

COLLABORATION FOR ENVIRONMENTAL EVIDENCE

SYSTEMATIC REVIEW NO. 47

WORKING TITLE: EFFECTIVENESS OF PROTECTED AREAS FOR THE CONSERVATION OF THE ANDEAN BEAR, *TREMARCTOS ORNATUS*, THROUGHOUT ITS DISTRIBUTION

REVIEW PROTOCOL

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COVER SHEET

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1. BACKGROUND

The Andean bear (*Tremarctos ornatus*), inhabiting forests, páramos and puna prairies of the Andes mountain range, is vulnerable to extinction across its wide but fragmented distribution (IUCN 2005; Peyton et al. 1999). Its main threats are habitat loss and poaching due to (1) expansions of the anthropogenic border, (2) conflicts with local economic activities and (3) utilitarian values granted by communities (Peyton et al 1998; Rodríguez & Rojas-Suárez 1999).

The legal protection of areas devoted to biodiversity conservation, known as Protected Areas (PAs), within the species distribution, has been one of the most frequently used strategies for the conservation of what is considered as viable habitats for Andean bear populations (Yerena 1998). In a relatively short time-span, this measure has allowed the allocation of large habitat extensions from the main development plans carried out by each of the countries across the species distribution (Peyton et al. 1998). Today, Andean bears inhabit at least 60 of these PAs, covering 22% of its total range across the region (Peyton et al. 1999, Peyton et al. 1998, Yerena 1994).

Similar strategies have been carried out across the world, where PAs has repeatedly been found to enhance the viability of wild populations (Woodroffe 2001). The recovery of the Grizzly bear (*Ursus arctos horribilis*) in the United States followed the establishment of the Yellowstone and Glacier NPs (Herrero 1999). The increase in Puma (*Felis concolor*) populations in Chile resulted from the establishment of the Torres de Paine NP. The recovery of the Siberian tiger (*Pantera tigris altaica*) in Russia is known to be a consequence of the reinforcement of exiting PAs. The increase on Black bear (*Ursus americanus*) population numbers resulted from the maintenance of a continuous protection unit across the Rocky Mountains in Canada (Herrero 1999).

There are, however, restrictions and collateral effects to this strategy, which reduce the effectiveness of PAs in achieving ultimate conservation goals for large mammals, and even more for carnivores. Size restrictions, for example, limit population viability while irregular shapes magnify edge effects and could increase exposure to human populations. Despite its popularity as a management tool, the success of PAs in reducing threats for Andean bear populations has yet to be systematically assessed. Their effectiveness, if any, relies probably on physical factors other than shape and size (predominant habitats, altitudinal variation, degree of isolation), as well as in human surroundings and legal status.

Using the systematic review approach, we propose to assess the effectiveness of PAs, across the Andes mountain range to preserve Andean bear populations and to reduce poaching and bear-habitat loss and/or degradation. Insights on variables related to the success of this intervention in achieving these conservation goals will be also pursuit.

2. OBJECTIVE OF THE REVIEW

To assess the effectiveness of PAs to preserve Andean bear populations, reduce poaching and/or bear-habitat loss and degradation across the Andes Mountain range.

2.1 Primary question

Are PAs effective to preserve Andean bear populations and to reduce poaching and/or bear-habitat loss and degradation within the species distribution?

2.2 Secondary question

What is the effect of: (1) structural characteristics (size and shape, isolation, main habitat type, etc), (2) anthropogenic characteristics (proximity to human population, etc), (3) geographical characteristics (elevation, slope, etc) and, (4) management characteristics (PA type i.e. IUCN categories, etc) on the effectiveness of PAs to preserve Andean bear populations, habitat and to reduce poaching?

3. METHODS

3.1 Search strategy

Researchers currently involved or in the past on projects dealing with PAs for Andean bear conservation will be contacted directly, as well as officers in charge of the management of PAs across the Andes, to request for grey literature and enquire about unknown practitioners and data sources. Leads from these enquiries will be then pursuit in the same way. In addition, searches will be carried out on recognized scientific search engines (e.g. ISI Web of Knowledge), specialized websites (e.g. www.carnivoreconservation.org) and webpages of relevant institutions (e.g. electronic catalogues of key universities libraries). All the hits obtained on each search will be examined, but for those obtained through Google Scholar for which only the first 100 hits will be evaluated. Finally, the cited literature of each of the documents found will be scanned through.

We will use the following terms, both in singular and plural and their combinations during the searches:

Terms in English

Spectacled bear
Andean bear, Jukumari, Jucumari
Tremarctos ornatus
Presence
Population size
Population density
* National parks
* Protected areas
* Reserve

Terms in Spanish

Oso de anteojos, frontino
Osos andino, Jukumari, Jucumari
Tremarctos ornatu
Presencia
Tamaño poblacional
Densidad poblacional
* Parques nacionales
* Áreas protegidas
* Reserva

Fragmentation	Fragmentación
Habitat	Hábitat
Habitat degradation	Degradación de hábitat
Habitat quality	Calidad de hábitat
Hunting	Cacería
Poaching	Cacería furtiva
* Conservation	* Conservación
Wildlife conservation	Conservación de fauna silvestre
Andes	Andes
Andes mountain range	Cordillera de Los Andes
Forest cover	Cobertura boscosa
Human-bear conflict	Conflicto hombre-oso
Vegetation cover	Cobertura vegetal
Cloud forest	Bosque nublado
Tropical rain forest	Bosque lluvioso tropical
High-elevation shrublands	Páramos, pajonales, praderas de puna
Andes Cordillera	Cordillera Andina
Montane forest	Bosque montano
Sub-montane forest	Bosque premontano

Additionally, keywords used in the studies found will be also included in the search. The database search will be carried out independently by three researchers following these guidelines:

- 1) The title contains at least one of the terms describing the intervention (*).
- 2) The remaining keywords were systematically combined a word at a time as *a word within the text*.

3.2 Study inclusion criteria (Table 1)

Relevant subject: Andean bear (*Tremarctos ornatus*).

Types of intervention: Establishment of different types or categories of PAs within the distribution of the Andean bear, according to IUCN management categories.

Types of comparator (For quantitative analysis only): Studies on time scale (before and after the creation of the PAs) and/or spatial scales (within PAs vs. unprotected area), depending on the dependant variable analyzed.

Types of outcome: Values for each of the variables indicating the effectiveness of the PAs: a) presence reports (sightings or indirect evidence); b) abundance or density estimates, population sizes; c) habitat quantity and/or quality (forest/high-elevation shrublands cover, habitat fragmentation, edge extent, abundance of food resource, availability of hiding and security cover, etc); d) poaching intensity. Possible changes in these indicator variables will be assessed in both a time and spatial scales.

Types of study: Qualitative/quantitative studies that assess the effectiveness of a PA (according to its characteristics) to preserve Andean bear populations and reduce poaching and bear habitat-loss and degradation. All the studies selected will be included in a

qualitative analysis, while only those for which comparators were found will be used in a quantitative analysis.

Potential reasons for heterogeneity: Structural, anthropogenic, geographical and protected areas management characteristics.

With the objective of filtering the most relevant studies, we will use the following three-step inclusion criteria:

1. Title and keywords: Only those studies whose title and keywords are associated to the objective of this review will be included.
2. Abstract: All the abstracts from the selected studies will be revised and only the most relevant to the review’s objective will be considered.
3. Entire manuscript: All the studies selected above will be read in full to determine which are most adequate for data extraction.

In each phase, a second reviewer will evaluate a sample of 25% of the studies to verify whether the above mentioned criteria were clearly defined and correctly applied. The results will be contrasted using a Kappa analysis, for which values greater or equal to 0.6 will be considered adequate and replicable. If the Kappa values are lower than the established limits, the criteria will have to be readjusted, and the process re-evaluated.

Table 1. Definition of the components to be included in the systematic review

<i>Subject</i>	<i>Intervention</i>	<i>Result</i>	<i>Comparators</i>
Andean bear (<i>Tremarctos ornatus</i>)	Establishment of a protected area (PA) within the Andean bear distribution	Presence reports, abundance estimates, population sizes and/or densities, as well as values of habitat quantity /quality and/or poaching events Changes in these variables before/after the creation of the PAs and/or within/outside of them, when applies.	Studies carried out in unprotected areas and/or before the creation of the PA’s that could be used as control. Variations in PA characteristics as stated in the Secondary question.

3.3 Study quality assessment

The selected studies will be classified according to the characteristics of the data available. Those studies that only mention the author’s opinion as an indicator of the effectiveness of the PA(s) will be classified as “qualitative”. Those studies that report numeric data for the variables mentioned in Table 1 will be classified as “quantitative”.

Those “quantitative” studies will be evaluated in terms of the quality of their methods, in relation to possible experimental biases associated to factors such as the analysis and process

scale, autocorrelation, pseudo-replication. Additionally detection, omission and possible post-experimental biases will also be considered. For each of the possible sources of bias, we will develop a code based on the appropriate indicator variables to categorize the quality of the studies quantitatively.

3.4 Data extraction strategy

For each of the studies the following information will be extracted when available.

1. Author:
2. Year:
3. Qualification:
4. Location:
5. Number of PAs considered:
6. Surface area of PAs:
7. Number of park rangers and management measures associated with the PAs.
8. Evaluation prior to the intervention: Yes/No
9. Characteristics of PA(s) according to variables in Table 2:
10. Result type: Qualitative/quantitative
11. Method used (highlighting any experimental bias)
12. Results: Presence reports, abundance or density estimates, population sizes, forest/forest/high-elevation shrublands cover, habitat fragmentation, edge extent, abundance of food resource, availability of hiding and security cover, poaching reports.
13. Study conclusions:
14. Any other information associated with the question(s) of the systematic review

3.5 Data synthesis

Our initially view is that we will find few studies that describe quantitatively changes in the indicator variables on the effectiveness of PAs. If this is we will carry out a qualitative analysis using each indicator variable as dependent variable and the characteristics stated in the Secondary Question as independent variable in a generalized lineal model (GLM), to determine whether there is a significant relationship.

If enough comparative studies are found (before and after, and within and outside PAs), a meta-analysis concentrated on the size of the effect of the PA's will be performed. In this case, effect size will be expected to vary according to the indicator variable used in each study. If for example, enough studies that describe changes in the habitat cover are found, the magnitude of effect could be determined using Cohen's D. If on the other hand, more studies encompassing poaching reports are found, a probability relationship (odds) will be used. Furthermore, in addition to the classic meta-analysis we believe that if the data is available, a meta-regression using as dependent variable the magnitude of the effect and as independent variables the factors mentioned in the Secondary Questions could be performed.

4. POTENTIAL CONFLICTS OF INTEREST AND SOURCES OF SUPPORT

None expected

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