

National Park System/Service

- Established 1872
- No regulations prohibiting feeding wildlife
- National Park Service established 1916



Great Smoky Mountains National Park

- Established 1934
- Human visitation increase
- Black bear populations increase
- Currently most visited
 National Park



NPS Mission

"...Preserve historic wildlife and provide opportunities for the public to view the natural system of the park..."

GSMNP Nuisance Bear Management Goal

Minimize bear-human conflicts while allowing wild bears to live naturally

Reactive Management

- 1970s 1990s
- Relocation of nuisance bears





Proactive Management

- Prevention of nuisance activity
- Behavior modification





Justification

- High visitor density
- High bear density
- Variable natural food crops





Hypotheses

- 1) Use of human food sources by black bears increases with increasing density of black bears.
- 2) Use of human food sources by black bears increases following poor hard mast production.
- Use of human food sources by black bears decreases following a change in management strategies by the National Park Service during the early 1990s.
- Because of larger home ranges, adult male black bears are more likely than other sex and age groups to have access to human food sources.



Feeding Ecology

- High energy foods
- Previous nutritional studies on scat
- Digestive efficiency range
 - 30% plant matter90% meat







Methods

1,835 hair samples collected from 1975 – 2008 Stratified random sampling 1980 – 2002 Stable carbon and nitrogen isotope analysis Multivariate analysis of variance (MANOVA)





Stable Isotopes – What are they?

 $\delta X = [(R_{sample} - R_{standard})/R_{standard}] \times 1000$

where R is ¹³C/¹²C or ¹⁵N/¹⁴N



Stable Isotopes – Carbon Fractionation Stable carbon isotope analysis Fractionation within photosynthetic pathways C₃ plants ¹³C depleted Native CSMNP vegetation C₃ plants

Stable Isotopes – Nitrogen Fractionation

- Stable nitrogen isotope analysis
- Fractionation within metabolic pathways – ¹⁴N removed from digestive tract
 - ¹⁵N is assimilated into tissues (enrichment)
 High trophic level = enriched ¹⁵N







Expected Outcome/Implications

- Can examine effectiveness of past management strategies and base future management strategies on results
- Can examine effect of poor mast year production and exploitation of anthropogenic food sources, enabling park personnel to better prepare for potential nuisance bear activity

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