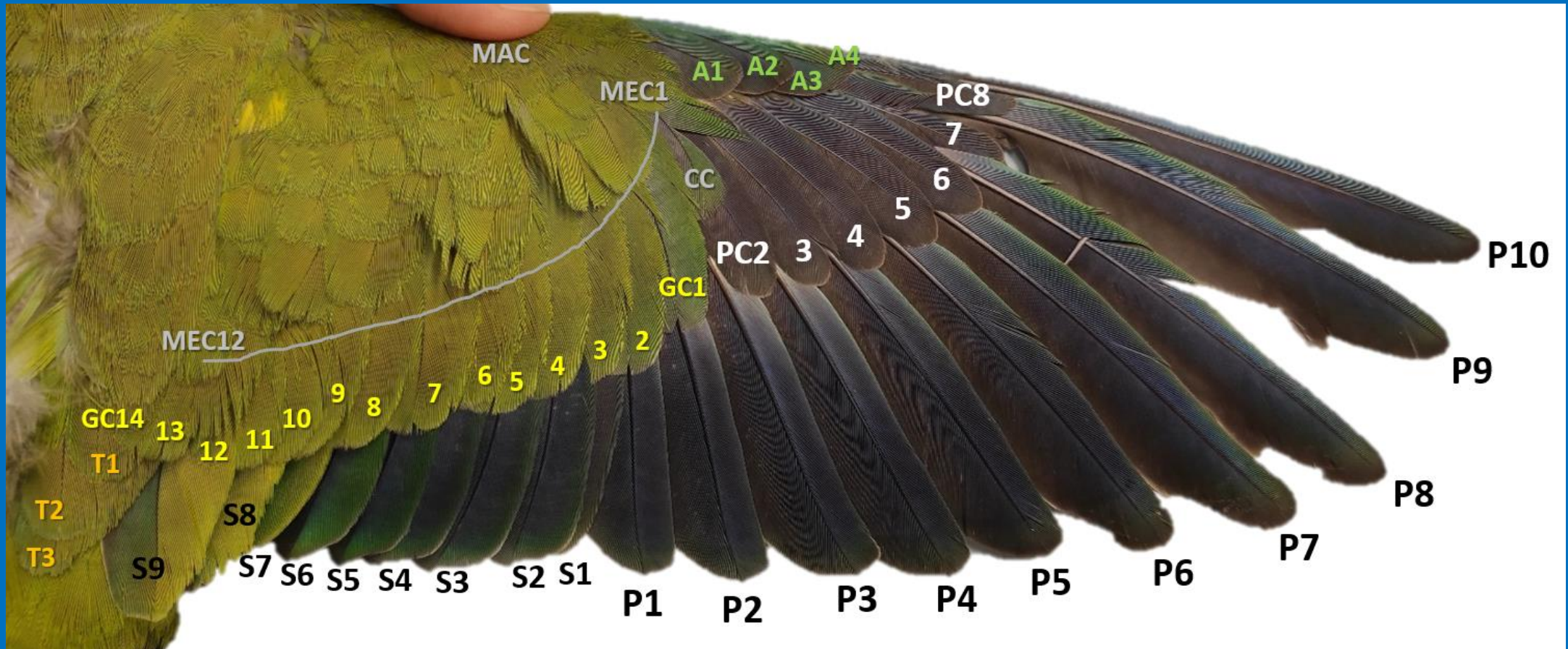


Moult and age determination criteria of the monk parakeet

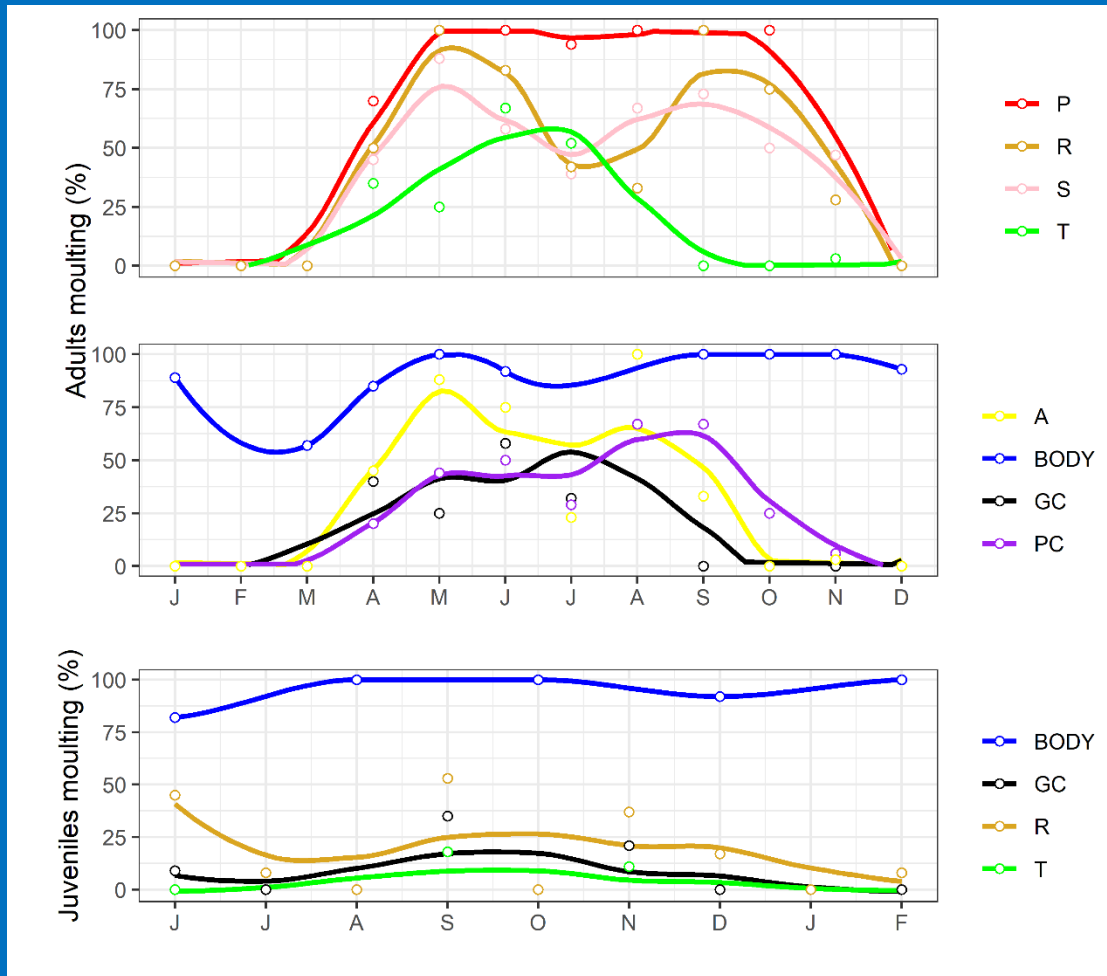
How to use moult to determine the age of a bird species (establishing ageing criteria from scratch)

Guallar et al 2025 Moult and age determination criteria of the monk parakeet (*Myiopsitta monachus*). Animal Biodiversity and Conservation 48

Feather numbering



Phenology



Local polynomial regression (span reduced to provide a more realistic fit)

Duration

Binomial regression using probit model (based on Rothery & Newton 2002. Ibis 144)

One model for moult start, another model for moult end: $y_i \sim a + b \cdot x_i + \varepsilon_i$

Binomial response: moult started/finished

Predictor: Julian date (more predictors can be added)

Error distribution is independent of predictor values

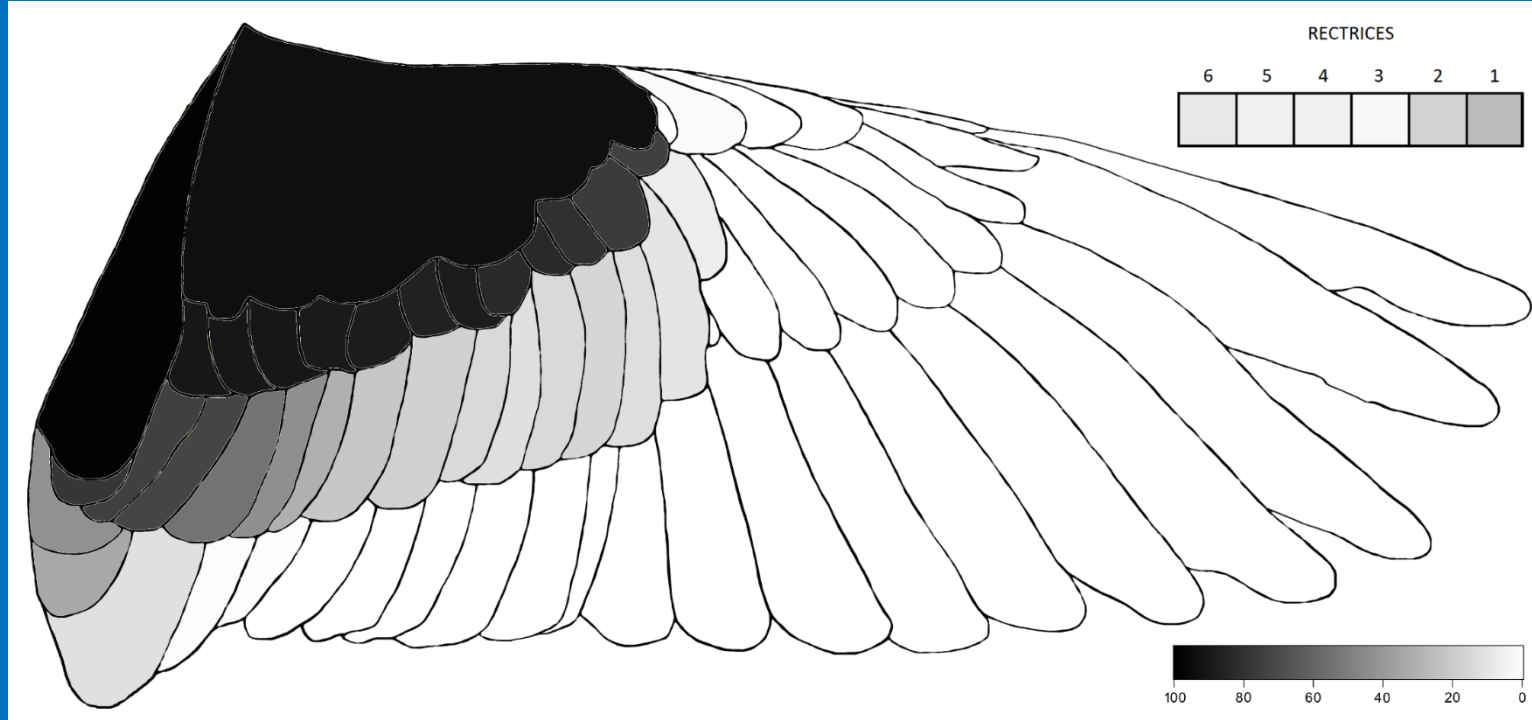
Link function: probit

Estimates: $\mu = -a/b$, $\sigma = 1/b$

Duration: $\mu_{end} - \mu_{start}$

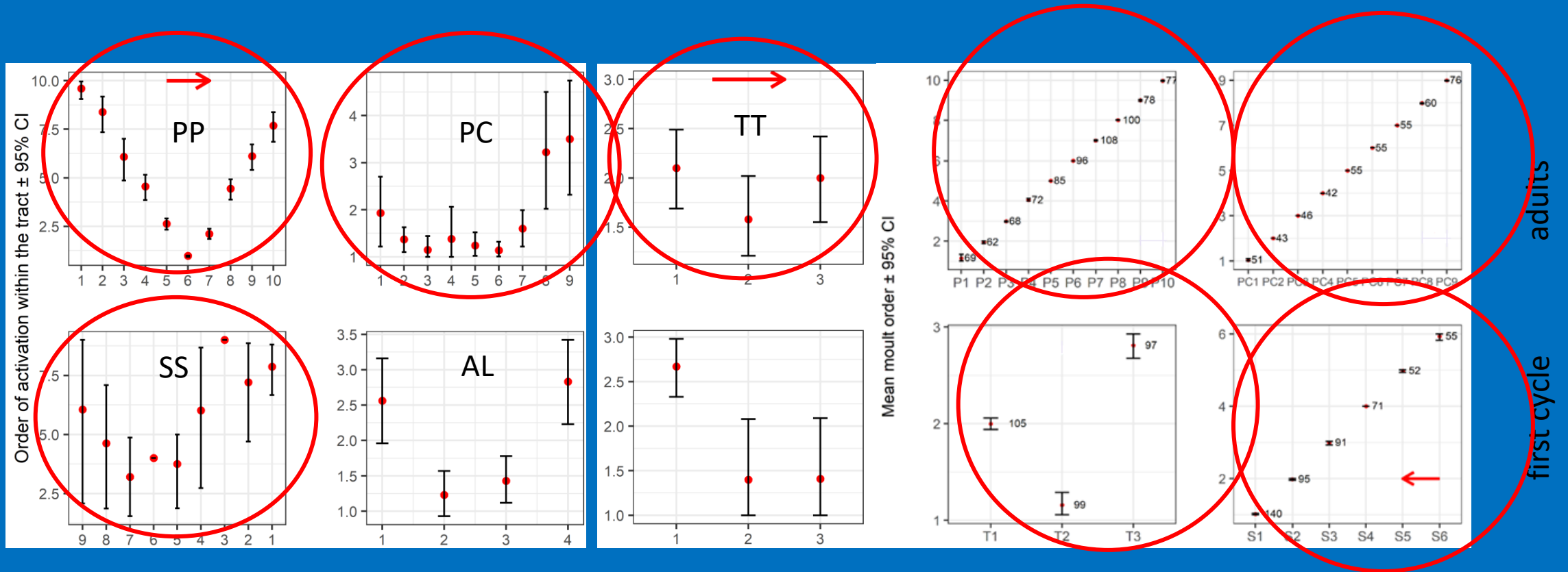
Error: $SE = \sqrt{SE_{end}^2 + SE_{start}^2}$

Frequency of wing-feather replacement



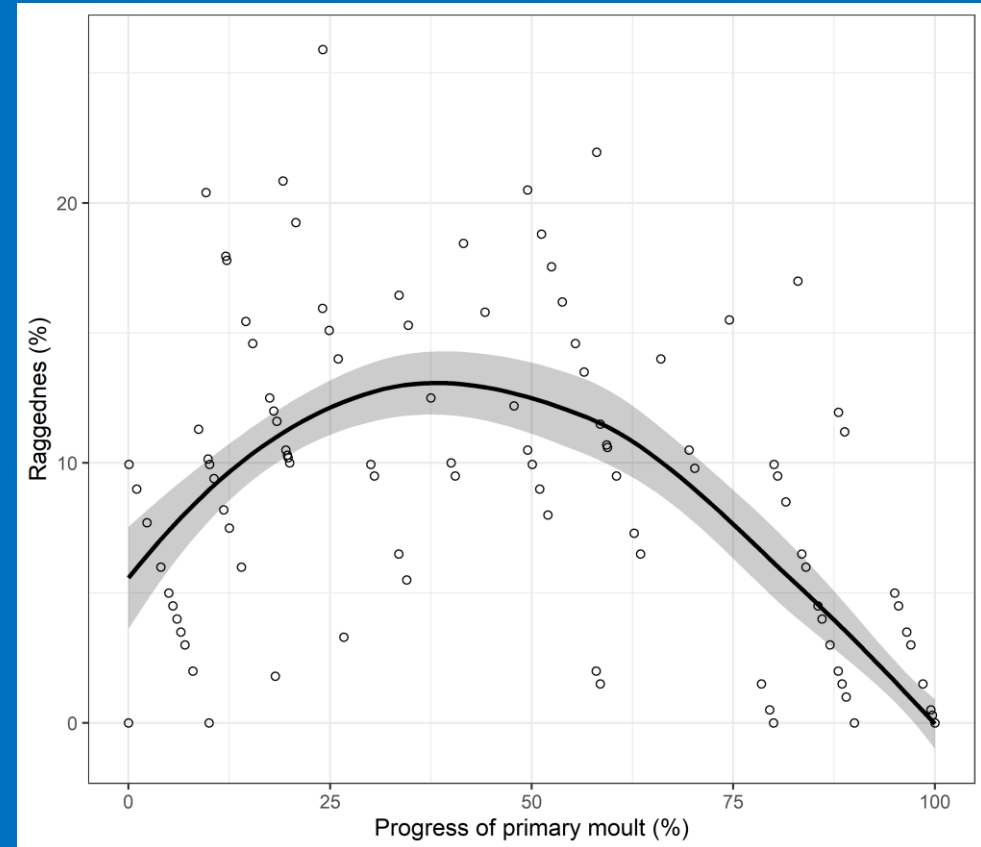
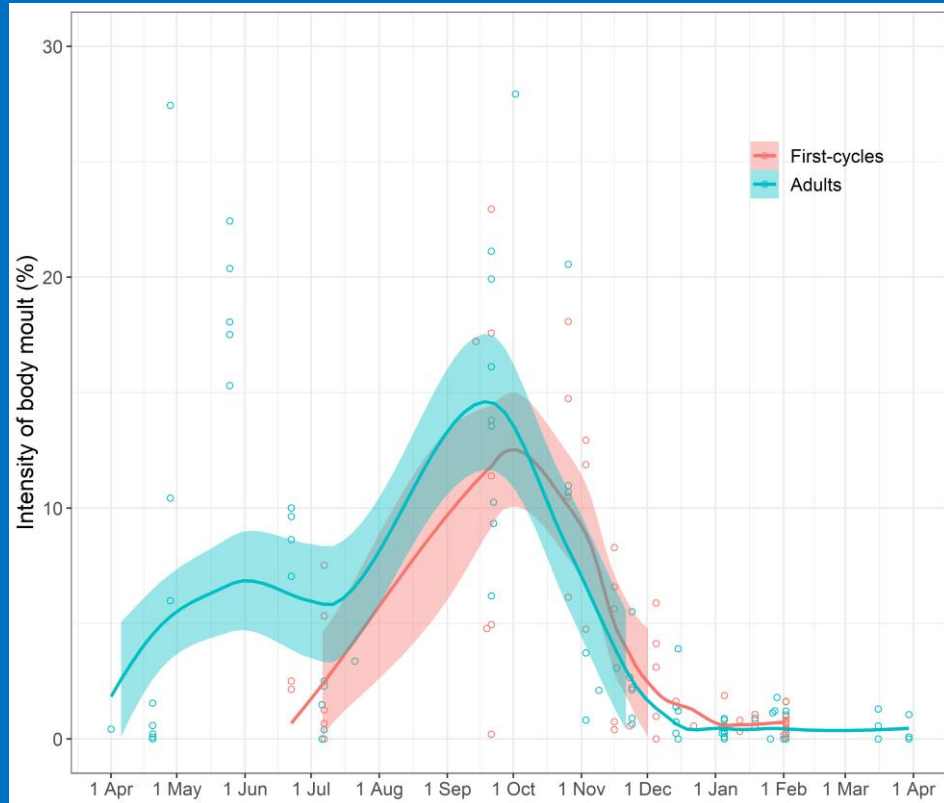
Mean of the scores from the sample of parakeets for each feather (scores: 0= old, 1= new)

Moult sequence



Bootstrap estimates (mean and 95% confidence intervals) obtained from observed order.

Moult intensity



Local polynomial regression (span= 0.5 and 0.75, respectively): growing body feathers and raggedness ($\sum_i(100 - l_i)$)

Alright, but how did you age them anyway?

1. Identification of juvenile characters.

All characters juvenile (before the post juvenile moult) → JUVENILE

1. Juvenile primaries and secondaries in combination of moult limits within secondary coverts (limits within tertials and rectrices frequent too) → FIRST CYCLE

2. Number of primary-covert generations after the first post breeding moult:

i) 7-9 juvenile PCs → SECOND CYCLE

ii) >2 juvenile PCs and 2 generations of adult PCs → THIRD CYCLE

iii) 0-2 juvenile PCs and 3 generations of adult PCs → FOURTH CYCLE

iv) all adult PCs → > FIFTH CYCLE OR OLDER