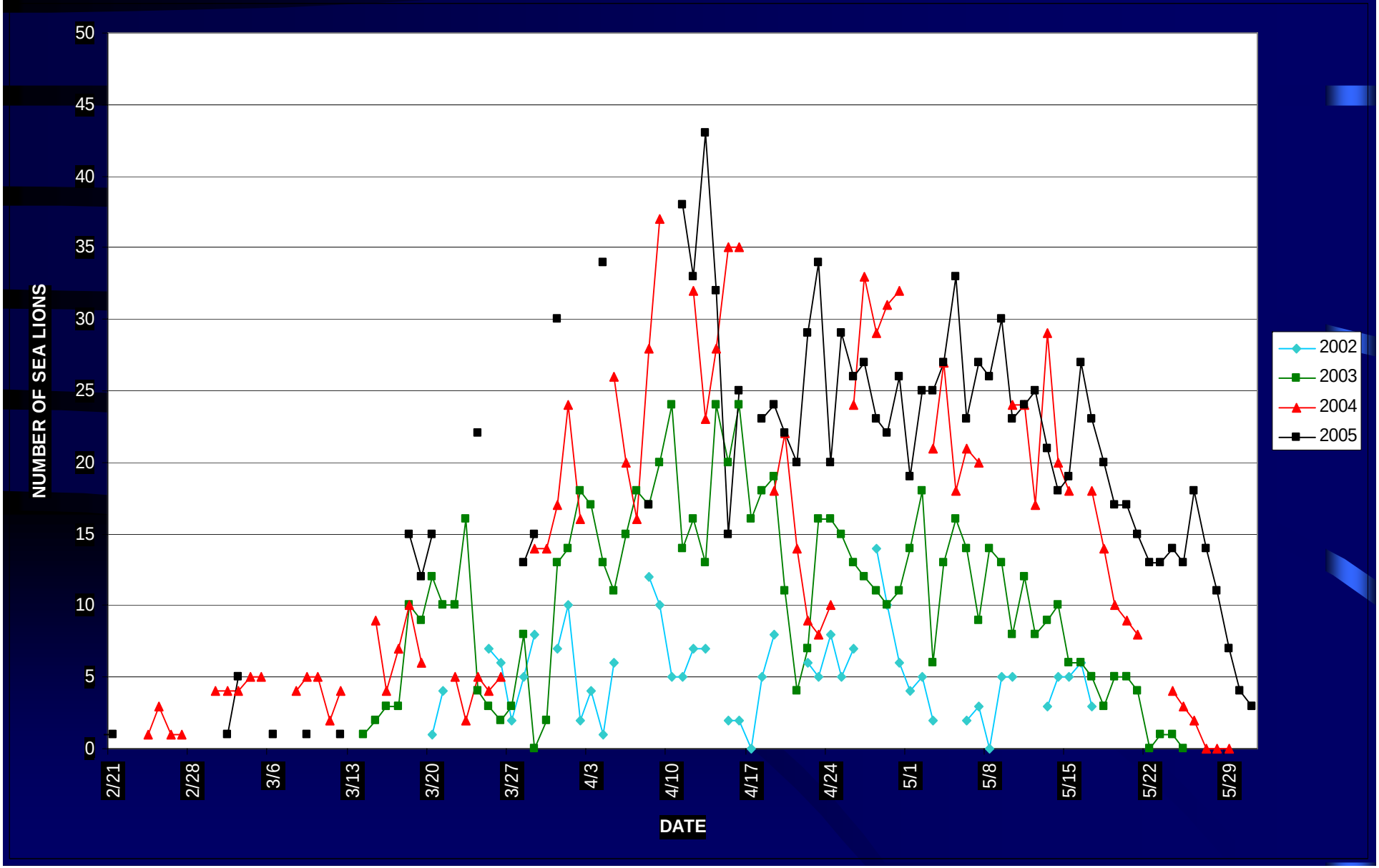
Location for Pinniped Observations, Bonneville Dam, 2002-2005



OBJECTIVES

- Seasonal timing, abundance of Pinnipeds
- Estimate # adult salmonids consumed
- Pinnipeds behavior within/between years

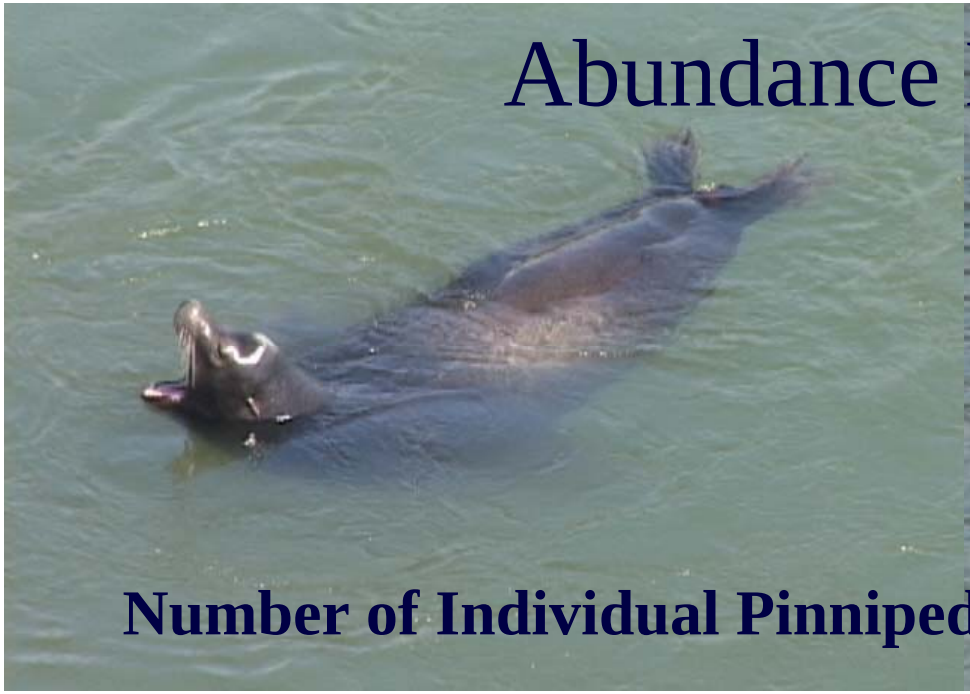
SEASONAL DISTRIBUTION OF PINNIPEDS AT BONNEVILLE, 2002-2005

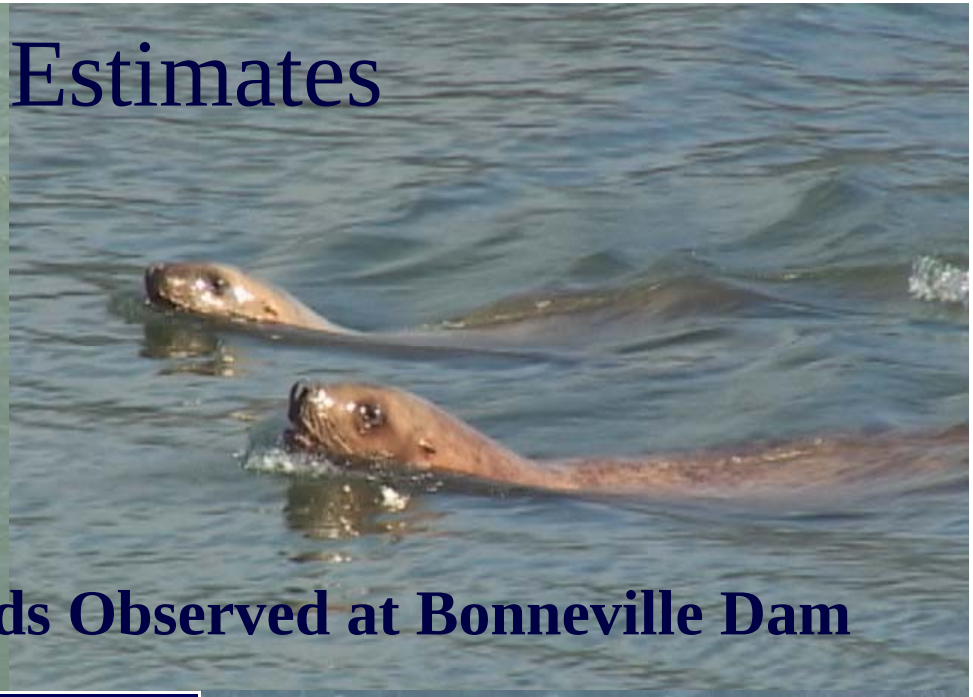


Number and Percent of Days Pinnipeds Observed Between 1 January and 31 May, Bonneville Dam

- 2002 – 58 days (38.4%)
- 2003 – 71 days (47.0%)
- 2004 – 97 days (63.8%)
- 2005 – 101+ days (66.9%)

Abundance Estimates





Number of Individual Pinnipeds Observed at Bonneville Dam

	2002	2003	2004	2005
California Sea Lions	30	106	101	80+
Steller's Sea lions	0	3	2	4
Harbor Seals	1	2	2	1
Total Pinnipeds	31	111	105	85+

MAXIMUM AND MEAN PINNIPEDS OBSERVED

Number of Pinnipeds	2002	2003	2004	2005
Maximum Daily Pinnipeds Seen	14	32	37	43
Mean Daily Pinnipeds Seen	5.2	10.7	14.6	21.7

Number of Days Individual Pinnipeds Present at Bonneville Dam, 1 January – 31 May

	2002	2003	2004	2005
Mean Days	4.7	6.4	7.5	8.4
Range Days	1 - 14	1 - 25	1 - 31	1 - 39

PREDATION IMPACTS AT BONNEVILLE DAM

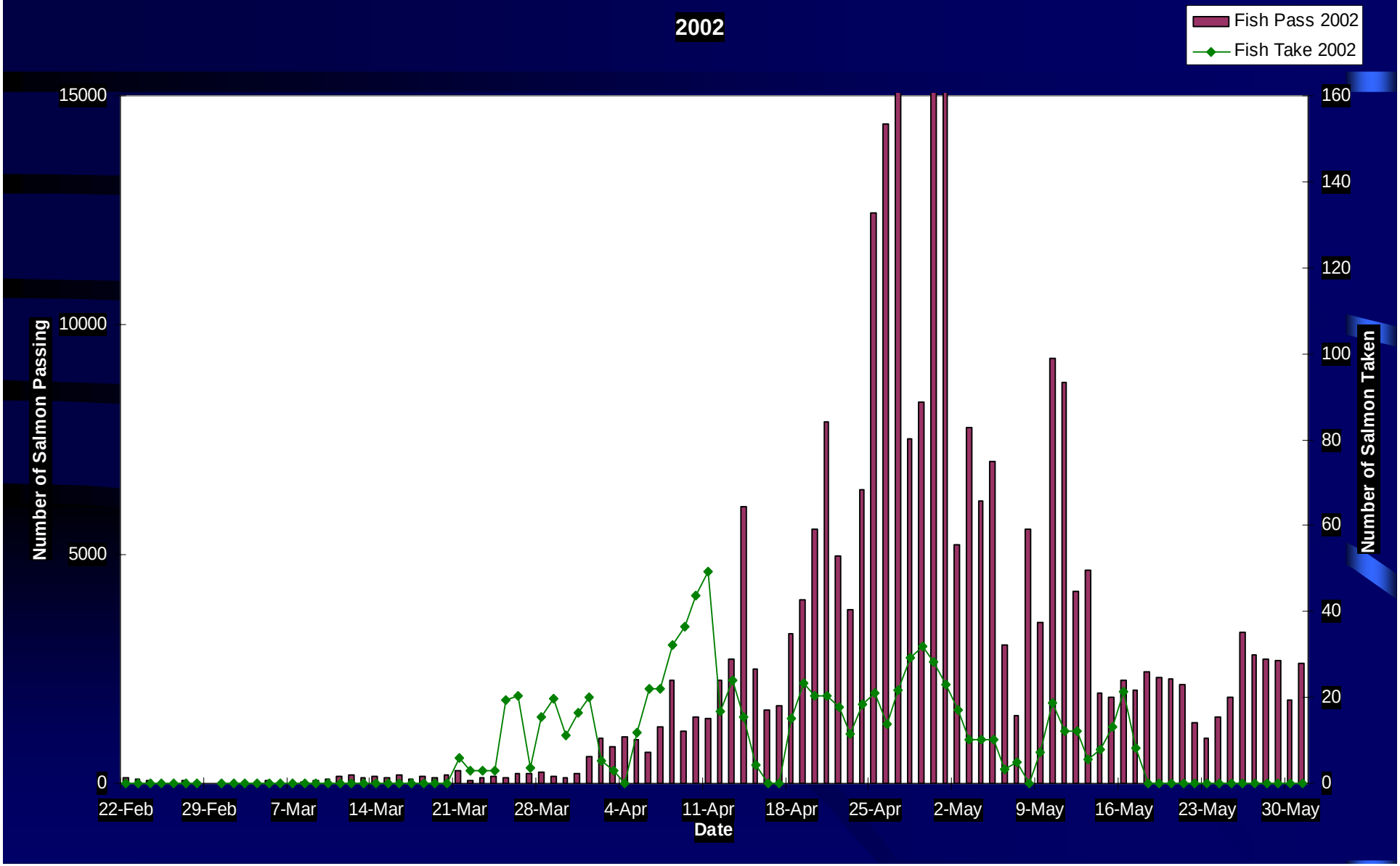
Estimate of the Number and Percent of Salmonids Caught by Pinnipeds at Bonneville Dam from 1 January to 31 May

Study Year	Total Hours Observed	Estimate of Salmonids Caught	Total Salmonids Passing Bonneville	Percentage of Salmonids Run Taken by Pinnipeds
2002	734	929	284,733	**0.3%**
2003	1,440	2,396	217,185	**1.1%**
2004	553	3,872	186,804	**2.0%**
2005	1,109	3,052	82,006	**3.6%**

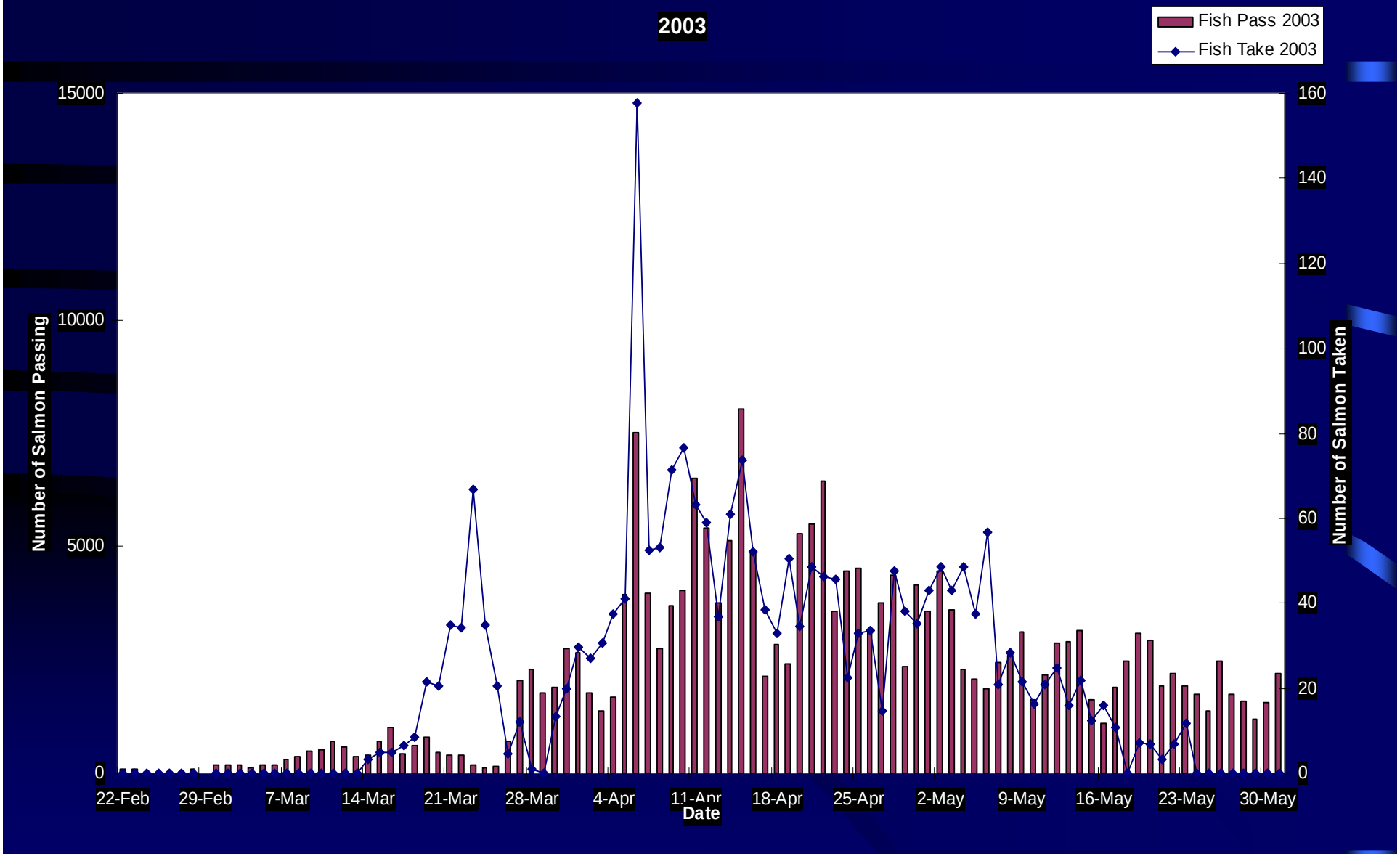
Percent of Salmonids That Were Caught But Escaped

- 2002 – 11.9%
- 2003 – 9.5%
- 2004 – 1.8%
- 2005 - 0.8%

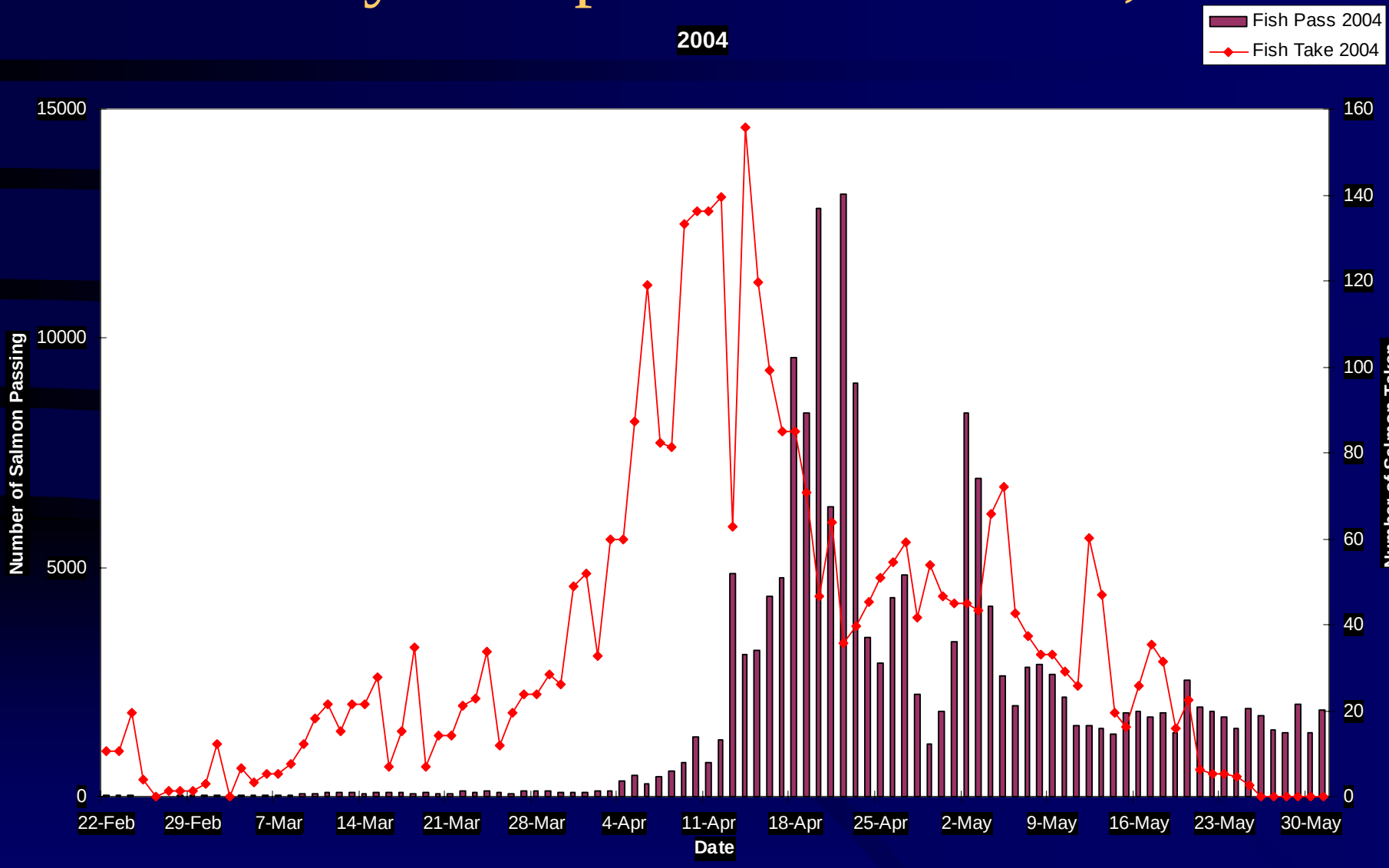
Number of Salmon Passing and Number Taken by Pinnipeds at Bonneville, 2002



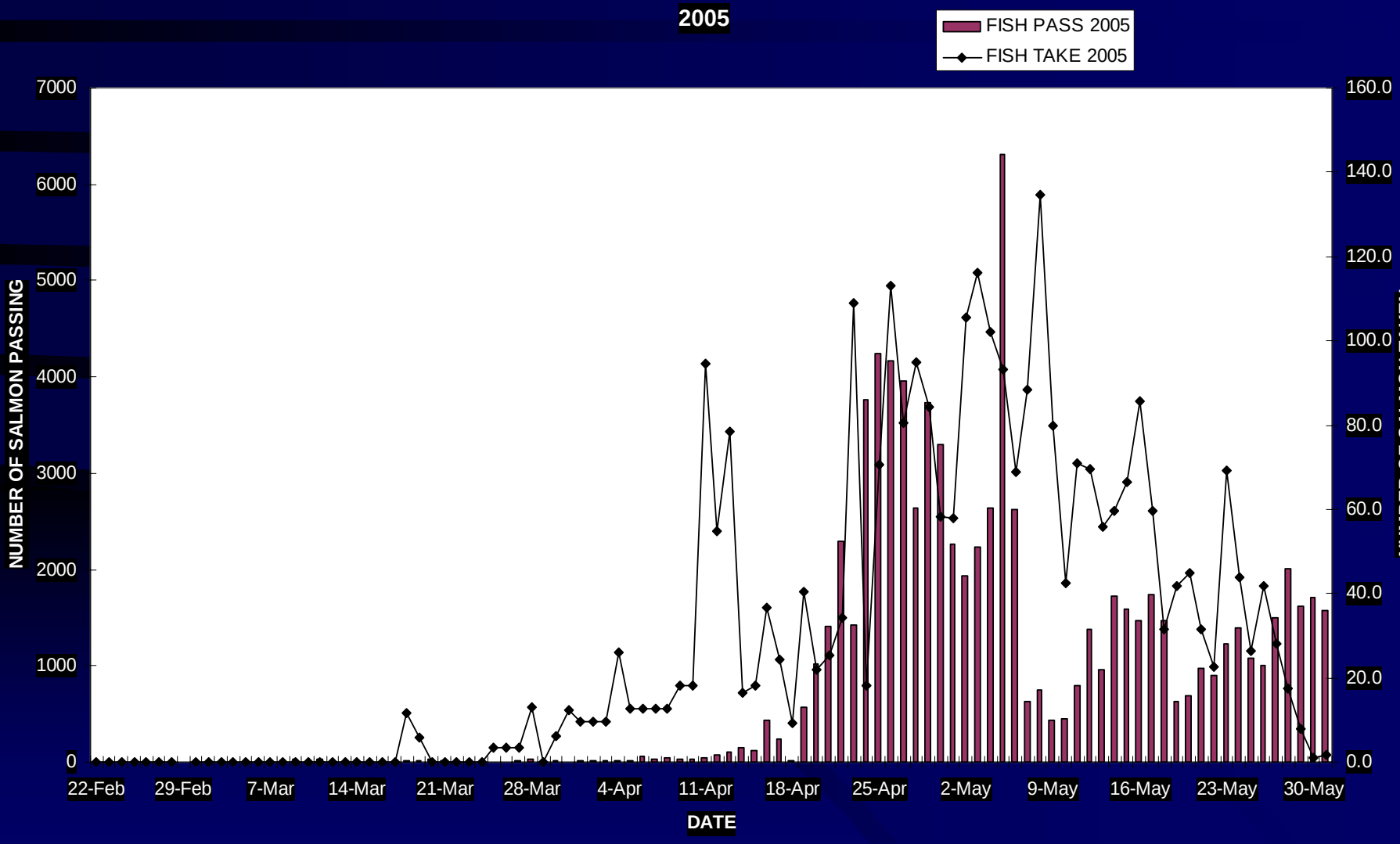
Number of Salmon Passing and Number Taken by Pinnipeds at Bonneville, 2003



Number of Salmon Passing and Number Taken by Pinnipeds at Bonneville, 2004



Number of Salmon Passing and Number Taken by Pinnipeds at Bonneville, 2005



Percentage of Salmonids Caught by Pinnipeds, by Location, and Percentage of Salmon Passing ( )

Location	2002	2003	2004	2005
PH2	55.8 (68.4%)	56.3 (69.4%)	57.4 (60.9%)	45.0 (57.5%)
PH1	31.1 (31.6%)	38.9 (30.6%)	37.8 (39.1%)	33.2 (42.5%)
Spill	14.1	4.5	5.0	21.8

Salmonid Catch Rate at Bonneville Dam (using expanded estimates and total daylight hours 1 January – 31 May)

Location	2002	2003	2004	2005
PH2	0.23	0.56	0.91	0.57
PH1	0.13	0.39	0.60	0.42
Spill	0.02	0.05	0.08	0.27
Total Project	0.13	0.33	0.53	0.42

Prey Taken by Pinnipeds

- Primary Prey Taken – Spring Chinook
- Lamprey are Next Most Common Prey
- 2002 – 5.4% 2003 – 11.3% 2004 – 12.2% 2005 – 25.1%
- Shad are Taken When Present in May
- 2002 – 0.0% 2003 – 3.5% 2004 – 2.0% 2005 – 2.8%
- Steelhead, Smolts, Bass, Sturgeon, Sucker, and Northern Pikeminnow also Observed Taken

Number of Highly Identifiable Pinnipeds That Were Seen to Return to Bonneville in Subsequent Years

	2002	2003	2004	2005
2002	16	12/16 (76%)	11/16 (69%)	
2003		72	36/72 (50%)	
2004				

NEW BEHAVIOR FOR 2004

Eating Fish Near Dam

Entering Fishways

Hauling Out

ENTERED FISHWAYS 2005

MORE HAUL OUT SITES 2005

SEA LIONS ENTERING FISHWAYS

- C404 1ST SEEN IN LOWER PORTION OF WASHINGTON SHORE LADDER IN 2004
- C404 WAS SEEN IN ONE OR BOTH LADDERS AT BONNEVILLE EVERY DAY BETWEEN 3/11/05 AND 3/31/05
- 2 SEA LIONS SEEN IN WASHINGTON SHORE FISH LADDER 3/27 AND 4/4
- TOTAL OF 9-10 DIFFERENT SEA LIONS NOTED ENTERING FISHWAYS, ONLY C404 AND ? SEEN ABOVE OVERFLOW WEIRS

ACTIONS TO KEEP SEA LIONS OUT OF FISHWAYS AT BONNEVILLE DAM, 2005

- **HARASSMENT** – ABOVE WATER PYROTECHNICS TO CHASE SEA LION OUT OF FISHWAYS, HIGH PRESSURE WATER?
- **ACOUSTIC DETERRENTS** – 205 dB 15 kHz DEVICES USED AT BALLARD LOCKS, INSTALL IN LOWER PORTION OF WASHINGTON SHORE TO KEEP SEA LIONS OUT
- **ENTRANCE EXCLUSION GATES** – AS AT WILLAMETTE VALLEY, DESIGN, FABRICATE, AND INSTALL GATES WITH 16” SPACED BARS AT 4 MAIN ENTRANCES

RESULTS 2005 HAZING

- ACTIVE HAZING BEGAN 4/6, INITIAL HAZING EFFECTIVE, LOST EFFECTIVENESS, UP TO 9-10 DIFFERENT SEA LIONS SEEN INTO FISHWAYS
- HIGH PRESSURE WATER NOT EFFECTIVE DUE TO DISTANCE INVOLVED TO WATER/SEA LIONS
- ACOUSTIC DETERRENT INSTALLED 4/21, NO SEA LION SEEN ABOVE THAT AREA SINCE, ALSO NO SIGN OF C404 SINCE
- SLED'S FAST TRACKED, INSTALLED ALL 4 5/30
- NEED TO THANK USGS-COOK AND UofI FOR OBSERVERS ON SHORT NOTICE FOR 2005

RESULTS TAILRACE HAZING

- NOAA/ODFW/WDFW/COE – USED UNDERWATER AND ABOVE WATER PYROTECHNICS AND RUBBER BULLETS 5/5, 5/6, W/BOATS 5/17, 5/18 FROM SHORELINE ONLY
- SEA LIONS CHASED OUT OF TAILRACES INITIALLY, RETURNED WITHIN HOURS OF STOPPING

SUMMARY POINTS

- Pinnipeds Arriving Earlier Each Year
- Individuals Staying for Longer Periods
- Increasing Average Number of Pinnipeds/Day
- Increasing Number of Salmon Taken (#, rate, %)
- Increased Percentage of Lamprey in Diet
- Number of Salmon Escaping Decreasing
- Beginning to Haul Out/Get into Fishways