

# **Aims and extent of bird strike prevention by lethal control on international airports**

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## Bird strikes

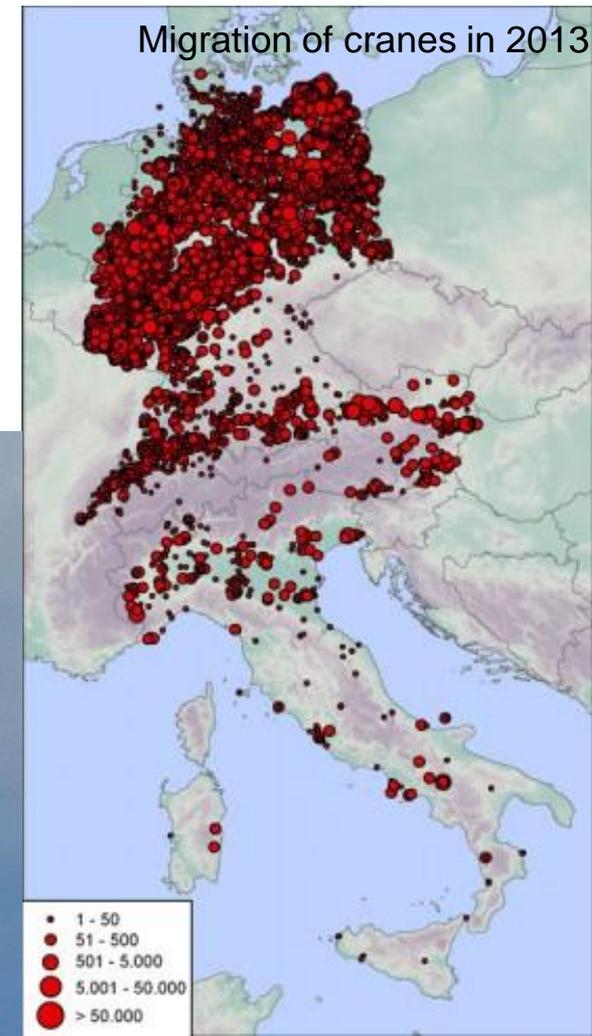
- Since the beginning of aircraft, at least 257 persons died due to bird strikes and 108 civil aircrafts were destroyed (Thorpe 2012)
- Bird strikes cost 1.2 billion USD worldwide annually (Belant & Martin 2011).



## Strike numbers increased in the last 20 years due to:

(Dolbeer & Eschenfelder 2003, Cleary & Dolbeer 2005, Dolbeer et al. 2014b)

- increase in aircraft movements
- use of larger, faster and quieter aircrafts
- population increases of large birds in Europe and the US
- better reporting



# Reporting of bird strikes

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- Reported bird strikes:
  - Pilot reports bird strike
  - Damage to aircraft due to birds found by maintenance personnel
  - Ground personnel reports observation of bird strike

Switzerland: about 2 reported strikes per 100.000 aircraft movements

- Unreported bird strikes:
  - carcass found within active airfield; no other cause of death

**Problem with unreported bird strikes:  
Birds can die on airfield e.g. from turbulences at start**



## Risk of birdstrikes

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- The probability of bird strikes increases with the birds' body mass
- In civil aviation bird strikes occur: (Dolbeer 2006, Dolbeer et al. 2014)
  - within 150 meters off the ground – thus close to the airport (75%)
  - during landing phase (61%)
  - during daylight (62%).

Thus, different management measures are taken at airports to reduce the risk of bird strikes.



# Management techniques

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Main categories of management techniques are:

- 1) habitat management and exclusion
- 2) repellents
- 3) population management

Our study focused on lethal control as management technique

## Sources:

1 book, 52 publications (21 reviewed), 19 proceedings, 11 management syntheses, questions to bird strike experts

**But:** only 8 peer-reviewed publications about shooting



### **Lethal control:**

- To what extent birds are killed on airports all over the world?
- What are the aims of killing birds at airports?
- What effects does the killing have on bird populations?
- Does killing reduce bird strike rates?

Objective answer about effects of shooting is difficult, as airports fear negative publicity when publishing numbers of birds shot



## Shooting of birds

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Shooting of birds at airfields serves two mainly independent approaches:

1. **reducing population density** of hazardous birds to reduce the strike risk (not aimed on a specific airport)
2. **reinforcement of non-lethal techniques**, where habituation occurs

Reduce the presence of the **most hazardous** species

- This is not necessarily the species most frequently struck, or the one causing the greatest damage, but the species that gets struck frequently and causes substantial damage.



# 1. general population management

Only two reviewed cases of shooting as a general population management tool:

- Canada Geese (USA)
- Laughing Gulls (colony near JFK airport)



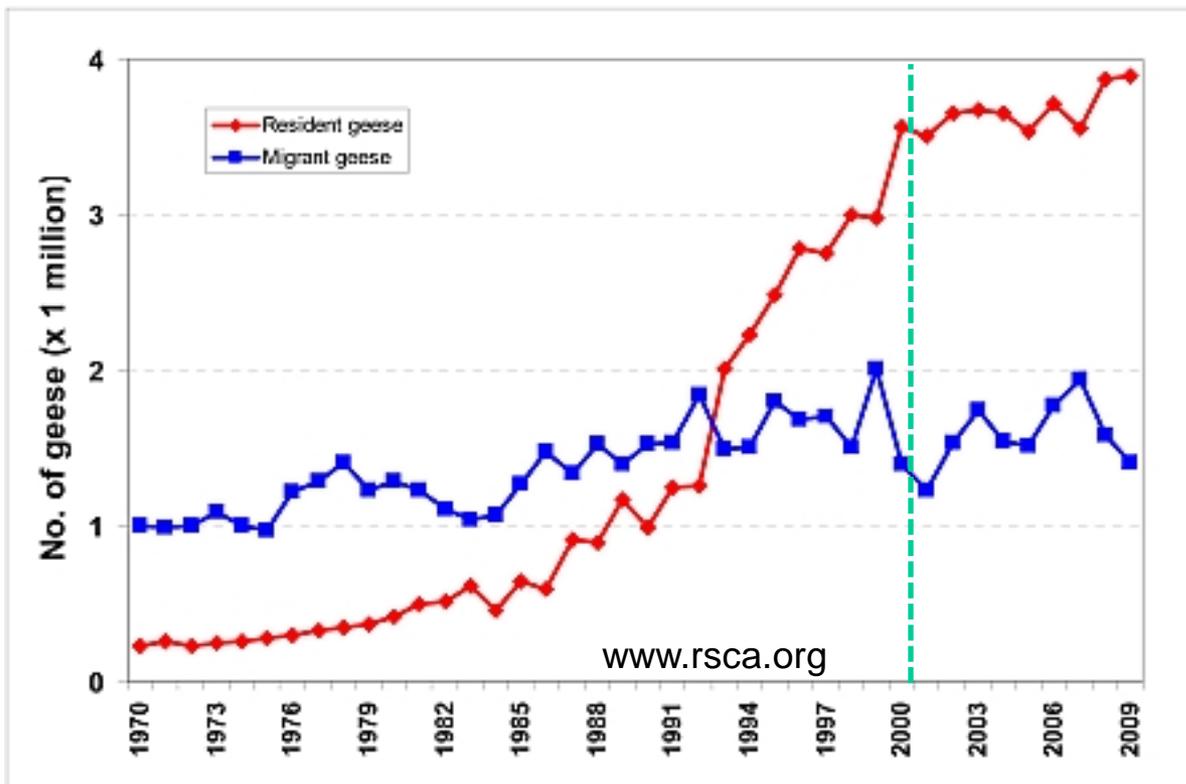
Marcel Burkhardt

Emergency landing  
on Hudson river due to strike  
with Canada Goose

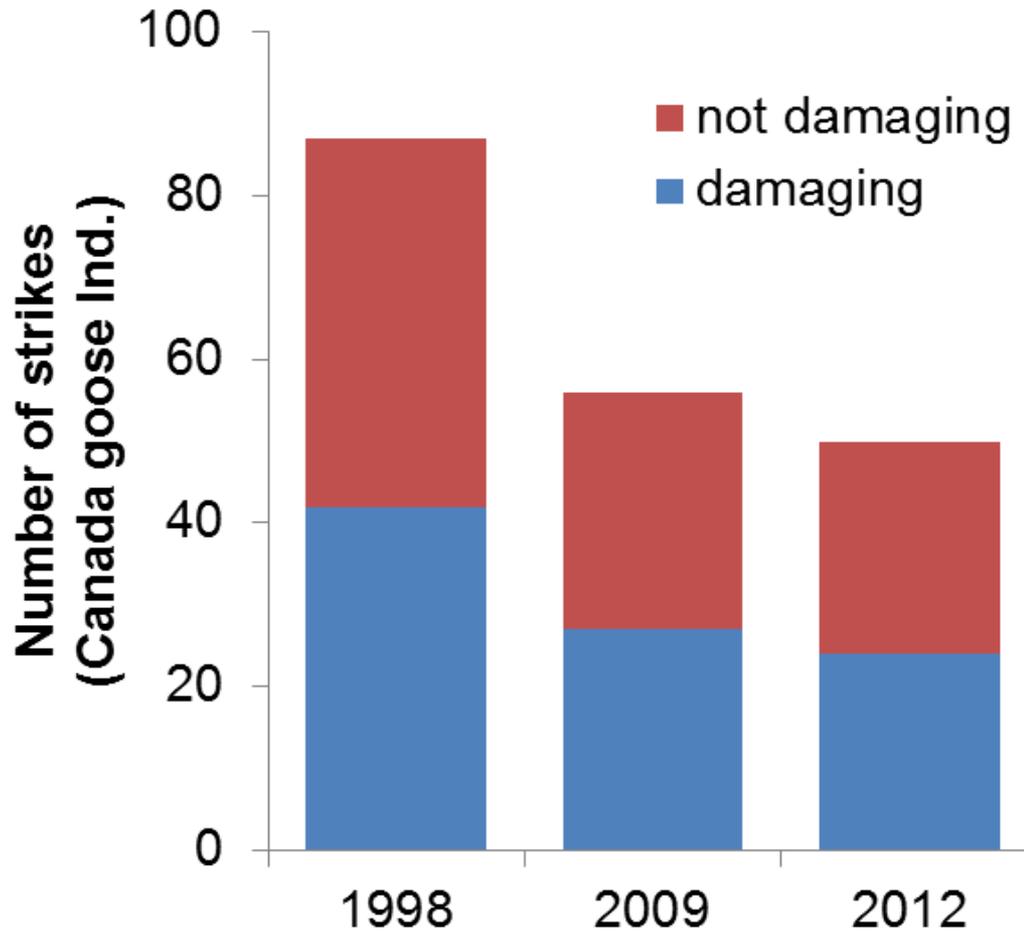


# 1. general population management - Canada Goose

- 3.1% of bird strikes, but 19.5% of damages and 29.1 % of costs (1990-2012)
- Strong population increase in USA (1970-2012: 4.5 fold)



# general population management – Canada Goose



- 4 millions Canada Geese shot in USA between 2001-11

- Bird strikes decreasing  
(Dolbeer et al. 2014)



## Positive effect of killing geese on strike number?

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### But:

- airports improved wildlife management during this time. Habitat management is said to be more effective
- the impact on geese population is massive compared to its effect on strike number
- after the Hudson flight 5000 local geese were killed, although Canada Goose leading to the bird strike stemmed from migratory populations (Marra et al. 2009)



## 2. general population management - Laughing Gulls

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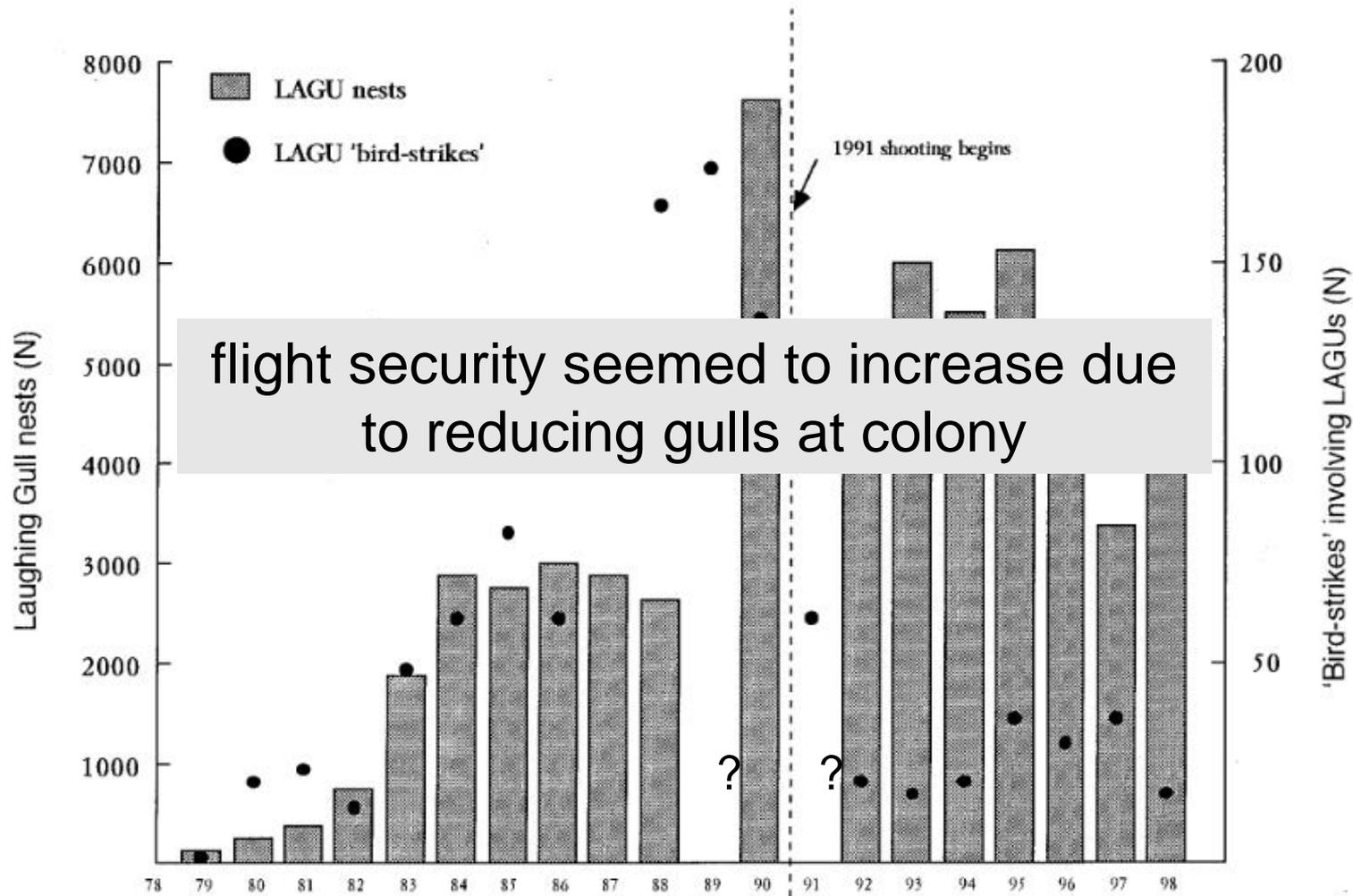
### Longterm experimental results near JFK airport

(Brown et al. 2001, Dolbeer et al. 2003)

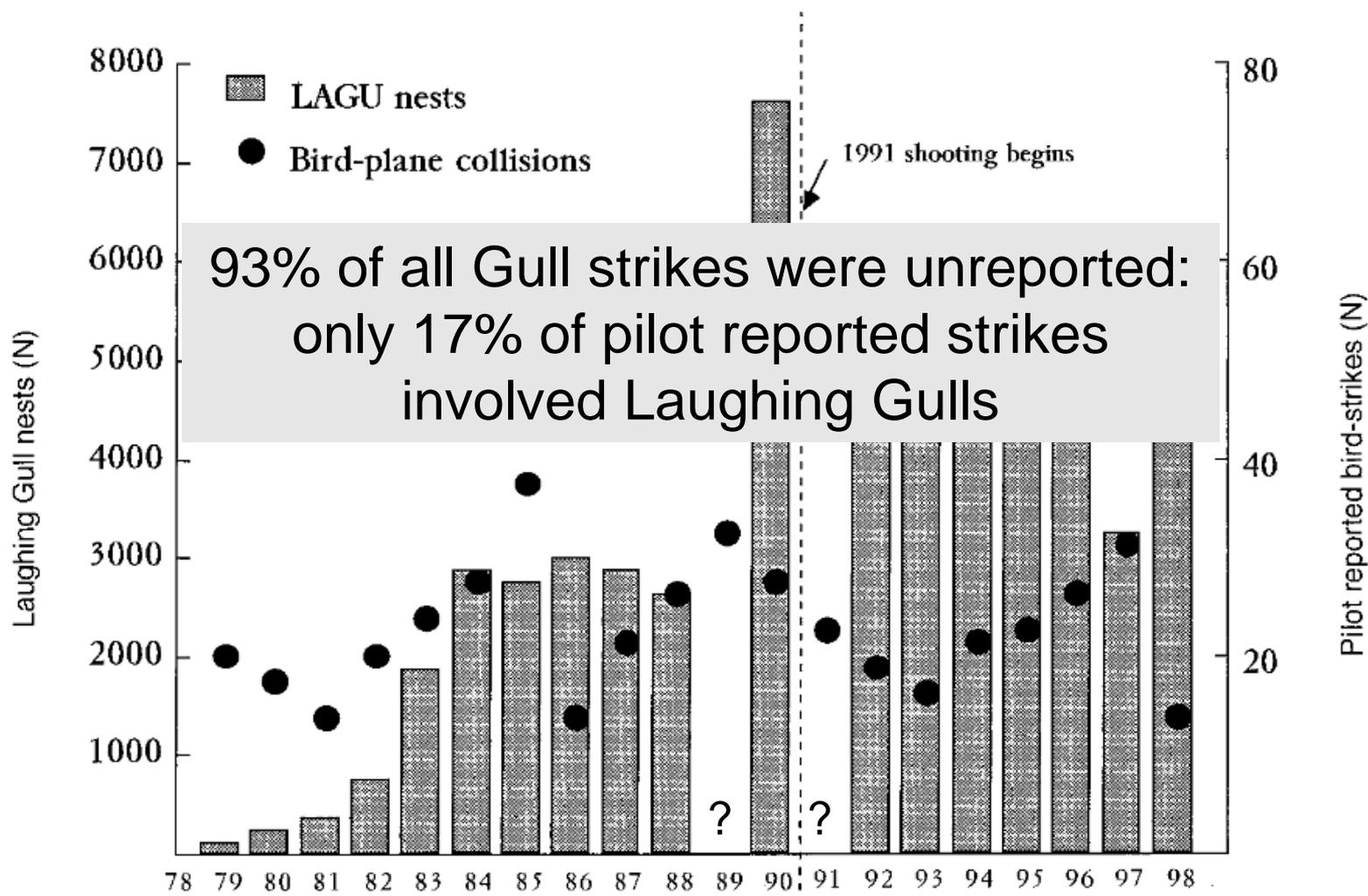
- Increase in breeding population (1979-90)
- increase in bird strikes at JFK airport
  - 52% Laughing Gulls of all strikes between 1988-1990
- 63`838 Laughing Gulls were shot 1991-2002
  - Colony was reduced by 57% from 1990 to 2002.



## 2. general population management - Laughing Gulls



## 2. general population management - Laughing Gulls



no correlation between JFK-colony and reported strikes

## 2. general population management - Laughing Gulls

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- JFK airport destroyed suitable habitats of the Gulls from 1991-1994 – in the beginning of the shooting (Brown et al. 2011)
- 90% non-breeders of the birds shot at the airfield: destroying nests increases non-breeding birds crossing airways and thus increases strike risk
- 98% of marked birds shot came from an other more distant breeding colony (strong immigration from other sites)

Lack of designed studies to investigate  
the effect of lethal control



## 2. general population management - Conclusion

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**General population management** away from airports is:

1. not likely to be successful
2. very questionable in respect to nature protection

Shooting in EU regulation is only allowed (Bird Directive):

- if other non-lethal methods are shown to be ineffective
- if only small amounts of individuals of a populations are reduced

## 2. Shooting as reinforcement technique

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The aim is not to reduce overall population, but to **remove target individuals to reinforce repellent techniques** as habituation occurs

### Examples:

- Reinforcement can lead to bird strike reduction of 86% (gulls at Atlantic city airport 1990-1992) (Montoney & Boggs 1993)
- selective shots of 1.9% of the local population resulted in a decline of gulls from 4.434 to 146 Ind. at a landfill site



## Shooting as reinforcement technique

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- Blank shots not effective as gulls and corvids habituated within four weeks
- Combination of blank and deadly shots:
  - gull numbers declined nearly 98% and stayed on the level
  - corvids did not decline
  - Two species at the same site can show different responses

Some studies with gregarious species show desired effects of selective shooting as reinforcement technique



## 2. Shooting as reinforcement technique

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- **But:** at JFK airport a multiple number of local colony size needed to be shot, to reinforce gulls to alter flight paths
- **But:** removing solitary bird's as raptors was ineffective in reducing problems
- **But:** Shooting can even increase strike risk replacing experienced with inexperienced birds (solitary species)

As long as an attraction is present, shooting will not be effective and may not even reduce target bird numbers

(Burger 1983).



# Conclusions

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- Main measure for reducing strike risk is habitat management
- Airport specific management
- Last option: repellent techniques and lethal control
- Repellent techniques are prone to habituation: reinforcement measures through lethal control may help
- Reinforcement techniques ineffective for solitary birds like raptors, some good results for socially gregarious species like gulls and – sometimes – crows
- General population management unsuccessful



Thank you



## Other management techniques

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- Make the habitat less attractive:
  - habitat management minimizes availability of food, water and shelter for hazardous birds at airports and its surroundings.
  - Most cost-effective long-term solution
- Chemical repellents mostly unsuccessful and heavily disputed (toxicity)



## Other management techniques - Repellents

- Auditory repellents generally successful, but habituation occurs quickly
  - Pyrotechnics
  - distress calls
- Visual repellents:
  - laser during night time seems to be effective, but light might attract migrating birds at night; habituation occurs
  - dogs seem to be effective when ground-feeding birds are present
  - falcons less effective



## Selected Opinions of experts and practitioners

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- Study first, before shooting is applied
- The more experienced the bird controllers, the less birds are shot
- The goal is to have a resident population with high vigilance level, not the absence of birds
- Young, unexperienced birds increase strike risk, thus shooting adults is counterproductive.

