Comparative Feeding Ecology of Coastal Cutthroat Trout and Rainbow Trout in the Cedar River, Washington with an emphasis on Consumption of Juvenile Salmonids

Roger Tabor, Hans Berge, Dan Lantz, Matt Klungle, and Brad Thompson

U.S. FISH & WILDLIFE SERVICE

King County

Washington Department of FISH and WILDLIFE

Acknowledgements

SPU
- Gary Spraque
- Paul Faulds

Cedar River AFC

Trout Unlimited

Private Landowners
- Tim Allen
- Julie Stachawiak

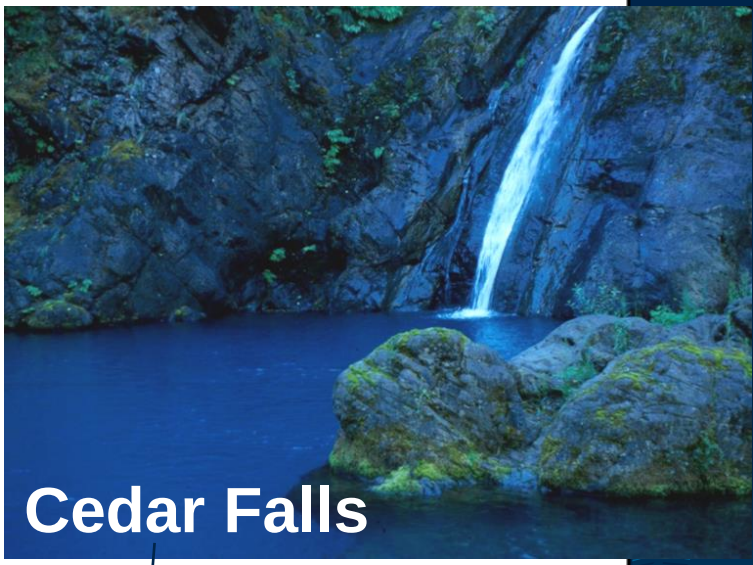
King County
- Kollin Higgins
- Jim Lissa
- Eleanor Bosman-Clark
- Ray Timm
- Frank Leonetti

USFWS
- Lindsy Wright
- Ben Price
- James Curtis
- Tracy Leavy
- Jeff Chan
- Scott Sanders
- Terence Lee
- Dan Spencer
- Steve Damm
- Keith Sweeney
- Howard Gearns
- Tim Romanski
- Nathan Hyde
- Eric Tallman

NOAA Fisheries
- Sean Naman
- Peter Kiffney
- Thomas Buehrens

WDFW
- Chad Jackson
- Brant Boelts
- Nathanael Overman
- Steve Foley
- Kelly Kiyohara
- Clayton Kinsel
- Scott Scheutzler
- Will Morris
- Nate Martens
- Yong-Woo Lee
- Todd Kassler
- Craig Busack
- Anne Bagley
- Bruce Bolding
- Shannon Vincent
- Devin West

Lake Washington Basin



Puget Sound

N

0 10 20 40

Kilometers

Seattle

Lake Washington

Lake Sammamish

Lower

Cedar River

Middle

Upper

Chester Morse Lake

Landsburg Diversion Dam

Background

1995 Closed to fishing

2003 – Trout abundance estimate
~17,500 trout > 200 mm (8”)

2004 - Catch and Release fishery opened

2005 - WDFW tasked to predict the impacts of alternate fishery regulations

2006-2010 - WDFW, King County, and USFWS study to estimate abundance, size distribution, and feeding habits of trout

Methods - Electrofishing Techniques

Summer

Tote-Barge electrofishing

Also angling used

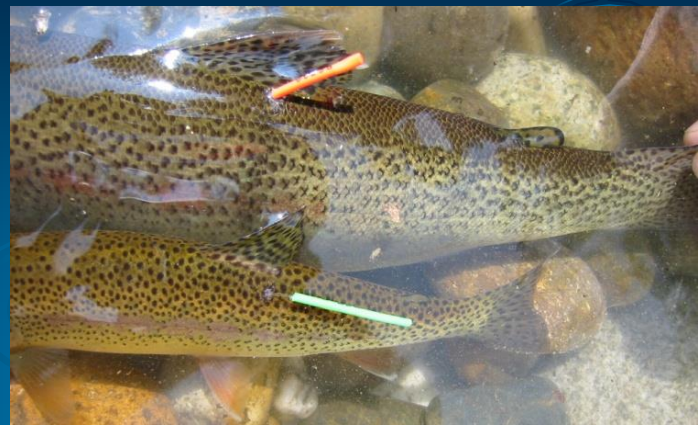
Winter-Spring

Raft electrofishing

Also backpack electrofishing used

Diet and Predation Estimation

- Gastric lavage
- Identify stomach contents
  - including DNA analysis
- Predation estimation
  - Direct consumption model
  - Population estimate used to estimate total consumption
    - Mark-resight method – summer
    - Snorkel counts - winter

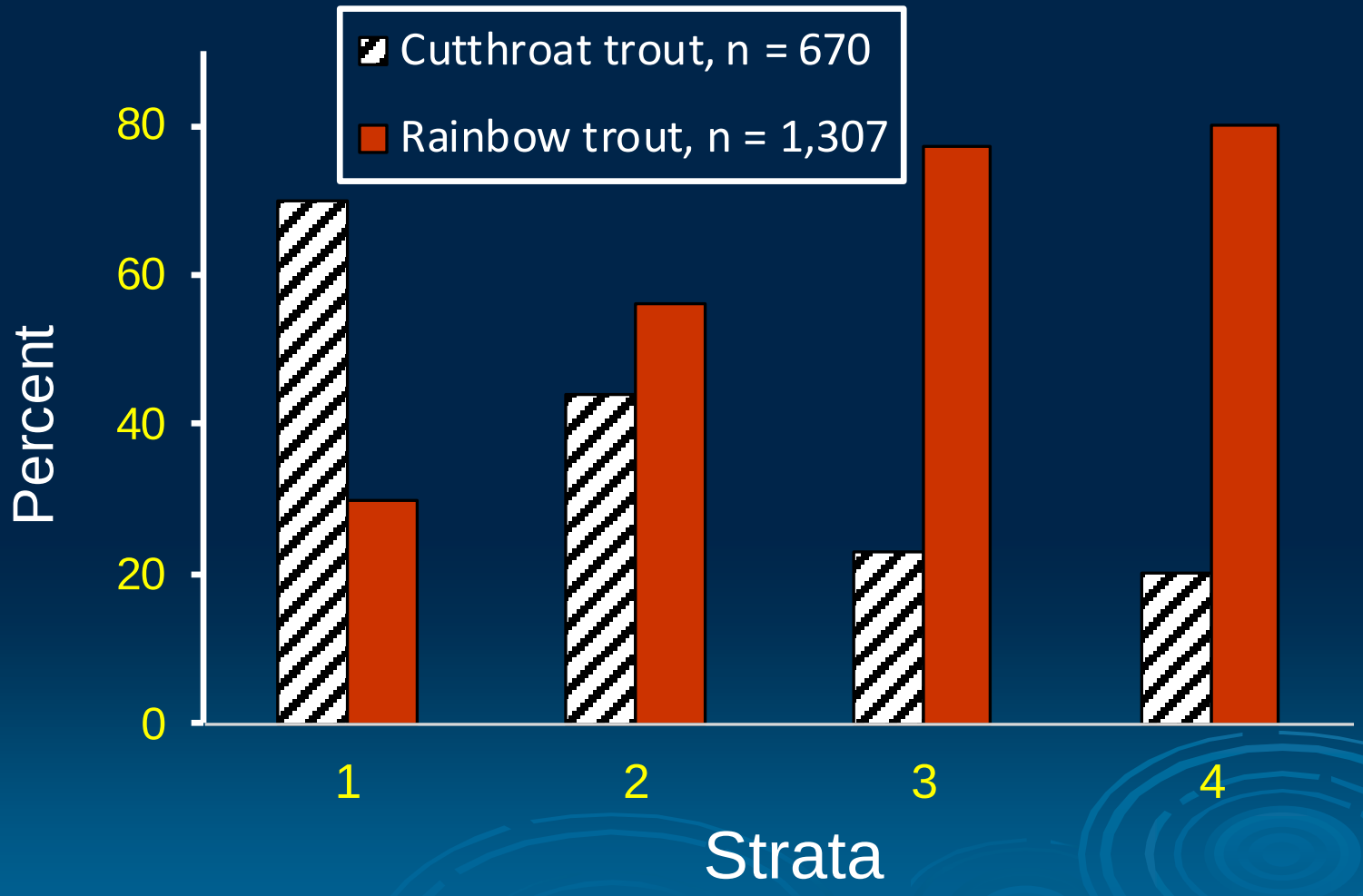


Methods - Four Strata

- Strata based on gradient, natural confinement, and channel type

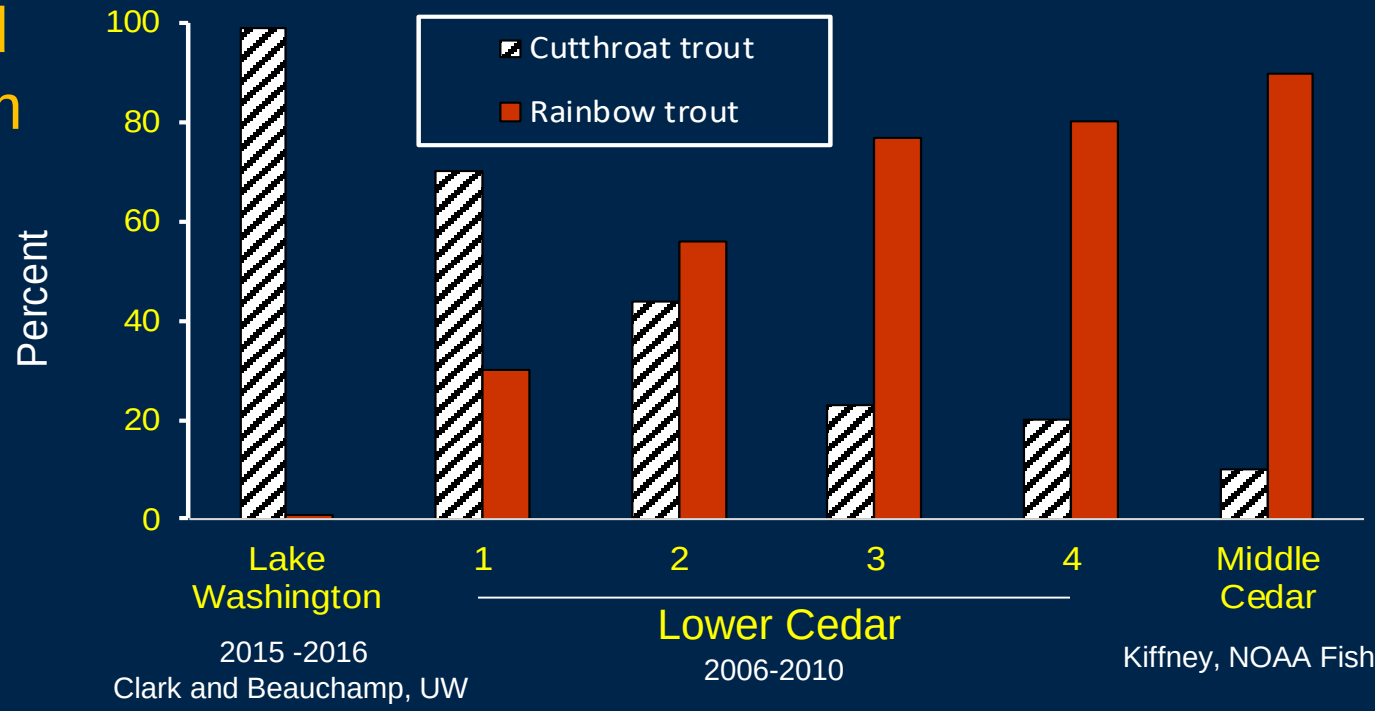
Species composition

Lower Cedar River



Species composition

Lake and Mainstem

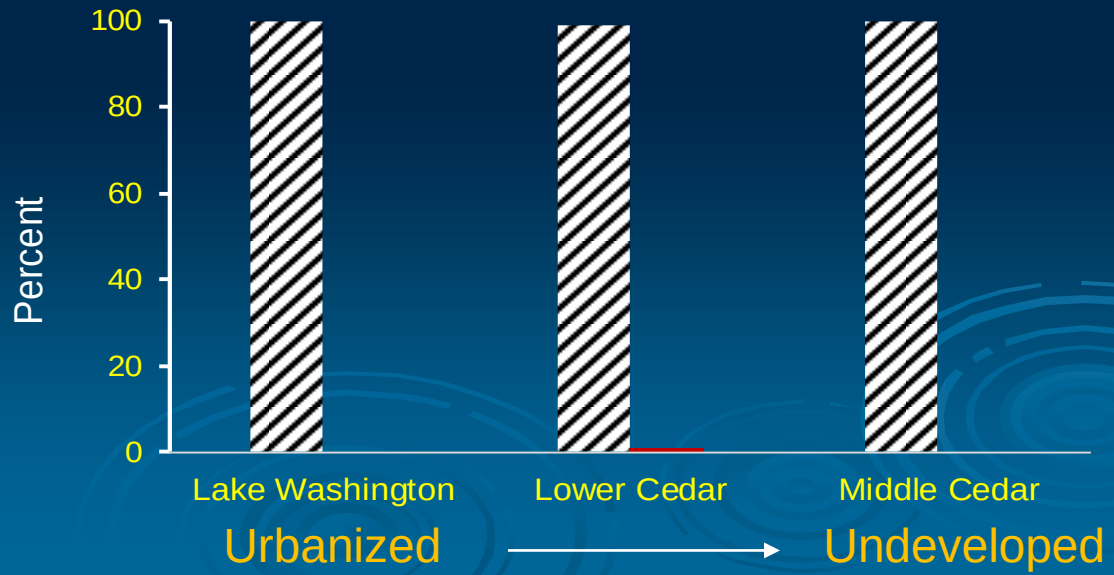


2015 -2016
Clark and Beauchamp, UW

2006-2010
Kiffney, NOAA Fisheries

Small Tributaries

2009-2013



Hartman and Gill 1968

66 southwestern British Columbia streams

Cutthroat trout

- small streams
- low gradient streams
- proximity to lakes

Rainbow trout

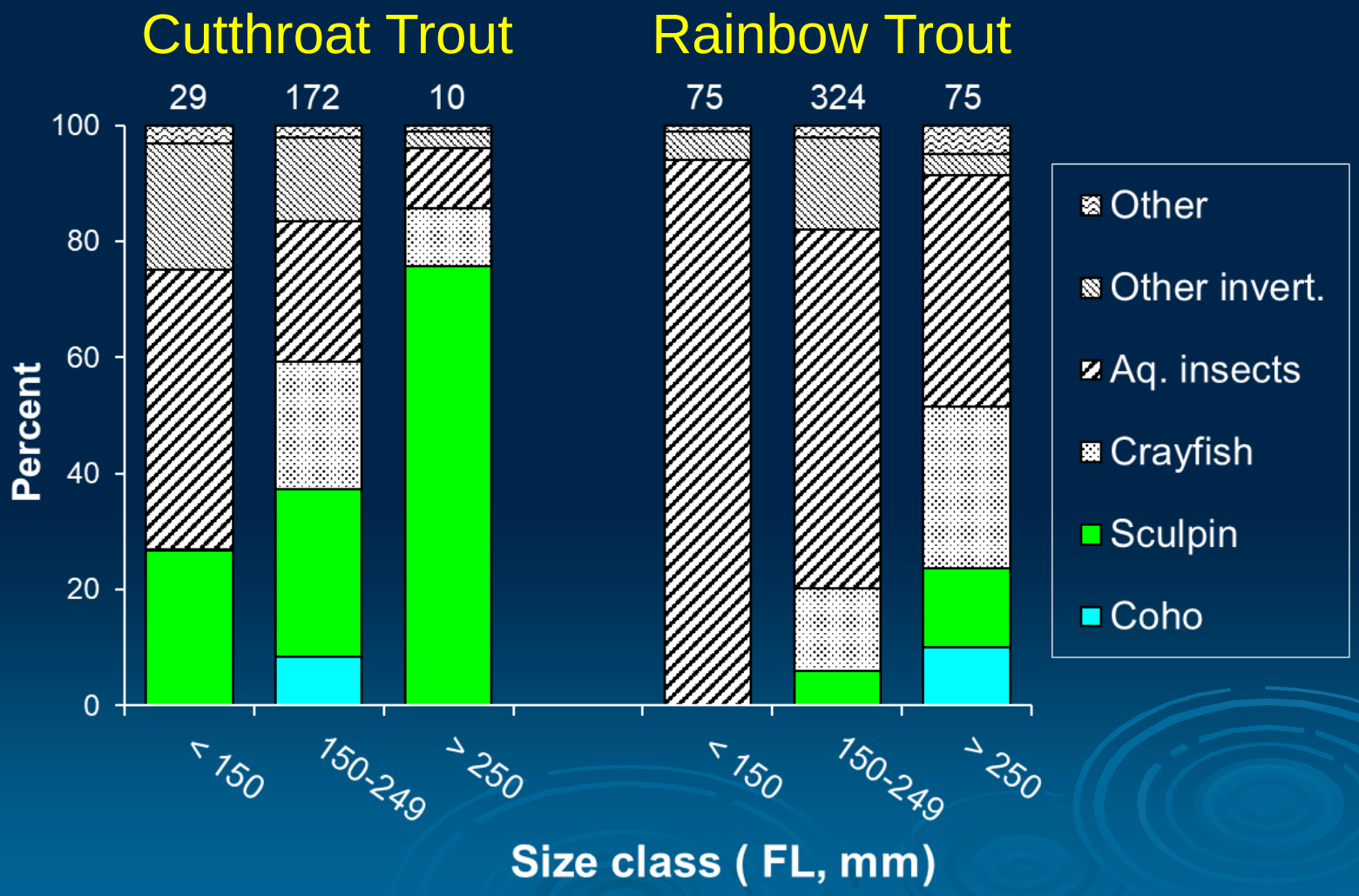
- large streams and rivers
- medium to high gradient streams

Summer Diet and Predation

One two-week period (July-August) in 2006 and 2007

Summer Diet

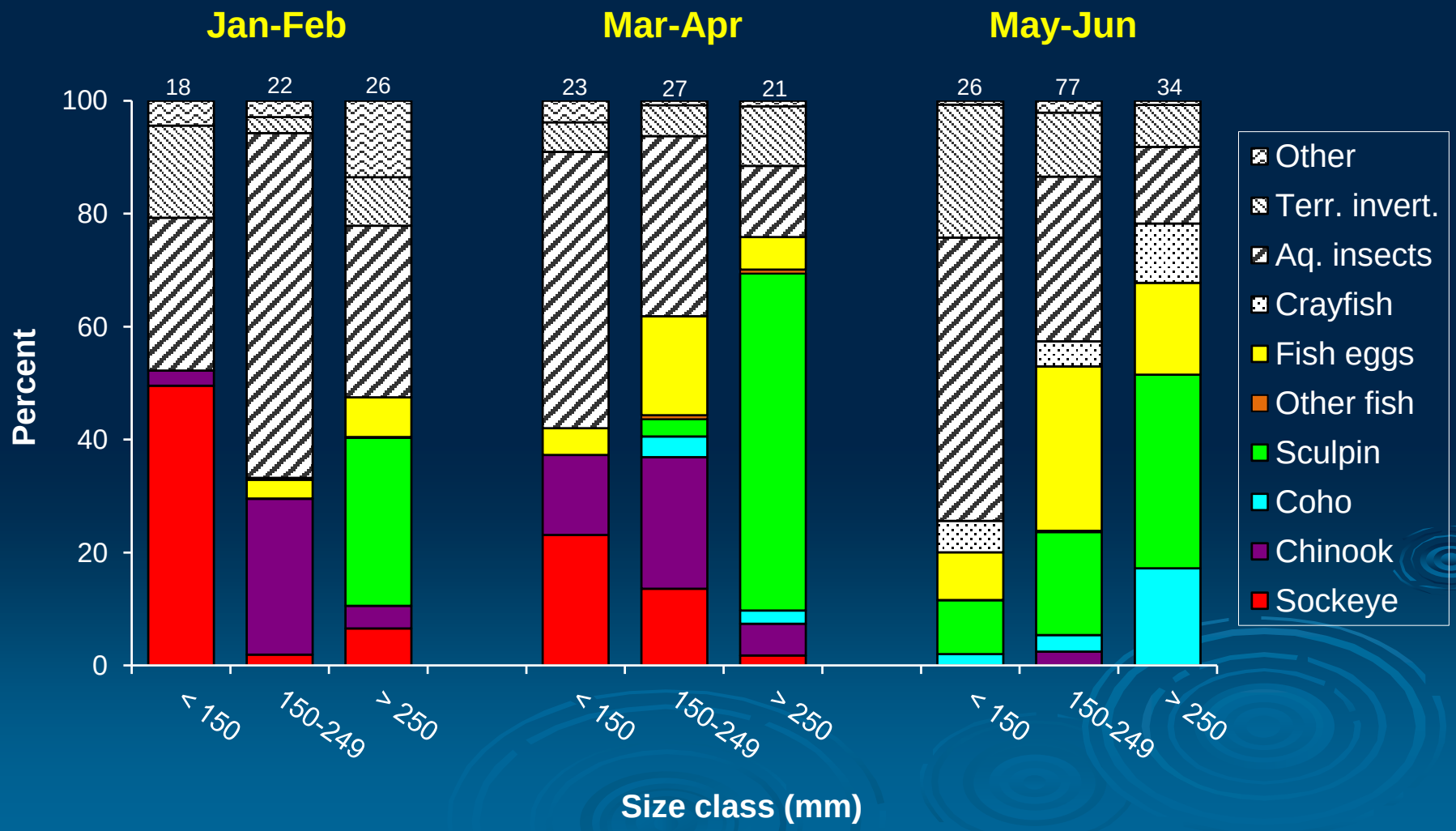
2006 and 2007 combined, percent by weight



Winter-Spring Diet and Predation

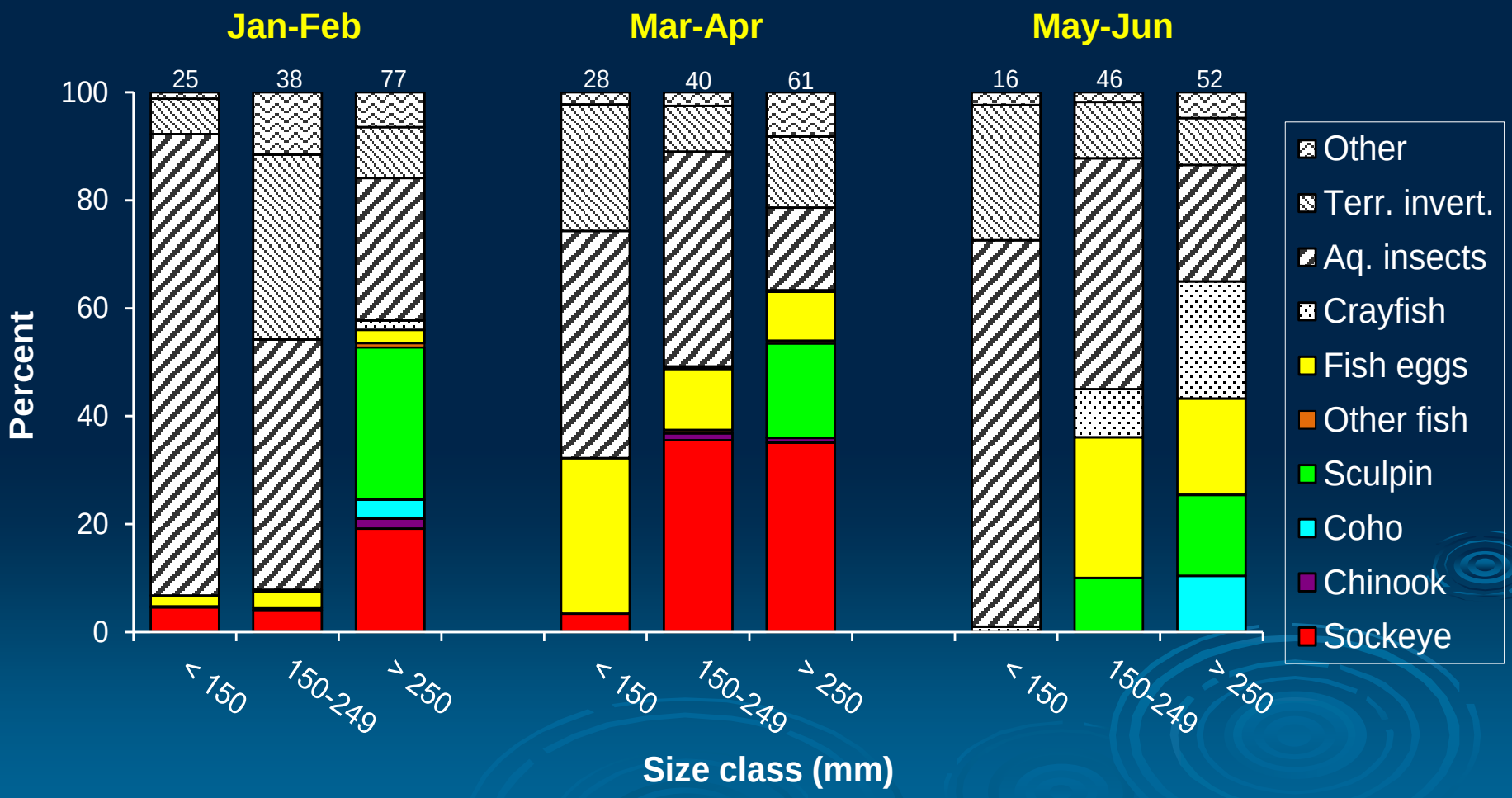
Cutthroat trout - 2010

Diet, percent by weight, all strata combined

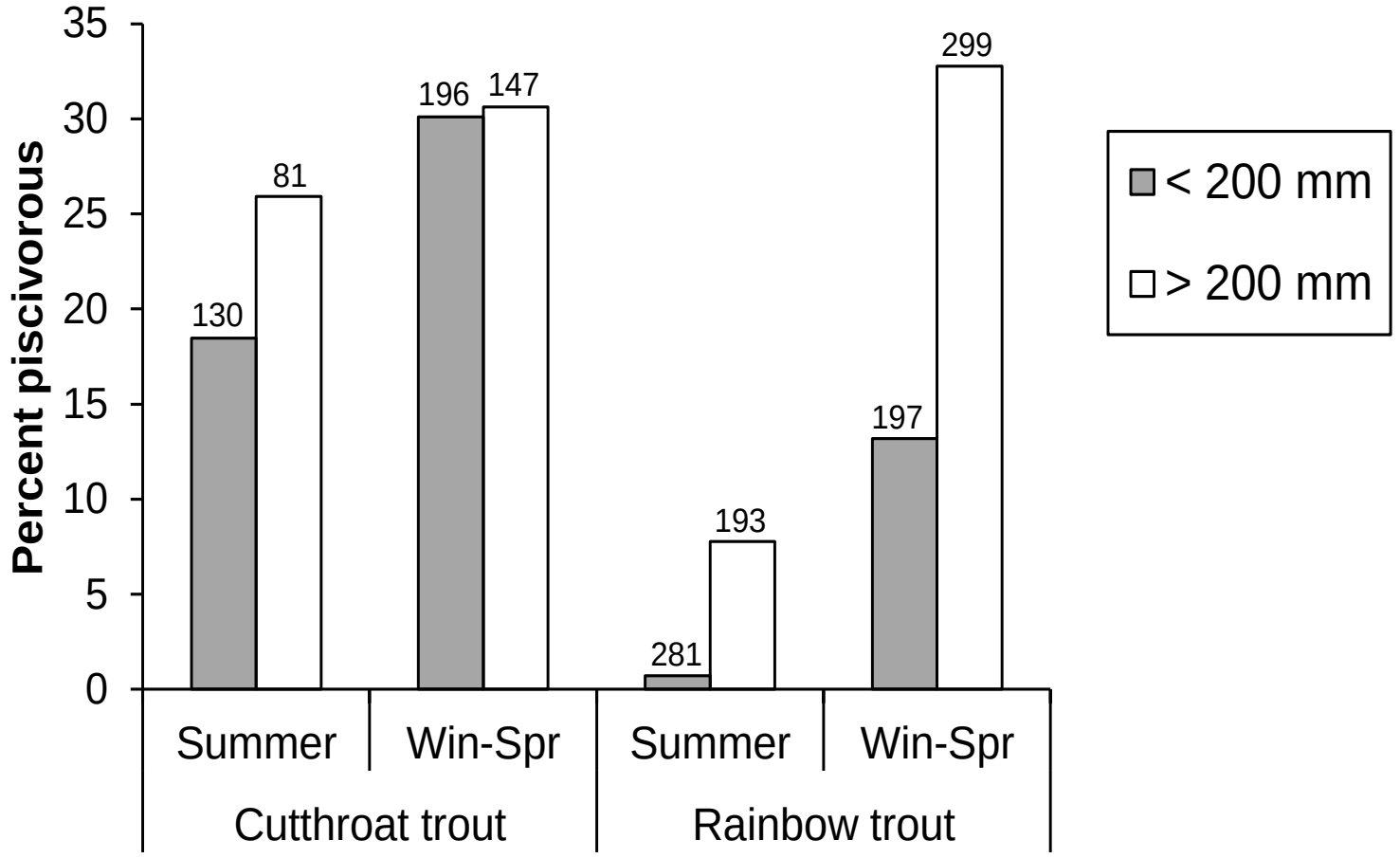


Rainbow trout - 2010

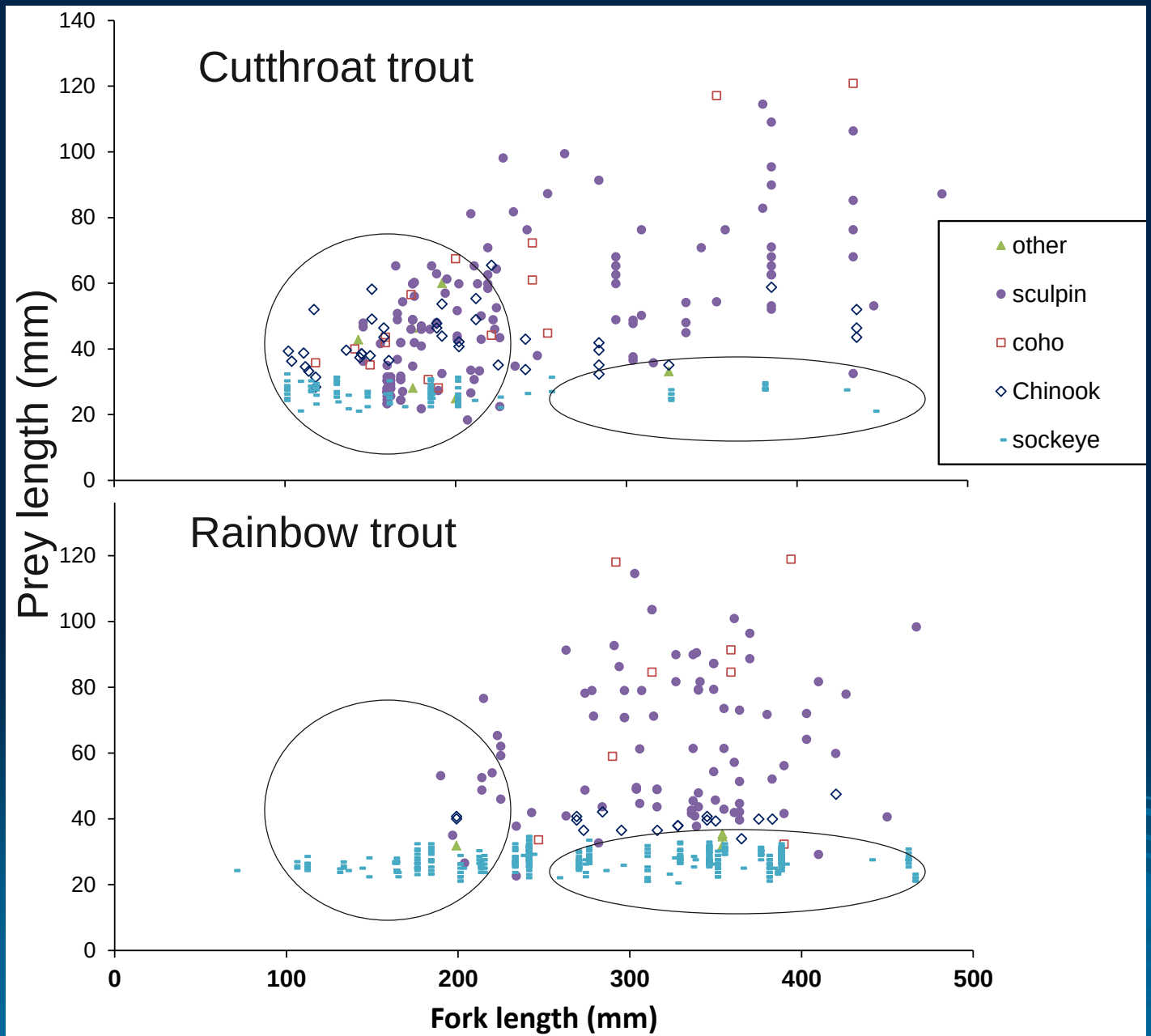
Diet, percent by weight, all strata combined



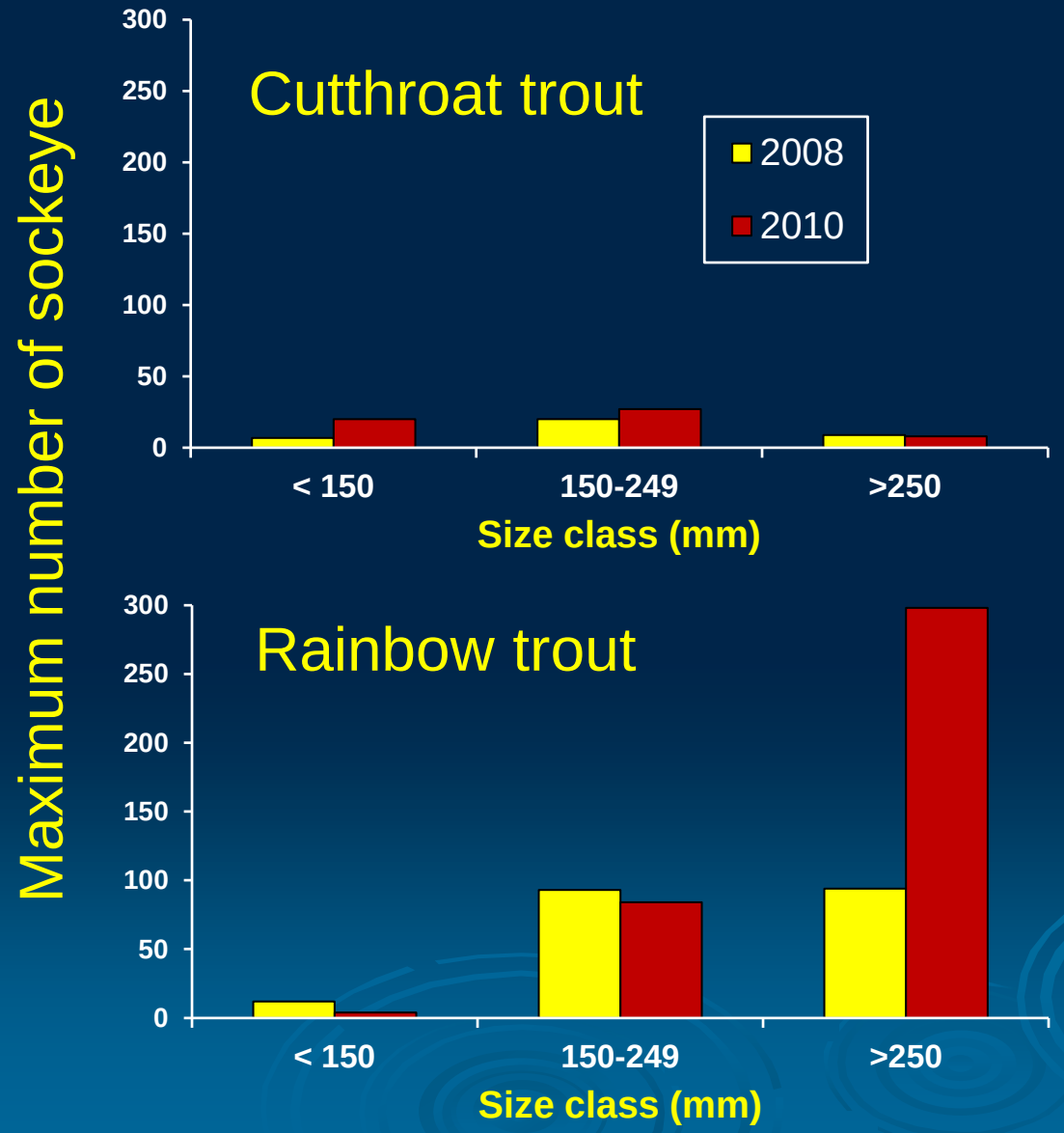
Percent Piscivorous



Prey length


Cutthroat trout
Rainbow trout
Prey length (mm)
Fork length (mm)
0
20
40
60
80
100
120
140
0
100
200
300
400
500
other
sculpin
coho
Chinook
sockeye

Maximum number of Sockeye fry



Food Specialization by Individual Trout

(Bryan and Larkin 1972)

Four Rainbow Trout stomach samples

Summary

- Within the Lake Washington Basin, cutthroat trout are the dominant trout species in the lake, lower end of the Cedar River, and in small streams

Summary

- Predation of sockeye was most evident in small cutthroat trout and large rainbow trout
- Consumption of sockeye was highest in large rainbow trout
- Predation of juvenile Chinook was observed primarily in cutthroat trout

Summary

- Cutthroat trout are piscivorous at a smaller size than rainbow trout
- As cutthroat trout grew they shifted to larger prey including sculpins and crayfish
- Relative consumption of salmonid prey may reflect differences in habitat use by both predator and prey

Questions

roger_tabor@fws.gov