

# **Downstream Survival of Juvenile Stream Type Chinook Salmon and Steelhead Through the Snake/Columbia River Hydropower System and Adult Return Rates**

**TMT  
December 13, 2006  
Bill Muir**



# Outline

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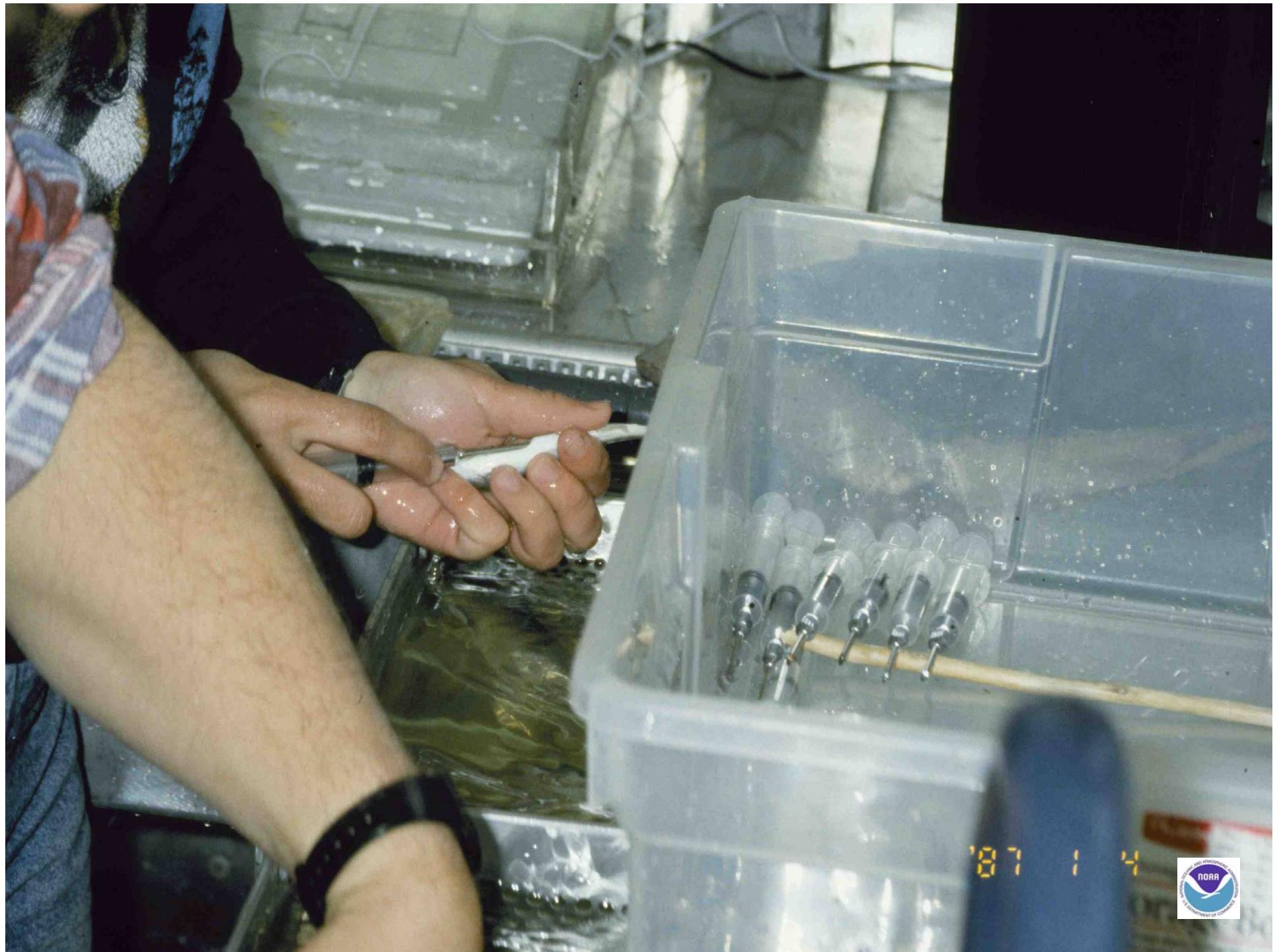
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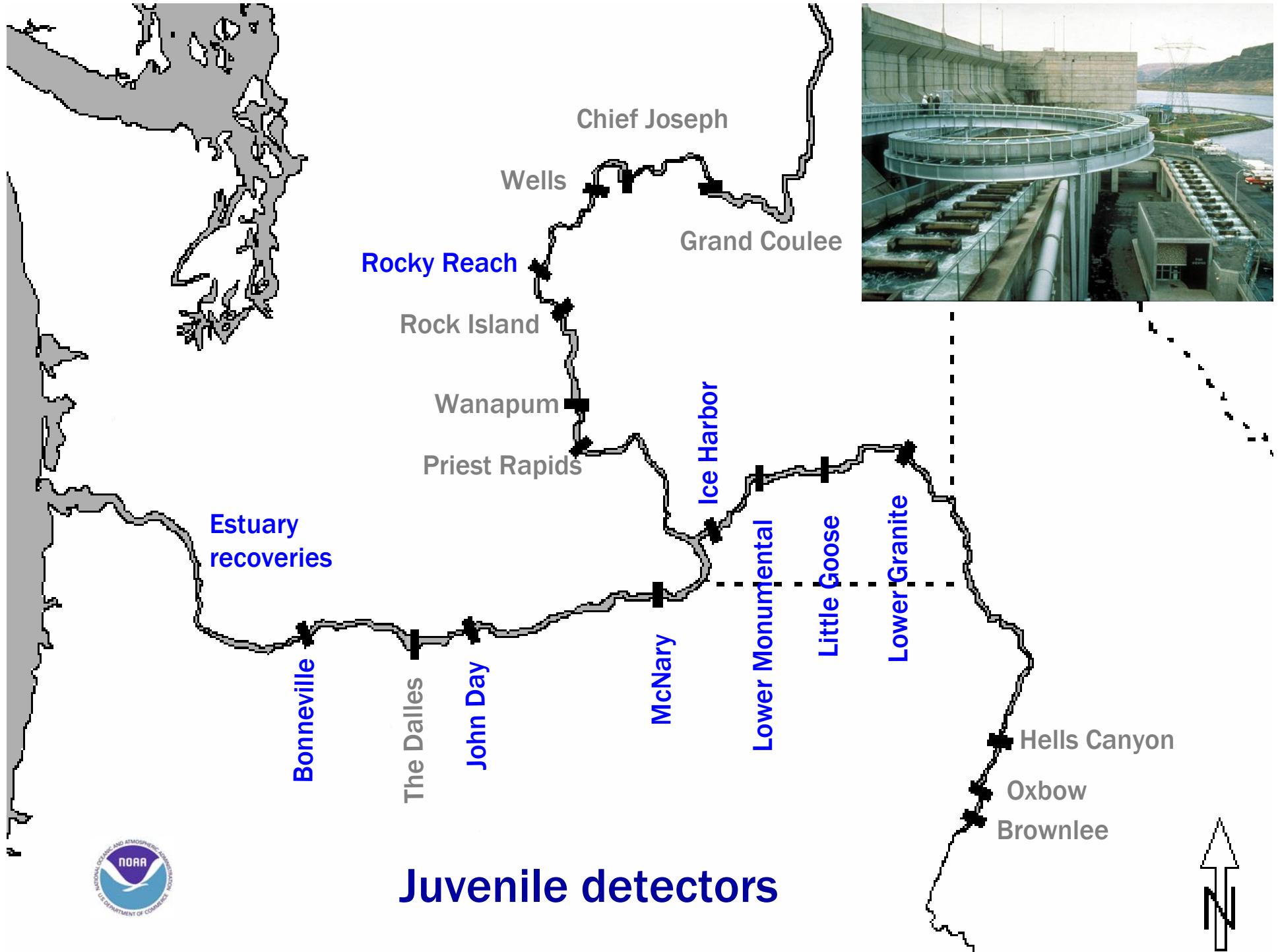
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- Chinook and steelhead survival through individual reaches
- Their survival through the entire hydropower system
- **Smolt-to-adult returns**





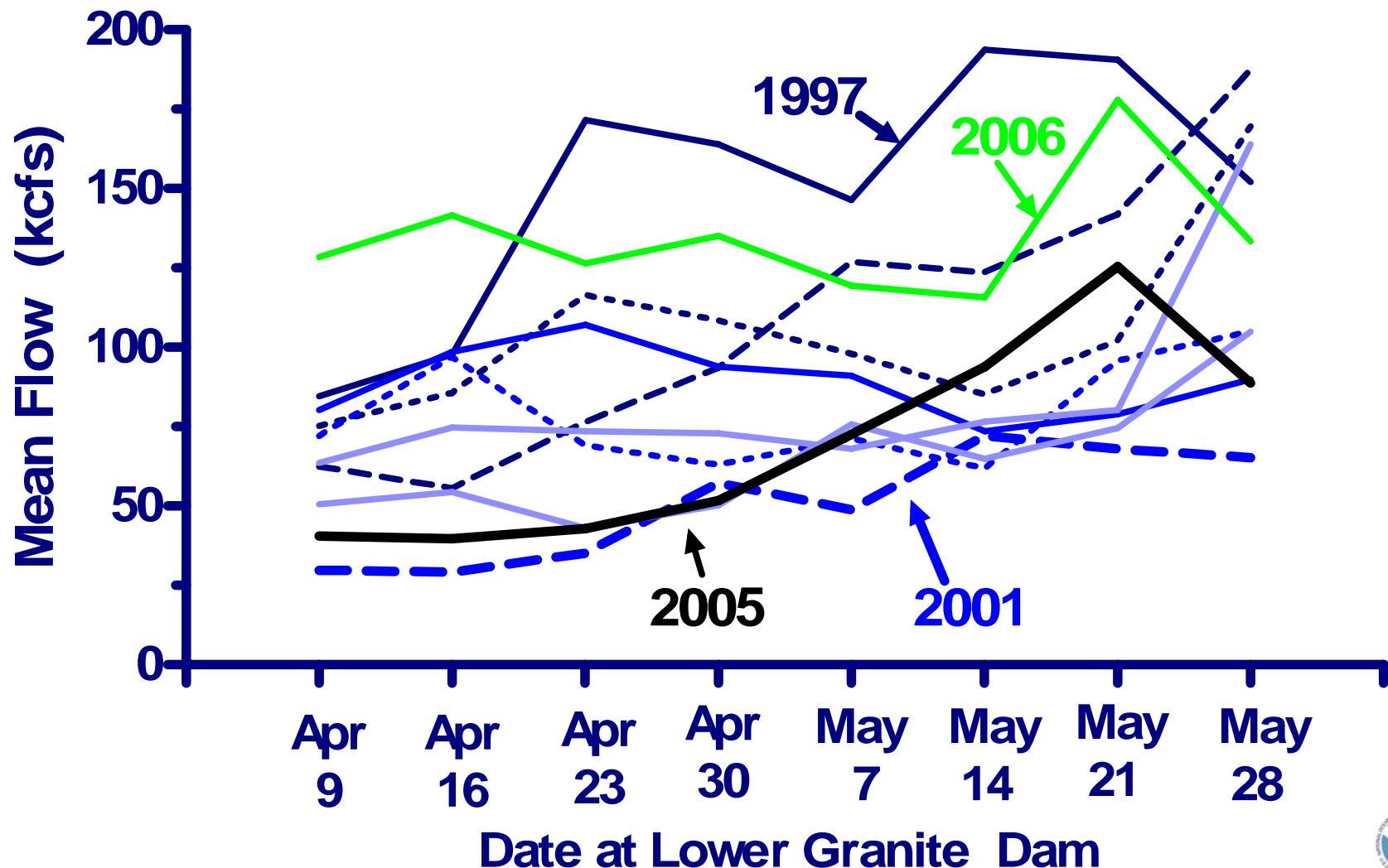
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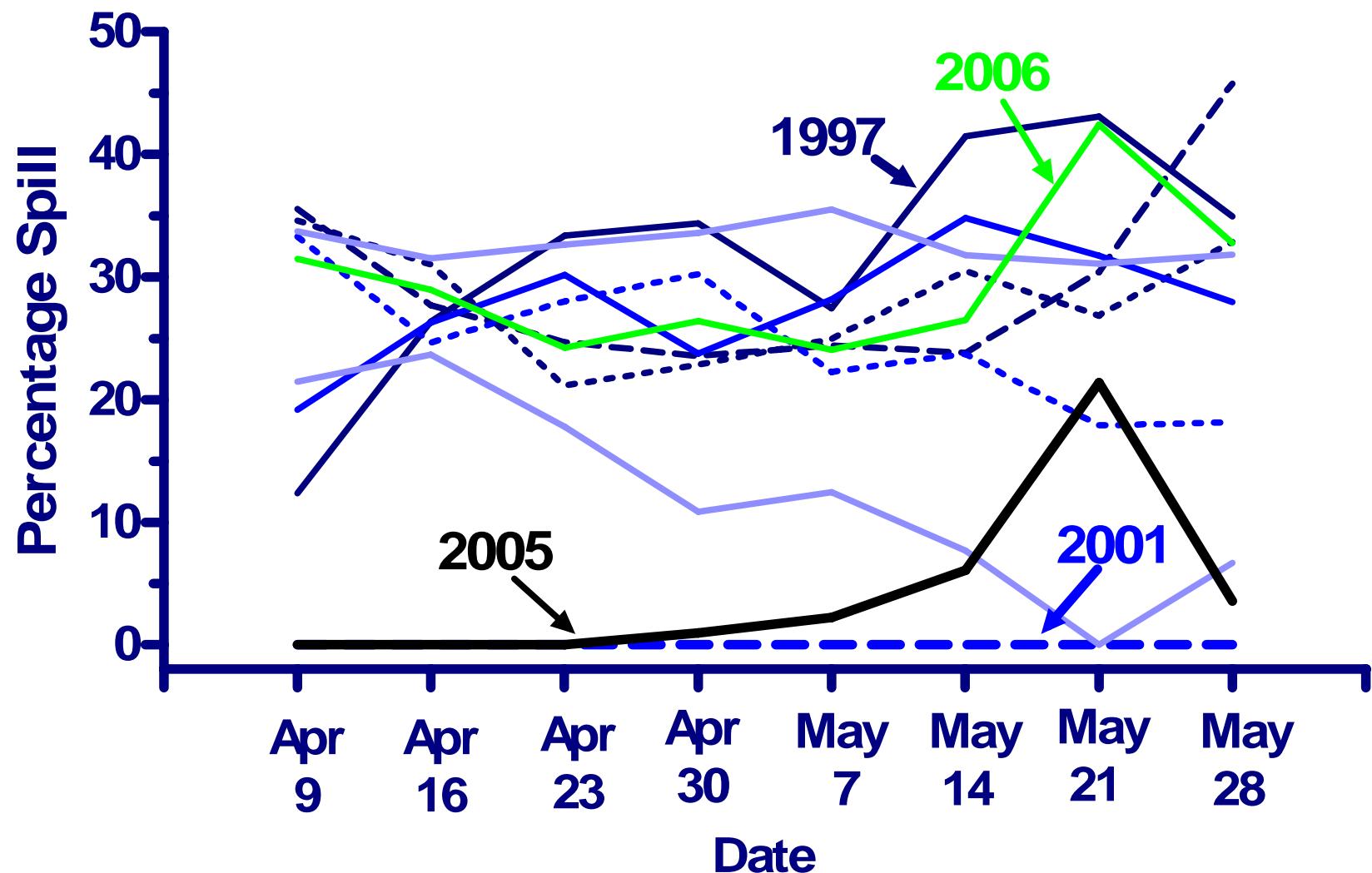




## Weekly Mean Flow (kcfs) Lower Granite Dam



## Mean Percentage Spilled LGR, LGS, LMN

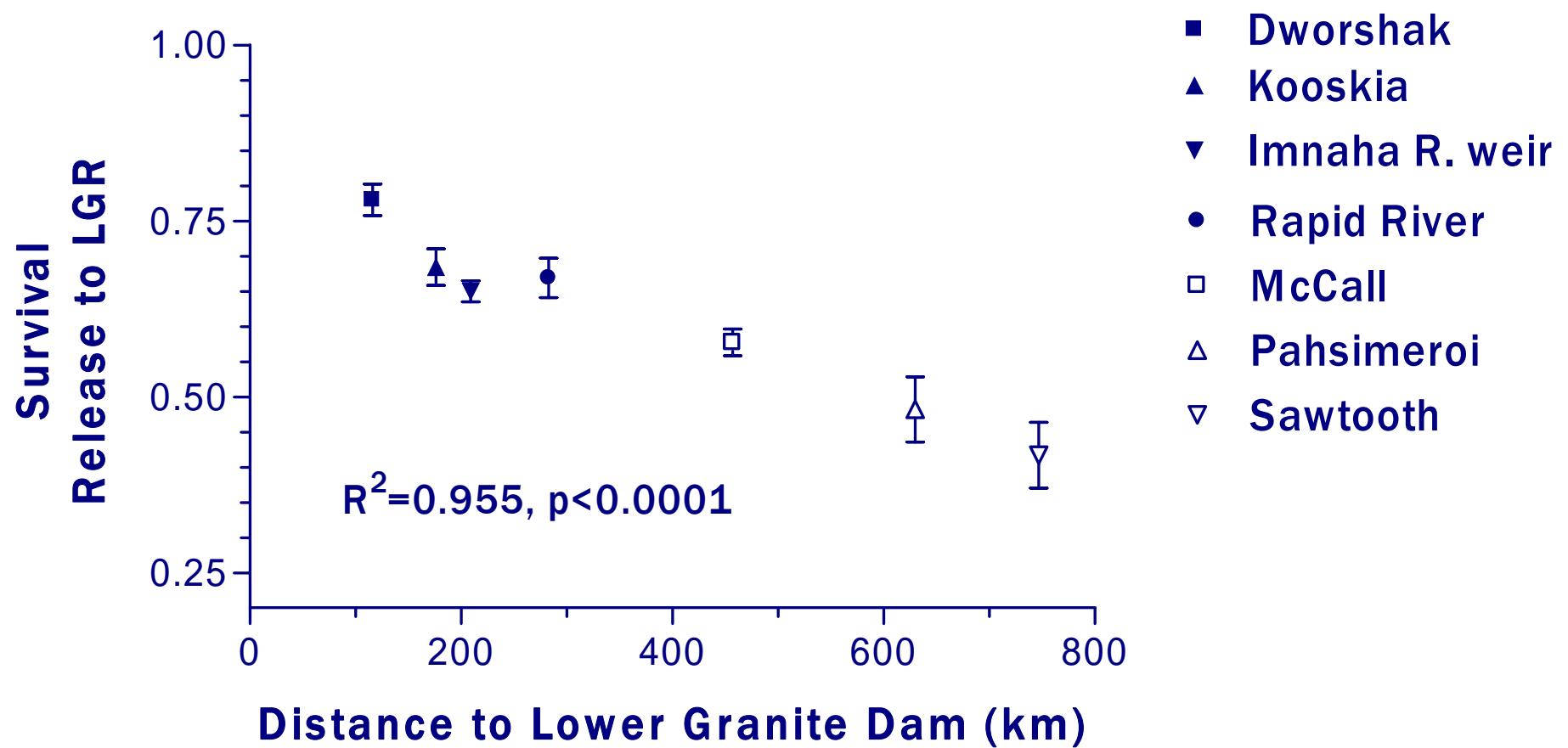


# Transportation

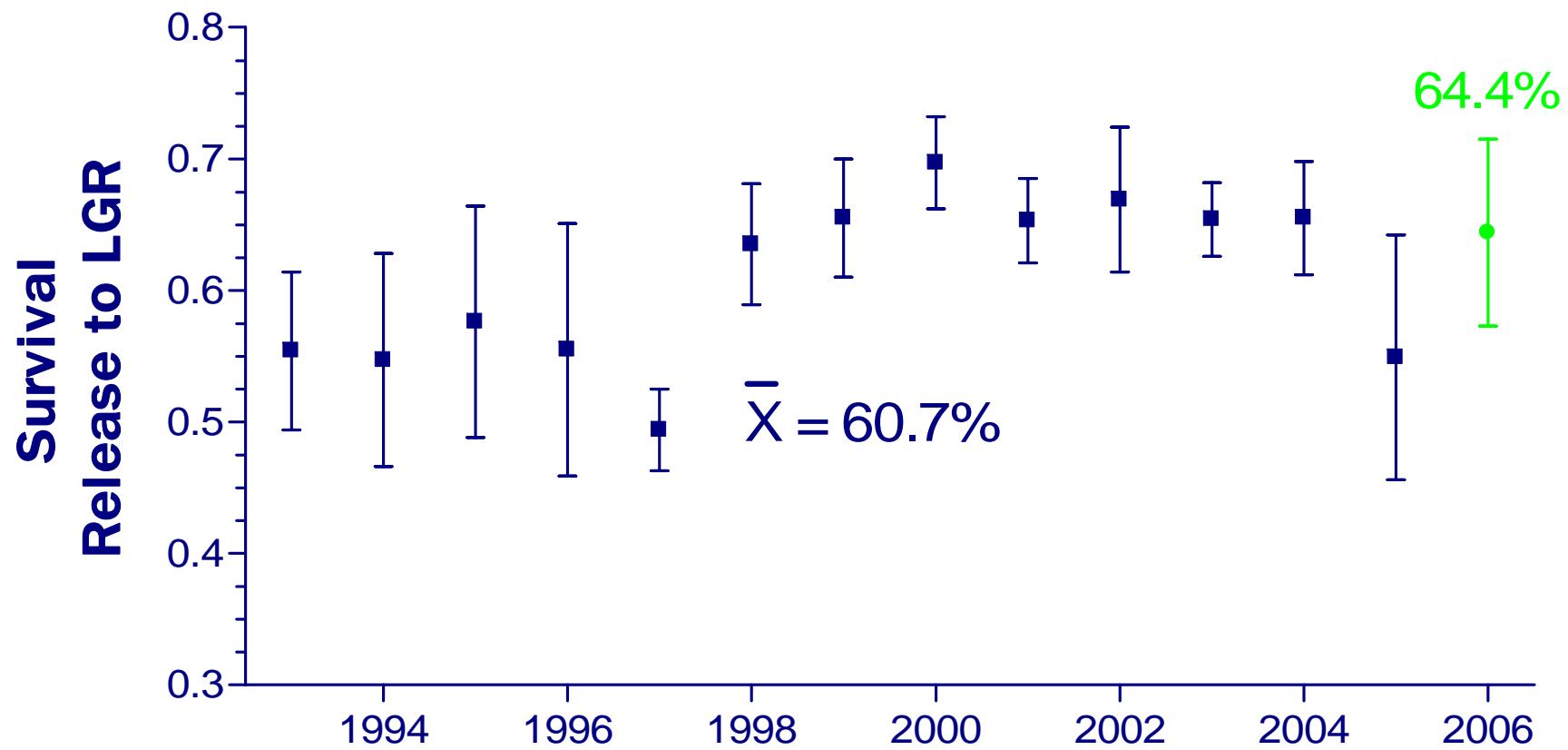
- 62% of non-tagged stream type Chinook
- 76% of non-tagged steelhead

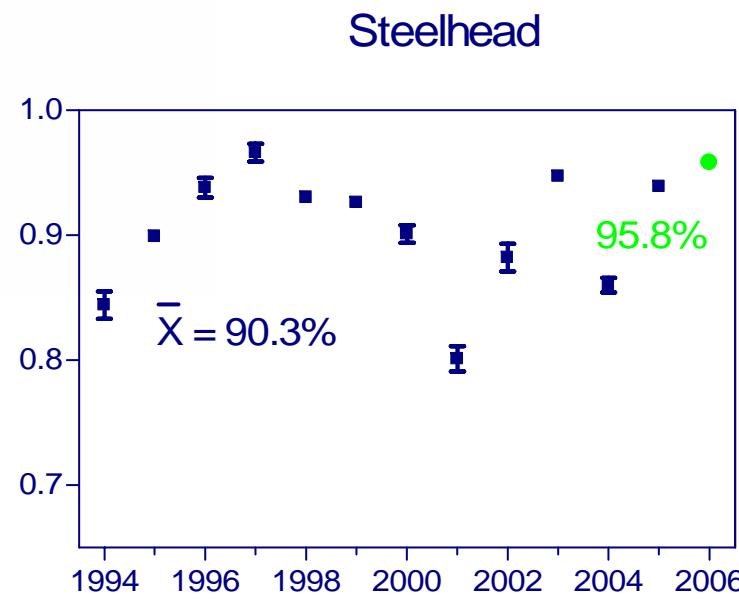
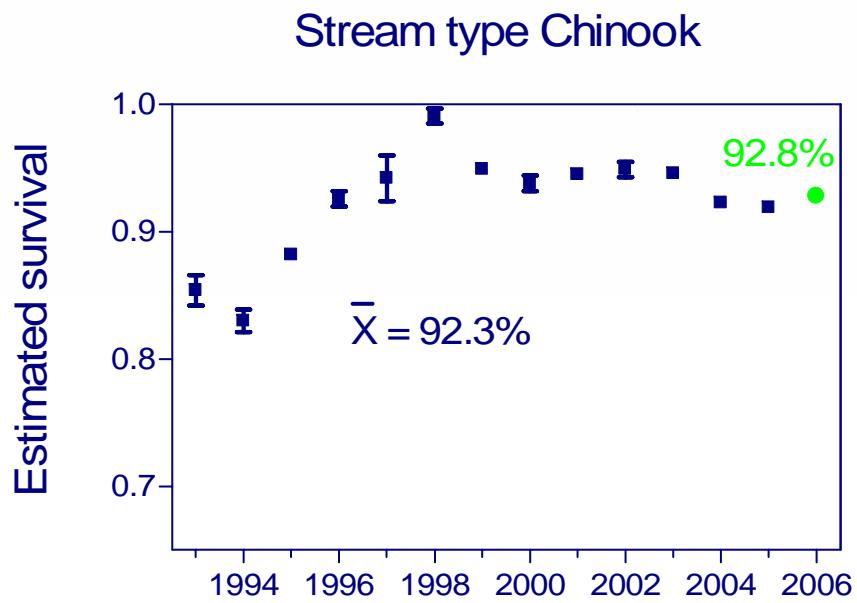
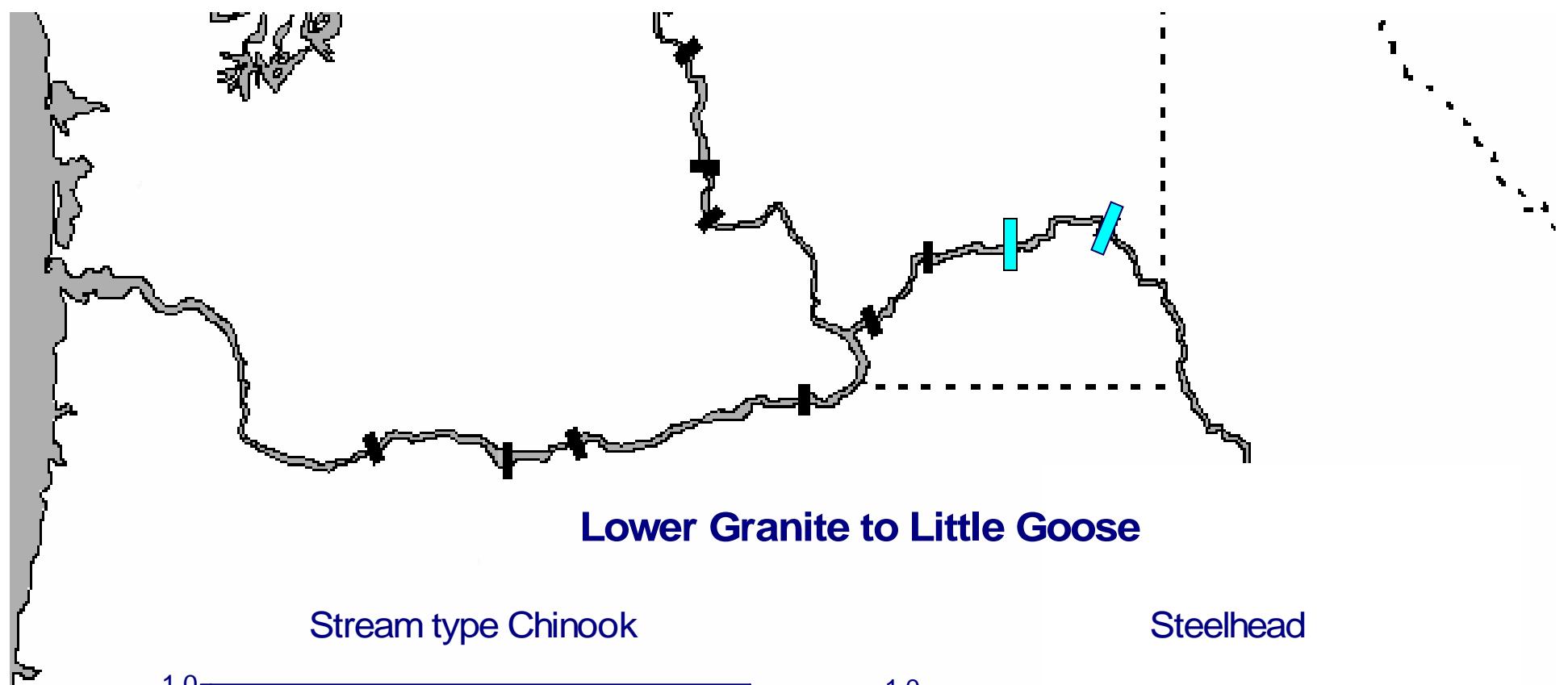


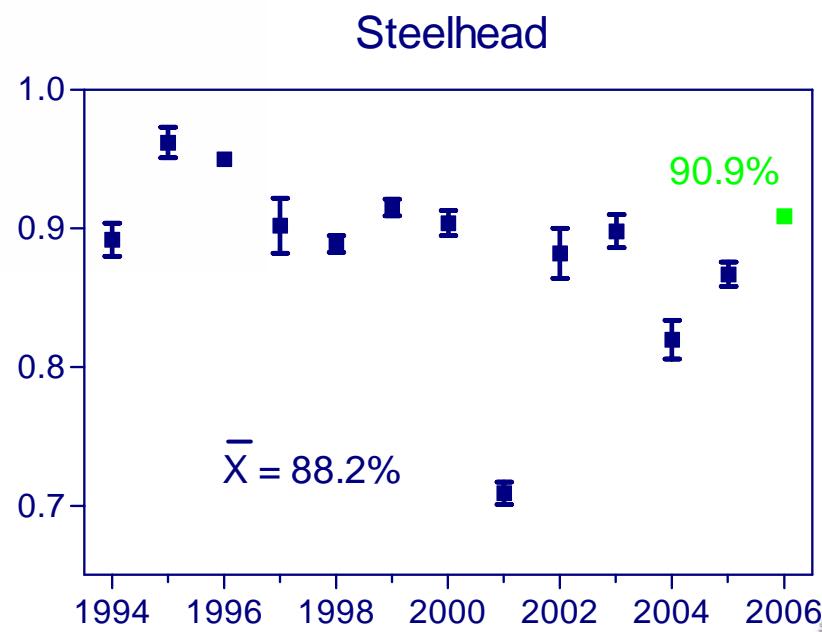
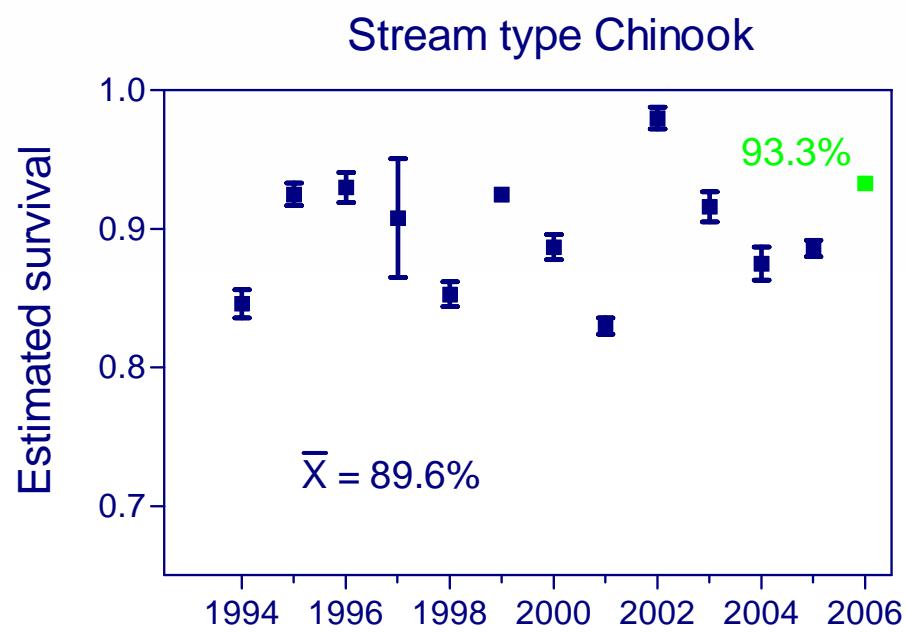
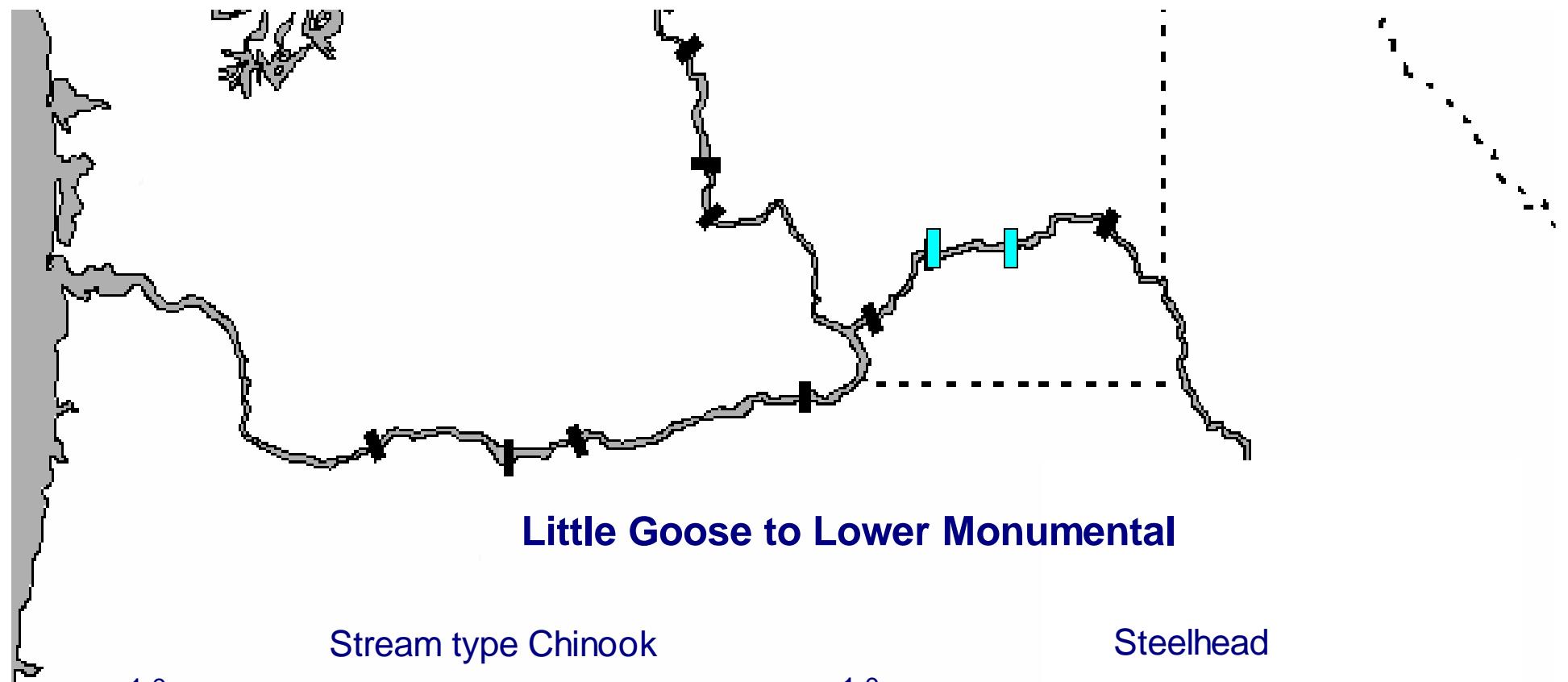
## Hatchery stream type Chinook (1993-2006)

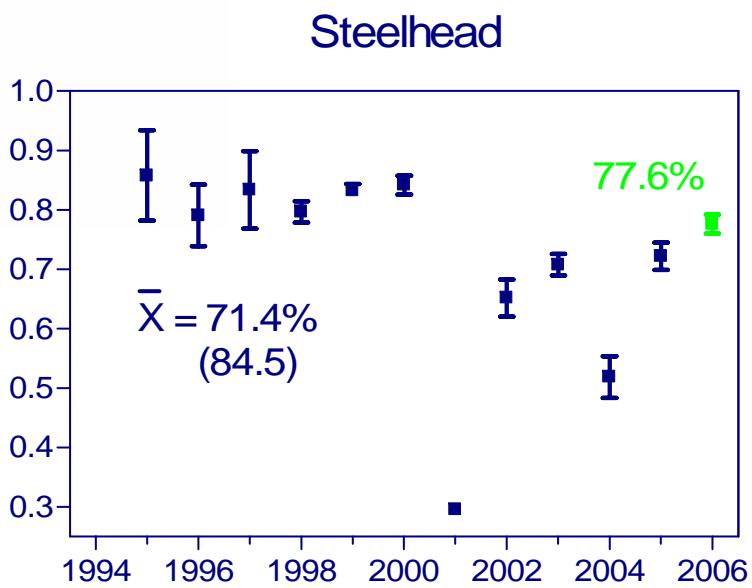
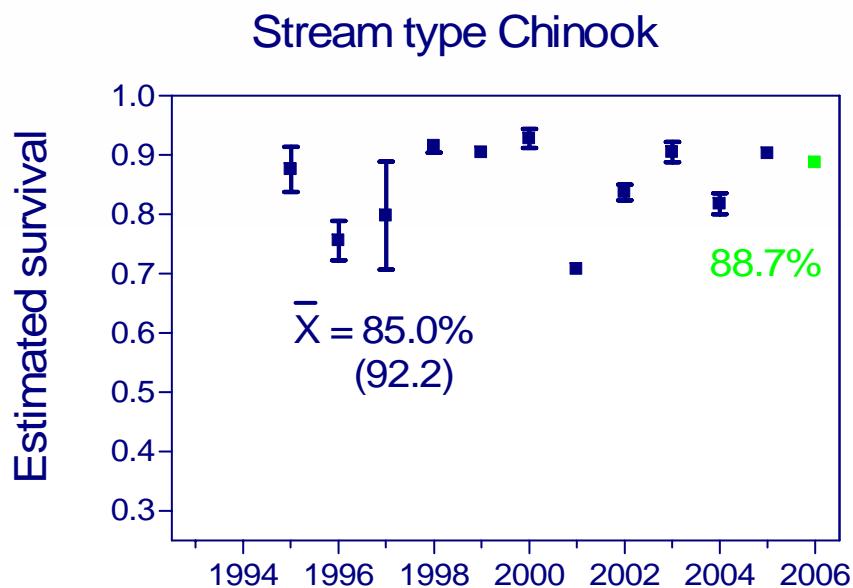
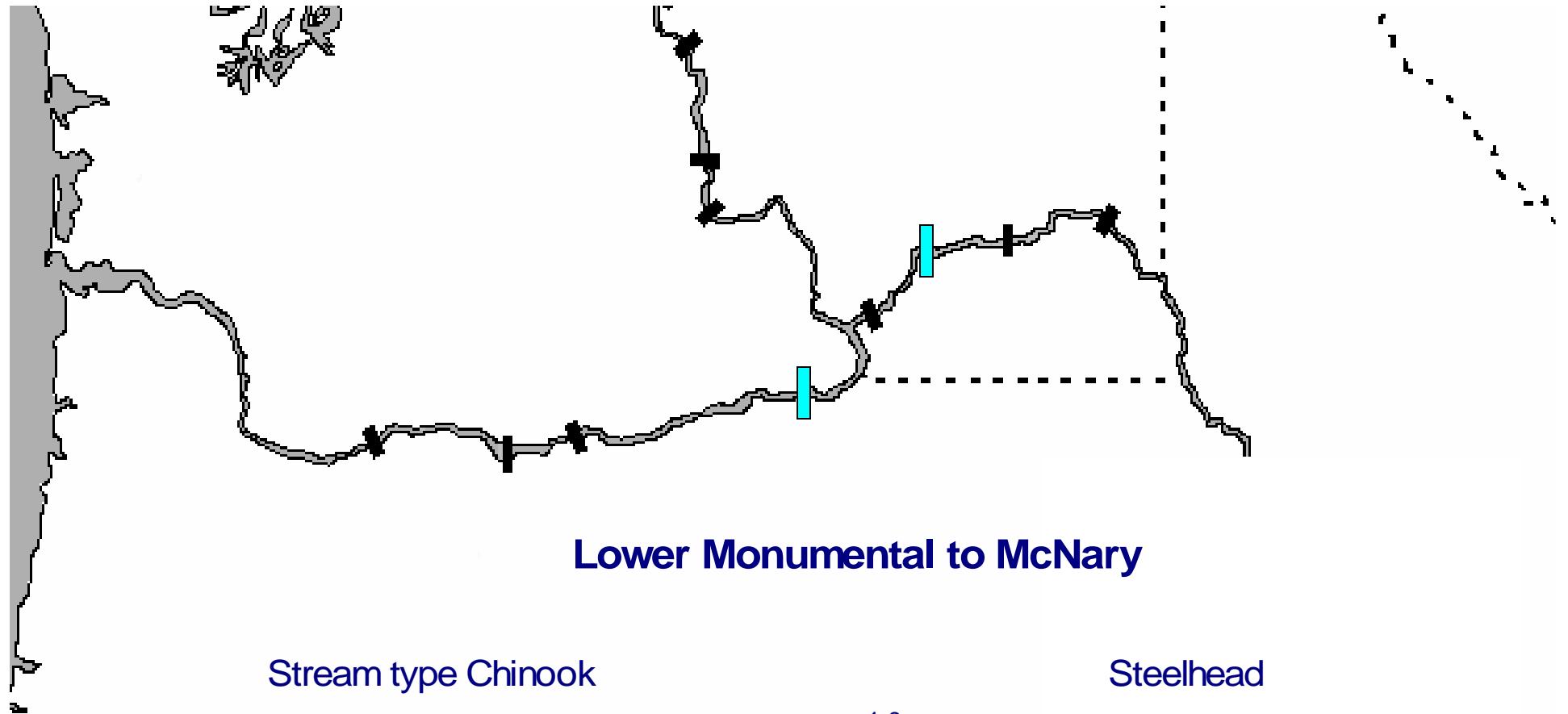


**Stream type Chinook  
All Snake River Basin  
hatcheries combined**





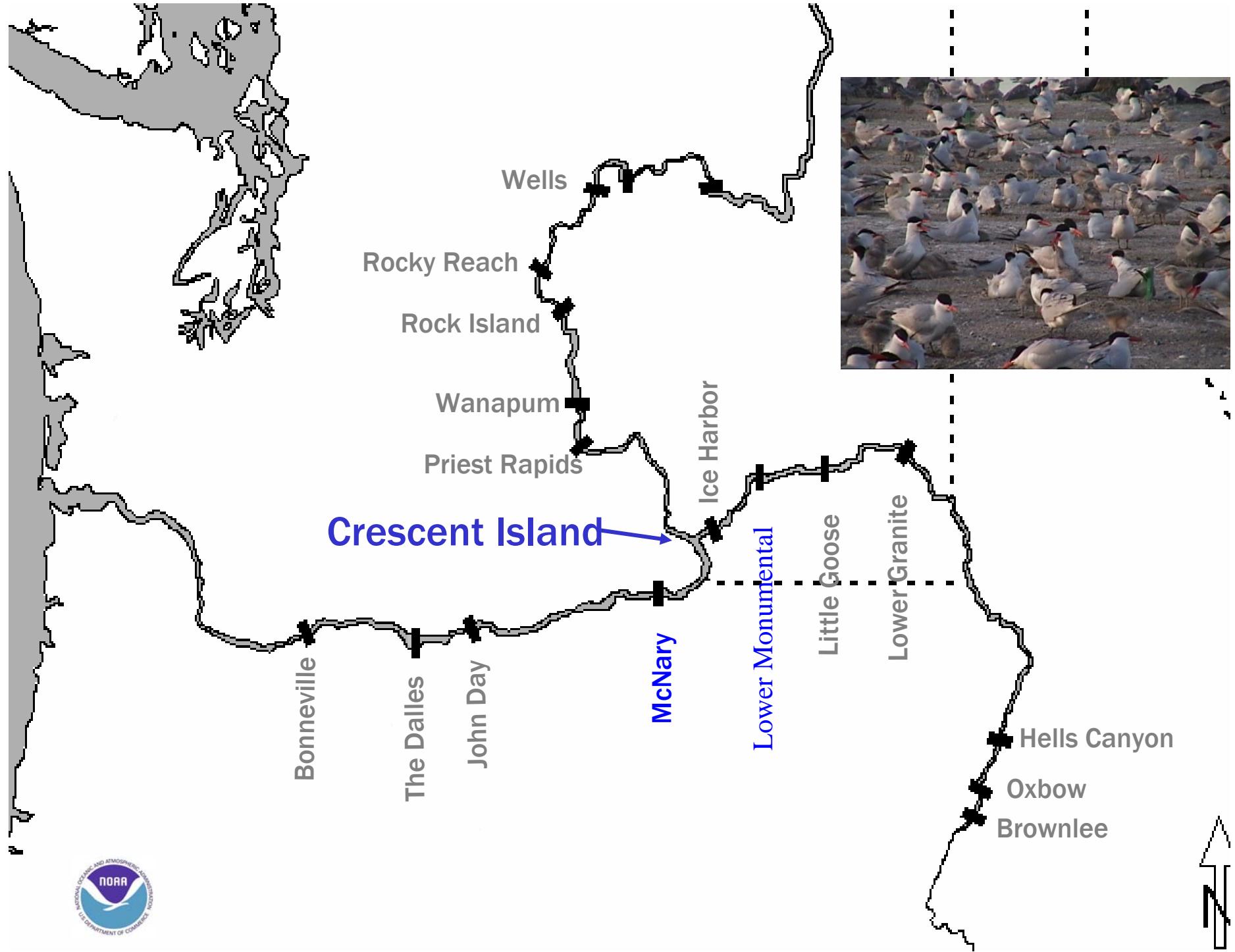


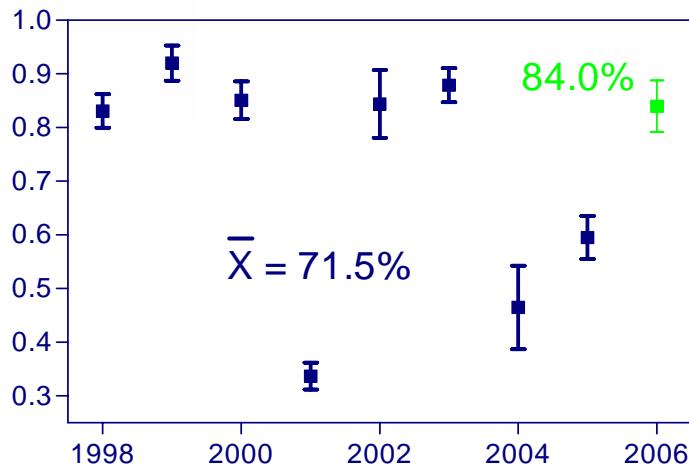
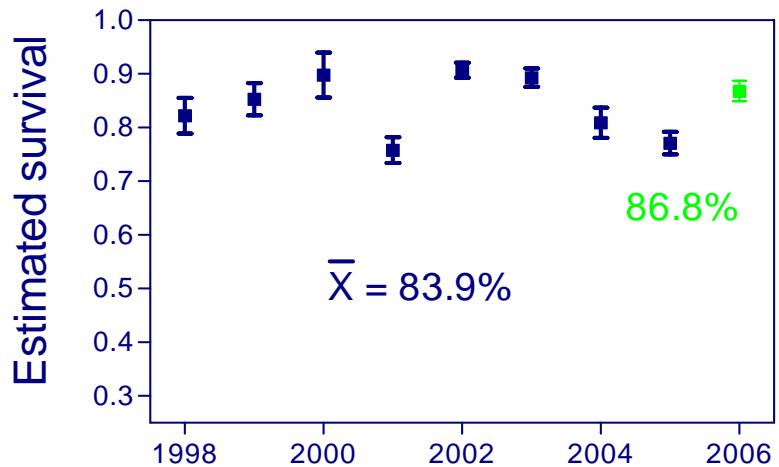
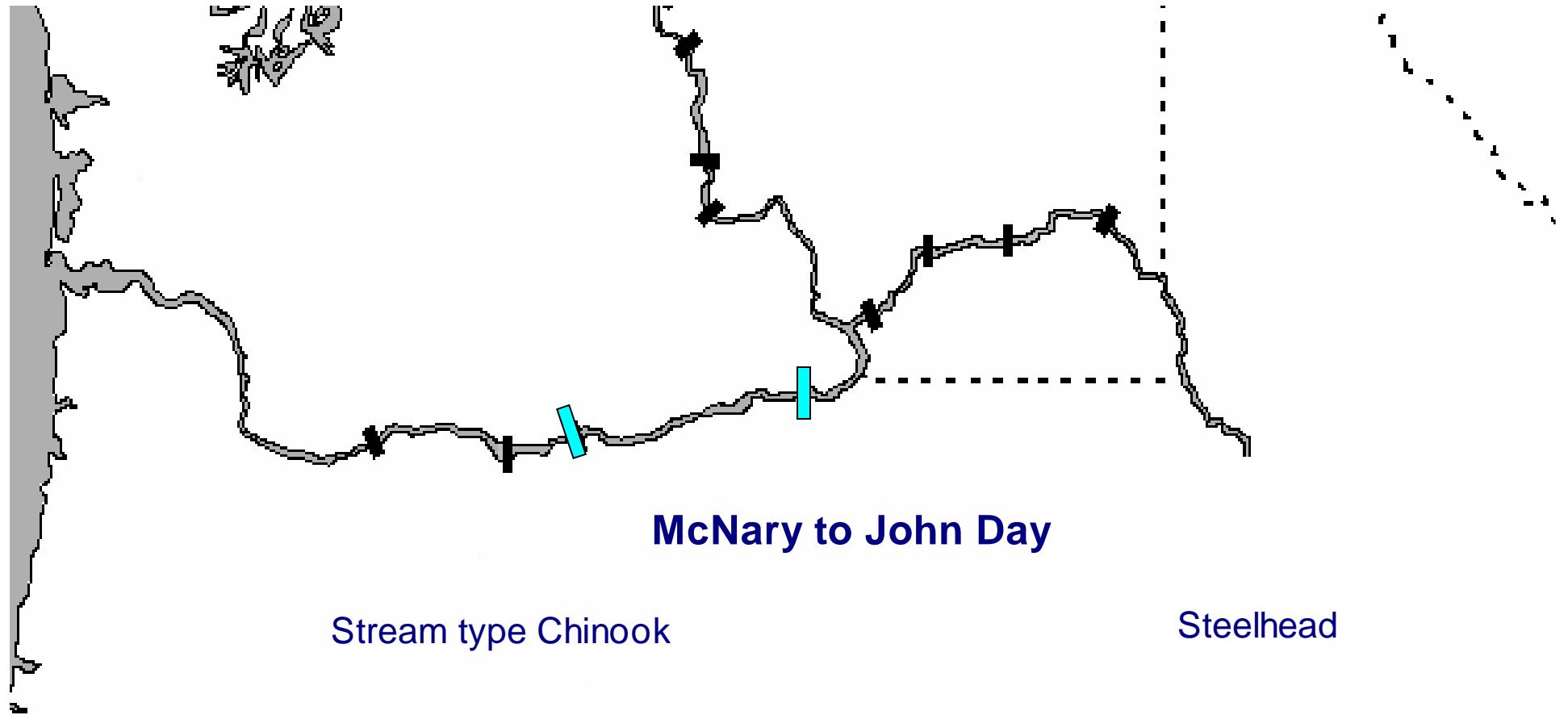


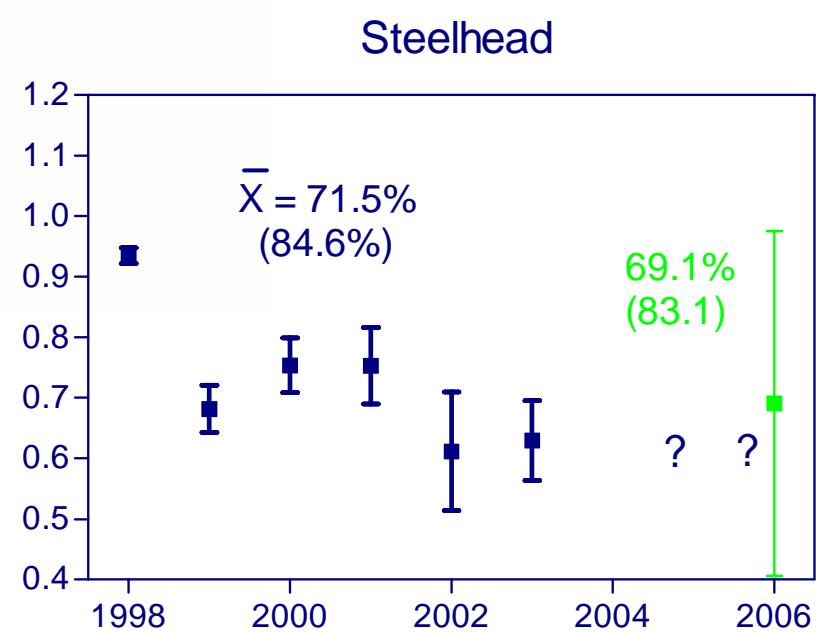
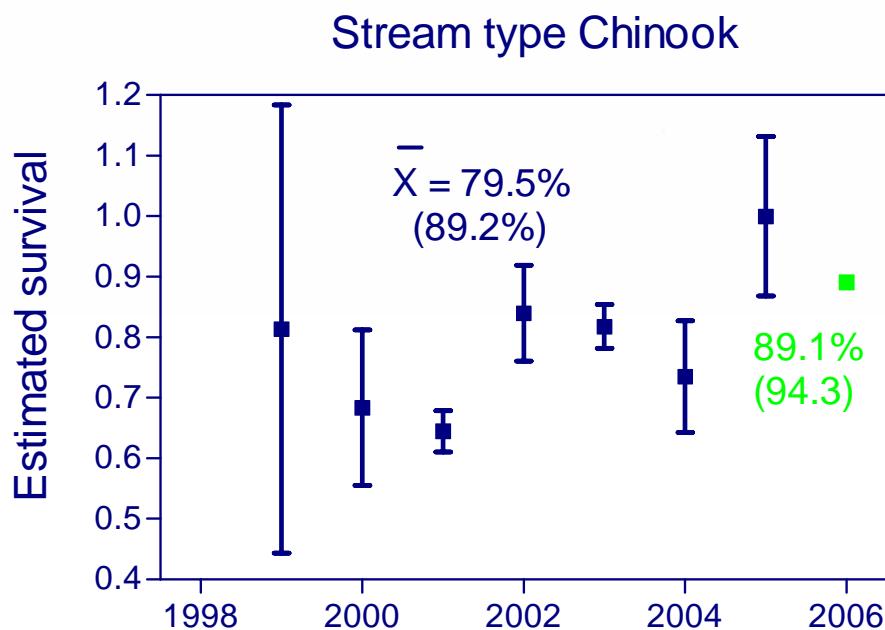
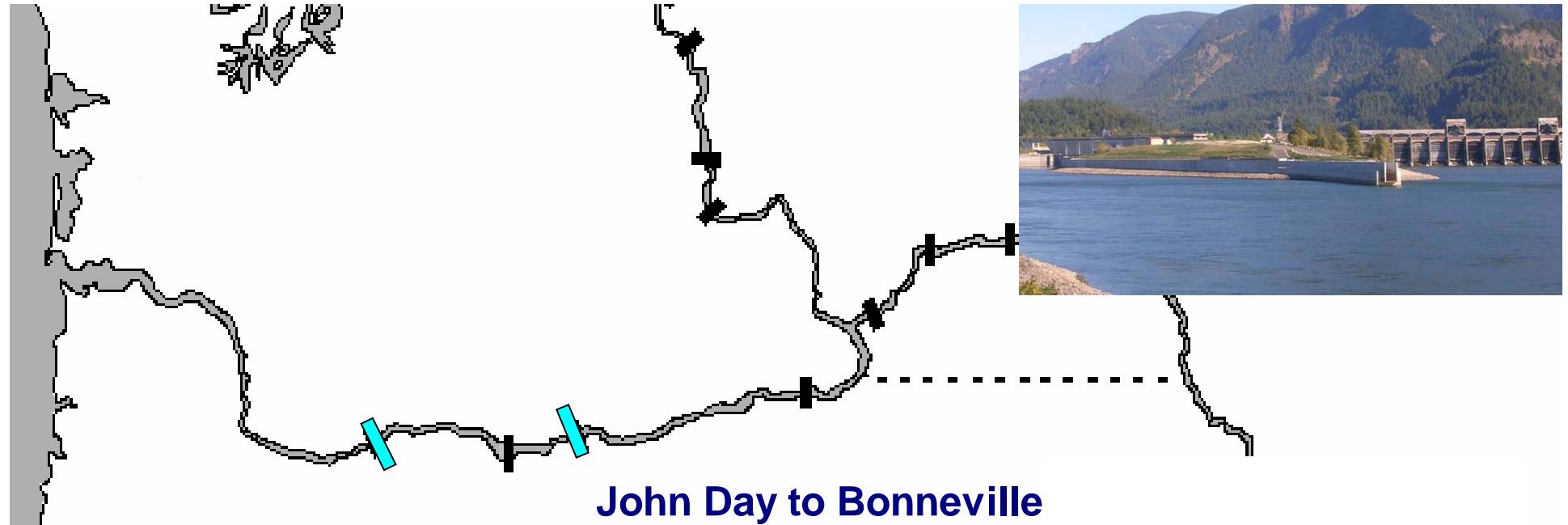
# Lower Monumental-McNary Survival Partitioned in 2006

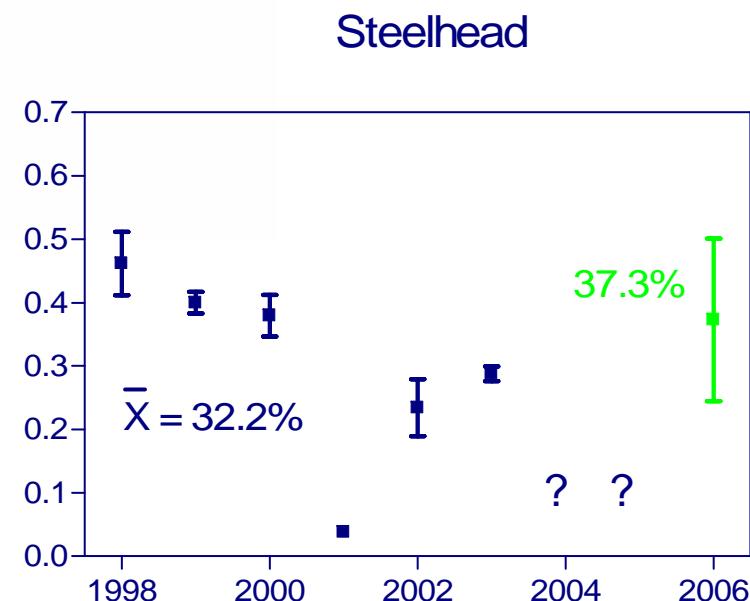
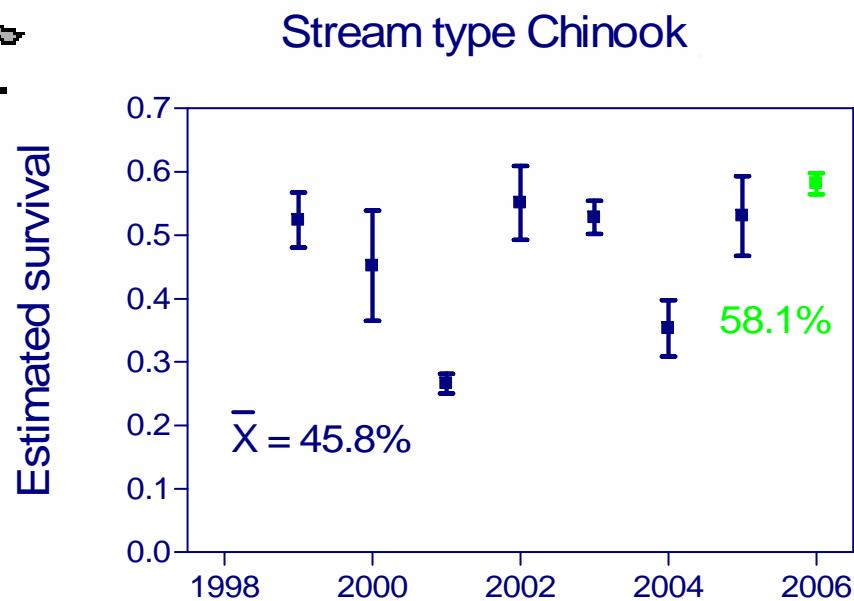
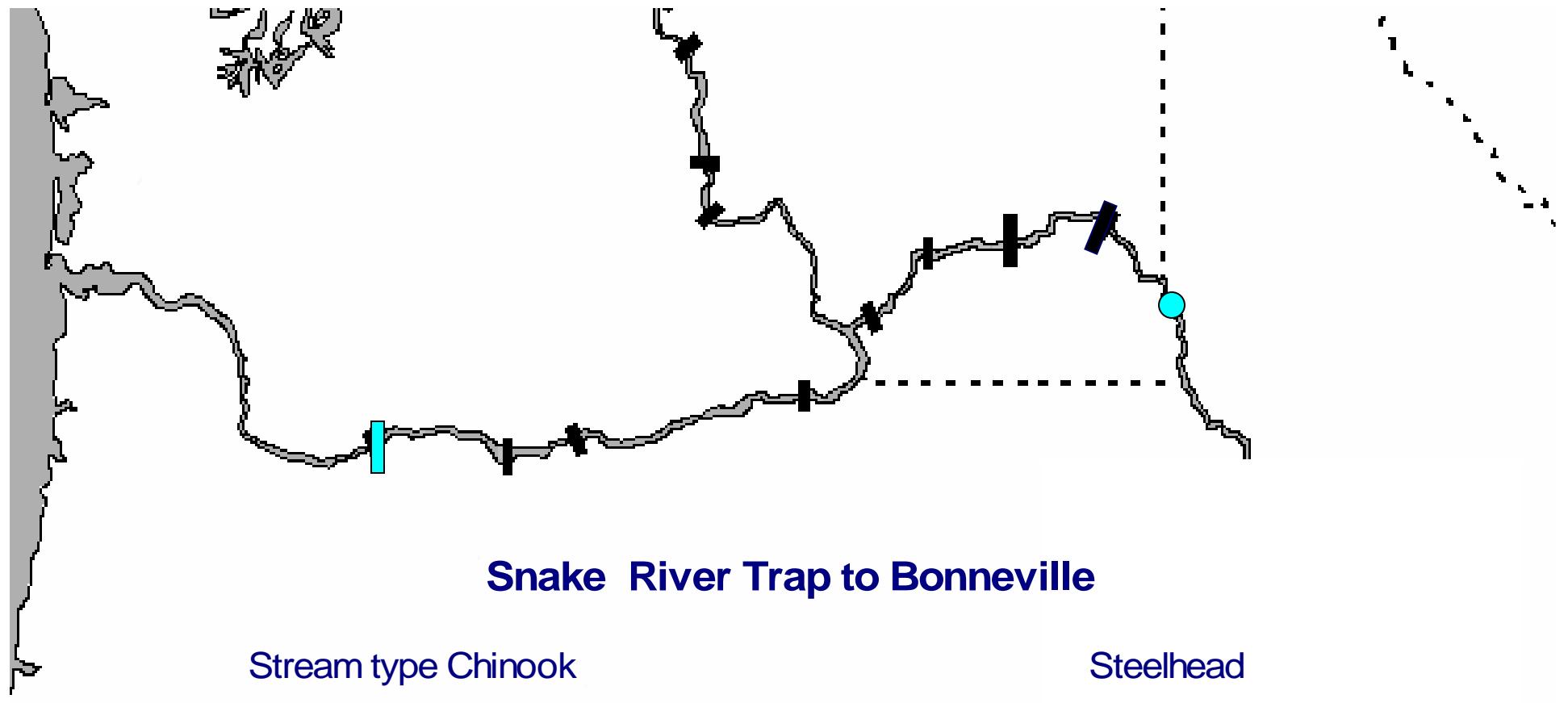
- Chinook Salmon
  - LMN-MCN 0.887 (0.004)
    - Lower Monumental to Ice Harbor: 0.914 (0.003)
    - Ice Harbor to McNary Dam: 0.964 (0.005)
- Steelhead
  - LMN-MCN: 0.776 (0.016)
    - Lower Monumental to Ice Harbor: 0.913 (0.010)
    - Ice Harbor to McNary Dam: 0.863 (0.018)



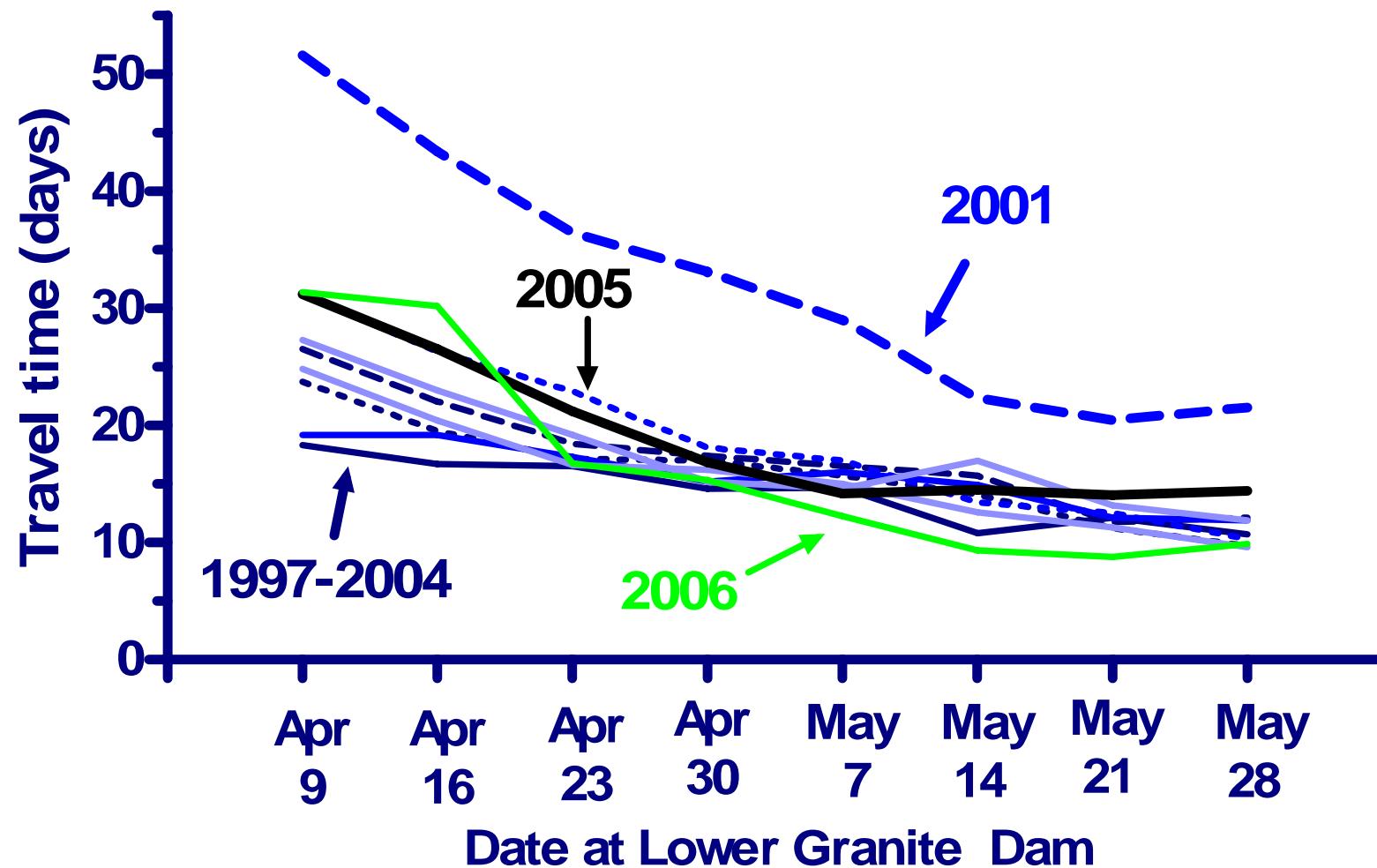




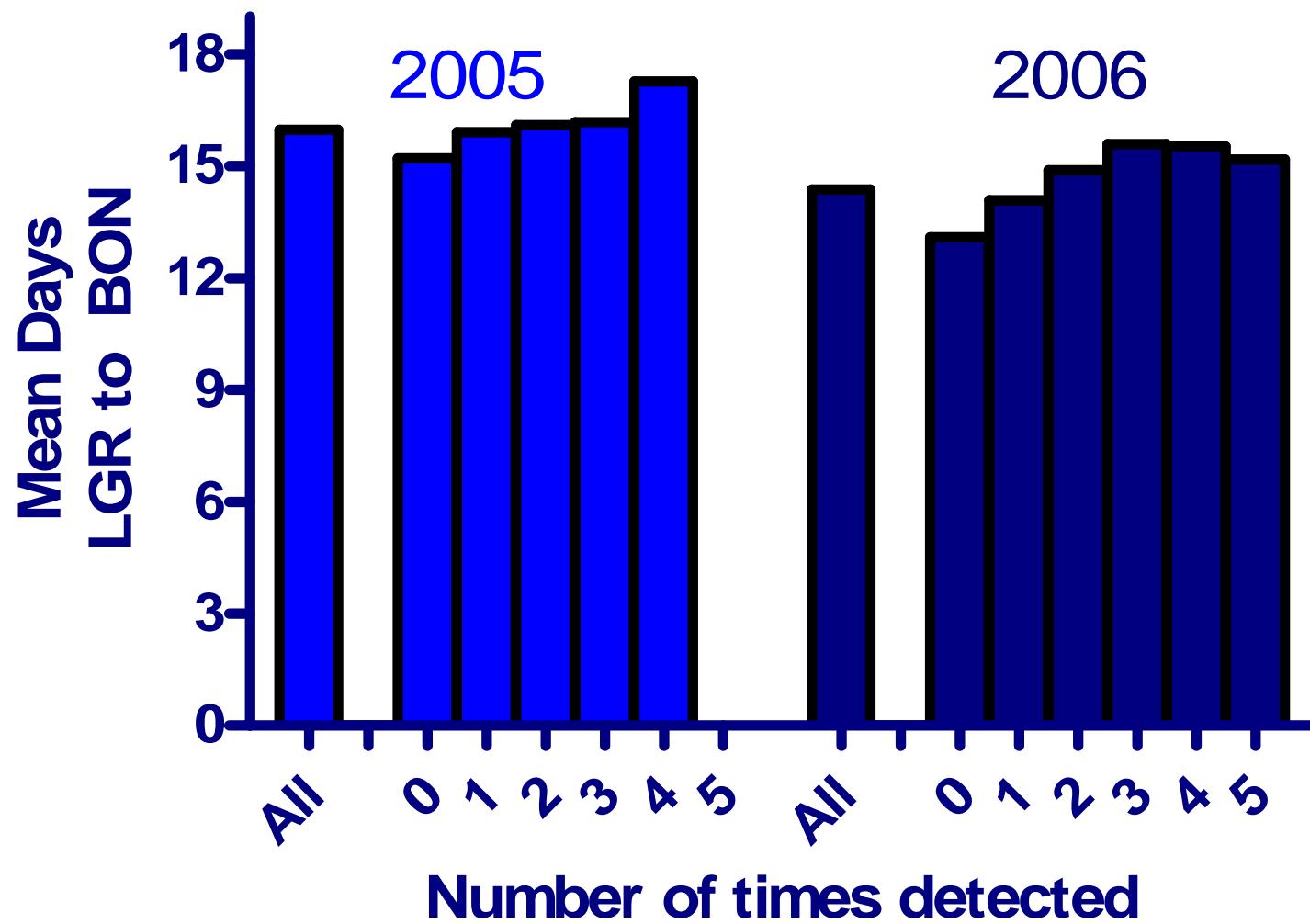




## Median travel time Stream type Chinook Lower Granite to Bonneville (461 km)

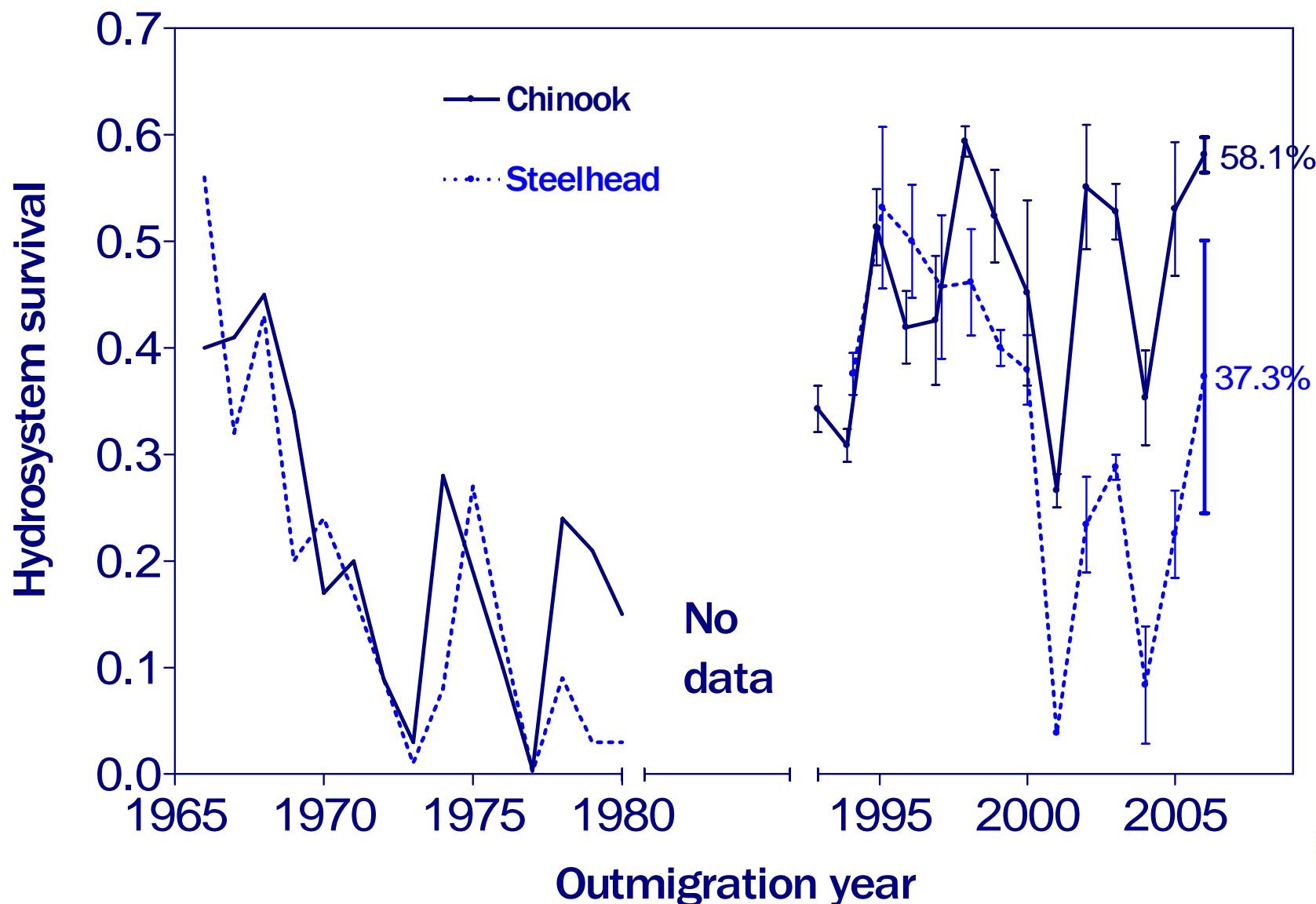


# LGR-BON Travel Time by number of detections



# Snake River Trap to Bonneville Dam Tailrace

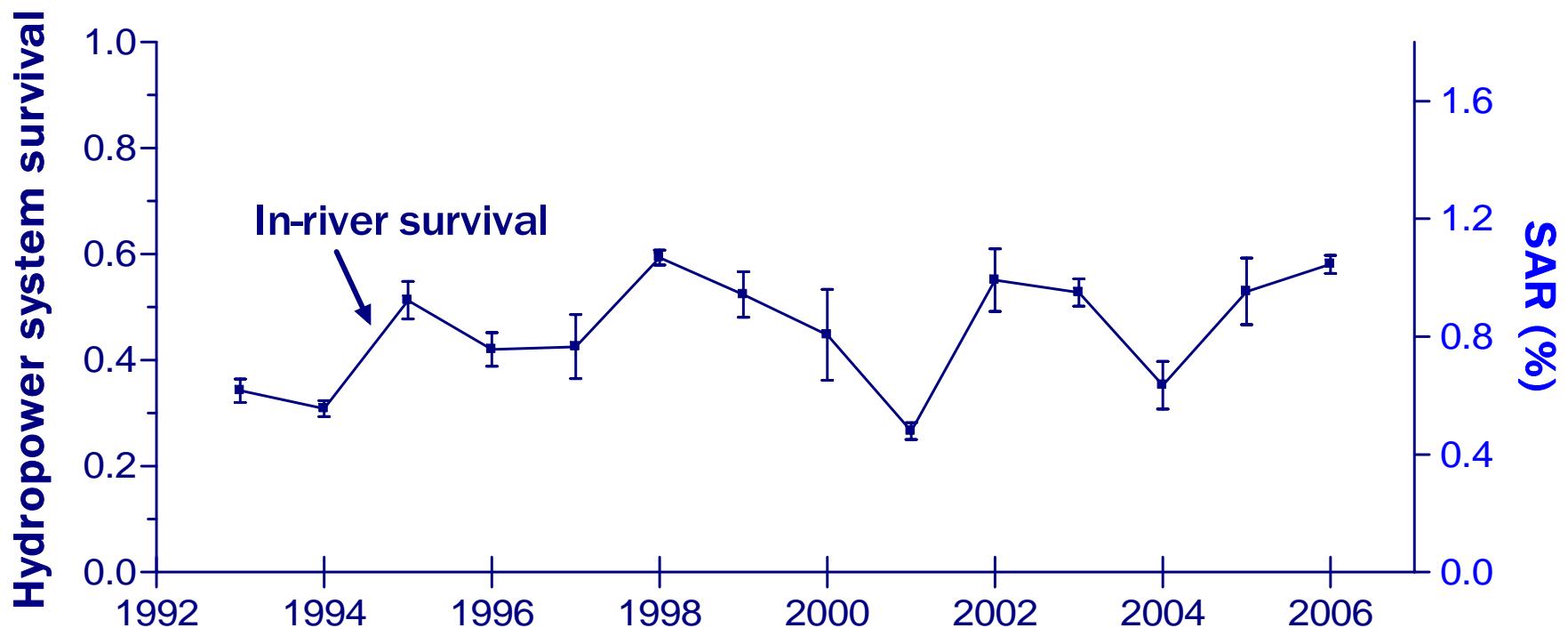
Per-project expansion in some years



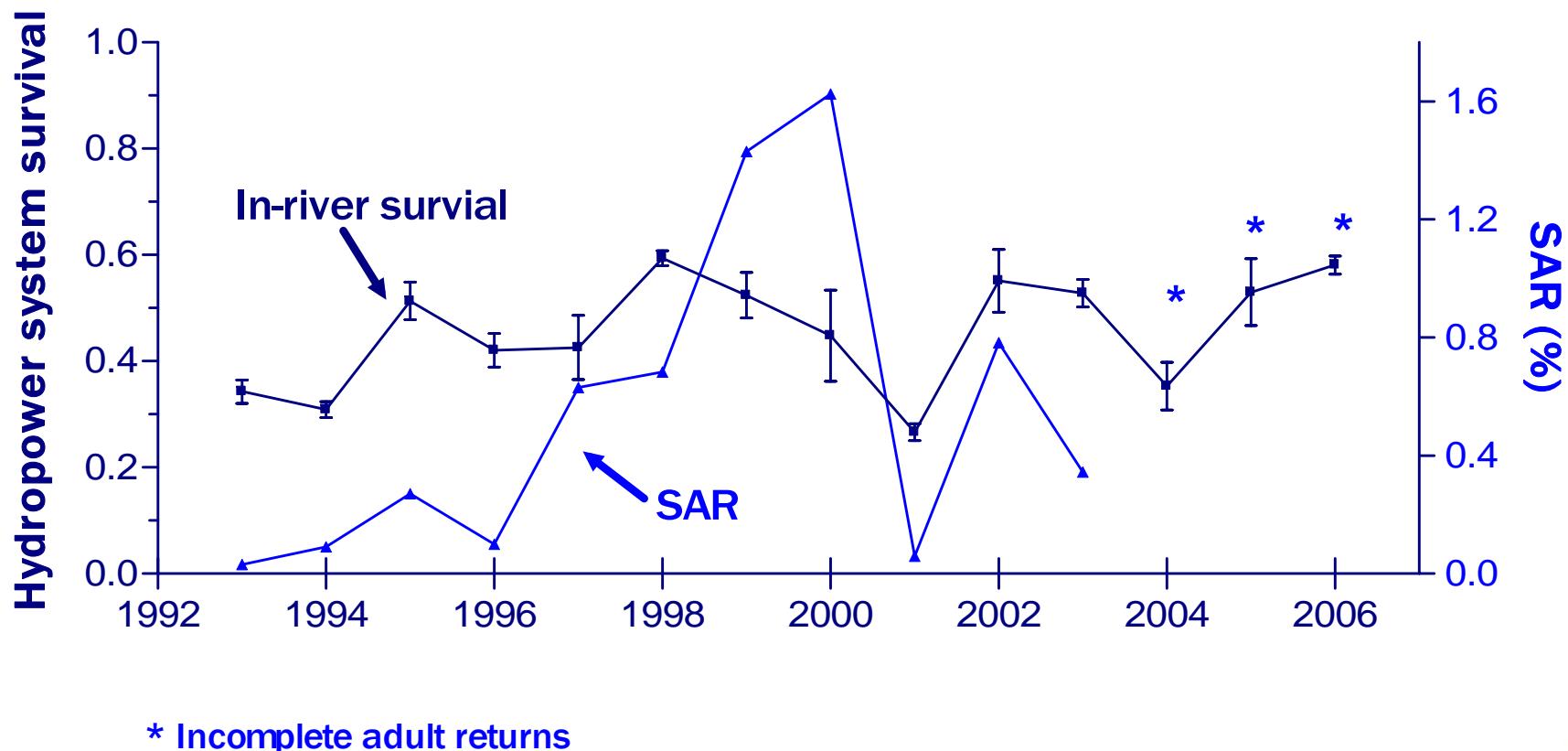
# How big of part does hydropower system survival play in adult returns?



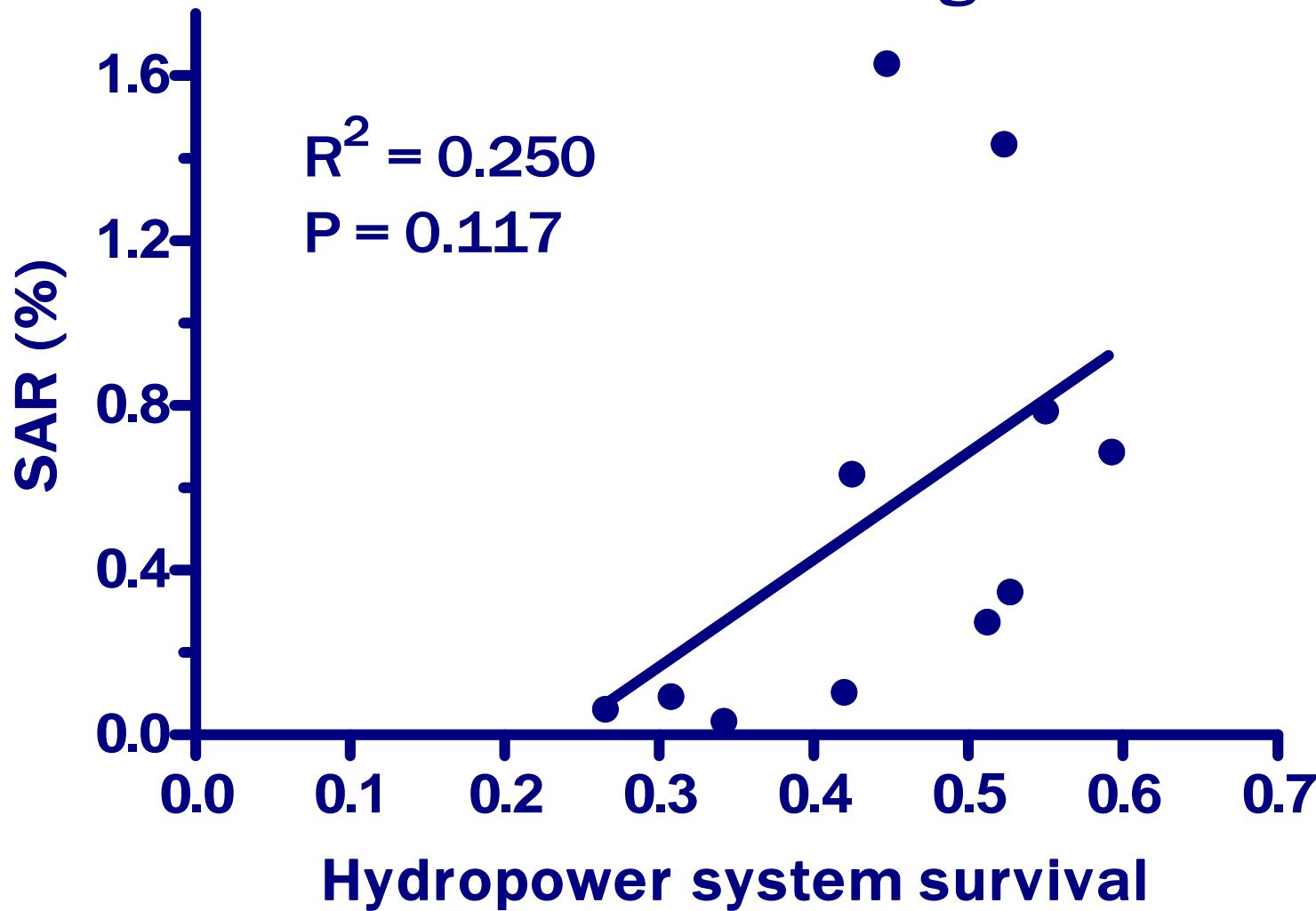
## Stream type Chinook based on PIT tags



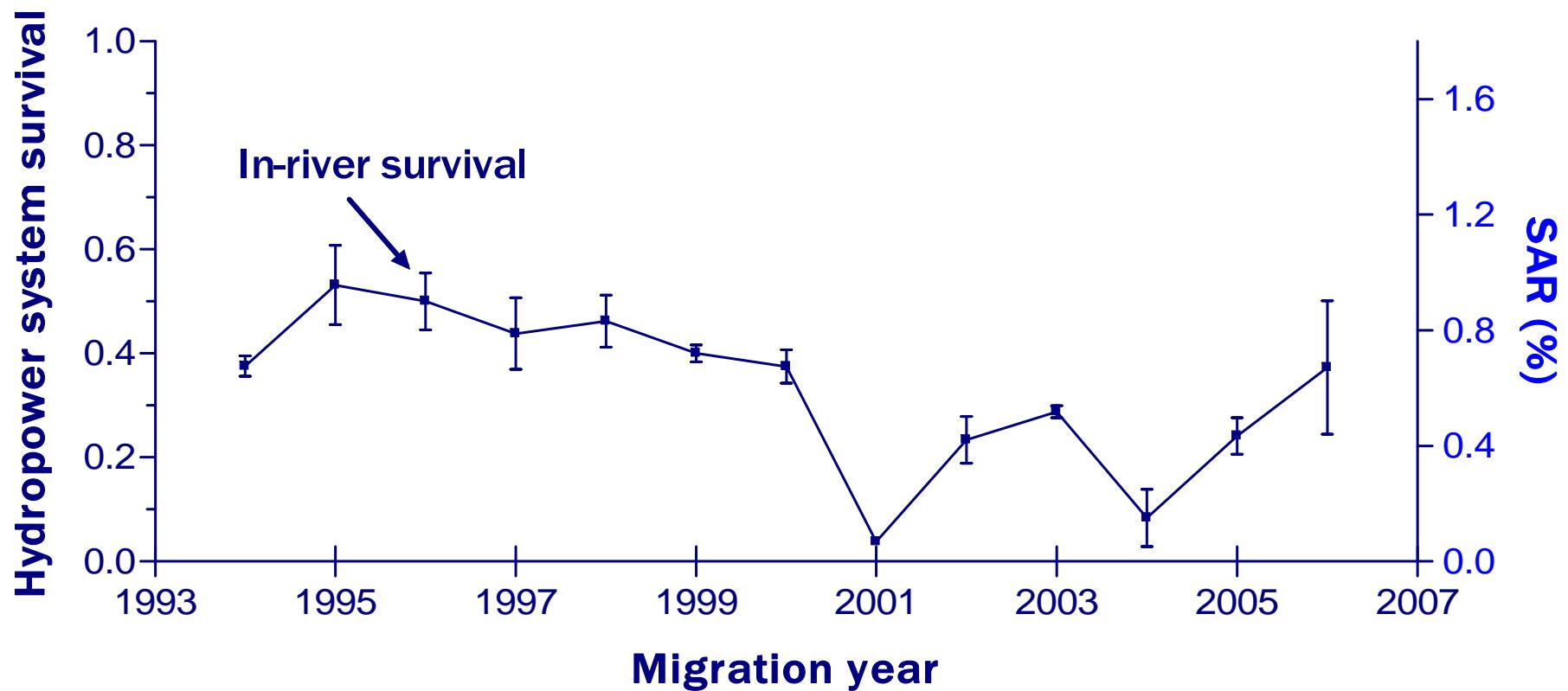
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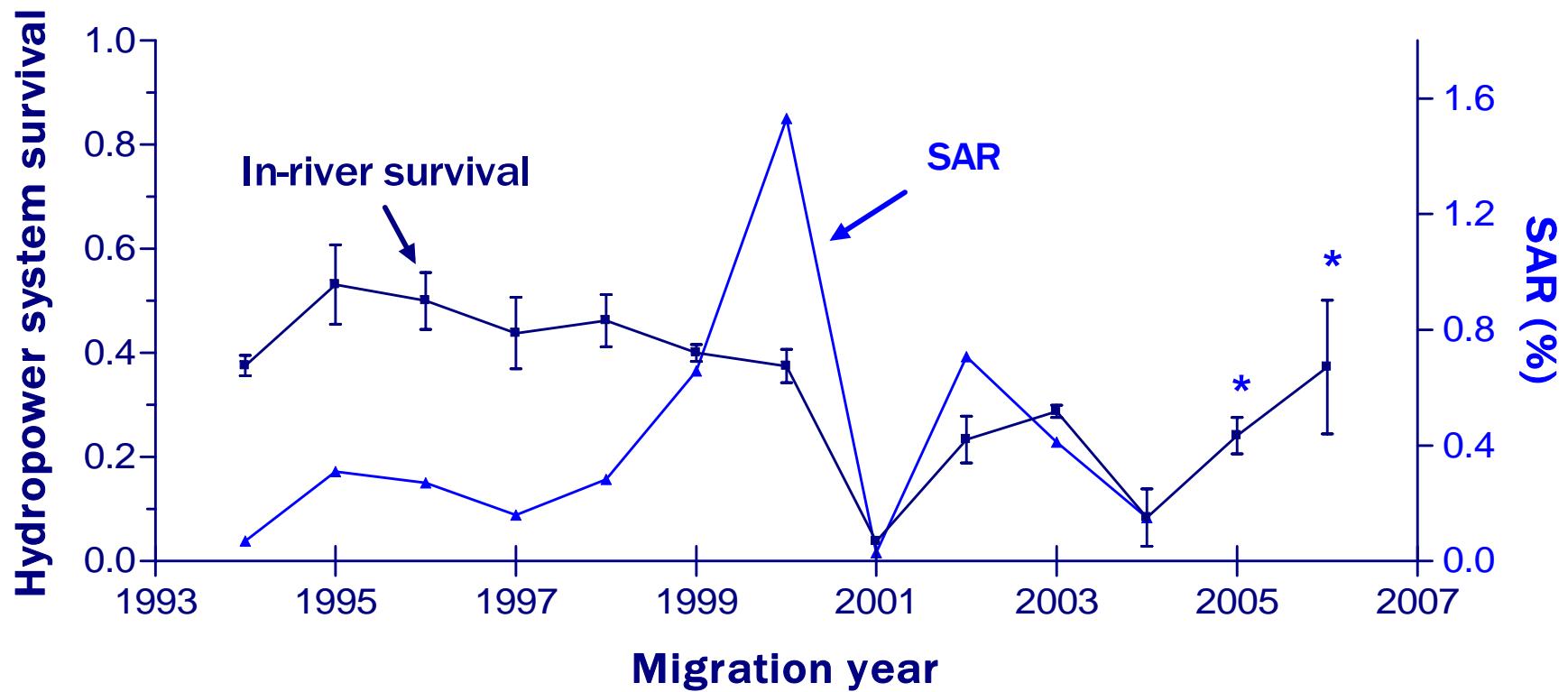
## Stream type Chinook based on PIT tags



## Steelhead based on PIT tags



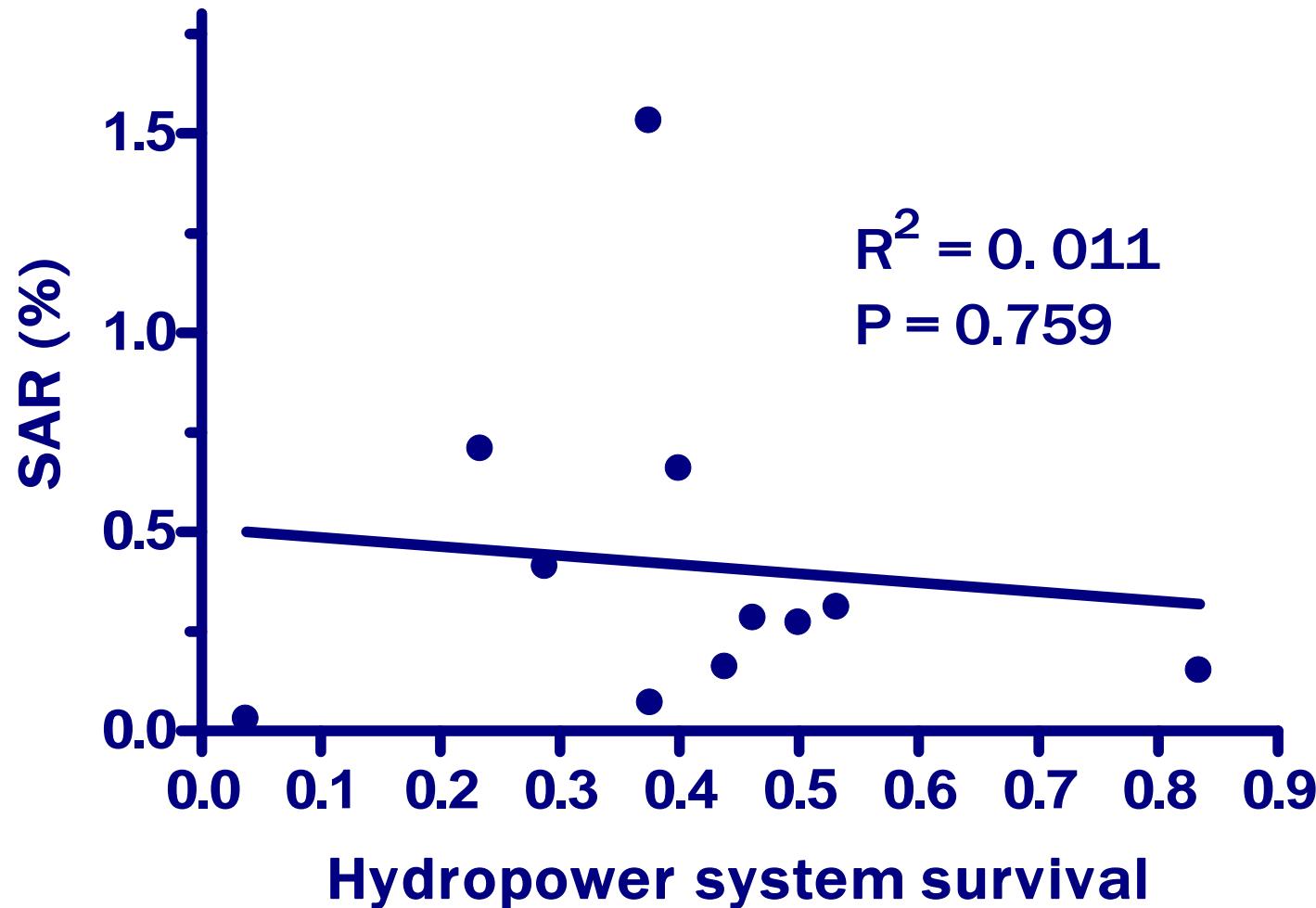
## Steelhead based on PIT tags



\* Adult returns incomplete



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- Because not all fall Chinook salmon migrate while bypass systems are on, estimates of their survival are difficult to interpret (joint probability estimate).
- Therefore, we are relying on SARs instead.

# Conclusions

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- Reach survival averaged 93% per project for Chinook and 88% for steelhead in 2006
- Hydropower system survival was 58% for Chinook and 37% for steelhead in 2006
- **Chinook and steelhead direct hydropower system survival has little influence on SAR**





# Questions

