Winter Foraging Habits of River otter (*Lontra canadensis*) at Big Creek in the Frank Church Wilderness, Idaho.

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RESEARCH RATIONALE

Significance

- Winter ice cover and scour may have consequences for river organic matter dynamics and food webs.
- Understanding of the effects of winter on river otter (*Lutra canadensis*) foraging habits is hindered because most semi-aquatic research is conducted during the summer.
- The main food source throughout the year is Teleost fish, but the tendency of river otter to forage on the bottom of stream beds for invertebrates in the winter increases (toweill, 1974, liers, 1951).

Research Objectives

- This study had two main objectives:
  - to quantify the presence of invertebrates as a prey item for river otters.
  - to provide insight into the potential shift in prey items during winter.

RESEARCH HYPOTHESES

- Invertebrates constitute a significant proportion of winter diet items for river otters in Big Creek.
- *Plecoptera pteronarcidae* constitutes a significant proportion of winter invertebrate diet items for river otters in big creek.

Figure 1: Otter scat collected at the latrine site Cougar Den March 25, 2011.

Figure 2: Otter scat collected at the latrine site between Goat Creek and Cougar Creek. Notice the *P. ptyernarcyidae* exoskeleton which has passed whole.

STUDY AREA

- Big Creek is a 6th order tributary (1444 km^2) of the Middle Fork Salmon River, which flows through the Frank Church 'River of No Return' Wilderness (Figs. 3).
- Three latrine sites (cougar den, between goat and cougar and goat creek) along big creek were discovered and sampled.

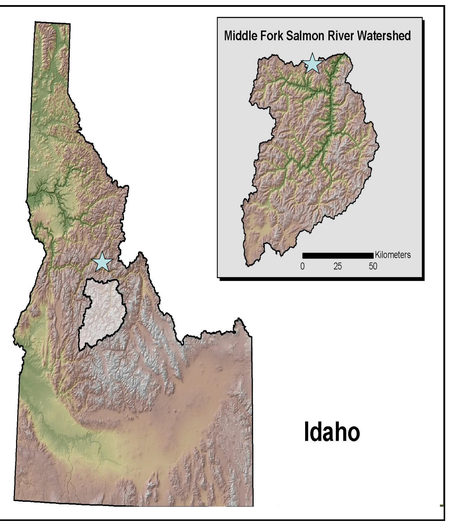

Fig. 3: Map of Middle Fork Salmon River watershed, located in a central Idaho wilderness.

SCAT METHODS

Fig. 4: Photo of otter scat at latrine site (Cougar Den) adjacent to Big Creek, on March 25, 2011. Scats were collected at three different latrine sites along big creek and were taken back to the ISU lab for analysis.

POINT FRAME METHODS

- Ratios of prey items were determined by point analysis. For each scat, multiplying the dry weight of the micro fragment fraction by the relative occurrence out of 46 points produced an estimate of dry weight for each food item.
- Food items were determined from remains of bone, exoskeletons, and hair. Taxa identified from scat were grouped into six categories: Teleost fish, various invertebrates, *Plecoptera pteronarcyidae,* mammal (hair, teeth, bones), plant biomass, unidentifiable biomass, and unidentifiable hard mass.
- Data was analyzed by category and the percentage occurrence, standard error (SE), and confidence intervals (CI) for each proportion was determined. Samples were analyzed by comparing 99% CIs from a binomial distribution, which was appropriate because it allows sampling with replacement, and does not assume independence of samples (Zar, 1999). The lack of overlap in the 99% CIs are indicative of statistically significant differences. 99% Cis were used in place of 95% CIS to reduce type I error.

POINT FRAME RESULTS

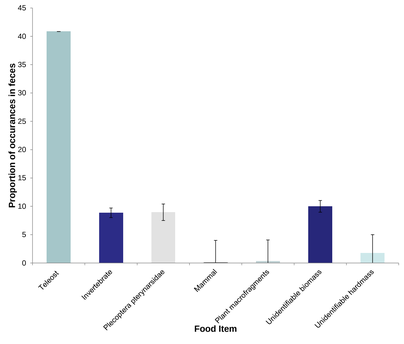

Figure 5. Mean Proportion of occurrences in scat with 99% confidence intervals for prey items.

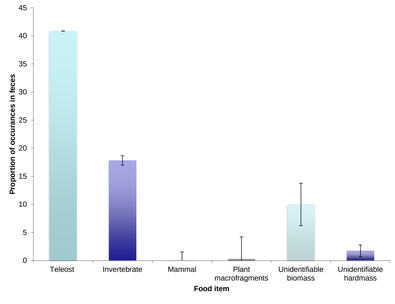

Figure 6. Mean Proportion of occurrences in scat where *Plecoptera pterynarsidae* is grouped as invertebrate with 99% confidence intervals

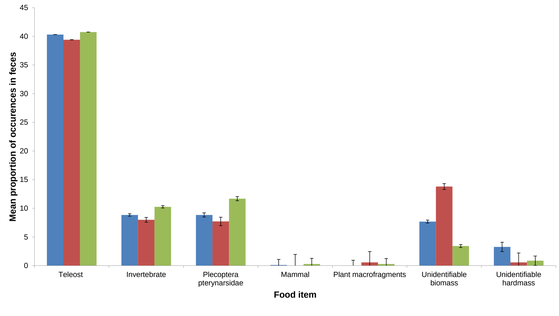

Figure 7. Mean proportion of occurrences in scat with 95% confidence intervals for the three different latrine sites.

The distribution of prey items within river otter scat?

Dry prey item	number of occurrences	dry weight per occurrence +/- sd	relative frequency of occurrence	relative dry weight ingested
Teleost	940	0.0721±0.065	40.85	2.9454
Various invertebrates	204	0.0103±0.014	8.87	0.0913
Plecoptera pteronarcyidae	206	0.0319±0.037	8.95	0.2856
Mammal	2	0.000±0.00	0.09	0.0000
Plant	7	0.0151±0.019	0.30	0.0046
Unidentifiable biomass	230	0.0045±0.005	10.00	0.0450
Unidentifiable hard mass	40	0.0058±0.009	1.74	0.0101

Fig. 7: Overall data collected for dry prey items. Dry weight per occurrence ± standard deviation stated. The relative dry weight ingested was obtained by multiplying the average weight per occurrence and by the relative occurrence out of 46 scats.

RESULTS

- Teleost (fish) occurred as the most frequent diet item, *Plecoptera pterynarsidae* was not nearly as frequent (204) but had a significant dry weight (0.0319±0.037). (Figure 7).
- *Plecoptera pterynarcyidae* was not a significantly different prey item in otter winter diet due to 99% confidence interval overlap between the invertebrates, Plecoptera pterynarcyidae, and unidentifiable biomass. (Figures 5 and 6).
- Invertebrates made up a significant proportion of diet items for river otters in the winter. (Figures 5, 6, and 7).
- Teleost was the main diet item in the winter for river otters along big creek (Figures 5, 6, and 7).

CONCLUSIONS

- The main prey item for river otters in the winter is teleost fish, but a significant amount of invertebrates was present.
- To gain a full understanding of the influx of invertebrate consumption in the winter, summer samples must be used as a comparison.
- Although *Plecoptera ptyernarcyidae* was not shown to be a significant diet item through point frame analysis, the dry weight data show that each occurrence was significantly larger than all other invertebrate groups combined.
- The abundance of invertebrates consumed in winter is significant (Figure 6) this may be due to the decrease in fish populations in the winter time, or may be a byproduct of Teleost foraging strategies.
- To gain a complete understanding of the impact invertebrates on winter diet assimilation efficiency's for invertebrates must be obtained. The degree which invertebrates are assimilated has a direct effect on the nutrients gained from this food item.

ACKNOWLEDGMENTS

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