Wildlife Risk Assessment

ADR.OPS.B.020

Whitepaper

ARCONDA.systems

eControl

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1 Introduction

The Wildlife Management module from eControl aviation provides a comprehensive toolkit for measuring and monitoring the risk of bird strike at airports.

The procedure implemented in eControl aviation was developed with the scientific support of the DAVVL – the German Bird Strike Committee (GBSC). As head of the German Bird Strike Committee, Mr. Christian Hellberg designed the analysis of the empirical dataset of observations and bird strikes.

The risk assessment was implemented in conformity with the model created by Dr. John Allan and refined by David C. Paton. eControl offers integrated risk assessment providing reliable key risk indicators for each of over 600 species. Risk calculations and trend analysis can be called up as required for individual habitats or special groups of species. eControl aviation brings together all available datasets in one risk model. Alongside bird strike officials' point-stop counting, there is also the option of including ad-hoc wildlife observations that occur for example when monitoring flight movement areas.

Bird strikes can be recorded manually with eControl or imported from reportable occurrences in E5X format in accordance with Regulation (EU) 376/2014. eControl aviation also has comprehensive ornithological classifications for every species, which are indispensable for calculating the risk of bird strike with precision. Correction factors that can be configured appropriately make it possible to take into account site-specific and time-based ornithological situations.

Observations, bird strikes, model parameters and all other data structures are stored without exception as read-only in eControl according to the eControl system standard.

eControl can be used as a web-based system in any system environment required. It is based on state-of-the-art Microsoft technology and an Oracle database that does justice to larger datasets – built up over many years. Our consultants are at your disposal for the acquisition of historical datasets to obtain meaningful key indicators for your passenger airport with the commissioning of the system.

eControl aviation can be used both at civil airports, by bird strike committees, and by competent authorities. Standardised interfaces enable simple data exchange between the stakeholders involved.

2 Regulation (EU) 139/2014 Bird Strike Risk

In the European Union, the airport operator is legally obliged in accordance with Regulation (EU) 139/2014 to carry out a systematic risk assessment for the risk of bird strike[1,2].

```
ADR.OPS.B.020 Wildlife strike hazard reduction

The aerodrome operator shall:

(a) assess the wildlife hazard on, and in the surrounding, of the aerodrome;

...

AMC1 ADR.OPS.B.020 Wildlife strike hazard reduction

GENERAL

The aerodrome operator should:
...
(c) ensure that wildlife hazard assessments are made by competent personnel; and

(d) establish, implement and maintain a wildlife risk management programme.

GM1 ADR.OPS.B.020 Wildlife strike hazard reduction

WILDLIFE RISK ASSESSMENT

(a) The aerodrome operator should:
     (1) conduct a risk assessment using strike data for each species, as well as
     information on the presence of species, the number of individuals, and their
     biology, and update this regularly;

     (2) take into account the number of strikes for each species and the severity
     of damage arising from those strikes; and

     (3) target actions on those species which are present with the highest fre-
     quency and create the greatest damage.
```

1 Source: Commission Regulation (EU) No 139/2014
http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014R0139&from=EN

2 Source: Annex to ED Decision 2014/012/R - EASA - Acceptable Means of Compliance (AMC) and Guidance Material (GM) to Authority, Organisation and Operations Requirements for Aerodromes
https://www.easa.europa.eu/system/files/dfu/2014-012-R-Annex%20to%20ED%20Decision%202014-012-R.pdf

3 ICAO Airport Services Manual - Part 3: Wildlife Control and Reduction (Doc 9137)

The airfield operator is required in accordance with ICAO Doc 9137 to control and reduce the adverse effects of wildlife[3].

```
...

3.3.1 Because of the importance of bird/wildlife control, each airport operator has
the responsibility to develop, implement and demonstrate an effective bird/wildlife
strike and wildlife control programme at the airport, and this should be tailored
to and commensurate with the size and level of complexity of the airport, taking
account of the identification of the bird hazard and the risk assessment of that
hazard.

...
```

In „Chapter 6: (*) use of the following risk matrix is recommended:

SEVERITY	PROBABILITY				
	Very high	High	Moderate	Low	Very low
Very high	3	3	3	2	2
Moderate	3	3	3	2	2
High	3	3	2	1	1
Low	2	2	1	1	1
Very low	1	1	1	1	1

Figure 6-1. A 5 × 5 risk assessment matrix

[3] Source: ICAO Airport Services Manual Doc. 9137 - Part 3 Wildlife Control and Reduction http://skybrary.aero/bookshelf/books/3185.pdf

4 The Risk Model

The risk matrix is a recognised standard instrument for classifying risks.

When analysing **bird strike risks „R“**, the **probability „P“** of the unwanted bird strike and the **potential impact of such a bird strike (Severity) „S“** for a special kind of bird are contrasted with a species.

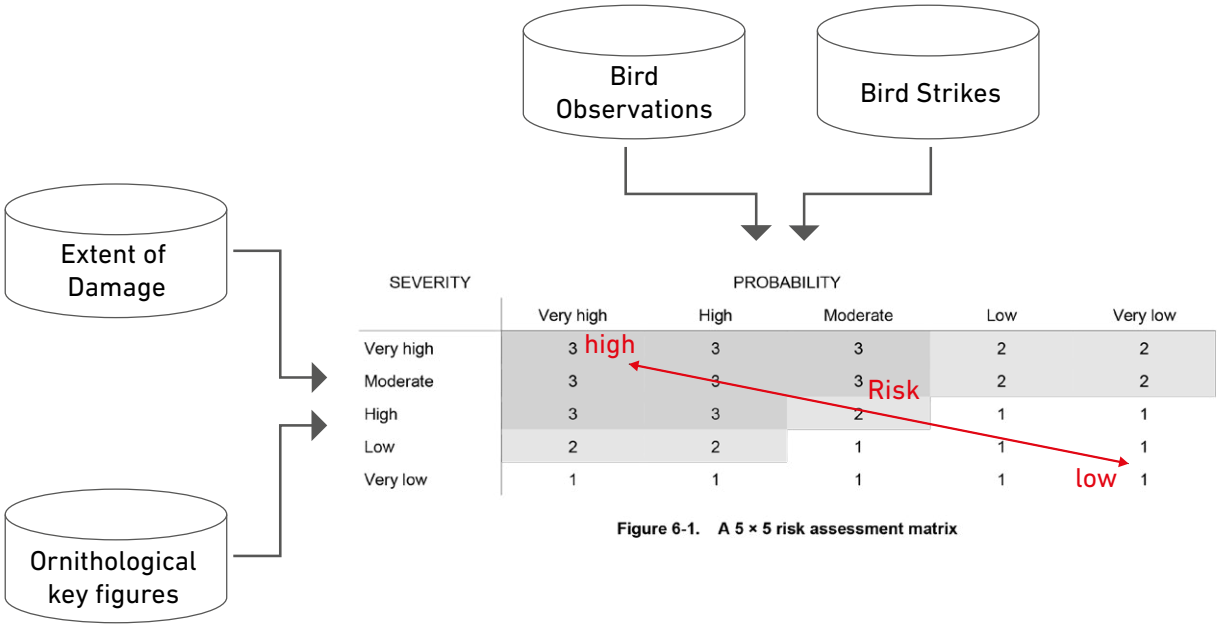


Figure 6-1. A 5 × 5 risk assessment matrix

The above risk assessment is an expanded model of that of scientists David C. Paton and J. Allan, which uses the eControl comprehensive movement dataset to establish authentic key risk indicators, following the scientific recommendations of Christian Hellberg of the German Bird Strike Committee (GBSC).

Risk assessment with eControl aviation blends empirical data from bird observation and bird strikes with ornithological classification from the eControl species database, to determine the conclusive risk of bird strike according to species.

The multi-level process for processing quantitative and qualitative data can be adapted to the individual customer. Interval limits, scores and risk indices are pre-set following best practice and can be adjusted as required.

Site-specific factors that influence the likelihood of occurrence can be defined for a period of validity, in order thus to completely automatically slip authentic risk impacts or mitigations into the risk model.

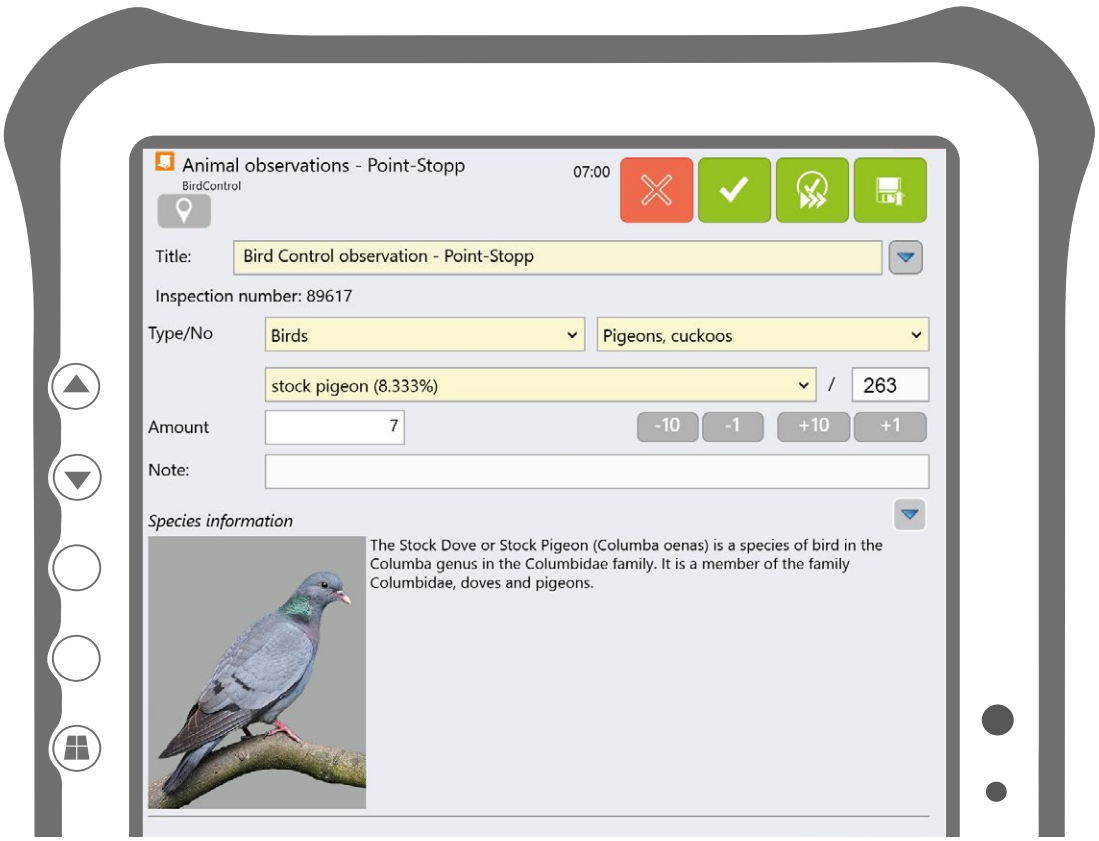
Risk assessments are calculated at the touch of a button by a pre-set report generator. For each risk assessment, comprehensive documentation is provided completely automatically.

- **Risk assessment risk potential species**
- **RIsk assessment module parameters probability and severity**
- **Risk assessment Ecological criterias**
- **Risk assessment Probability details**
- **Risk assessment Severity details**
- **Risk assessment per Species**
- **Risk assessment species accumulated**
- **Risk assessment relative bird strikes frequency and severity**
- **Risk assessment species and trend analysis**
- **Risk assessment maintenance risk matrix birdstrike**

5 Wildlife Observations

With eControl aviation, systematic bird counts can be carried out in habitats along a monitoring measuring section. The so-called point-stop process is applicable for the airport itself and for all relevant external habitats.

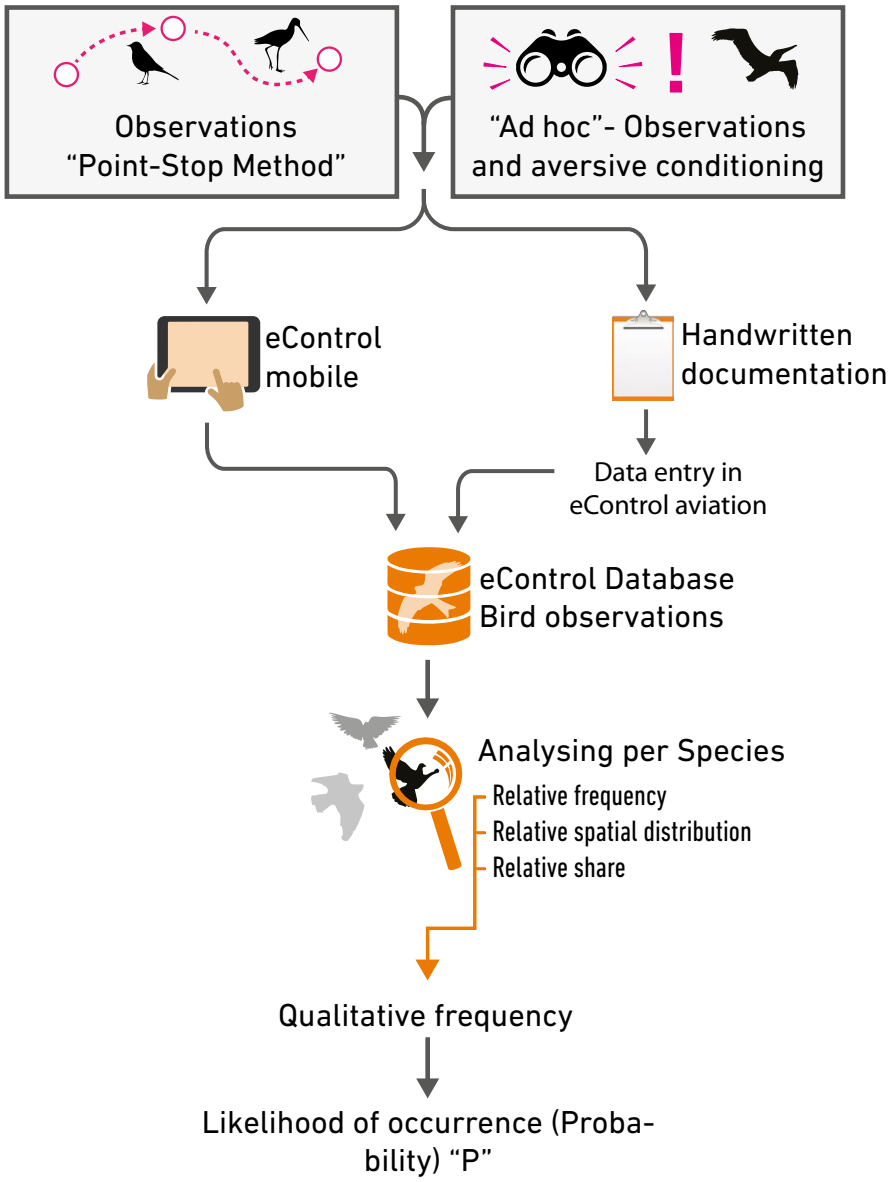
These wildlife counts can be documented directly in the field with eControl mobile and accepted completely automatically by eControl in the central database without further acquisition work. Acquisition can be mobile in the most cost-effective way possible with the help of the eControl mobile software module.



Bird counts are qualitatively classified as part of the risk assessment by relative number, relative frequency and relative spatial distribution.

These qualitative frequencies are a substantial element for determining the risk component **"Probability (P)"**.

Bird counts by bird strike officials are used without additional acquisition work both for habitat management and as a basis of data for the risk assessment. Another source of bird strikes are the so-called "ad hoc" observations, documented by operative units in the regular monitoring of aviation areas.


Observations
“Point-Stop Method”
“Ad hoc”- Observations
and aversive conditioning
eControl
mobile
Handwritten
documentation
Data entry in
eControl aviation
eControl Database
Bird observations
Analysing per Species
Relative frequency
Relative spatial distribution
Relative share
Qualitative frequency
Likelihood of occurrence (Proba-
bility) “P”

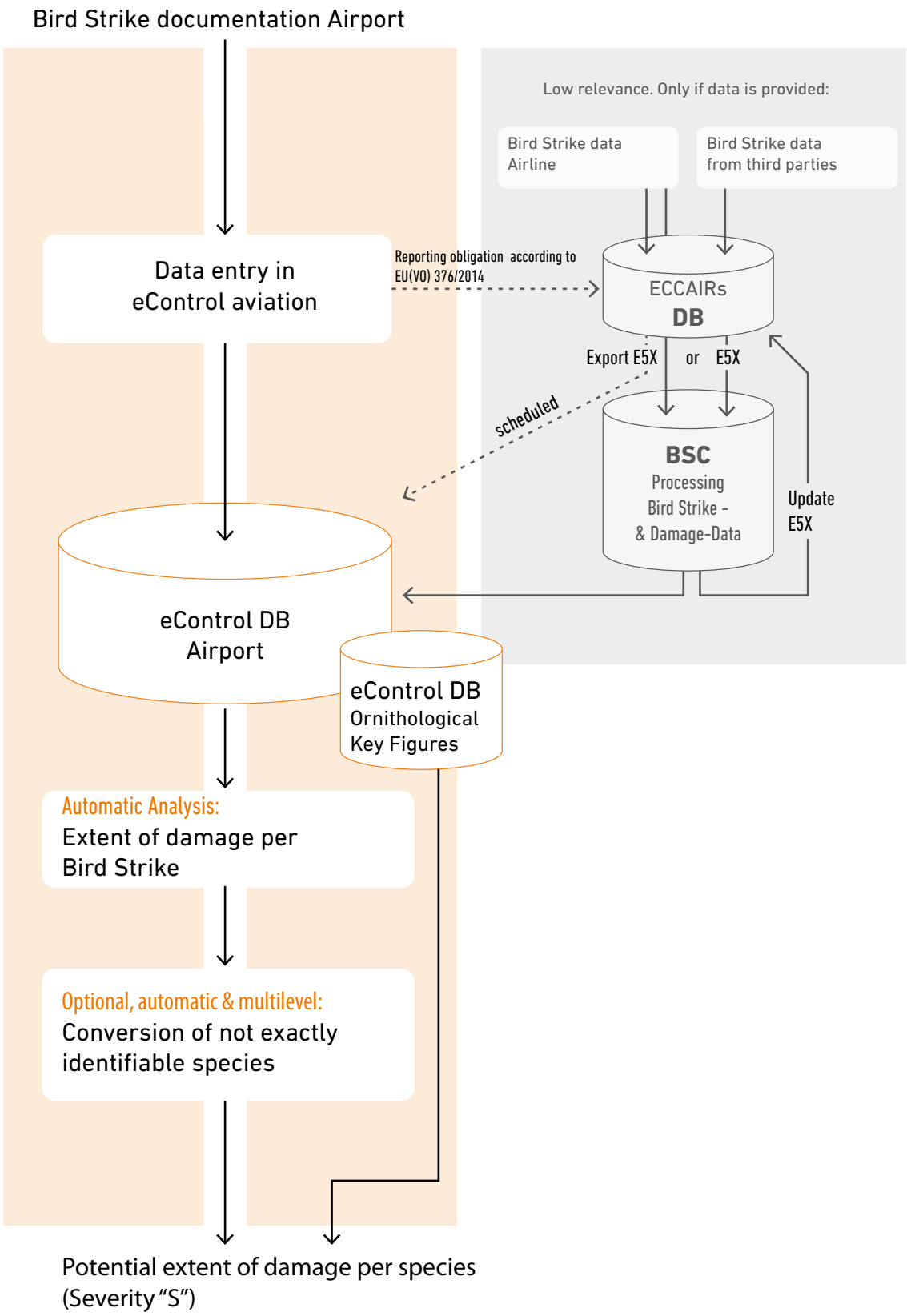
6 Bird Strikes

Past bird strikes documented are a decisive element for assessing further risks of bird strike. Bird strikes can be recorded direct by airports in eControl aviation according to the ICAO DOC 9332 standard. In addition bird strikes are reported to the national investigating authorities by airlines and other organisations. These bird strike reports shall be taken into account for an authentic calculation of the risk of bird strike.

With eControl aviation, bird strikes can be imported in ECCAIRS format E5X by the national supervisory authorities or in a proprietary eControl format by national BSCs (Bird Strike Committees), if they process bird strikes at national level using eControl aviation.

Unfortunately, empirical bird strike data neither have the claim to completeness nor can the species involved be reliably determined in each case.

eControl counteracts these shortcomings optionally with intelligent procedures that lead to a significant improvement of the data situation according to scientific opinion.


Bird Strike documentation Airport
Low relevance. Only if data is provided:
Bird Strike data Airline
Bird Strike data from third parties
Data entry in eControl aviation
Reporting obligation according to EU(VO) 376/2014
ECCAIRs DB
Export E5X
or
E5X
scheduled
BSC
Processing Bird Strike - & Damage-Data
Update E5X
eControl DB Airport
eControl DB Ornithological Key Figures
Automatic Analysis:
Extent of damage per Bird Strike
Optional, automatic & multilevel:
Conversion of not exactly identifiable species
Potential extent of damage per species (Severity "S")

With eControl, bird strikes that cannot reliably be assigned to a species can be optionally included via impact factors when determining risk. Intelligent methods are applied to determine these impact factors using the actual involvement of species in the reference period, and these methods process each bird strike independent of the data quality. The historic extent of the damage of bird strikes can already be classified approximately through data gathering in accordance with the ICAO standard. Bird strikes with a significant risk potential have resulted in either a documented influence on the course of the flight or damage to aircraft components. If a bird strike results in the inspection of an A/C without a survey report, by default a medium extent of damage is assumed - the commercial loss for the operator is also significant here.

Damage classification can be adjusted to individual specifications at any time. The extent of damage is measured by a configurable classification according to bird strike. For every classification, scores can be freely determined, based on the risk assessment.

In the bullet point 6.6 of the Part 3 Wildlife Control and reduction document (Doc. 9137) a period of 5 years is recommended for the representative consideration of bird strikes according to species.

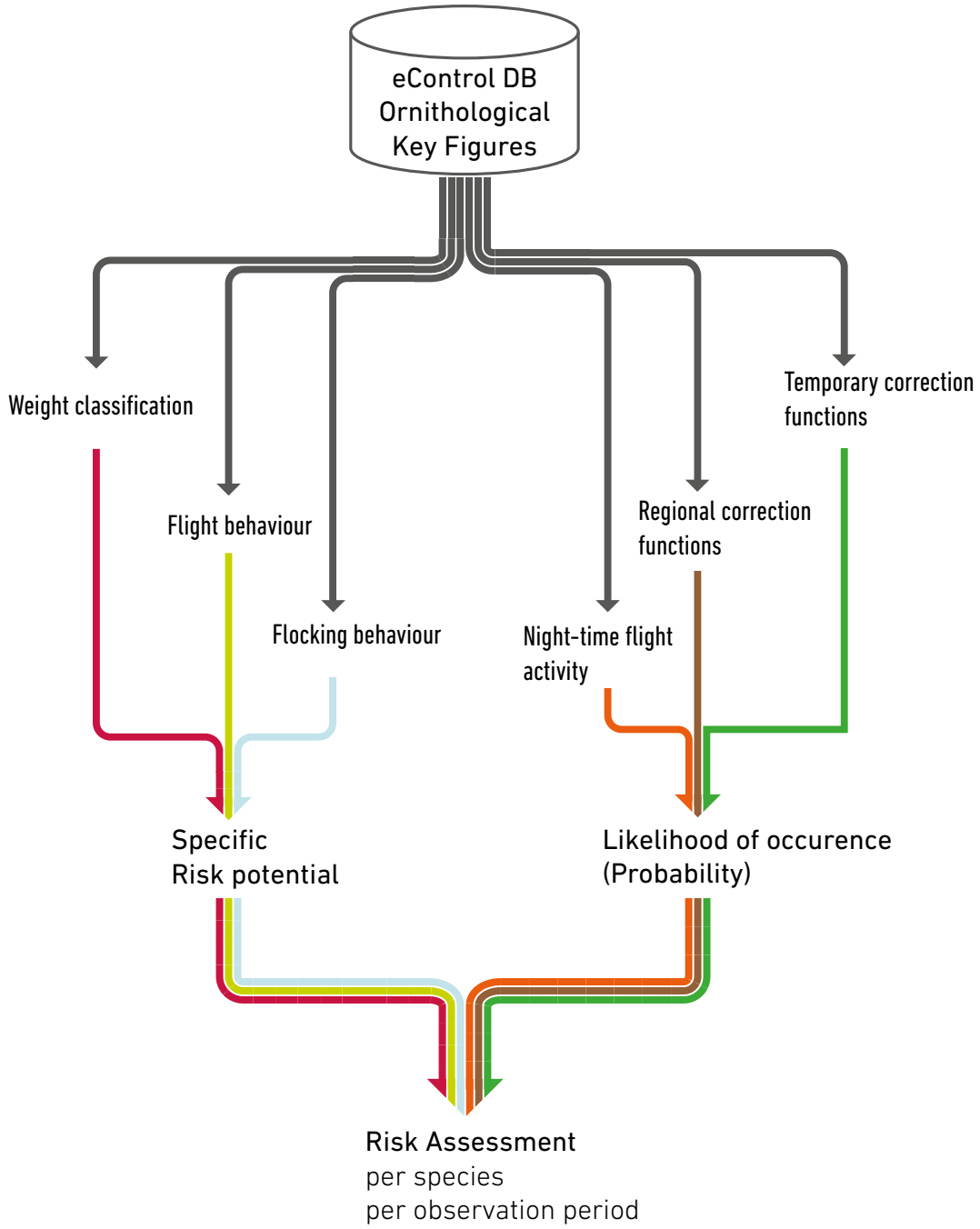
When validating risk indices, the observer has the option to increase the reference period for considering bird strikes notwithstanding a longer eligibility period in order to be able to recognise errors in measurement from the small number of bird strikes per species. The number and determination of interval limits is predefined at system level and can be altered as required.

There is an option to extend the reference period for bird strikes differently from the risk assessment analysis period, to ensure authentic processing of the species involved when there is a lower number of bird strikes per year.

7 Species Indicators

eControl aviation has a comprehensive ornithological database, enabling the free storage of biological master data for any species. For more than 1000 species eControl aviation offers around 30 indicators per species.

These indicators classify average bodyweight, flight characteristics and propensity for flight, night flying activity, feeding and breeding habits, migratory behaviour and many other aspects that can be used both for habitat management and for risk assessment. These figures can be readjusted according to need for the relevant site to take regional or temporary effects into account.



8 The Risk Matrix

The risk matrix is used additionally for a qualitative risk assessment to enable aggregation of the risk across species.

The individual risk assessment performed for a species can be precisely assigned to an element of the risk matrix. Each element of the risk matrix has a risk index. The addition of all risk indices for an observation period yields the overall risk for the respective site. Risk indices are ordinal, which enables measurement and comparison of the risk of bird strike over time. This trend analysis enables an objective evaluation of the measures for reducing the bird strike risk. With this risk matrix, acceptance criteria can be systematically combined according to species, so that action and habitat management can be controlled objectively according to species.

High, intolerable risk of bird strike
-> Additional risk mitigation measures required

Medium, tolerable risk of bird strike
-> Continuous annual review of effectiveness of mitigation measures

Low, acceptable risk of bird strike
-> No additional measures required

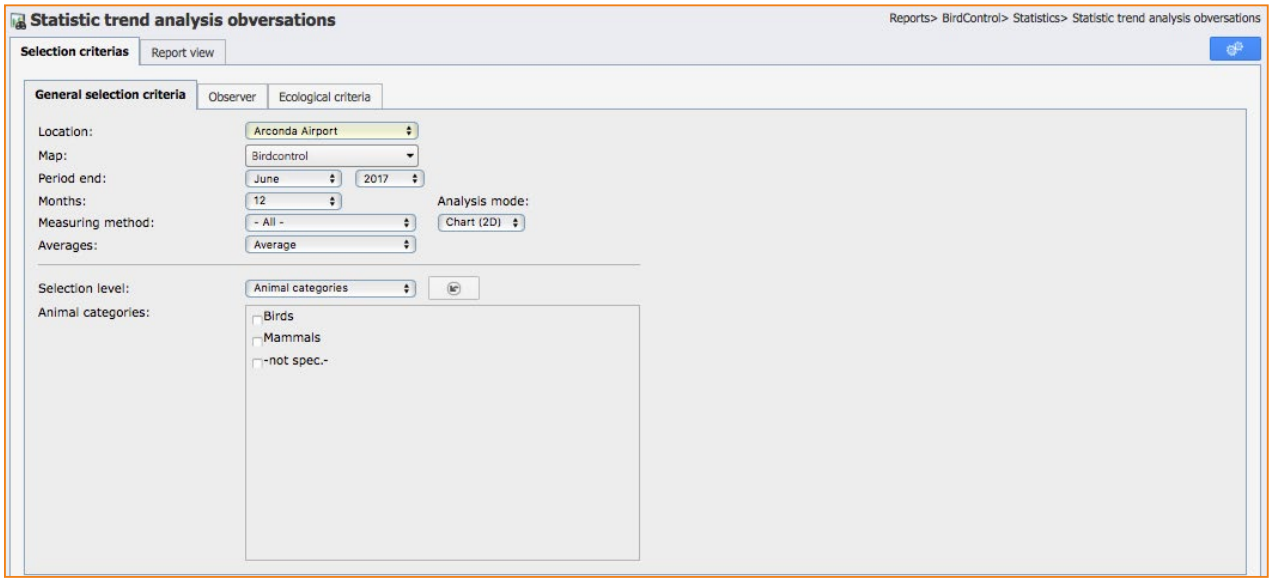
A qualitative risk assessment can be adjusted by the customer to the airport's individual requirements.

Severity	Total occurrence			
				Very high
	Acceptable 133 x 0.010 **1.330**	**Acceptable** 3 x 0.100 **0.300**	**Acceptable** 0 x 1.000 **0.000**	**Tolerable** 0 x 10.000 **0.000**
	Acceptable 90 x 0.100 **9.000**	**Acceptable** 6 x 1.000 **6.000**	**Tolerable** 1 x 10.000 **10.000** Graureiher	**Tolerable** 1 x 100.000 **100.000** Turmfalke
	Acceptable 27 x 1.000 **27.000**	**Tolerable** 3 x 10.000 **30.000** Stockente Haustaube Ringeltaube	**Not tolerable** 2 x 100.000 **200.000** Star Rabenkrähe	**Not tolerable** 1 x 1,000.000 **1,000.000** Mäusebussard
	Tolerable 0 x 10.000 **0.000**	**Not tolerable** 0 x 100.000 **0.000**	**Not tolerable** 0 x 1,000.000 **0.000**	**Not tolerable** 0 x 10,000.000 **0.000**
	Not tolerable 0 x 100.000 **0.000**	**Not tolerable** 0 x 10,000.000 **0.000**	**Not tolerable** 0 x 10,000.000 **0.000**	**Not tolerable** 0 x 100,000.000 **0.000**
Amount species	**267.000**		**Accumulated risk**	**1,383.630**

System settings are specified in the above risk matrix. All classifications and the number of the respective elements, quantifications etc. are implemented with absolute flexibility through database settings and can be adjusted as required by the customer according to the specifics of the site and regulatory requirements.

9 Carrying Out the Risk Assessment

Risk assessment can be carried out at any time at the request of the user with eControl aviation. Numerous calculation parameters mean the bird strike official can carry out precise testing of assumed cause-and-effect chains and contributing factors. Causal relationships identified can be compared with various habitat management statistics that can be calculated with exactly the same calculation parameters at system level, to ensure efficient measures for reducing the risk of bird strike.



The above selection criteria are available for various bird control statistics. Below is a list of the most important report generators of the Bird Control software module.

- **Birdstrike time of day analysis**
- **Frequency and vegetation data**
- **Frequency distribution of birds**
- **FD birds to partial areas**
- **Cartographic evaluation**
- **Message animal collisions grouped by animal species**
- **Message animal collisions and observations**
- **Monthly average of bird observations**
- **Frequency distribution of animal species -daily**
- **Animal collision elevation profile**
- **Dead animal finds**
- **Trend analysis observations**

The selection criteria can also be used for different report generators.

10 Parameter Risk Assessment and Trend Analysis

- **Period from/to (Risk Assessment Observation period, compare chapter 11-15)**

  Specification of an observation period for bird observations
  or
  Type and number of calculation intervals (see section „15. Report: Species trend analysis“)

- **Bird strike reference period**

Specification of a different, representative reference period for bird strikes, to guarantee a representative distribution of bird strikes according to species

- **Site**

There can be nuanced extension of different sites or airports

- **Habitats**

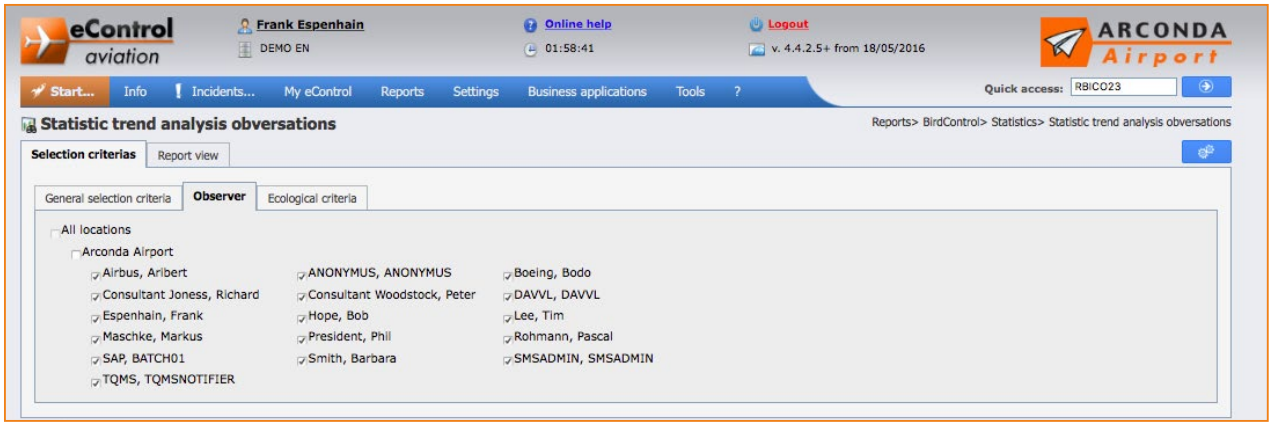
Bird observations can be narrowed down to individual habitats or to a desired number of habitats. As an example, in this way surveys of external habitats can be excluded from calculation of the risk assessment.

- **Counting procedure**

The counting procedure means bird observations can be narrowed down to point-stop counts or ad-hoc observations (e.g. from monitoring aviation areas).

- **Observers/Personnel**

Observations can be narrowed down to a specific group of observers on a separate tab head, for taking into account the different ornithological competences of personnel that may lead to a different frequency distribution for the species observed.



Selection of observers is standardised for all eControl habitat management statistics.

- **Determining frequency**

When determining number frequencies of species or bird observations either:

- Frequencies per inspection or
- Frequencies per inspection and observation period

can be selected.

- **Species frequency distribution**

There are three options for the procedure to calculate the number and distribution of bird strikes:

- a) Bird strikes of identified species / Total number of all bird strikes
- b) -"- / Total number of all bird strikes with bird strikes identified
- c) All bird strikes incl. impact factors for species not precisely identified / number of all bird strikes

Option a) delivers the lowest frequencies. Option b) leads to increased proportions for bird strikes „n". Option c) uses all available information and offers an authentic distribution of bird strikes, higher than with Option a) but lower than with selective consideration of Option b). Option c) is the default.

- **Bird strike notification category**

Consideration of bird strikes can be based on bird strikes recorded independently by airports "Bird strike notification" or on bird strike reports provided by the respective bird strike committees (BSCs) or by regulatory authorities in E5X format.

The default is: „Notification Bird strike"

- **Flight phases (and areas)**

This parameter enables a nuanced consideration of bird strikes according to the flight phase in which they arose. Pre-selected are all flight phases of "areas 1 and 2", where it can be assumed that these fall within the area of responsibility of the airport.

The observer is required to specify flight phases for consideration. A very restrictive consideration can lead to a risk rating that is latently too low. In this connection consideration should also be given to (*), which allows for a wildlife risk management monitoring area of 13Km (7nm) outwards from the airport reference point.

11 Report: Probability details

The risk assessment statistic “Probability details” documents the underlying calculation:

Risk Assessment Species

Reports > BirdControl> Risk Assessment> Risk Assessment Species

Selection criteria | **Report view**

Risk assessment probability details

Location:	Arconda Airport
Map:	Bird Control - Arconda Airport (160), Measuring Point A, Measuring Point B, Measuring Point , Measuring Point V1, Measuring Point V2, Measuring Point 1, Measuring Point 10, Measuring Point 11, Measuring Point 12, Measuring Point 13
Investigation period from/to:	01/01/2015/28/08/2017
Reference date bird strike from/to:	29/08/2012/28/08/2017
Measuring method:	- All -
Averaging procedure:	Share of Bird strikes
Messages:	Hazard message animal collision
Frequency computation:	Frequency per inspection
Flight phase:	Sinkflug (1.000 - >200 ft) - Area 2, Landung (200 - >0ft) - Area 1, Rollen Landung (0 ft) - Area 1, Rollen (0 ft)- Area 1, Stand (0 ft)- Area 1, Start (0 ft) - Area 1, Start (>0 - 500 ft) - Area 1, Unbekannt - Area 1, Steigflug (>500 - 1.500 ft) - Area 2
Flight propensity:	☐
Night flight activity:	☐
Year specific correctional factors:	☐
Representation:	Risk assessment probability details
Order:	Probability of occurrence
Observer:	All
Ecological criteria:	

Species	Scientific name	Bird observation		Observation frequency		Area propagation		Quantitative overall incidence		Relative bird strike frequency		Quantitative Probability		Correction factors		Total occurrence	
	ID	Relative share		Relative share		Relative share		ø Scores		Relative share		ø Scores		Δ Scores		Σ Scores	
		Total:	**6753**	*Total:*	**98**	*Total:*	**21**			*Total:*	**7/37**						
Selection	S	*Selection*	t, B, M, O	*Selection*	t, B, M, O	*Selection*	t, B, M, O			*Selection*	t, D			*Selection*	t		
Buzzard	Buteo buteo	*Count*	378	*Count*	95	*Count*	15			*Count*	2.000						
	9902028	*Amount*	5.598%	*Amount*	96.939%	*Amount*	78.947%			*Amount*	5.405%						
		Class	**Very high**	*Class*	**Very high**	*Class*	**Very high**	*Class*	**Very high**	*Class*	**Very high**	*Class*	**Very high**			*Class*	**Very high**
		Score	4	*Score*	4	*Score*	4	*ø Scores*	4	*Score*	4	*Score*	4	*Score*		*Score*	4
Kestrel	Falco tinnunculus	*Count*	539	*Count*	96	*Count*	19			*Count*	2.000						
	9902039	*Amount*	7.982%	*Amount*	97.959%	*Amount*	100.000%			*Amount*	5.405%						
		Class	**Very high**	*Class*	**Very high**	*Class*	**Very high**	*Class*	**Very high**	*Class*	**Very high**	*Class*	**Very high**			*Class*	**Very high**
		Score	4	*Score*	4	*Score*	4	*ø Scores*	4	*Score*	4	*Score*	4	*Score*		*Score*	4
Gray Heron	Ardea cinerea	*Count*	18	*Count*	13	*Count*	6			*Count*	1.000						
	9902004	*Amount*	0.267%	*Amount*	13.265%	*Amount*	31.579%			*Amount*	2.703%						
		Class	**High**	*Class*	**Low**	*Class*	**Medium**	*Class*	**Medium**	*Class*	**High**	*Class*	**High**			*Class*	**High**
		Score	3	*Score*	1	*Score*	2	*ø Scores*	2	*Score*	3	*Score*	3	*Score*		*Score*	3
Carrion Crow	Corvus corone corone	*Count*	1066	*Count*	96	*Count*	19			*Count*	0.000						
	9902179	*Amount*	15.786%	*Amount*	97.959%	*Amount*	100.000%			*Amount*	0.000%						
		Class	**Very high**	*Class*	**Very high**	*Class*	**Very high**	*Class*	**Very high**	*Class*	**Low**	*Class*	**High**			*Class*	**High**
		Score	4	*Score*	4	*Score*	4	*ø Scores*	4	*Score*	1	*Score*	3	*Score*		*Score*	3
Starling	Sturnus vulgaris	*Count*	770	*Count*	28	*Count*	10			*Count*	1.000						
	9902173	*Amount*	11.402%	*Amount*	28.571%	*Amount*	52.632%			*Amount*	2.703%						
		Class	**Very high**	*Class*	**Medium**	*Class*	**High**	*Class*	**High**	*Class*	**High**	*Class*	**High**			*Class*	**High**
		Score	4	*Score*	2	*Score*	3	*ø Scores*	3	*Score*	3	*Score*	3	*Score*		*Score*	3
	Fringilla coelebs	*Count*	30	*Count*	1	*Count*	1			*Count*	0.000						
	9902162	*Amount*	0.444%	*Amount*	1.020%	*Amount*	5.263%			*Amount*	0.000%						
		Class	**High**	*Class*	**Low**	*Class*	**Low**	*Class*	**Medium**	*Class*	**Low**	*Class*	**Medium**			*Class*	**Medium**
		Score	3	*Score*	1	*Score*	1	*ø Scores*	2	*Score*	1	*Score*	2	*Score*		*Score*	2

12 Report: Severity details

The risk assessment statistic “severity details” provides detailed information for the potential extent of damage according to species for the respective risk assessment.

Risk Assessment Species

Reports > BirdControl> Risk Assessment> Risk Assessment Species

Selection criteria | **Report view**

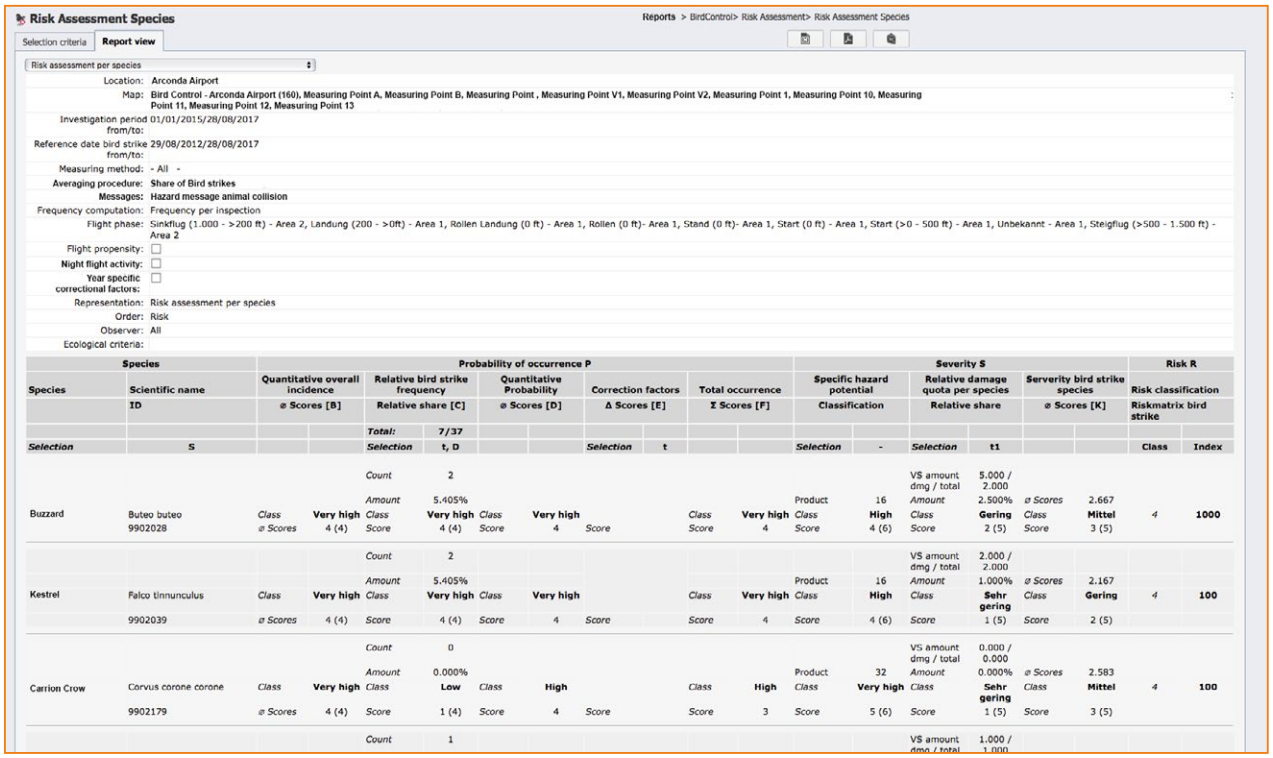
Risk assessment severity details

Location:	Arconda Airport
Map:	Bird Control - Arconda Airport (160), Measuring Point A, Measuring Point B, Measuring Point , Measuring Point V1, Measuring Point V2, Measuring Point 1, Measuring Point 10, Measuring Point 11, Measuring Point 12, Measuring Point 13
Investigation period from/to:	01/01/2015/28/08/2017
Reference date bird strike from/to:	29/08/2012/28/08/2017
Measuring method:	- Alle -
Averaging procedure:	Share of Bird strikes
Messages:	Hazard message animal collision
Frequency computation:	Frequency per inspection
Flight phase:	Sinkflug (1.000 - >200 ft) - Area 2, Landung (200 - >0ft) - Area 1, Rollen Landung (0 ft) - Area 1, Rollen (0 ft)- Area 1, Stand (0 ft)- Area 1, Start (0 ft) - Area 1, Start (>0 - 500 ft) - Area 1, Unbekannt - Area 1, Steigflug (>500 - 1.500 ft) - Area 2
Flight propensity:	☐
Night flight activity:	☐
Year specific correctional factors:	☐
Representation:	Risk assessment severity details
Order:	Probability of occurrence
Observer:	All
Ecological criteria:	

Species	Scientific name	Body mass		Swarm formation		Flight propensity		Specific hazard potential		Loss ratio per species		Serverity bird strike species	
	ID	Classification[G.1]		Classification[G.2]		Classification[G.3]		Classification[H]		ø Damage[J]		ø Scores[K]	
Selection	S	*Selection*	-	*Selection*	-	*Selection*	-	*Selection*	-	*Selection*	t1		
										Damage index / Amount VS	0.00/0.00		
								Product	16	ø Damage	0.000	ø Scores	2.000
Golden eagle	Aquila chrysaetos	*Class*	1.001-5.000 g	*Class*	Usually solitary or widely spaced	*Class*	Rapid direct	*Class*	High	*Class*	Sehr gering	*Class*	Gering
	9902415	*Score*	16.000	*Score*	1.000	*Score*	1.000	*Score*	4 ()	*Score*	1 ()	*Score*	2 ()
										Damage index / Amount VS	2.00/2.00		
								Product	16	ø Damage	1.000	ø Scores	2.000
Kestrel	Falco tinnunculus	*Class*	201-1.000 g	*Class*	Usually solitary or widely spaced	*Class*	Slow, meandering, erratic, hovering, manoeuvrable	*Class*	High	*Class*	Sehr gering	*Class*	Gering
	9902039	*Score*	8.000	*Score*	1.000	*Score*	2.000	*Score*	4 ()	*Score*	1 ()	*Score*	2 ()
										Damage index / Amount VS	0.00/0.00		
								Product	16	ø Damage	0.000	ø Scores	2.000
Merlin	Falco columbarius	*Class*	201-1.000 g	*Class*	Usually solitary or widely spaced	*Class*	Slow, meandering, erratic, hovering, manoeuvrable	*Class*	High	*Class*	Sehr gering	*Class*	Gering
	9902038	*Score*	8.000	*Score*	1.000	*Score*	2.000	*Score*	4 ()	*Score*	1 ()	*Score*	2 ()
										Damage index / Amount VS	0.00/0.00		
								Product	16	ø Damage	0.000	ø Scores	2.000
Hobby	Falco subbuteo	*Class*	201-1.000 g	*Class*	Usually solitary or widely spaced	*Class*	Slow, meandering, erratic, hovering, manoeuvrable	*Class*	High	*Class*	Sehr gering	*Class*	Gering
	9902037	*Score*	8.000	*Score*	1.000	*Score*	2.000	*Score*	4 ()	*Score*	1 ()	*Score*	2 ()
										Damage index / Amount VS	0.00/0.00		
								Product	16	ø Damage	0.000	ø Scores	2.000
Peregrine	Falco peregrinus	*Class*	201-1.000 g	*Class*	Usually solitary or widely spaced	*Class*	Slow, meandering, erratic, hovering, manoeuvrable	*Class*	High	*Class*	Sehr gering	*Class*	Gering

13 Report: Per species

Risk assessment according to species and observation period stems from bringing together the likelihood of occurrence and the potential extent of damage. eControl aviation provides the following report:



Risk Assessment Species

Reports > BirdControl> Risk Assessment> Risk Assessment Species

Selection criteria | Report view

Risk assessment per species

Location: Arconda Airport

Map: Bird Control - Arconda Airport (160), Measuring Point A, Measuring Point B, Measuring Point , Measuring Point V1, Measuring Point V2, Measuring Point 1, Measuring Point 10, Measuring Point 11, Measuring Point 12, Measuring Point 13

Investigation period from/to: 01/01/2015/28/08/2017

Reference date bird strike from/to: 29/08/2012/28/08/2017

Measuring method: - All -

Averaging procedure: Share of Bird strikes

Messages: Hazard message animal collision

Frequency computation: Frequency per inspection

Flight phase: Sinkflug (1.000 - >200 ft) - Area 2, Landung (200 - >0ft) - Area 1, Rollen Landung (0 ft) - Area 1, Rollen (0 ft)- Area 1, Stand (0 ft)- Area 1, Start (0 ft) - Area 1, Start (>0 - 500 ft) - Area 1, Unbekannt - Area 1, Steigflug (>500 - 1.500 ft) - Area 2

Flight propensity: ☐

Night flight activity: ☐

Year specific correctional factors: ☐

Representation: Risk assessment per species

Order: Risk

Observer: All

Ecological criteria:

Species		Probability of occurrence P										Severity S						Risk R	
Species	Scientific name	Quantitative overall incidence		Relative bird strike frequency		Quantitative Probability		Correction factors		Total occurrence		Specific hazard potential		Relative damage quota per species		Severity bird strike species		Risk classification	
	ID	⌀ Scores [B]		Relative share [C]		⌀ Scores [D]		Δ Scores [E]		Σ Scores [F]		Classification		Relative share		⌀ Scores [K]		Riskmatrix bird strike	
				Total:	7/37														
Selection	S			Selection	t, D			Selection	t			Selection	-	Selection	t1			Class	Index
Buzzard	Buteo buteo 9902028	Class	Very high	Count	2									VS amount dmg / total	5.000 / 2.000				
				Amount	5.405%							Product	16	Amount	2.500%	⌀ Scores	2.667		
		Class	Very high	Class	Very high	Class	Very high			Class	Very high	Class	High	Class	Gering	Class	Mittel	4	1000
		⌀ Scores	4 (4)	Score	4 (4)	Score	4	Score		Score	4	Score	4 (6)	Score	2 (5)	Score	3 (5)		
Kestrel	Falco tinnunculus 9902039			Count	2									VS amount dmg / total	2.000 / 2.000				
				Amount	5.405%							Product	16	Amount	1.000%	⌀ Scores	2.167		
		Class	Very high	Class	Very high	Class	Very high			Class	Very high	Class	High	Class	Sehr gering	Class	Gering	4	100
		⌀ Scores	4 (4)	Score	4 (4)	Score	4	Score		Score	4	Score	4 (6)	Score	1 (5)	Score	2 (5)		
Carrion Crow	Corvus corone corone 9902179			Count	0									VS amount dmg / total	0.000 / 0.000				
				Amount	0.000%							Product	32	Amount	0.000%	⌀ Scores	2.583		
		Class	Very high	Class	Low	Class	High			Class	High	Class	Very high	Class	Sehr gering	Class	Mittel	4	100
		⌀ Scores	4 (4)	Score	1 (4)	Score	4	Score		Score	3	Score	5 (6)	Score	1 (5)	Score	3 (5)		
				Count	1									VS amount dmg / total	1.000 / 1.000				

Risk assessment based on a variety of calculations around the likelihood of occurrence and the potential extent of damage, where specific reports can be called up for each risk observation, to create transparency around the basis of calculation.

14 Report: Species accumulated

The classification of species into the risk matrix and the final aggregation of the risk indices enable complete risk measurement taking all species into consideration. This approach is necessary for reviewing the effectiveness of bird strike prevention measures, as measures to control individual species or categories often entail undesirable compensating effects. After the occurrence of birds of prey is reduced, the growth in prey birds can compensate or over-compensate for the risk mitigation effect. Compensating effects are included by taking all species into account as part of the Observation Period risk assessment.

Risk Assessment Species

Reports > BirdControl> Risk Assessment> Risk Assessment Species

Selection criteria | **Report view**

Risk assessment species accumulated

Location:	Arconda Airport
Map:	Bird Control - Arconda Airport (160), Measuring Point A, Measuring Point B, Measuring Point , Measuring Point V1, Measuring Point V2, Measuring Point 1, Measuring Point 10, Measuring Point 11, Measuring Point 12, Measuring Point 13
Investigation period from/to:	01/01/2015/28/08/2017
Reference date bird strike from/to:	29/08/2012/28/08/2017
Measuring method:	- All -
Averaging procedure:	Share of Bird strikes
Messages:	Hazard message animal collision
Frequency computation:	Frequency per inspection
Flight phase:	Sinkflug (1.000 - >200 ft) - Area 2, Landung (200 - >0ft) - Area 1, Rollen Landung (0 ft) - Area 1, Rollen (0 ft)- Area 1, Stand (0 ft)- Area 1, Start (0 ft) - Area 1, Start (>0 - 500 ft) - Area 1, Unbekannt - Area 1, Steigflug (>500 - 1.500 ft) - Area 2
Flight propensity:	☐
Night flight activity:	☐
Year specific correctional factors:	☐
Representation:	Risk assessment species accumulated
Order:	Probability of occurrence
Observer:	All
Ecological criteria:	

Severity	Total occurrence			
				Very high
	Acceptable 133 x 0.010 **1.330**	Acceptable 3 x 0.100 **0.300**	Acceptable 0 x 1.000 **0.000**	Tolerable 0 x 10.000 **0.000**
	Acceptable 90 x 0.100 **9.000**	Acceptable 6 x 1.000 **6.000**	Tolerable 1 x 10.000 **10.000** Graureiher	Tolerable 1 x 100.000 **100.000** Turmfalke
	Acceptable 27 x 1.000 **27.000**	Tolerable 3 x 10.000 **30.000** Stockente Haustaube Ringeltaube	Not tolerable 2 x 100.000 **200.000** Star Rabenkrähe	Not tolerable 1 x 1,000.000 **1,000.000** Mäusebussard
	Tolerable 0 x 10.000 **0.000**	Not tolerable 0 x 100.000 **0.000**	Not tolerable 0 x 1,000.000 **0.000**	Not tolerable 0 x 10,000.000 **0.000**
	Not tolerable 0 x 100.000 **0.000**	Not tolerable 0 x 10,000.000 **0.000**	Not tolerable 0 x 10,000.000 **0.000**	Not tolerable 0 x 100,000.000 **0.000**

Amount species	**267.000**	**Accumulated risk**	**1,383.630**

Datenquellen

Ökologische Stammdaten eControl aviation (Bericht Ökologische Kriterien)
Vogelbeobachtungen und Vogelschläge (div. Wildlife-Statistiken)
Modellparameter (Bericht Modellparameter Eintrittswahrscheinlichkeit und Schweregrad)
Eintrittswahrscheinlichkeit (Bericht Risk Assessment Detailinformationen Eintrittswahrscheinlichkeit)
Schweregrad (Bericht Risk Assessment Detailinformationen Schweregrad)
Riskassessment je Species (Bericht Risk Assessment je Species)

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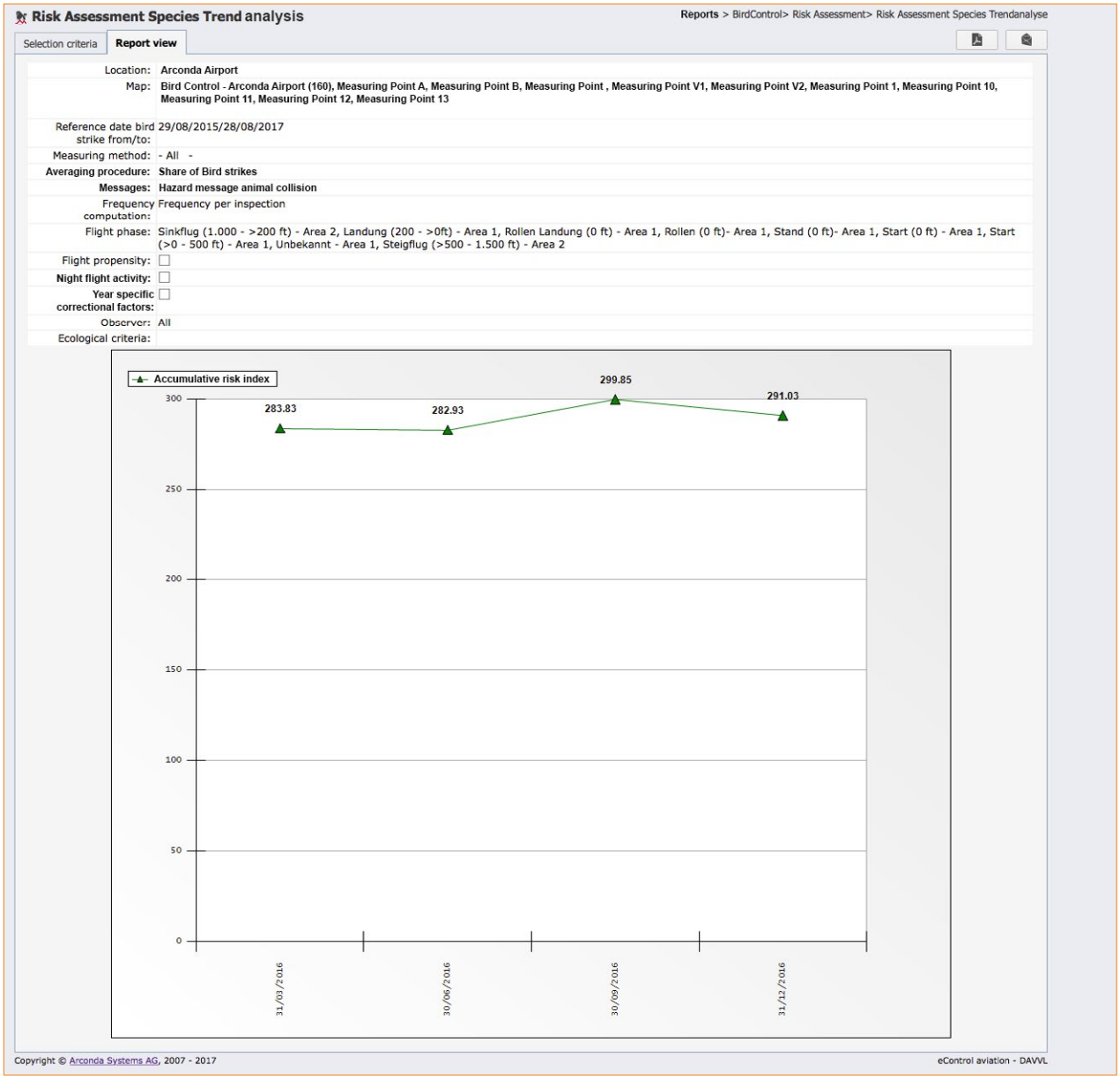
15 Report: Species trend analysis

The long-term development of the risk of bird strike can only be determined by trend analysis. With the Trend Analysis Risk Assessment the system carries out its own risk assessment for each observation interval. eControl ensures that temporary correction factors are correctly taken into account and carries out the risk assessments for the individual observation intervals with the same model parameter, to avoid distortions of the trend analysis.

The trend analysis can be presented for a month, a quarter or a year, provided the system supports up to 36 observation intervals.

To facilitate accounting for the occurrence and distribution of bird strikes according to species in a statistically appropriate way, a differently representative observation period for bird strikes can also be set here of course. Anomalies in the trend analysis can be investigated through individual risk assessments in accordance with bullet points (*), selecting identical analysis parameters to enable retrieval of the detailed information desired.



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