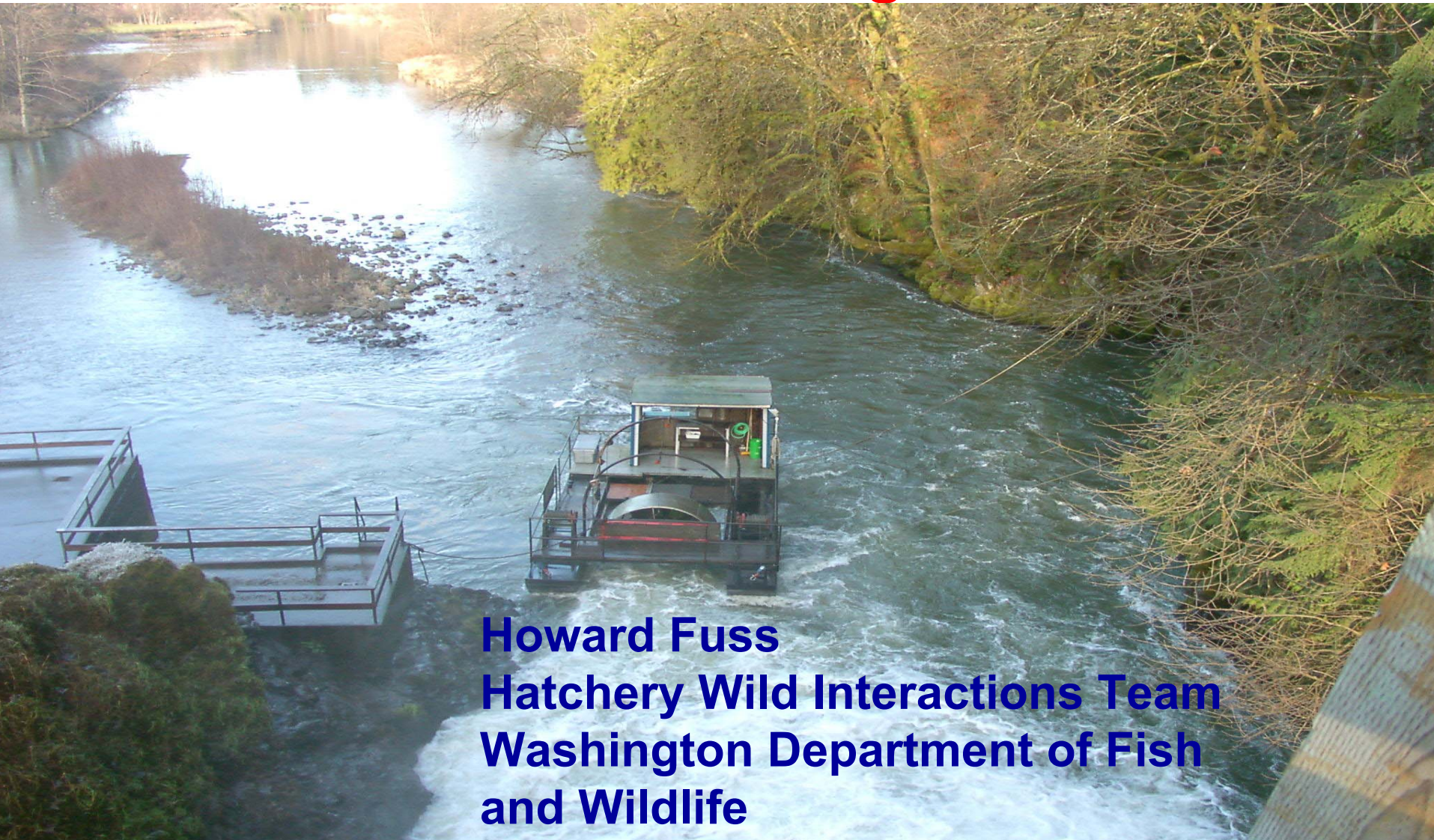


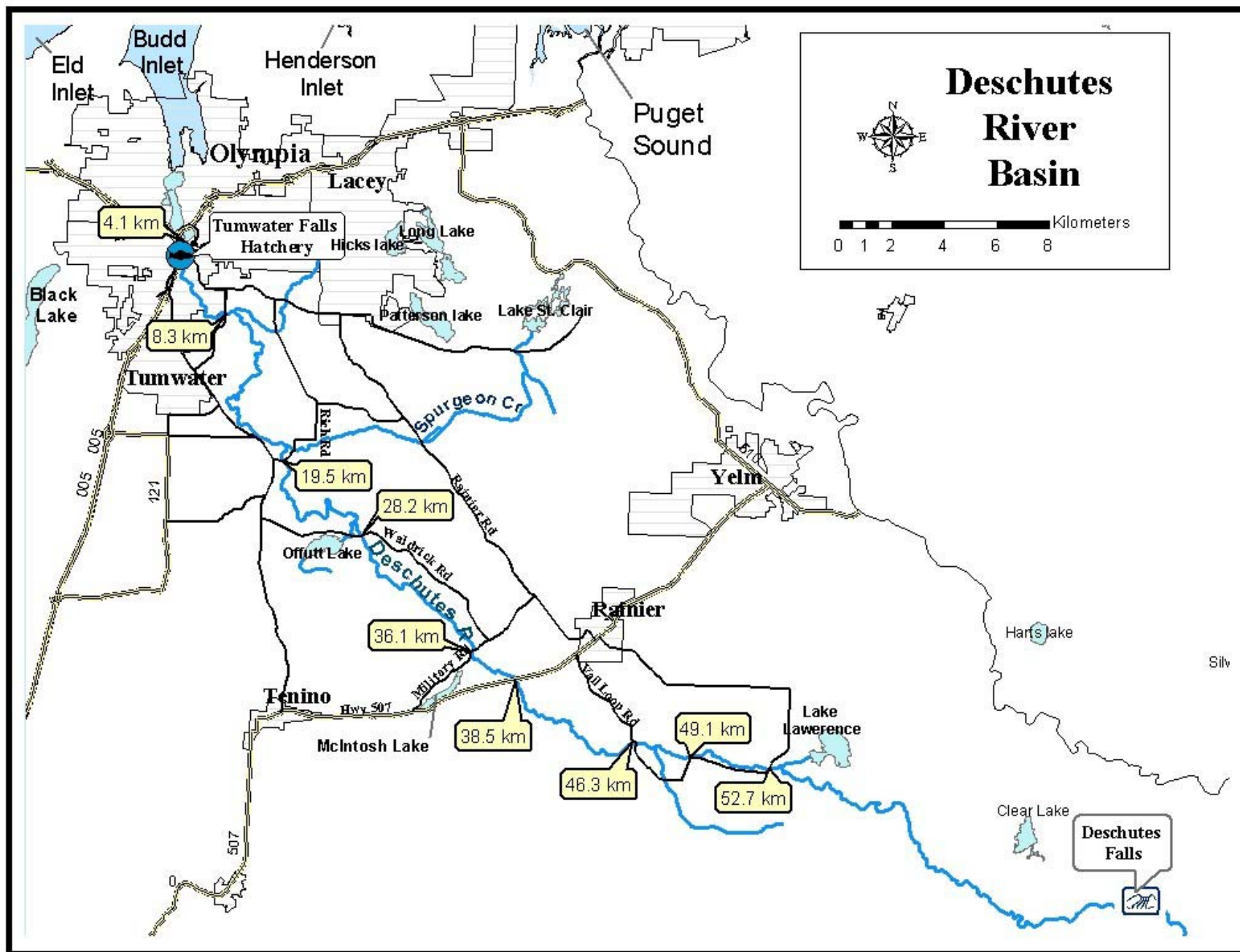
Reproductive success of hatchery chinook salmon in the Deschutes River, Washington



**Howard Fuss
Hatchery Wild Interactions Team
Washington Department of Fish
and Wildlife**

Acknowledgments

- **HSRG for providing funding for staff to do spawning ground surveys and running the smolt trap.**
- **Crew of Tumwater Falls Hatchery (Mary Evans, Lee Pilon in particular)**
- **Squaxin Tribe, Tim Flint, Rich Lincoln, Rich Eltridge, Larry Phillips and Jay Hunter**
- **Pete Topping, Brant Boelts, Shona Bruce, Jeremy Graham, Jack Tipping, Lee Blankenship, Denette Aho and Tumwater Falls Park**



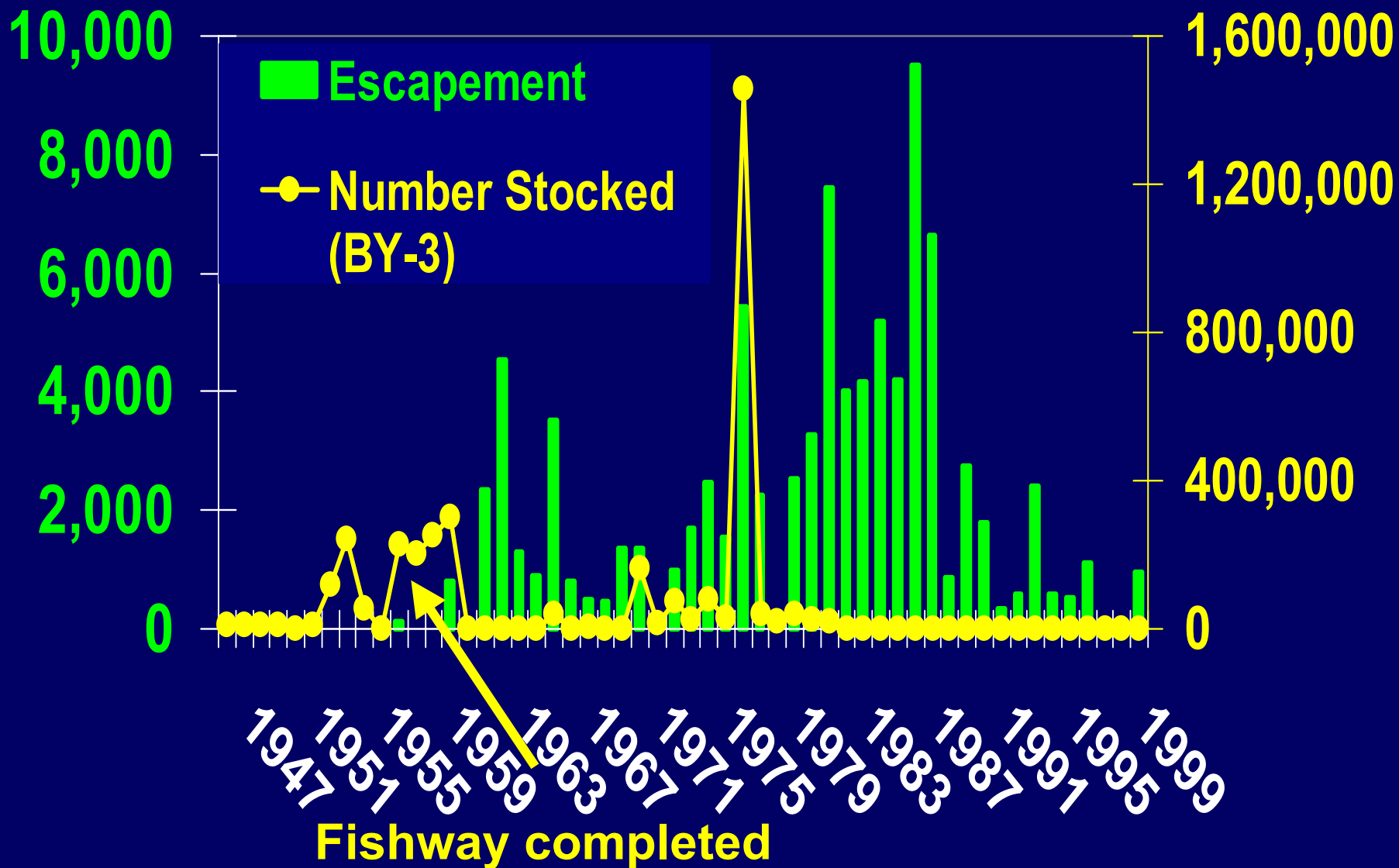
Purpose

- **Measure survival rates from egg to smolt stage of progeny of hatchery origin chinook**
- **Compare traits that effect fitness of this stock with other wild stocks such as emergence timing, diel migration, growth**
- **Compare smolt-to-adult survival differences of wild and hatchery chinook**

Why Deschutes was chosen

- Stock has long history of artificial culture (introduced from Green River)
- Multiple introductions from other hatcheries, and mixture of stocks
- Mixture of rearing strategies, including fry, fingerling and yearling releases
- Little if any previous natural production
- 100% control of upstream fish passage
- Reasonable accessibility for spawning ground surveys and about 40 river miles of available spawning habitat
- Juvenile fish trapping operation in place for wild coho

Deschutes Coho



Methods

Capitol Lake

- * Fish were counted as they entered holding pond

- * “Green” females were selected, measured and placed in transport pipe to river located above falls

- * Scales were taken from spawned adults to determine age structure, and 50 females were chosen for fecundity determination

Deschutes River

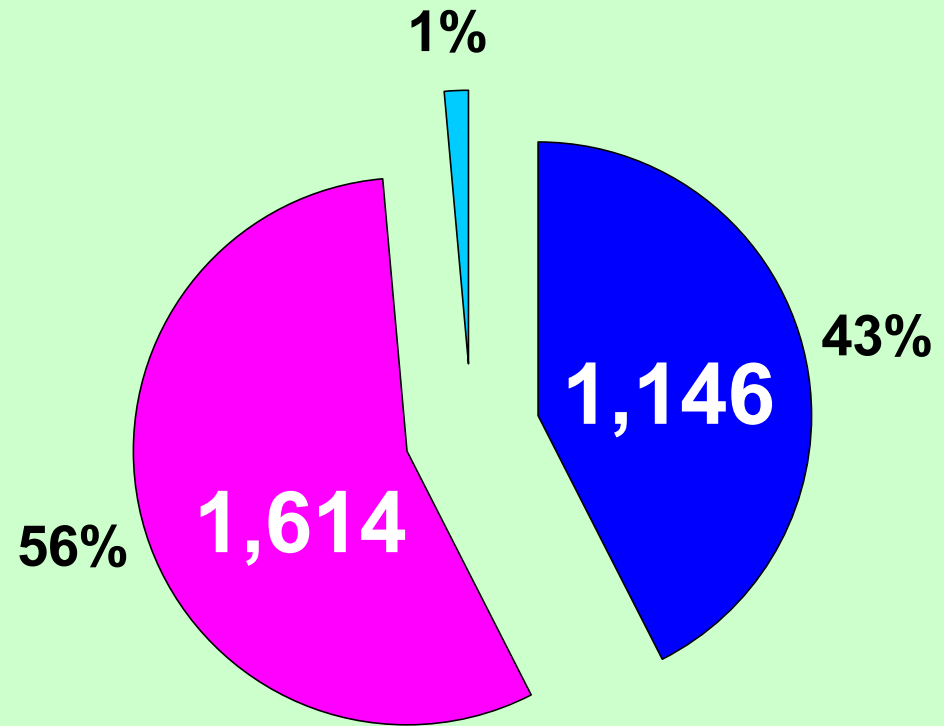
- * Survival determined by CWT and presence or absence of adipose fin

Results



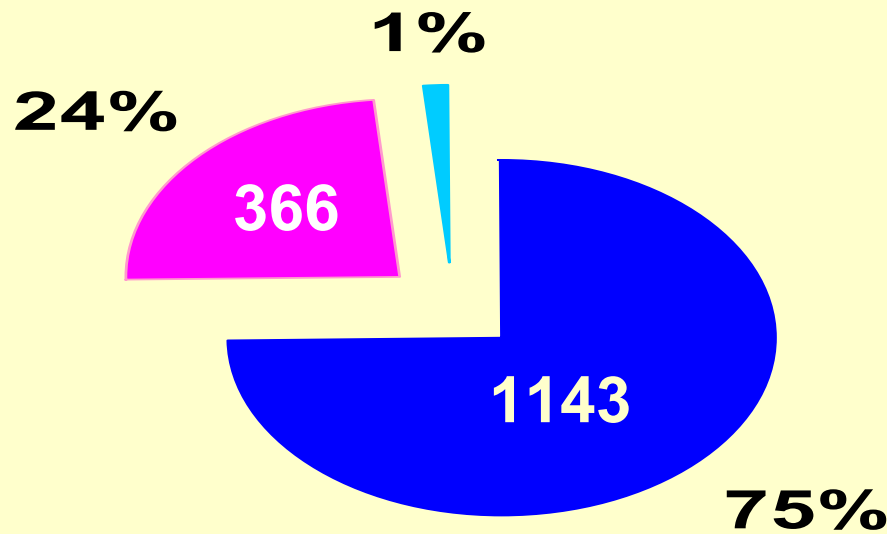
Upstream 2000

- 2,877 fish were passed upstream
- 1,068 females and 1,051 males used by hatchery



■ Male ■ Female ■ Jacks

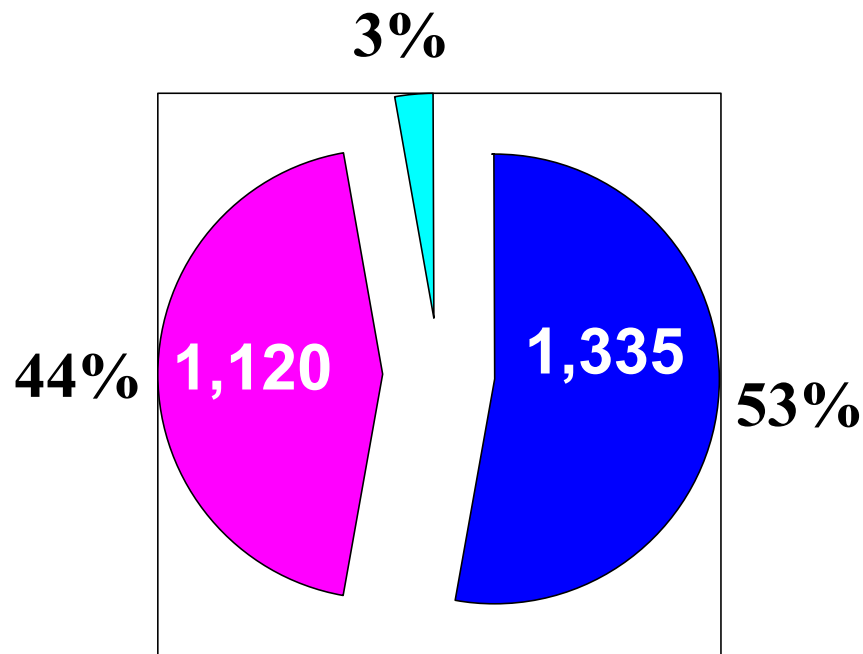
Upstream 2001



- 1,530 fish passed upstream in 2001
- Only 366 females
- 1,194 females and 1,136 males used for spawning

■ Males ■ Females ■ Jacks

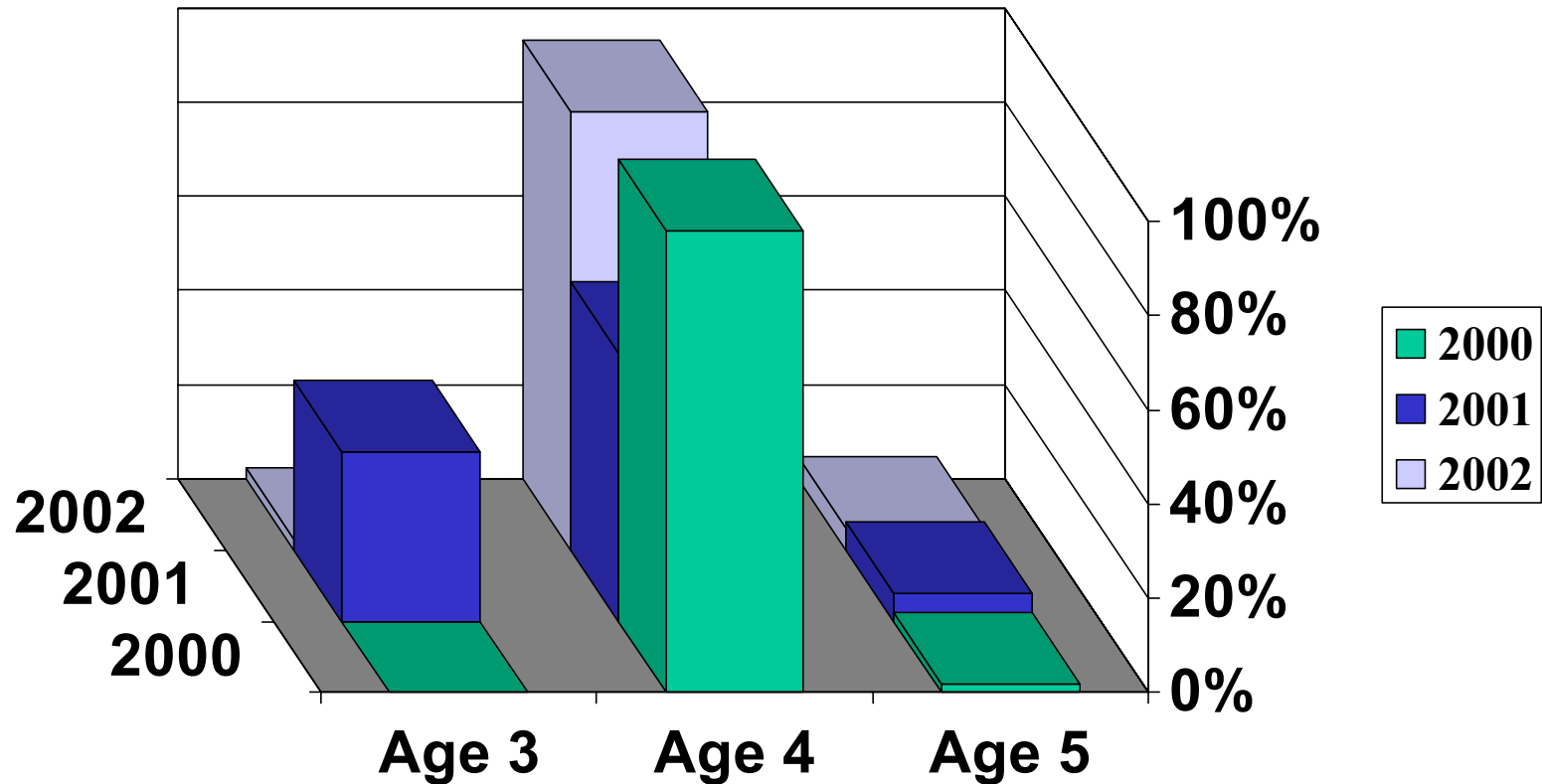
Upstream 2002



- 2,523 fish passed upstream
- 1,120 females
- 1,036 females and 1,034 males (14 jacks) used for spawning

■ Males ■ Females ■ Jacks

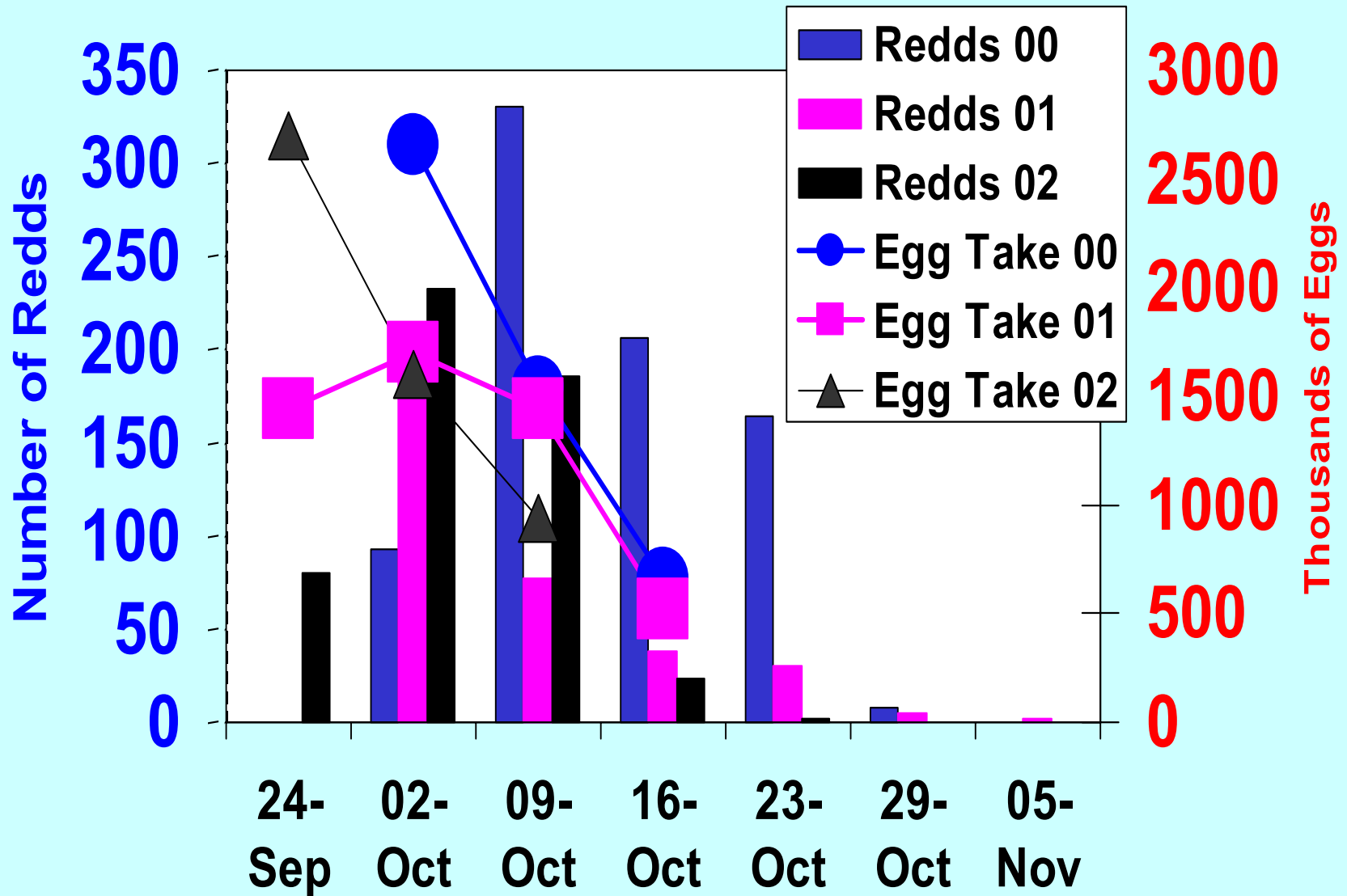
Age at Return



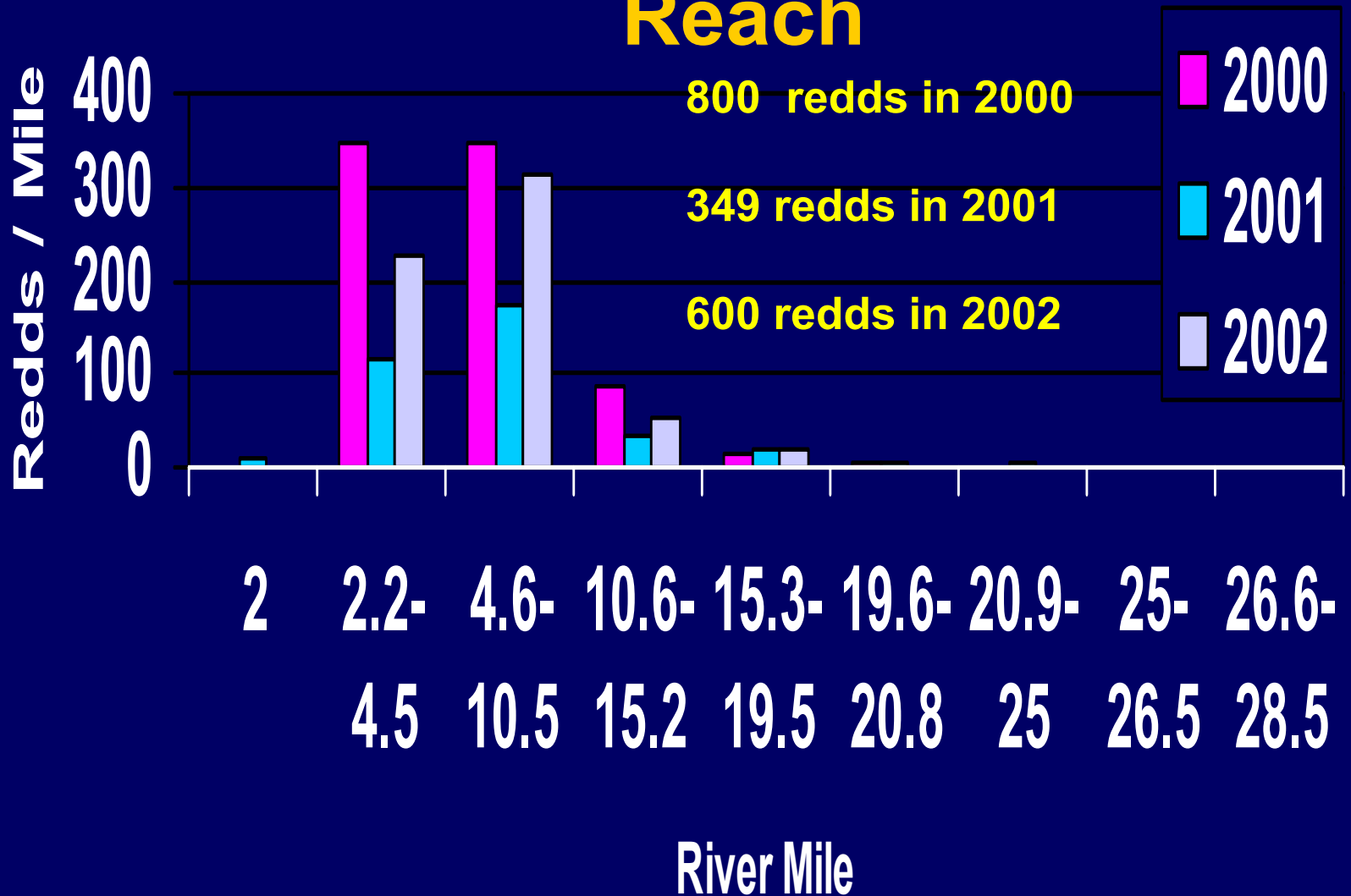
Spawn Timing and Distribution



Spawn Timing



Redd Distribution by Reach

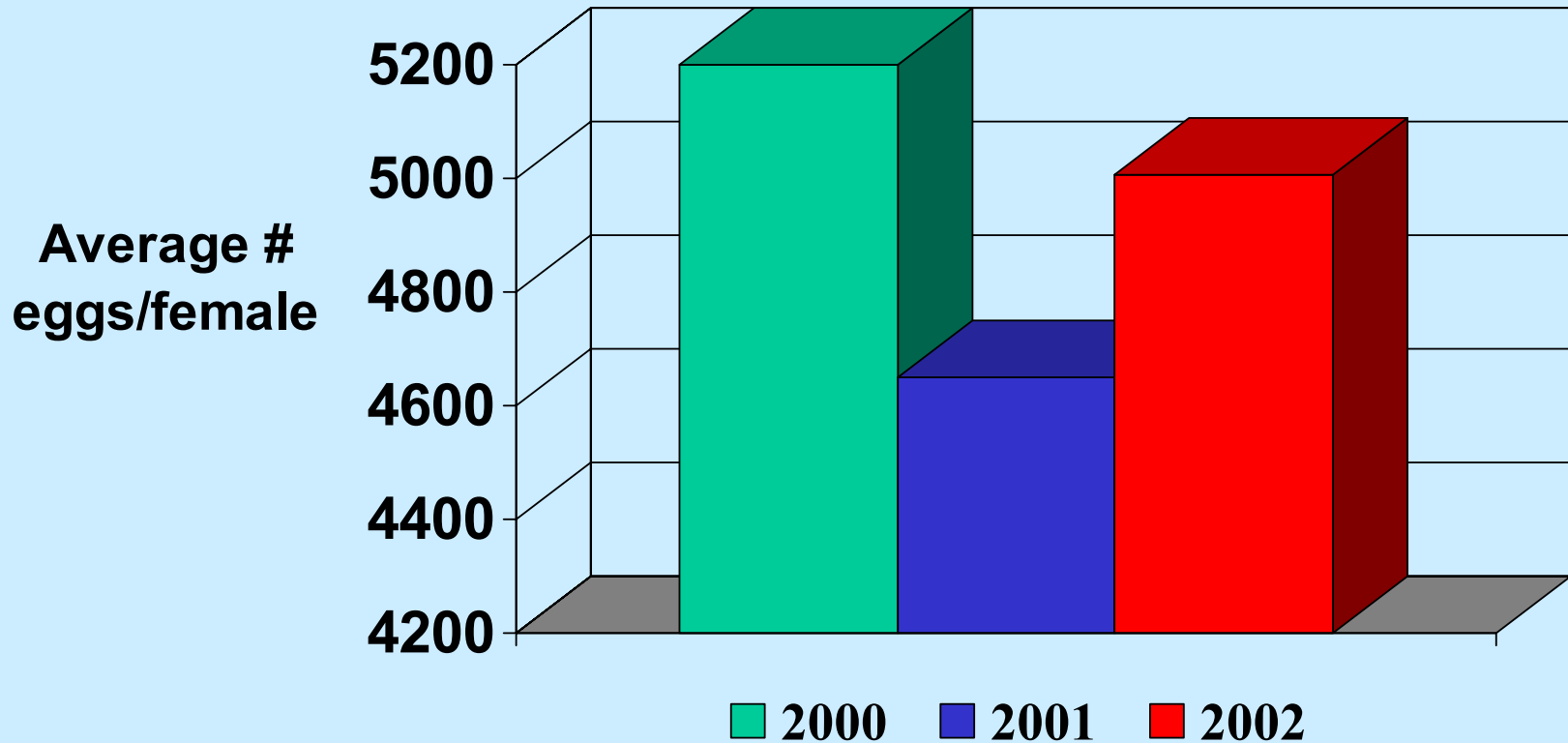


2002 spawning distribution by week

Spawner success

- 2000: 1,153 females upstream
 - 800 redds (69%)
- 2001: 369 females upstream
 - 344 redds (93%)
- 2002: 1,120 females upstream
 - 600 redds (54%)

Deschutes Fecundity



Egg Deposition

The background of the slide is a photograph of several salmon swimming in water. The fish are shown from a side-on perspective, moving towards the left. Their scales are detailed with a pattern of small, dark spots. The water is a deep blue, and the lighting creates a sense of depth and movement.

- **2000: 4.17 million**

- **2001: 1.6 million**

- **2002: 3.2 million**



**Enumeration of
juveniles and
characterization of
fitness
characteristics**

- **Trapping started in February each year**
- **Trapping ended July 16, 2001 and June 25 in 2002**
- **Trap was not fished for 2-3 days following each hatchery release (5 total)**
- **Trap efficiency was 22- 33%**

Survival Estimates 2000

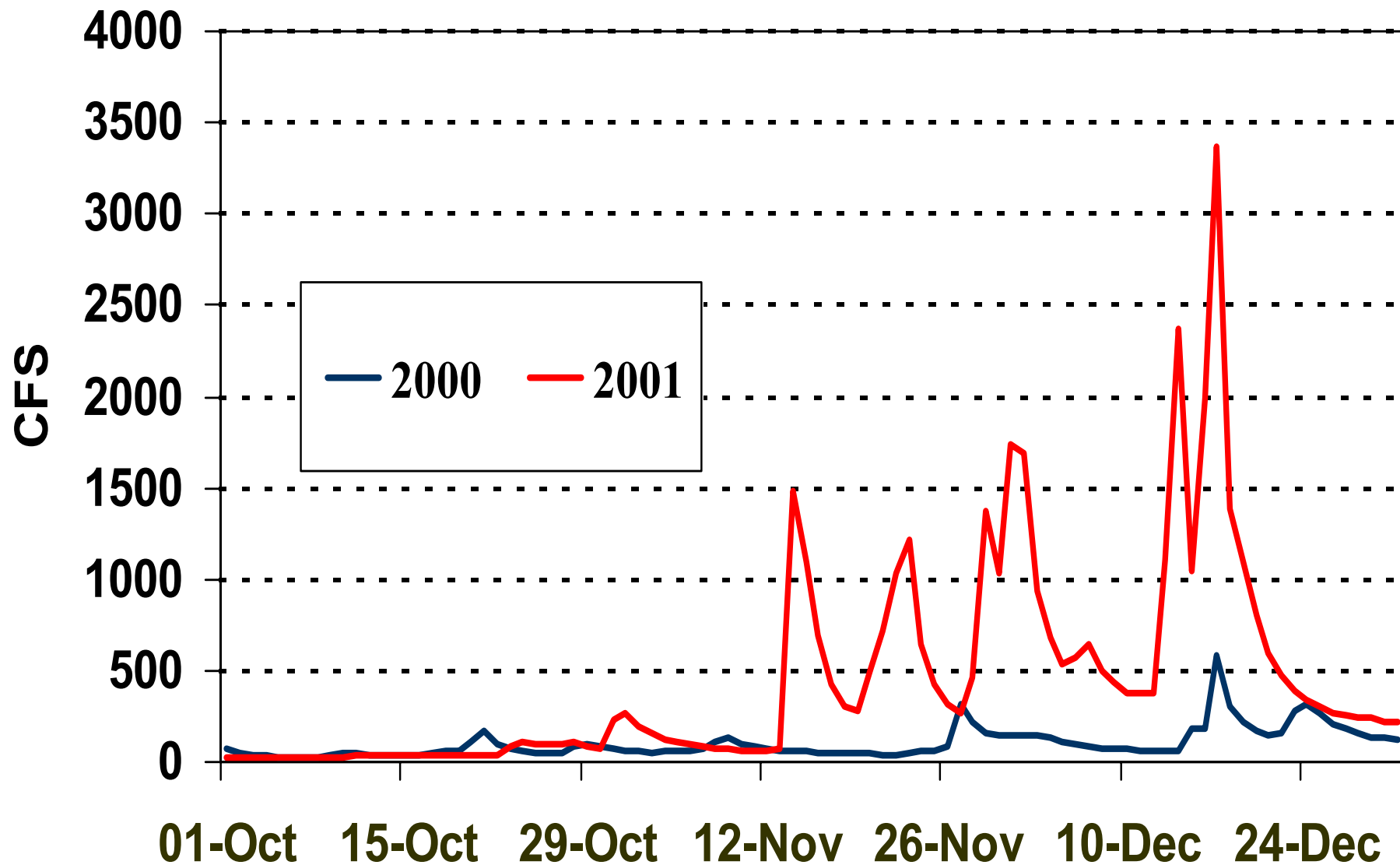
Brood

- 150,569 juvenile wild chinook were captured.
- Estimated 514,000 total juveniles survived to Capital Lake
- 12.3% survival from egg deposition to Capital Lake

Survival Estimates 2001 brood

- 7,100 juvenile wild chinook were captured.
- Estimated 63,000 total juveniles survived to Capital Lake
- 4.0 % survival from egg deposition to Capital Lake

Deschutes Flows during incubation period



Fitness Traits

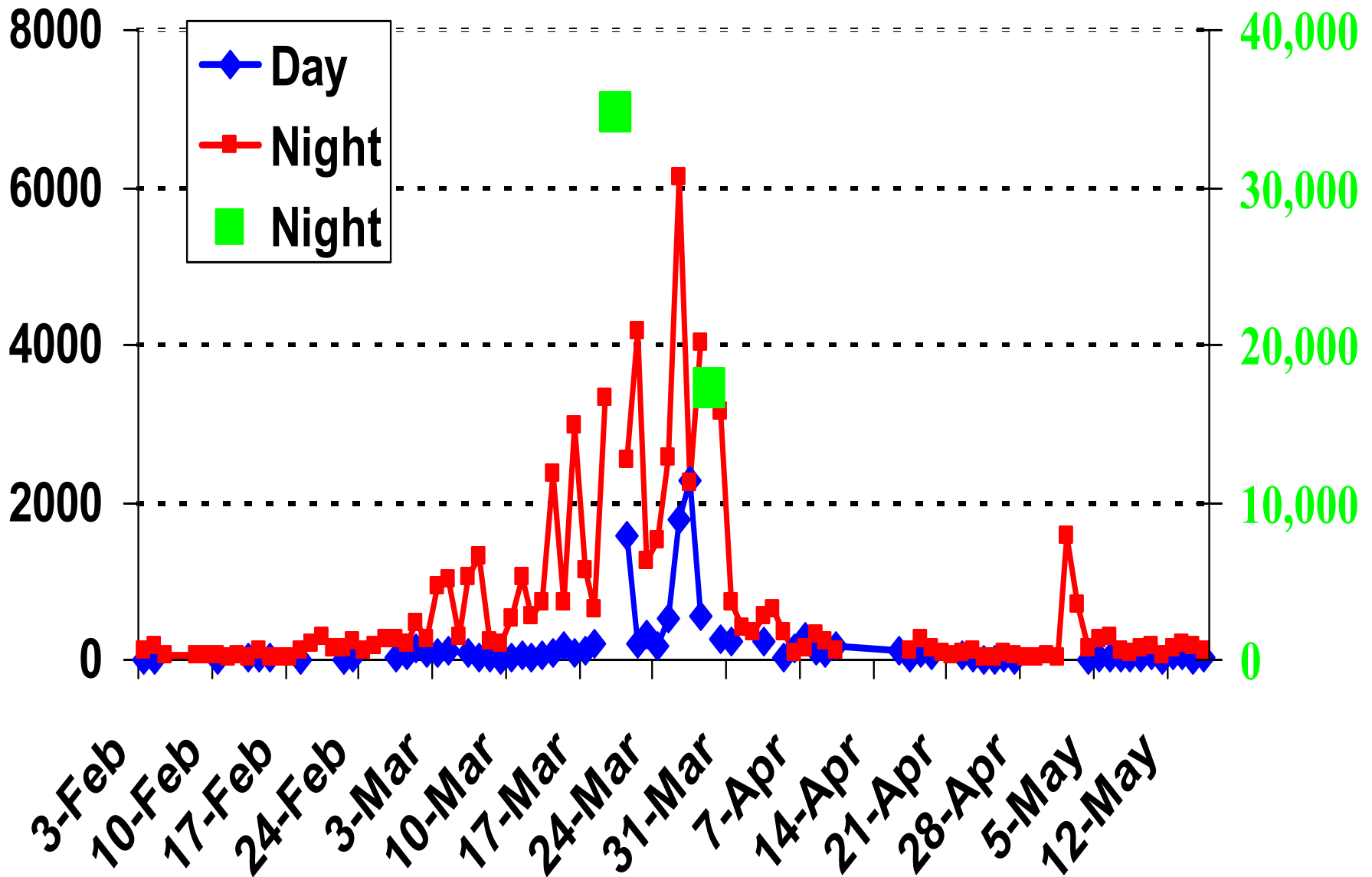


Cutthroat bite marks

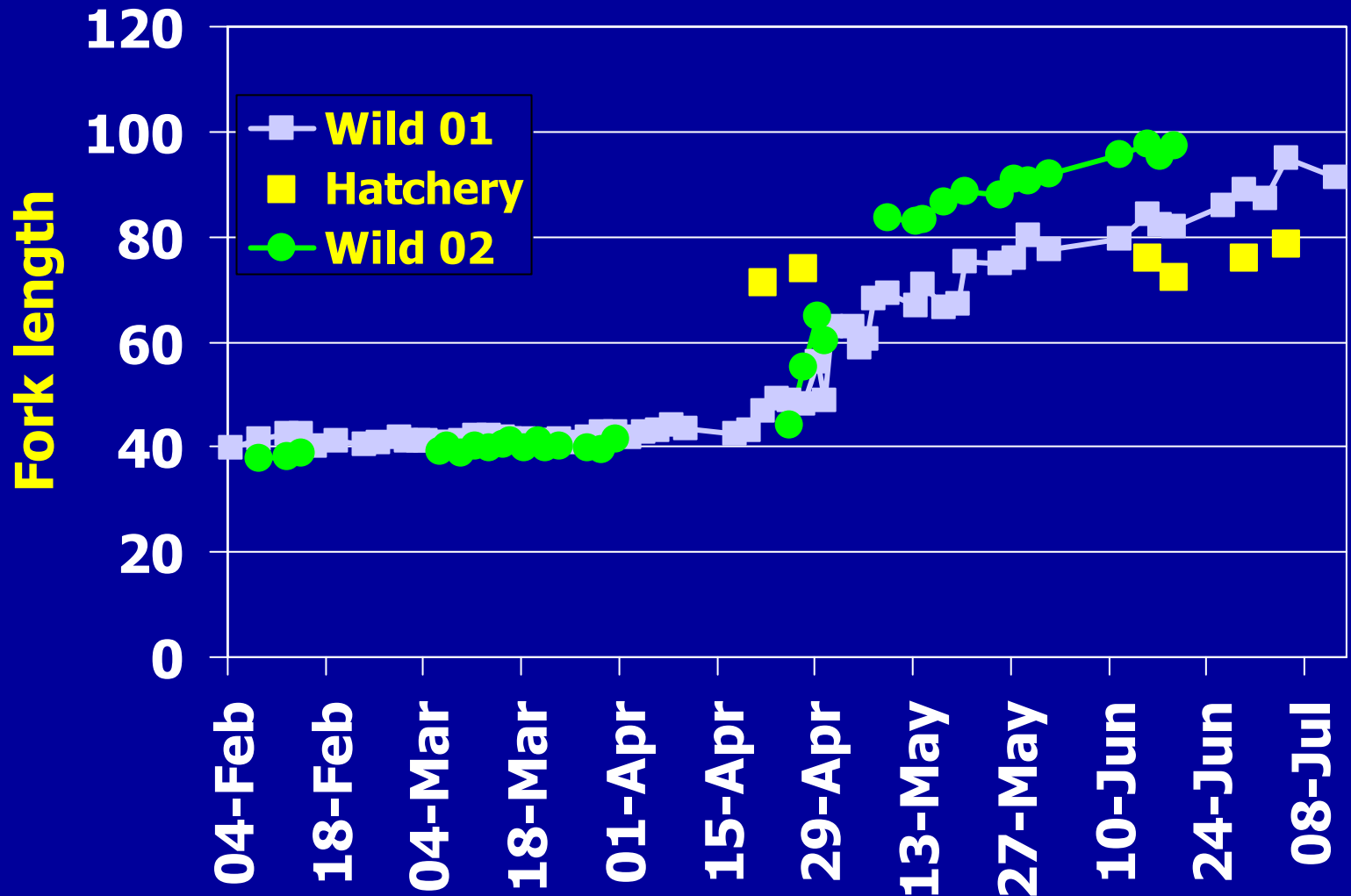


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Diel Catch of juvenile chinook 2001



Deschutes "Wild" Chinook Growth



Hatchery and Wild fish comparison In June 2000



Hatchery



Wild

Summary

- Adequate numbers of chinook were passed upstream in 2 of 3 broods
- Survival from egg deposition to the trap was **12.3%** and **4%** in first two broods
- Survival was influenced by flows and likely predation
- 84% of the fish were captured before May 1 and smaller than 50 mm in 2001 and 54% in 2002
- Smolts were greater than 70 mm by mid-May
- Estimated total juvenile production to the trap was **512,397 in 2001** and **63,000 in 2002**

