

Intra-annual differences in rainbow and brown trout diet near the Little Colorado River, Grand Canyon, AZ.



Emily Thompson, Michael D. Yard, and Lewis Coggins

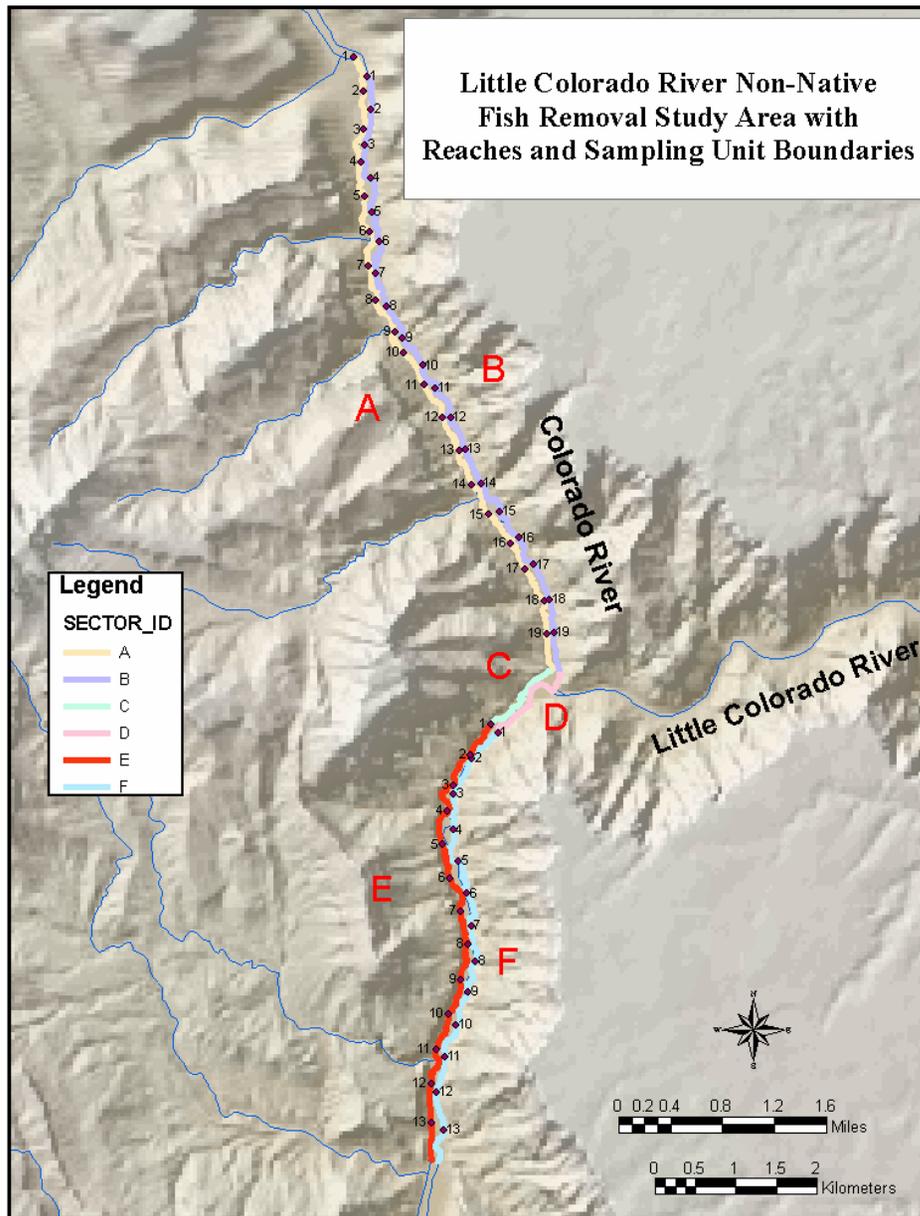
Grand Canyon Monitoring and Research Center
&
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Rainbow and Brown Trout Diet Analysis

- Study Objectives

- Determine if proportion of food items varied
 - Among rainbow trout & brown trout
 - Among fish found above and below LCR
- Determine if quantity of food consumed varied
 - Among rainbow trout & brown trout
 - Among fish found above and below LCR
 - Relative to food availability

SAMPLING DESIGN – MECHANICAL REMOVAL REACH



- Electrofishing gear type
- 5 pass depletion effort
 - Above LCR
 - Below LCR



FIELD PROCEDURE

- Euthanized
- Field measurements
- Evisceration
- Sample Preserved (ETOH)



DIET ANALYSIS

- Stomach samples were randomly selected for assessment
- Microscopic Assessment
- Years 2003 & 2004
 - Rainbow trout (n = 720)
 - 120 samples per trip
 - Upstream – downstream
 - < 250 mm & > 250 mm
 - All available Brown trout
 - Upstream – downstream
 - < 250 mm & > 250 mm

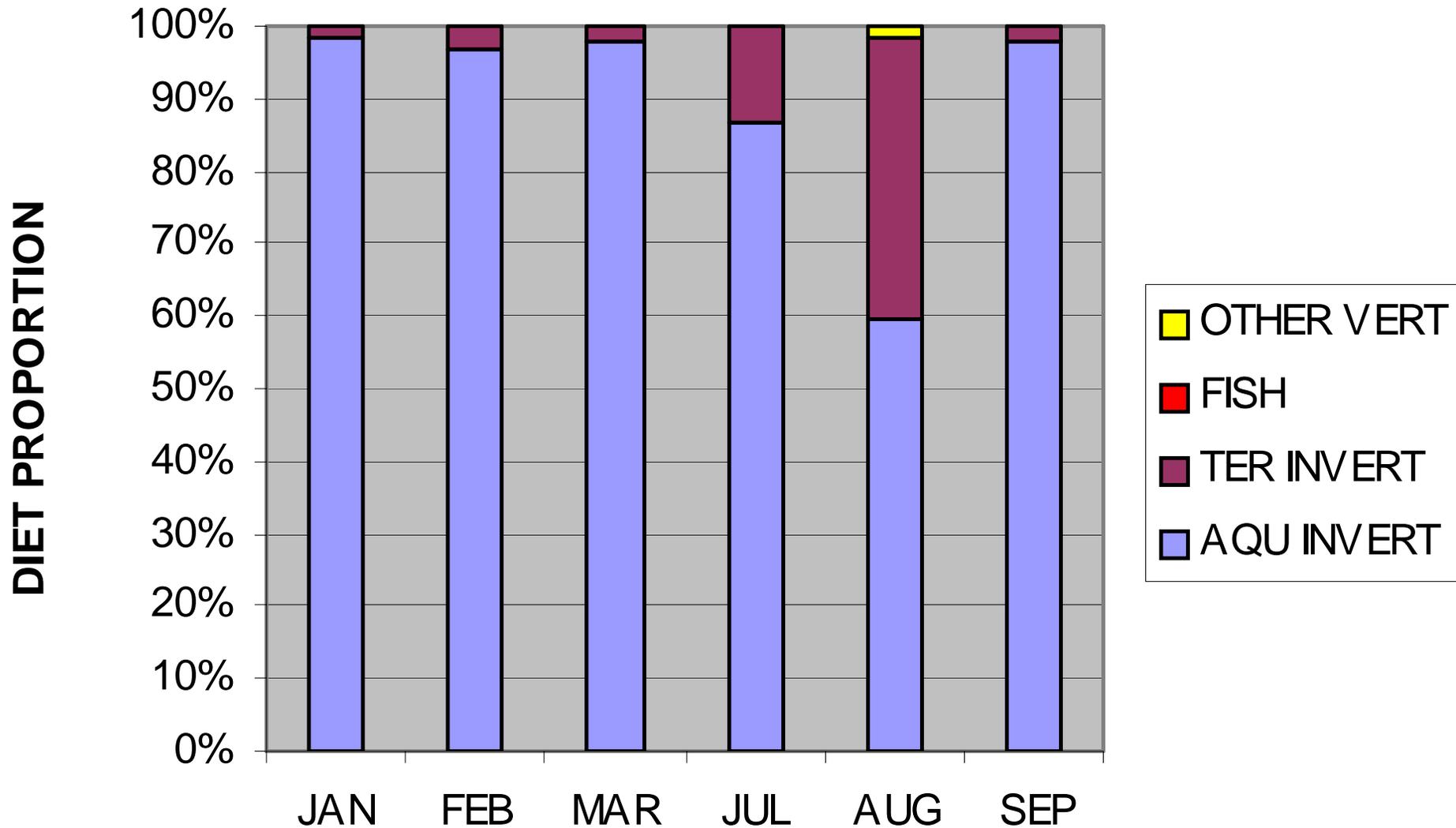


Detailed Diet Analysis

- Diet
 - Two size classes: <250 & >250 mm
 - Above and below the LCR
 - Winter
 - (January, February, & March)
 - Summer
 - (July, August & September)

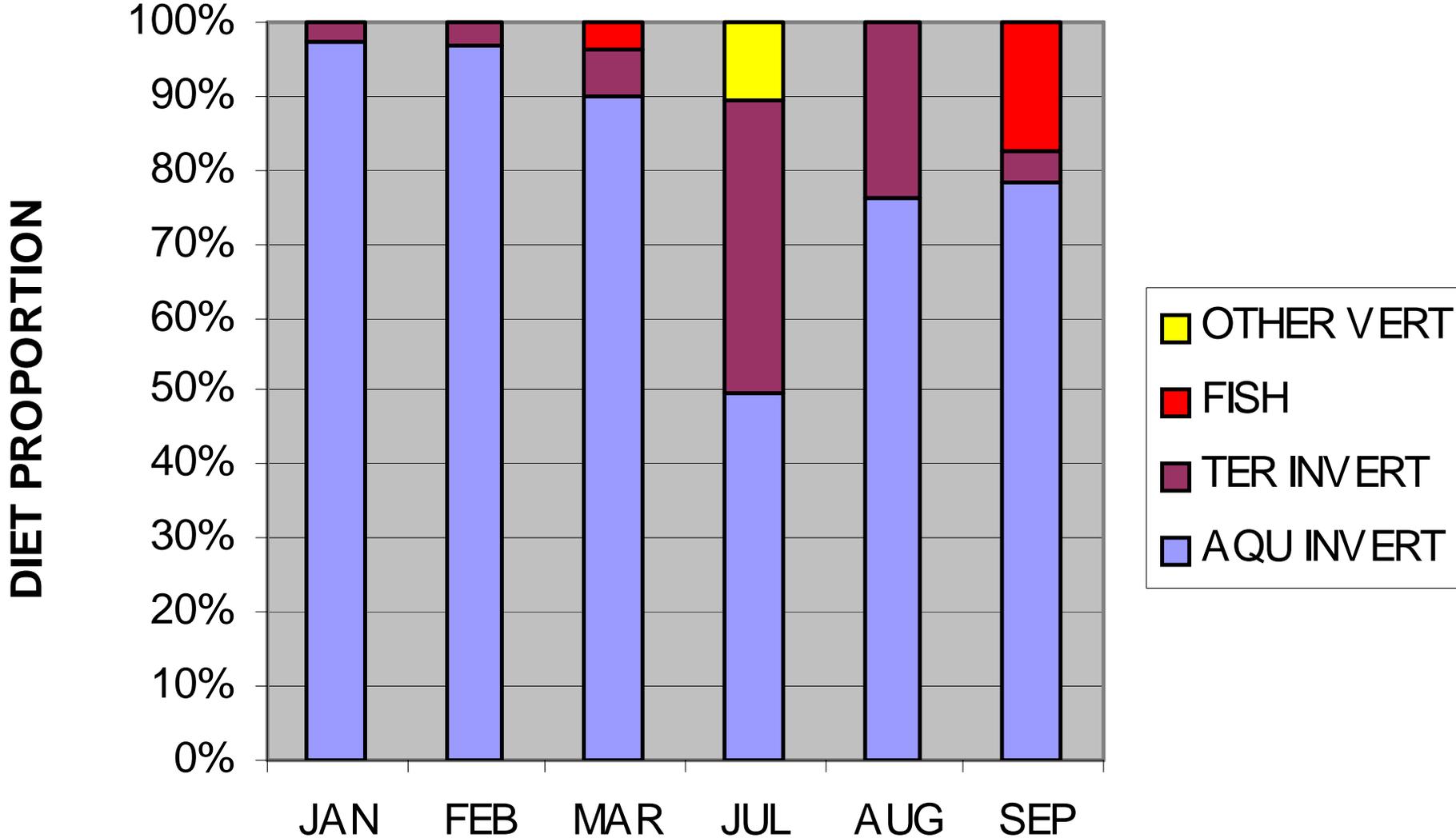
RAINBOW TROUT - 2003

ABOVE LCR



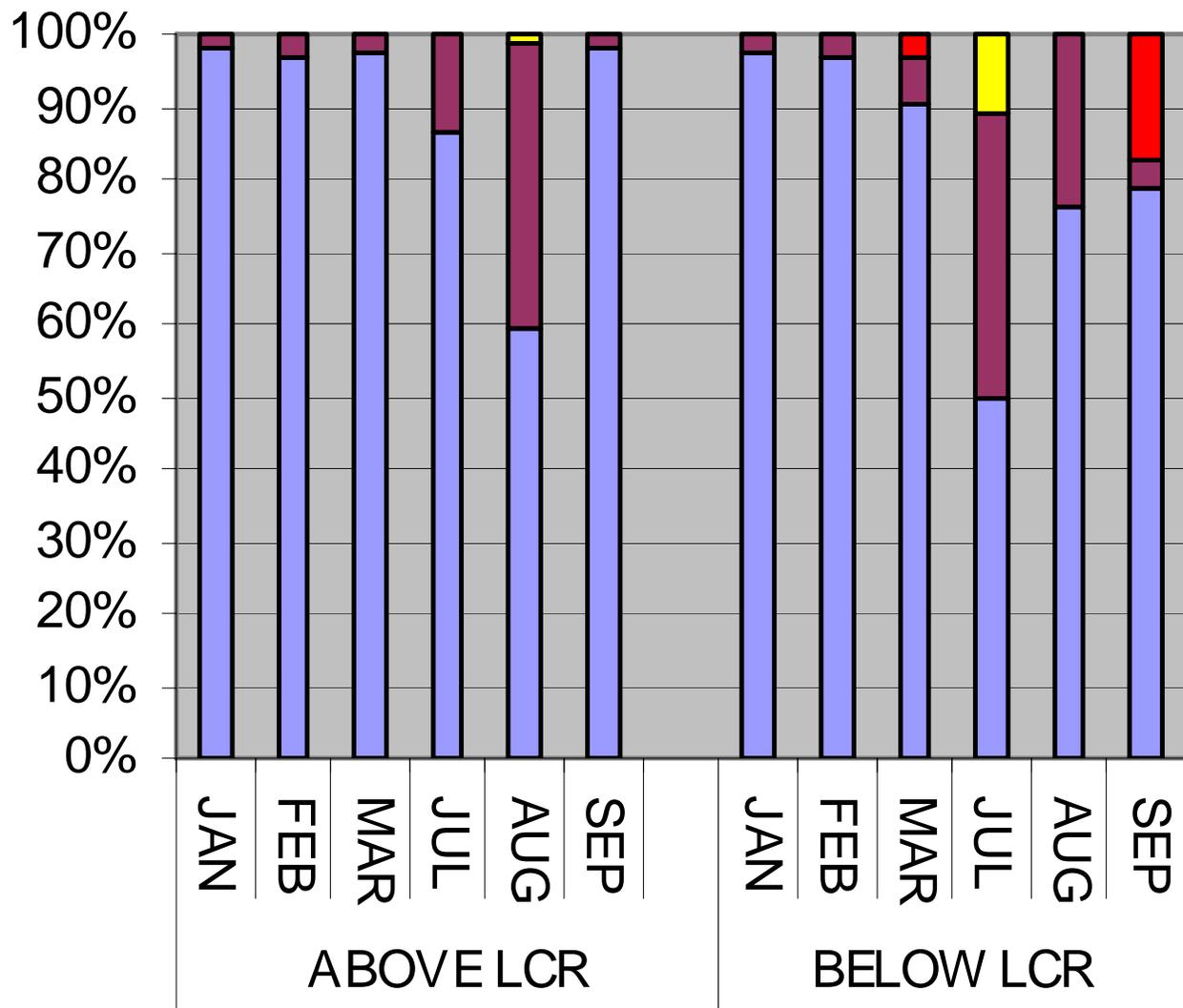
RAINBOW TROUT - 2003

BELOW LCR



RAINBOW TROUT - 2003

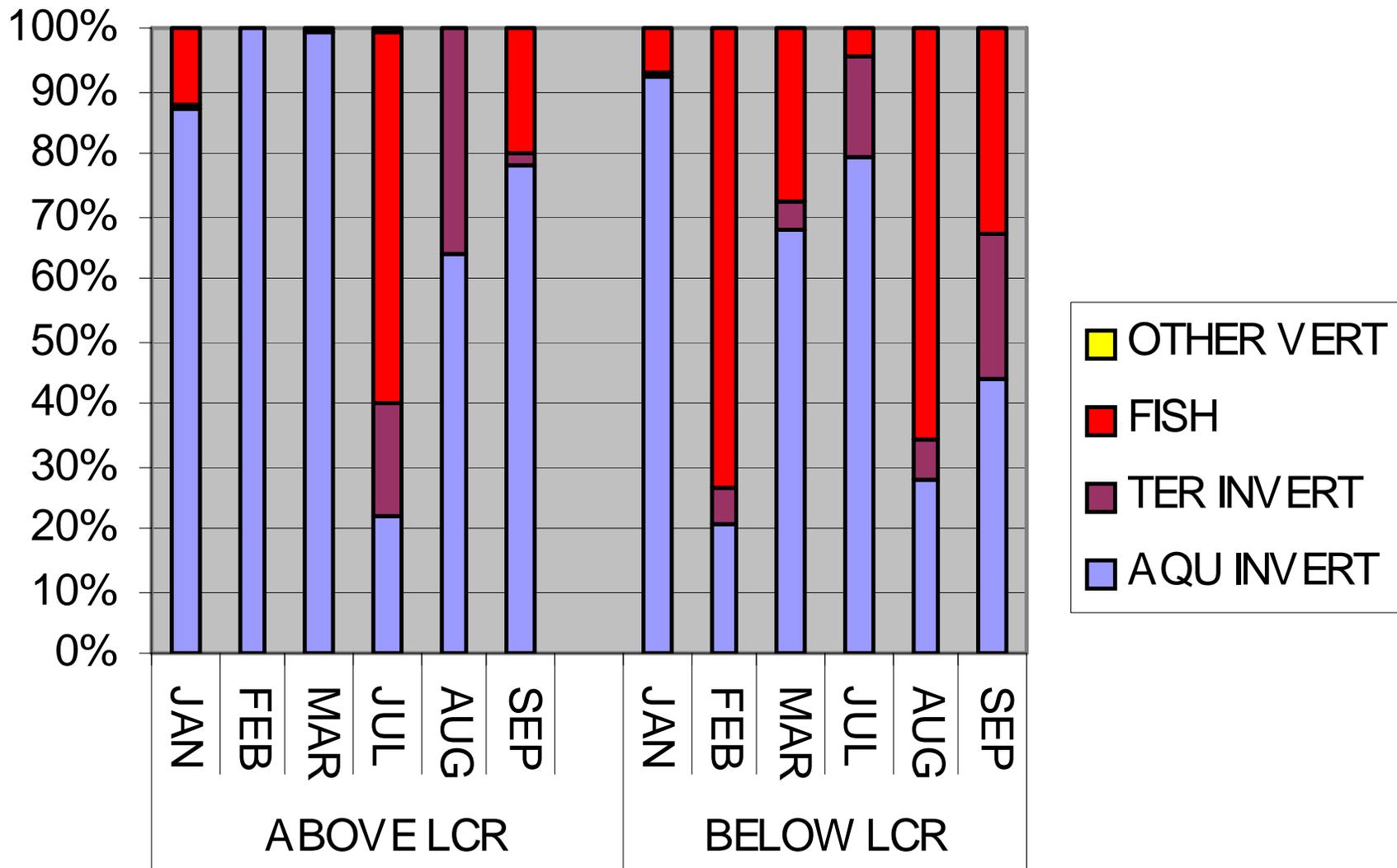
DIET PROPORTION



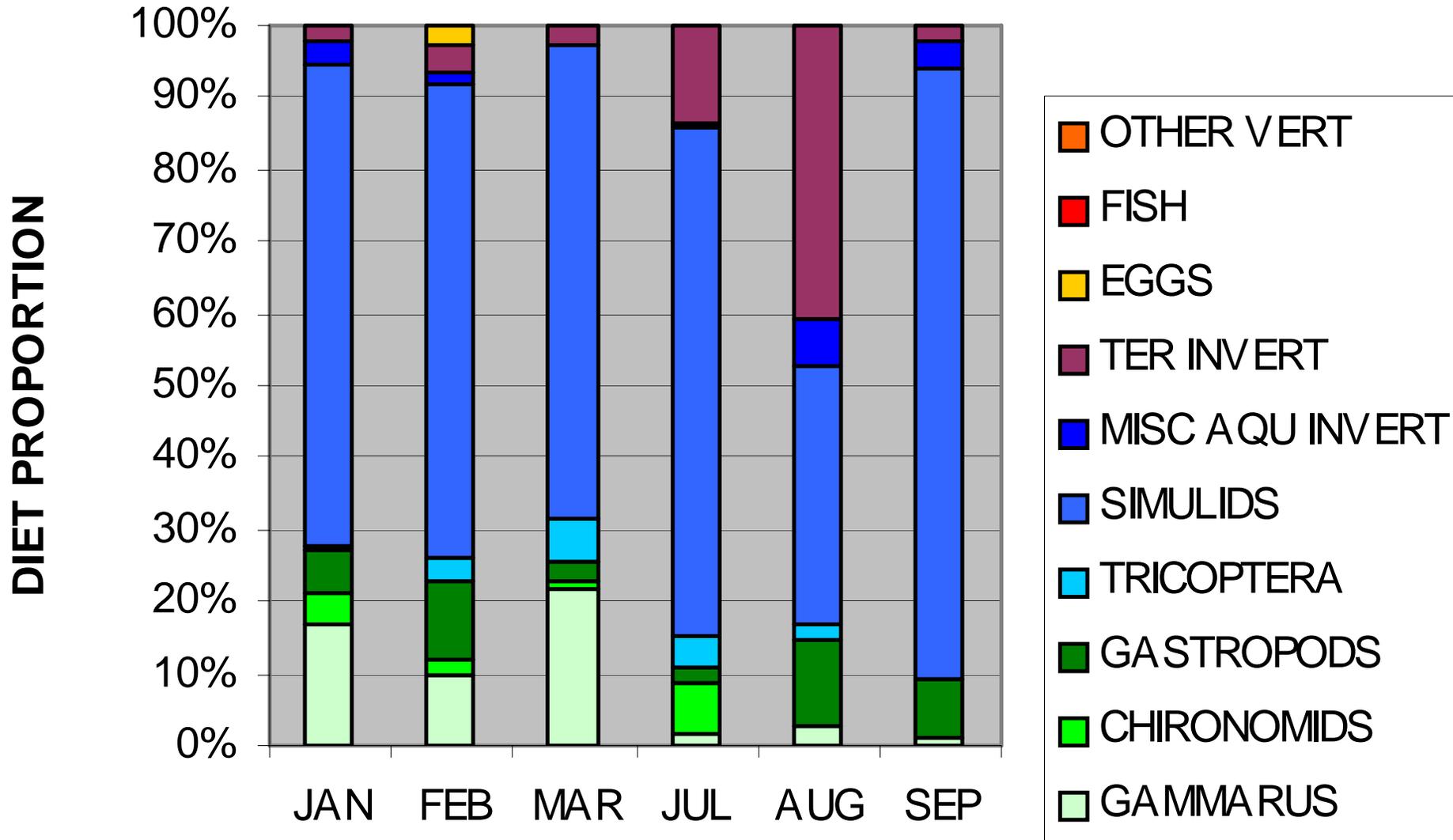
- OTHER VERT
- FISH
- TER INVERT
- AQU INVERT

BROWN TROUT - 2003

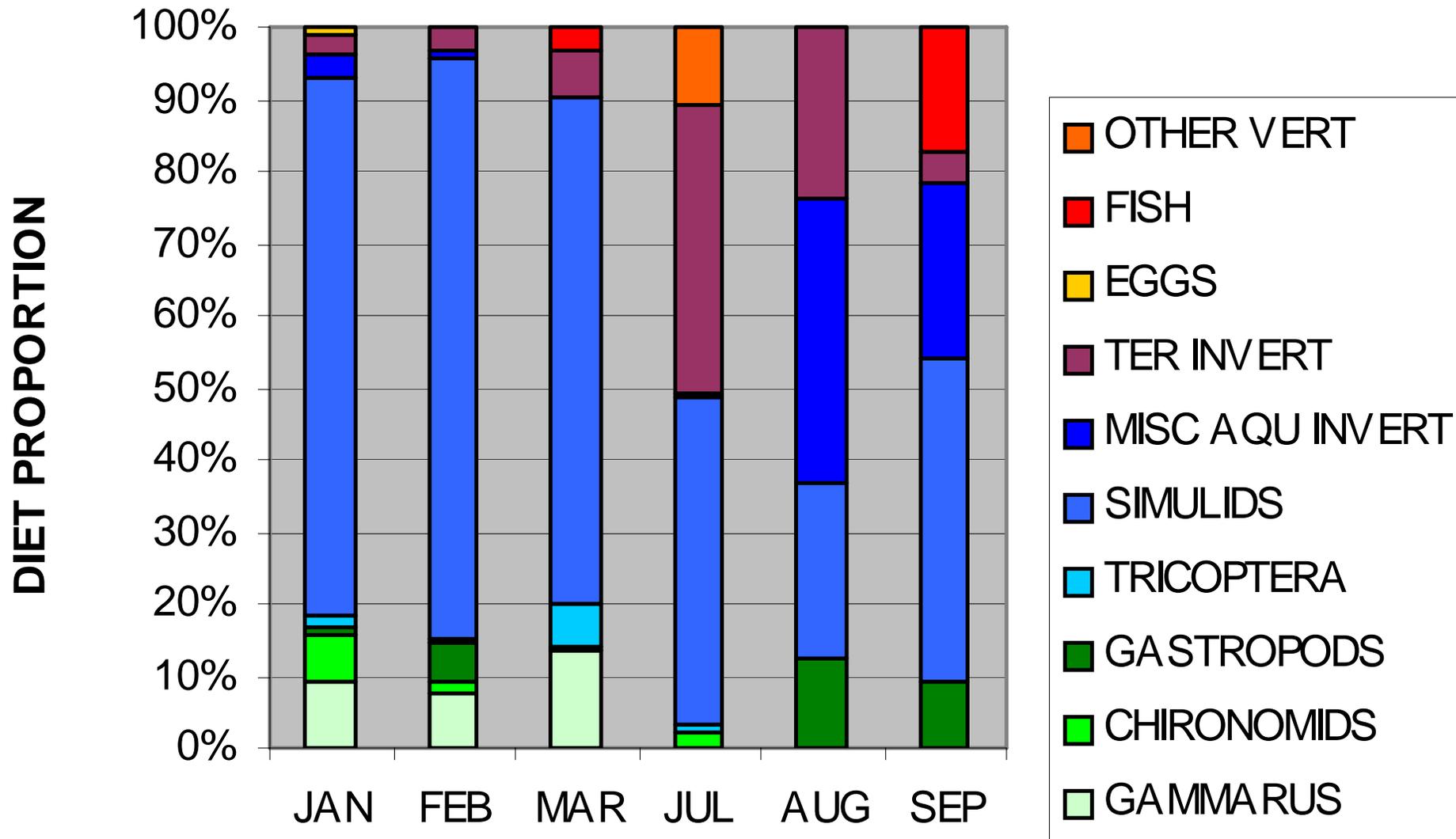
DIET PROPORTION



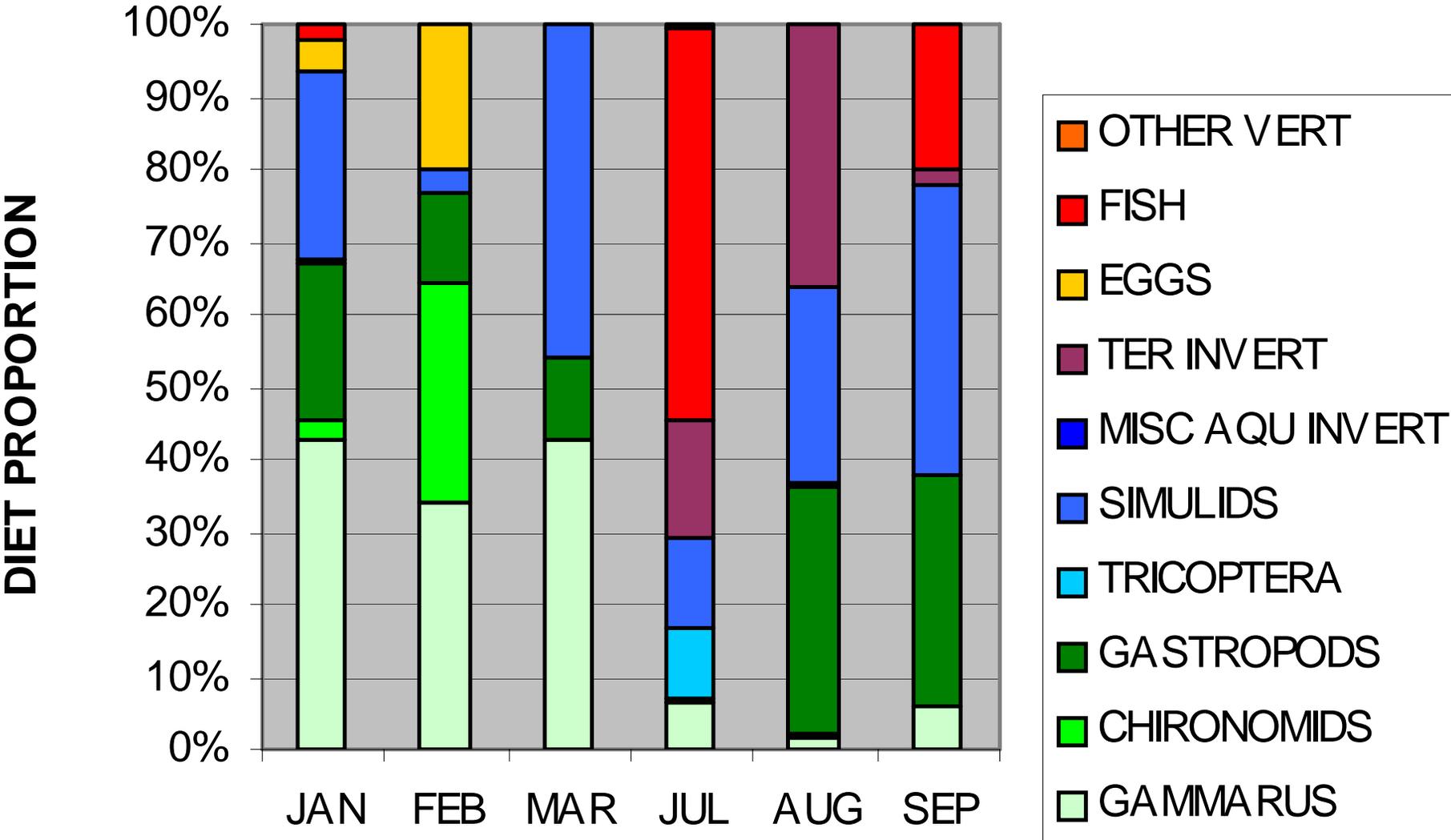
RAINBOW TROUT ABOVE LCR



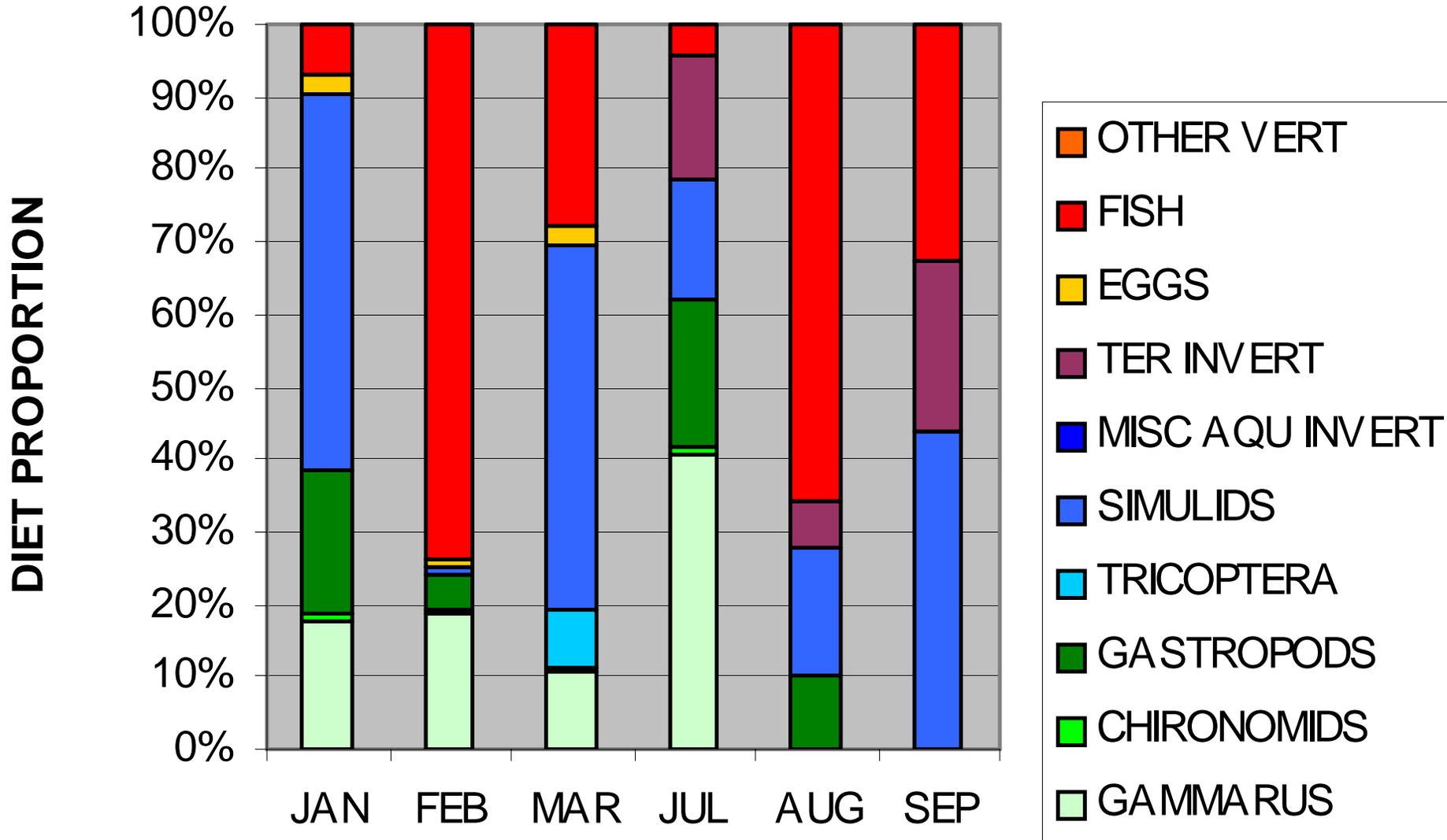
RAINBOW TROUT BELOW LCR



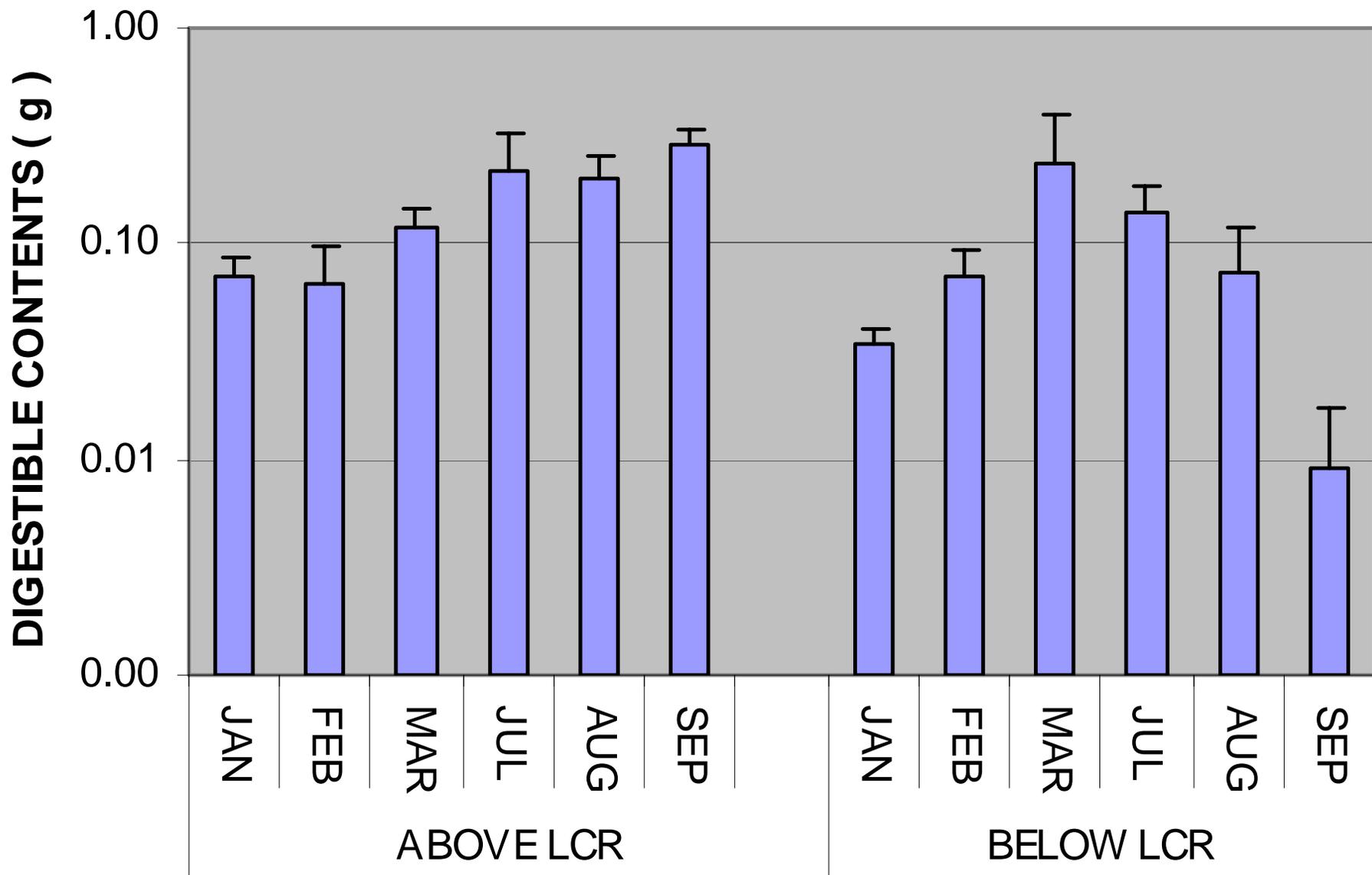
BROWN TROUT ABOVE LCR



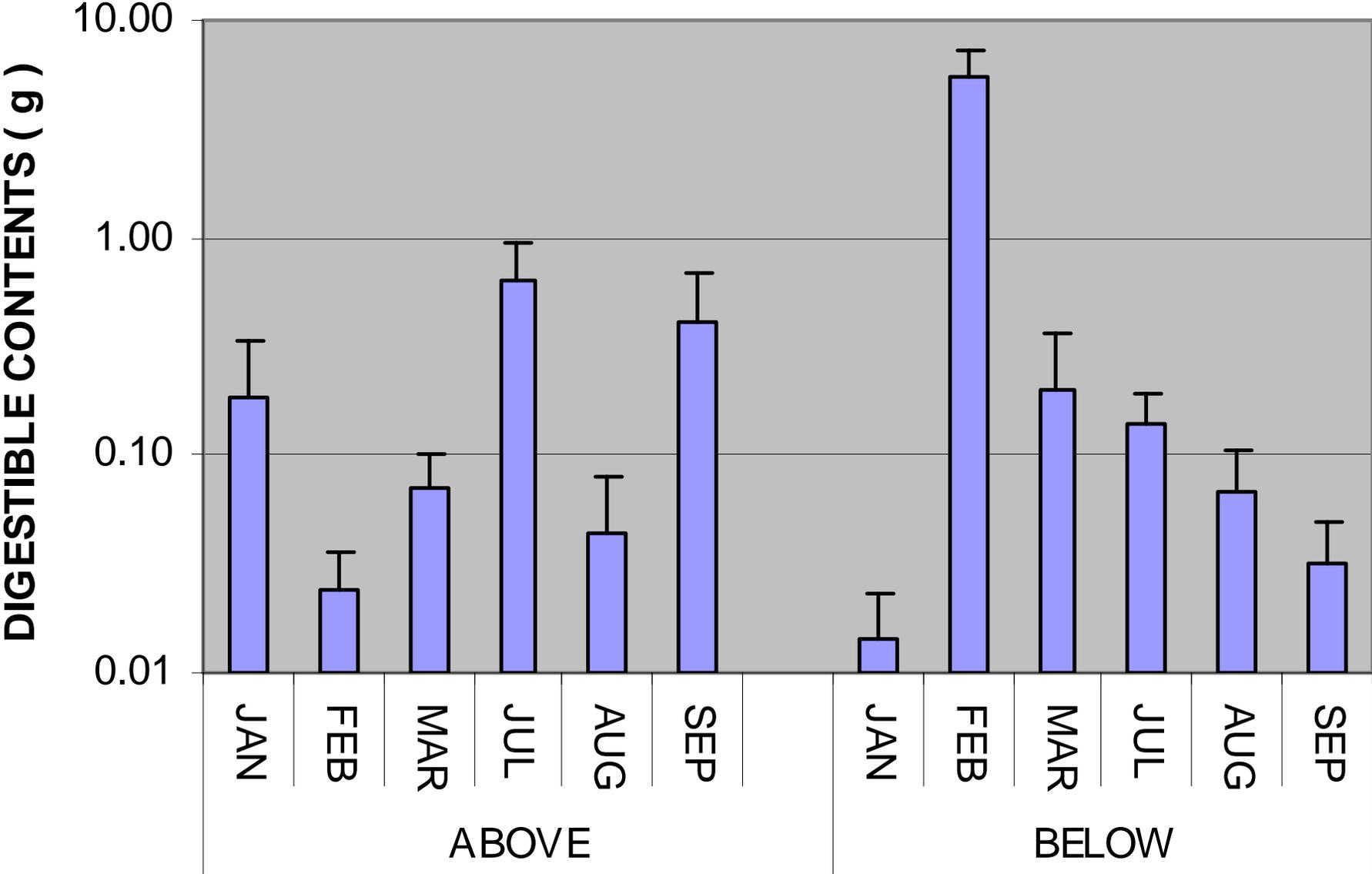
BROWN TROUT BELOW LCR



RAINBOW TROUT : 2003



BROWN TROUT : 2003



Conclusion

- Proportion of FISH in diet
 - BROWN TROUT = 17% to 95%
 - RAINBOW TROUT = 0.5% to 2.5%
 - DOWNSTREAM > UPSTREAM
 - Differences due to spatial and temporal differences
- Diet primarily AQUATIC in origin
 - Terrestrial use increased over summer, but still a smaller proportion
 - Diet proportions similar to drift proportions

Conclusion

- **Rainbow trout diet:**
 - Simuliids = 55% to 95% of all macroinvertebrate items
 - Chironomids and zooplankton consumed in lower proportion than drift availability
 - Chironomid drift availability = 28% of all drift items
Diet consumption = 1% to 2.5%
 - *Gammarus* = 5% to 9% of overall diet
Although low, diet proportion higher than drift availability.
- **Brown trout diet:**
 - Simuliids = 25% to 30% of all macroinvertebrate items
 - *Gammarus* and gastropods = 24% to 40% of all macroinvertebrates

Conclusion

- PROPORTION of diet items consumed equal both upstream and downstream of LCR
- QUANTITY of biomass consumed different
 - Macroinvertebrate biomass > upstream than downstream
 - No spatial differences observed among the quantity of macroinvertebrates found available in the drift.
 - Biomass difference due to differences in visual prey detection (INCREASED TURBIDITY).
- Increased piscivory appears to compensate for the reduced total macroinvertebrate biomass consumed.