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There's not a lot of cool chicks out there: A regional study of climate change on passerine morphology over time

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BACKGROUND

- In the past 100 years, a rapid change in climate is believed to be occurring.
- Wildlife have been responding by changing their distribution, population size, and morphology.
- Bergmann's rule states that larger animals are found in colder environments, and smaller animals in warmer environments.

OBJECTIVE

- to use an existing museum specimen collection to assess whether bird morphology has shifted over a long period of time.
- examine the pressures that climate change might exert on avifauna through morphological traits.

Hypothesis:

- (1) morphology of birds has changed over time as a result of changing climate
- (2) if morphology has changed, then it was expected that migratory birds would experience the most change.

MATERIALS & METHODS

Materials used:

- standard caliber (cm)
- standard ruler (cm)
- Measured wing chord, tarsus length, and body size. For consistency, left feet and wings were used.
- Data recorded: sex, year of collection, area of collection (County, State), and species.
- If not known, data was entered in as NA.
- Data was analyzed using linear regression modeling in R-Studio.

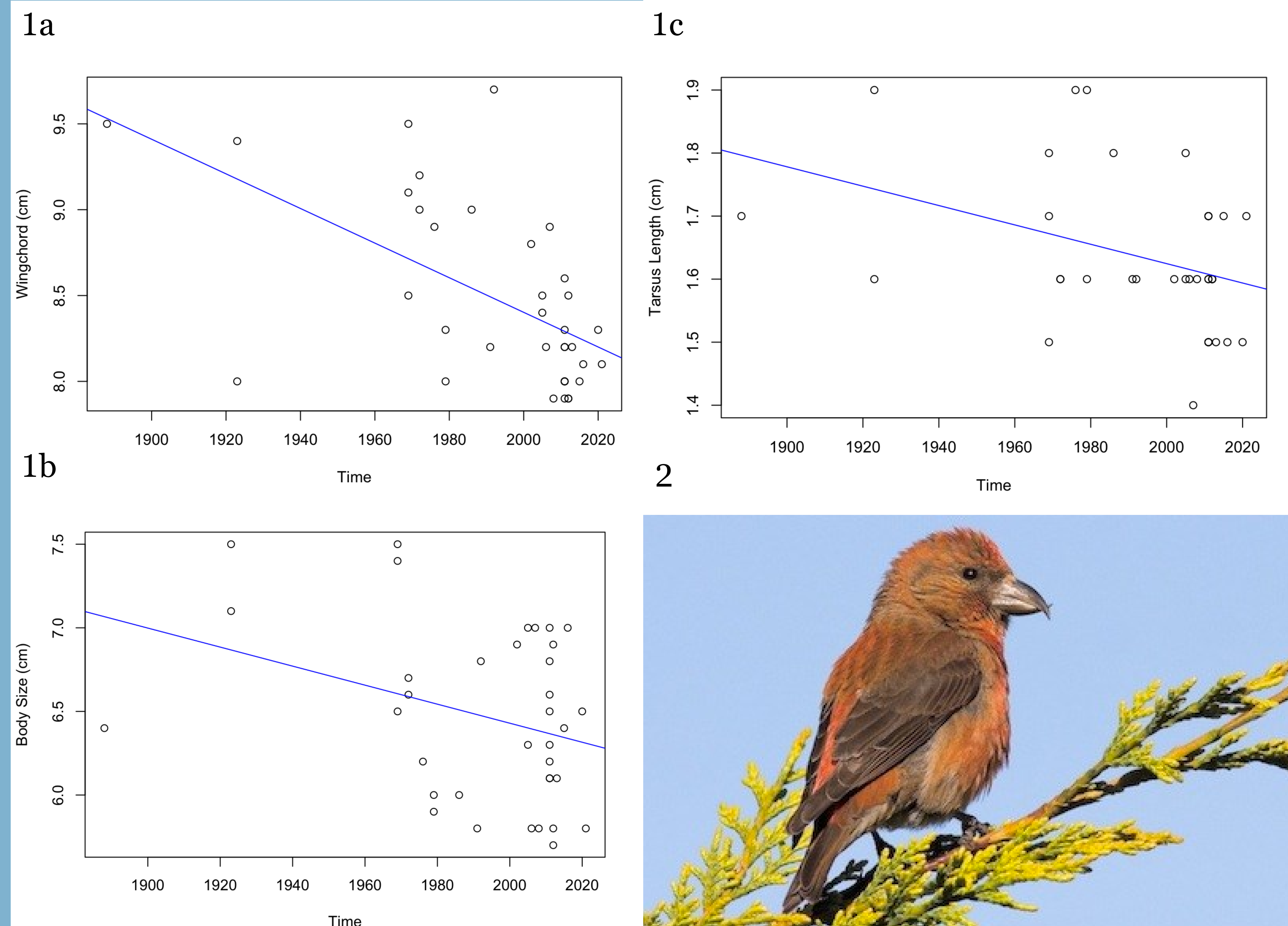


Fig.1 Linear model displaying wingchord(a), body size (b), and tarsus length (c) over time for the Red Crossbill (RECR) species.

Figure 2. Photo of a male red crossbill (*Loxia curvirostra*), courtesy of the Albuquerque Journal.

RESULTS

Total Number of Specimens (**n**) = 766, Number of Families = 18, Number of Species = 35

- 1 species with 3 significant variables (RECR)
- 2 species with 2 significant variables (AMCO, YEWA)
- 10 species with 1 variable of significance.
- number of migrants w/significance = 4
- number of residents w/significance = 10

Species	Pw	Pb	Pt
RECR	0.0002	0.048	0.022
AMCR	0.0003	0.0005	0.139
YEWA	0.3156	0.0013	0.0338
STJA	0.0042	0.4944	0.6256
AUWA	0.855	0.0124	0.213
SWTH	0.0432	0.1687	0.4312
HETH	0.0848	0.7397	0.0498
FOSP	0.0111	0.3611	0.3163
BLPH	0.5725	0.0177	0.2736
AMGO	0.8918	0.0003	0.3447
PAWR	0.026	0.2494	0.4837
HOWR	0.0397	0.6398	0.9636
BRCR	0.0154	0.4016	0.5882
GCKI	0.4869	0.6888	0.0433

- Results provide *some* support for the hypothesis that bird morphology has changed over time. However, not in the way that was originally thought.
- Results do *not* support the hypothesis of migrants exuding more change than residents.

DISCUSSION

- Bird morphology does seem to be changing, possibly as a result of climate change.
- Museum specimens should be used more often as a reference to physical fieldwork to aid and support hypotheses and projects.
- Genetic analyses on museum specimens could provide more fruitful evidence for climate change on wildlife, and other topics.
- Possible confounding variables: # of specimens, limited scope of project, and some specimens not having enough data collected.

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