

# Adult Chinook Salmon Passage at Little Goose Dam in Relation to Spill Operations - 2008



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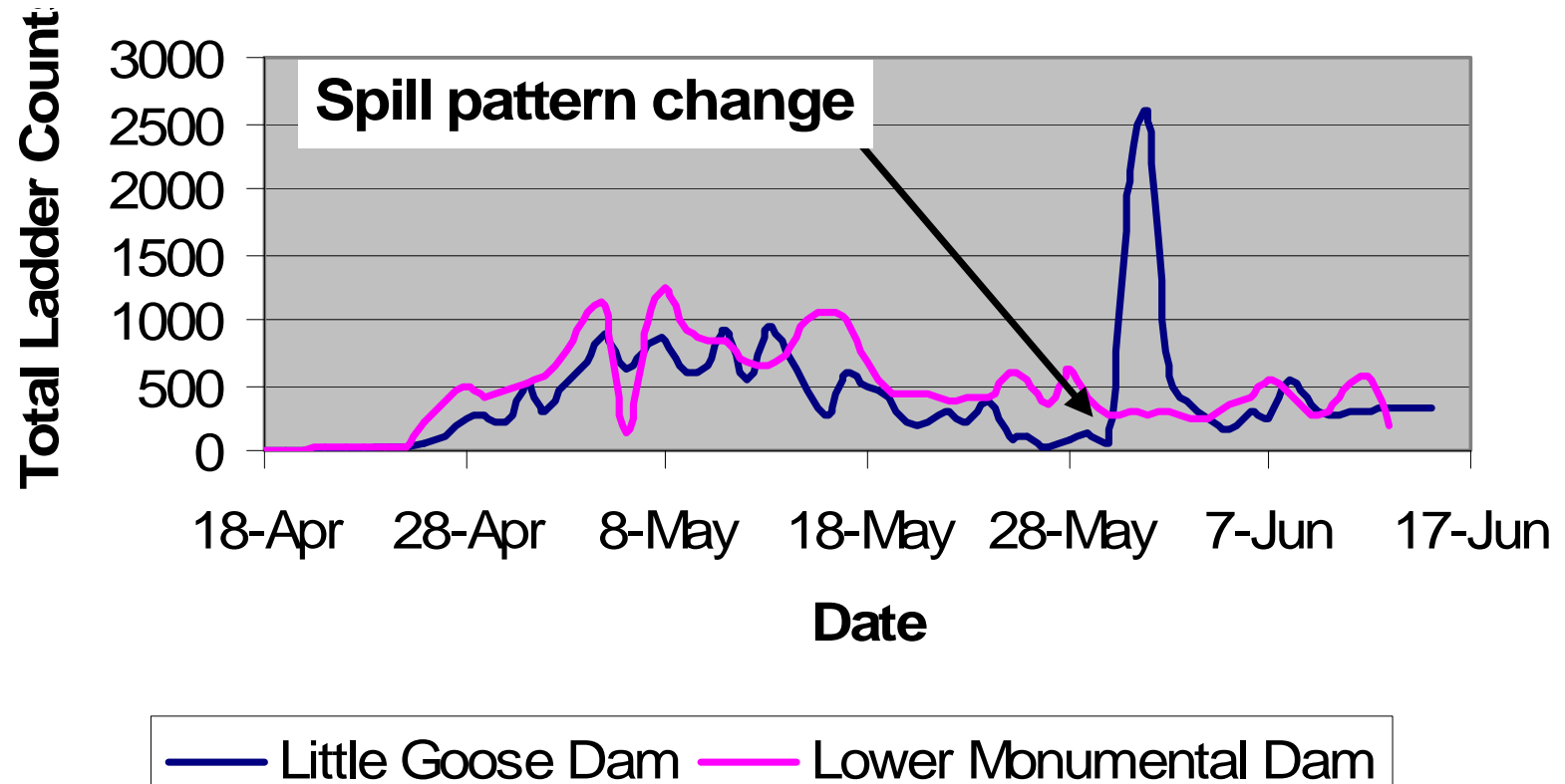


**University of Idaho**

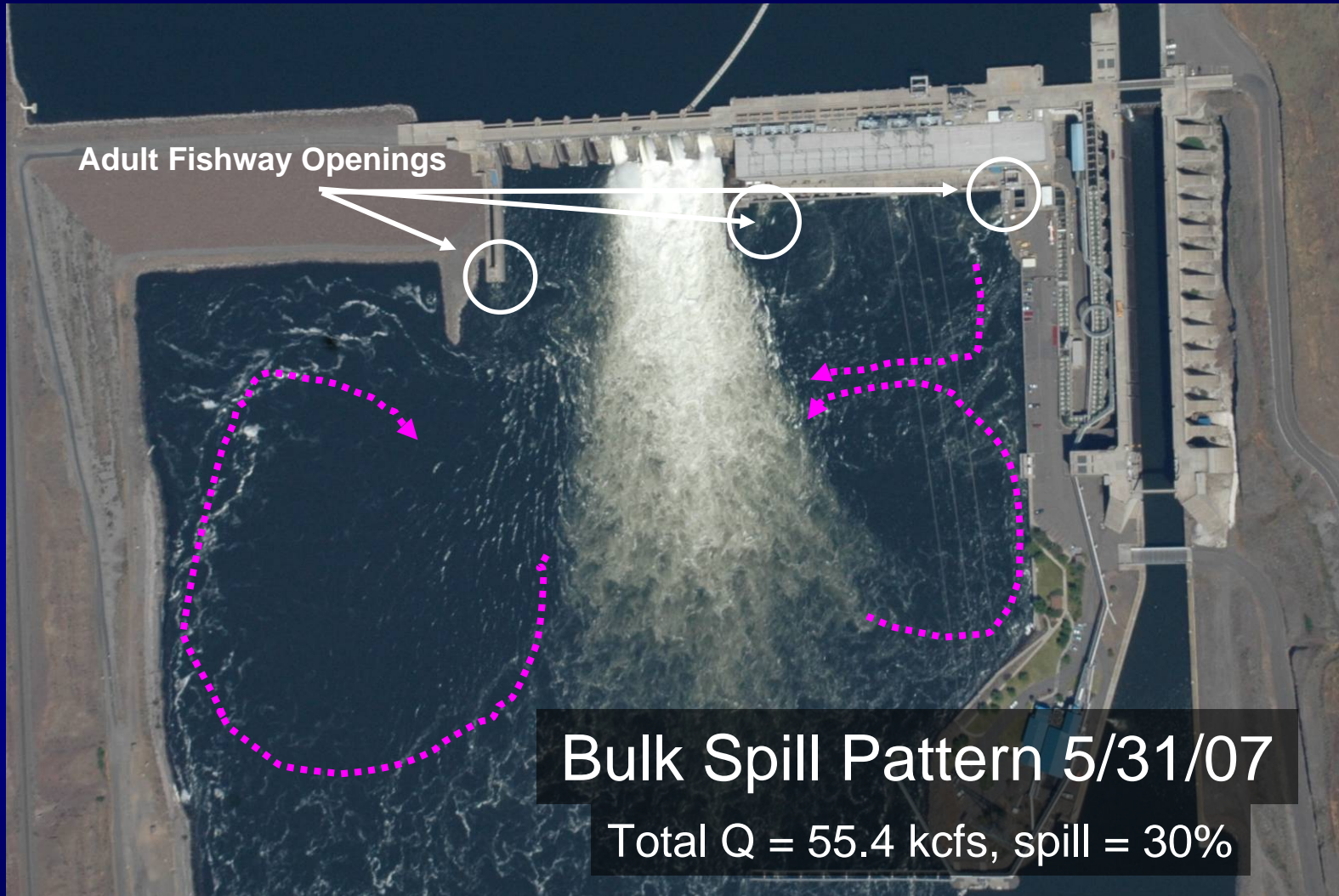


# Context

## Spring Chinook Passage in 2007



# Context



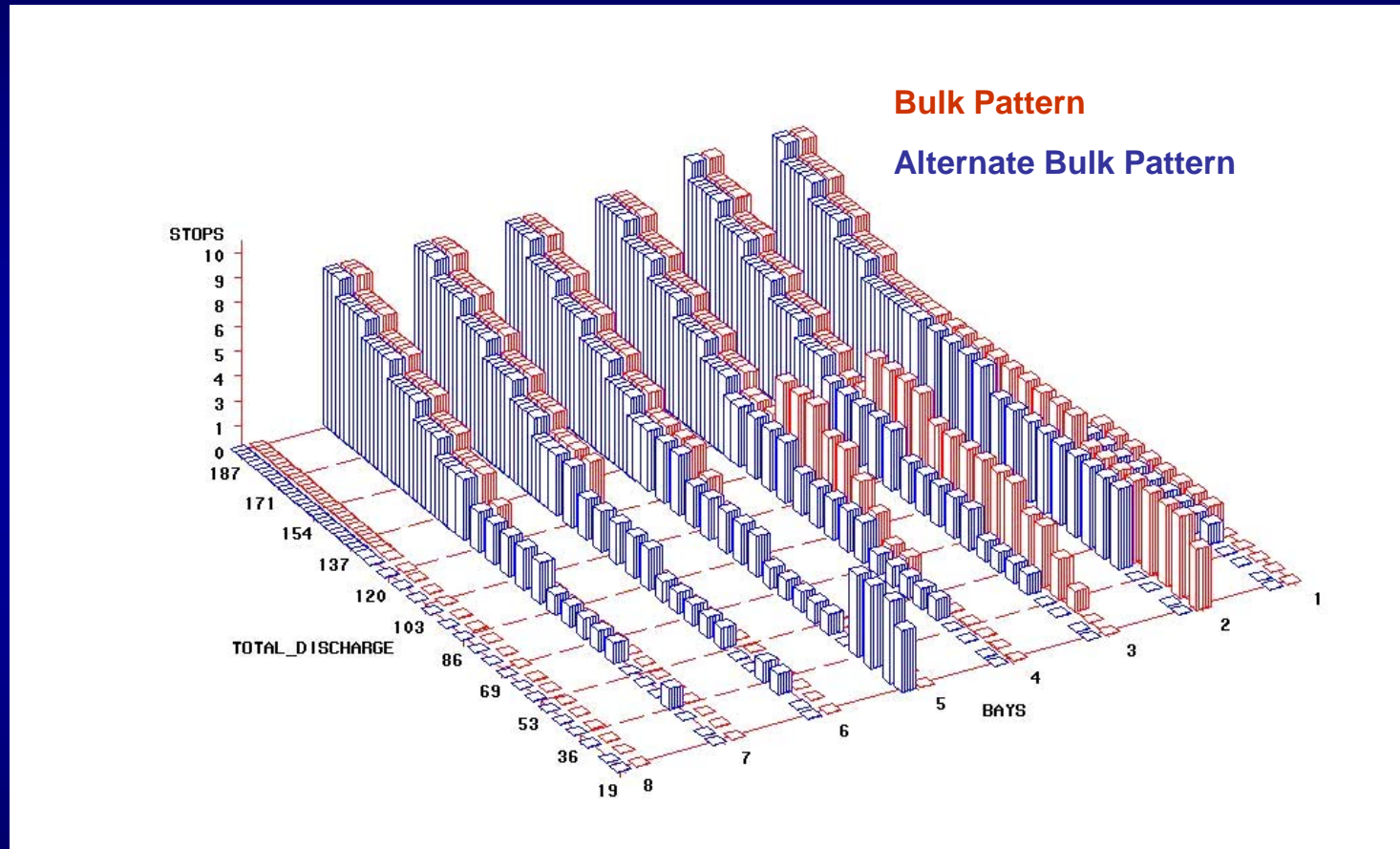
# Objectives

- Apply three spill patterns at Little Goose Dam during 2008
- Characterize tailrace conditions with use of GPS-equipped drogues
- Evaluate passage times and behaviors of radio-tagged adult Chinook salmon



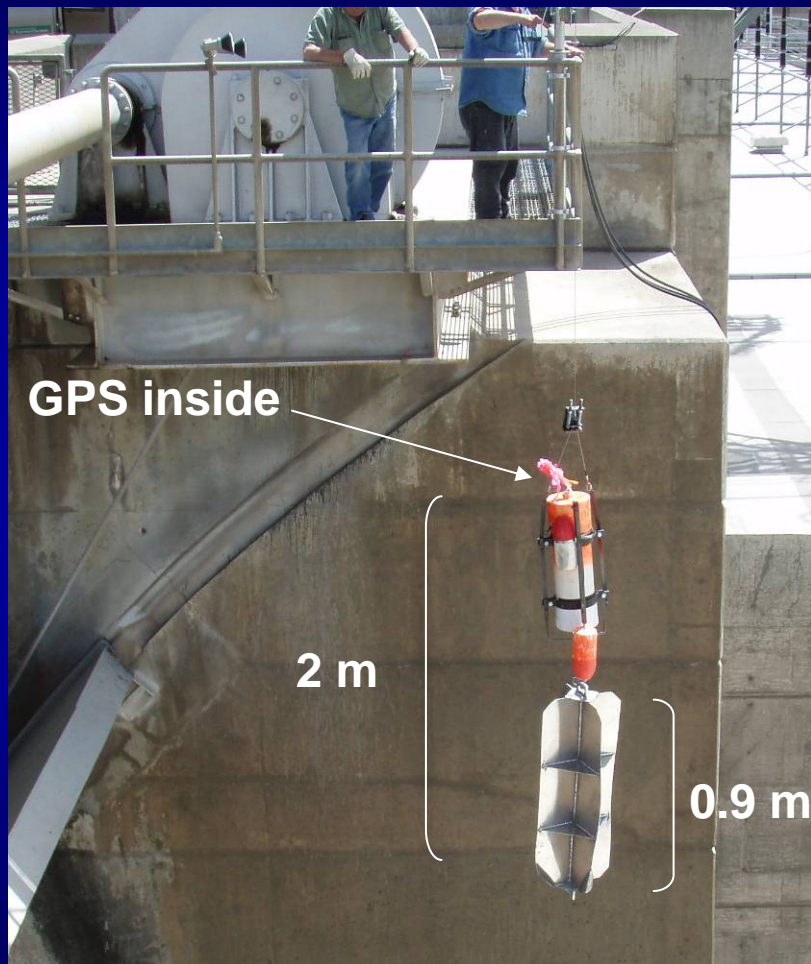
# Spill Patterns

Each treatment applied for 2 days w/in 6 day blocks



**Uniform Pattern = similar volumes of spill through most spillbays**

# Methods - Drogue Releases



- Release at:
  - Each ladder entrance
  - Edges of spill pattern
- Release daily:
  - April 3 thru August 31
    - When river  $Q < 120$  kcfs



# Methods

- **Trap, radio-tag, and release adult spring-summer Chinook salmon at Ice Harbor Dam**

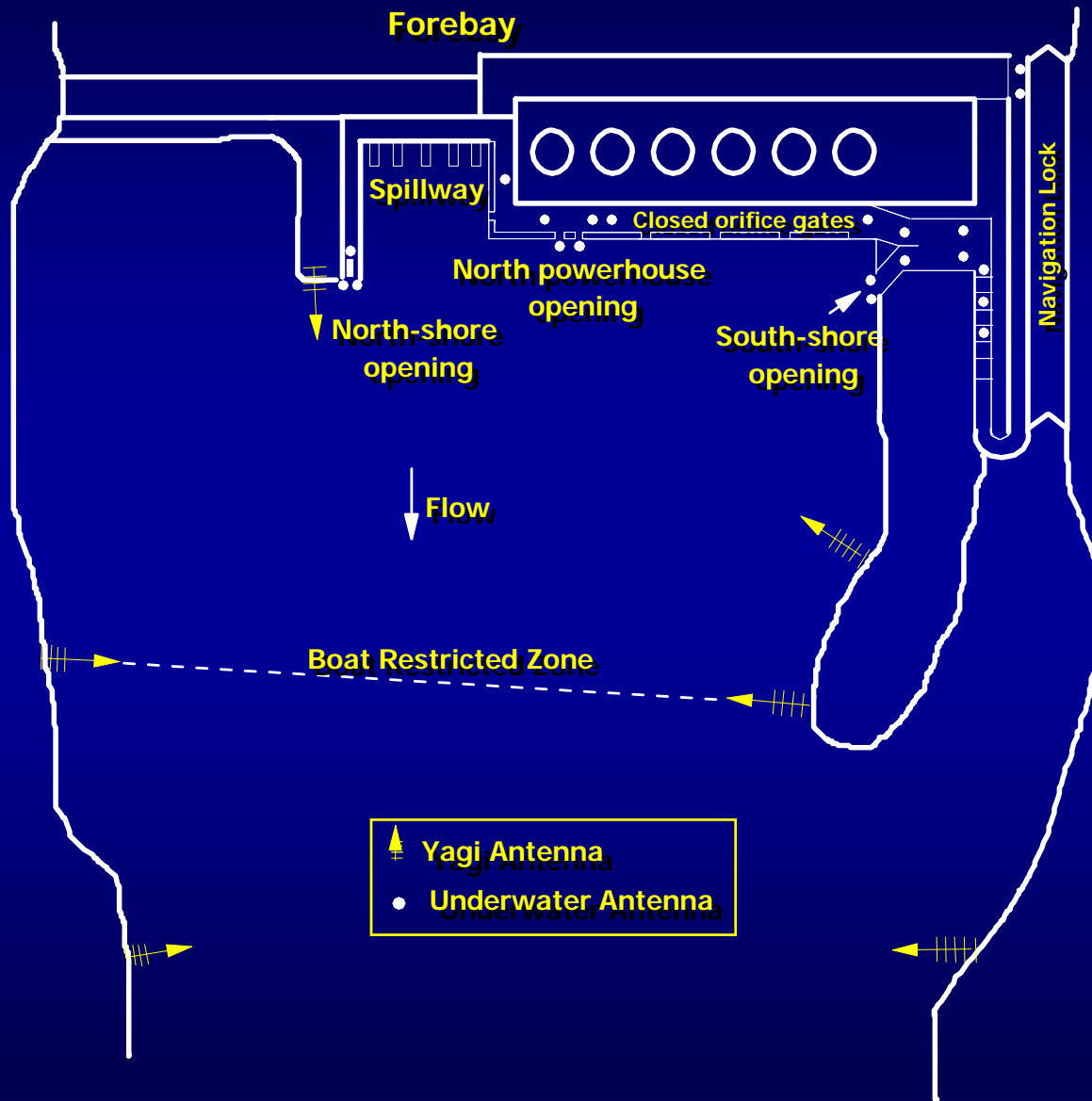


# Methods

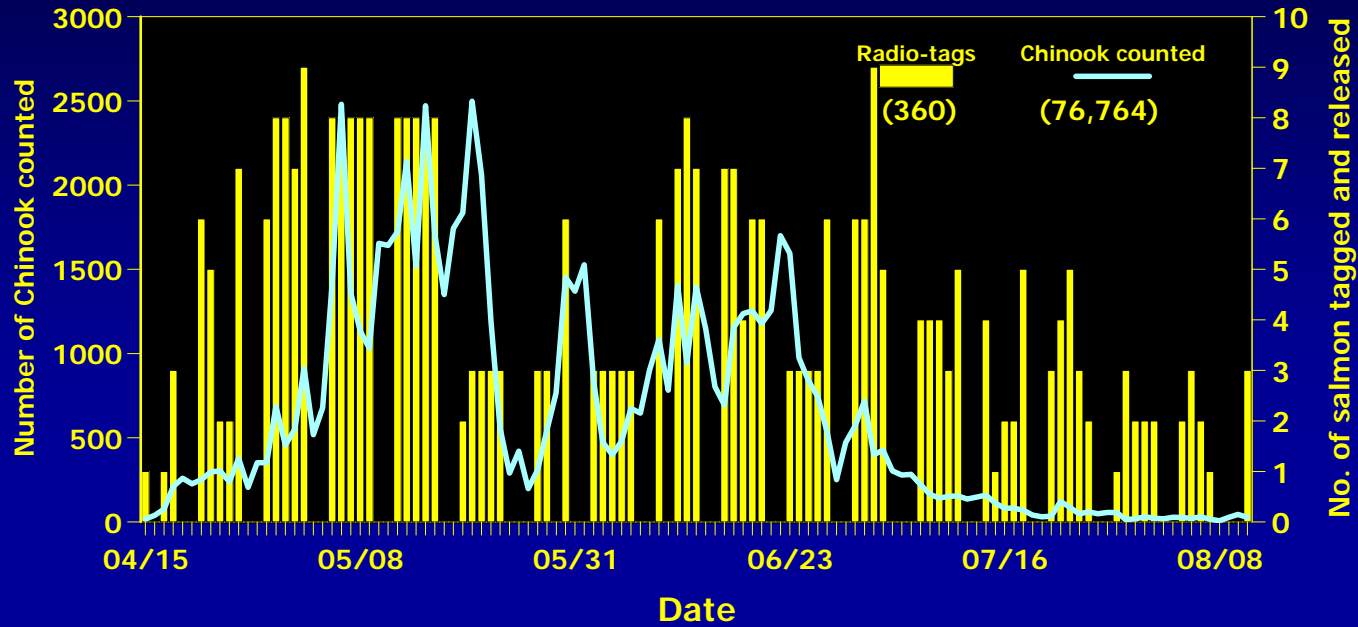
- Monitor movements of tagged salmon in and around Little Goose Dam



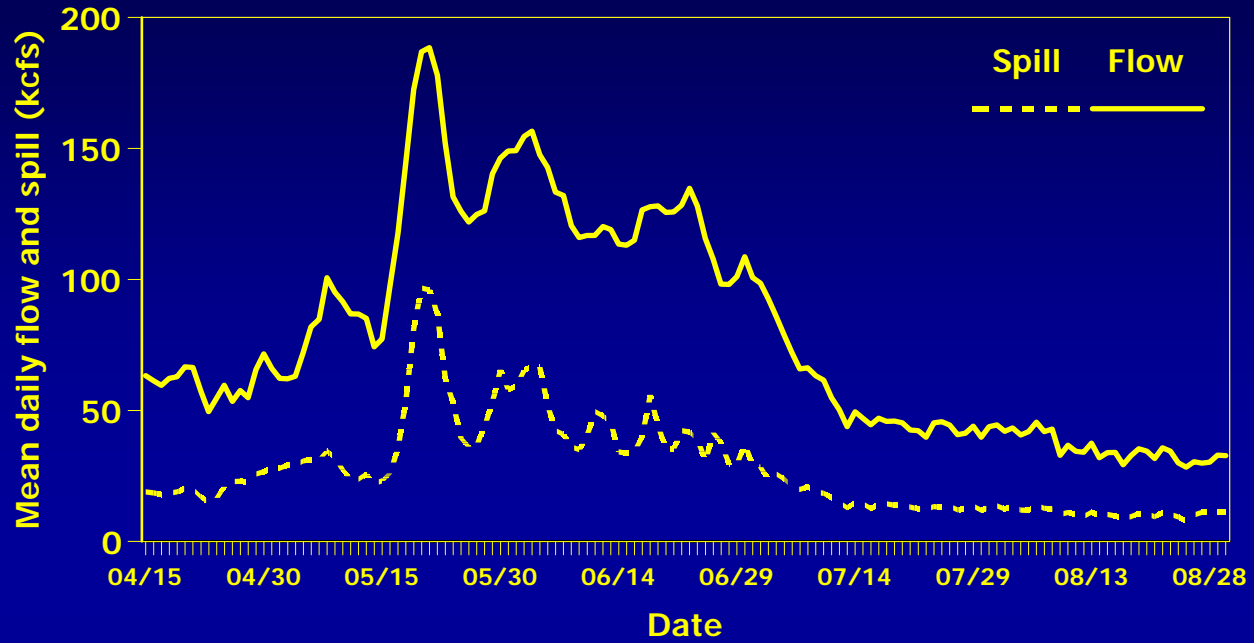
# Study Site



# Radio-taggings at Ice Harbor Dam - 2008

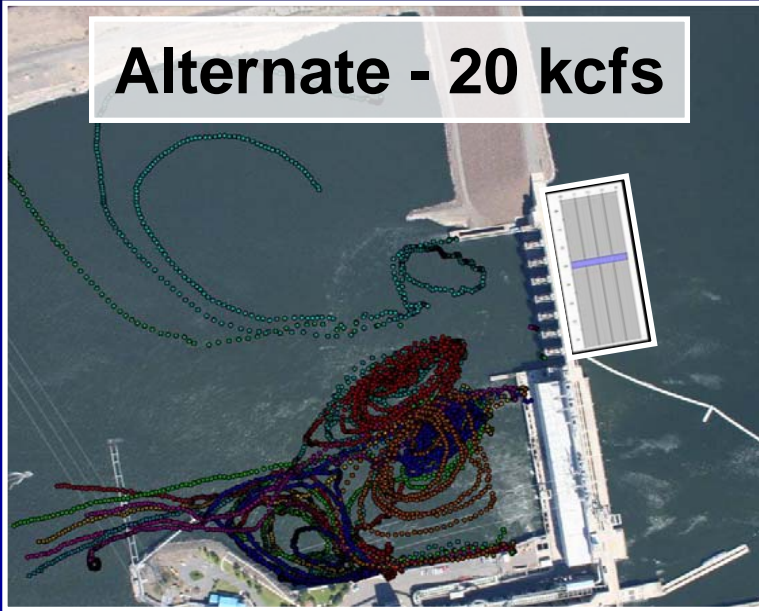


# River Conditions at Little Goose Dam - 2008

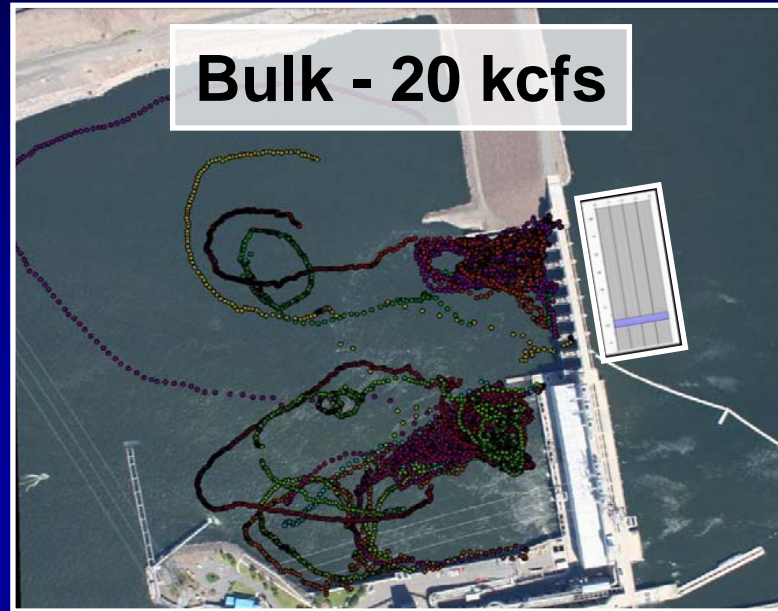


# Results - Tailrace Conditions

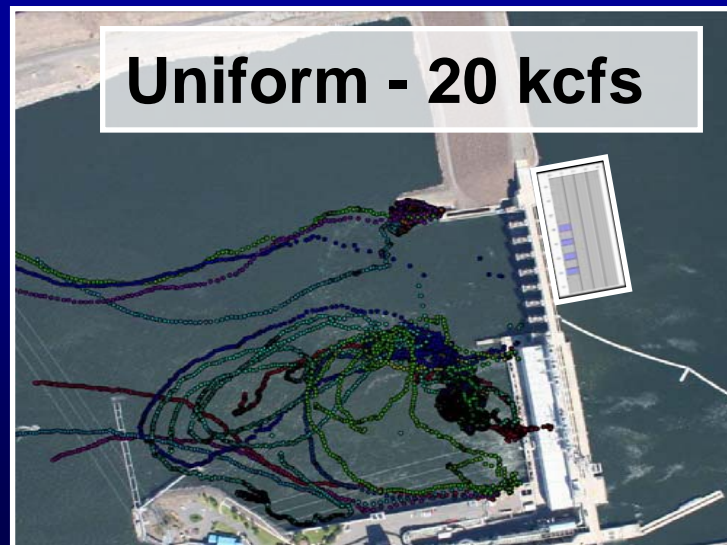
**Alternate - 20 kcfs**



**Bulk - 20 kcfs**

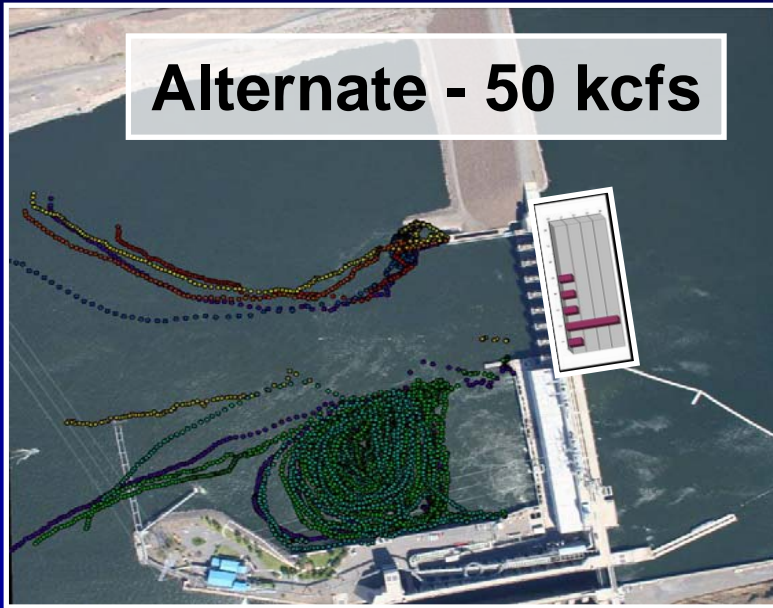


**Uniform - 20 kcfs**

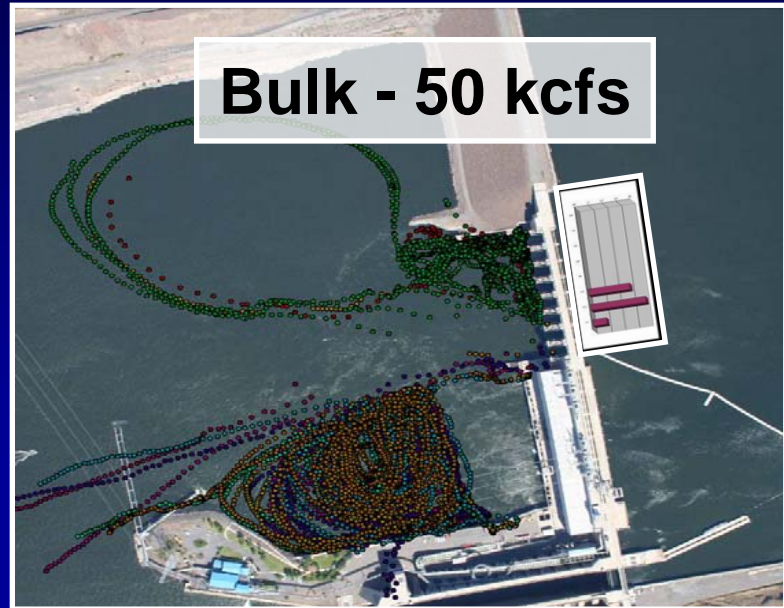


# Results - Tailrace Conditions

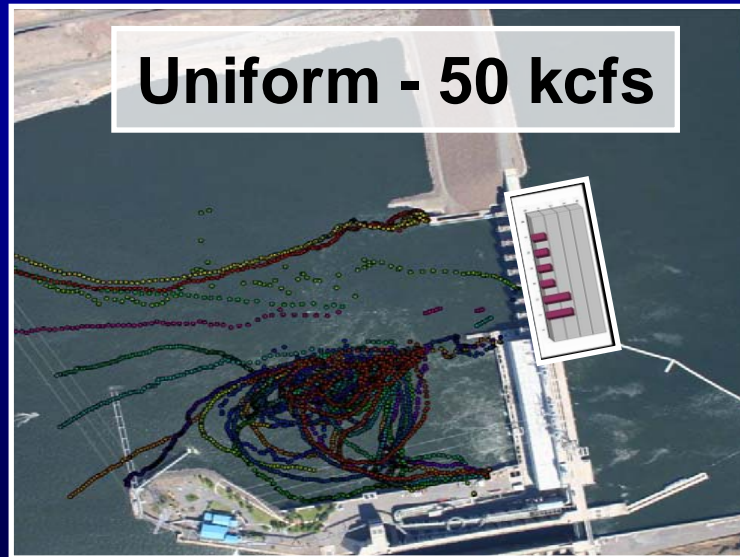
**Alternate - 50 kcfs**



**Bulk - 50 kcfs**

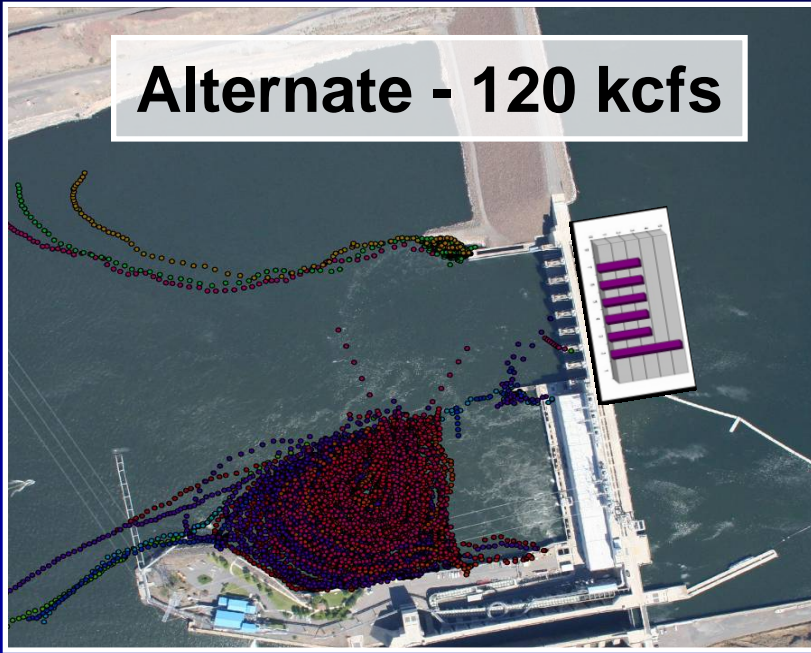


**Uniform - 50 kcfs**

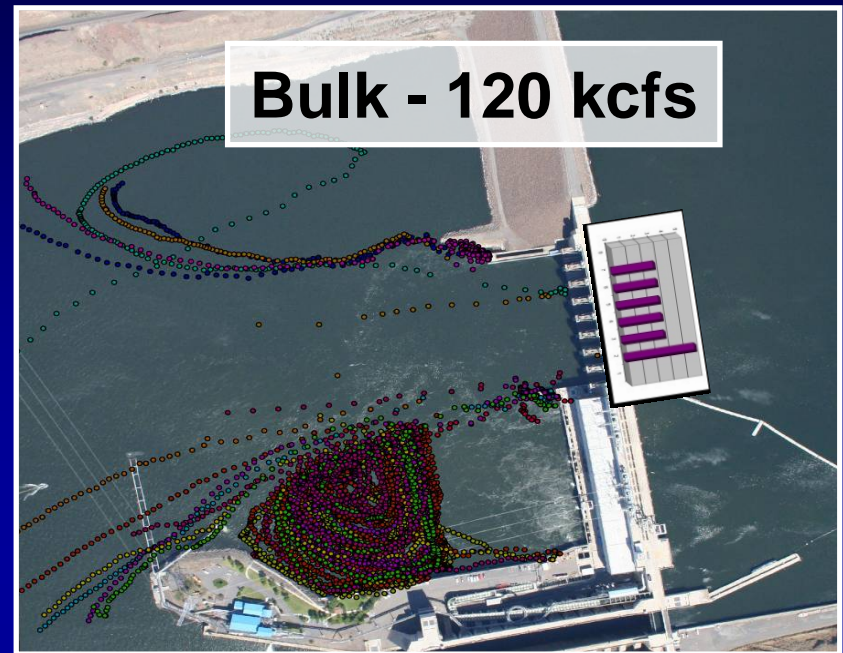


# Results - Tailrace Conditions

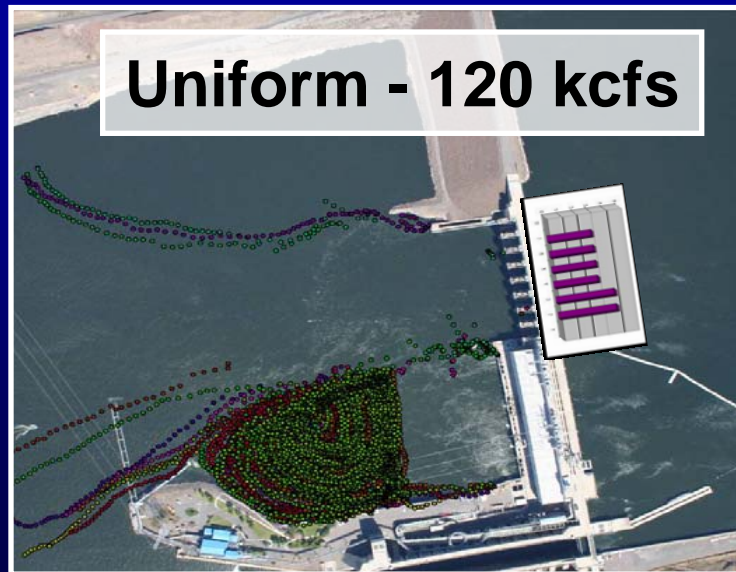
**Alternate - 120 kcfs**



**Bulk - 120 kcfs**



**Uniform - 120 kcfs**



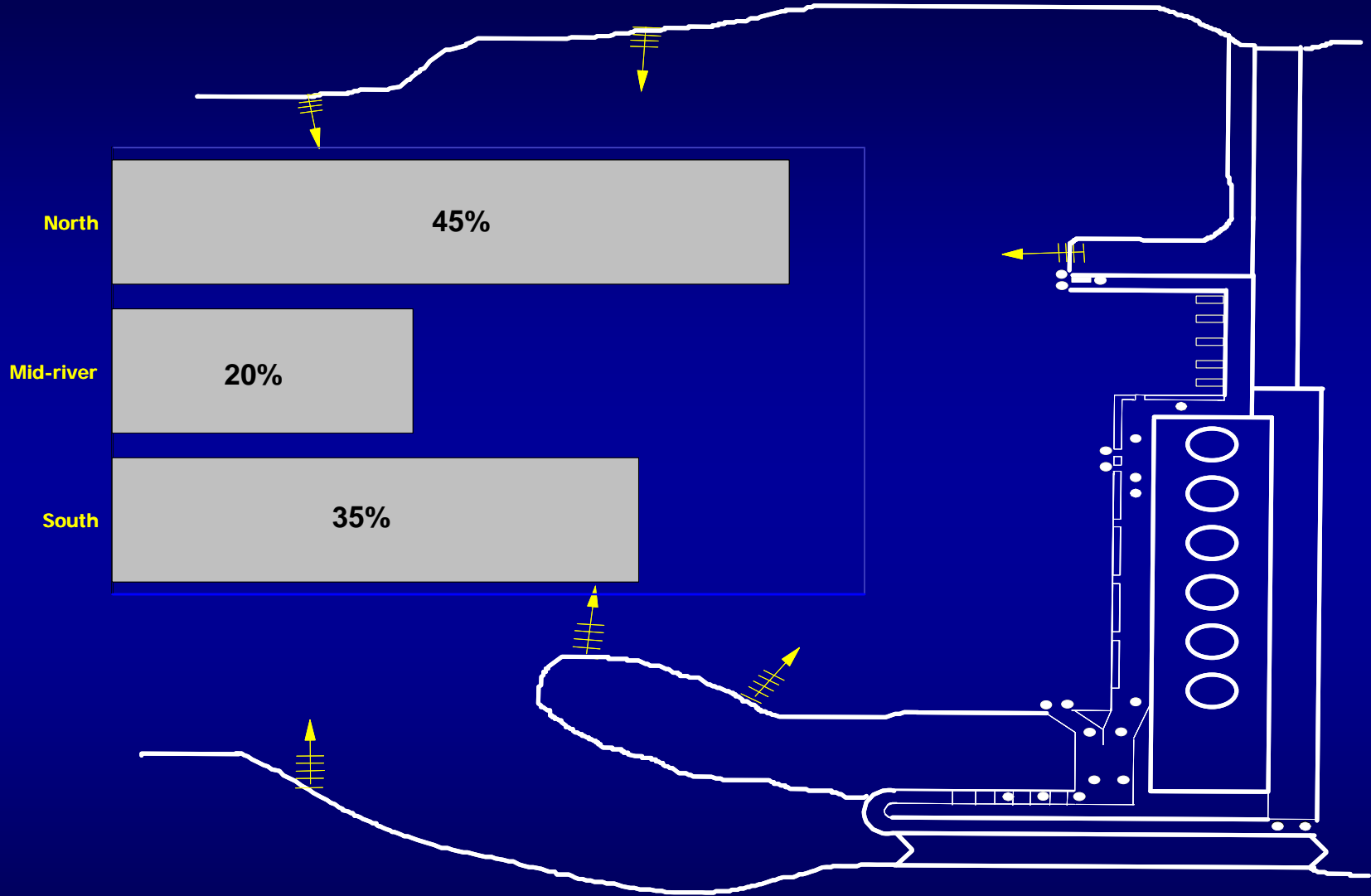
# Overview of Tailrace Conditions

- Eddies near powerhouse and earthen dam were always present, but extent varied
  - By discharge and spill pattern
    - Powerhouse eddy size and cohesiveness...
      - Bulk > Alt. Bulk > Uniform; increased w/ Q
    - North shore eddy size...
      - Uniform > Alt. Bulk > Bulk; diameter decreased w/ Q
- Trends followed those of spill patterns
  - Differences among patterns diminished with increasing discharge (equal by ~ 120 kcfs)

# Telemetry Results

<b>2008</b>	<b>Freq.</b>	<b>Percent</b>
<b>Recorded at dam</b>	<b>290</b>	<b>100</b>
<b>Known to pass dam</b>	<b>283</b>	<b>96</b>
<b>Recorded 1st tailrace entry</b>	<b>265</b>	<b>91</b>
<b>Recorded 1st fishway approach</b>	<b>289</b>	<b>99</b>
<b>Recorded 1st fishway entrance</b>	<b>286</b>	<b>98</b>
<b>Recorded ladder exit</b>	<b>282</b>	<b>97</b>

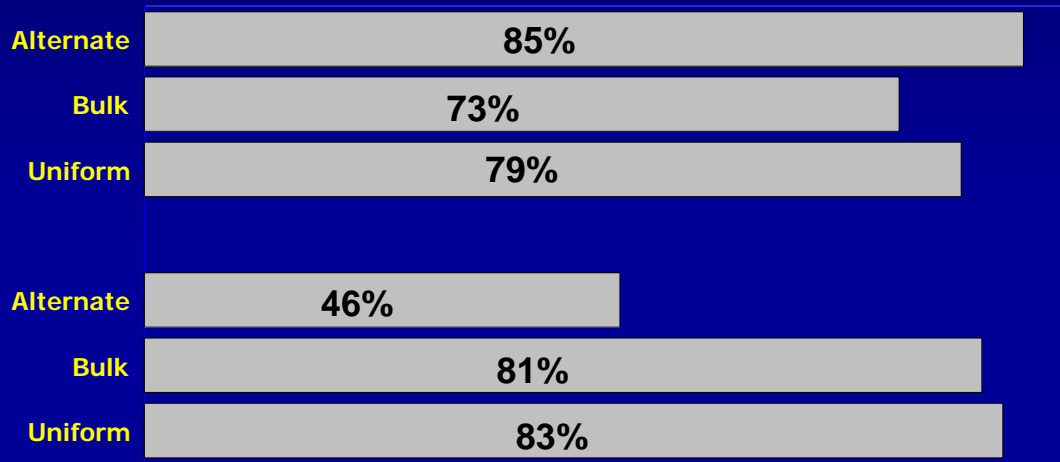
# Sites of Tailrace Entry



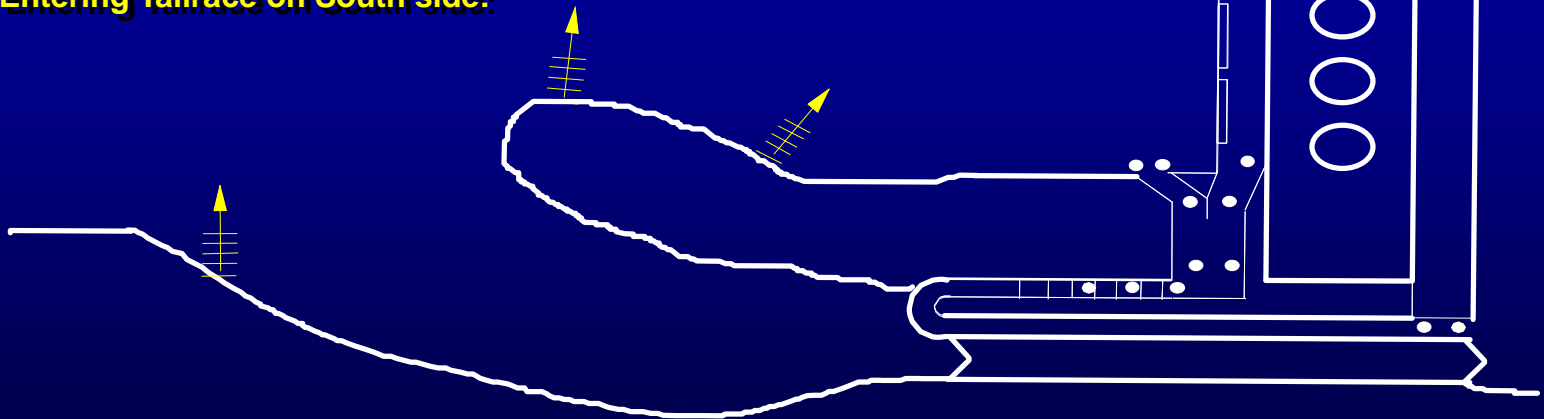
Reasonably Consistent among Spill Treatments (+/- 4%)

# BRZ Entry - Generally Consistent with Tailrace Entry

Of those Entering Tailrace on North side:



Of those Entering Tailrace on South side:

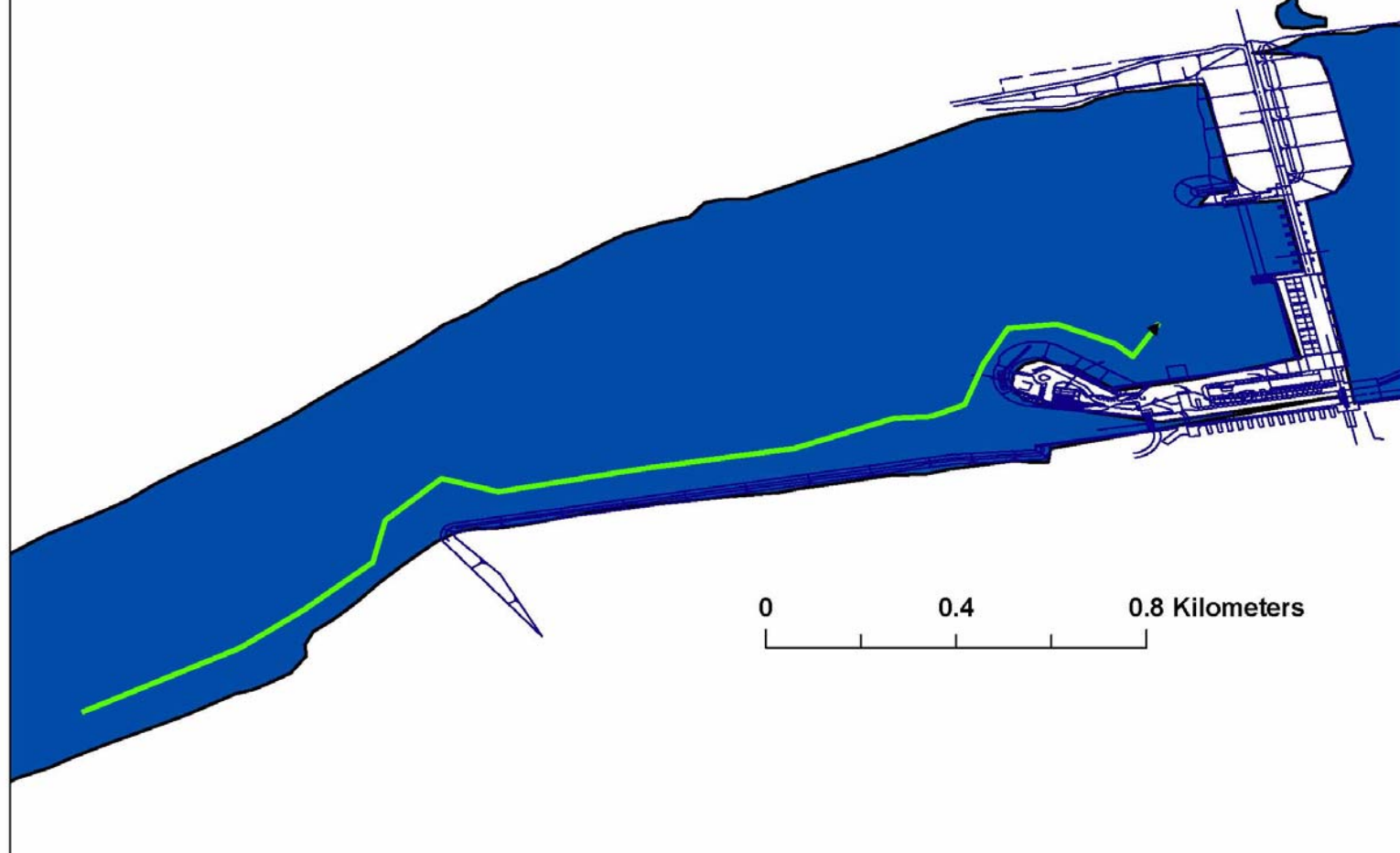


# Mobile Tracking Data Used to Corroborate and Augment Fixed Site Data



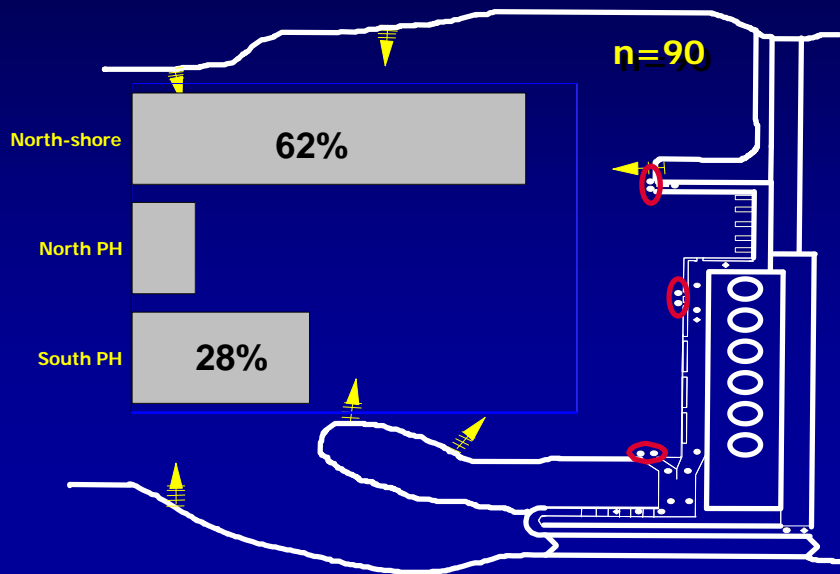
Alternate Spill Pattern  
Summer Chinook  
July 1, 2008 24-92

Little Goose Dam

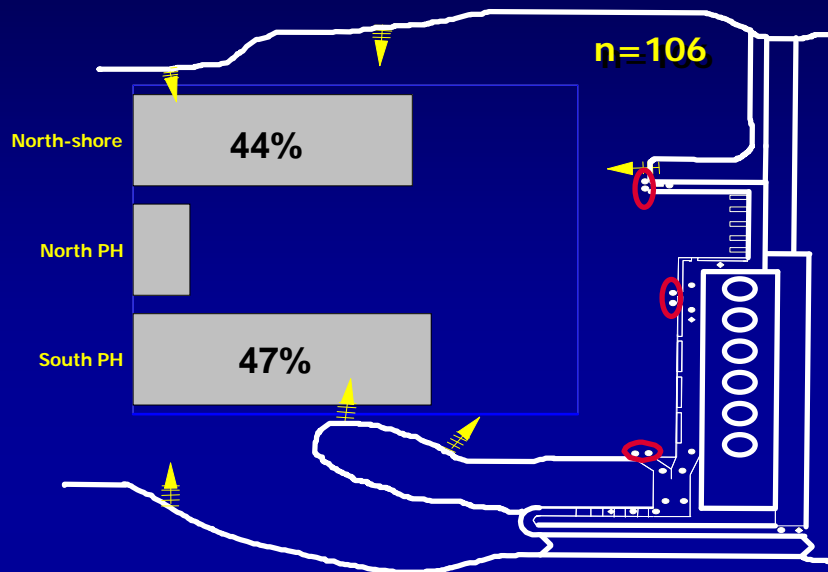


# Distribution of First Fishway Approaches

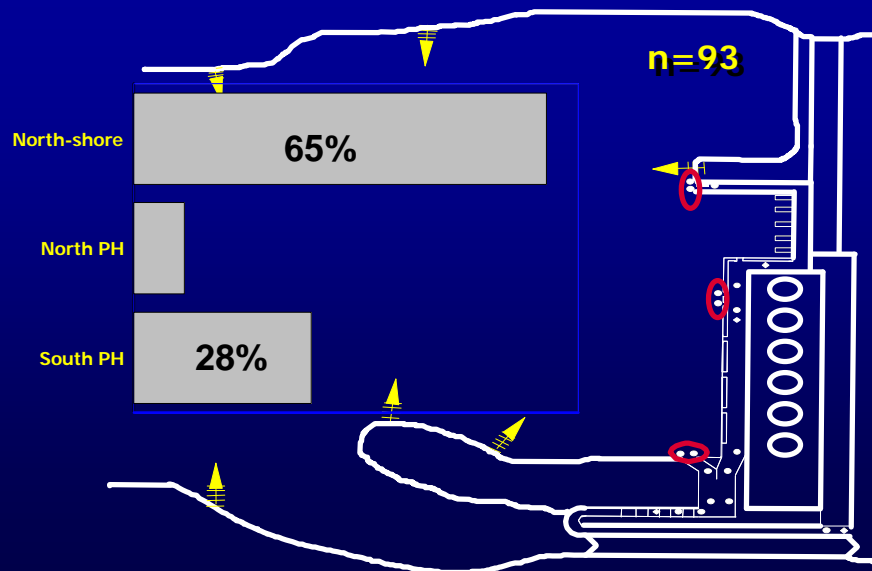
## Alternate



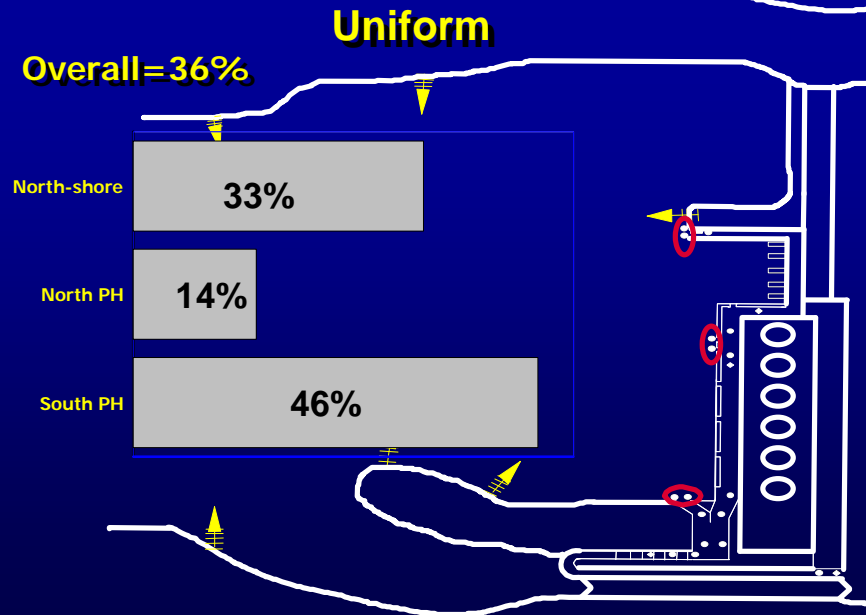
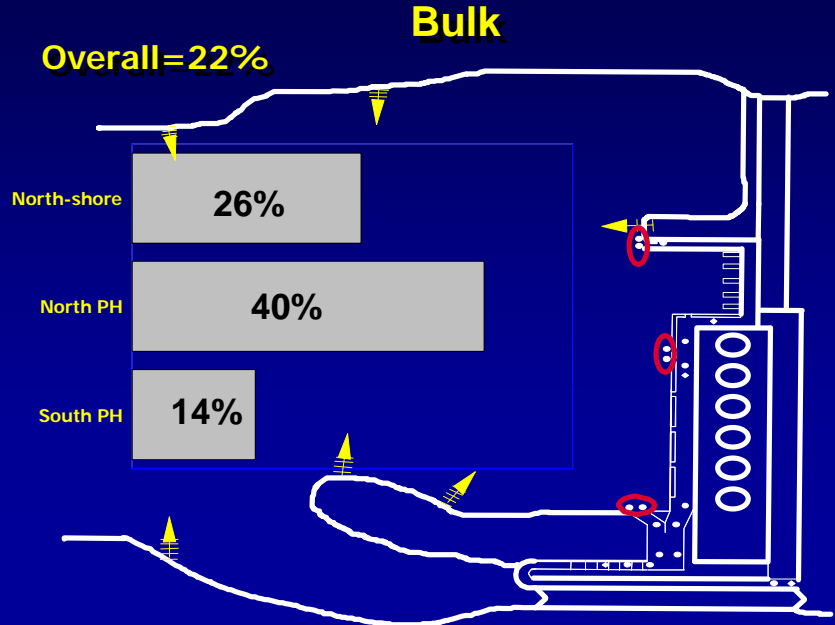
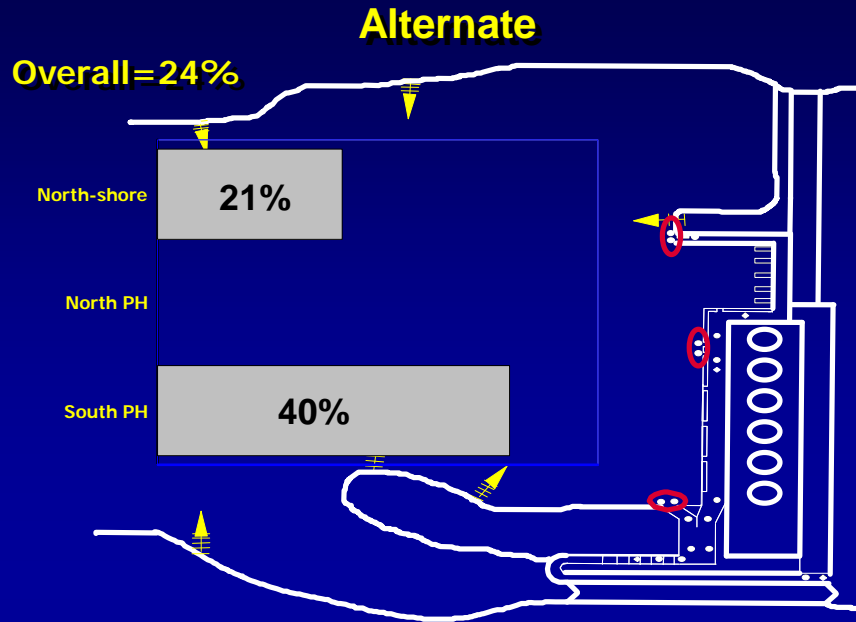
## Bulk



## Uniform

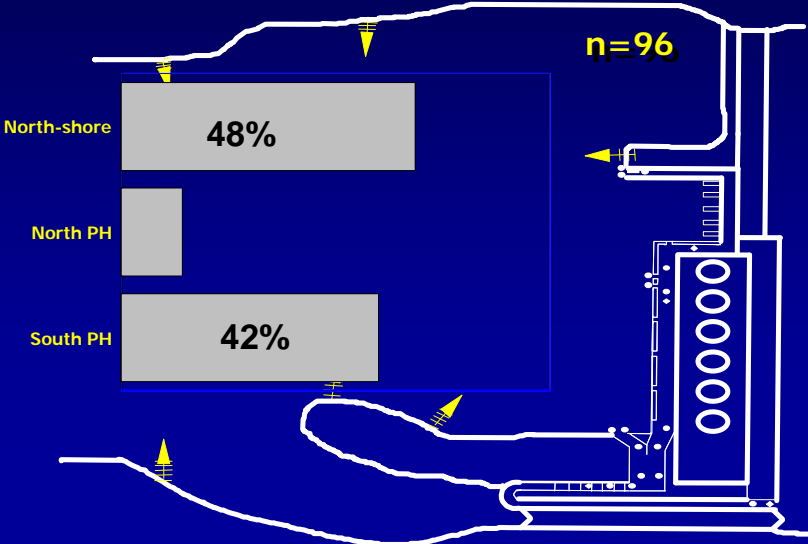


# Percentage of First Approaches Resulting in Entries

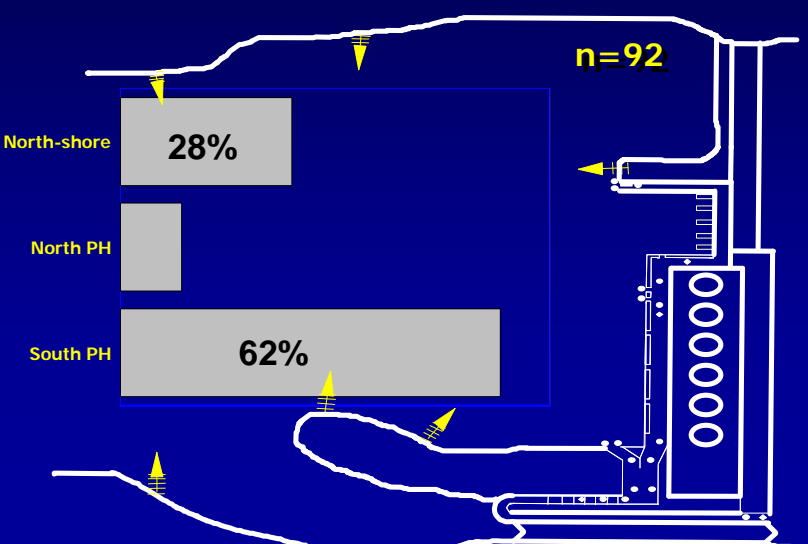


# Distribution of First Fishway Entries

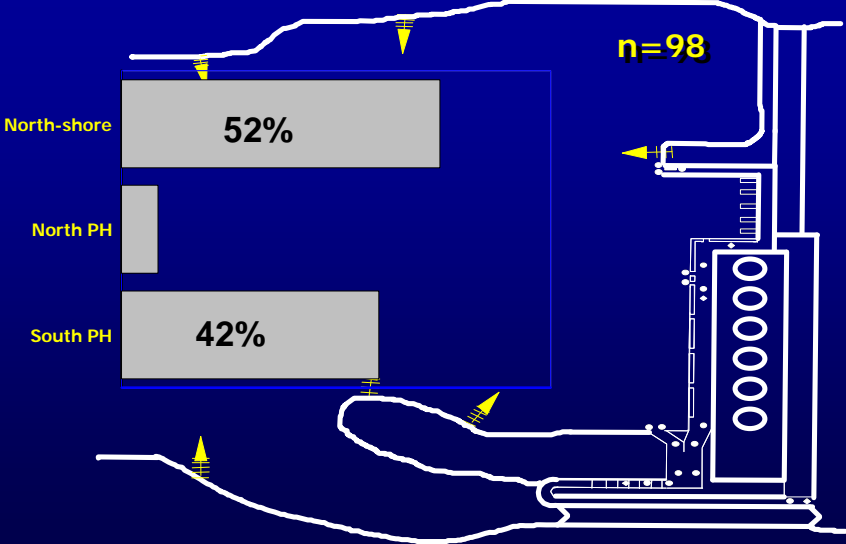
**Alternate**



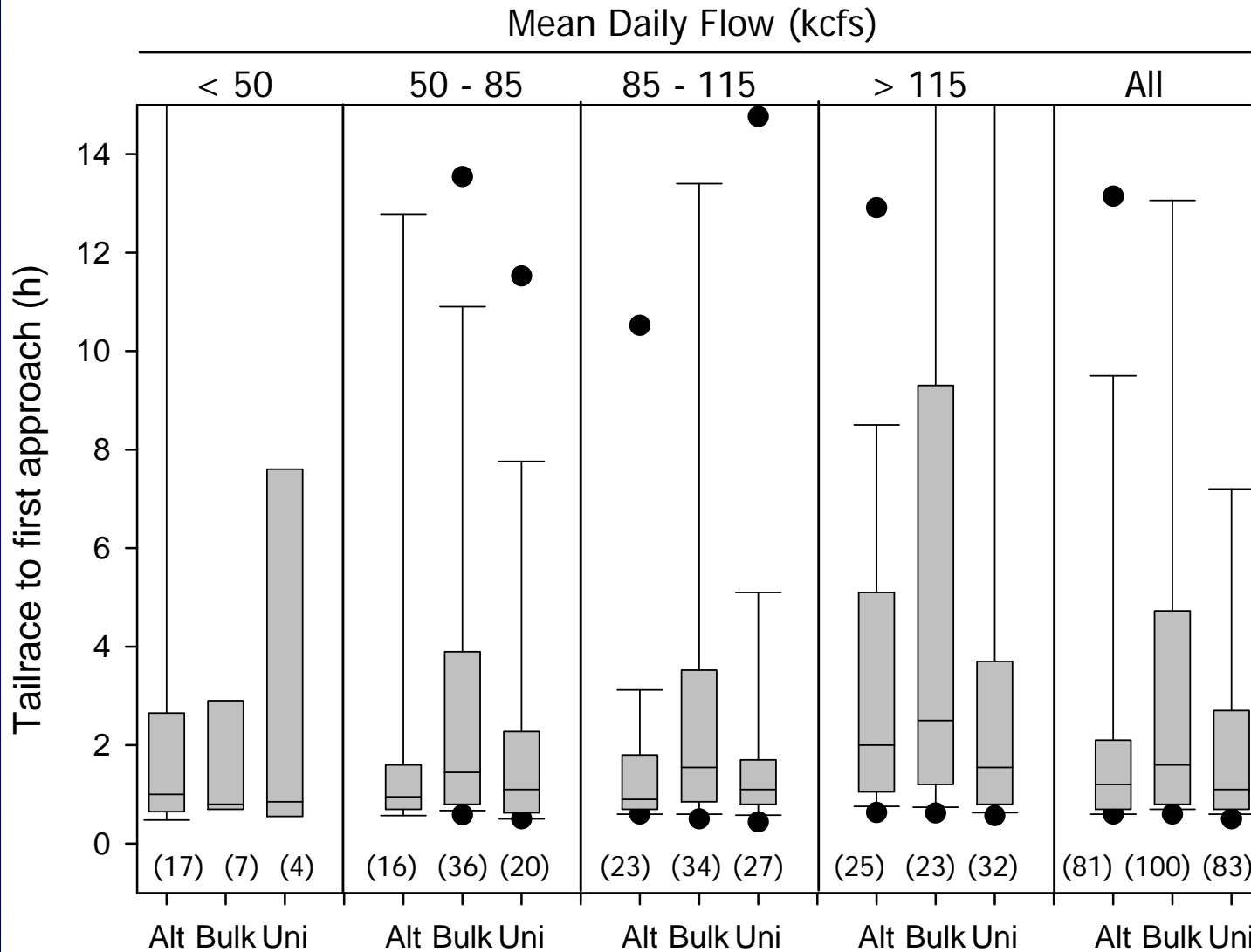
**Bulk**



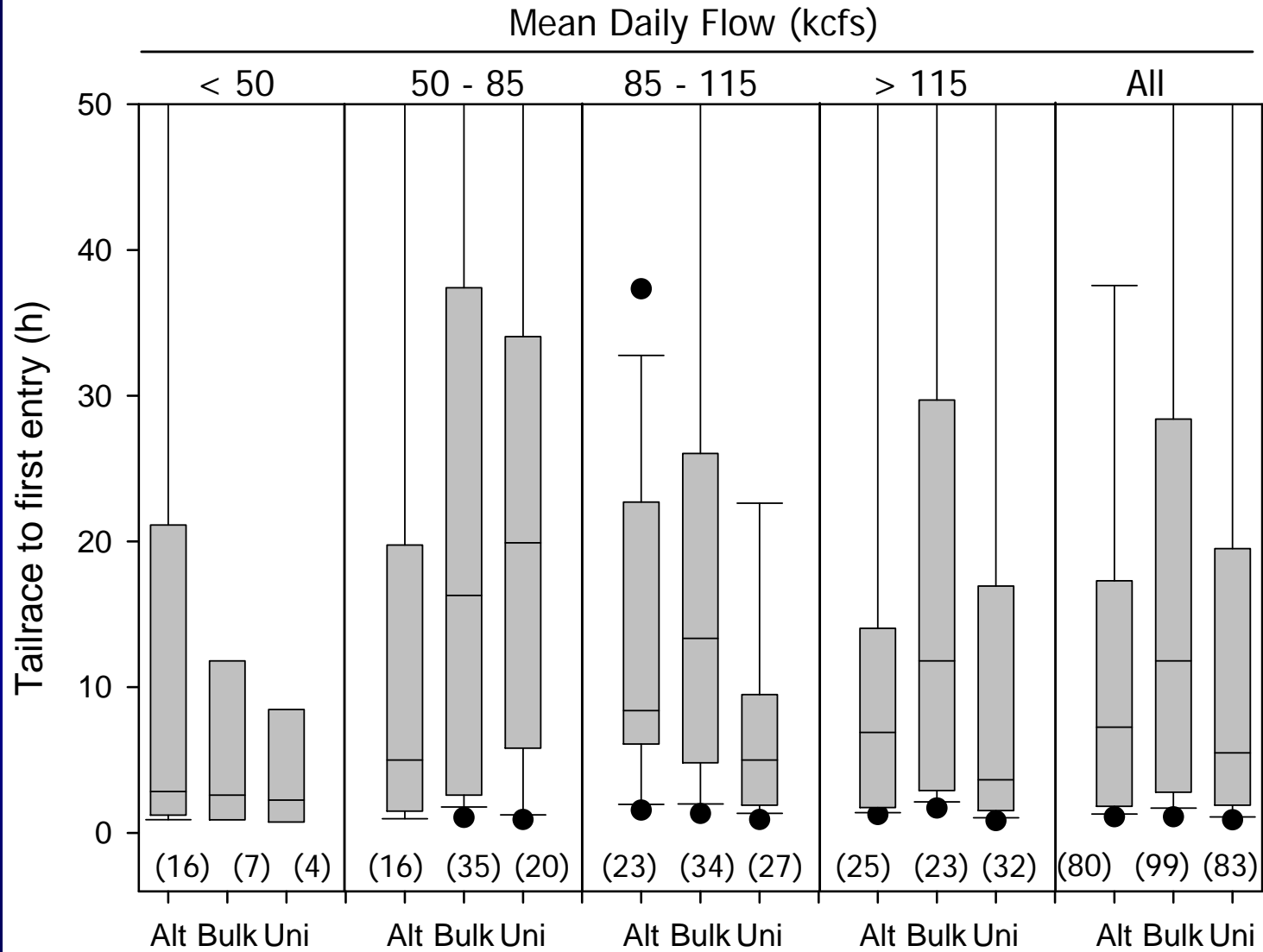
**Uniform**



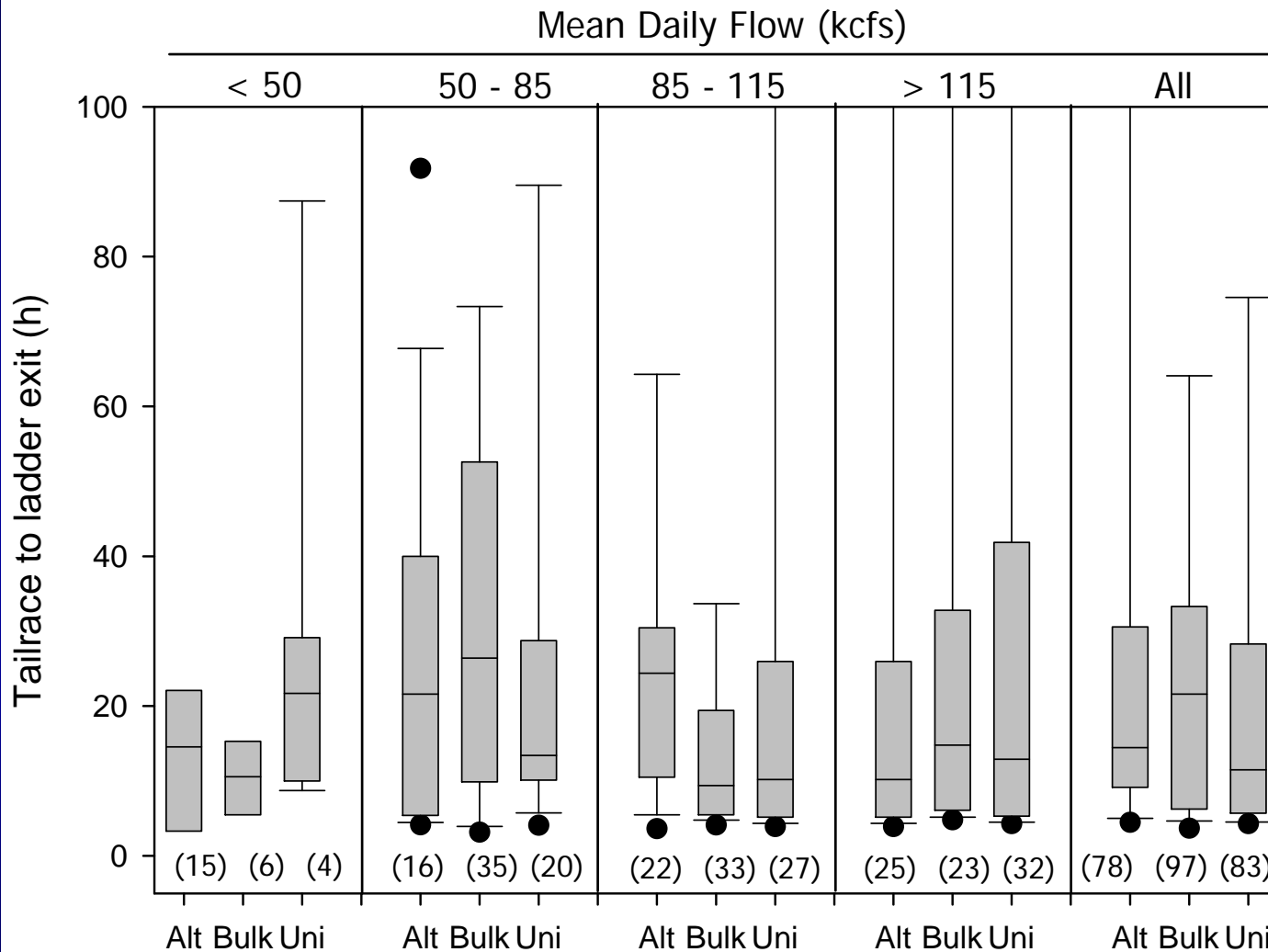
# Passage Times - Tailrace to First Approach



# Passage Times - Tailrace to First Entry



# Passage Times - Tailrace to Ladder Top



Hazard analysis: Uniform vs. Alt: 0.861  
Uniform vs. Bulk: 0.715

# Conclusions

- Uniform treatment had highest proportion of successful first entries
- Bulk treatment had longest passage times
- Uniform treatment was most conducive to adult passage over range of discharge and spill during 2008