

Line of sight: simulated aerial avian predators can reduce problematic bird fly-overs of airfields.

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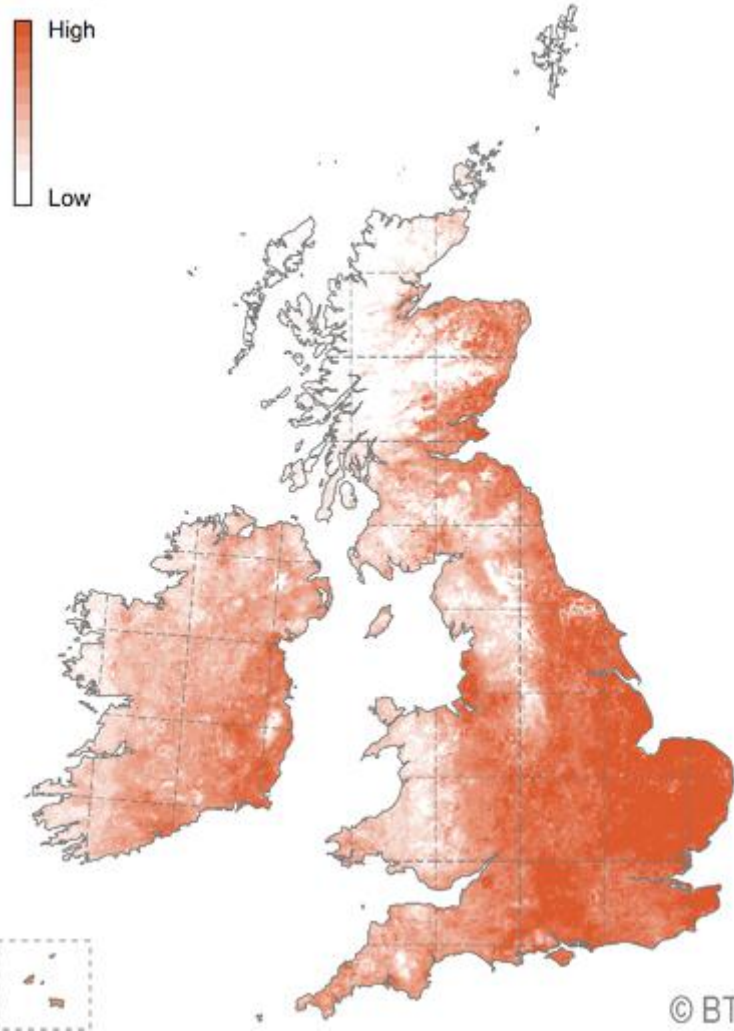
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Wood Pigeon (*Columba palumbus*)

Breeding Relative Abundance 2008–11



Wood Pigeon (*Columba palumbus*)



Widespread and highly abundant in Ireland

- Estimated population of approximately two million and eight million breeding birds, respectively (Gibbons et al. 1993, Newson et al. 2005).

Extensive and varied diet

- Grains of cereal crops Summer / Autumn
- Fruit & seed of trees in Winter / Spring
- Introduction of oilseed rape (*Brassica napus*)

Weight \geq 500g

- One of the largest biomass of any wild bird found in Ireland and Great Britain.

Casement Aerodrome Ireland

- ▶ Operates a range of rotary and fixed wing aircraft
- ▶ Training field
- ▶ Bird Control is operated and managed by contractor;
- ▶ Bird Control Ireland Ltd



Irish Air Corps



Casement Aerodrome & Farmland, County Waterford

Dominant crops in both locations Winter Barley & Winter Wheat



Overflights by Wood Pigeon

Predominantly East to West- Morning
Predominantly West to East - Afternoon



Methods 1

Aerodrome Fields for Study

Pigeon flight line ←



- ▶ Flight line position assessed 60 min twice daily, three weeks.
- ▶ Threshold ≥ 50 Wood Pigeon / hour
- ▶ 3 sites 2012 and 2013.
- ▶ Sites were examined for 2 or 4 day periods.
- ▶ Kite treatment after Control trials
- ▶ Trials lasted 3 – 4 hours

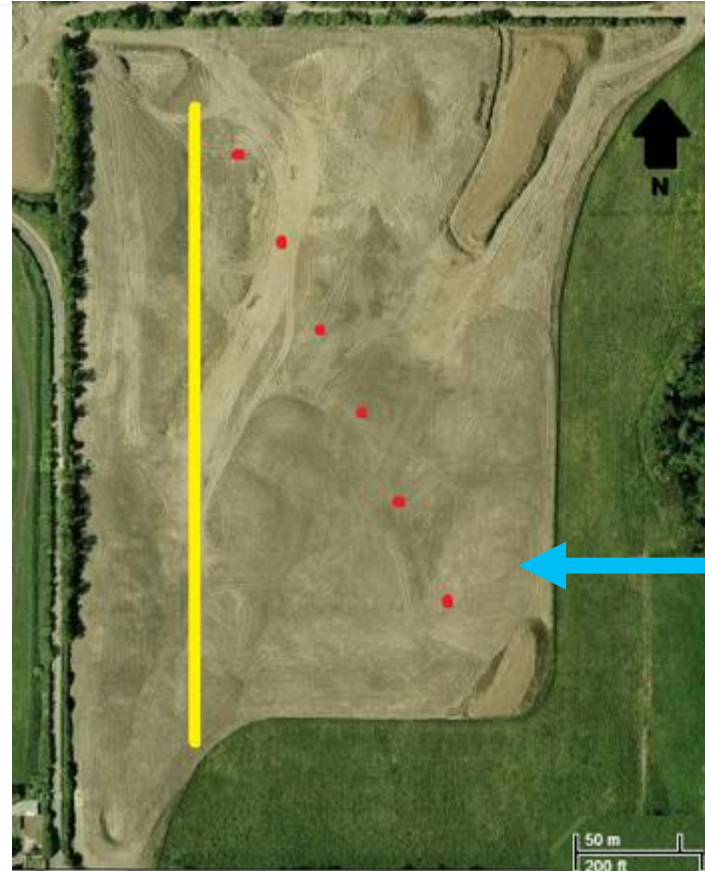
Methods

West of 23 Apr

East of 23 Apr

Kites indicated • Plane of Observation —

Kites indicated • Plane of Observation —



Simulated Predator

10 m telescopic pole tethered to wooden post. 8m kite line

- Max possible height 18m



“Hawk Kite” ultra light weight Icarex and carbon fibre. Self launching





- ▶ Kite poles deployed 2 days in advance of trials
- ▶ 6 Kites deployed, 50m apart
- ▶ Single observer 100m distant, clear line of sight 500m
- ▶ Observation 30min after kite deployment
- ▶ Height $>30\text{m}$ or $\leq 30\text{m}$ estimated relative to fixed reference points

Pigeon evasion behavior

- ▶ Evasion only observed when kites deployed
- ▶ **U Shape Flight-** Turned around & vacated in direction of arrival
- ▶ **Protean Flight-** Flight through the kite line performing anti predator movement
- ▶ **S Shaped Flight-** Altered flight, along line of kites until passed then resumed original direction
- ▶ **Increased elevation**
- ▶ **Decreased elevation**
- ▶ (Fennessy *et al.* 2005)(Kelly *et al.* 2001)



DATA ANALYSIS

- ❑ R Statistical Analysis Software
- ❑ Non-normal distribution of the data

- ❑ Number of pigeons overflying per hour was square root transformed & analysed using Linear Mixed Effects Models (LMM)
- ❑ Proportion of wood pigeon flying below 30m was assessed with a Generalized Linear Mixed Model (GLMM).
- ❑ Proportion of pigeons performing evasive behaviours was likewise assessed with a GLMM, with respect to height ($\leq 30\text{m}$ & $\geq 30\text{m}$)

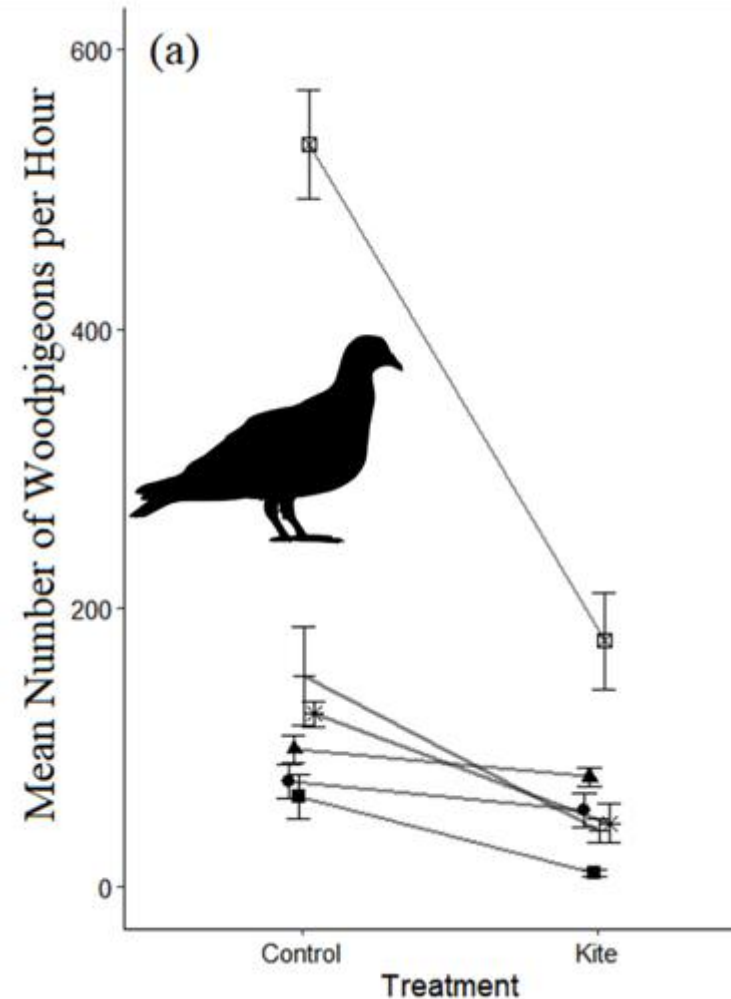
- ❑ Fixed Factors = Treatment type (Kite or No kite) or flight height
- ❑ Fixed Factors included = Trial date and Trial Year

- ❑ Random Effect = Site ($n = 5$)
- ❑ P values calculated using the likelihood-ratio test ($\alpha = 0.05$)

► Results 1

Reduced Mean (\pm SE) Fly Overs by Wood Pigeons on Hourly Basis

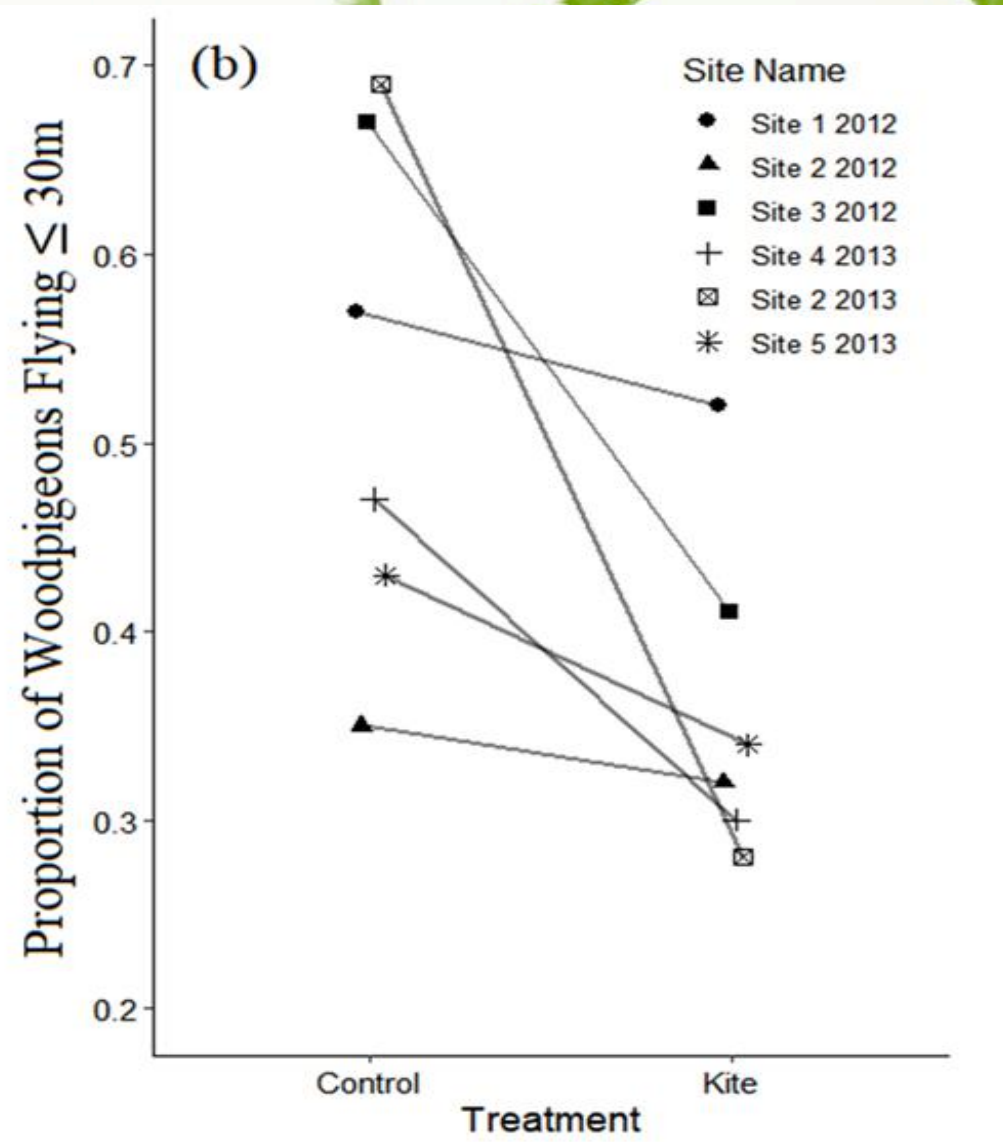
- Overall from 178.37 / hour (\pm 29.98) to 70.69 / hour (\pm 11.01) $P < 0.001$
- Re analysis excluding site 2, 2013
- From 105.07 / hour (\pm 11.88) to 48.79 / hour (\pm 5.76) $P < 0.001$



Results 2

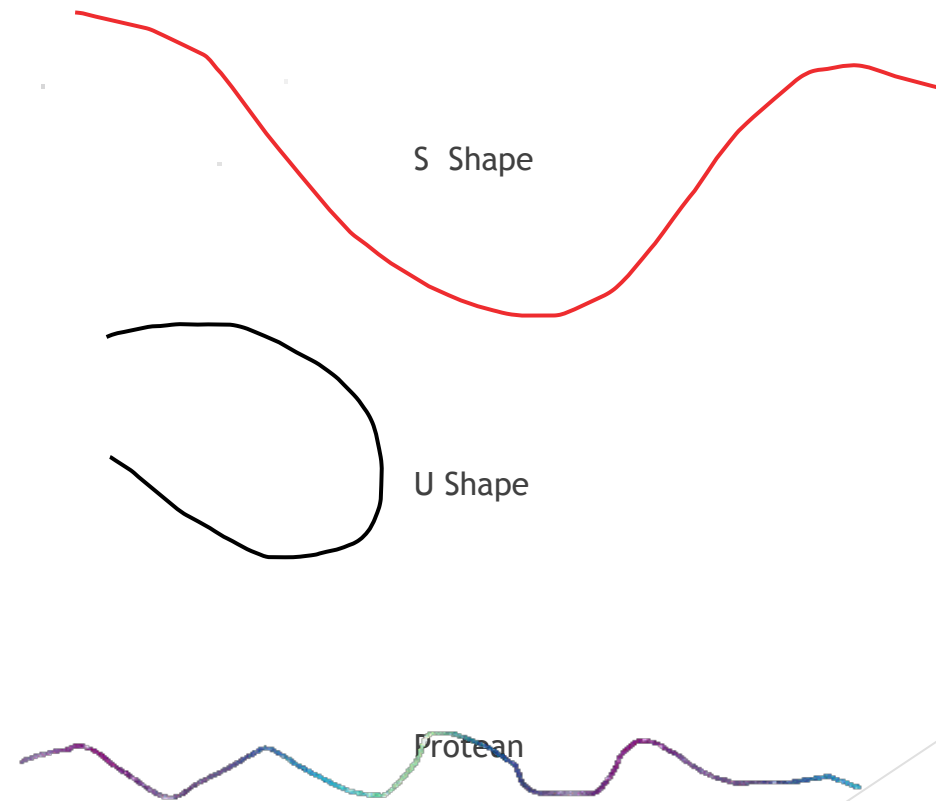
Proportion of Wood Pigeon flying at heights $\leq 30\text{m}$ decreased in presence of hawk kites

$P < 0.001$



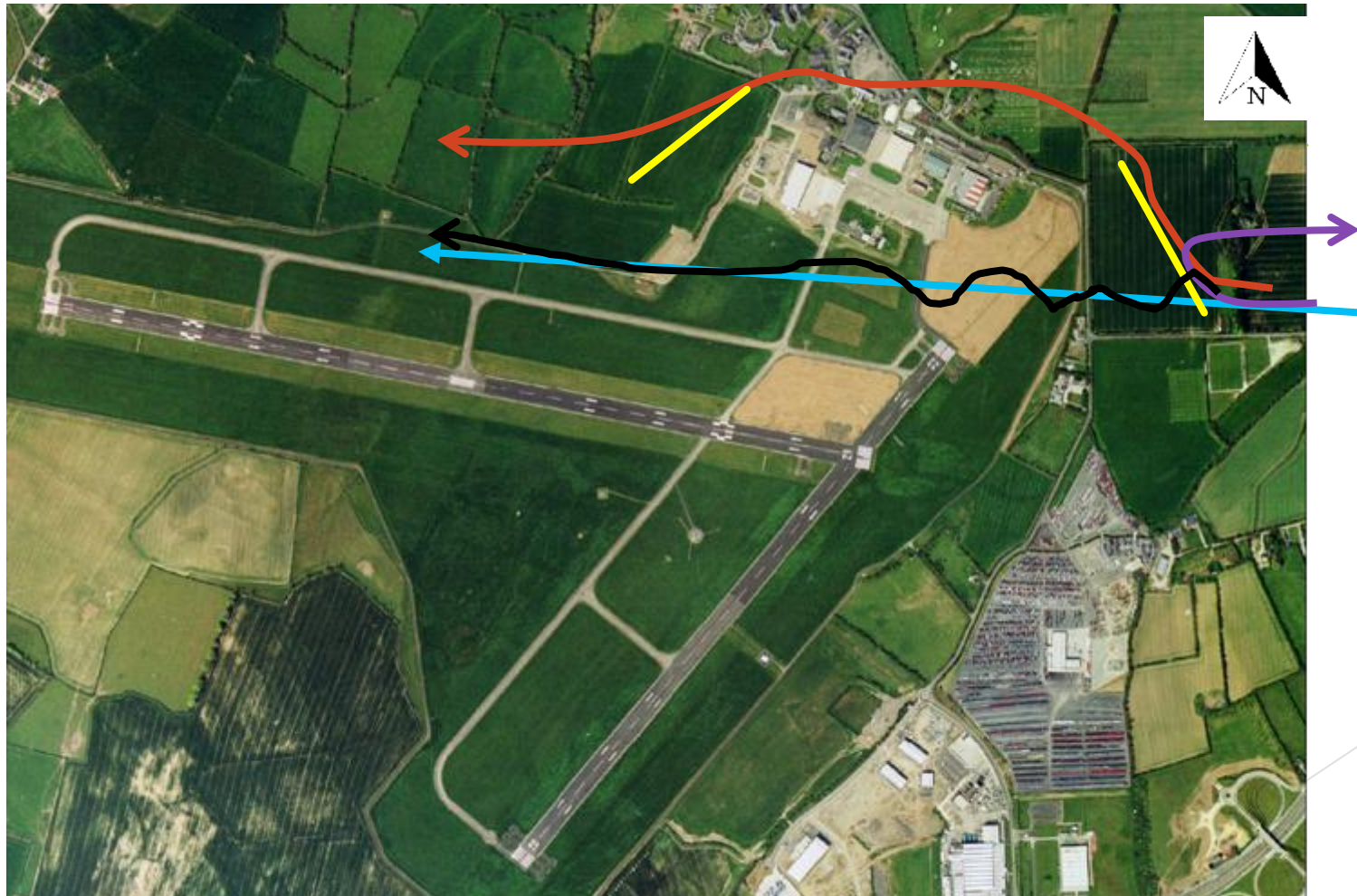
Results 3

- ▶ 52 % of all Wood Pigeon that crossed the site performed an Evasive behaviour.
- ▶ Evasive behaviour more frequent $\leq 30M$ (69%) than those $\geq 30M$ (50%) $Z= 15.11; P<0.001$
- ▶ Those that displayed evasive behaviors;
- ▶ 60 % performed S shape
- ▶ 20% performed U shape
- ▶ 9 % performed Protean



Indication of Wood Pigeon movement from the East

No Kites  With Kites, S Shaped  With Kites, Protean 
With Kites U Shape  Kite Line 



Pole support and Kite storage, Dublin Airport

- ▶ Preliminary Results
- ▶ Significant reduction in overflights
- ▶ Fly Overs under $\leq 30\text{m}$ Reduced
- ▶ Alteration of flight paths and anti predator displays
- ▶ Hawk Kite deployment at Casement aerodrome has proven useful



Advantages / Disadvantages



- ▶ Inexpensive
- ▶ Easily managed
- ▶ Materials available locally
- ▶ Person assigned
- ▶ Habituation
- ▶ Not for all birds, corvids gull species
- ▶ Each aerodrome is different
- ▶ Further research kite height, spacing, kite size, different kite types.

- ▶ Fennessy, G., S. Sheehy, T. C. Kelly, M. J. A. O'Callaghan, and R. Bolger. 2005. Over-flying of birds at an airport: developing a methodology. *Proceedings of the International Bird Strike Committee* 27:1–6.
- ▶ Harris, R. E., and R. A. Davis. 1998. Evaluation of the efficacy of products and techniques for airport bird control. Aerodrome Safety Branch, Transport Canada, Ottawa, Canada.
- ▶ Kelly T. C., M. J. A. O'Callaghan, and R. Bolger. 2001. The avoidance behaviour shown by the rook (*Corvus frugilegus*) to commercial aircraft. Pages 291–229 in H. J. Pelz, D. P. Cowan, and C. J. Feare, editors. *Advances in vertebrate pest management II*. Filander Verlag, Fürth, Germany.
- ▶ *Human-Wildlife Interactions* 14(3):Early Online, Winter 2020 • digitalcommons.usu.edu/hwi

Thank You

