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Collective Aspects of Mitigating Interactions Between Large Carnivores and Humans

Holly Nesbitt

Alexander L. Metcalf
University of Montana, Missoula

Alice Lubeck
University of Montana

Libby C. Metcalf

Crystal Beckman

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A brown bear is shown in profile, facing right, standing in a field of green shrubs. The bear's fur is a mix of brown and tan. The background is a dense thicket of green leaves and branches.

Collective aspects of mitigating interactions between large carnivores and humans

Holly K. Nesbitt¹, Alexander L. Metcalf¹, Alice A. Lubeck¹,
Elizabeth Covelli Metcalf¹, & Crystal Beckman²

¹Human Dimensions Lab

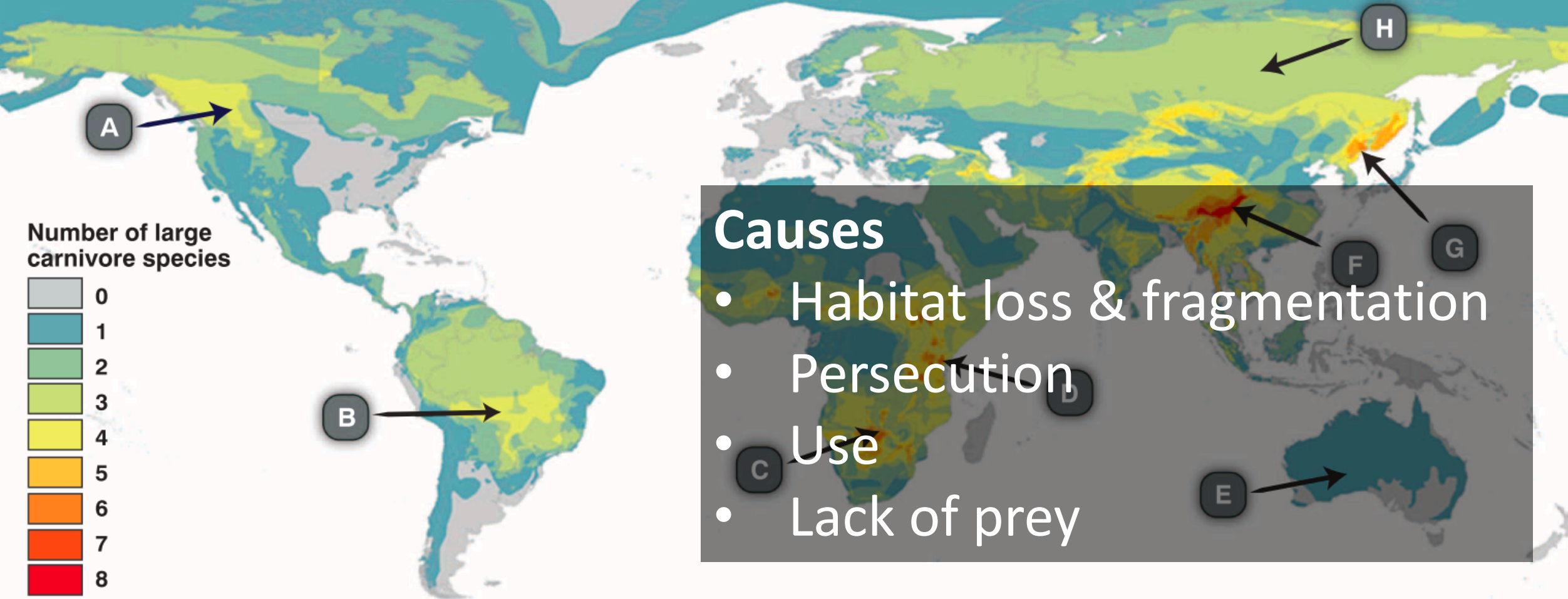
²Montana Department of Natural Resources & Conservation

Large carnivores – a global conservation concern



24/31 large carnivore species listed as near threatened, vulnerable, or endangered by the IUCN

Ripple et al. 2014



A	B	C	D	E	F	G	H
gray wolf puma brown bear American black bear	maned wolf jaguar puma giant otter	African wild dog lion cheetah leopard spotted hyena brown hyena Cape clawless otter	African wild dog lion cheetah leopard spotted hyena striped hyena Cape clawless otter	dingo	gray wolf dhole snow leopard clouded leopard leopard Eurasian lynx brown bear Asiatic black bear	gray wolf dhole tiger leopard Eurasian lynx brown bear Asiatic black bear	gray wolf Eurasian lynx brown bear

900,000 in North America



Weidner

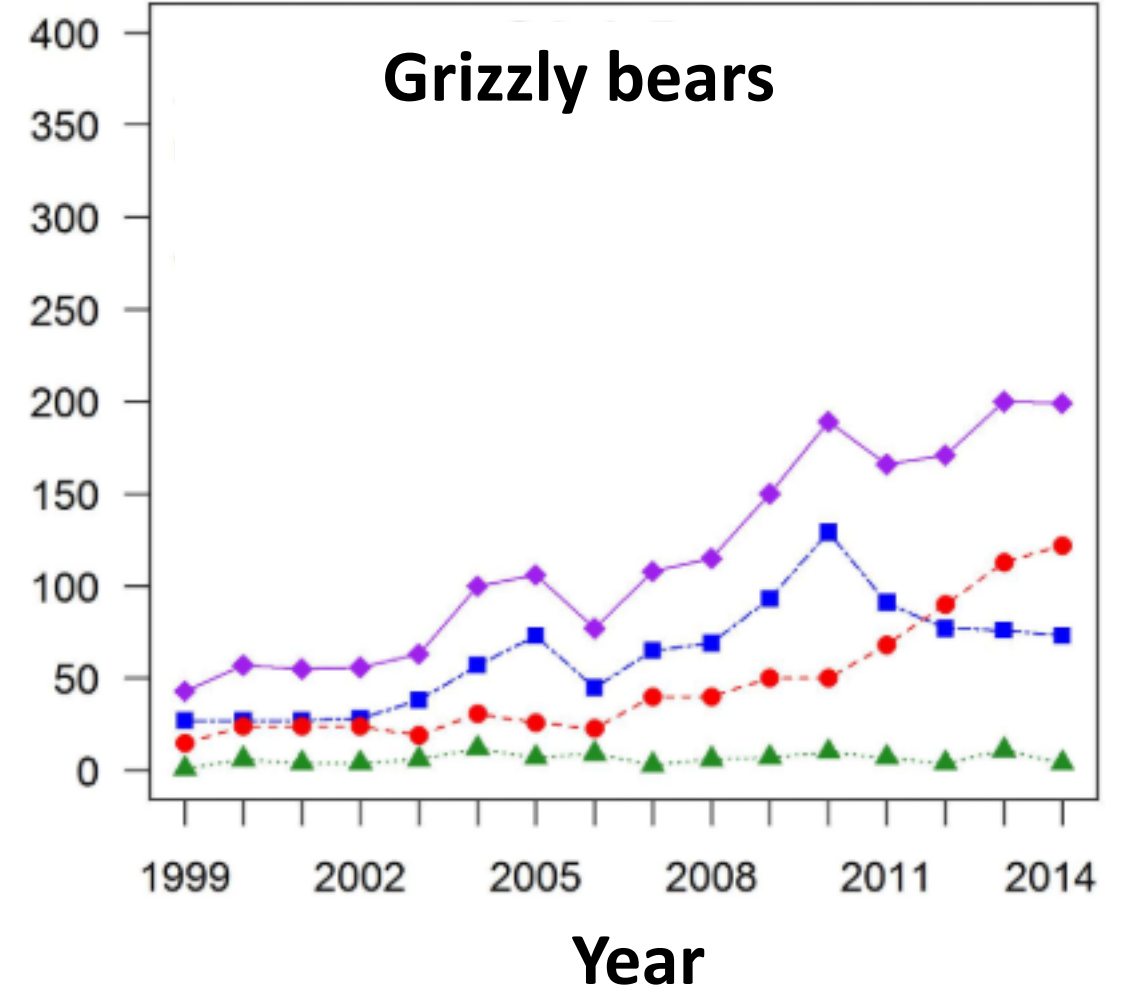
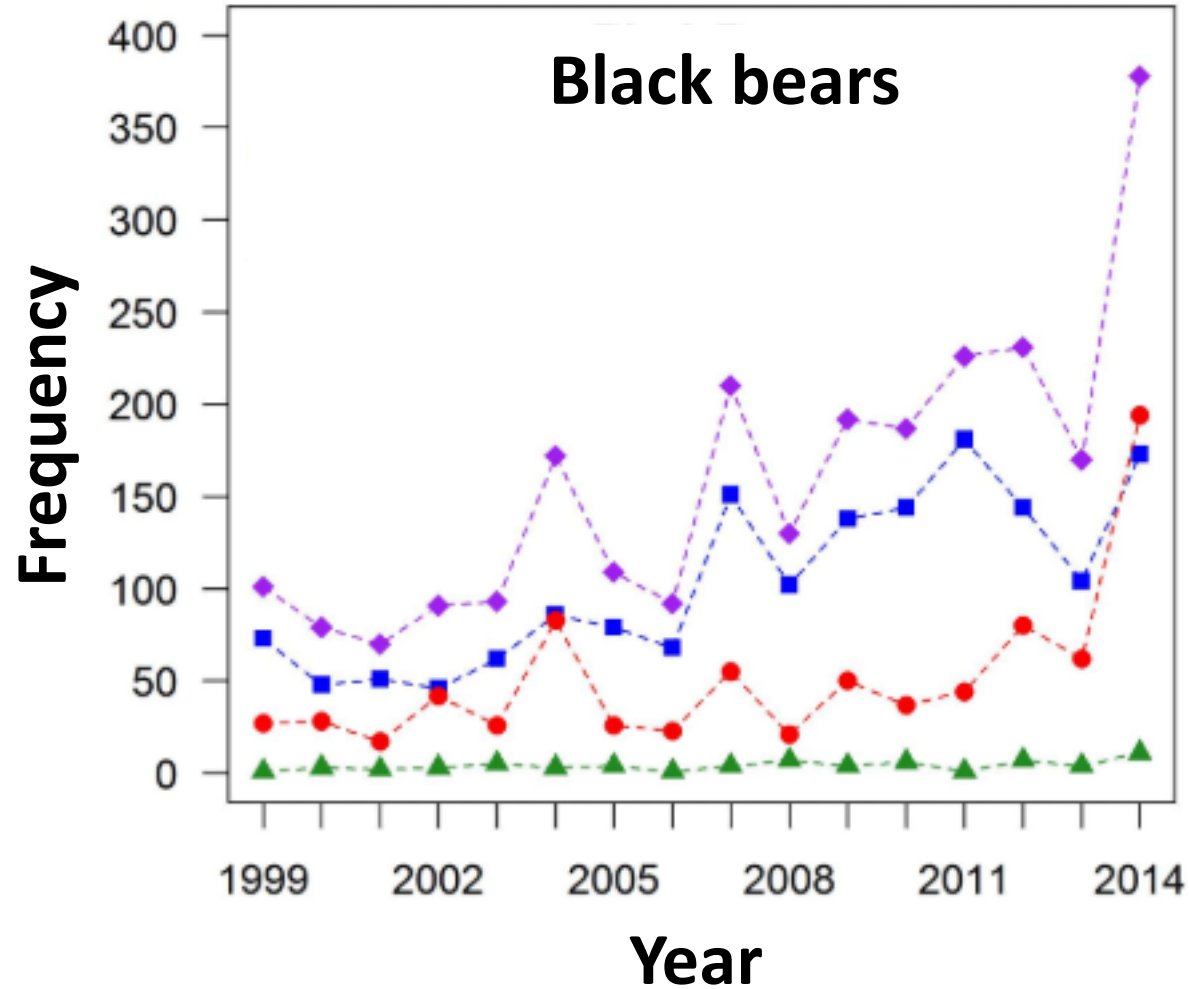
600 in 1975 in lower 48
1550 today in lower 48
58,000 in North America

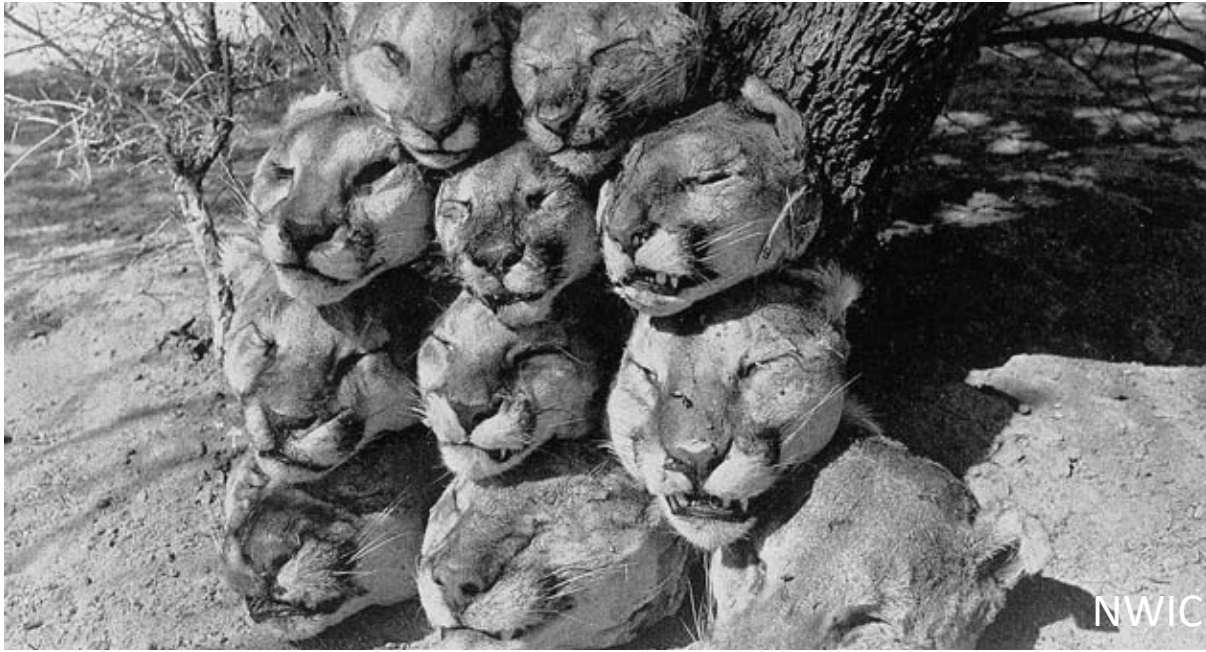


Nesbitt

Bears in Alberta

Total occurrences, sightings, incidents, and conflicts

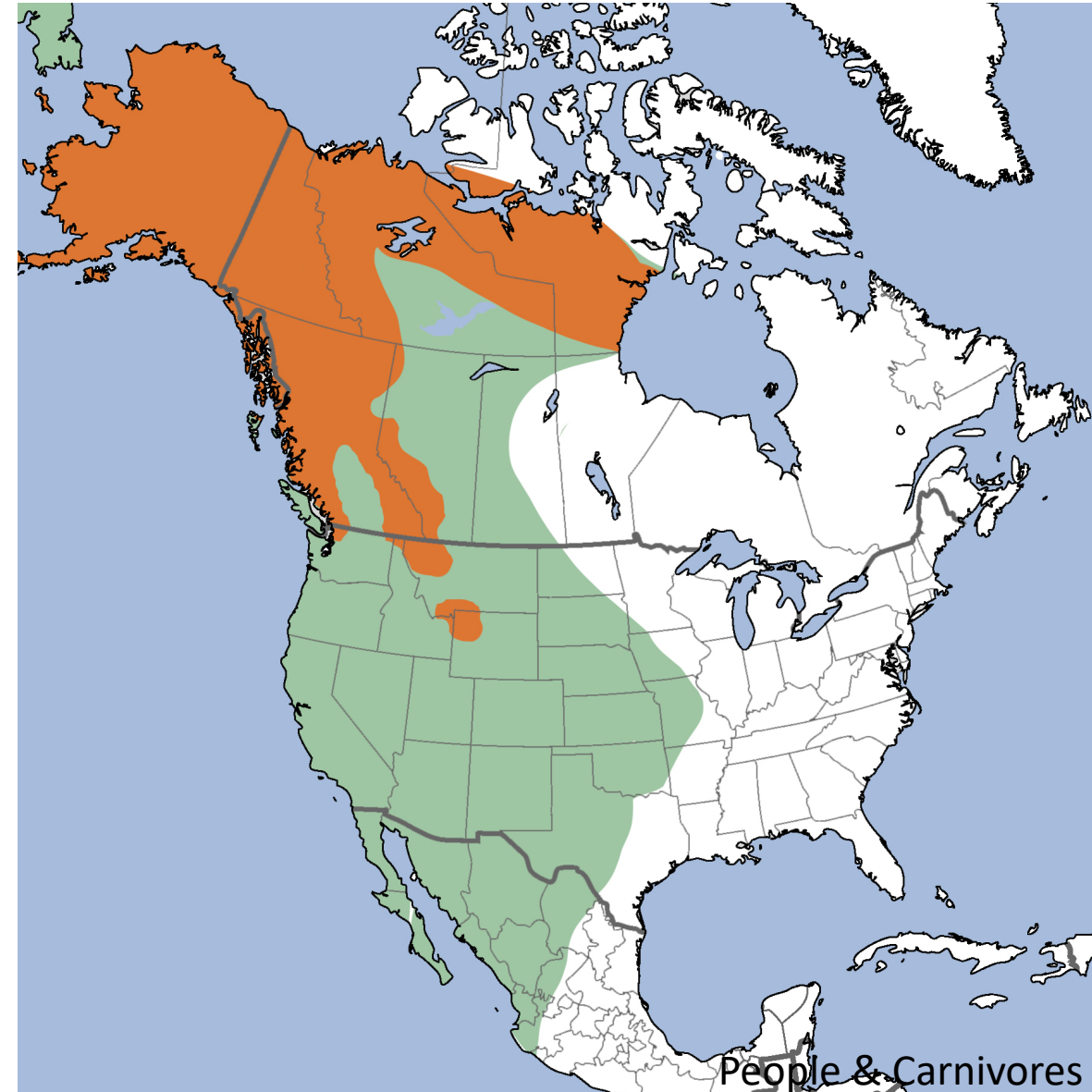




Bear ranges – then and now



Black bears



Grizzly bears





Masterfile



Smith



Billingsley



NYT



Casper Star

Change in human
behavior!



Ian



Rakusen



CoS



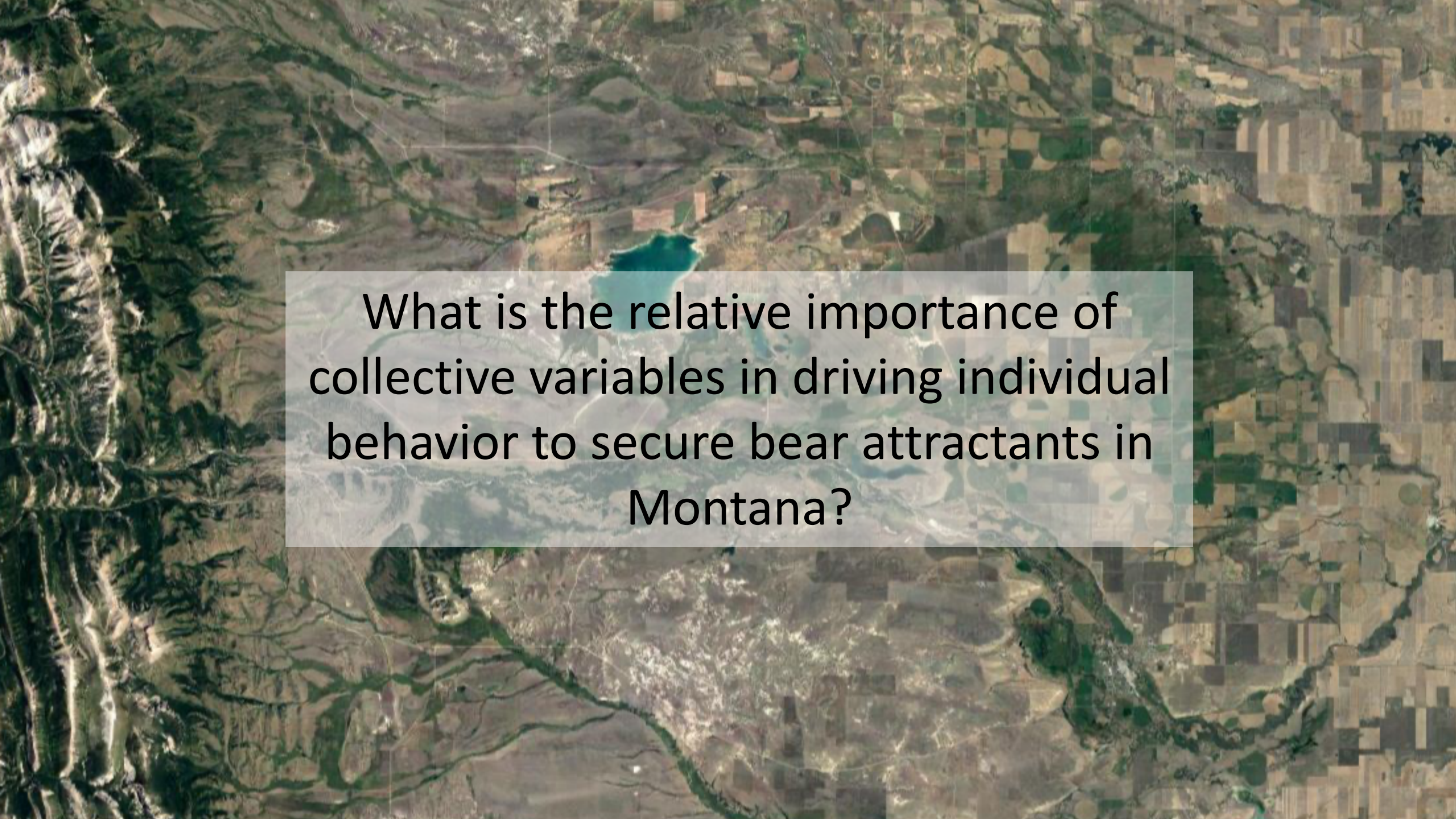
Prancer



Not only is coexistence collective from a physical perspective...



Getty Images

An aerial photograph of a mountainous landscape. On the left, a rugged mountain range with snow-capped peaks is visible. A river flows through the center of the image, winding between the mountains and a large, irregularly shaped lake. The surrounding terrain is a mix of green forested areas and brown, cleared land, possibly agricultural fields. The overall scene depicts a natural environment in a mountainous region.

What is the relative importance of
collective variables in driving individual
behavior to secure bear attractants in
Montana?

April 4, 2017



Dear Montana Landowner:

Last month we mailed you a survey about natural resource management on your property. You are one of a few Montana private landowners selected to participate in this study and your response will help natural resource management agencies across the state better design outreach programs for private landowners in Montana.

If you have already completed and returned this survey to us, please accept our sincere thanks. If not, please take some time to complete the survey and return it to us in the postage-paid envelope provided.

- **Survey**
- **Random sample**
- **Private landowners**
- **0.2-2500 hectares**
- **outside inc. municipalities**
- **4500 surveys total**

This survey asks about land management decisions, including fire risk reduction, weed control and human-bear conflict reduction on private lands. In Montana, these three issues cross property boundaries and affect multiple landowners. Because these issues are widespread, your input is valuable.

Your participation in this survey is completely voluntary and you may stop at any time or skip any question you do not wish to answer. All your answers will be anonymous – we will only report summaries of our findings. The identification number on the survey is there so we can check your name off the mailing list and save postage on future mailings.

It should take about 15-20 minutes to complete the survey. By completing and returning the questionnaire, you imply your consent to participate in this study. If you have any questions, do not hesitate to contact us.

Sincerely,

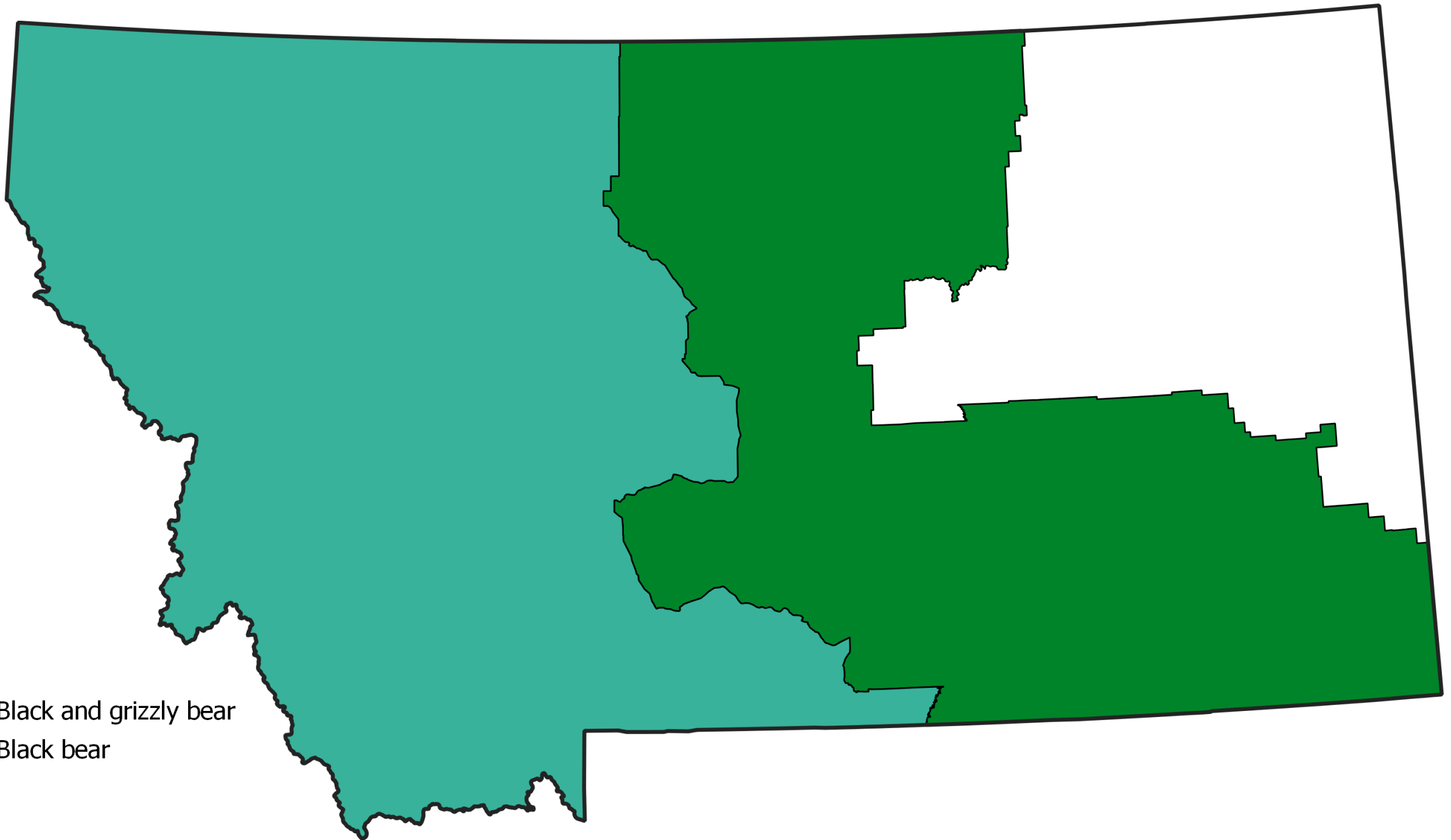
Dr. Alexander L. Metcalfe
Natural Resource Working Group
W. A. Franke College of Forestry and Conservation
alex.metcalfe@umontana.edu
(406) 243-5673


To complete the survey online! Go to:
<https://goo.gl/PP3PFR>




**Livestock Carcass Removal
Offered Free
March – May 2019**

CALL TO MAKE ARRANGEMENTS



 Black and grizzly bear

 Black bear

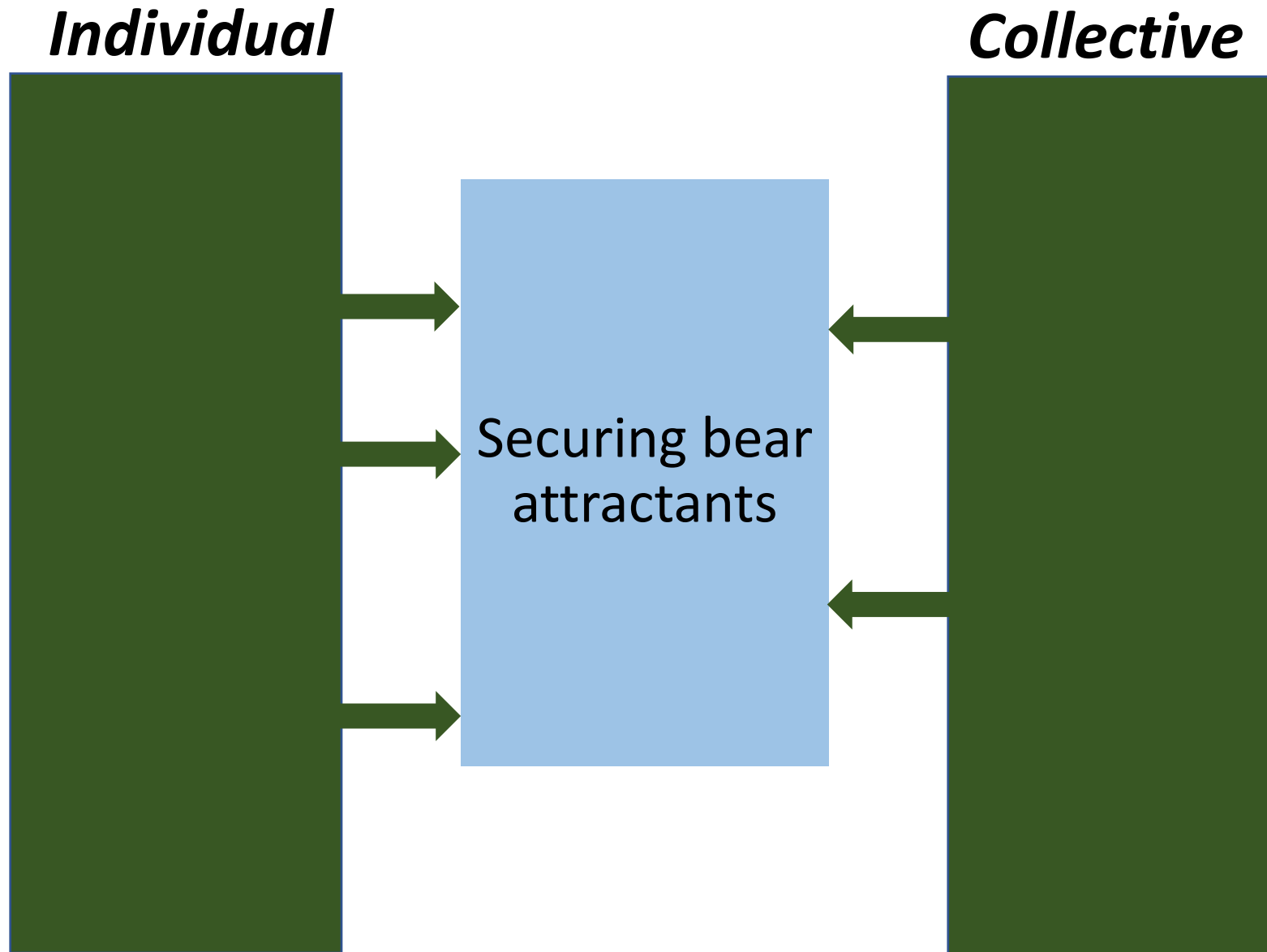
Collective interest model

Individual

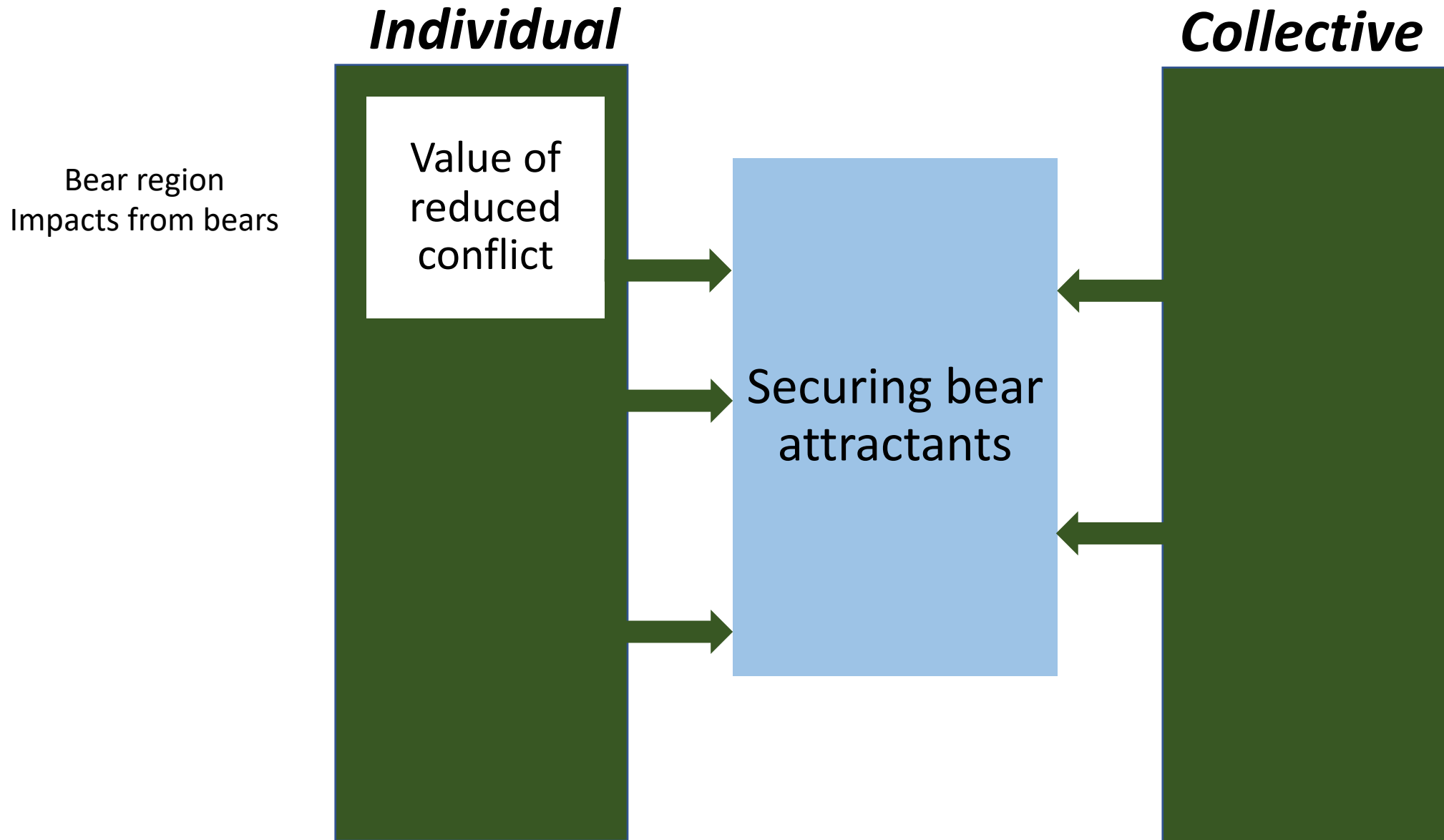
Collective



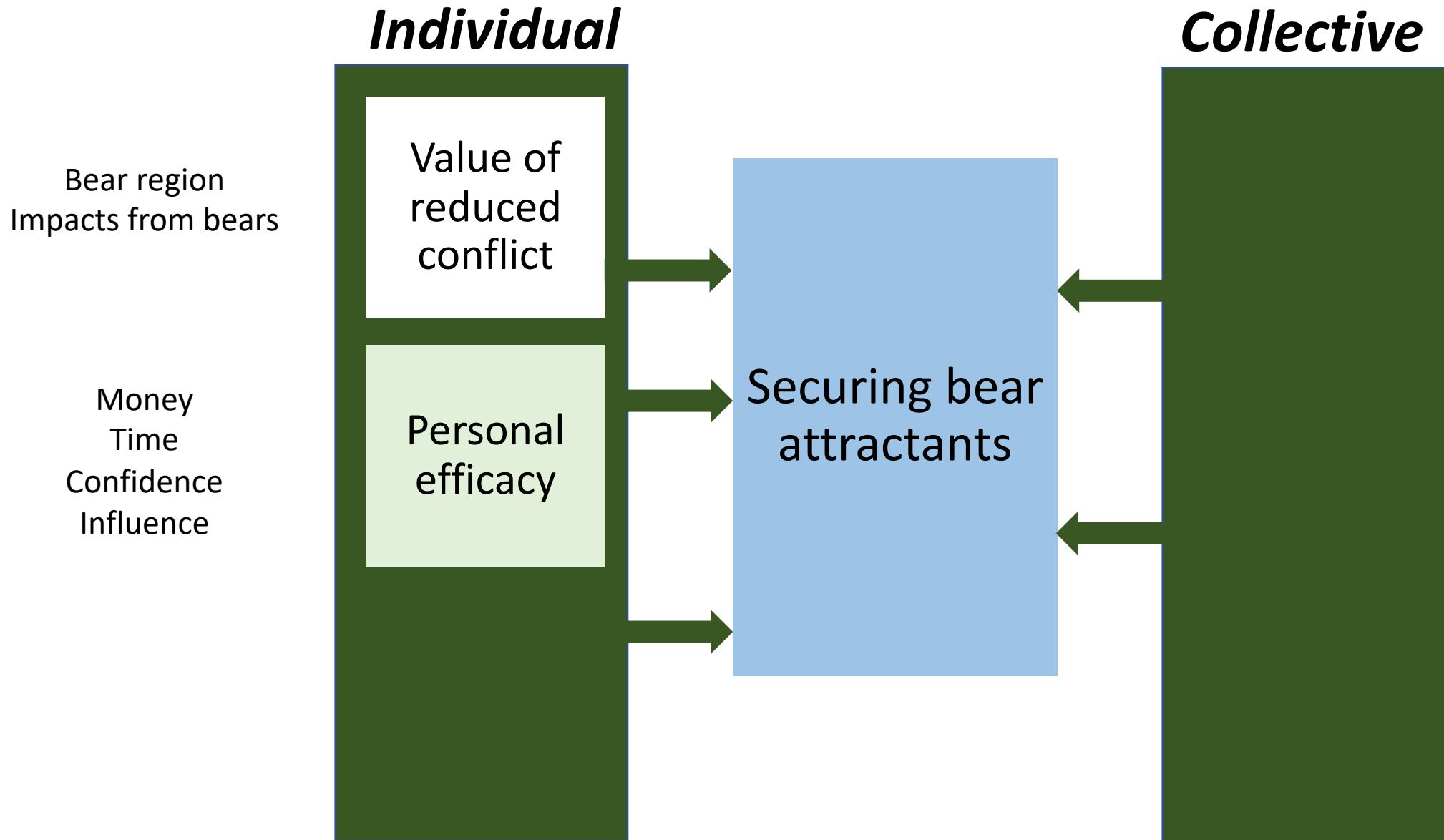
Collective interest model



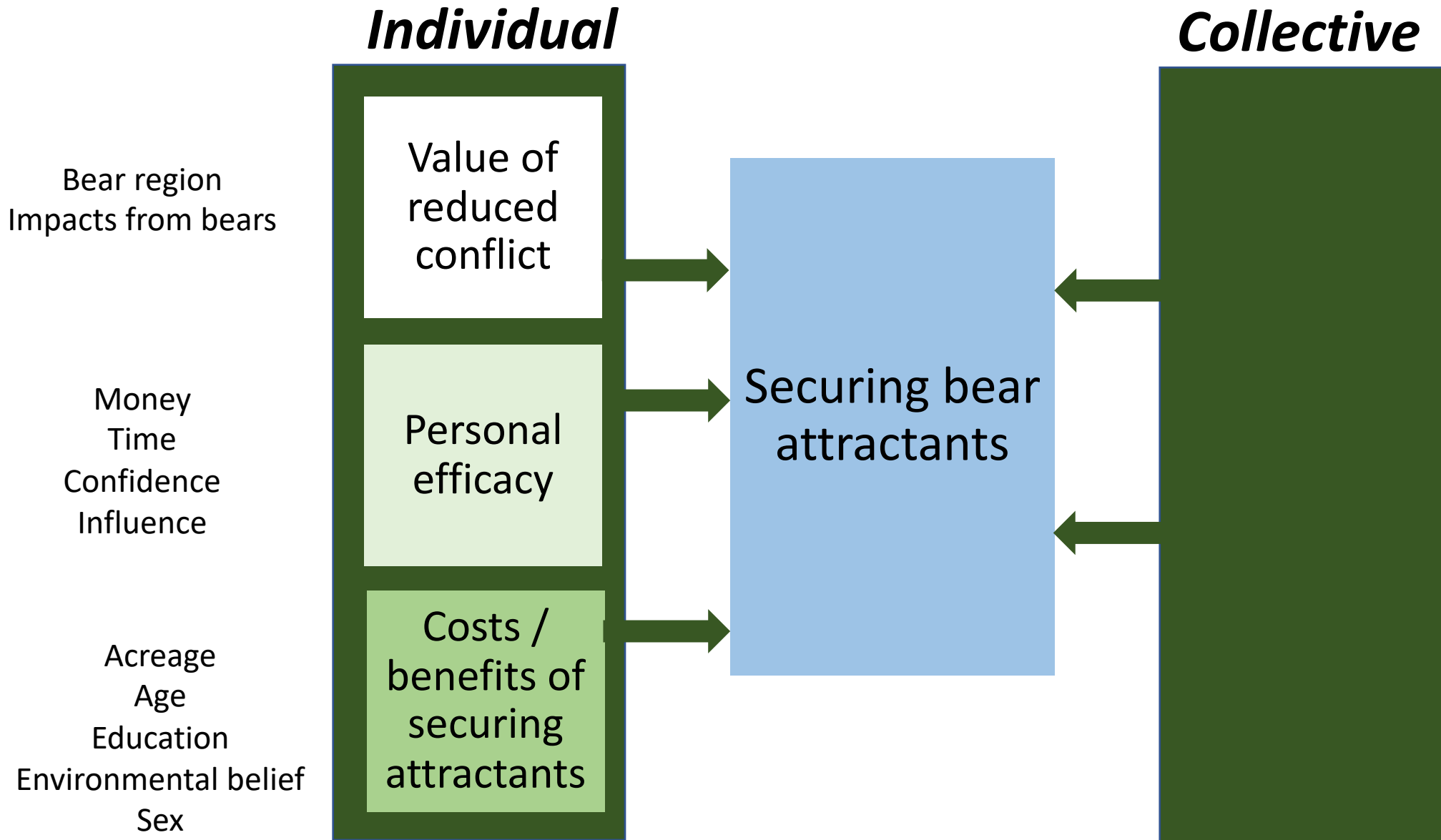
Collective interest model



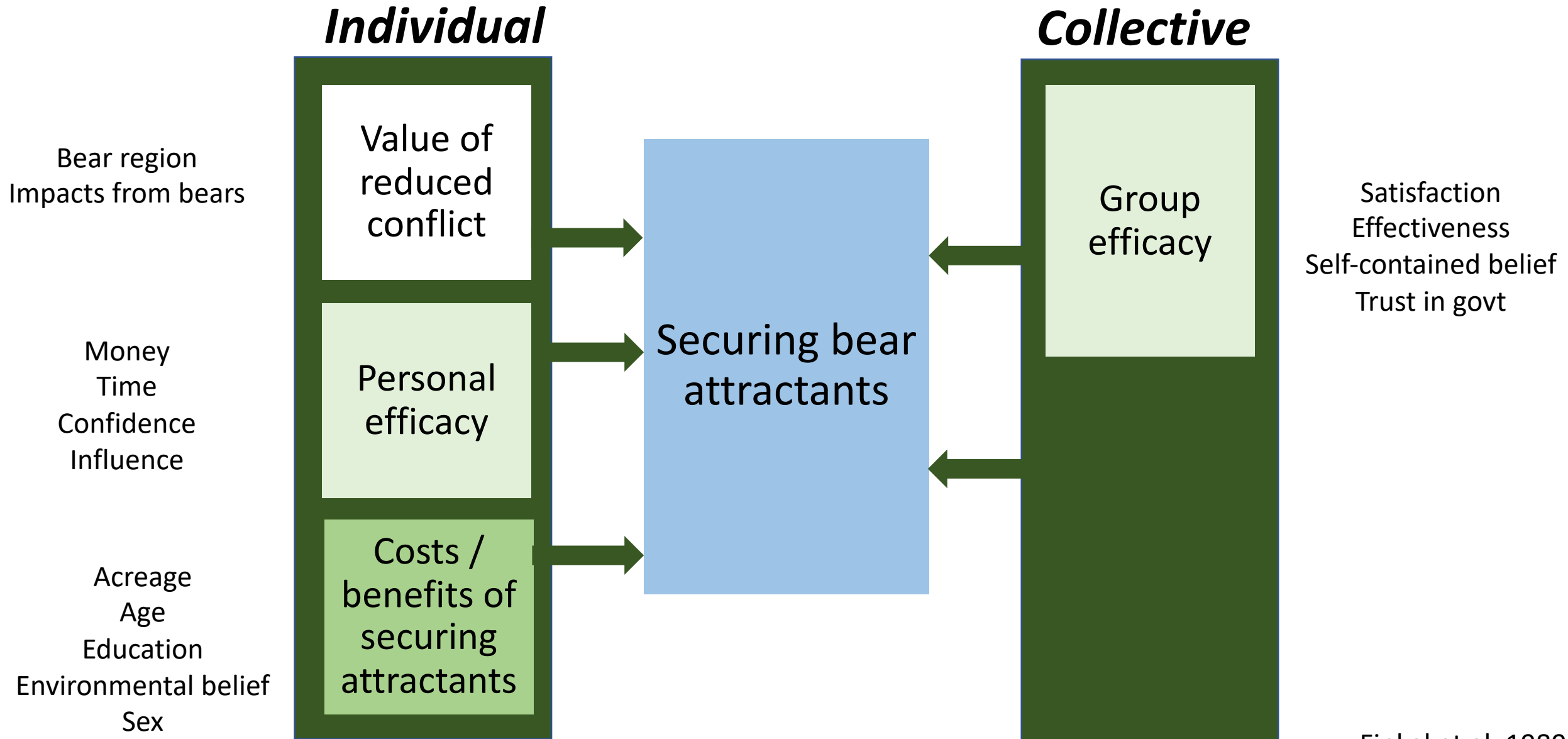
Collective interest model



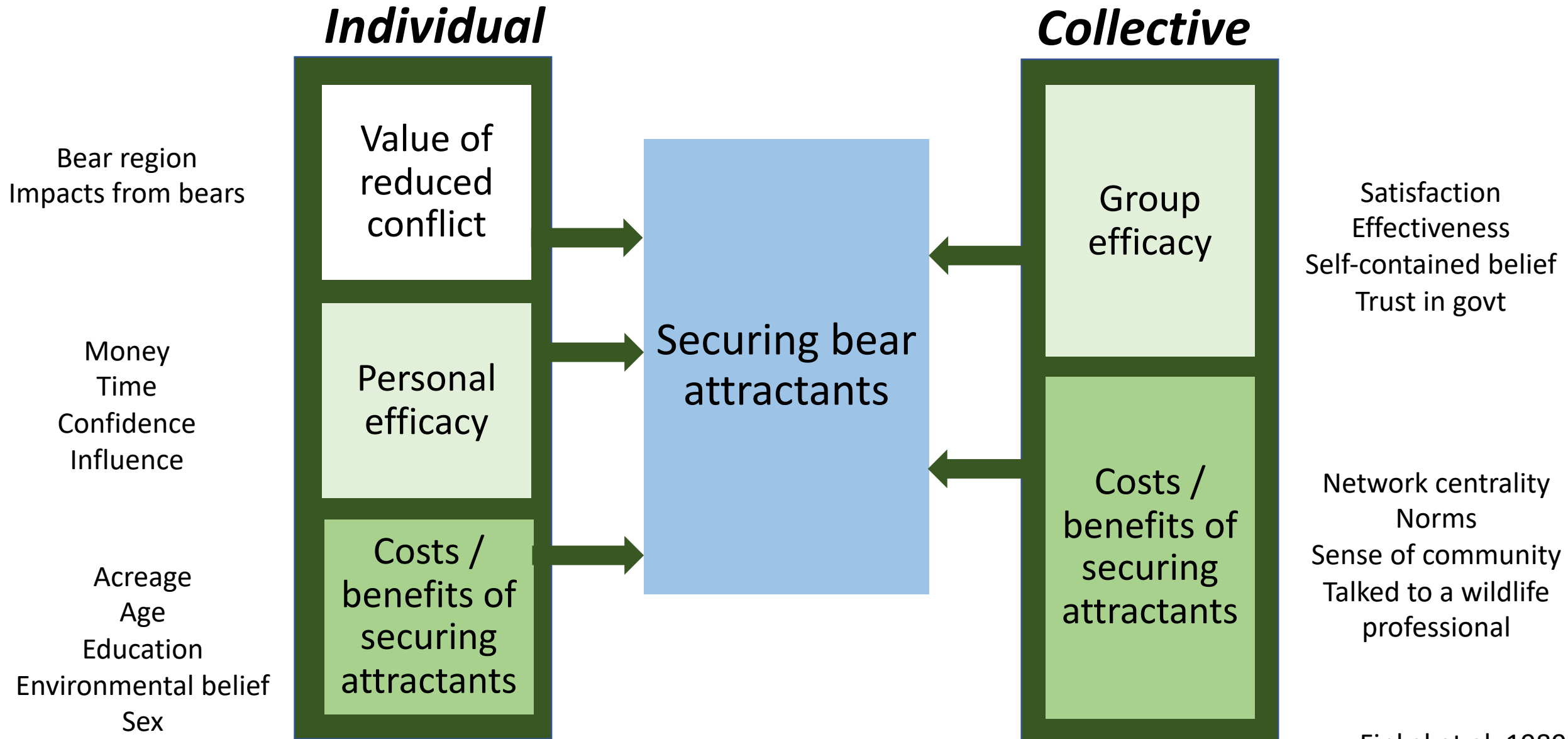
Collective interest model



Collective interest model



Collective interest model



The numbers stuff...

6 logistic regressions

- Linearity assumptions met
- ## Backward selection (AIC)

- Top models had 8-11 dfs

Likelihood ratio tests

- Sig dif from null but not from saturated

Hosmer-Lemeshow GOF

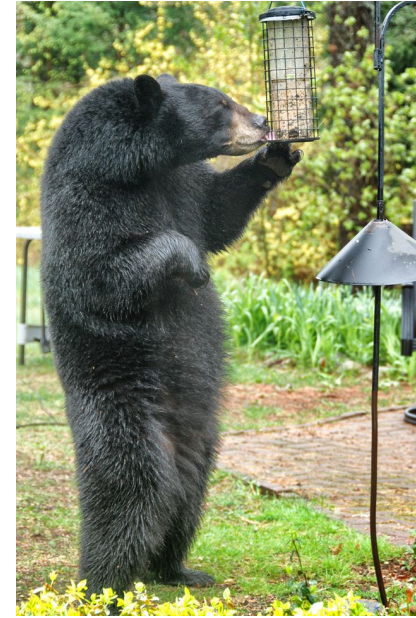
- Little evidence for lack of fit

McFadden's pseudo R^2

- 0.25-0.34 for final models

Cross-validation

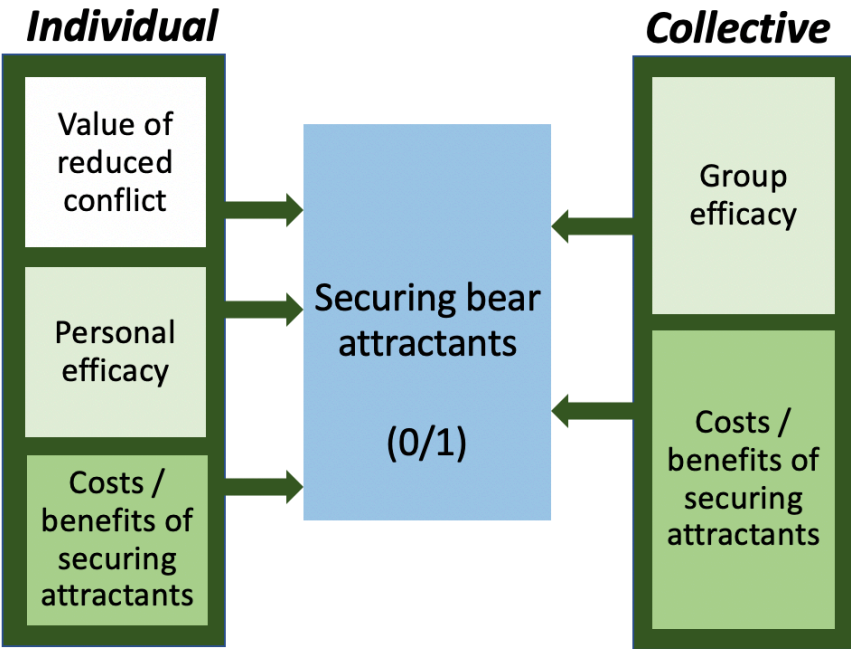
- 65%-76% prediction accuracy



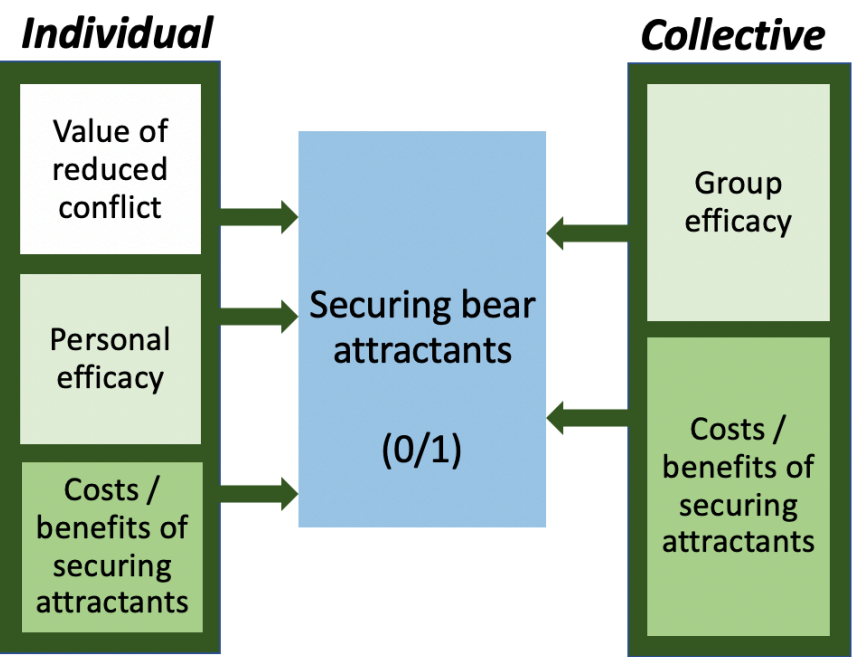
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CALL TO MAKE ARRANGEMENTS

Using bear resistant garbage cans



Using bear resistant garbage cans

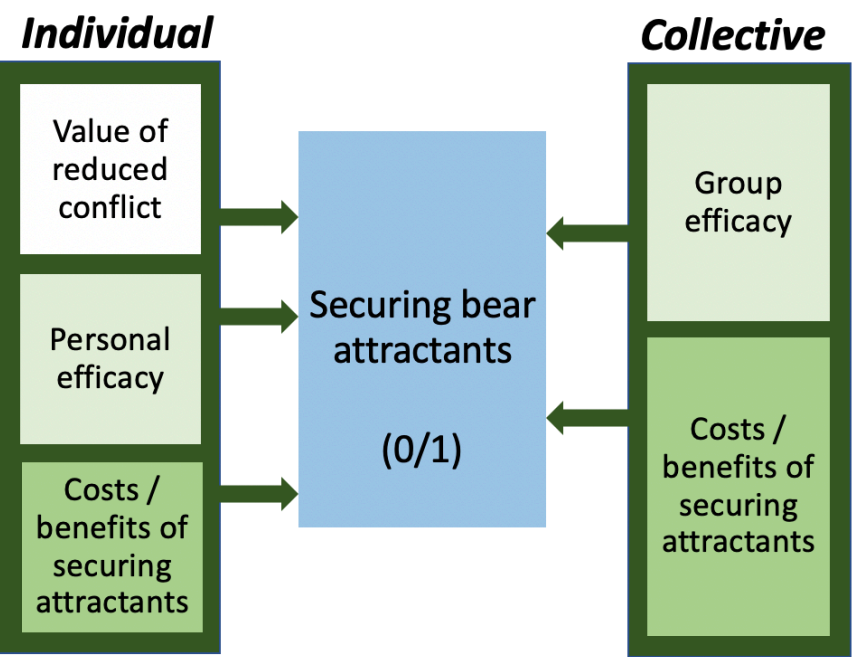


- Trust in government (pg)
- Effectiveness of group (pg)
- Network centrality (C/B)
- Norms (C/B)
- Talked to professional (C/B)
- Anthropocentric env belief (C/B)
- Biocentric env belief (C/B)

Collective

Individual

Using bear resistant garbage cans



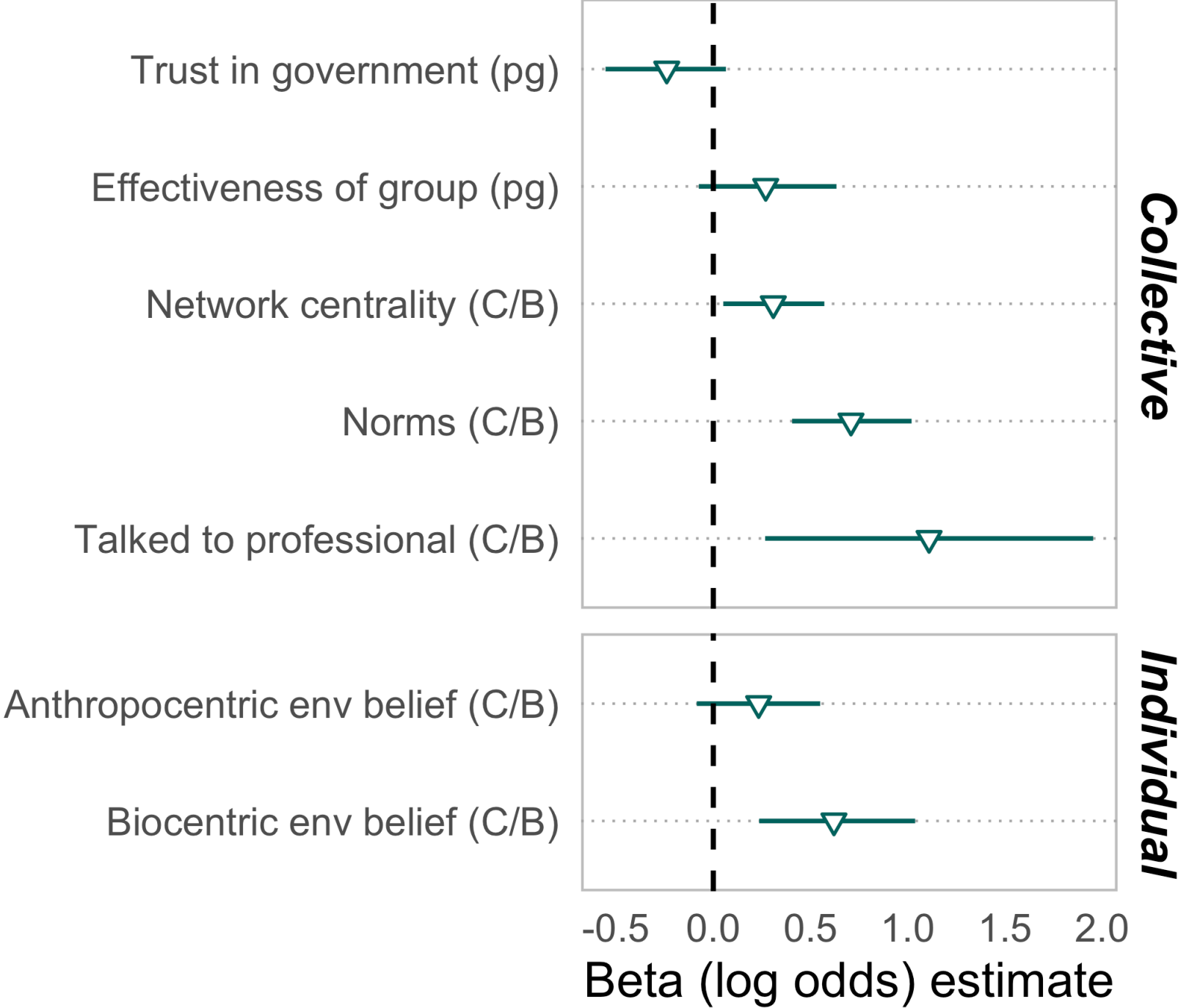
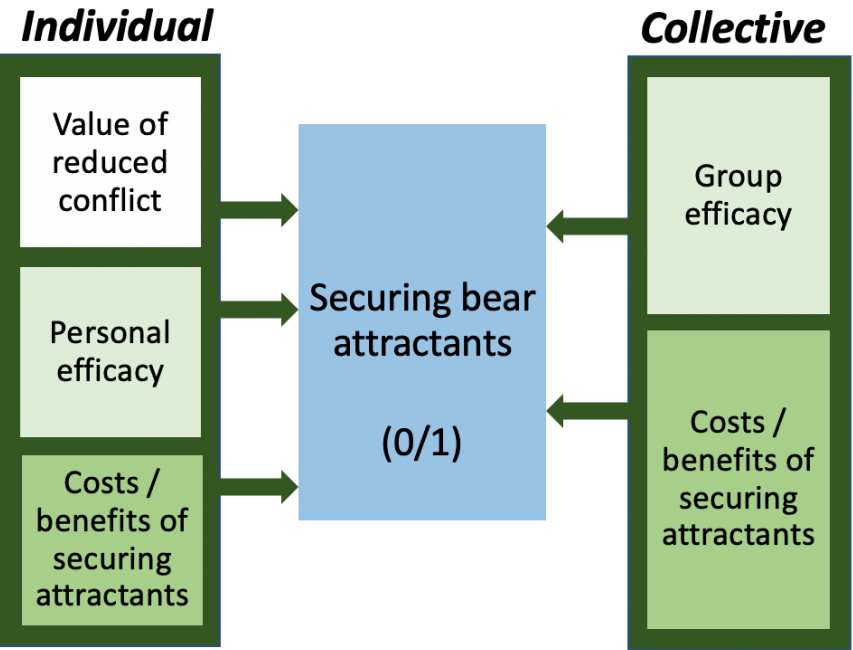
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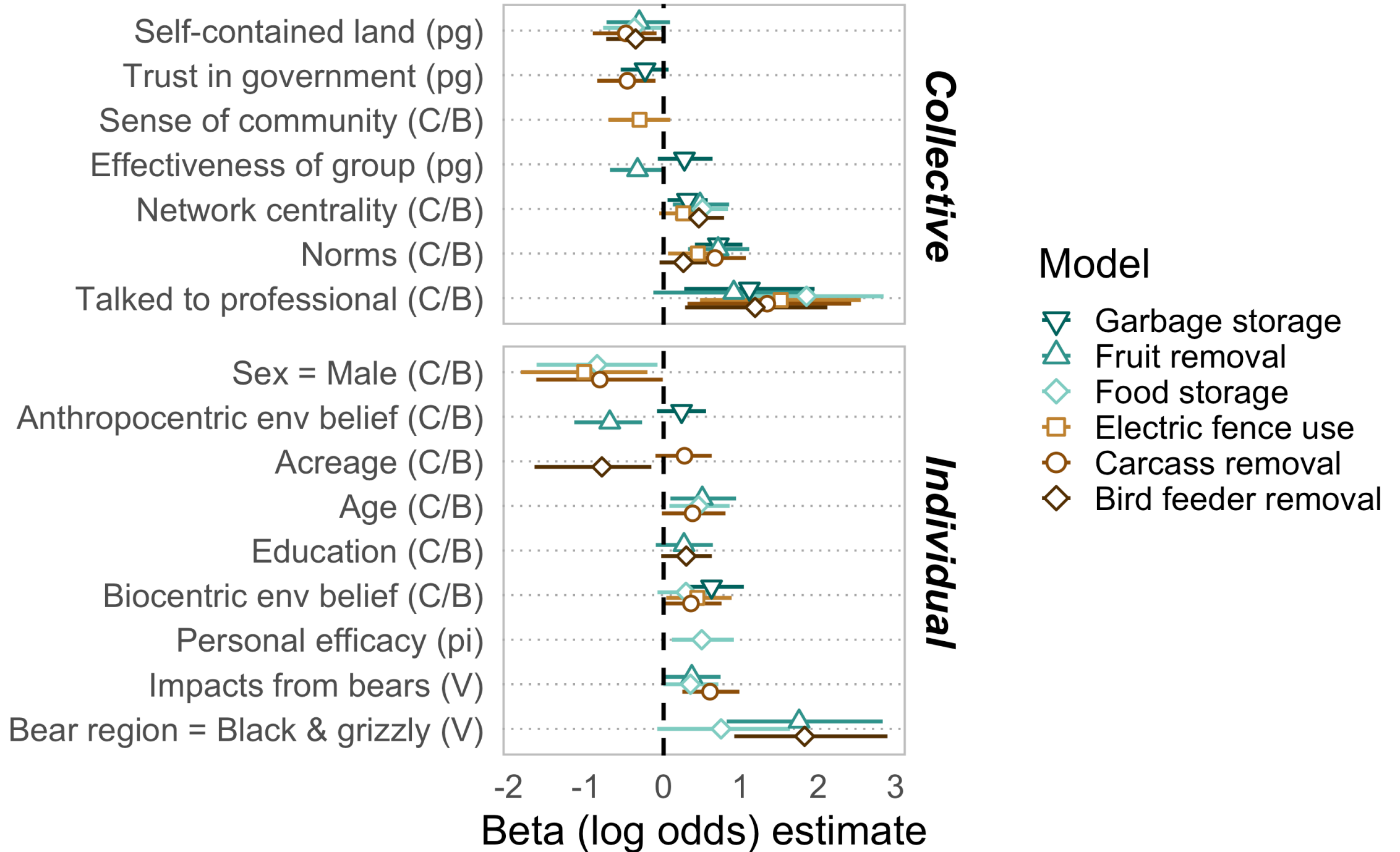
Collective

Individual

-0.5 0.0 0.5 1.0 1.5 2.0
Beta (log odds) estimate

Using bear resistant garbage cans







FWP



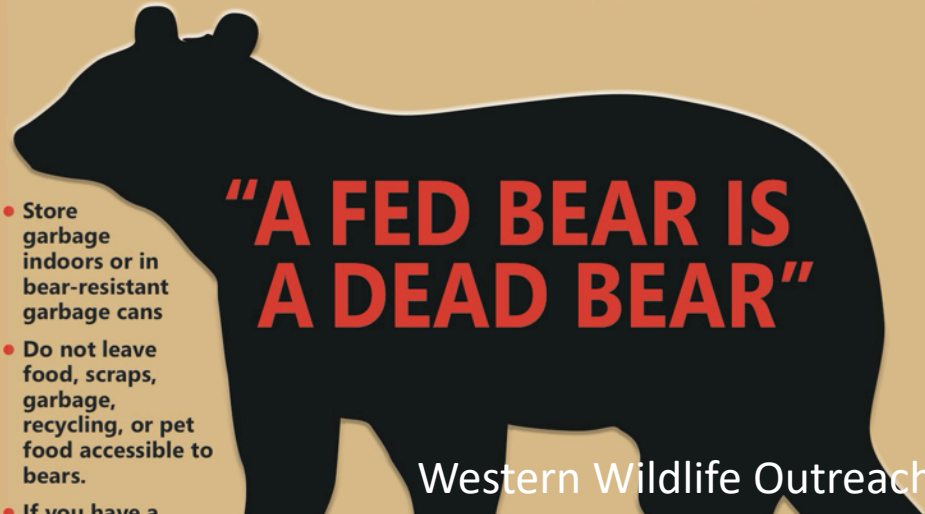
Cates-Carney



Outdoor Channel

YOU ARE IN BEAR COUNTRY

Please make ALL bear attractants
inaccessible, including garbage.*



"A FED BEAR IS A DEAD BEAR"

- Store garbage indoors or in bear-resistant garbage cans
- Do not leave food, scraps, garbage, recycling, or pet food accessible to bears.
- If you have a

Western Wildlife Outreach



A photograph of four brown bears in a lush, green forest clearing. The bears are scattered across the frame, mostly facing away from the camera or looking down at the ground. The vegetation is dense with various green plants and shrubs. The lighting suggests it might be late afternoon or early morning, with soft shadows.

Thanks!

nesbitt.holly@gmail.com