Response of birds to UAS approach: implications for hazing applications

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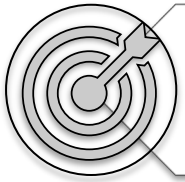
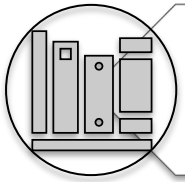
Bird Strike Committee USA Meeting 2022

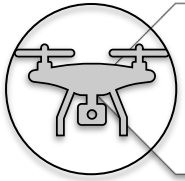
Drone hazing applications



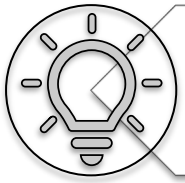
Management goals



Antipredator theory



Perceived risk is influenced by…

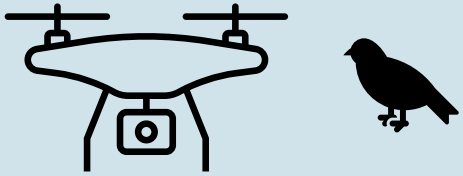


Behavioral metrics for future studies

Drone hazing applications

Agriculture

Natural resources

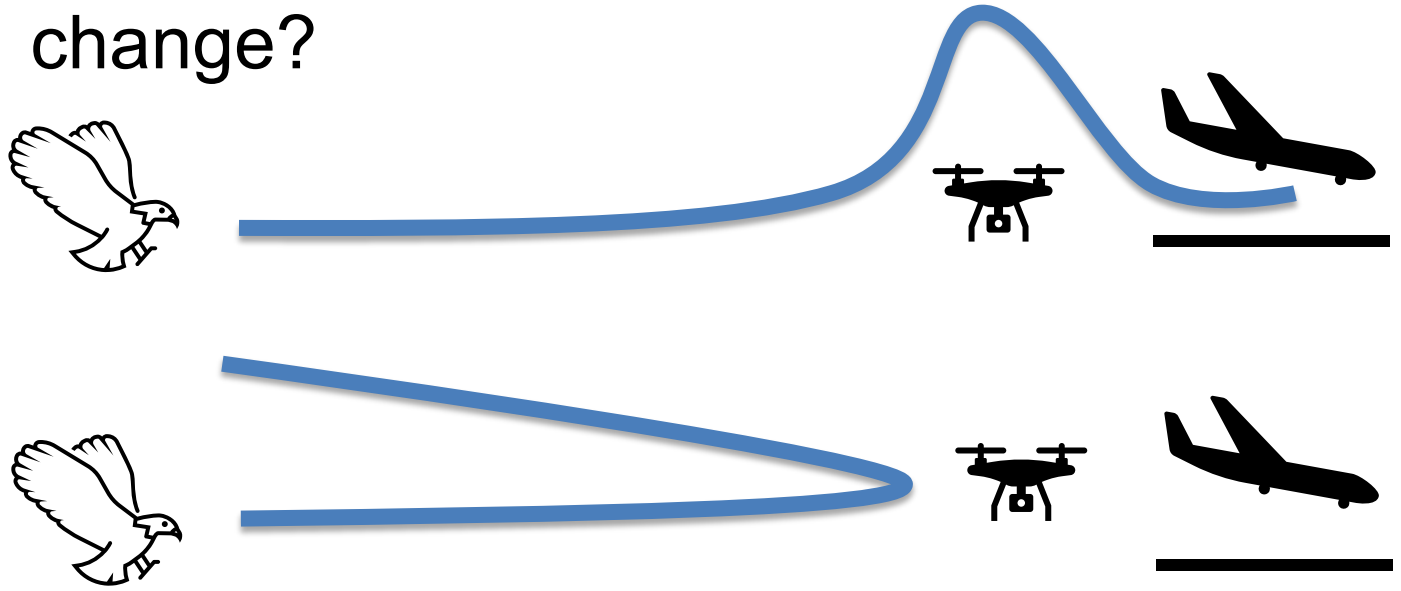


Property

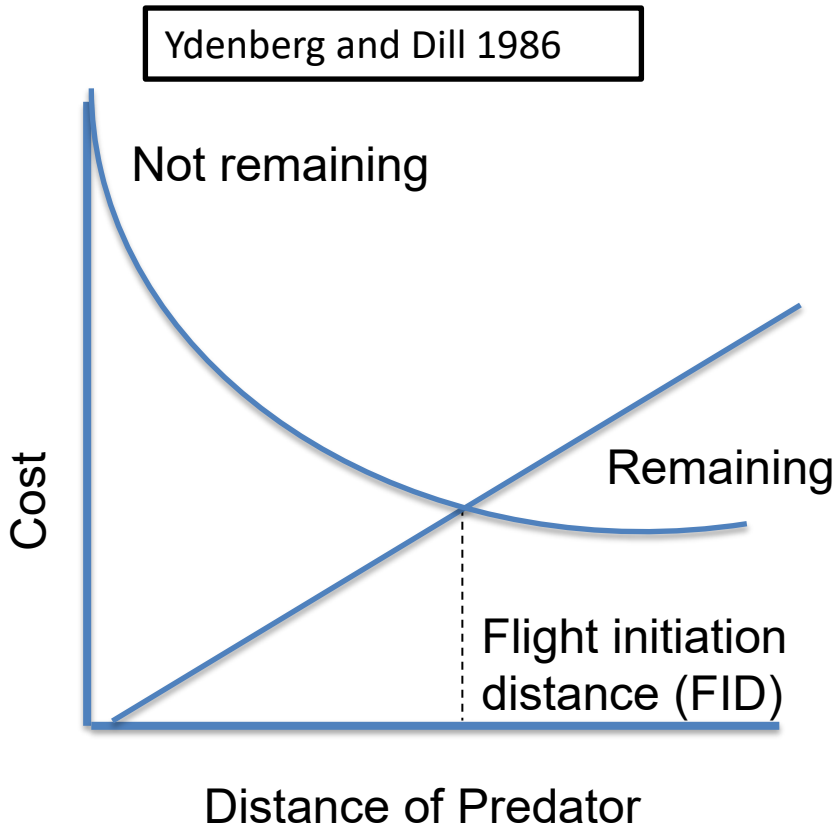
Human health and safety

Management goals

- Clear definition of what is “success”
  - To what extent must the animal’s behavior change?

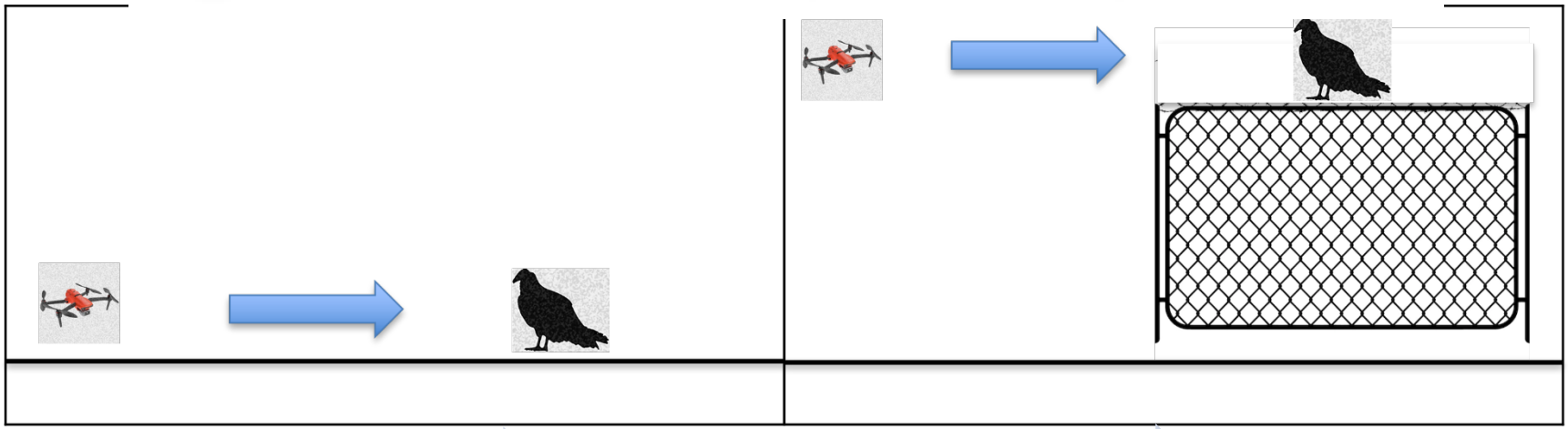


Antipredator theory



- Economics of prey escape decisions
- Limitations to vehicle applications (Lunn et al. 2022)
- Best available framework

Antipredator theory



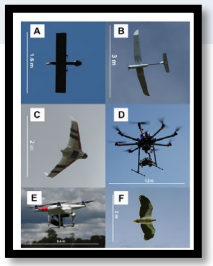
Increased perceived risk → Greater FID

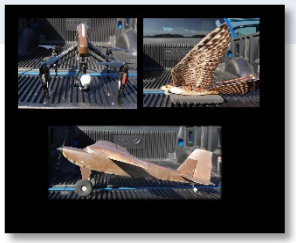
Decreased perceived risk → Smaller FID

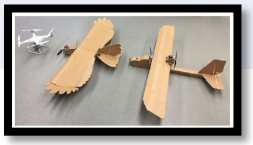
Perceived risk is influenced by…

Response	Waterbirds McEvoy et al. 2016	Vultures Pfeiffer et al. 2021	Passerines Egan et al. 2020
Highest escape response	Delta shaped fixed-wing	Multirotor and fixed-wing	Predator
Fastest reactions	Not measured	Fixed-wing	None
Fewest birds remaining	Not measured	Multirotor	Not measured
Greatest FID	Not measured	None	Not measured

Drone type







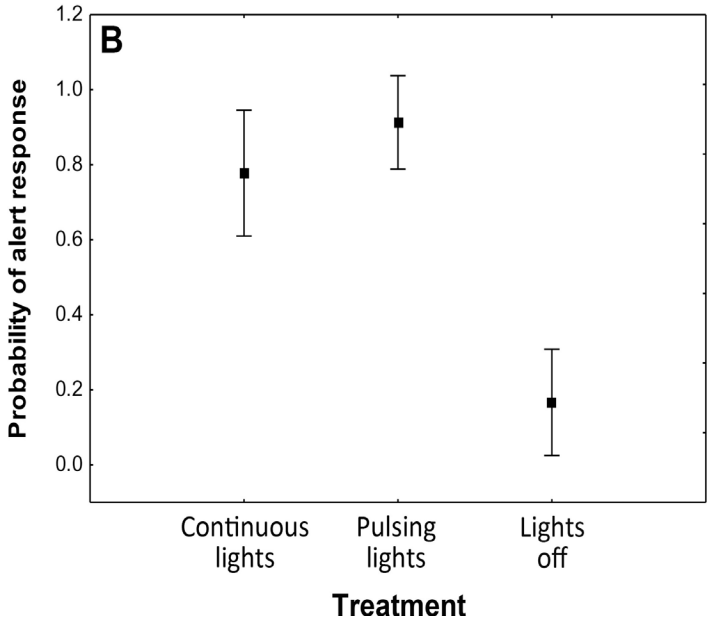
Perceived risk is influenced by…

Enhancing drone type

Geese alerted sooner with pulse light (Blackwell et al. 2012)

Cowbirds were more likely to become alert with lights (Doppler et al. 2015)

Blackwell et al. 2012

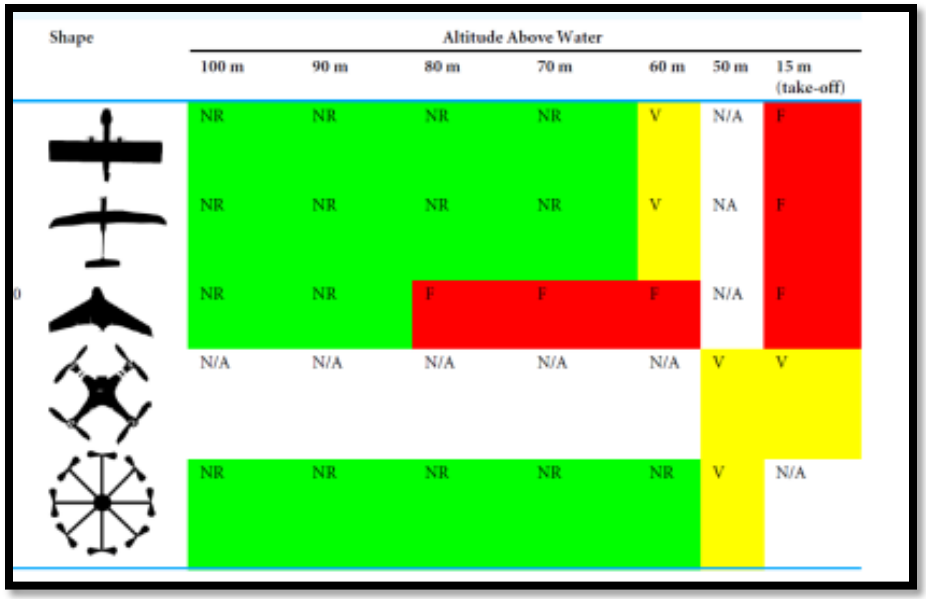


Doppler et al. 2015

Perceived risk is influenced by…

Altitude

Lower altitudes were perceived as riskier in terms of higher escape reactions, but not as measured by FID



Shape	Altitude Above Water						
	100 m	90 m	80 m	70 m	60 m	50 m	15 m (take-off)
	NR	NR	NR	NR	V	N/A	F
	NR	NR	NR	NR	V	NA	F
	NR	NR	F	F	F	N/A	F
	N/A	N/A	N/A	N/A	N/A	V	V
	NR	NR	NR	NR	NR	V	N/A

Figure from McEvoy et al. 2016. Also see: Collins et al. 2019; Egan et al. 2020; Weston et al. 2020; Pfeiffer et al. 2021

Perceived risk is influenced by…

Angle of approach

90° approaches were perceived as riskier than other angles to waterbirds (Vas et al. 2015)

0° approaches were perceived as riskier than overhead to vultures (Pfeiffer et al. 2021)

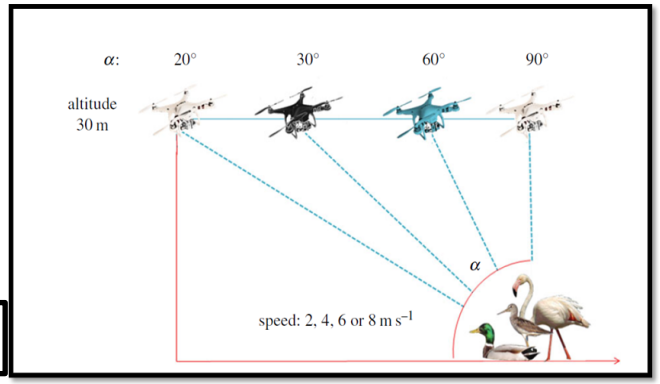


Figure from Vas et al. 2015

Perceived risk is influenced by…

Angle of approach

Video Wildlife Services New York

Perceived risk is influenced by…

Starting distance

Higher probability of escape when launched closer

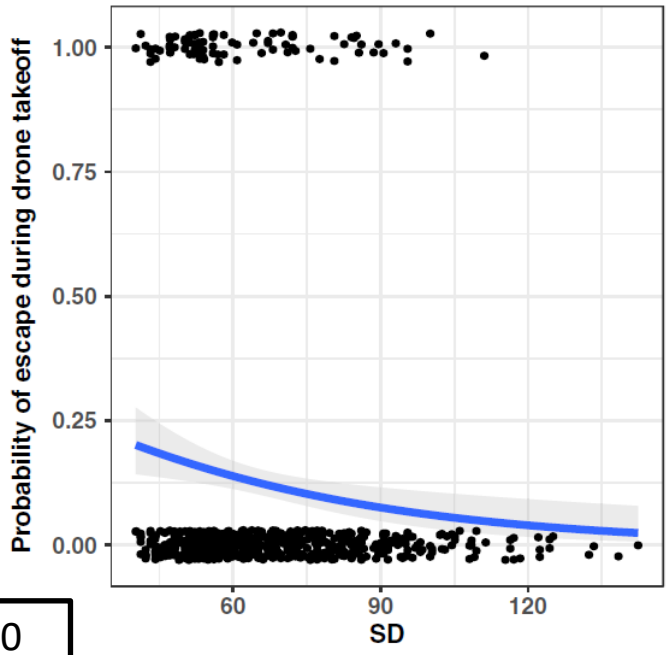


Figure from Weston et al. 2020

Perceived risk is influenced by…

Context

Waterbirds responded more in coastal/AG than lochs (Jarrett et al. 2020)

Gulls initiated escape at night, but continued to nest (Pfeiffer et al. *in prep*)

Figure from Pfeiffer et al. *in prep*

Perceived risk is influenced by…

Flock characteristics

Information exchanged about vehicle approach (Blackwell et al. 2019)

Vultures did not weigh escape decisions by flock number (Pfeiffer et al. 2021)

Waterbird flocks >25 birds were more likely to react (Jarrett et al. 2020)

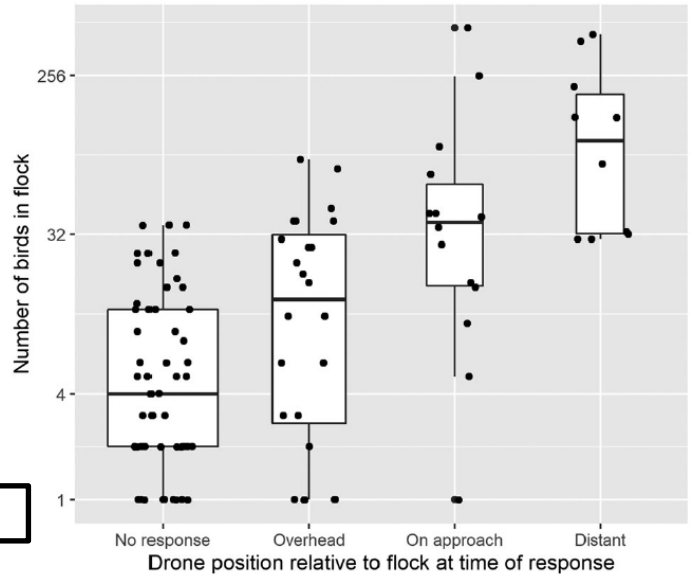
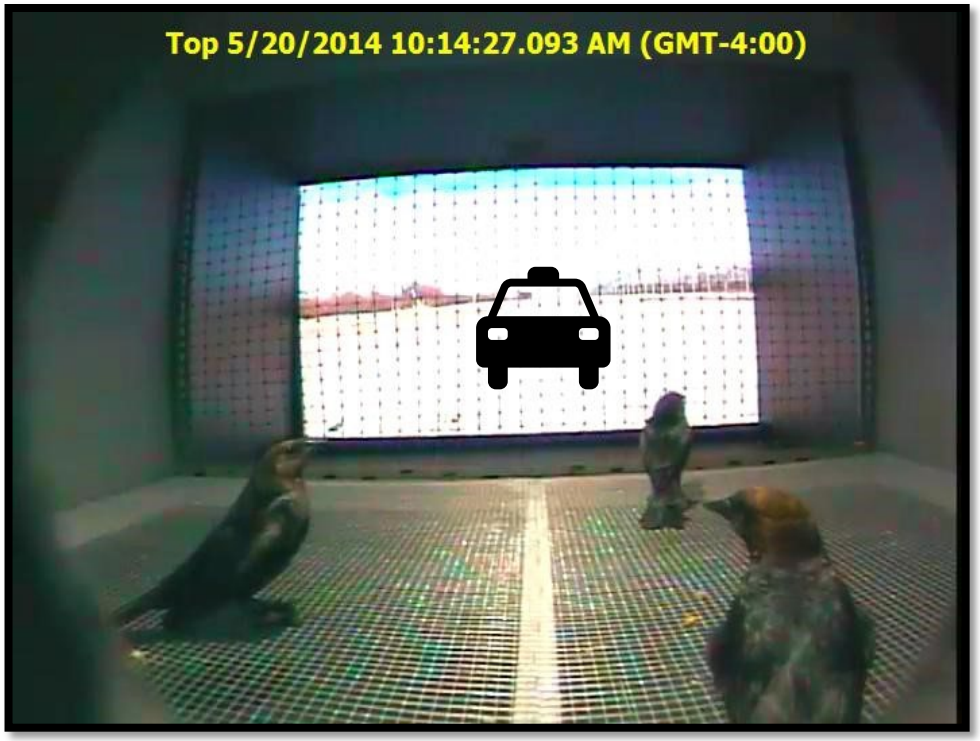


Figure from Jarrett et al. 2020

Perceived risk is influenced by…

Individual variation



DeVault et al. 2017; 2018

Behavioral metrics for future studies

- Probability of reaction and alert (Yes/No)
- Reaction and alert time
- Flight-initiation distance
- Bird remaining index
- Latency to return

4. Species counts *after* treatment

General gull reaction: ☐No reaction ☐All flush ☐Half flush ☐ ¼ flush ☐Other:		
#HERG:	#RBGU:	#Gull spp:
Time gulls return to treatment area:		

Behavioral metrics for future studies

Future directions

- Interactions of factors on bird response
- Context of management goals
- Flock escape patterns

Behavioral metrics for future studies

Future directions

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Ohio Field Station

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