



# Pros and cons of the BRI<sub>2</sub> risk assessment method for wildlife strike management at Italian airports

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# Italian airports

**101** airports

**48** certified by ENAC

**44** regularly operative

**32** < 50,000 flights/year

**8** > 50,000 < 100,000 flights/year

**4** > 100,000 flights/year

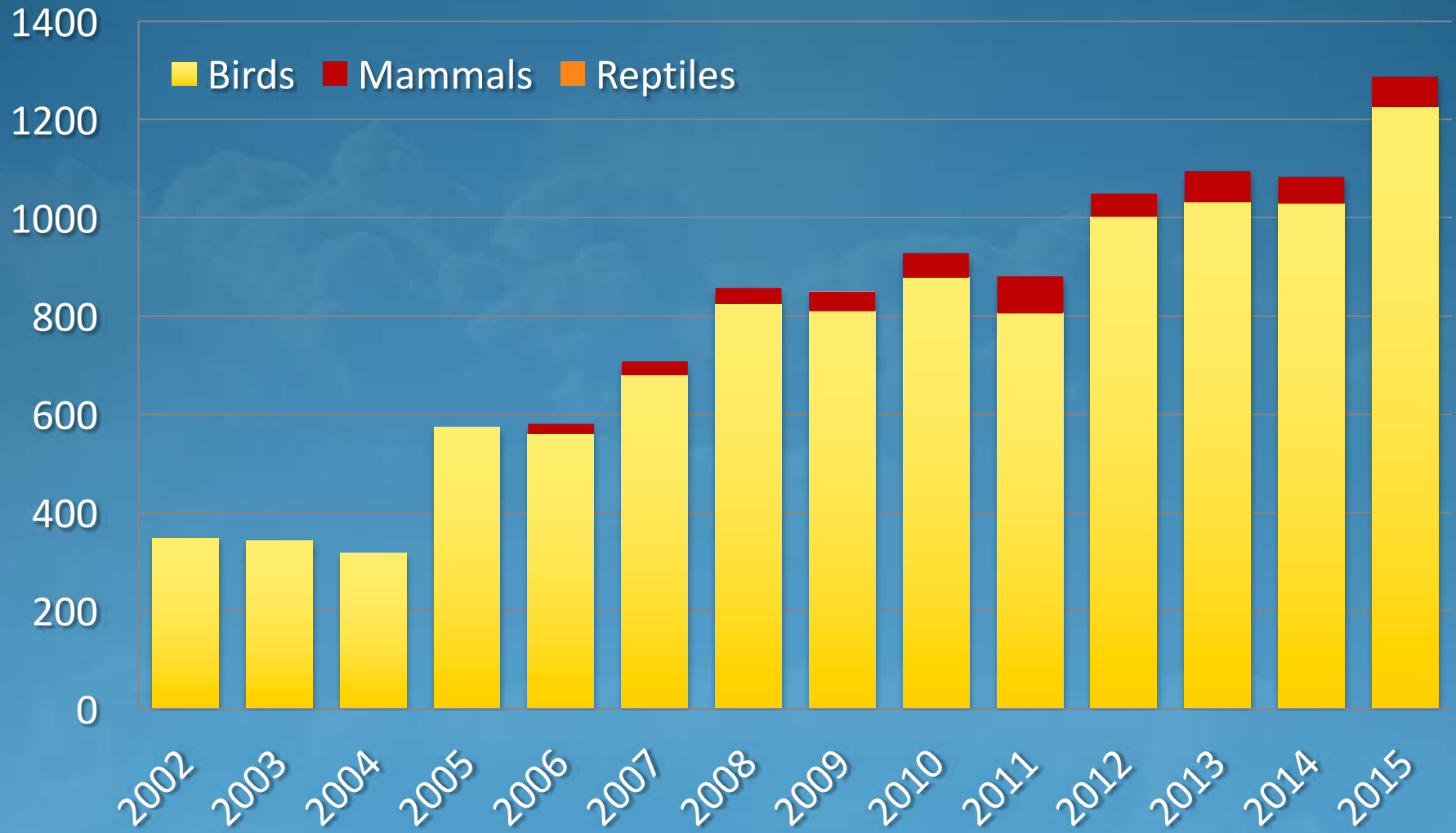
**29** Coastal airports

**15** Inland airports



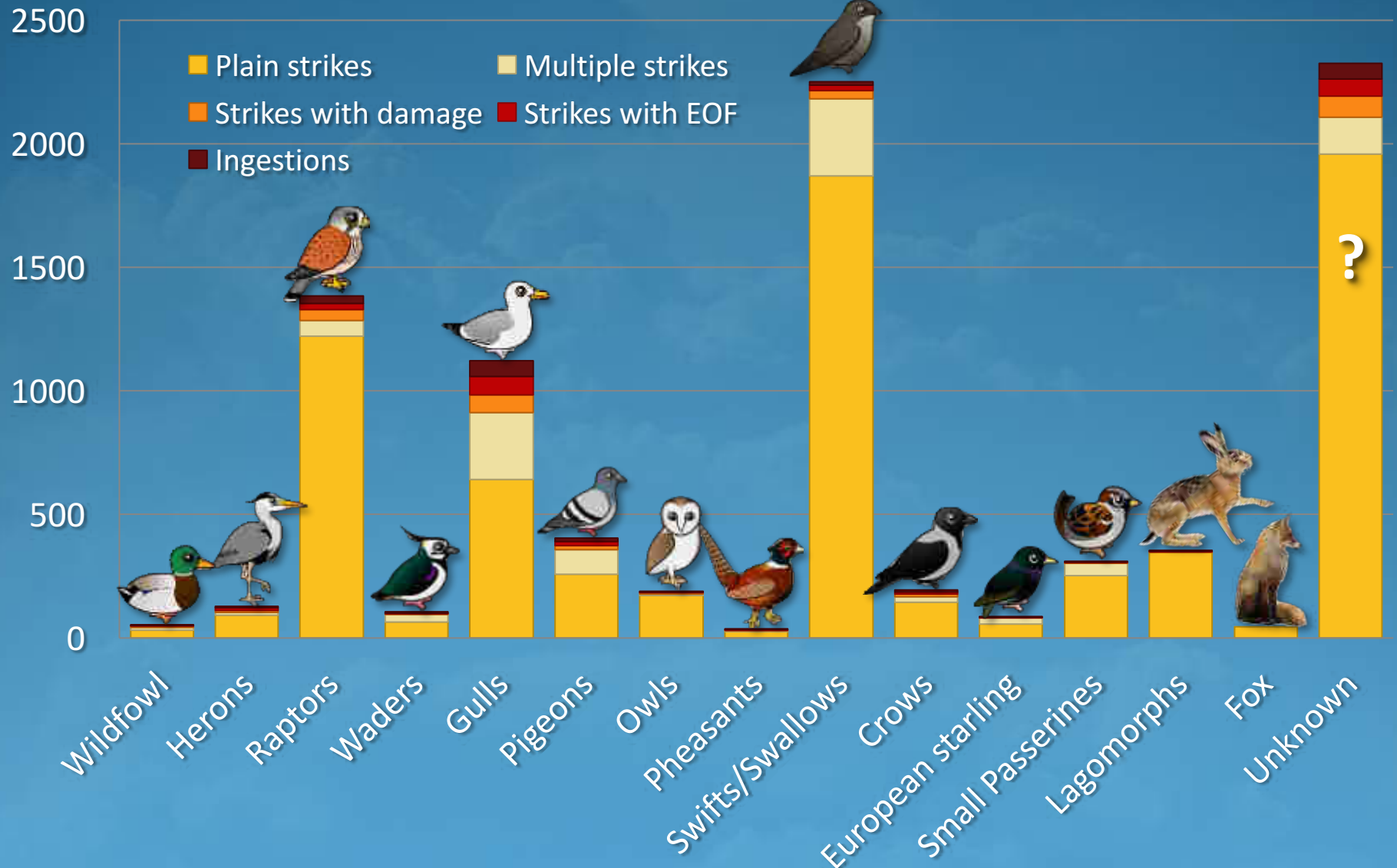
# Wildlife Strikes to civil aviation

Italy, 2002-2015 – N. 10,902



# Wildlife strikes to civil aircraft by wildlife group

## Italy, 2006-2015 – N. 9,319



# Estimated economic losses by wildlife group

## Italy, 2006-2015 – N. 9,319



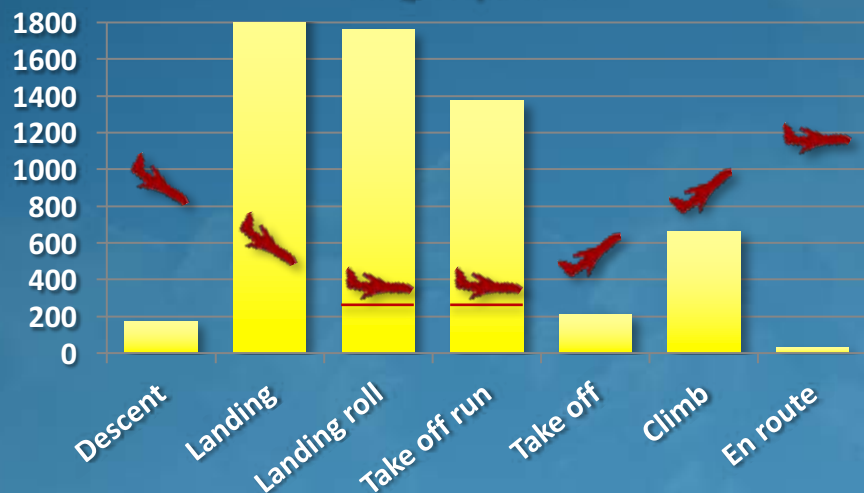
Estimated data



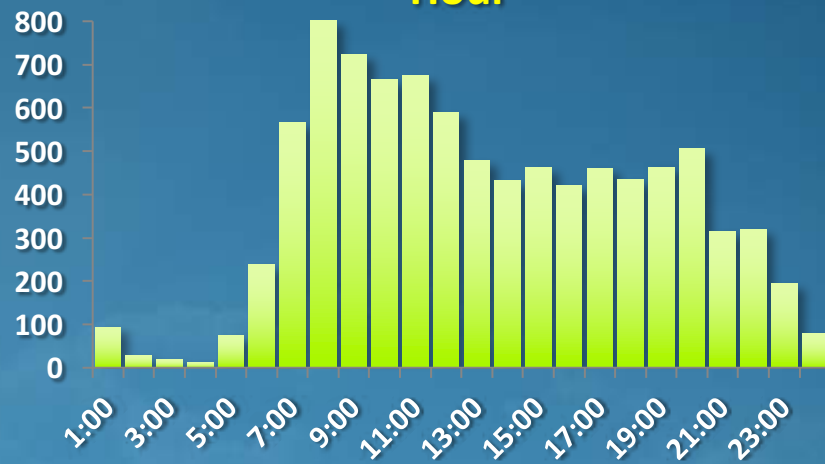
# How, where and when wildlife strikes occur

## Italy, 2006-2015 – N. 9,319

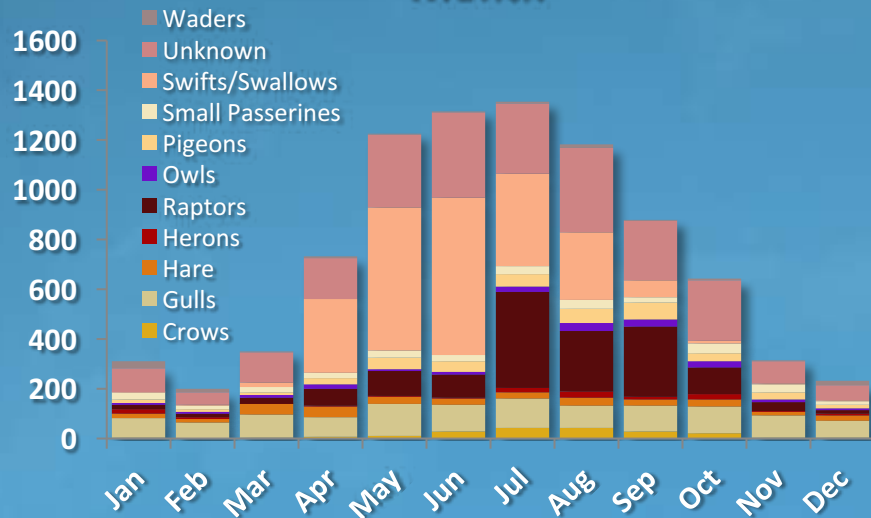
### Flight phase



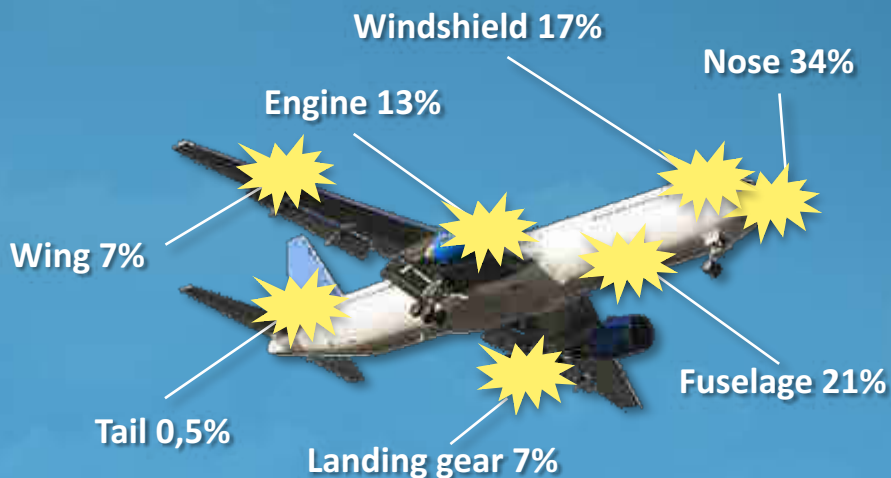
### Hour



### Month



### Struck parts of the aircraft





- **R.C.E.A. Chapt. 4 and 5** (*Rules for the construction and operation of airports*)
- **Circolare APT-01 B** (*Procedures for prevention of wildlife strike hazard at airports*)
- **Informative Tecniche su fonti attrattive e discariche** (*Guidelines to identify/manage wildlife attractive sites near airports*)

- **Wildlife strike reporting**
- **Airport ecological assessment**
- **Airport wildlife/habitat management plan**
- **Annual reporting**
  - **Risk assessment** (*introduction of BRI*)

# BRI

## *Birdstrike Risk Index*

- **Joined project**
  - Statistics Dept. University of Venice
  - Venice airport management company (SAVE)
  - Italian CAA (Enac)
- **Considered information**
  - Ecological characteristics of the airport bird community  
(*Mean daily no. of observed individuals per species*)
  - Local history of wildlife strikes  
(*No. of wildlife strikes per species and their effect on flight*)
  - Local flight traffic  
(*Mean number of flights per month*)

### Wildlife Strike Risk Assessment in Several Italian Airports: Lessons from BRI and a New Methodology Implementation

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The historical risk associated to a species, or Group Factor (**GF<sub>i</sub>**)

$$GF_i = \overline{W}_i \cdot Ag_i \cdot \frac{BS_i}{TFN} \cdot EOF_i^{95}$$

The actual Group Specific Risk (**GSR<sub>i</sub>**)

$$GSR_i = \frac{GF_i}{\sum_{i=1,N} GF_i} \cdot DB_i$$

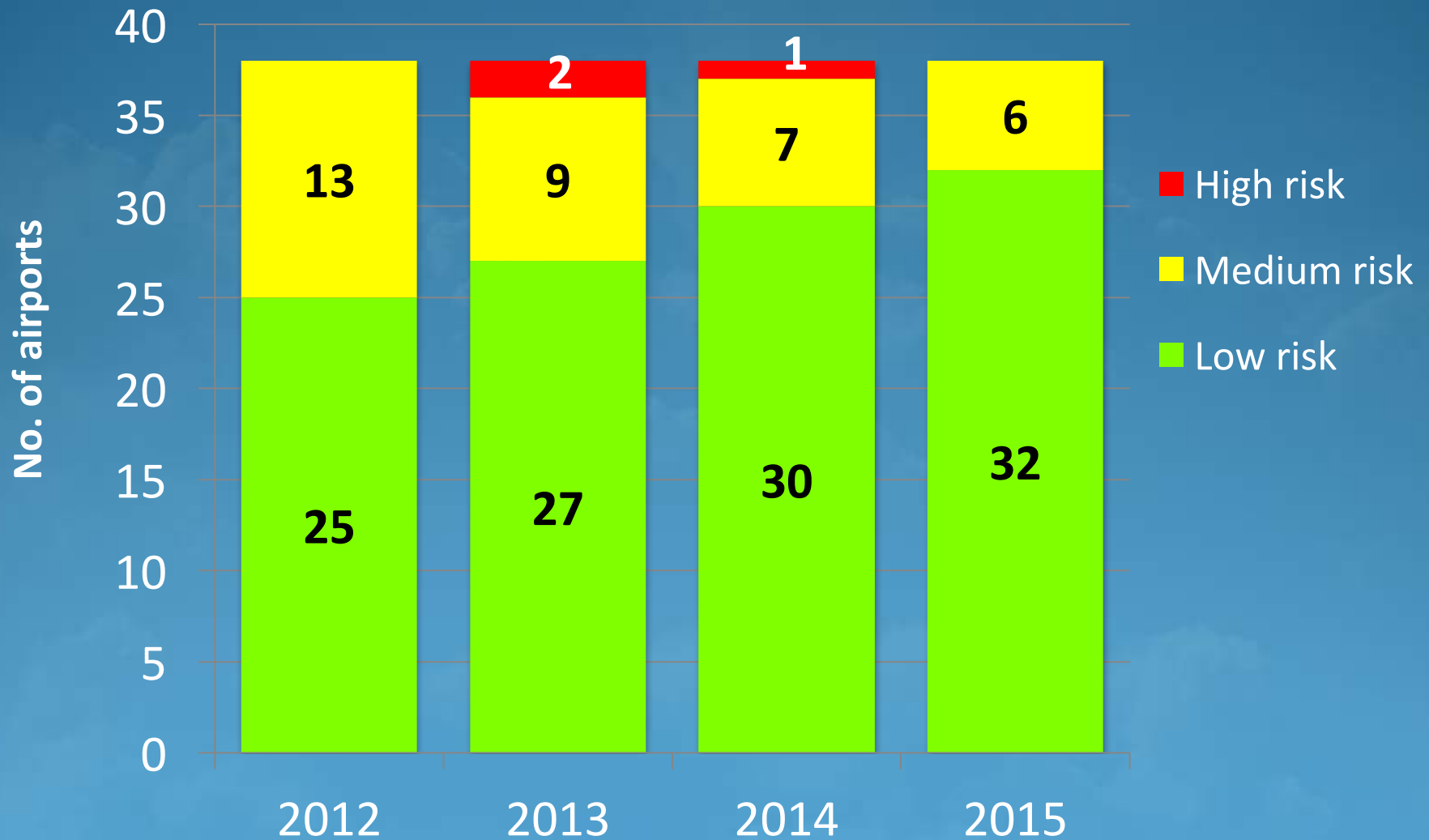
The **BRI** (version 2)

$$BRI2 = \left( \frac{\sum_{i=1,N} GSR_i \cdot DF}{\overline{TFN}} \right)$$

- **i** indicates a species group
- **N** is the group total
- **$\overline{W}$**  the average weight of the **i**<sup>th</sup> group
- **Ag** the group specific aggregation index
- **BS** is the mean value of impacts recorded per year
- **TFN** is the mean value of flights per year
- **$\overline{TFN}$**  is its monthly average
- **DB<sub>i</sub>** represents the mean daily number of birds of the **i**<sup>th</sup> group
- **DF** is the mean daily flight traffic calculated on a monthly basis
- **EOF<sup>95</sup><sub>i</sub>** is the 95<sup>th</sup> percentile of the EOF (Effect On Flight)

**EOF Values:** 1 = None; 2 = Minor (delay); 3 = Substantial (prec. landing, aborted take off); 4 = Serious (engine shutdown, forced landing, vision obscured); 5 = Catastrophic

# Trend of risk classes in 38 Italian airports 2012-2015



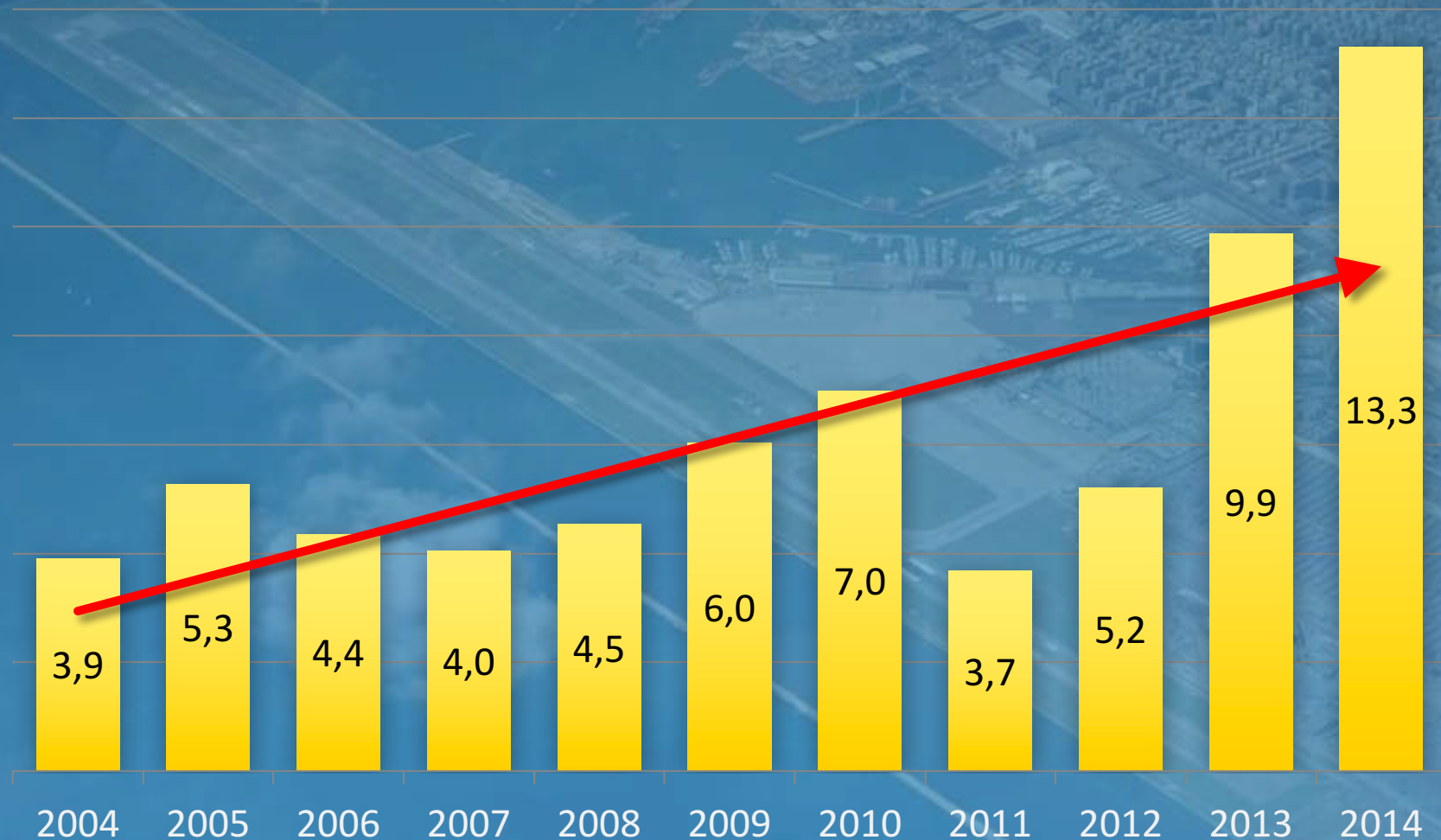


- **R.C.E.A. Chapt. 4 and 5** (*Rules for the construction and operation of airports*)
- **Circolare APT-01 B** (*Procedures for prevention of wildlife strike hazard at airports*)
- **Informative Tecniche su fonti attrattive e discariche** (*Guidelines to identify/manage wildlife attractive sites near airports*)

- Wildlife strike reporting
- Airport ecological assessment
- Airport wildlife/habitat management plan
- Annual reporting
  - Risk assessment
- Identification and monitoring of the surrounding hazardous wildlife attractive sites (within 13 km)

# N. birdstrikes/10.000 movements/year

## Genoa Airport



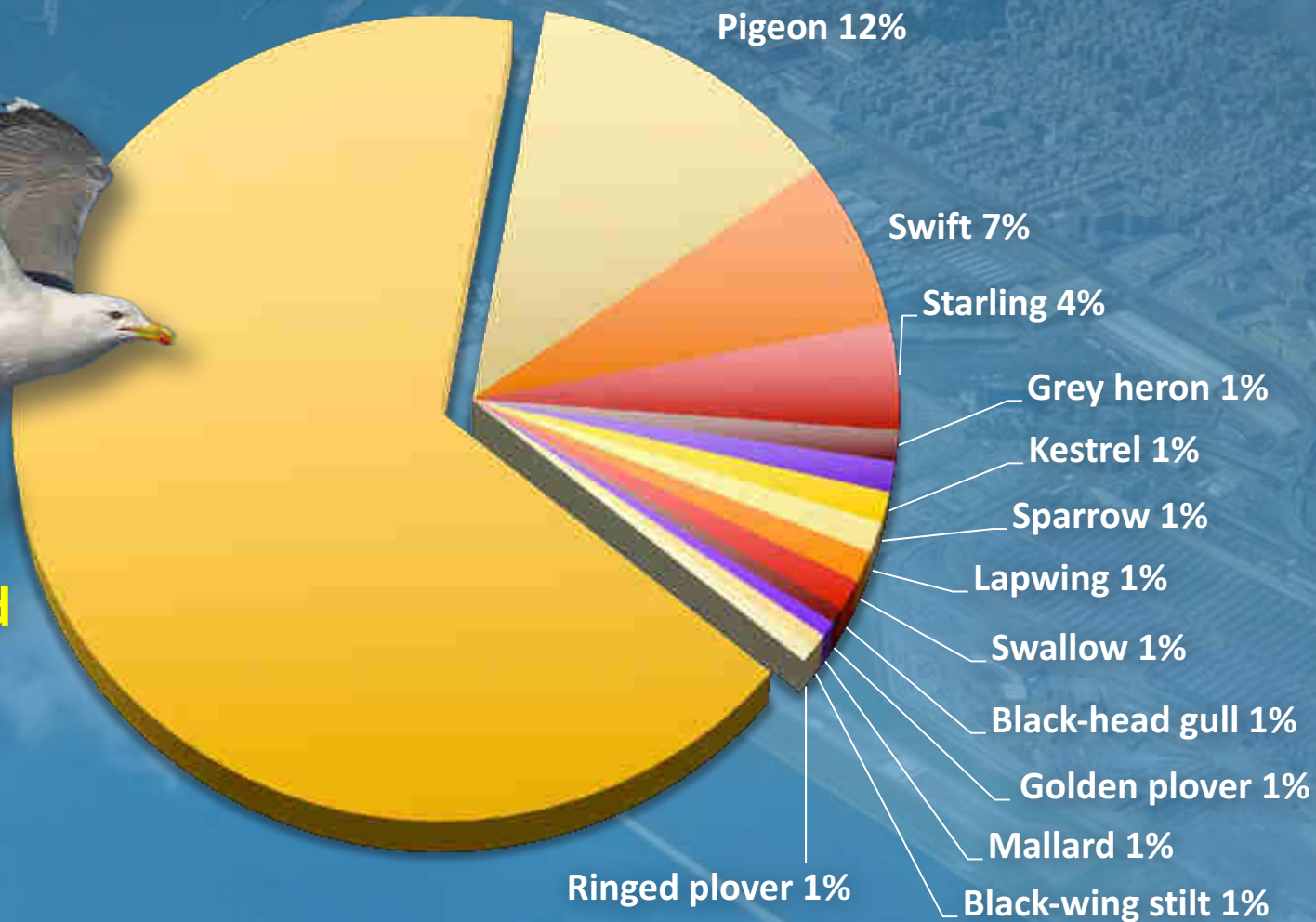


# Struk species

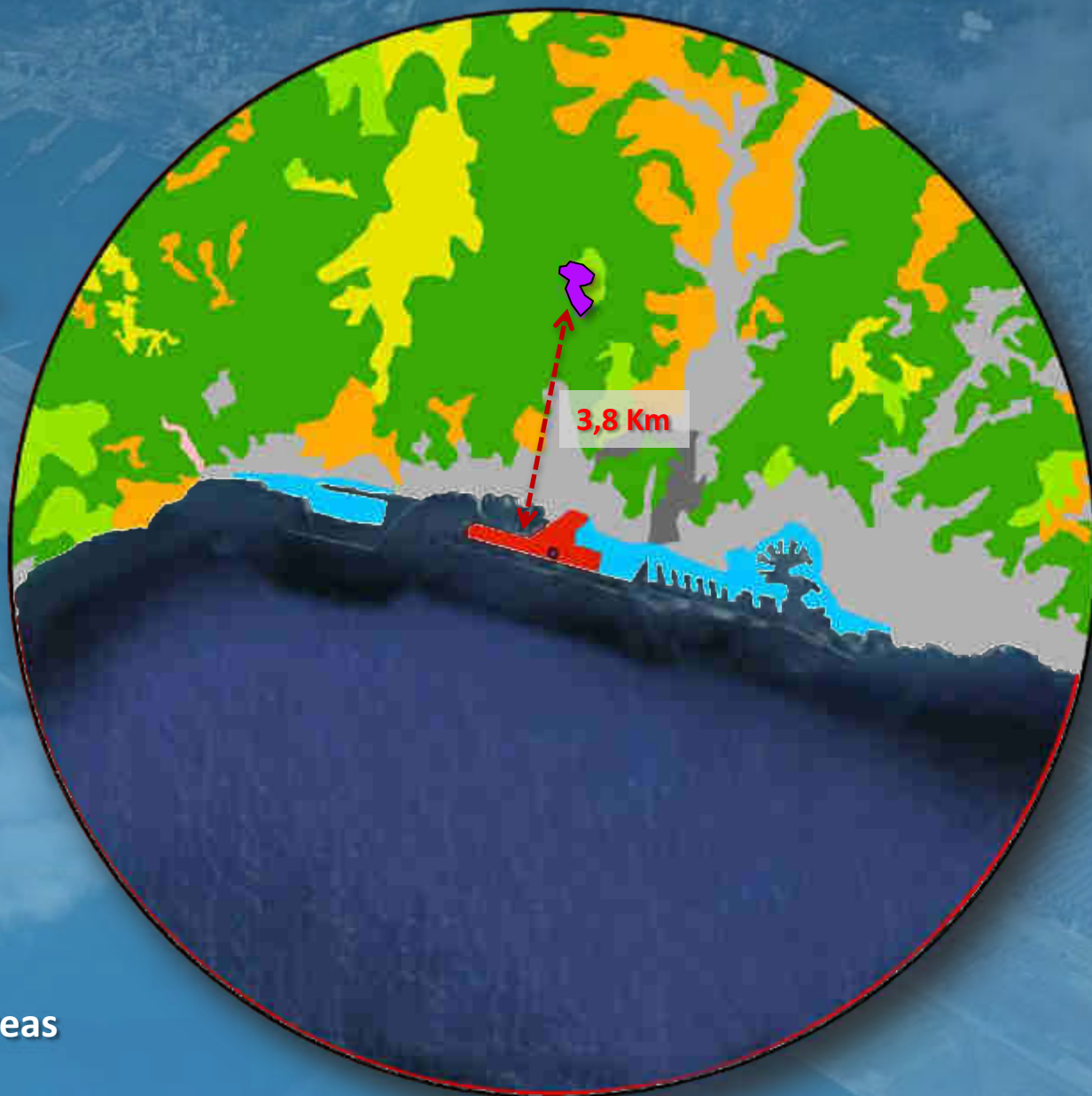
Genoa airport, 2004-2014 - N = 162



**Yellow-legged  
gull 67%**



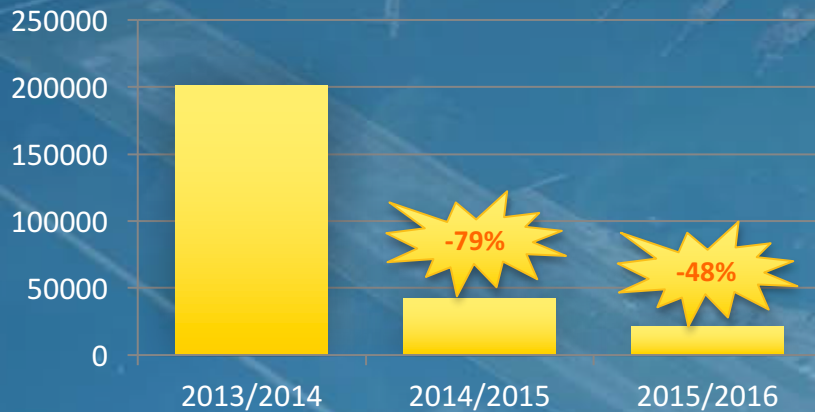




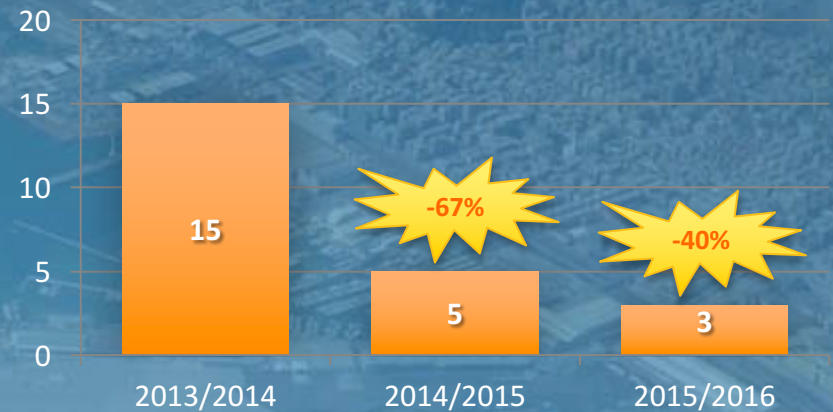
- Urban areas
- Industrial areas
- Roads and rails
- Ports
- Airport
- Dump sites
- Cultivated areas
- Forests
- Pasture areas
- Sparsely vegetated areas

# By 10.31.2014 the landfill closes

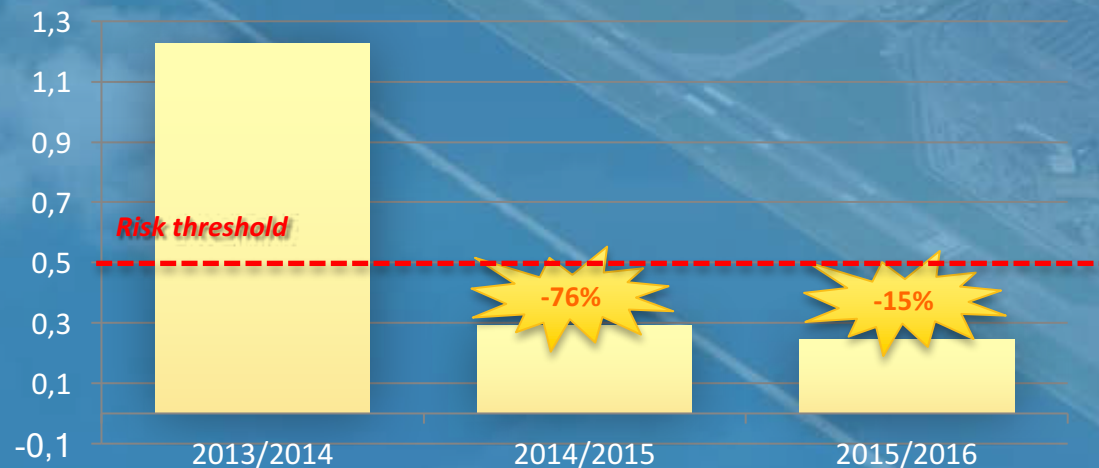
**Yellow-legged gull observations**  
(nov-oct 2013/14 - nov-oct 2015/16)



**Yellow-legged gull strikes**  
(nov-oct 2013/14 - nov-oct 2015/16)



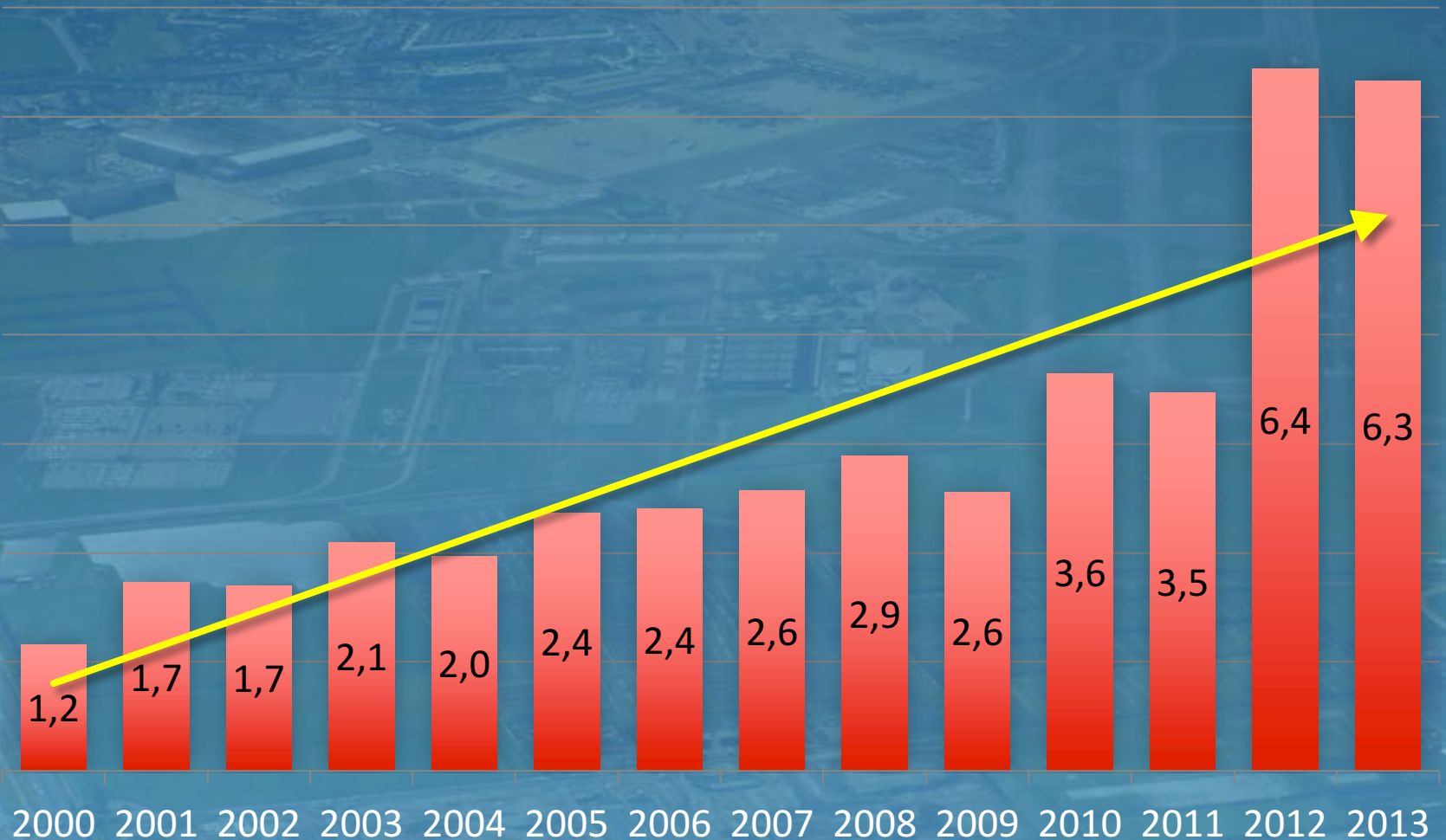
**Birdstrike Risk Index**  
(nov-oct 2013/14 - nov-oct 2015/16)





# N. birdstrikes/10.000 movements/year

## Rome Fiumicino Airport





Date: 07 July 2007  
Local time: 17.24  
Aircraft: B 767  
Altitude: 15 feet  
Airport: Roma Fiumicino  
Flight phase: Take off

**BIRD STIKE WITH > 20 YELLOW-LEGGED GULLS**



**PRECAUTIONARY  
LANDING AND  
SERIOUS DAMAGES**



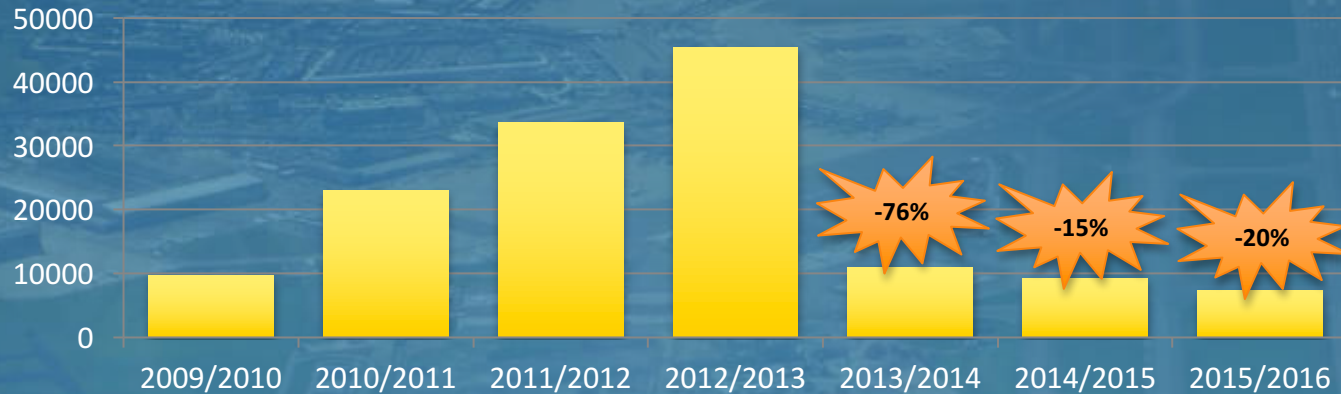


- Urban areas
- Roads and rails
- Mineral extraction
- Green urban areas
- Airport
- Dump sites
- Cultivated areas
- Forests
- Shrubland
- Beach
- Vineyards and olive groves
- Rivers and lakes



# By 04.01.2013 the landfill closes

Yellow-legged gull observations  
(apr-mar 2009/10 - apr-mar 2015/16)



Birdstrike Risk Index  
(apr-mar 2009/10 - apr-mar 2015/16)



# International Bird Strike Committee

## Standards For Aerodrome Bird/Wildlife Control

### *Standard n. 9*

... airports, or airport authorities, should seek to have an input into planning decisions and land use practices within the 13 km bird circle for any development that may attract significant numbers of hazardous birds/wildlife.



Thank you for your attention