

# Vulnerability to Avian Predation of Steelhead Smolts from the Snake and Columbia Rivers

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## A Collaborative Research Endeavor

USGS - Oregon Cooperative Fish & Wildlife Research Unit

Oregon State University

Real Time Research, Inc.

NOAA Fisheries

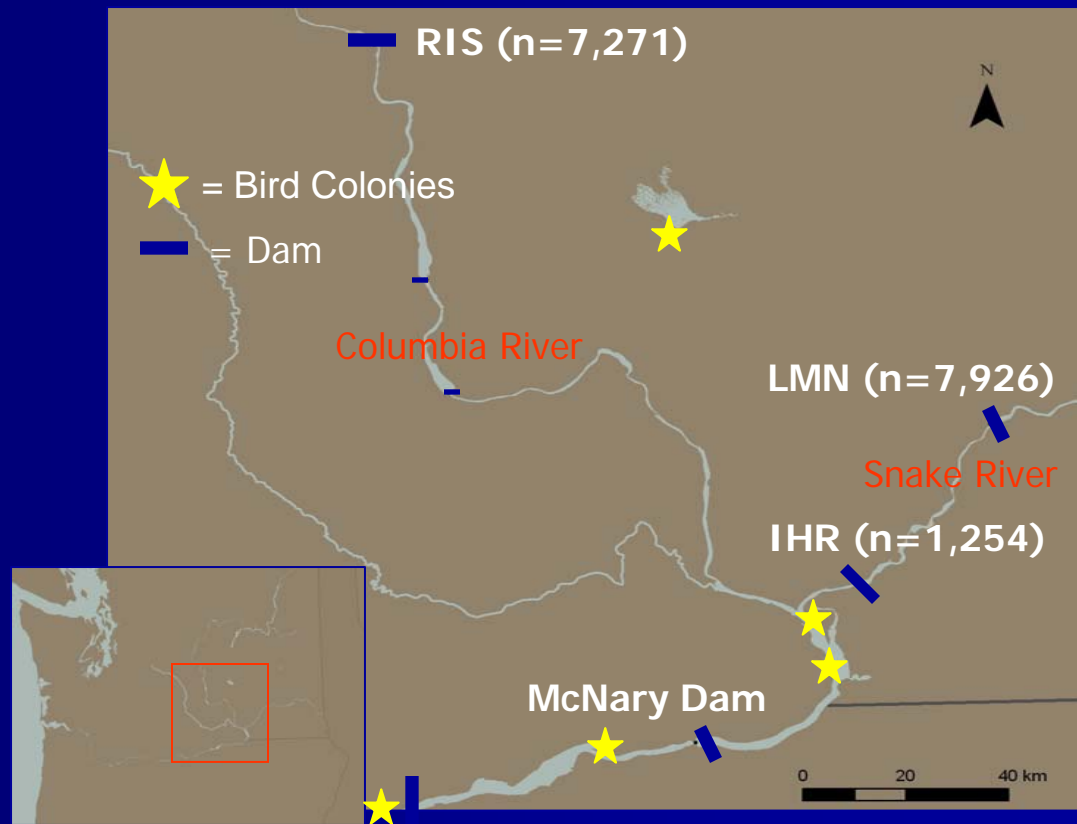


# Smolt Data Collection

- Proportional, non-selective sampling scheme
- Rear-type, length and weight

- Condition Scoring
  - fungal infections
  - descaling
  - body injuries
  - etc.

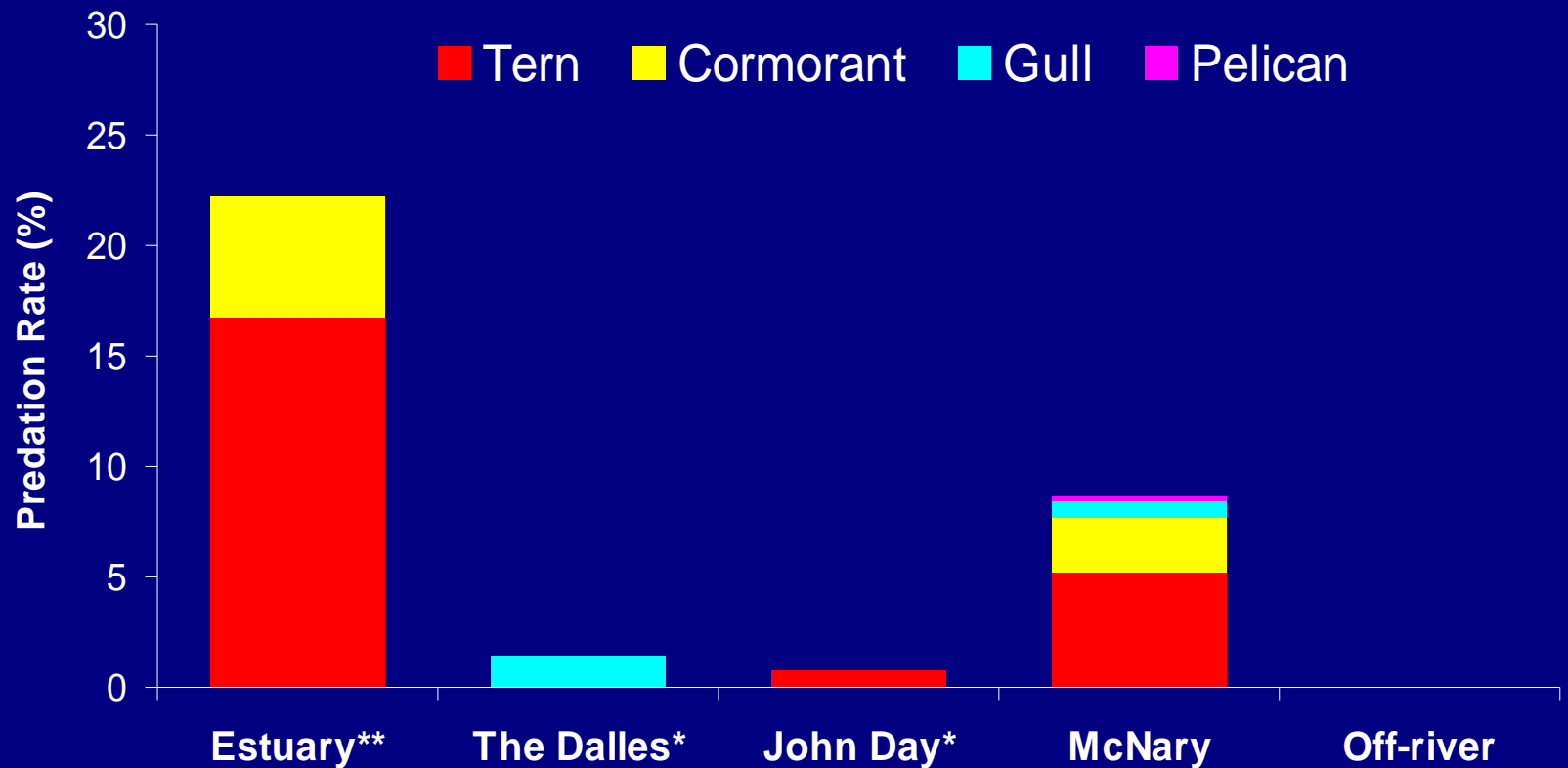
❖ Tag recovery



# Assumptions and Caveats

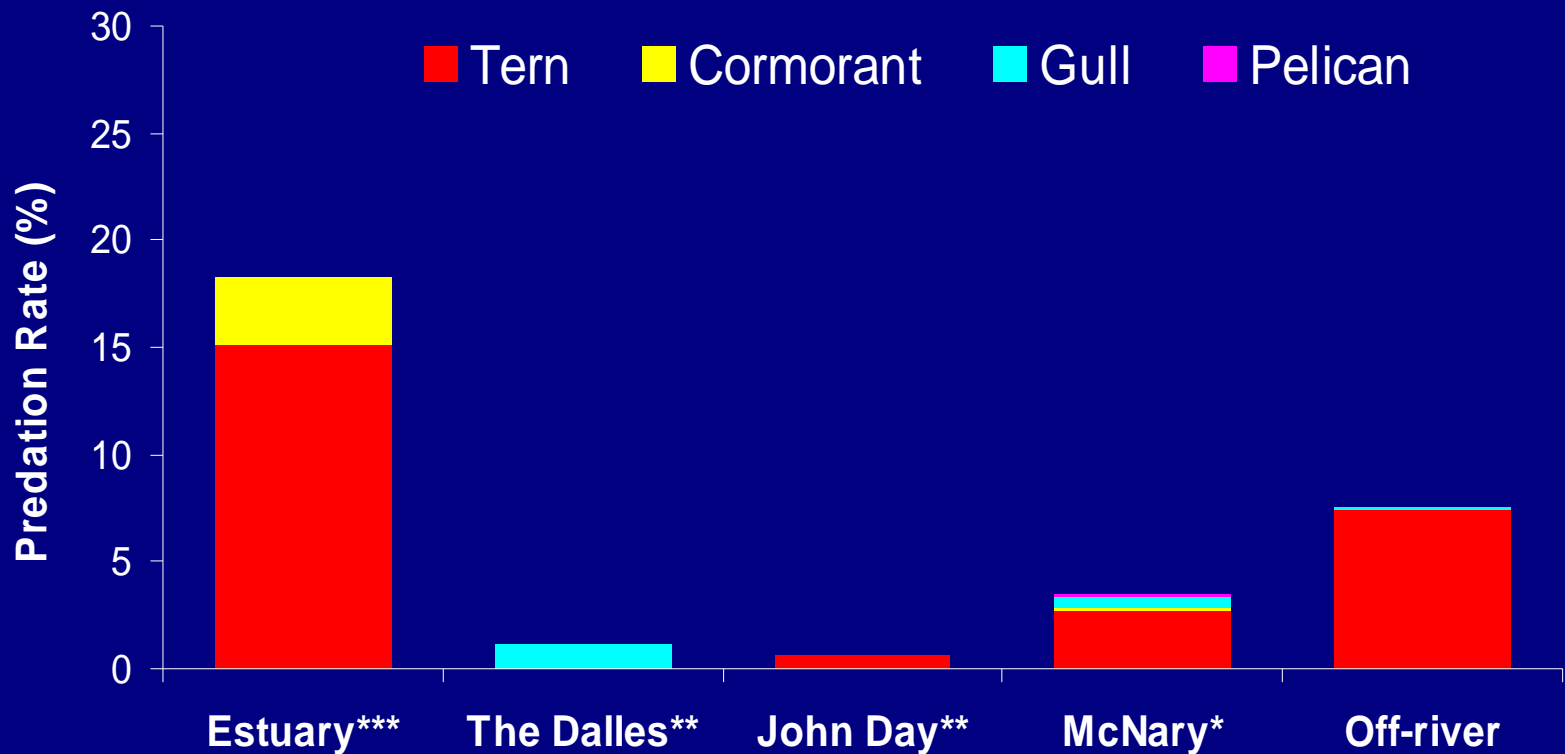
- No sampling or tagging effects
- PIT-tagged fish are representative of non-tagged fish
- Predation rate estimates are minimal estimates
- Apply to in-river migrants only
- Preliminary data
- Predation rates are not consumption estimates

# 2008 Predation Rate Estimates: Snake River Steelhead



\*\* adjusted for in-river survival to Bonneville Dam; \*adjusted for in-river survival to McNary Dam

## 2008 Predation Rate Estimates: Columbia River Steelhead



\*\*\* adjusted for in-river survival to Bonneville Dam; \*\*adjusted for in-river survival to McNary Dam

\*adjusted for in-river survival to Priest Rapids Dam

## 2008 McNary Pool Predation Rates: Species Comparisons

Species	Tern	Cormorant	Gull	Pelican
SR Steelhead	4.9%	2.5%	0.8%	0.2%
SR Chinook	0.8%	0.6%	0.4%	0.1%
SR Sockeye	1.0%	1.0%	0.2%	<0.1%
CR Steelhead	2.8%	0.1%	0.5%	0.1%
CR Chinook	0.3%	0.1%	<0.1%	<0.1%
CR Sockeye	<0.1%	<0.1%	<0.1%	<0.1%

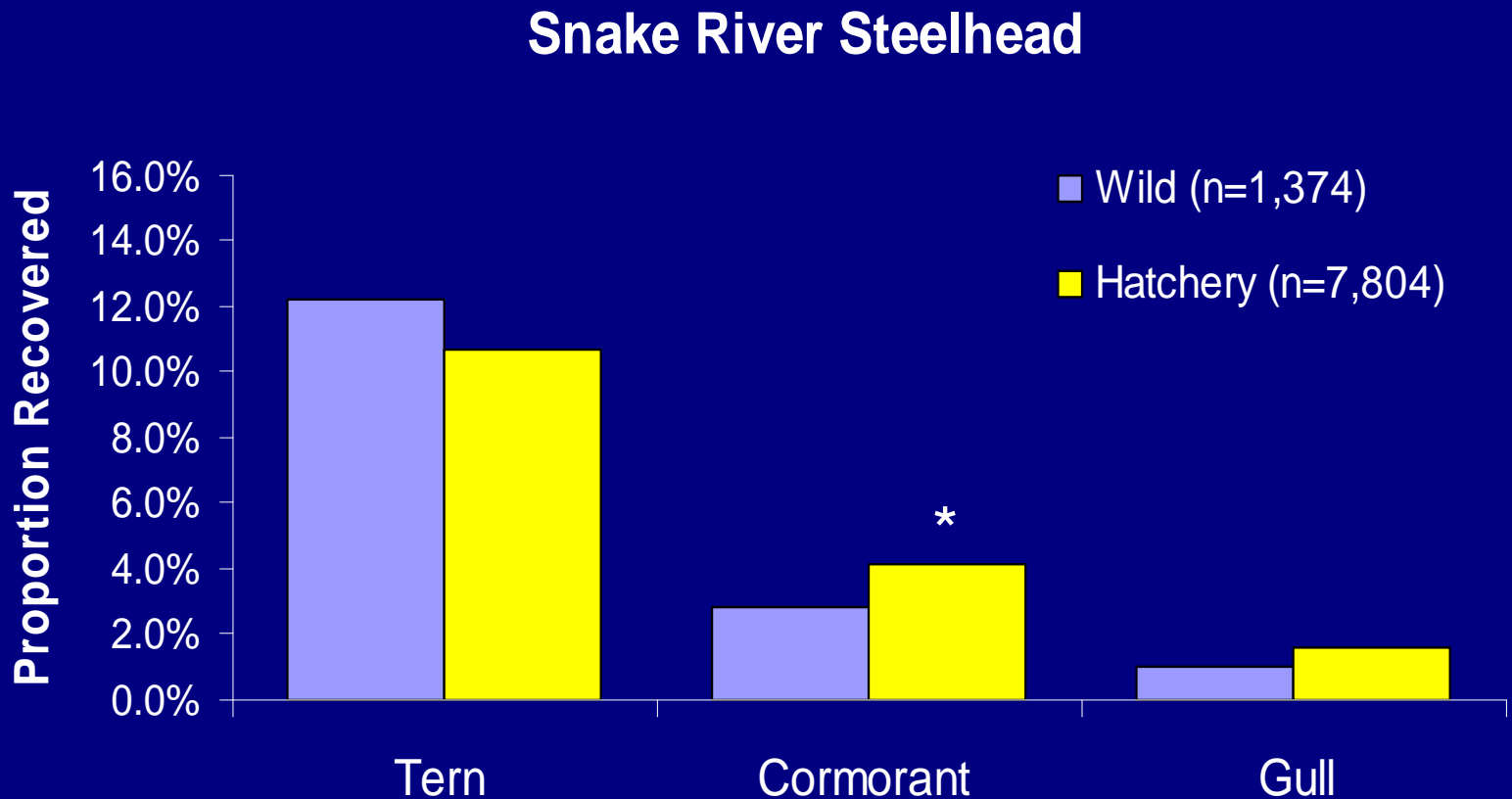
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SR=Lower Monumental Detections; CR = Rock Island Releases; Adjusted for detection efficiency.

# Vulnerability Results

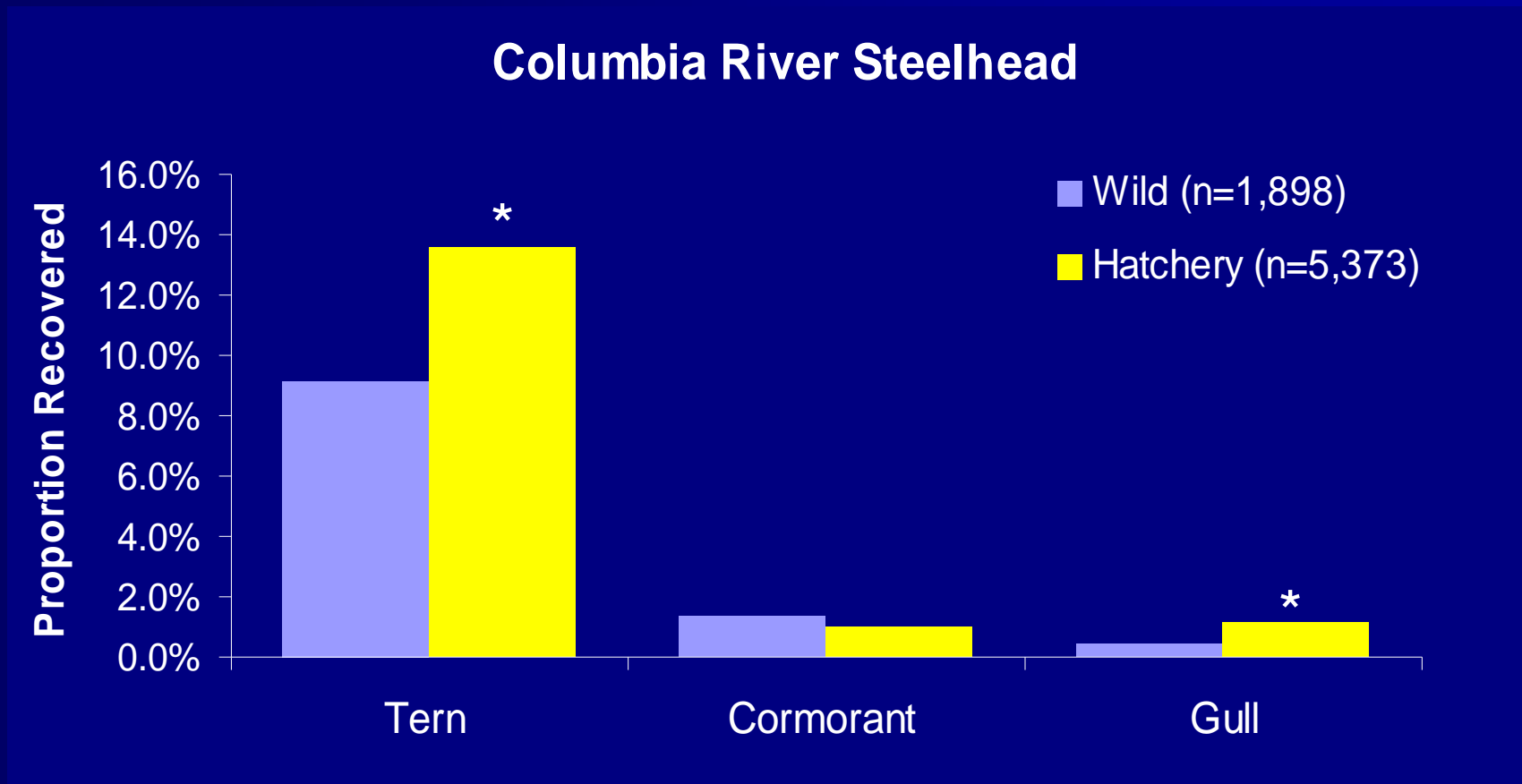


# 2008 Predation Rate Estimates: Rear-type Comparisons



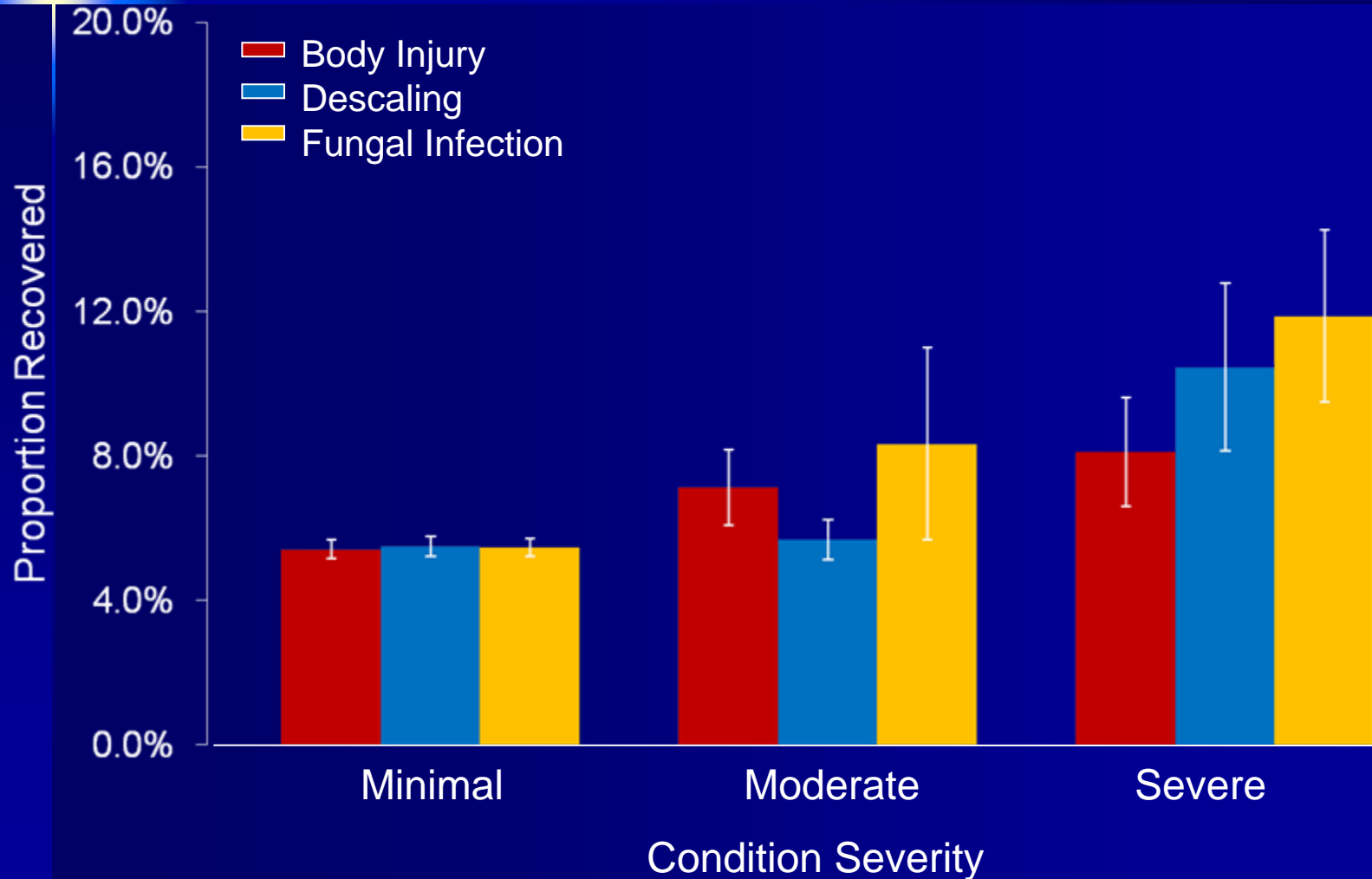
\* Alpha = 0.01

# 2008 Predation Rate Estimates: Rear-type Comparisons

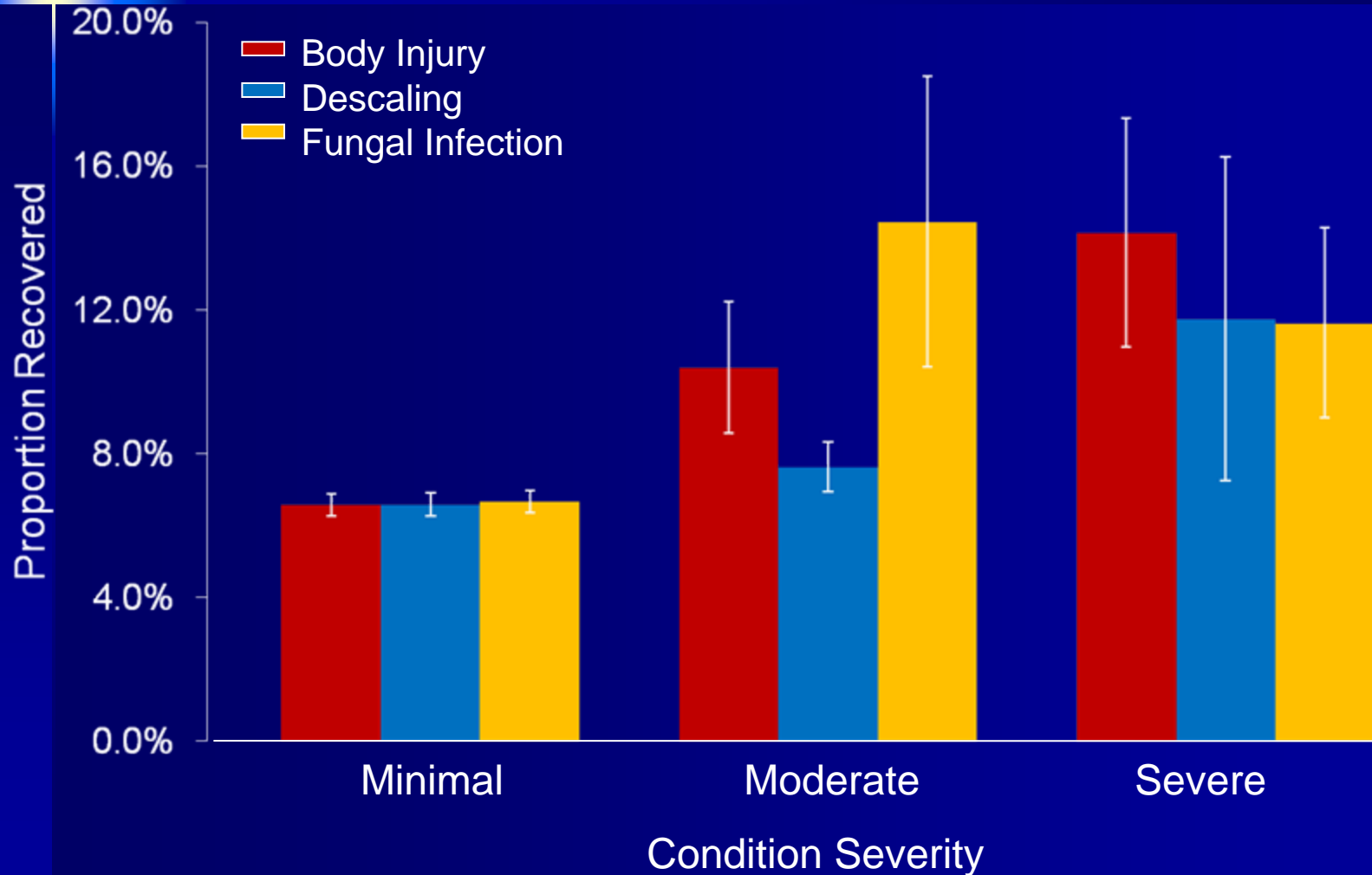


\* Alpha = 0.01

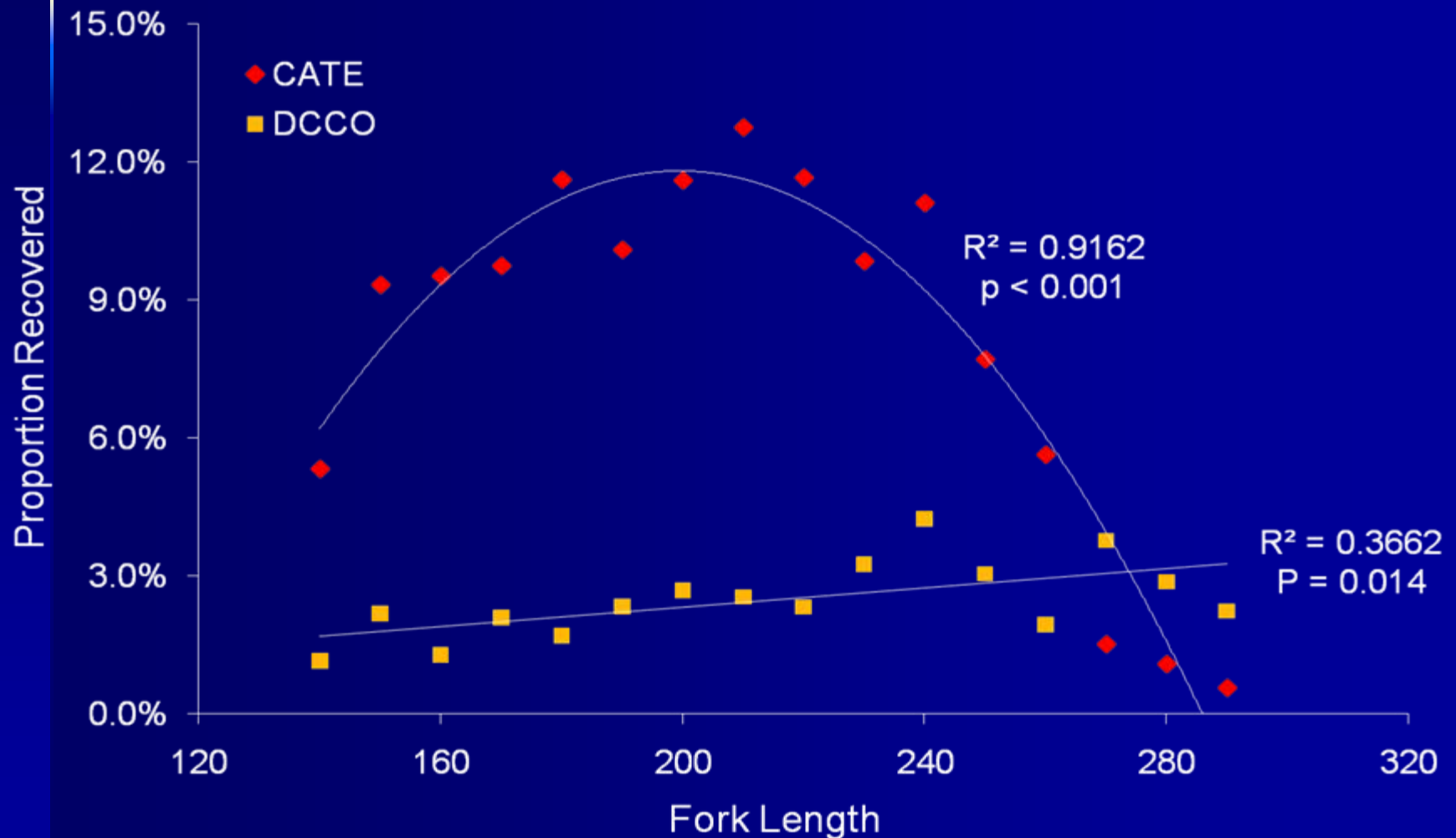
# 2008 SR STHD Susceptibility to Avian Predation (n=517)



# 2008 CR STHD Susceptibility to Avian Predation (n=498)



# Predation of CR and SR STHD between 140 and 300 mm (n=2,993)



# Summary and Conclusions



- Of all river segments, avian predation was highest in the estuary, followed by McNary pool
- Of all avian predators, steelhead were the most vulnerable to Caspian terns, followed by cormorants, gulls, and pelicans
- Predation on Columbia and Snake River steelhead populations differed upstream of McNary dam but were similar downstream of McNary dam; more data are needed
- Susceptibility to bird predation increased with declining external smolt condition
- Predation was often higher on hatchery-reared fish
- Biotic and abiotic factors influence smolt vulnerability; more data are needed



# Acknowledgments

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