

Nevin, Owen ORCID: https://orcid.org/0000-0003-3513-8053 (2018) Charismatic carnivores: cuddly curiosities or case studies in conservation? In: Department of Science, Natural Resources and Outdoor Studies lecture, 4 December 2018, University of Cumbria, Ambleside, UK. (Unpublished)

Downloaded from: http://insight.cumbria.ac.uk/id/eprint/4231/

Usage of any items from the University of Cumbria's institutional repository 'Insight' must conform to the following fair usage guidelines.

Any item and its associated metadata held in the University of Cumbria's institutional repository Insight (unless stated otherwise on the metadata record) may be copied, displayed or performed, and stored in line with the JISC fair dealing guidelines (available <u>here</u>) for educational and not-for-profit activities

provided that

• the authors, title and full bibliographic details of the item are cited clearly when any part of the work is referred to verbally or in the written form

• a hyperlink/URL to the original Insight record of that item is included in any citations of the work

- the content is not changed in any way
- all files required for usage of the item are kept together with the main item file.

You may not

- sell any part of an item
- refer to any part of an item without citation
- amend any item or contextualise it in a way that will impugn the creator's reputation
- remove or alter the copyright statement on an item.

The full policy can be found here.

Alternatively contact the University of Cumbria Repository Editor by emailing insight@cumbria.ac.uk.

Charismatic Carnivores: Cuddly Curiosities or Case Studies in Conservation?

Professor Owen T Nevin

Associate Vice-Chancellor, CQUniversity, Australia

Anniversary Visiting Professor of Conservation Biology, University of Cumbria



BE WHAT YOU WANT TO BE

















Yellowstone Wolves

- 1914 US Army enlisted to support eradication
- 1926 Last wolf killed in the park
- 1943 Last wolf in the Greater Yellowstone Ecosystem killed
- 1944 –
- "There still remains, even in the United States, some areas of considerable size in which we feel that both red and gray [wolves] may be allowed to continue their existence with little molestation.
 ... Where are these areas? Probably every reasonable ecologist will agree that some of them should lie in the larger national parks and wilderness areas: for instance Yellowstone and its adjacent national forests.
 Why, in the necessary process of extirpating wolves from livestock ranges of Wyoming and Montana, were not some of the uninjured animals used to restock Yellowstone?"

- Aldo Leopold, 1944 The Wolves of North America



Yellowstone Wolves

• 1995/6 – Reintroduction began





British Columbia, Canada



Ecotourism as a conservation tool

• Bear viewers are:

- Highly motivated (96% rate wildlife as important or very important in choosing a holiday)
- Well educated (>50% have a Bachelor's, Master's or Doctoral Degree)
- High earners (46% earn >CDN\$100,000)
- From a broad age range
- 33% would not have visited British Columbia without the opportunity to go bear viewing.

Ecotourism as a conservation tool

 Appropriately managed ecotourism has been shown to have positive impacts on bears

Results

- First study to show positive impact of ecotourism on the viewed species
 - Refuging by females with cubs
 - Consume 37% more fish when people are present
 - Drop vigilance behaviors and spend more time fishing
 - Large adult males avoid people

Implications

- Keys to success:
 - Predictable human activity patterns
 - Leave sufficient time/space for bears which avoid people

Source-sink management
Viewing sites as "bear factories"

Ecotourism as a conservation tool

- Appropriately managed ecotourism has been shown to have positive impacts on bears
- Ecotourism gives land value

Ecotourism gives land value

Economics Methodology

 (follows directives for land use planning)
 Annual returns for average lodge: \$844,610
 Motivational revenue (indirect Provincial income): \$282,530

 # guests * further days in BC * daily spend * % lost without bear viewing

564 * 11 * \$138



0.33

Ecotourism gives land value

Present Value (PV) to the Province (with 2.6% to profit, 25.8% to labour and 5% to capital costs) = \$376,465 per year

Discounted at 4% over 80 years = \$9,348,961



Ecotourism gives land value

Bear viewing value/(Logging - Non-use benefits)

= Ha for bear viewing no net loss revenue

- High timber valued
 - \$9 348 961/\$33 956 per Ha = 275 hectares
- Average timber valued
 - \$9 348 961/\$14 995 per Ha = 1290 hectares
- Low timber valued

- \$9 348 961 / \$2 330 per Ha = 4012 hectares University

Economics

- Land use planning is driven by economics not ecology
- Ecotourism income can be treated like income from extractive land use
- Tourism is an export
- Locally extremely valuable
- Why does increasing the economic value of land matter?



Strathcona Park, British Columbia





BE WHAT YOU WANT TO BE

Habitat use and dispersal



CRICOS PROVIDER CODES: QLD 00219C, NSW 01315F, VIC 01624D

Methodology

 Application of **GPS** and satellite communication technology in the investigation of habitat use and seasonal home range analysis






























Results

- Summer habitat use
 - Clusters of points indicate foraging sites
 - These occur on edges of mature forest
 - Natural edges (lakes and streams)
 - Man-made edges (boundaries of cut blocks)

Implications

- High resolution telemetry allows detailed examination of spatial behavior
 - This can be used to construct behaviorally informed models of habitat use and connectivity

Implications

Trap-lining requires connectivity



























Grey squirrels – connectivity and invasion



CRICOS PROVIDER CODES: QLD 00219C, NSW 01315F, VIC 01624D

GPS Telemetry - Methodology











Landscape Ecology Results



Case Study – Whinlatter Forest



Legend



- Target woodlands
- Least cost corridor



- Whinlatter Forest
- Woodland
- OSMM

0.7 Kilometers

Fuzzy logic modelling of snow leopard populations in response to threats from climate change

- Owen Nevin¹, Ian Convery², Azim Baibagysov³, Volker Deecke², Claire Holt², Sabir Nurtazin³ & Darrell Smith²
 - 1. CQUniversity Australia, Gladstone, QLD, Australia
 - 2. University of Cumbria, Ambleside, United Kingdom
 - 3. Kazakh National University, Almaty, Kazakhstan









Study site - Almaty State Nature Reserve, Kazakhstan

- ASNR established 1931 one of the oldest protected areas in the Tian Shan range
- The current area of the reserve is 700km²
- 950 recorded plant species representative of steppe, wet meadow, forest, and alpine ecosystems
- Fauna includes woodland & alpine mammal species: gray wolf, brown bear, eurasian lynx, siberian ibex, elk, roe deer, grey marmot, and two species of pika. Birds includes golden eagle, lammergeyer, Himalayan snowcock, and chukar.















Field methods

- 40 x Bushnell Trophy Cam HD deployed Aug 2014 – May 2015
 - Maximum deployment period = 11 months
 - Minimum recorded operational temperature = -22°C
- 5,152 Camera trap nights
- Sample area 25 * 10 km
- Elevationally-stratified saturation sampling approach
- Also conducted:
 - ungulate prey abundance surveys
 - standard sign survey techniques (based on the Snow Leopard Information Management System) approach developed by Jackson & Hunter (1996)

30°F-1°C ()

Camera Name



Field methods



Bushnell M Camera Name 30°F-1°C ()

10-07-2014 07:42:28
Camera Trapping Results

- 50 independent capture events of snow leopards
 - between 1 and 10 images per event
- Catch Per Unit Effort (CPUE) = 0.97 per 100 trap nights
 - High for snow leopard studies
- 275 capture events of primary prey
- 68 capture events of secondary prey.

Individual identification

- We tested a number of population estimation techniques:
 - individual identification through local knowledge
 - expert knowledge
 - 3-D pattern recognition software (ExtractCompare; conservationresearch.co.uk 2013)
 - 2-D pattern recognition software (Wild-ID; Bolgeret al., 2011).
 - For comparison/baseline also used photographs of 4 captive individuals (Lakeland Wildlife Oasis, UK)

Individual identification

- For individual identification by experts we followed the methodology of Jackson et al. (2006)
- All photographs were classified according to the aspect of the animal (face, left and right flank, and tail).
- Photographic quality was subjectively scored on a scale from: 0 5:
 - 0 (no useful information)
 - 5 (clear full-frame side-on image with good contrast)



Camera trap images of the same individual snow leopard. The left picture was taken at 08:12hrs local time on 28 Feb. 2015 using the camera's infrared flash, the right picture was captured by the same camera trap at 16:45hrs on 07 Mar. 2015 using natural light. Insets show the pelage patterns used for identification.



Individual identification

- 50 detections events = 39 matching events
- Large number (10) capture events = 1 individual
- The largest number of unique individuals was given by the analysis of flank shots



Bushnel M Camera Name 30°F-1°C 🔿

10-07-2014 07:42:28



Population estimation

- Capture histories of identified individuals used in a capture-mark-recapture analysis using Cormack-Jolly-Seber population estimate
 - 11 individuals (with 95% Cl 11 18)
- Estimated population density 4.4 –7.2 SLs/100km²
- Comparable density elsewhere in range; e.g. Hemis National Park, Ladakh, India (Jackson et al., 2006)

- Fuzzy logic uses quantitative and qualitative data data aggregated into composite indicators, expresses difficult to define terms such as sustainability (Kouloumpis et al., 2008).
- The fuzzy snow leopard model was run on 'if-then' rules to produce a composite estimate of the snow leopard environment across a variety of locations.

Camera Name

30°F-1°C ()









Schematic of the hierarchical fuzzy model for snow leopard environmental evaluation across a range locations in ASNR.

- Three IPCC climate change scenarios considered:
 - scenario B1 +1.8°C
 - scenario A1B +2.8°C
 - scenario A2 +3.4^oC
- Also used by Forrest et al. (2012) in their assessment of snow leopard habitat vulnerability to treeline shift in the Himalayas



ISING M Camera Name 30°F-1°C 🔘

10-07-2014 07:42:28

- Current habitat status:
 - Prime habitat 2000 3000 m.
 - Areas above and below this band are less favorable
 - lowest suitability below 1600m
- Model describes a general pattern of decreasing habitat suitability (58%) in response to climate change
 - reduction in snow leopard habitat suitability in ASNR
 - some areas will have the potential to become suitable (above 3000m)



Matrix plot of modelled snow leopard environmental index; constriction of red banding illustrates the pressure due to increased temperature on high value snow leopard habitat.

• Competition?

- increased completion from other predators
- Especially species better adapted to forest habitats
- Likely more intense in winter
 - Prey switching from ibex to forest ungulates
 - Direct competition with wolf
 and Eurasian lynx
- Also likely throughout range:
 - as forests move upslope colonization by other species, including common leopards (*Panthera pardus*), wild dogs (*Cuon alpinus*), and in Bhutan, tigers (*Panthera tigris*)



Matrix plot of modelled snow leopard environmental index; constriction of red banding illustrates the pressure due to increased temperature on high value snow leopard habitat.

Management implications

- With climate warming, habitat at lower elevations become unsuitable at a faster rate than habitat in higher elevations becomes available
- Strongest negative impacts below treeline
- Pinching effect overall availability of suitable snow leopard habitat will be reduced
- Connectivity across valley bottoms & using densely forested habitat in winter (prey switching) impacted with small changes

Grizzly Bear Habitat Management In Canada's Rocky Mountain Parks: Balancing Visitor Expectations With Bear Habitat Requirements





20,238 km² 40,000 residents 5.5M visitors

423 camera trap sites 23 GPS collared bears









N



Legend

ō	GB Camera Captures
6	Cameras
\Diamond	GB 2 hour locations
\diamond	GB 4 hour locations

- Roads

- Trails

Park Boundary





Summer

Legend

Grizzly Bear Captures
 Cam Locations Su14
 GB 2 hour locations
 GB 4 hour locations
 Roads
 Trails

Park Boundary





N

Fall

Legend

L

6	GB Camera Captures
(3)	Cameras
\diamond	GB 2 hour locations
\Diamond	GB 4 hour locations
	Roads
	Trails
	Park Boundary





Bushnell 🕅 KL1 70ºF21ºC 🌒

07-23-2012 19:45:18



isinel 🕅 SK8 4677°C 🌢

01-08-2013 11:45:57



Results

- Bear use of human trails was highest in Spring and lowest in Fall
- Bears select for high quality habitat in all seasons
- Bears increase movement rates when selecting habitat near roads but not near trails
- On regularly used trails, bears use trails sooner after the most recent human user than by chance



Spring Cameras





RSF Value











Spring Cameras





RSF Value





BE WHAT YOU WANT TO BE

Conclusions



CRICOS PROVIDER CODES: QLD 00219C, NSW 01315F, VIC 01624D

Conclusions

- Cuddly Curiosities or Case a
 - Cuddly Curiosities or Case studies of Conservation?

• False dichotomy?



BE WHAT YOU WANT TO BE

Questions?



CRICOS PROVIDER CODES: QLD 00219C, NSW 01315F, VIC 01624D


















Bushnell M Camera Name 30℃F-1℃C

10-07-2014 07:42:28



Bushnell M Camera Name 41°F5°C ()

08-08-2014 07:31:02

