Estimating the Survival of the Peregrine Falcon in Cape Town

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Data collected by: Andrew Jenkins

Conservation story

- Despite being the fastest animals on Earth, Peregrines faced extinction from a pesticide that caused eggshell thinning.
- This impacted breeding success, which led to a rapid decline of the species.
- Manmade nestboxes were introduced that boosted breeding success among urban Peregrines.
- Survival estimates inform conservation efforts; however, these estimates are outdated.

855 birds tracked since 1997

Breeding pairs: 5 in 1989 → 43 in 2019

Breeding season is from August to December

Peregrine egg | Nestling (1-2 years old) | Juvenile (2-3 years old) | Adult Peregrine (3+ years old)

OUR GOAL: Update survival estimates

How do Peregrines thrive in an urban world?

- While non-breeders move around a lot, breeding Peregrines are territorial and are found nesting on mountains and cliffs.
- Urbanisation moved them inland, with many found nesting on tall buildings in the city.

What we did

Data prep and cleaning

- We worked with data collected by Andrew Jenkins on 855 Peregrines across mountain and city habitats in Cape Town.
- Coloured aluminium rings & SAFRING (ID) bands are used to identify and classify each bird upon resighting.

Created encounter histories

- These are binary encoded strings that record whether or not the bird was seen on a particular encounter occasion, and in what state it was seen (breeding vs not breeding).
- We then inputted these encounter histories into a specialised statistical software called Program MARK. This allowed us to look at 2 types of models: single-state CJS models and multistate models.

Single-state CJS models

0	1	1	0	0	1	1	1	1	1

- Foundation of our analysis. Estimates φ (survival) and p (detection).
- We looked at time and age effects, as well as additive vs interactive model structures.
- Key assumptions: no tag loss or misidentification, homogenous survival and detection probabilities and independence of fates.

Multi-state models

0	N	N	0	B	B	0	B	B	B

- Captures the transitions between non-breeders and breeders. Estimates ψ (transition probability) in addition to survival and recapture probabilities.
- Additional key assumption: homogenous transition probability across birds.

φ ψ P

What we found

High adult survival = population stability
Breeding adults have high apparent survival

Younger non-breeders struggle to survive
Survival improved with age

Detection mirrors behaviour
Breeders are easy to spot (fixed territories) Non-breeders roam widely.

Population reached equilibrium
Rapid growth→ stability

Early recruitment
Most birds start breeding between 2-4 years old

Nest boxes are still in use
They continue to support their balanced population

Our day in the field :