Global wins for conservation can mean local losses in the battle to solve human wildlife conflict

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Conservation & sustainable development

- Globally – strong push for wildlife protection

Conservation & sustainable development

- Globally – strong push for wildlife protection

- Simultaneously – strong focus on achieving the Sustainable Development Goals


Disconnects at the local level

Subsistence agriculture & forests

This disconnect is true for many social-ecological systems

Trophy hunting

MPAs & fisheries

- Marine mammals → iconic group for wildlife protection

- Declines in marine mammal populations globally → widespread marine mammal conservation legislation
  - E.g. International Whaling Commission

Increased potential for conflict

- Increases in some marine mammal populations → pinnipeds
- Leading to renewed conflict with fisheries

Research Question

What are the drivers of conflict between small-scale fisheries and sea lions in Peru & Chile?

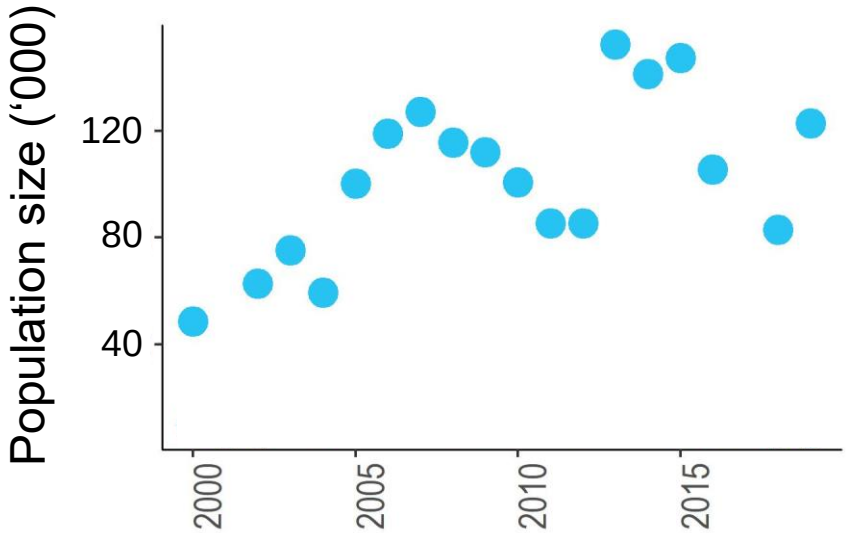
Dirigentes de la Región de Los Lagos piden ayuda a las autoridades

Dramática lucha enfrenta a pescadores y lobos marinos por comida

South American sea lion *Otaria flavescens*

- “Opportunistic predator”
- Forages in surface, coastal waters:
  - fish, cephalopods & crustaceans
- Highly developed cognitive abilities
  - When sharing a habitat with fisheries → behaviour changes to “sit and wait”

O. flavescens



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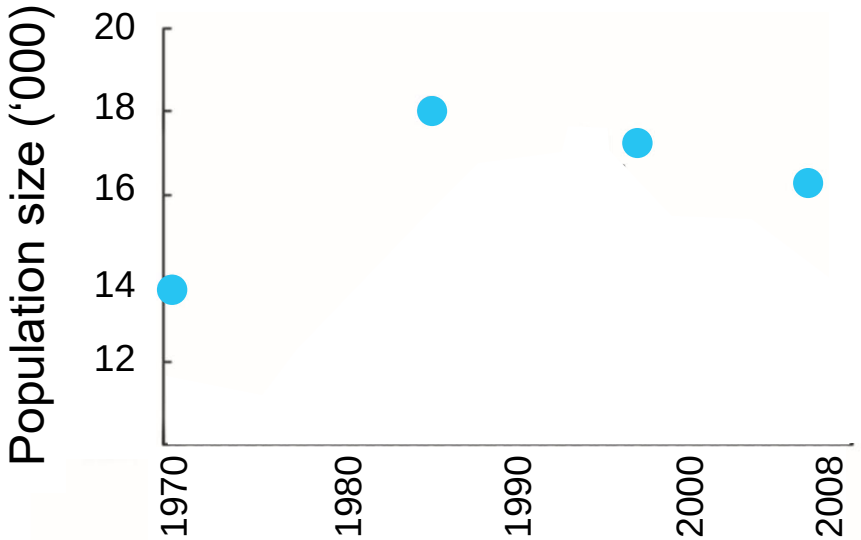

Central Chile

Sepúlveda et al 2011 *RCHN*

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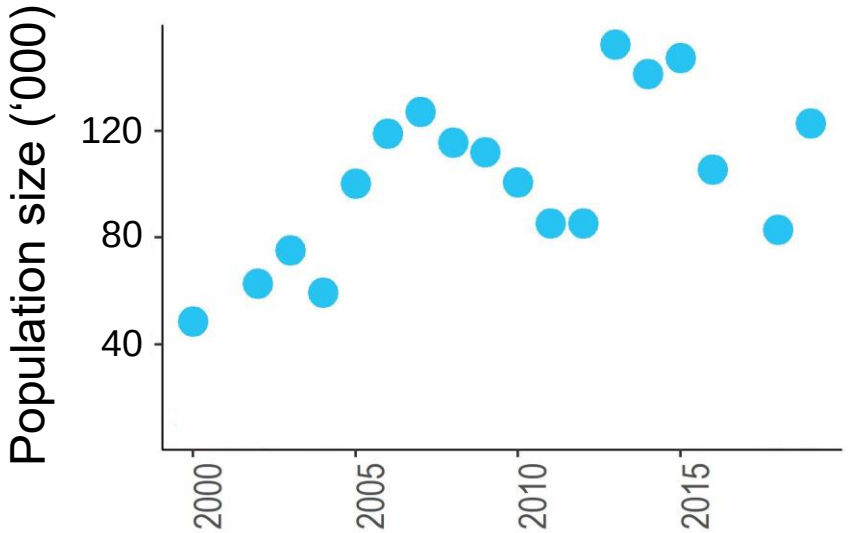

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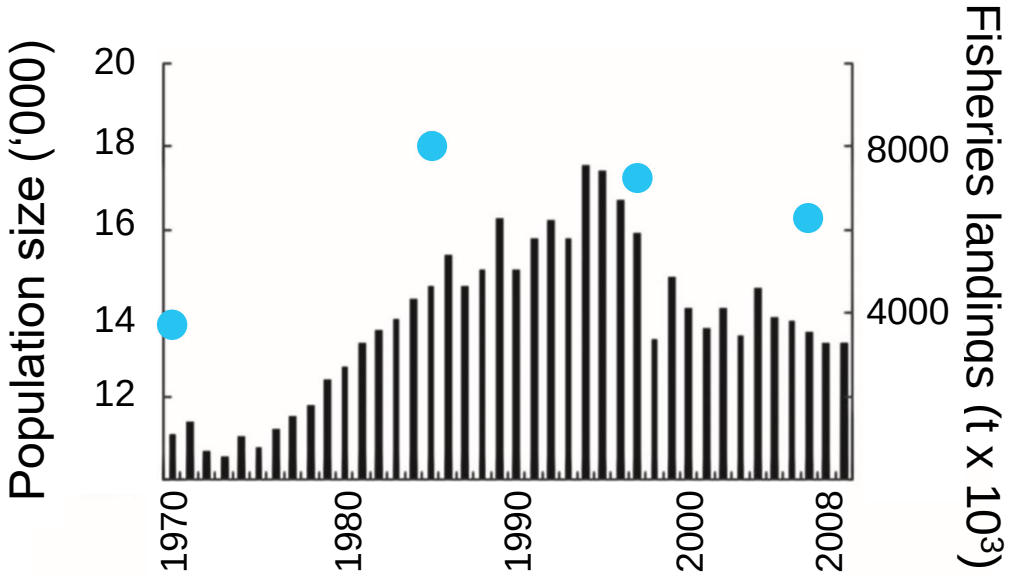
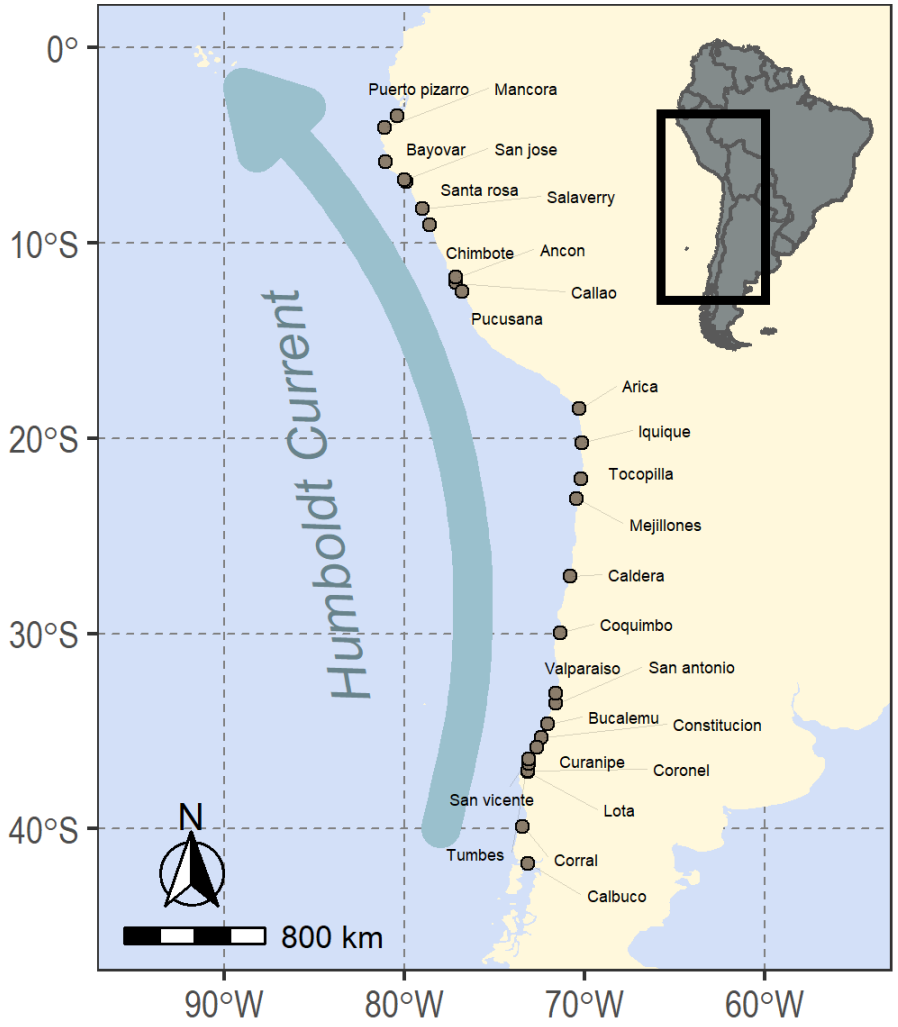


Central Chile

Sepúlveda et al 2011 *RCHN*

Approach

- Survey of 301 fishers
  - Chile → 201 fishers, 17 ports
  - Peru → 100 fishers, 10 ports
- Method: best-worst scaling
- Additional data:
  - Socio-economic characteristics
  - Attitudinal questions



Drivers of conflict

Assessed 12 potential drivers

Drivers of conflict

Strategy	Having to change my fishing strategy
Employment	Being forced to seek alternative employment
Reputation	Conflict with sea lions is giving fishing a bad reputation

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Risks	Sea lions may present unknown risks (e.g. disease)
Harm	Hurting sea lions while I am fishing
Behaviour	Sea lion behaviour is changing
Population	There are too many sea lions

Best-Worst Scaling Survey

12 drivers of conflict

- Strategy
- Employment
- Reputation
- Fish
- Inputs
- Profits
- Safety
- Time
- Risks
- Harm
- Behaviour
- Population

MOST	IMPORTANT	LEAST
	Fish	
	Behaviour	✓
	Population	
✓	Risks	

Example…

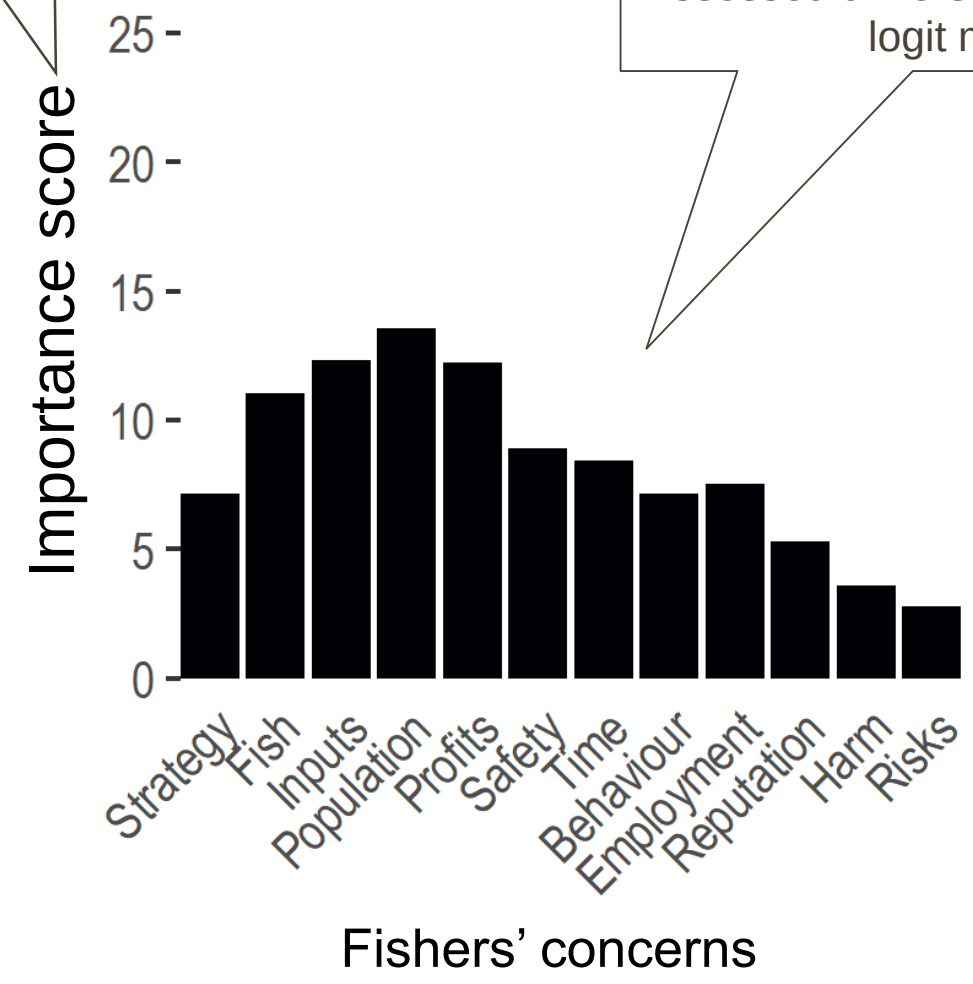
12 questions in total

8 survey versions

Drivers of conflict

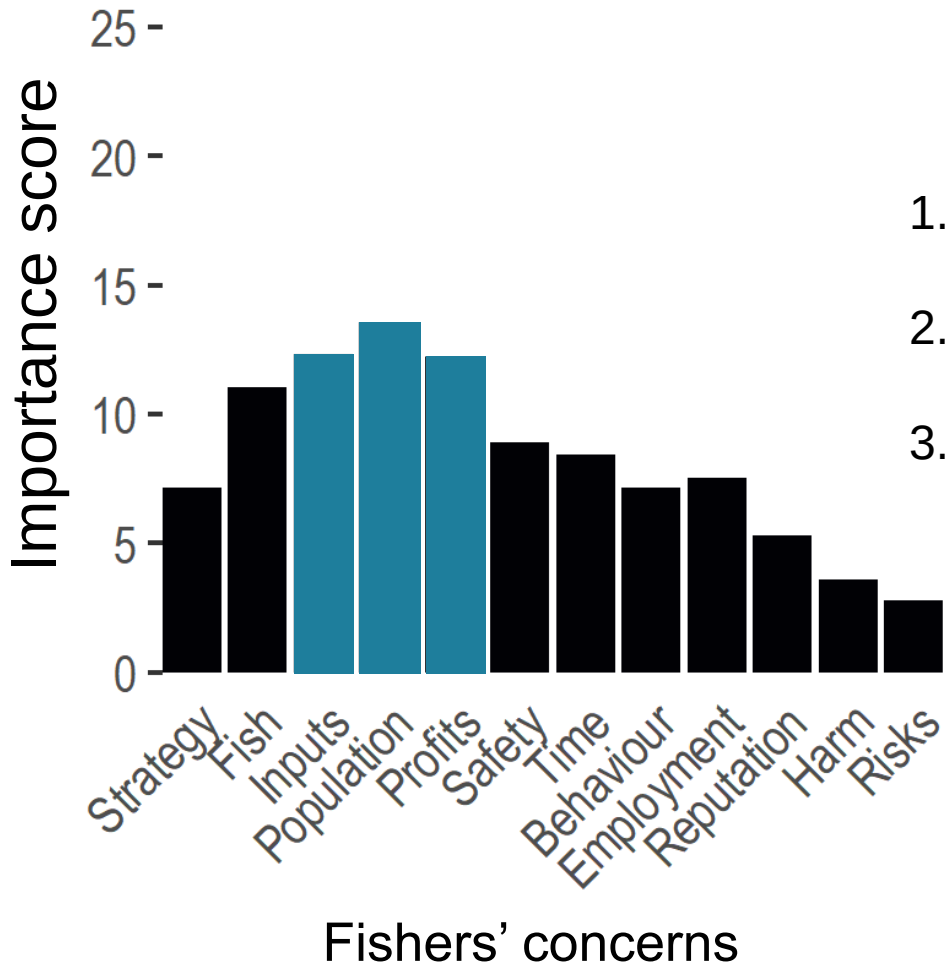
Describes relative importance of each driver

Assessed drivers using conditional logit model



Davis et al 2020 *bioRxiv*

Drivers of conflict



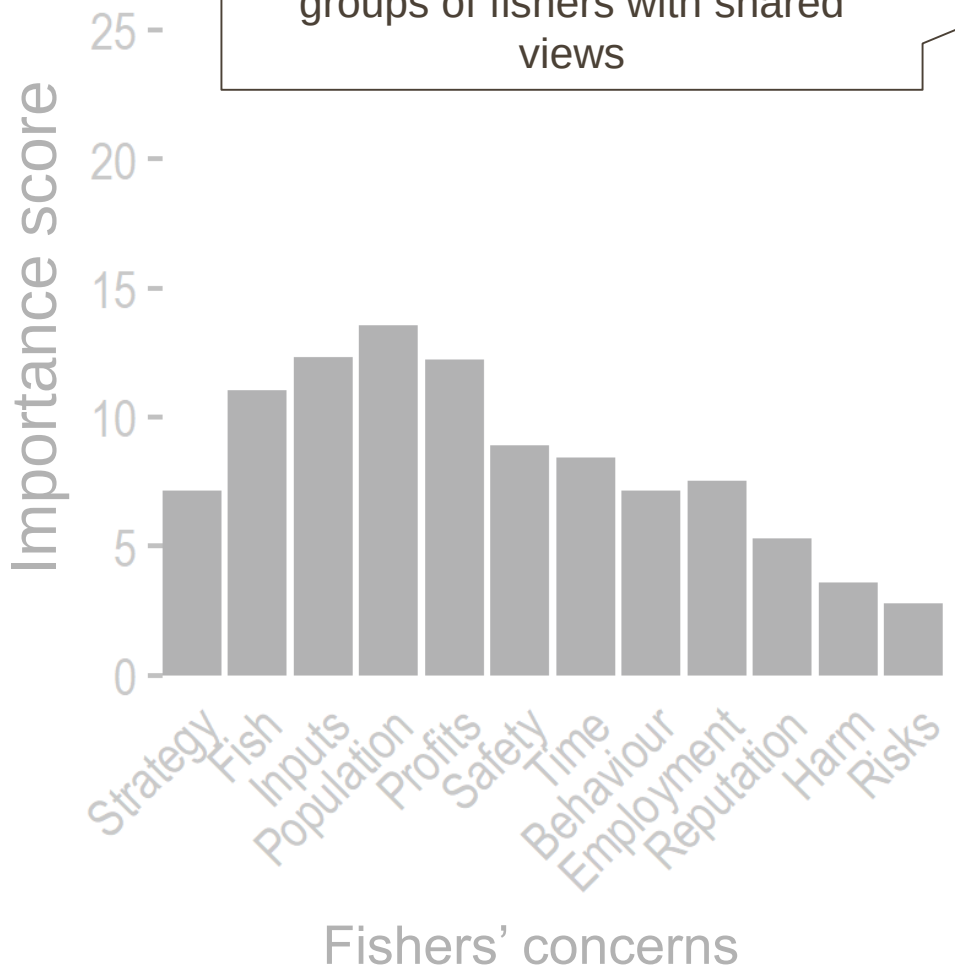
Top 3 drivers of fishers' conflict with sea lions

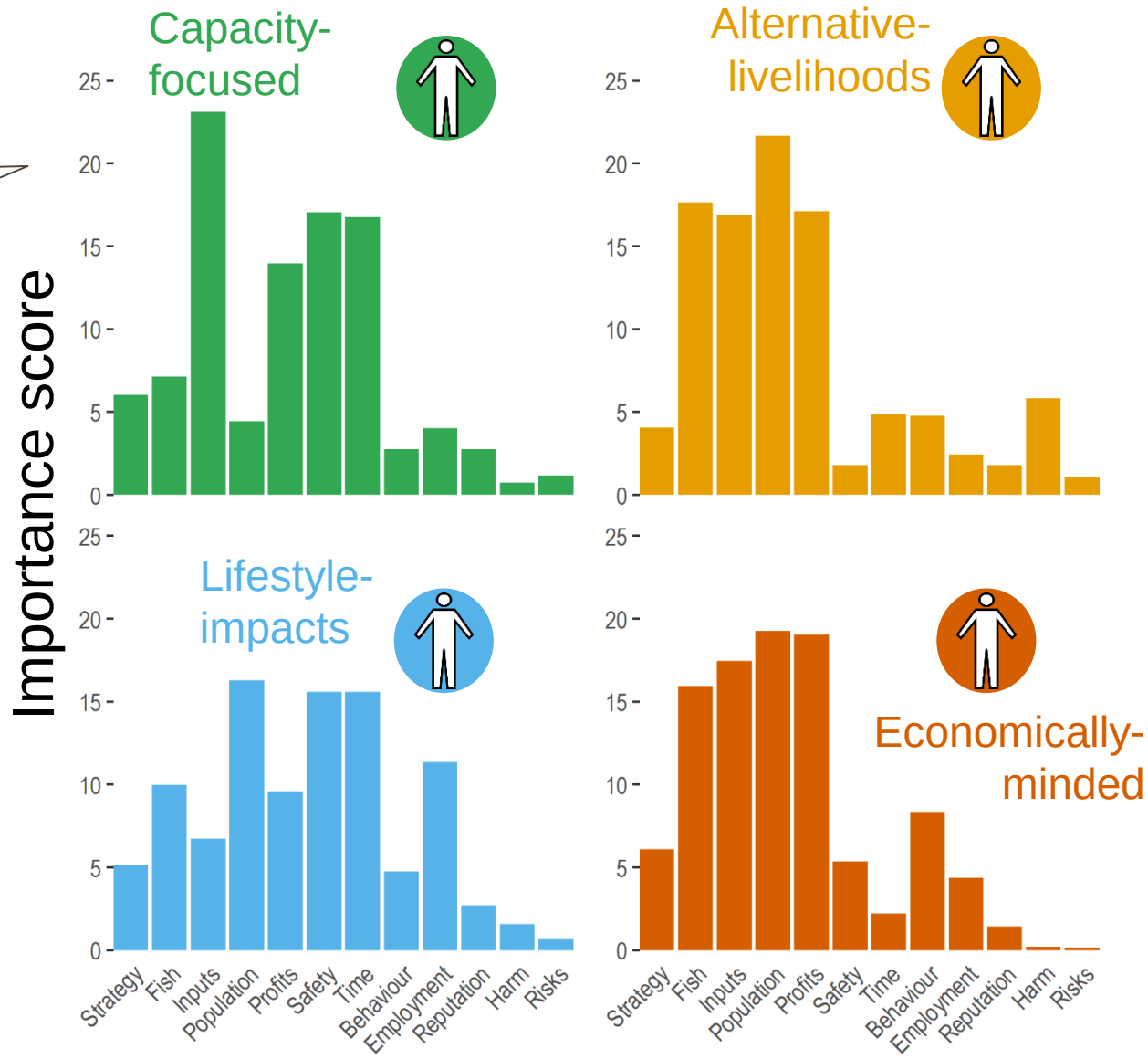
1. Population
2. Inputs
3. Profits

Davis et al 2020 *bioRxiv*

Drivers of conflict

Used a scale adjusted latent class model to understand heterogeneity in fishers' preferences – describes groups of fishers with shared views





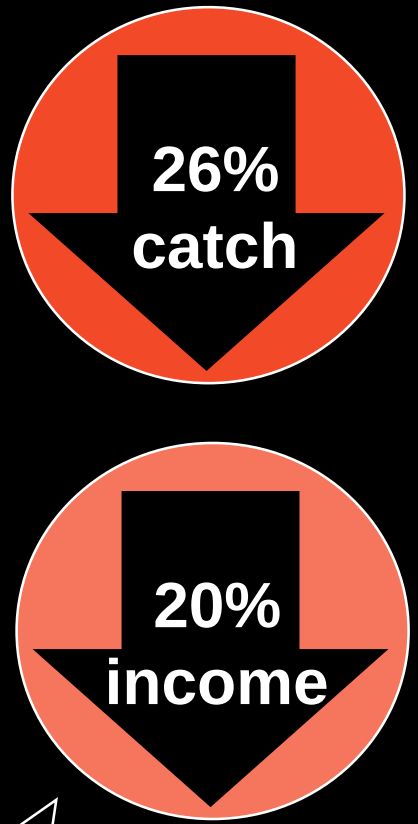
Davis et al 2020 *bioRxiv*

Marginal effects describing fisher's probability of being in each of the five preference classes based on their characteristics

Variable	Class 1	Class 2	Class 3	Class 4	Class 5
Involved in sea lion tourism	-0.257	-0.023	0.192	0.163	-0.074
Impact of sea lions on earnings	0.037	0.010	0.002	0.009	-0.059
Respondents from Peru	0.566	0.149	-0.017	-0.053	-0.644
		Capacity-focused	Lifestyle-impacts	Alternative-livelihoods	Economically-minded

Perceptions

Sea lions → fishers



Fishers' perceive sea lions cause catch and income losses

Davis et al 2020 *bioRxiv*

Perceptions

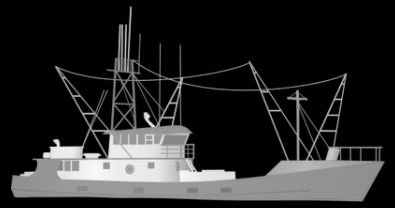
Sea lions → fishers

26% catch

20% income

Fishers → sea lions

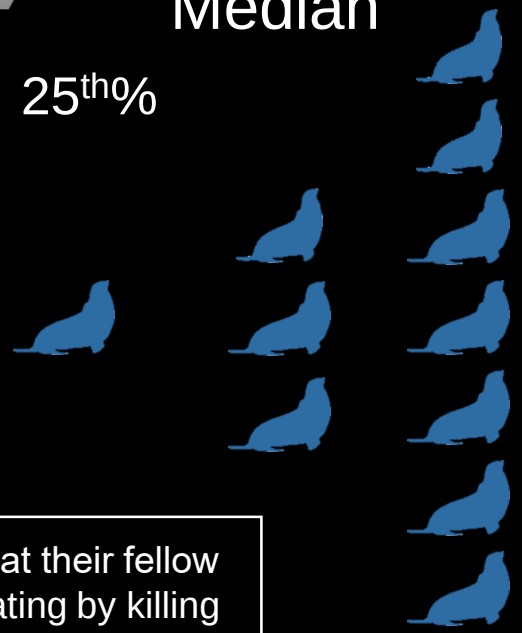
67% vessels kill sea lions



75th%

Median

25th%



Fishers' report that their fellow fishers are retaliating by killing sea lions (even though they're protected species)

Davis et al 2020 *bioRxiv*

The populations of many pinniped species are declining or close to stable

Perceptions

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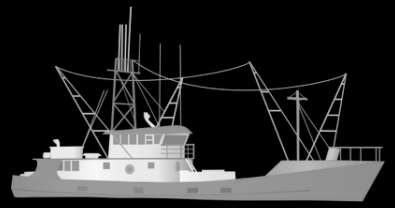
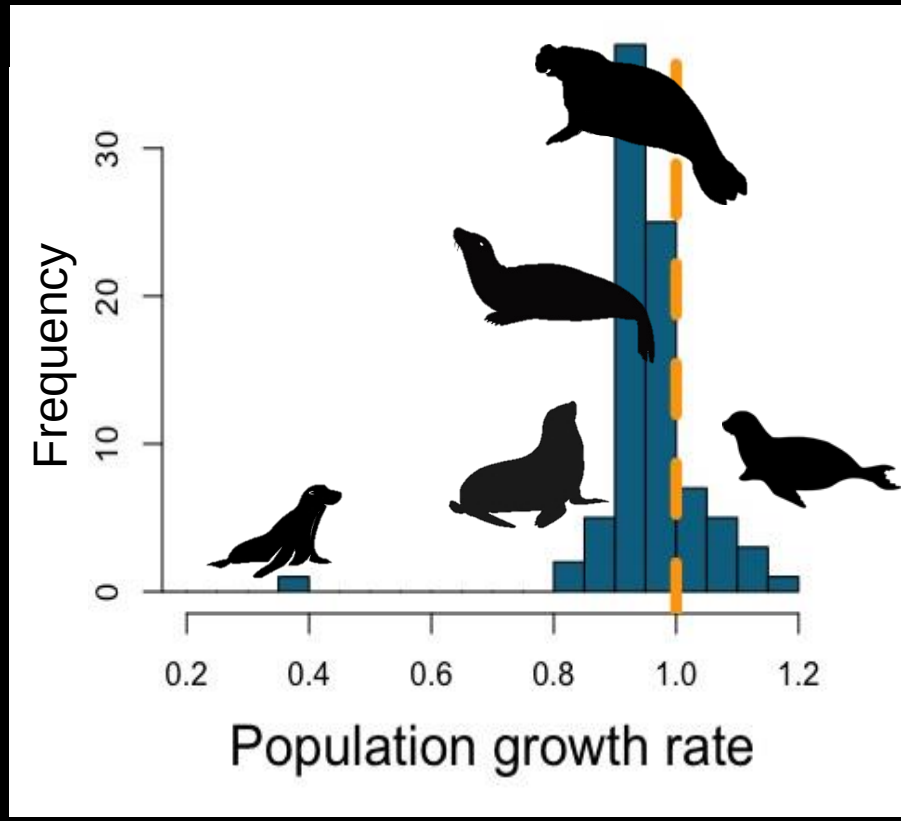


Reality



N = 11 pinniped species

Davis et al 2020 *bioRxiv*

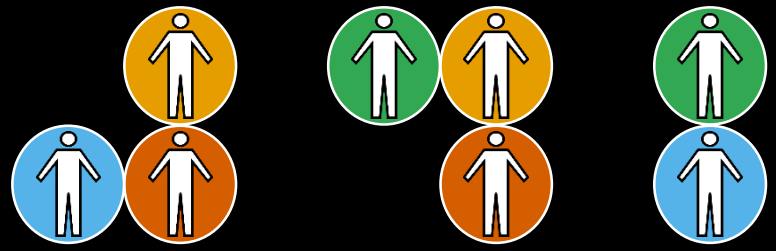
Davis et al *in prep.*

Two-sided story

Two-sided story

Understanding perceptions of different groups of fishers helps us better target solutions

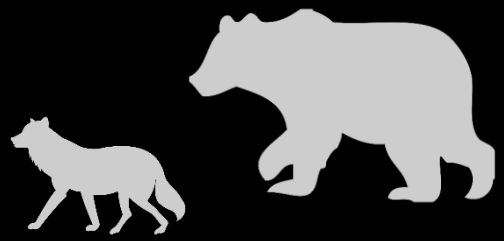
Culls Compensation Capacity



Davis et al 2020 *bioRxiv*

Two-sided story

Population culls have worked for some species – BUT (!) effectiveness probably limited to managing public sentiment



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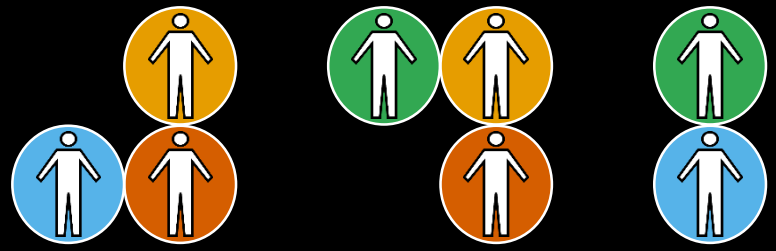
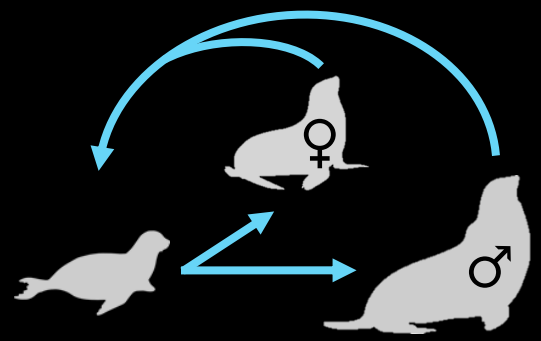


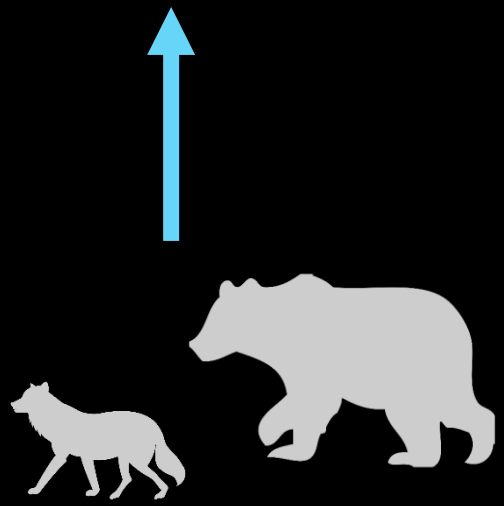
Knott et al 2014 *EJWR*
Kaltenborn & Brainerd 2016 *EJWR*

Davis et al 2020 *bioRxiv*

We need to understand what would be the impact of culls on populations of South American sea lions in Peru & Chile (ongoing work)

Two-sided story





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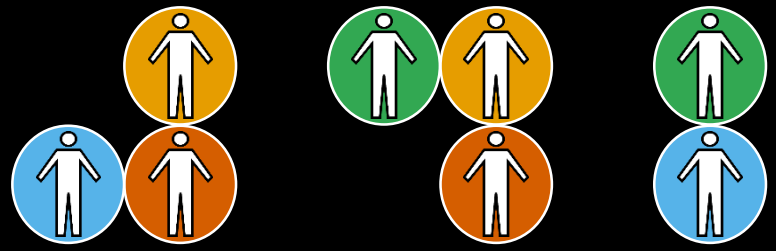

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Collaborators

Pinniped image credits:
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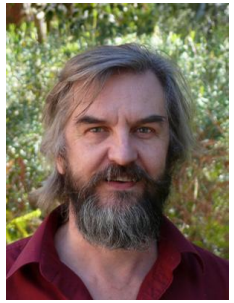

Morena Mills

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Thank you

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Check out the working paper based on this research:

Davis, KJ, J Alfaro-Shigueto, WNS Arlidge, M Burton, JC Mangel, M Mills, EJ Milner-Gulland, J Palma Duque & C Romero-de-Diego. 2020. Disconnects in global discourses - the unintended consequences of marine mammal protection on small-scale fishers. BioRxiv*, 2020.2001.2001.892422*. 10.1101/2020.01.01.892422. Read here