

# **Snake River Steelhead Straying**

**Risk To Oregon Mid-C Steelhead Populations and  
Transportation Effects**

**ISAB Briefing 2010**

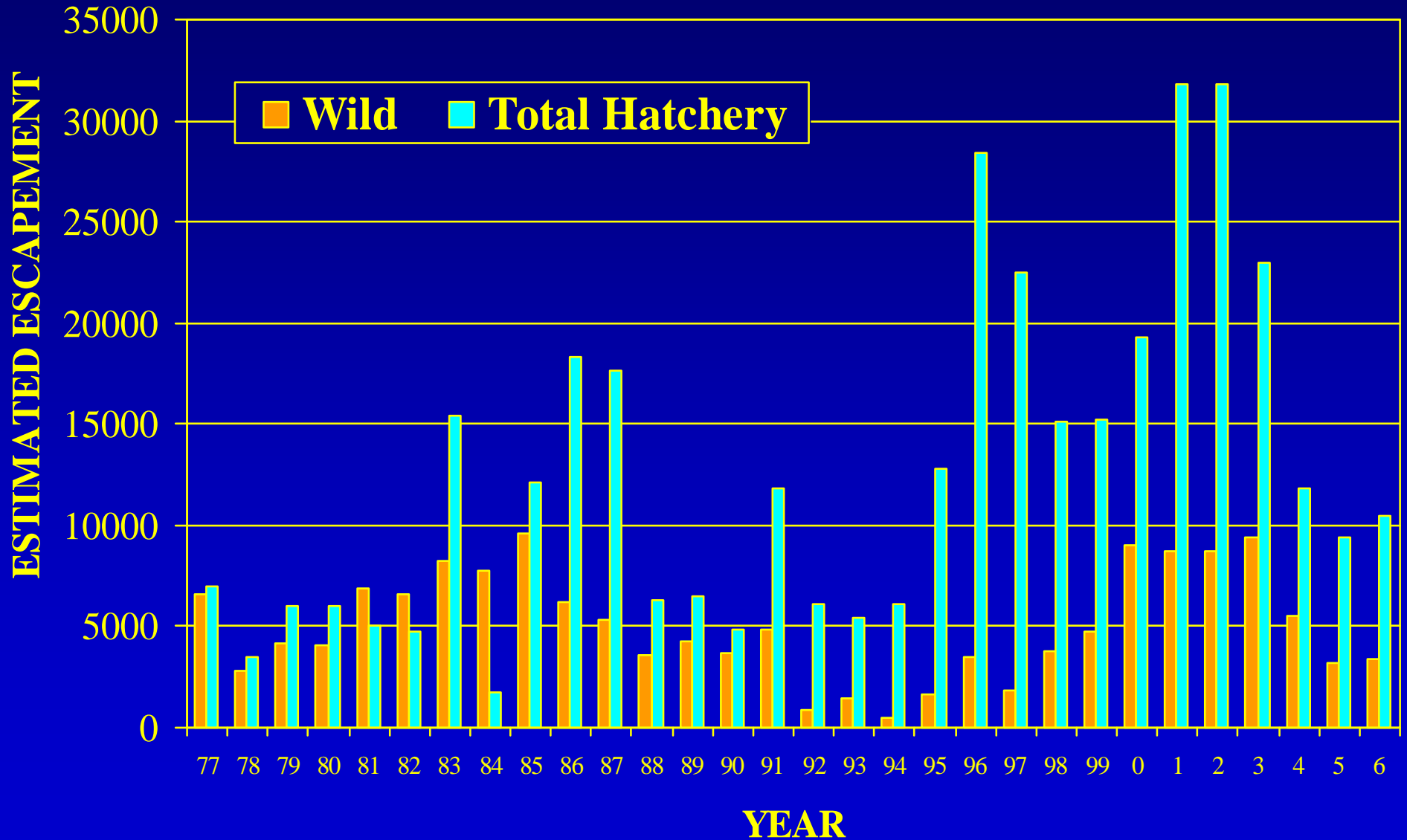
# Organization of Today's Presentation

- Hatchery Steelhead Straying into Mid-C steelhead populations and abundance of naturally spawning Snake River hatchery strays
- Relationship of transportation and stray rates
  - Adult conversion rates from Bonneville Dam to Lower Granite Dam for in-river and transported steelhead (CSS)
  - Results of transport and in-river migrant straying into the Deschutes and John Day rivers from PIT tagged adult returns (2007-08 and 2008-2009)

# Management Issues

- **Mid-Columbia River steelhead ESA listed with the Deschutes, John Day and Umatilla populations essential for DPS recovery.**
- **Snake River Hatchery strays comprise a substantial proportion of spawners in the Deschutes River and John Day River populations.**
- **The Deschutes River Westside steelhead population has the largest abundance/productivity viability gap and is at high risk of extinction (Carmichael and Taylor 2009).**
- **Snake River hatchery strays are considered a primary threat to Deschutes River and John Day River steelhead populations, there are a considerable number of recovery plan management actions to address this threat and model results indicate a substantial productivity increase with reduction of stray abundance (Carmichael and Taylor 2009).**

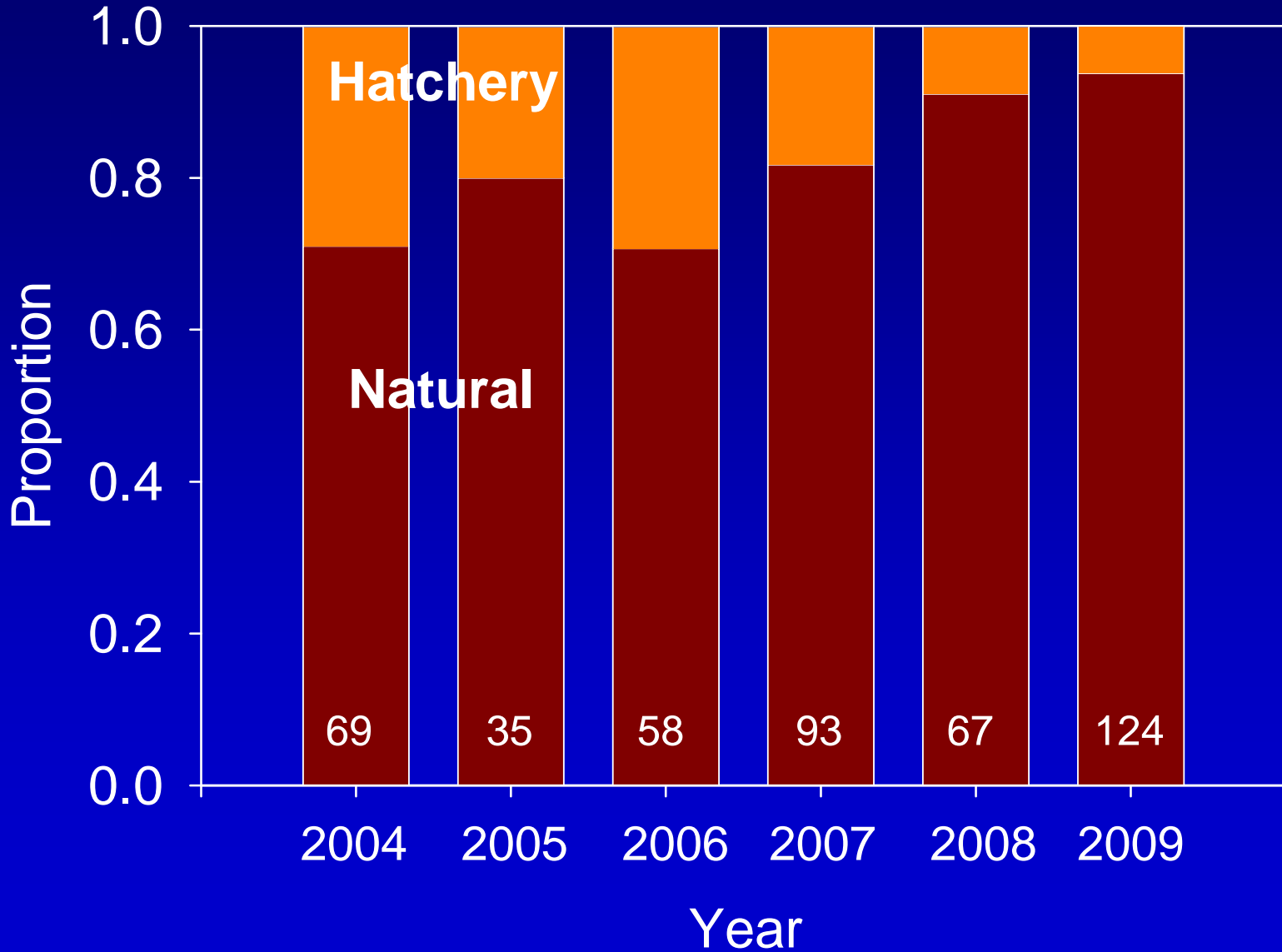
# Origin of Steelhead Escapement Above Sherars Falls



# Recent 10-Year Average Proportion of Natural Spawners That Were Snake River Strays (ICTRT)

| <u>Population</u>             | <u>Spawner Abundance</u> |                 | <u>Snake River Hatchery Stray Proportion</u> |
|-------------------------------|--------------------------|-----------------|--|
|                               | <u>Natural</u>           | <u>Hatchery</u> |  |
| Deschutes River Eastside      | 975                      | 526             | 35%  |
| Deschutes River Westside      | 337                      | 100             | 29%  |
| Lower Mainstem John Day River | 1620                     | 180             | 10%  |
| North Fork John Day River     | 1601                     | 139             | 8%   |
| Umatilla River                | 1398                     | 74              | 5%   |

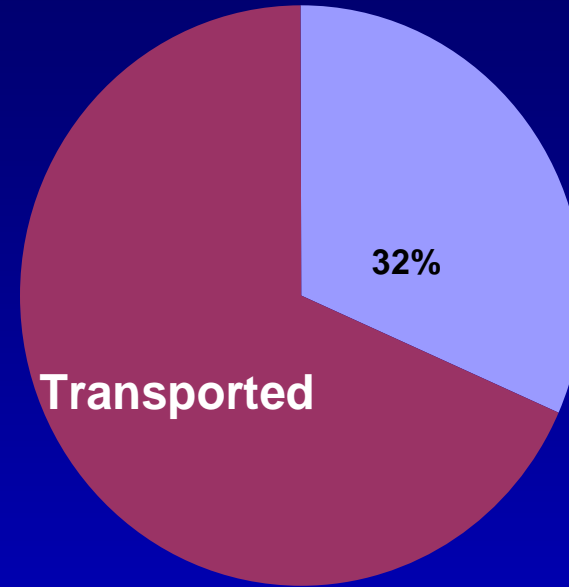
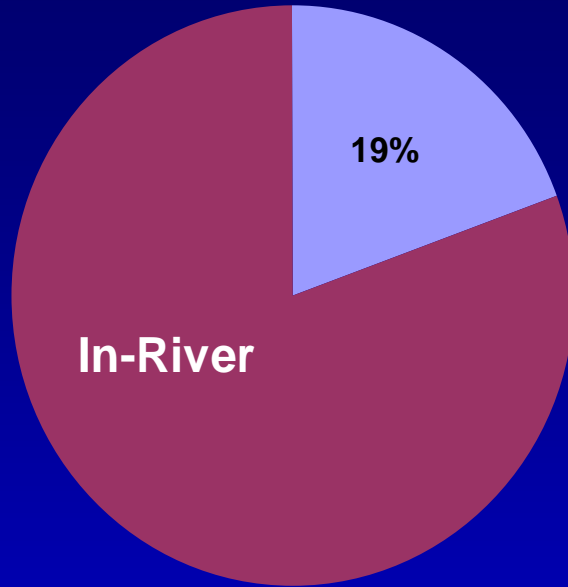
# Proportion of Hatchery Steelhead Spawners in the John Day River Subbasin



# Between Dam Conversion Rates

- Examines the proportion of adults that pass Bonneville Dam that pass Lower Granite Dam
- Compare the conversion rates between adults produced from transported smolts and adults produced from in-river migrants by origin

# Snake River Wild Adult Steelhead Passage Between Bonneville Dam and Lower Granite Dam

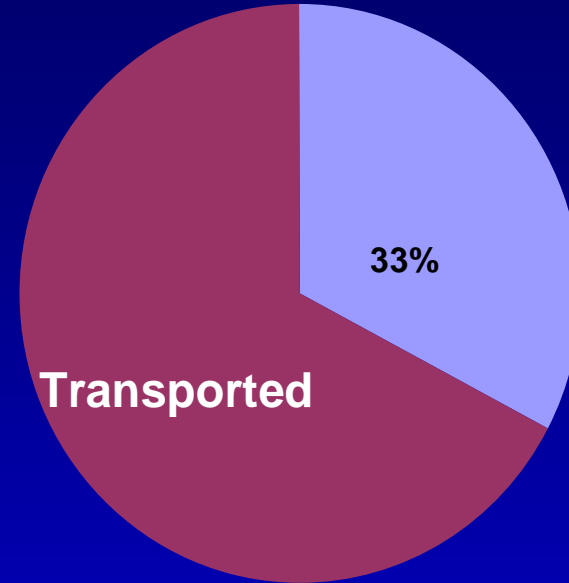
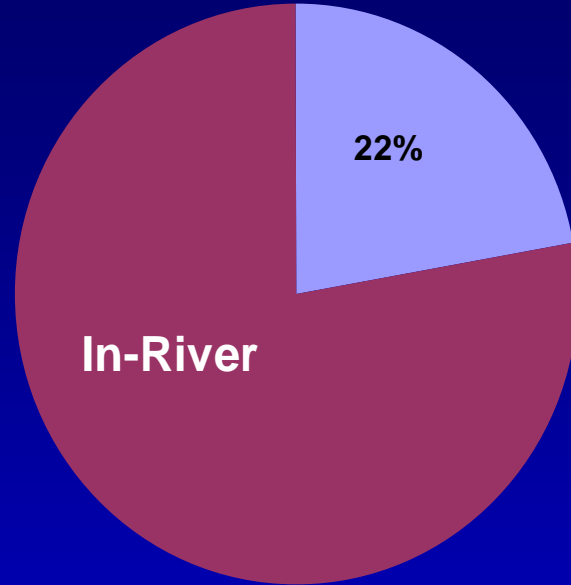


z-test  
P < 0.001

| Migration<br>Year | In-River    |            | Transport   |            |
|-------------------|-------------|------------|-------------|------------|
|                   | # Adults    | Failed     | # Adults    | Failed     |
| 1999              | 51          | 25%        | 46          | 43%        |
| 2000              | 1098        | 19%        | 1272        | 29%        |
| 2001              | 26          | 35%        | 522         | 31%        |
| 2002              | 326         | 17%        | 720         | 31%        |
| 2003              | 113         | 16%        | 339         | 23%        |
| 2004              | 16          | 38%        | 106         | 48%        |
| 2005              | 23          | 0%         | 120         | 32%        |
| 2006              | 180         | 22%        | 671         | 37%        |
| <b>Combined</b>   | <b>1833</b> | <b>19%</b> | <b>3796</b> | <b>32%</b> |



# Snake River Hatchery Adult Steelhead Passage Between Bonneville Dam and Lower Granite Dam

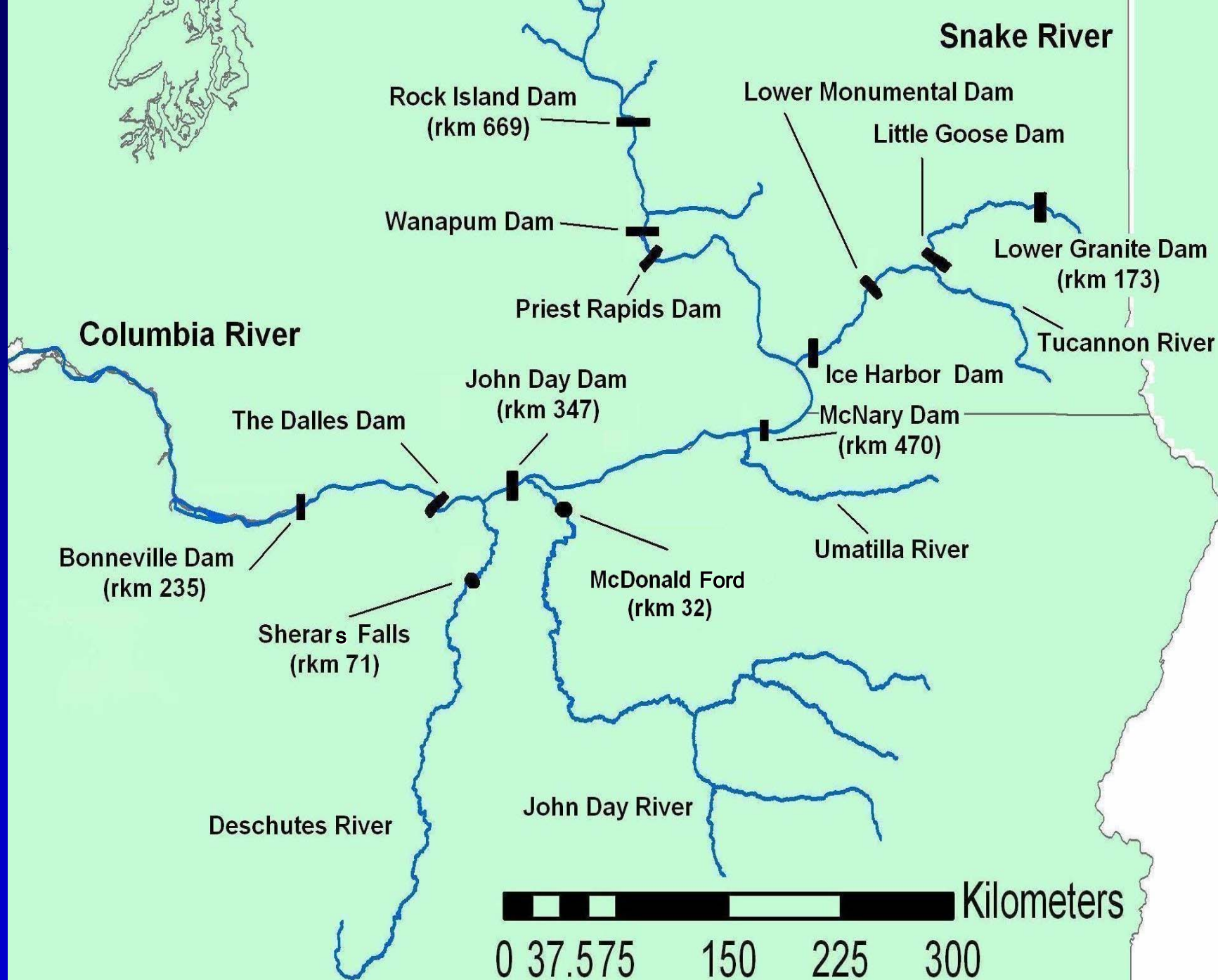


z-test  
P < 0.001

| Migration       | In-River    |            | Transport  |            |
|-----------------|-------------|------------|------------|------------|
| Year            | # Adults    | Failed     | # Adults   | Failed     |
| 1999            | 188         | 27%        | 187        | 38%        |
| 2000            | 426         | 23%        | 55         | 36%        |
| 2001            | 10          | 20%        | 29         | 41%        |
| 2002            | 347         | 20%        | 14         | 14%        |
| 2003            | 208         | 19%        | 109        | 21%        |
| 2004            | 61          | 28%        | 16         | 38%        |
| 2005            | 102         | 20%        | 29         | 38%        |
| 2006            | 408         | 24%        | 24         | 29%        |
| <b>Combined</b> | <b>1750</b> | <b>22%</b> | <b>463</b> | <b>33%</b> |

# Adult PIT-tag Stray Analysis 2007-08 and 08-09 Run Years

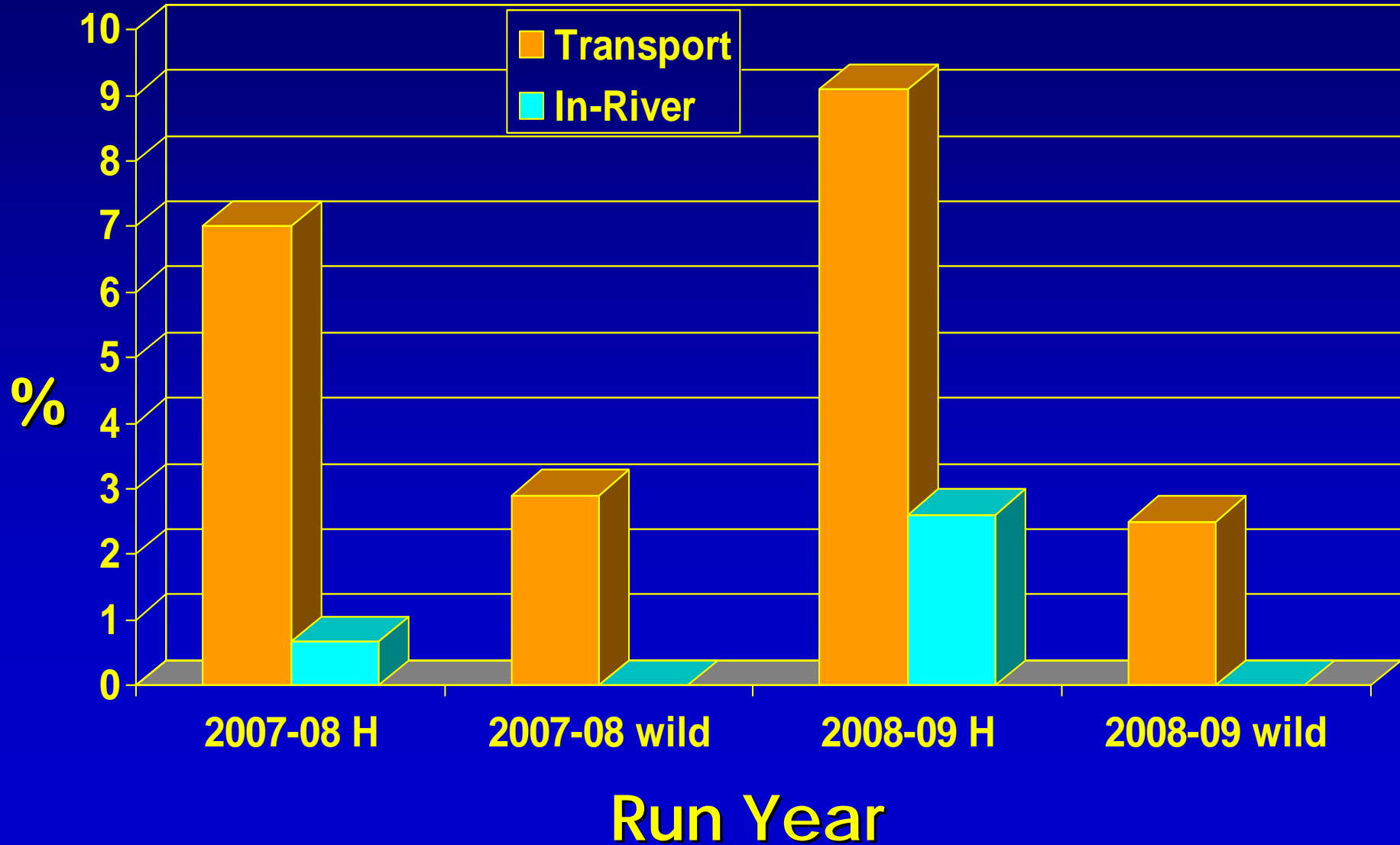
- **NOAA transport tag groups**
  - Released at Lower Granite Dam as smolts in 2005, 2006, and 2007
  - Return to the river group (RR)
  - Barge transported group (BR)
- **Queried adult detections at Bonneville (N)**
- **Compared proportion of Bonneville adults that were detected as strays from barged and return to river groups**
  - z-tests: statistical test to compare detection rates of two groups (RR vs. BR or hatchery vs. natural)
  - John Day River: McDonald Ford
  - Deschutes River: Sherars Falls
    - Unknown detection efficiency at the Deschutes River John Day sites



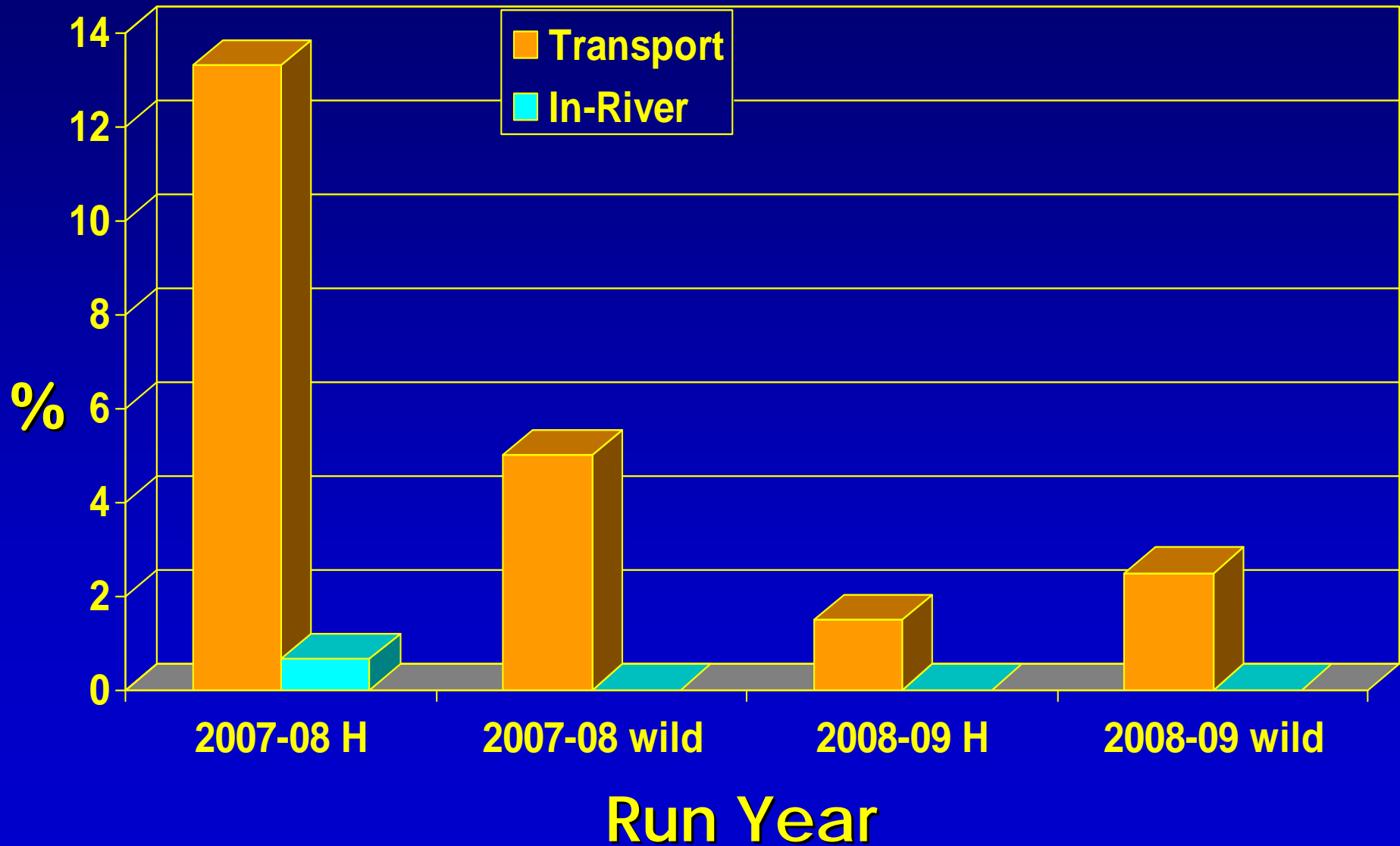
# Adult Steelhead Detections of Transport Study Groups 2007-08 and 2008-09 Run Years

| Smolt Group                 | Bonneville Dam (N) |            |              | John Day River |           |            | Deschutes River |           |            |
|-----------------------------|--------------------|------------|--------------|----------------|-----------|------------|-----------------|-----------|------------|
|                             | Hatchery           | Wild       | All          | Hatchery       | Wild      | %          | Hatchery        | Wild      | %          |
| <b>Barged<br/>2007-08</b>   | <b>918</b>         | <b>343</b> | <b>1,261</b> | <b>29</b>      | <b>17</b> | <b>3.6</b> | <b>64</b>       | <b>10</b> | <b>5.9</b> |
| <b>In-River<br/>2007-08</b> | <b>151</b>         | <b>77</b>  | <b>228</b>   | <b>1</b>       | <b>0</b>  | <b>0.4</b> | <b>1</b>        | <b>0</b>  | <b>0.4</b> |
| <b>Barged<br/>2008-09</b>   | <b>1584</b>        | <b>612</b> | <b>2196</b>  | <b>23</b>      | <b>15</b> | <b>1.7</b> | <b>144</b>      | <b>40</b> | <b>8.4</b> |
| <b>In-River<br/>2008-09</b> | <b>152</b>         | <b>87</b>  | <b>239</b>   | <b>0</b>       | <b>0</b>  | <b>0.0</b> | <b>4</b>        | <b>0</b>  | <b>1.6</b> |

# Stray Rates Into the Deschutes for Transported and In-River Migrants



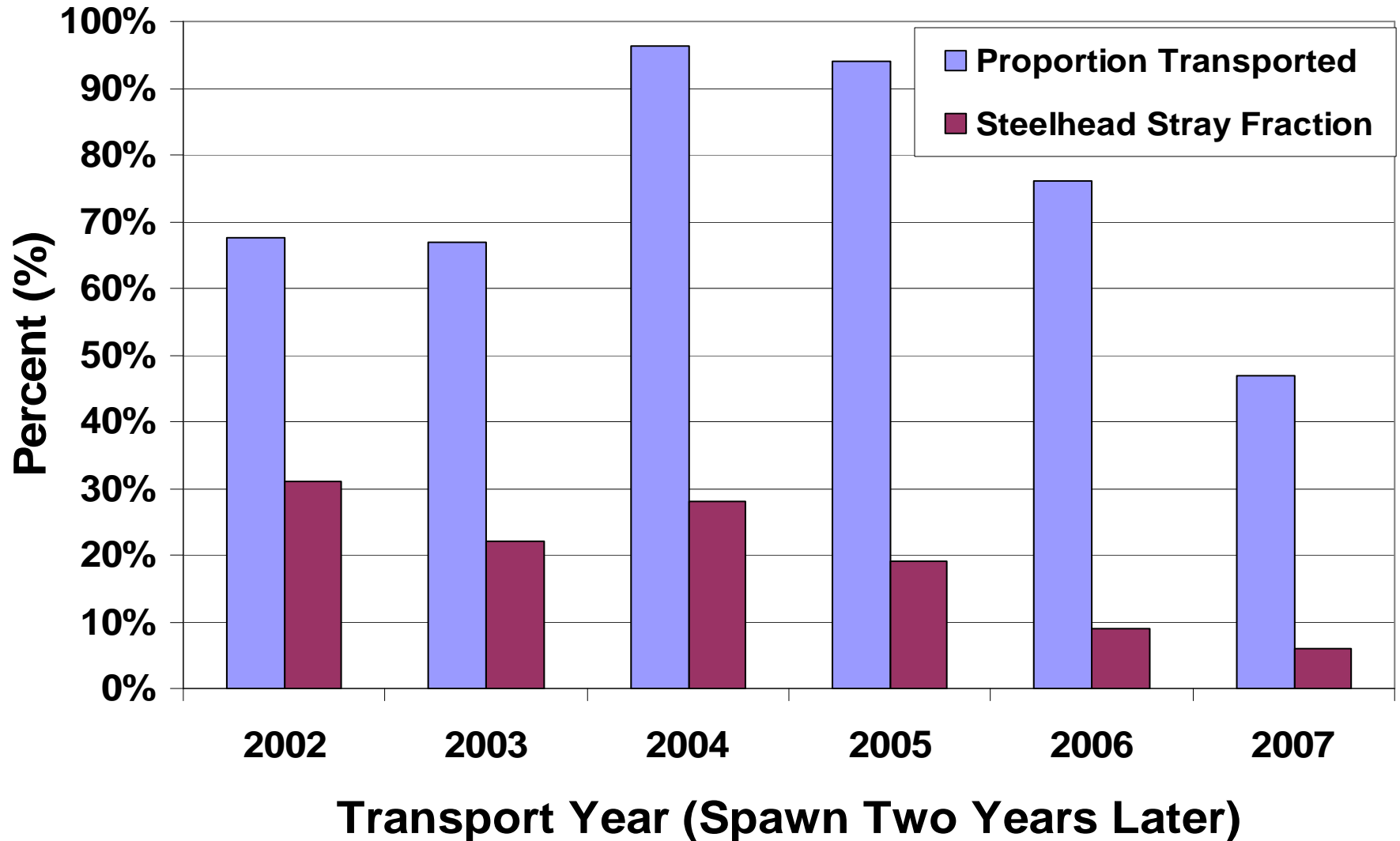
# Stray Rates Into the John Day for Transported and In-River Migrants



# Statistical Results (z-tests)

- Returning adults that were transported as smolts (BR) stray at greater rates than those that were allowed to migrate the river corridor (RR).
  - % detections of BR fish > % RR fish in John Day,  $P = 0.003$
  - % detections of BR fish > % RR fish in Deschutes,  $P < 0.001$
- Transported hatchery adults stray at greater rates into the Deschutes River than transported natural adults,  $P < 0.001$
- Similar rates of straying of transported hatchery and natural adults into the John Day River. There was no significant difference,  $P = 0.19$

# Proportion of Steelhead Juveniles Transported and Proportion of Hatchery Origin Spawners in the John Day Basin Two Years Later





# Summary

- Snake River hatchery strays are considered a significant threat to viability of Oregon's Mid-C steelhead populations, model results indicate reduction in hatchery spawners will provide a significant productivity improvement.
- There is a significantly lower conversion rate from Bonneville Dam to Lower Granite Dam for adults returning from transported smolts (CSS).
- Two years of observations from the Deschutes and John Day rivers pit-tag monitoring indicate that adults, transported as smolts, stray at significantly higher rates than adults that were in-river migrants and these adults are the primary source of strays in Oregon's Mid-C steelhead populations.

# Summary

- **Results from Keefer et al.(2009) radio telemetry studies also indicate that the stray rates for transported fish are higher than in-river migrants.**
- **Maintaining a reduced number of Snake River hatchery smolts that are transported will contribute significantly to recovery of Mid-C steelhead in Oregon.**