

Long-term monitoring of harvested mountain ungulates to improve their conservation and sustainable use

- Marco Festa-Bianchet, U. Sherbrooke
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- Dave Coltman, U. Alberta



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Research questions – mountain sheep:

1. Do regulations and harvest levels affect the evolution of smaller horns?
2. What are the effects of protected areas?
3. What are the effects of weather and of climate change on horn growth?



Research questions – mountain goats:

1. Does early horn growth affect age at harvest?
2. Does age of first reproduction in females vary over space and time?
3. How has the harvest of different sex-age classes varied over time?



How?

Long-term harvest data from BC, Alberta, Yukon, NWT.

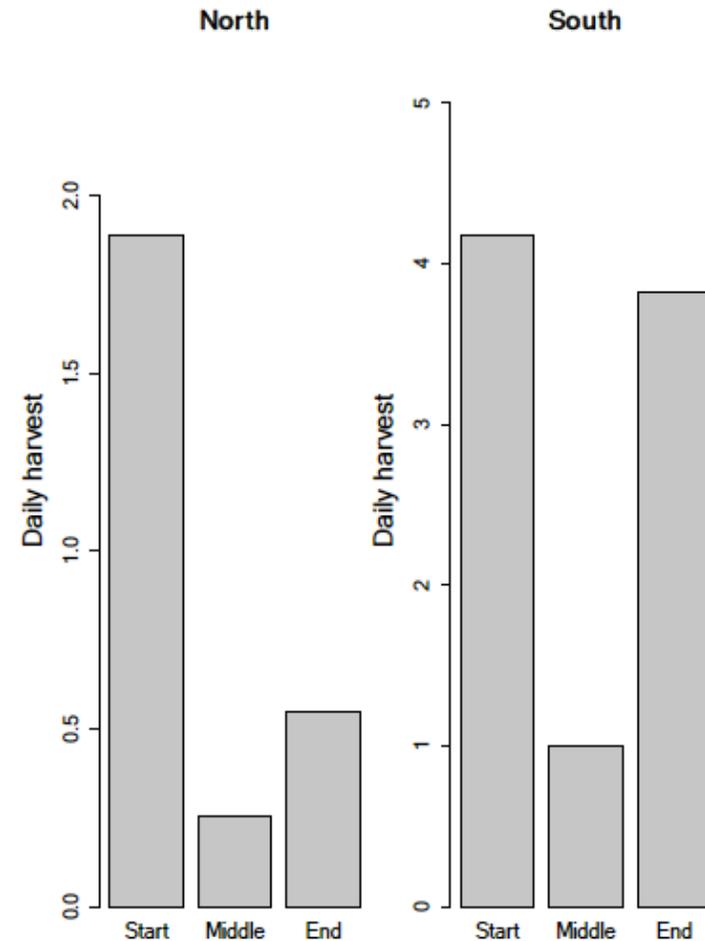
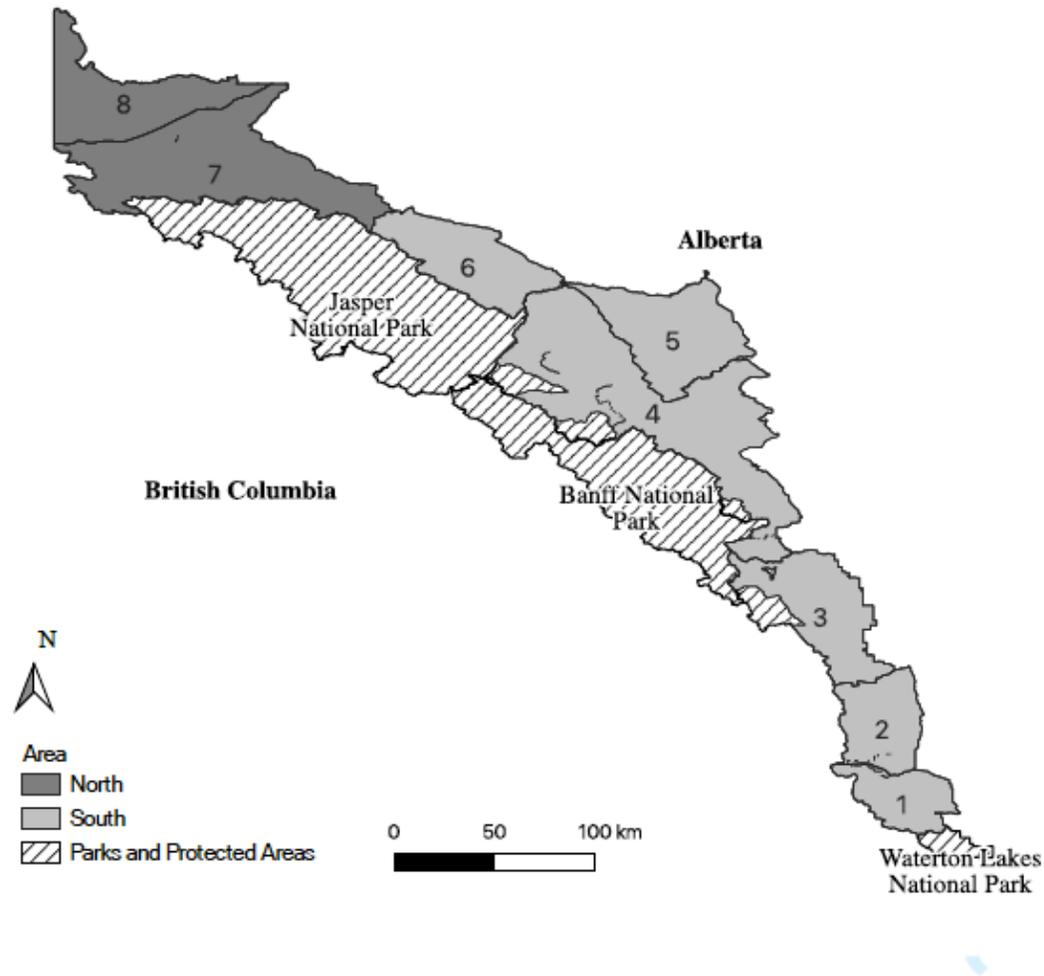
A	B	C	D	E	F	G	H	
CID_NO	SPECIES_CODE	KILL_CODE	KILL_CODE_DESCRIPTION	HUNTER_LICENCE_TYPE	KILL_DATE	SEX	MU_CODE	SUB_UP
		1	hunter kill	NRH	19750928	U	801	
		1	hunter kill	RH	19750928	M	809	
700263	SHEC	1	hunter kill	RH	19750928	M	504	
700264	SHEC	1	hunter kill	RH	19750913	M	331	
700265	SHEC	1	hunter kill	RH	19751004	M	331	
700266	SHEC	1	hunter kill	NRH	19751020	M	504	
700267	SHEC	1	hunter kill	RH	19750901	M	803	
700268	SHEC	1	hunter kill	NRH	19750928	M	801	
700269	SHEC	1	hunter kill	NRH	19750924	M	801	

Progress: bighorn sheep

Effects of harvest pressure and timing on bighorn sheep horn size

Roxane Lassis^{1}, Marco Festa-Bianchet¹ and Fanie Pelletier¹*

a)



‘South’: second harvest peak in late October, likely including many rams exiting National Parks

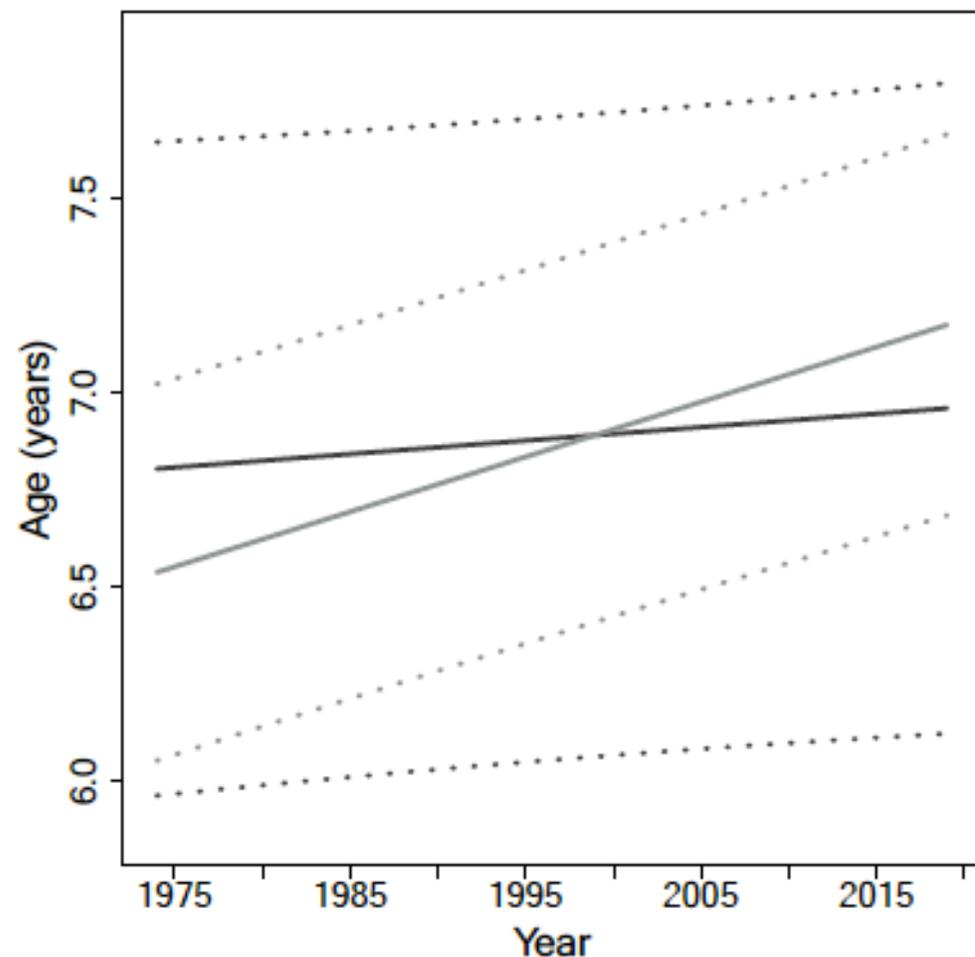
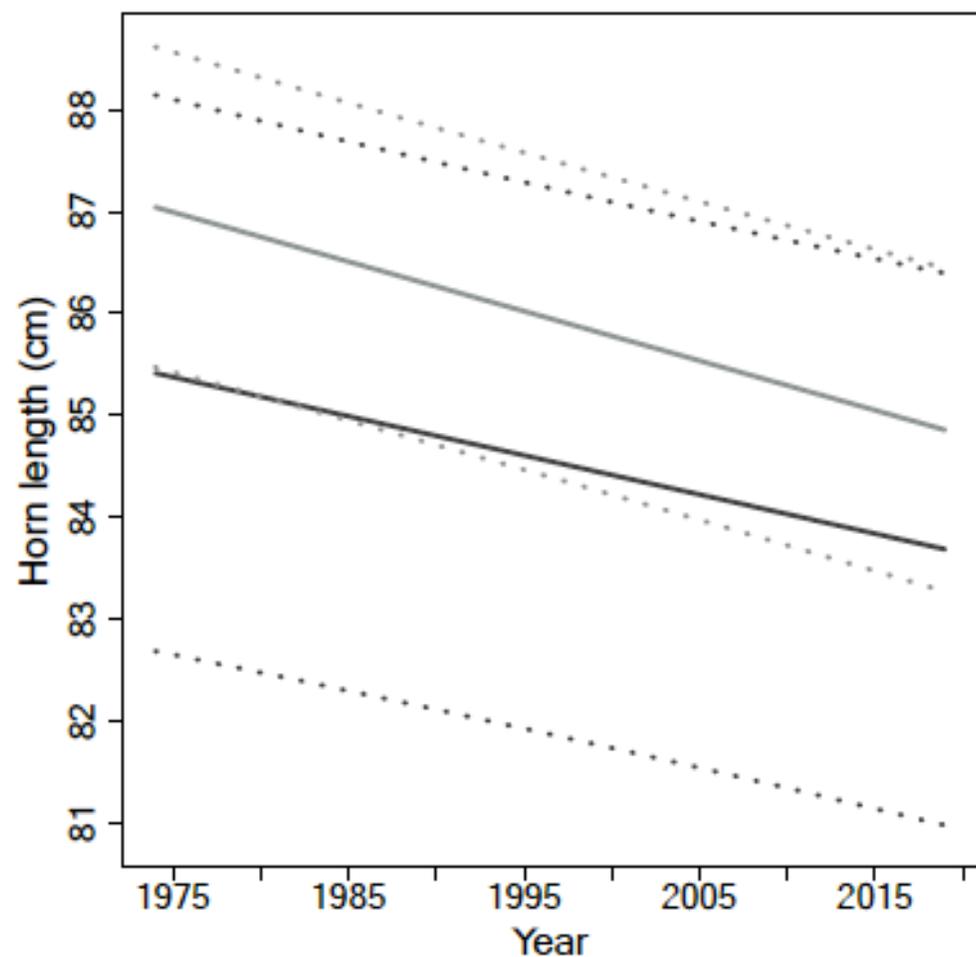
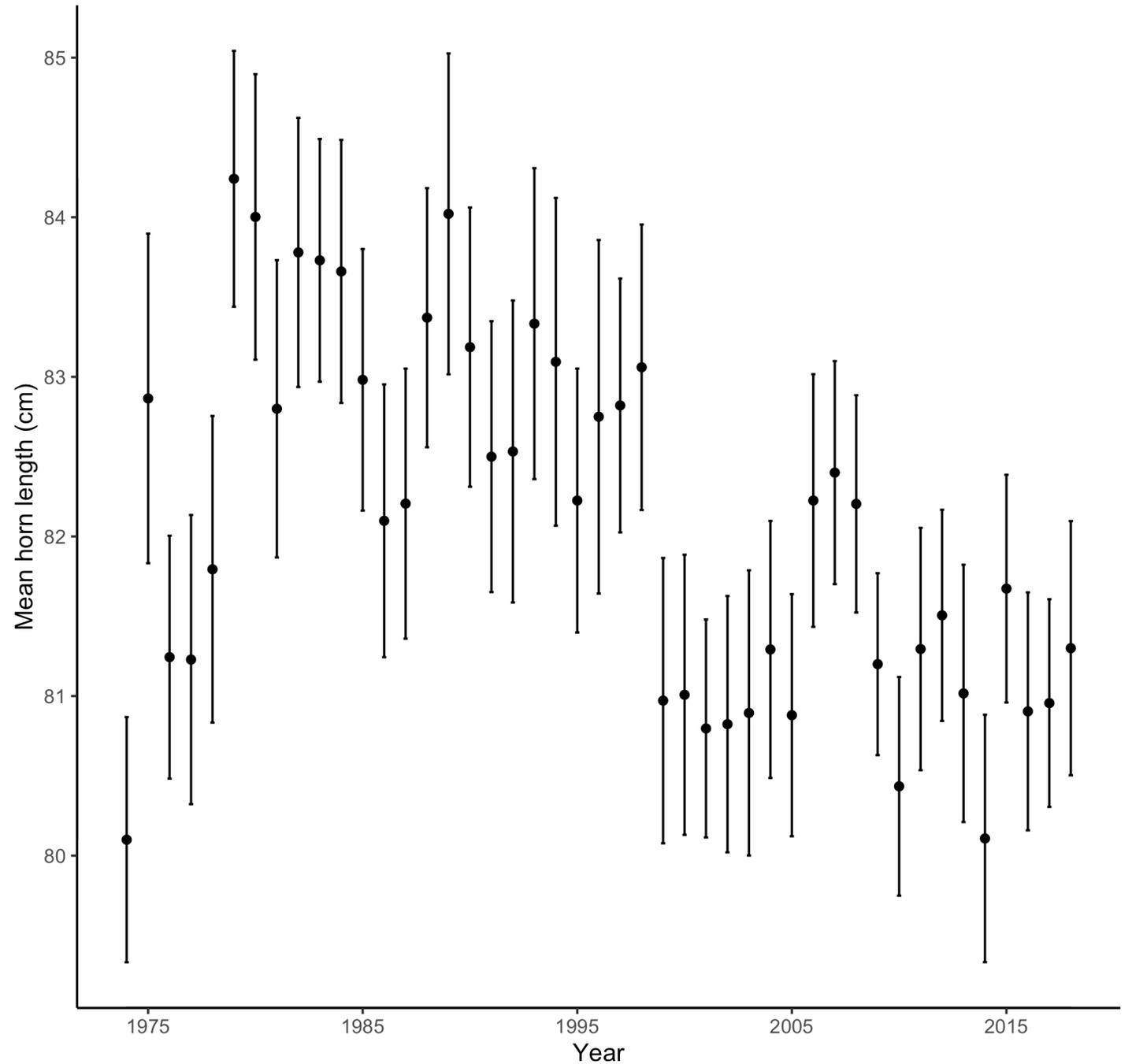
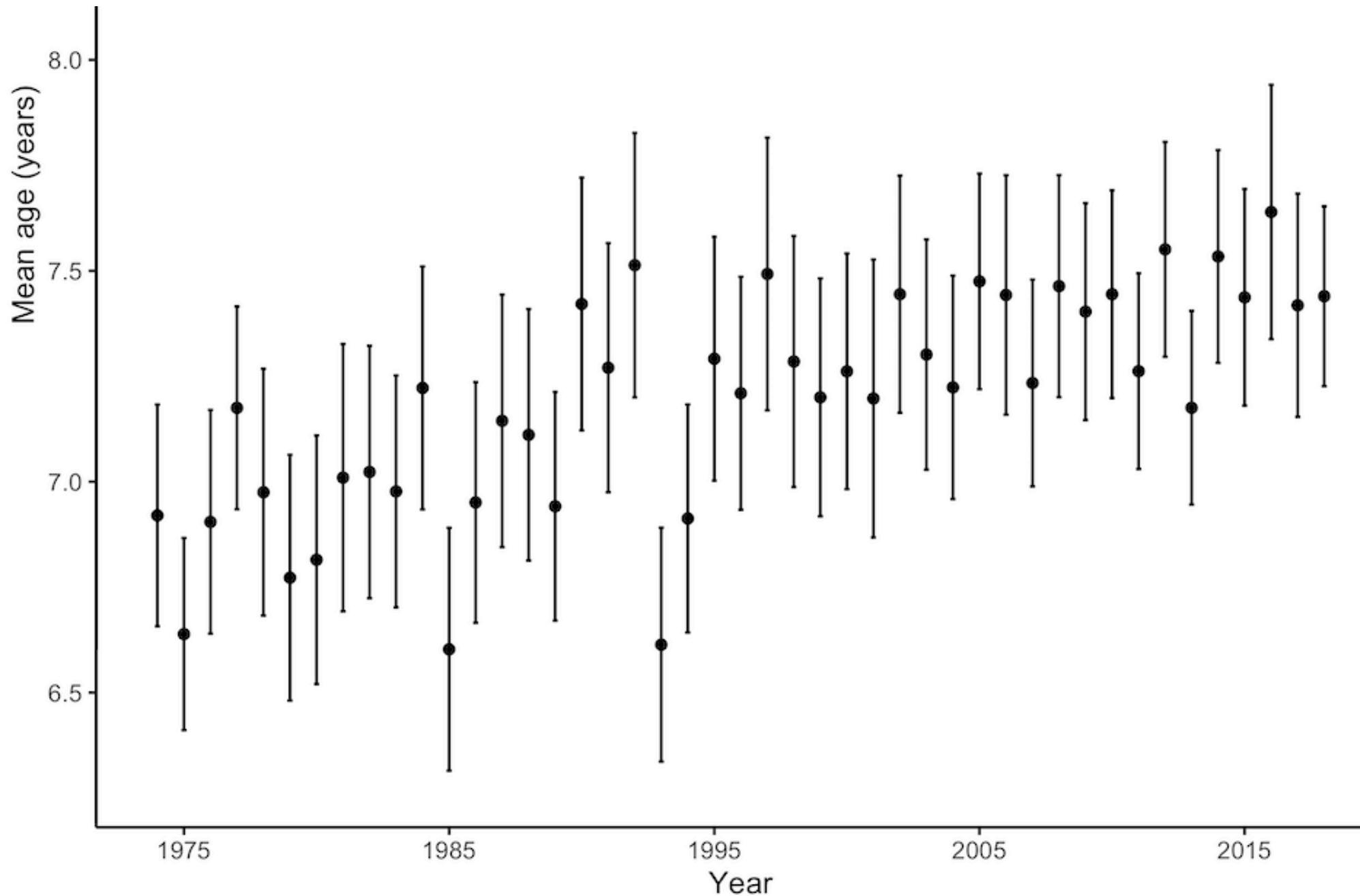


Figure 4: Combined effects of area and harvest year on a) horn length (cm) and b) age at death (years) with 95% confidence intervals of bighorn rams shot under the 4/5-curl regulation in northern (dark grey line) or in southern hunting areas (light grey line), 1974-2019, Alberta,

Alberta: horns of
bighorn sheep rams
are getting shorter...

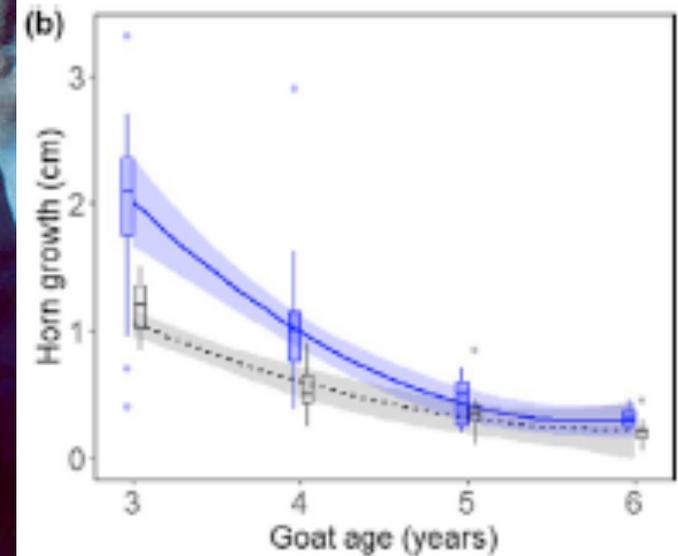


... and age at harvest increases, as most rams aged 4 or 5 years do not reach minimum legal horn size



Growth and reproduction trade-offs can estimate previous reproductive history in alpine ungulates

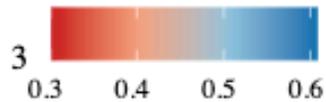
Benjamin Larue¹  | Fanie Pelletier¹ | Steeve D. Côté² | Sandra Hamel² | Marco Festa-Bianchet¹



Delay in age of first reproduction in BC mountain goats: fewer first reproduce at 3 years



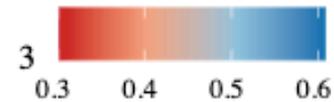
1981



Source: British Columbia Ministry of Forest, Lands, Natural Resource Operations and Rural Development

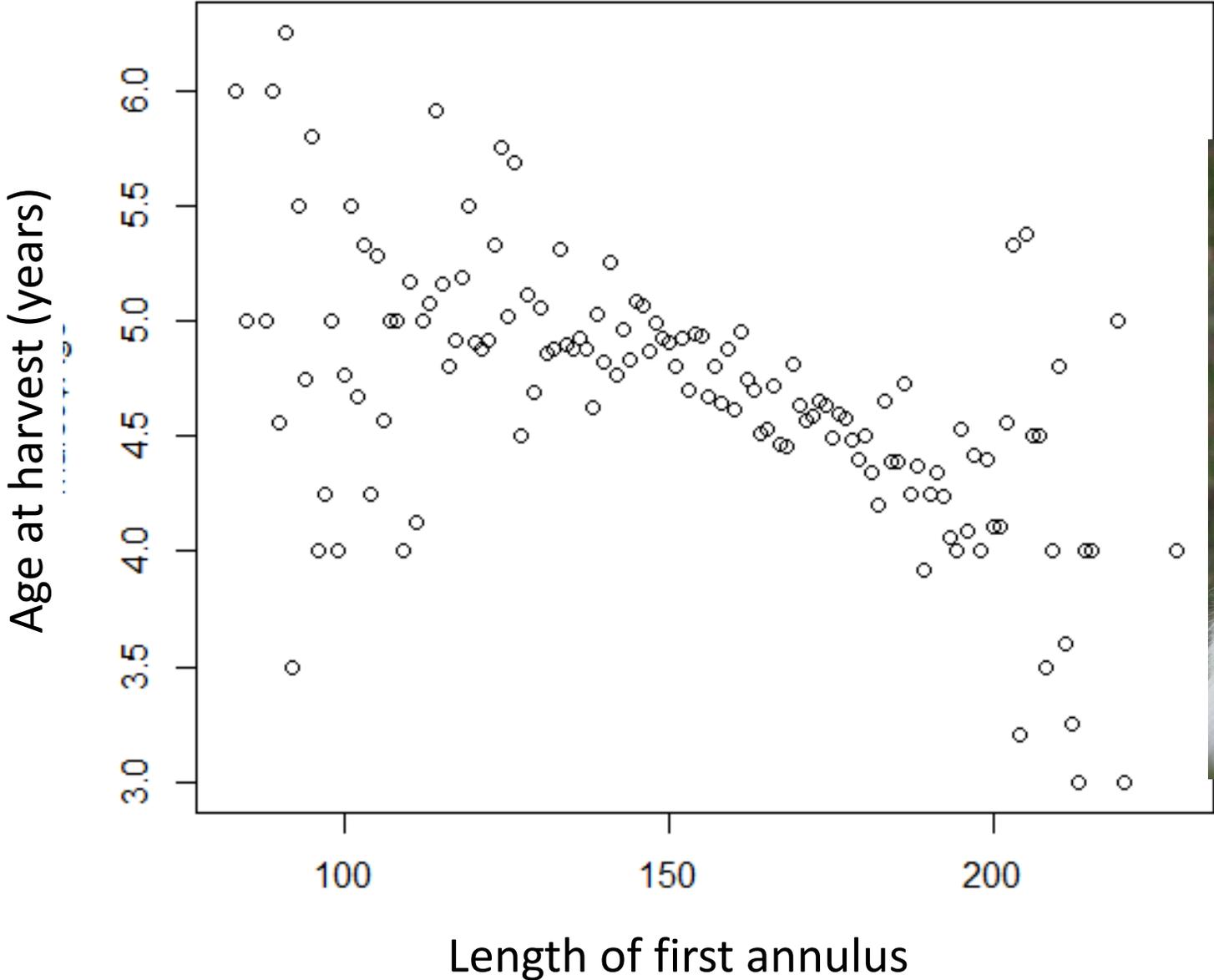


2019



Source: British Columbia Ministry of Forest, Lands, Natural Resource Operations and Rural Development

Mountain goat males with rapid early horn growth are shot at a younger age





Roxane Lassis, PhD student, Sherbrooke. Mountain sheep.
One paper submitted, 2 in prep.
Expected graduation winter 2023.



Sam Deakin, PhD student, U. of Alberta. Mountain sheep.
1 paper published, 2 in prep.
Expected graduation fall 2023



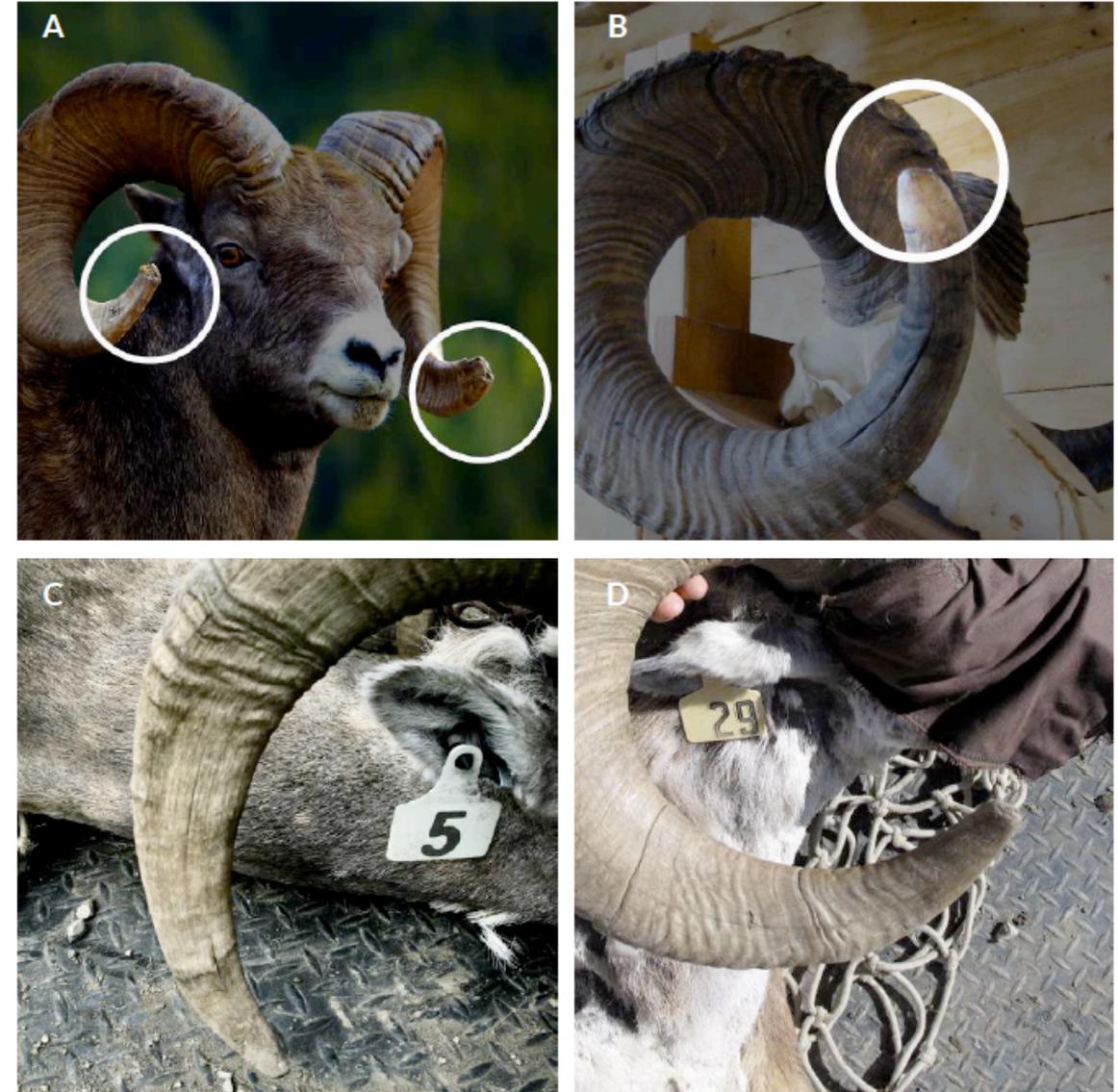
Chad Rice, MSc student, Sherbrooke.
Mountain goats.
Two papers in prep.
Expected graduation winter 2022.

Also...

June 2021: Sam Deakin collected more than 700 fecal samples from bighorn rams in Banff and Jasper for genetic analyses

Guide to aging and measuring mountain sheep by Limoilou Renaud near completion

Worn and broken horns



Outcomes so far

3 students making progress, data analysis advancing papers being written.

Various presentations at conferences.

Ongoing collaboration with provincial and Parks wildlife biologists.

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Issues

Covid slowed us down.

No data from Yukon.

THANK YOU!

Students and collaborators: Fanie Pelletier, Dave Coltman, Jon Jorgenson, Anne Hubbs, Chiara Feder, Gerry Kuzik, Jack Hogg, Yoanna Poisson, Roxane Lassis, Maria João Janeiro, Sam Deakin, Chad Rice



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