



Aerodrome : A Bird's-eye view

- **Air Traffic - A glance**
- **Birds' Migratory routes – Level of Airspace inhabitation**
- **Aerodrome Wildlife strikes – Most Hazardous fauna**
- **Birds & its instincts on aerodrome ecosystem**
- **Potential species - Probability**
- **Significance of Aerodrome Topography**
- **Critical track**
- **Aerodrome ecosystem – Sources**
- **Highfliers**
- **Primary Hazard Zone – Critical zones**
- **Aerodrome control area**
- **Sampling – Potential bird hazard log**
- **Hazard Ranking**
- **Bird calendar**
- **Passive control – VMP**
- **Conclusion**



Focus Areas

Airspace occupancy - A glance

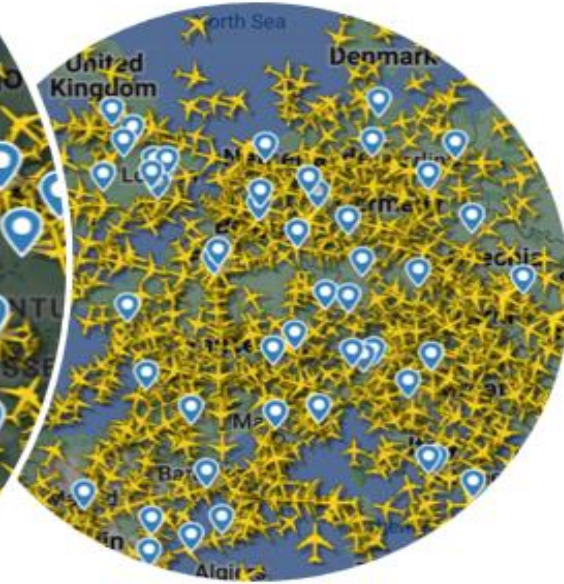
INDIAN AIRSPACE



US AIRSPACE

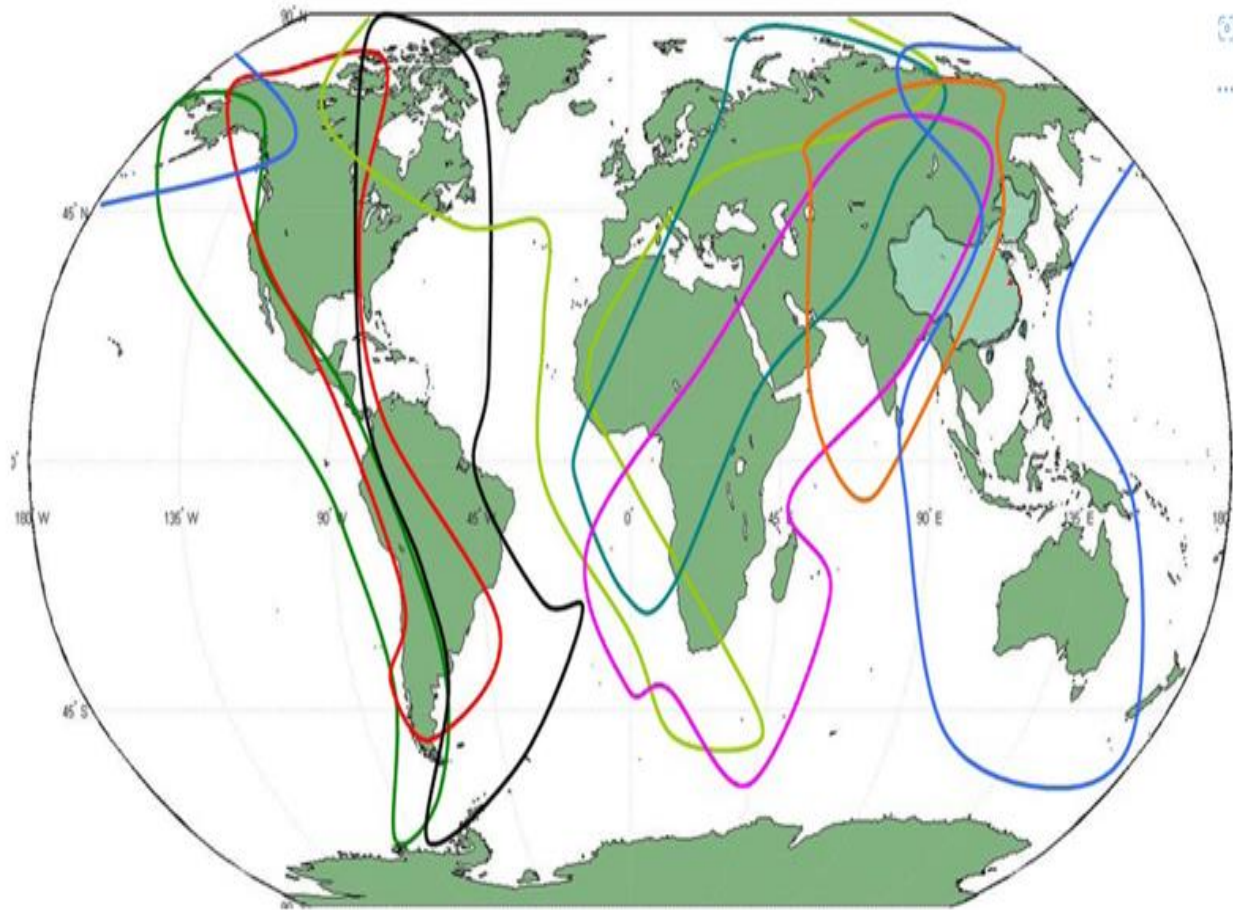


UK AIRSPACE



Source : Flightawaredata

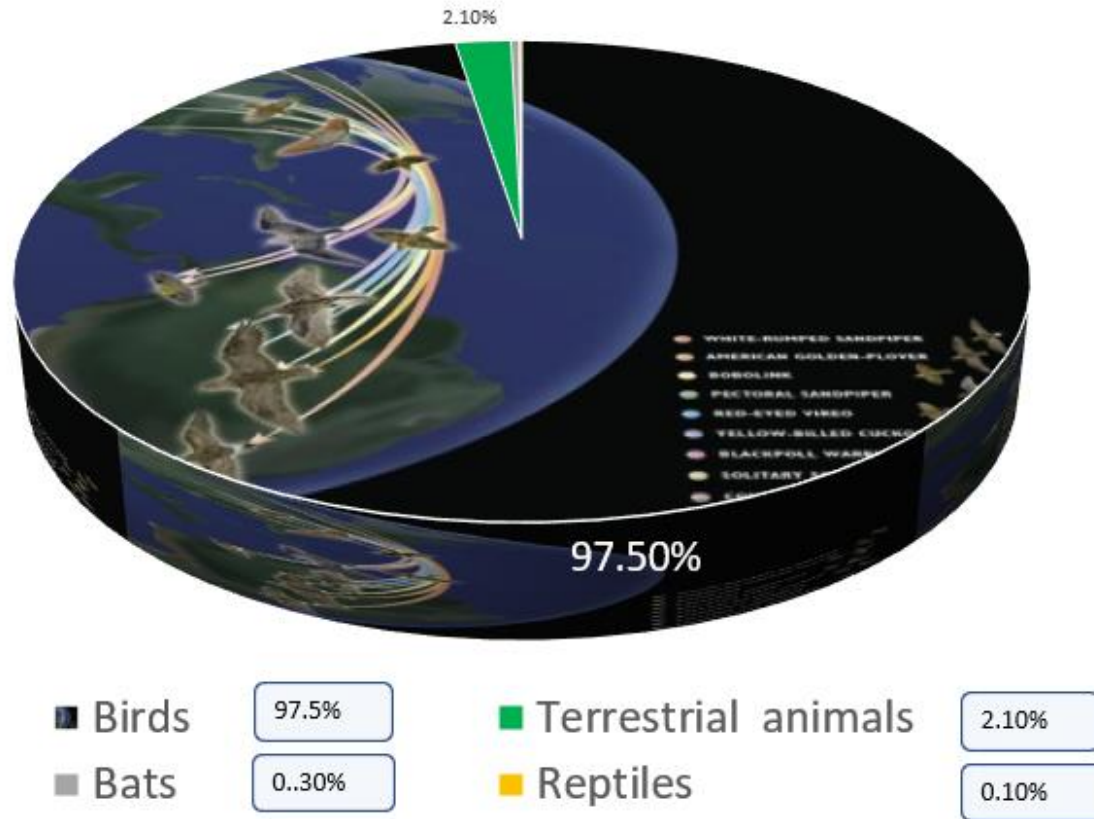
Migratory routes - Airspace inhabitation



- About 11000 species of birds
- 50% of them are migratory (incl local)
- 8 Major routes covering all continents
- Coastlines, mountain ranges, plains, river & valleys
- Use the same overland routes during both north (spring) and southward (fall) migrations.

Aerodrome wildlife strike – Most hazardous category

Wildlife Strike data





Birds and its Instincts at aerodrome ecosystem

Significance of aerodrome Topography

BAT CLUSTERS

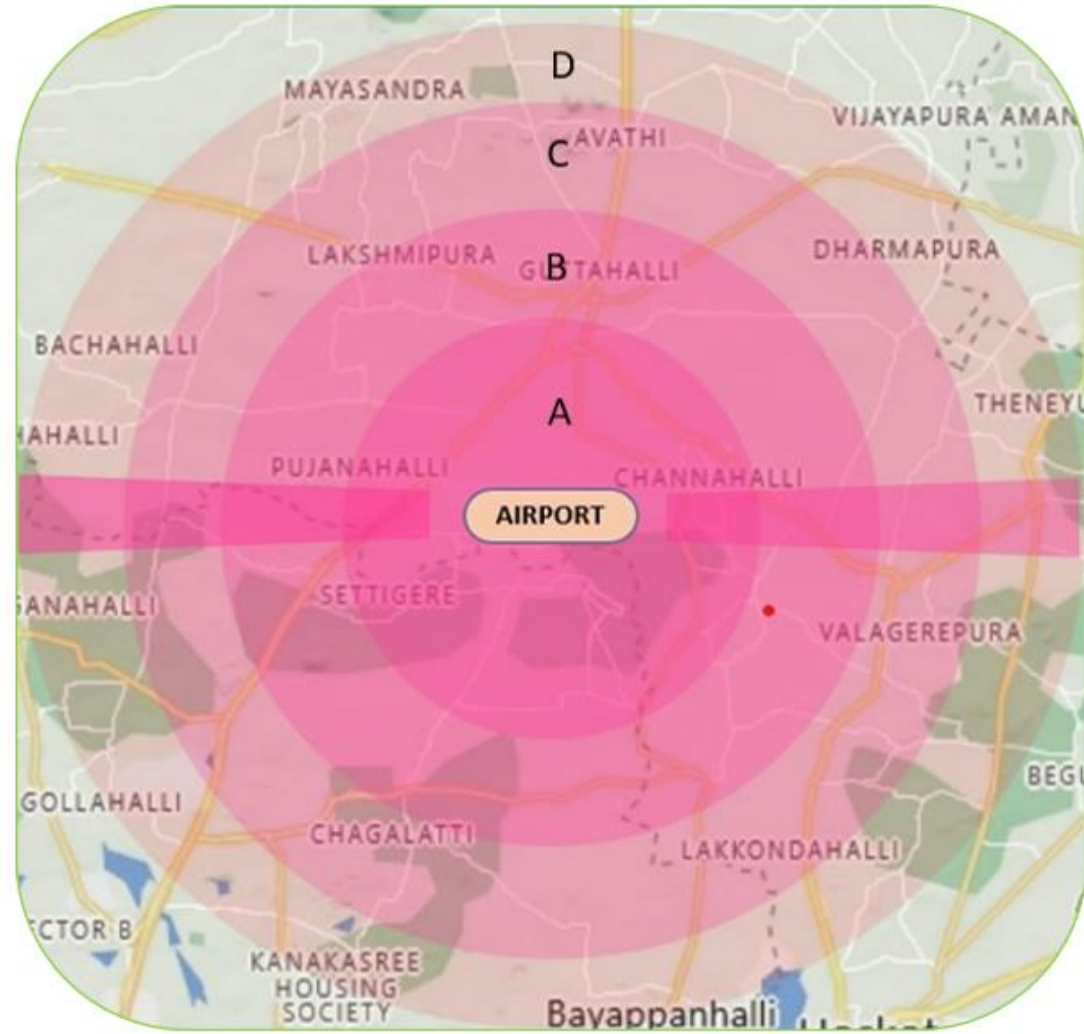
A	B	C	D
1	-	3	2

LAKES – WADERS

A	B	C	D
12	13	12	14

BIRD COLONIES

A	B	C	D
4	6	5	6



Highfliers

Global ranking

Ruppell's vulture	- 37000'
Common crane	- 33000'
Bar-headed goose	- 27835'
Whooper swan	- 27000'
Alpine chough	- 26500'
Bearded vulture	- 24000'
Andean condor	- 21300'
Bar-tailed godwit	- 20000'

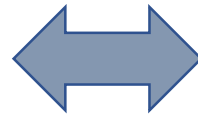
BIAL ranking

Common crane	- 33000'
Bar-headed goose	- 27825'
Duck	- 21000'
Eagle	- 20000'
Black kite	- 16000'
Stork	- 16000'
Heron	- 9000'

Generalist vs specialist species - Aerodrome environment

GENERALIST

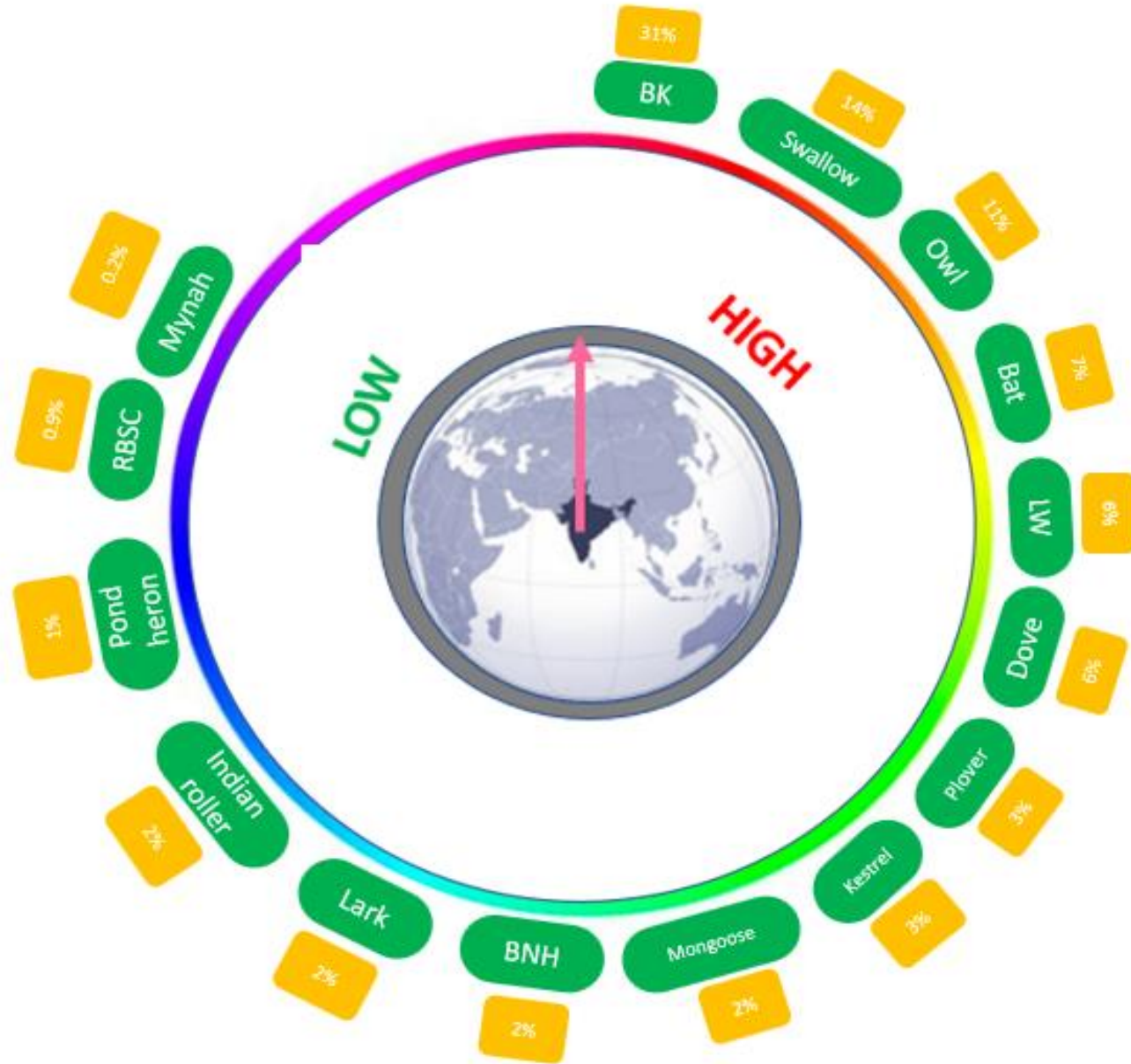
Species	Avg Mov	TBM%	HR
		Average	
Black kite	54475	29%	1
Swallow	16263	4%	7
Cattle egret	8218	4%	5
Pigeon	7602	19%	6
Lapwing	3608	3%	9



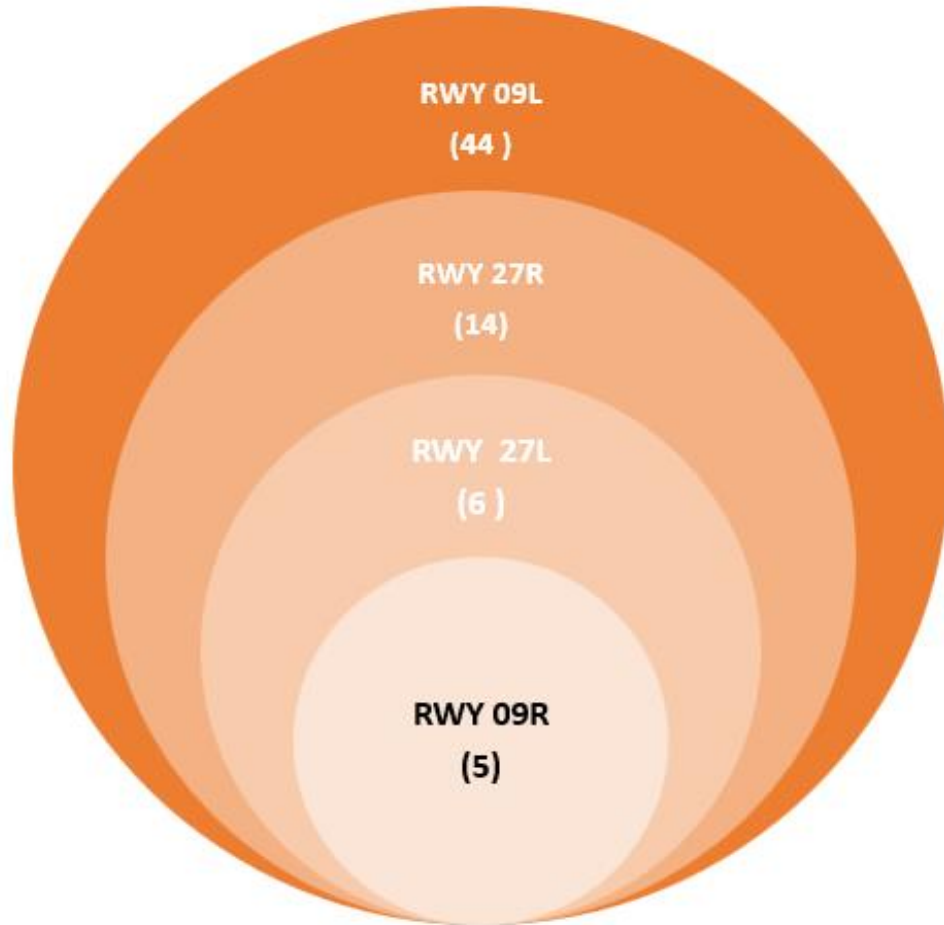
SPECIALIST

Species	Avg Mov	TBM%	HR
House crow	54475	29%	2
Marsh harrier	3467	0.1%	17
Kestrel	15621	1%	8
Parakeet	50377	16%	4
Black-shoulderd kite	5721	0.2%	16

Potential species Probability



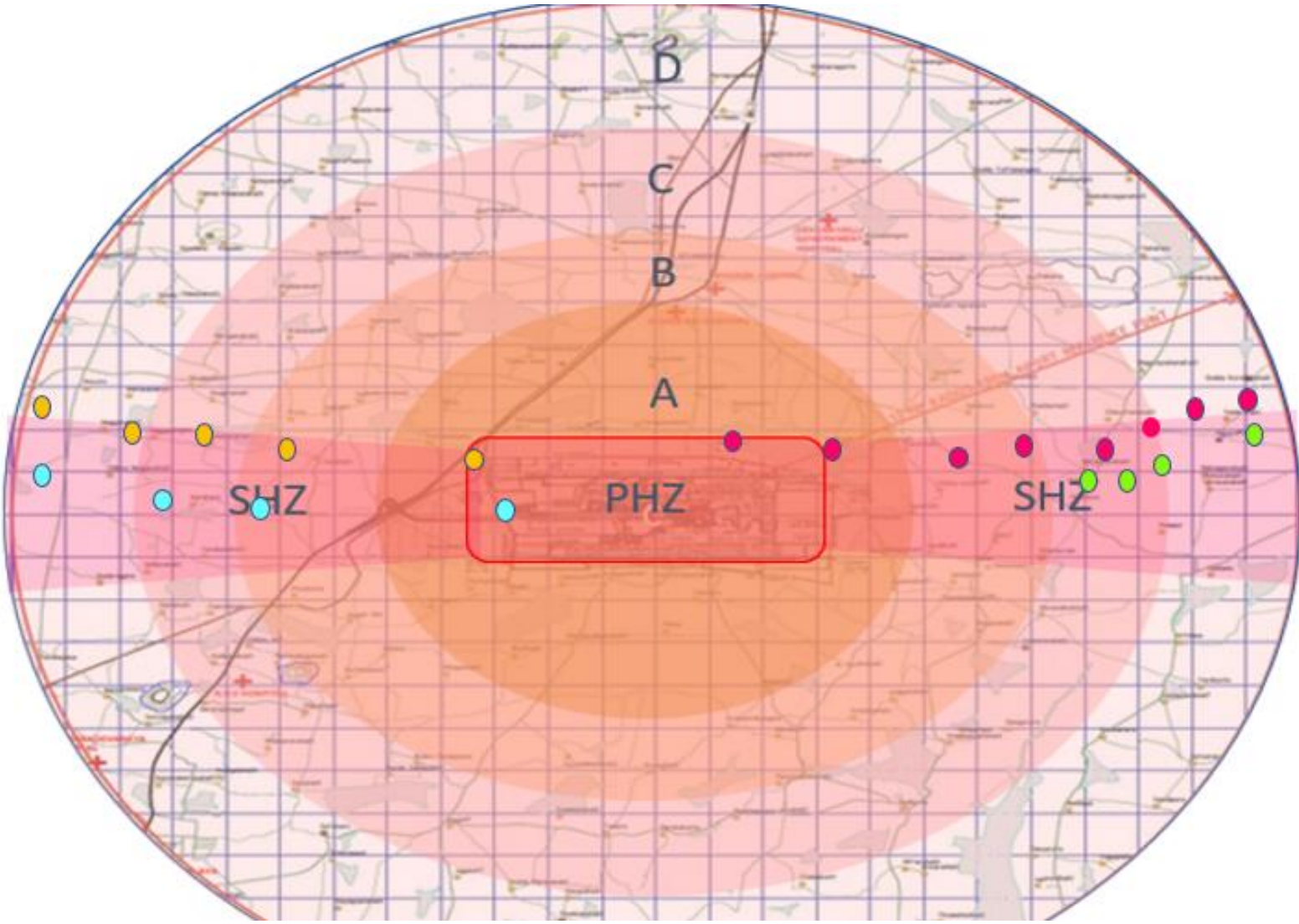
Potential track



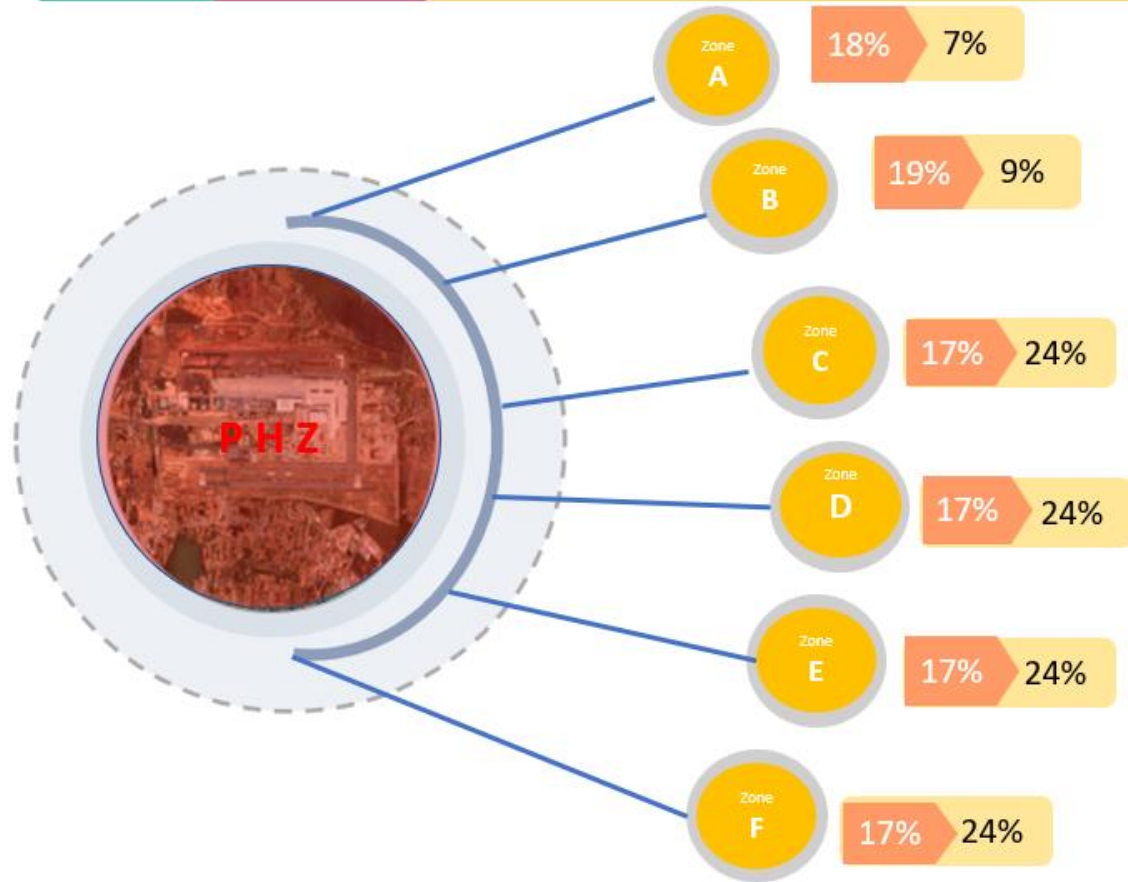
D A Y	Altitude	Runway				D A R K P H A S E
	In feet	09L	09R	27L	27R	
	100	6	0	1	5	
	500	9	0	0	3	
	1000	8	0	2	3	
	2000	3	0	2	2	
	3000	5	0	0	0	
	5000	2	1	1	1	
	6000	4	1	0	0	
	7000	3	2	0	0	
	8000	2	9	0	0	
	9000	2	9	0	0	
	10000	0	1	0	0	

Data extracted from 2020 after ops of second runway

Sources in ecosystem

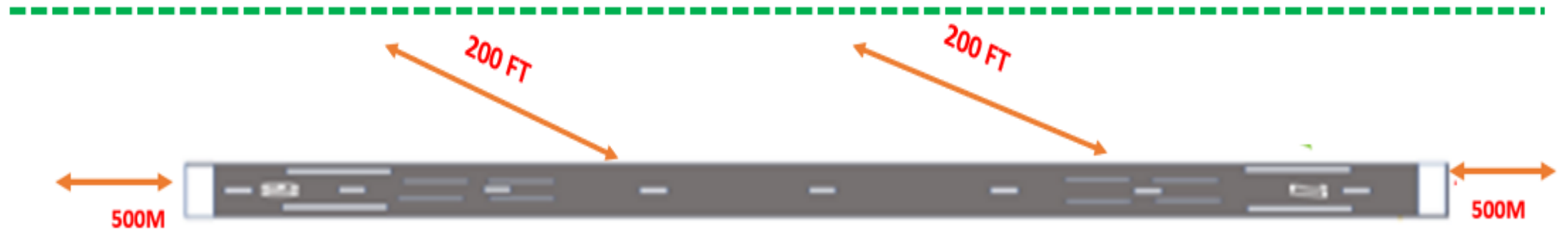


Primary Hazard Zone – Impact on runway

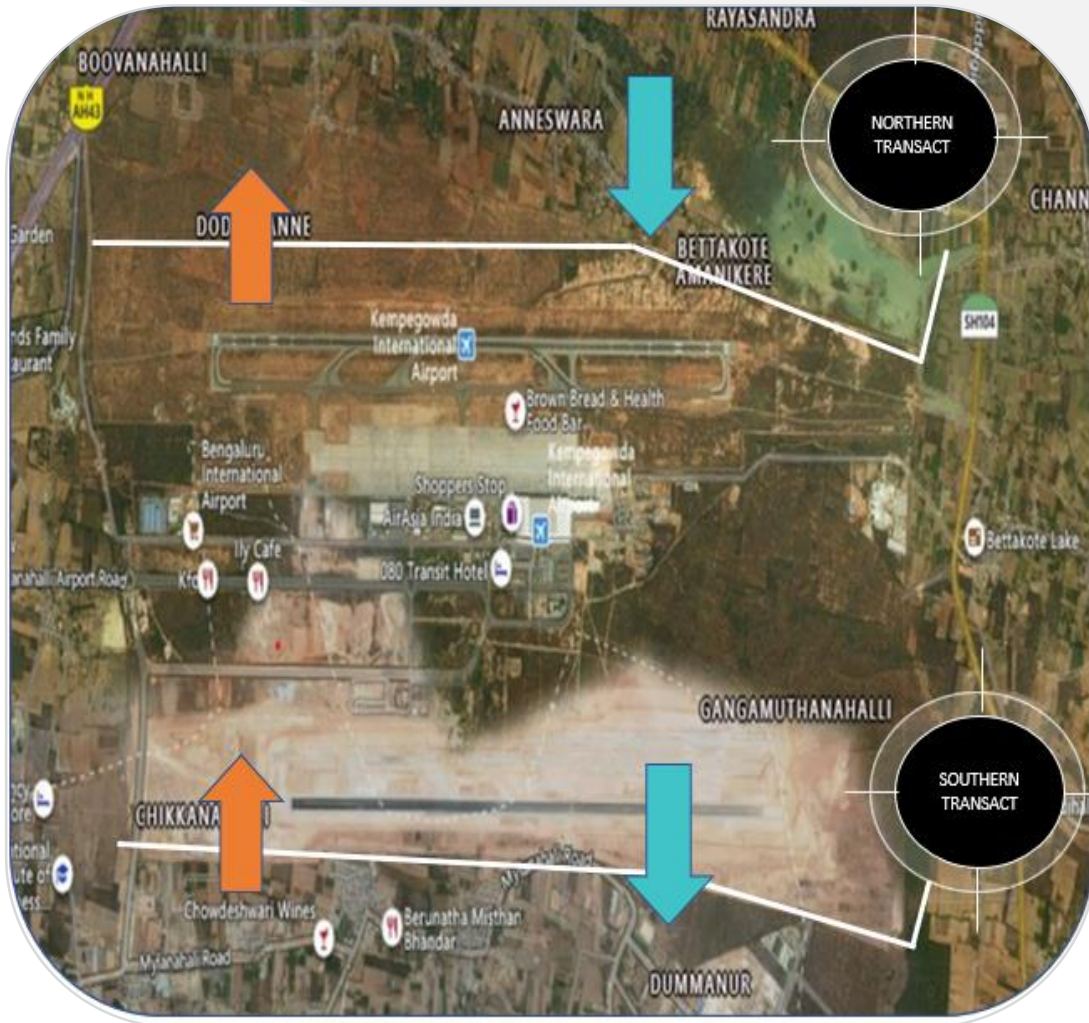


RWY	IMPACT ZONES		
27 R	Zone A	Zone B	Zone C
27 L	Zone C	Zone D	Zone E
09 R	Zone E	Zone D	Zone C
09 L	Zone E	Zone D	Zone C

Aerodrome control area



Sampling - Potential bird hazard log



POTENTIAL HAZARDOUS BIRD TRANSACT - VOBL AIRSPACE

Species	BK	HC	CE	Pigeon	Parakeet	Swallow	Others
AM	801802	229896	26231	260765	272019	61733	148209
AM Avg	156	45	5	51	53	12	29
PM	343629	98527	61205	111757	116579	41155	79806
PM Avg	67	2	2	3	0	27	108

- Mapping of Bird active area at BIAL airspace
- Critical bird crossing locations
- Potential hazardous species with Hazard Ranking
- Species specific treatment measures
- Management of potential hazardous species

HAZARD RANKING

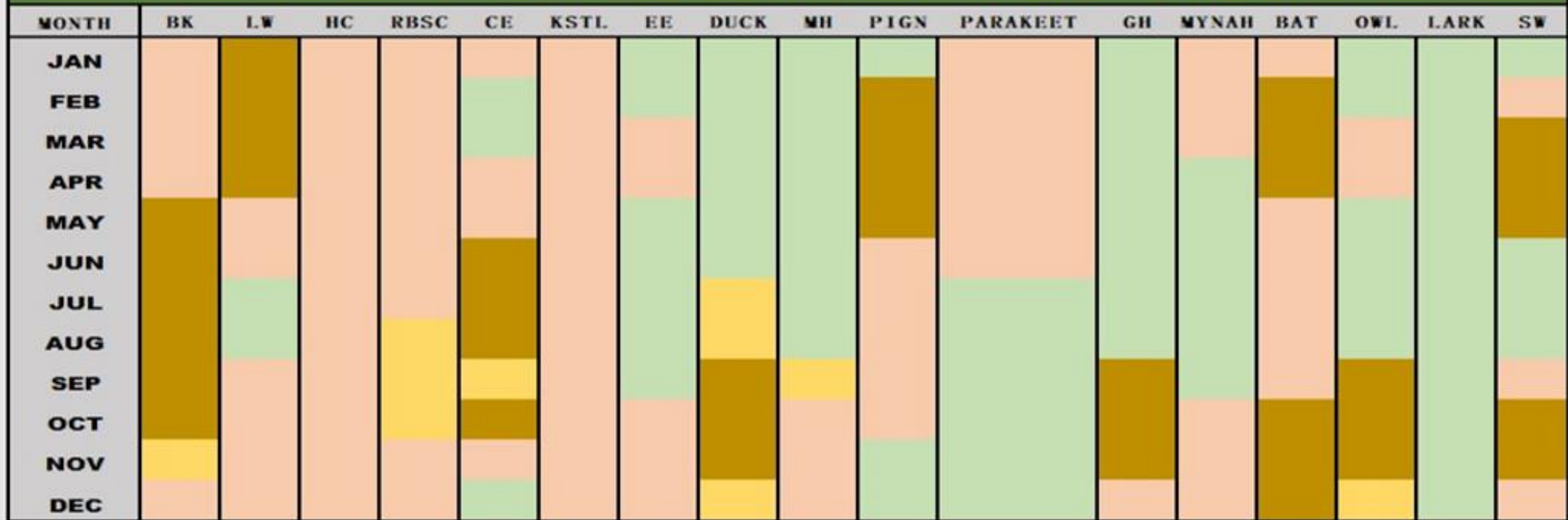
Sl.No.	Species	Mass (in gms)	Ranking based on Mass	Wingspan (in Cms)	Ranking based on wingspan	Involved with bird strike	Raning based on bird strike	No of signthing at PHZ	Ranking based on the movement at PHZ	Average group size if there is a flocking behaviour	Ranking based on Average Group size	Sum of ranking	Hazard Ranking
			R		R		R		R		R		HR
1	Black kite	750	3	200	2	81	1	30	1	25	1	8	1
2	House crow	400	4	80	6	2	6	20	2	20	2	20	2
3	Red-backed sea eagle	700	3	180	2	3	7	5	4	5	5	21	3
4	Parakeet	80	7	40	9	0	0	15	3	15	3	22	4
5	Cattle egret	150	5	70	7	3	7	15	3	20	2	24	5
6	Pigeon	150	5	60	8	4	5	1	6	10	4	28	6
7	Swallow	30	8	30	10	9	3	1	6	20	2	29	7
8	Kestrel	350	5	90	5	3	7	1	6	2	7	30	8
9	Lapwing	90	6	40	9	9	4	2	5	2	7	31	9
10	Mynah	40	8	40	9	3	7	1	6	1	8	38	10

WHM – A Ceaseless endeavor

RISK INDEX LEGEND																
Species	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Black kite	13	11	9	7	9	7	7	3	2	1	1	0	2	4	6	3
RI	4C	4D	4D	4D	4D	4D	4D	4E	4E	3E	2E	2E	2E	4D	4D	4D
Owl	1	1	0	3	0	5	4	1	1	1	1	0	0	2	0	0
RI	2E	2E	2E	4D	2E	4D	4D	2E	2E	2E	2E	2E	2E	3E	2E	2E
Bat	0	1	0	0	0	2	4	0	12	0	4	5	1	0	2	0
RI	2E	3D	2E	2E	2E	3D	4D	2E	4D	2E	4D	4D	3D	2E	3D	2E
Swallow	0	0	0	0	0	2	4	0	12	0	4	5	4	0	2	0
RI						3E	4E	2E	4E	2E	4E	4E	4E	2E	2E	2E

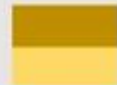
Wildlife Hazard Calendar

WILDLIFE HAZARD CALENDAR - CRITICAL SPECIES

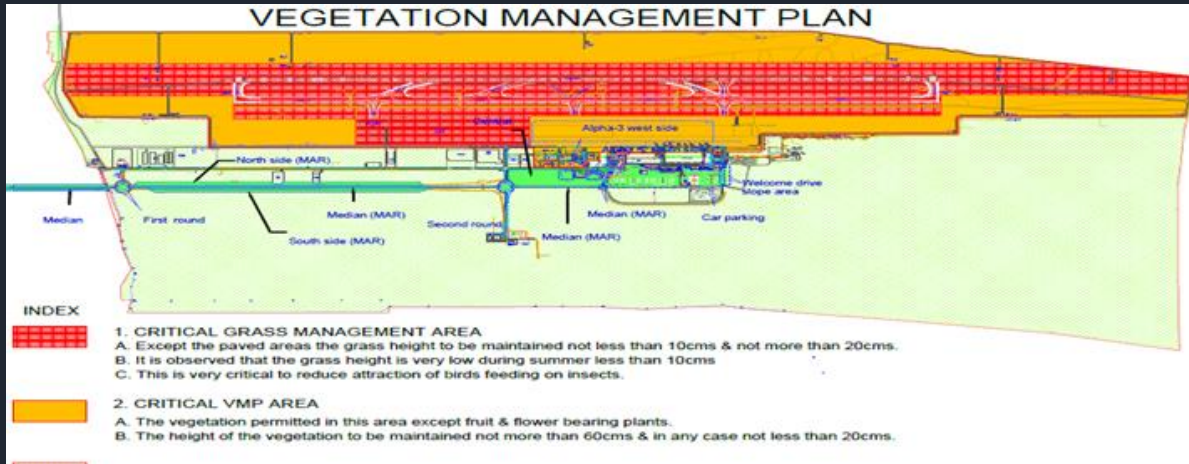


LEGEND

HIGH
MEDIUM



LOW
NORMAL



Habitat Management Measures

- Soil testing
- Grass species identification - 25
- Soil sampling – 20
- Water sampling - 3
- Bird sampling > 100 m from Rwy

Conclusion

Facts about birds

- Airspace is a habitat
- Intelligent species
- Highly adaptive
- Acts upon instincts

Aerodrome operator's responsibility

- Engage a specialist for aerodrome WHM
- Conduct a WHA survey
- Develop an integrated WHMP
- Develop a system to Monitor & record all wildlife movements/incidents
- Conduct stakeholder engagement
- Continuous Monitoring of aerodrome eco-system
- Periodic review of WHMP

THANK YOU

www.bengaluruairport.com
