Effect of fire on American Macromammals with

different feeding behavior.

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1. Introduction

What is fire from an ecological point of view?

In ecology, fire must be understood as a disturbance; a phenomenon of natural or human origin that causes a significant change in the ecosystem. Are events of limited duration which disrupt the structure of an ecosystem, community or population and change resources, the availability of substrate or the physical environment. Any disturbance is the starting point of an ecological succession (structuring process of natural systems).

What are its effects on wildlife?

- Mortality
- **Indirect**
- Increase of predation due to lack of coverage Hungry because of lack of food availability
- Eliminates / provides necessary habitats
- Stimulates food sources

How do these effects depend?

Fire characteristics

- Uniformity Severity Size Intensity Season
- **6** Duration Animal and plant community
- Vegetation structure Habitat Regeneration capacities Type of substrate
- Wildlife
- Mobility characteristics
 - Days Time elapsed
- Feeding behavior
 - Ability to colonize burned areas Ability to use smaller territories
 - Ability to use fire for hunting
 - Weeks Months Years

Decades

2. Objectives & hypotheses

The main objective is to determine how fire affects Americans macromammals depending on time elapsed, feeding behavior of species and season in which it occurs. By means of a literature review it has attempted to answer the following hypotheses:

- In short term, generalist species will be less harmed by fire than specialists.
- Herbivores will be more negatively affected than carnivores and omnivores in short term.
- In medium and long term, most species will be benefited.
- Spring is the season in which the fire will have more negative effects.

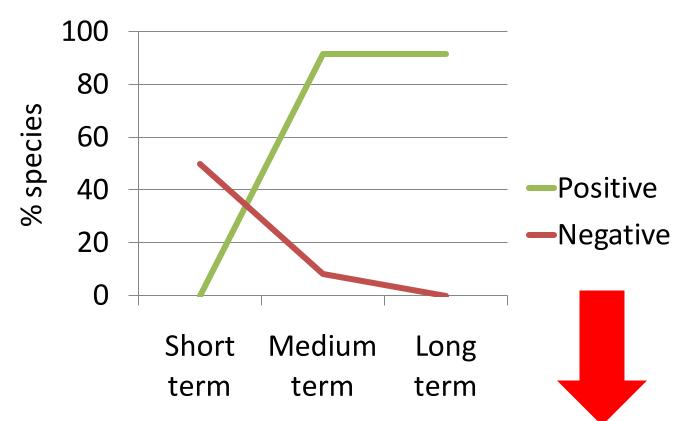
3. Material & methods

- 1) We have chosen a total of 12 species of North American macromammals: (H: herbivorous, O: omnivorous, C: carnivorous / G: generalist, I: intermediate, S: specialist) 1) Bison bison H/S, 2) Lynx rufus C/S, 3) Ursus americanus O/G, 4) Urocyon cinereoargenteus ○/I, 5) Canis lupus C/G, 6) Alces alces H/G, 7) Cervus elaphus H/G, 8) Puma concolor C/I, 9) Ursus arctos ○/G, 10) Rangifer tarandus H/I, 11) Canis latrans O/I and 12) Lynx canadensis C/S.
- 2) 45 articles were reviewed to determine how fire affects them. It has also collected detailed information about feeding of species.
- 3) Data of articles was collected in an Excel spreadsheet. It has been used the qualitative variable "fire effect" with three options (positive / null / negative). In this variable are included different quantitative variables (population density, number of individuals, adult and young survival, age of first reproduction, body size and fecundity) allowing us to compare them.
- 4) 3 data were collected: effect of fire depending on 1) time elapsed, 2) feeding behavior of the species studied (degree of specialization and type of food) and 3) season in which it occurs.

Note that this study is about large and high intensity fires because it is where we find the most remarkable effects on macromammals.

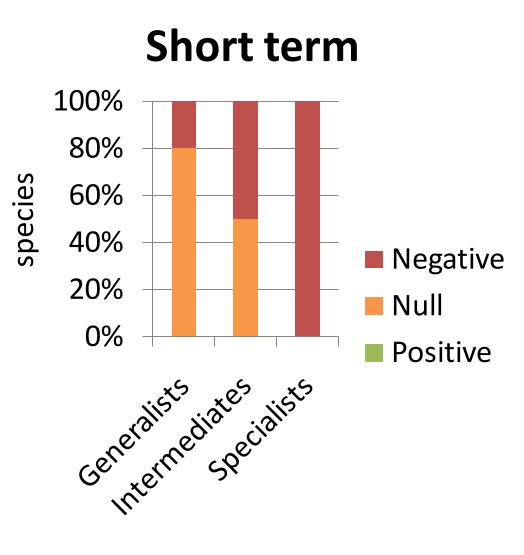
4. Results

Effect of fire depending on time elapsed



In short term, negative effects are usually for the reduction of food resources. In medium and long term, fire has a positive effect on most species because there is an increase in productivity after fire. Few animals in this study depend on climax communities, an example is the caribou (Rangifer tarandus).

Depending on degree of specialization

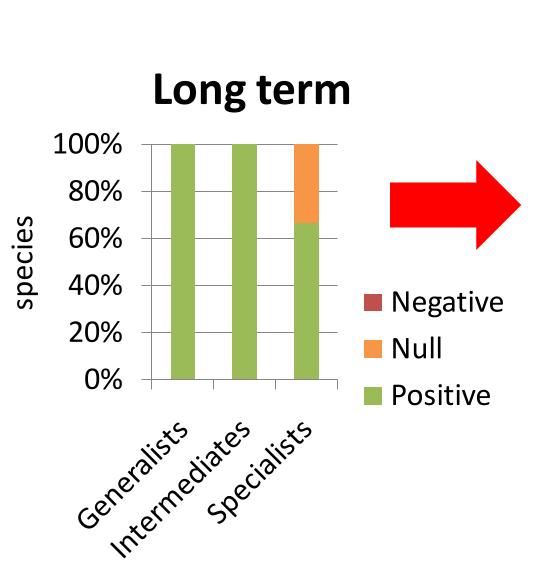


100%

80%

60%

Medium term 60% 40% Negative 20% Null Positive Internediates Generalists

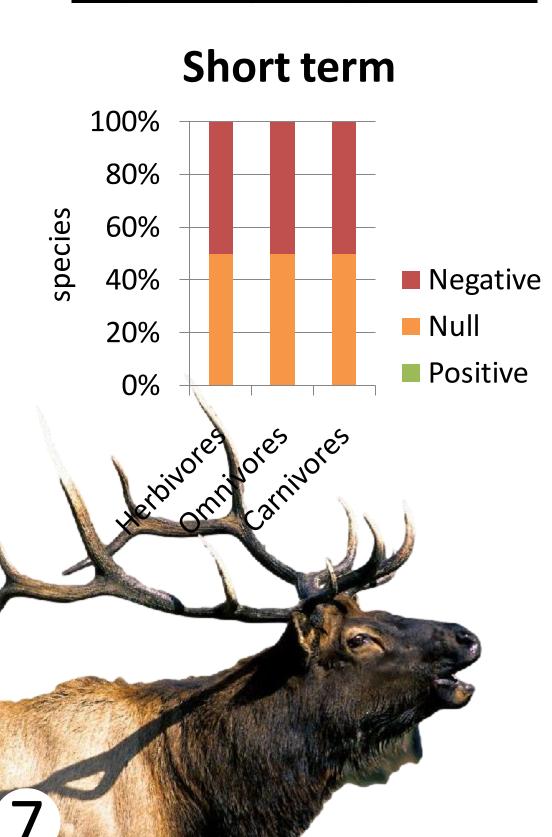


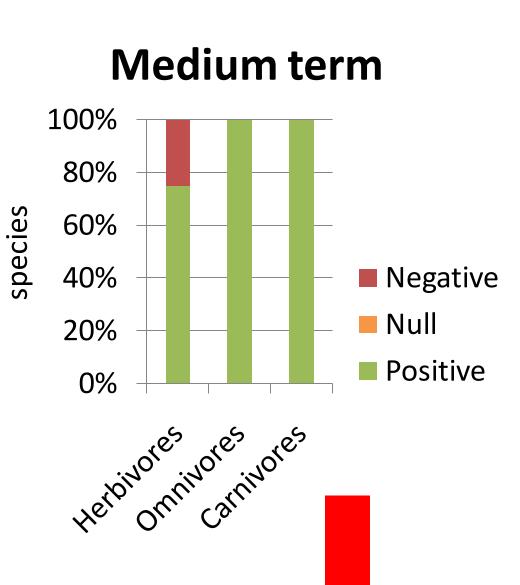
Positive

Negative

In short term, generalist species, as they feed on a wider variety of foods, are less likely to be harmed when fire removes a part of those resources. In medium and long term, the degree of specialization no longer influence because of increase in food availability.

Depending on type of food





Depending on type of food have not been observed significant differences between herbivores, omnivores and carnivores.

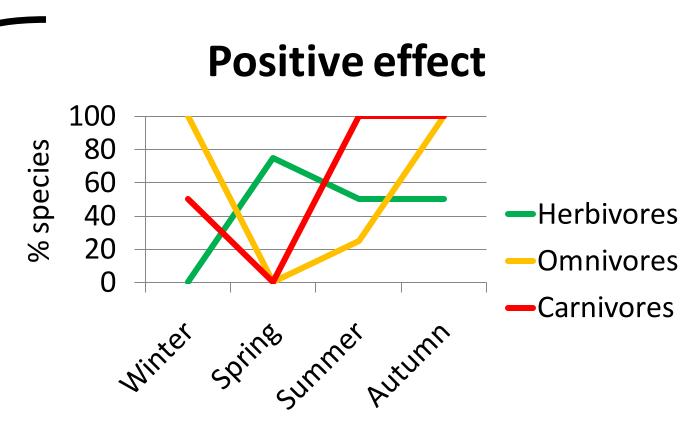
Long term % species 60

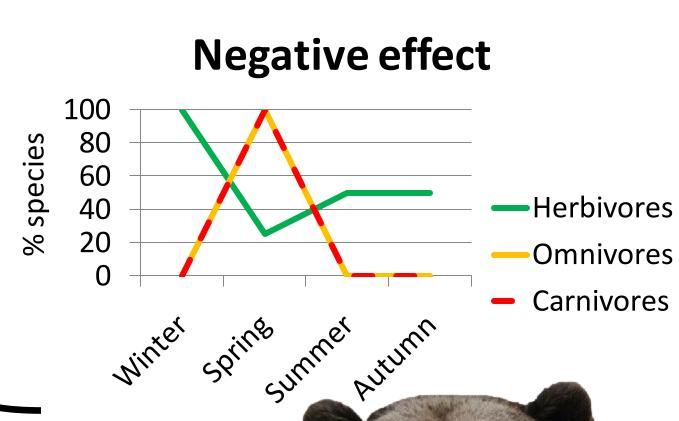
Negative Null 20% Positive Ornivores Ornivores

Spring is the season in which fire is more harmful for most species, while autumn is where it is most beneficial. Spring is the breeding season for most species and, in case of fire, young animals are more susceptible to injury or mortality than adults.

Depending on season in which it occurs

Effect of fire





But there are differences depending on the type of food. For herbivores spring is the season where fire is more beneficial because it increases productivity for summer and autumn. Young herbivores have more mobility and are less susceptible to fire.

5. Conclusions

- It has been confirmed that in short term, generalist species are less harmed by fire than specialists. Although we must also take into account the abundance and distribution of food resources.
 - Moreover, it is confirmed that in medium and long term, most species are benefited due to

increased productivity that occurs in burned areas.

- On the other hand, it's not true that herbivores are more harmed than carnivores and omnivores in short term. It has not been observed that fire has a different effect depending on type of food. Regarding to feeding behavior, influences mainly the degree of specialization than if species are herbivorous, carnivorous or omnivorous.
- While it is true that, in general, spring is the season in which fire has more negative effect, is not the case of herbivores, for which is the most beneficial.

• It is noteworthy that the effect of fire (positive / null / negative) in the 12 species is not always supported by quantitative data and depends on personal judgment. For this reason we must bear in mind that other people may differ. Using qualitative data due to absence of quantitative studies is one of the main limitations.

> • Finally, it is important to know how animal populations respond to fire especially if they are endangered. Therefore, although it is more difficult to relate fire with concrete effects in macromammals due to their large mobility that allow them to move to other areas, conducting more quantitative studies of effect of fire is necessary to predict its response after a fire. This can be helpful in conservation of species.



