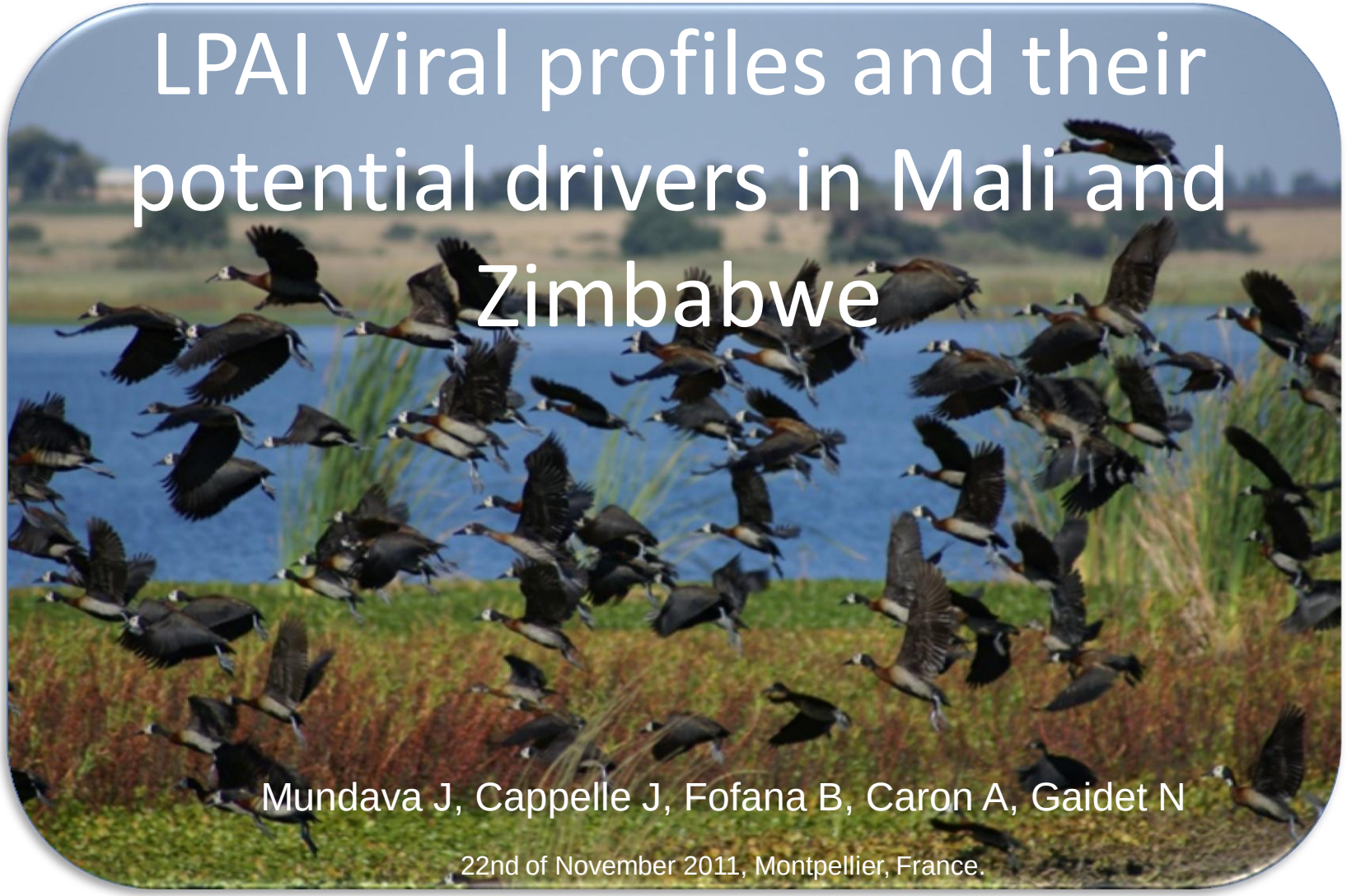
LPAI Viral profiles and their potential drivers in Mali and Zimbabwe



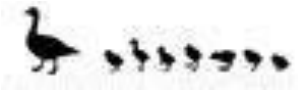
Mundava J, Cappelle J, Fofana B, Caron A, Gaidet N

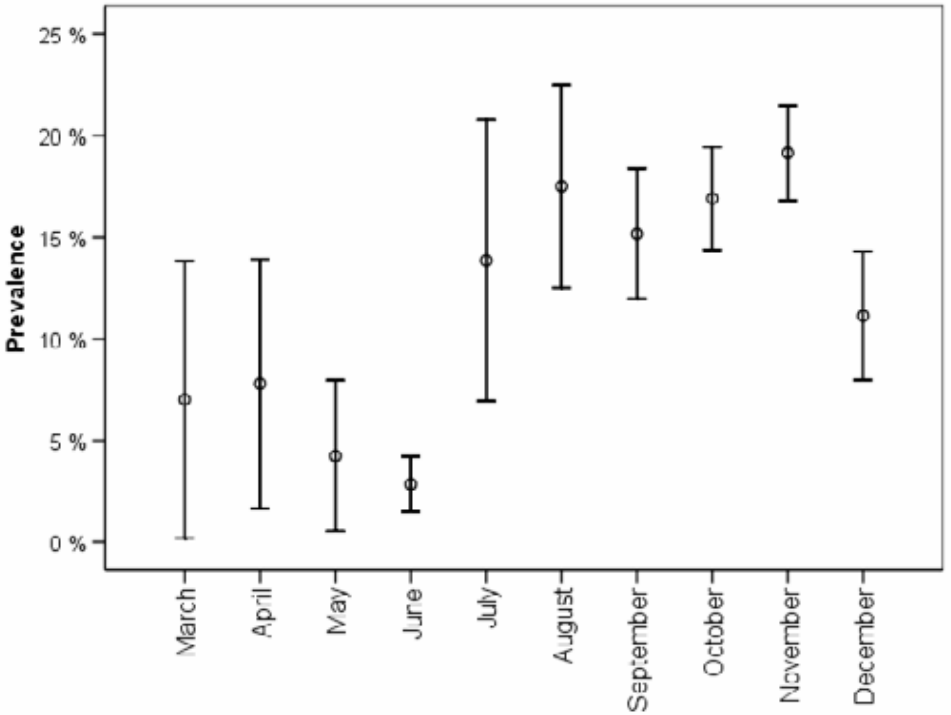
22nd of November 2011, Montpellier, France.

AIV seasonal circulation in Europe

- Density

- Juveniles

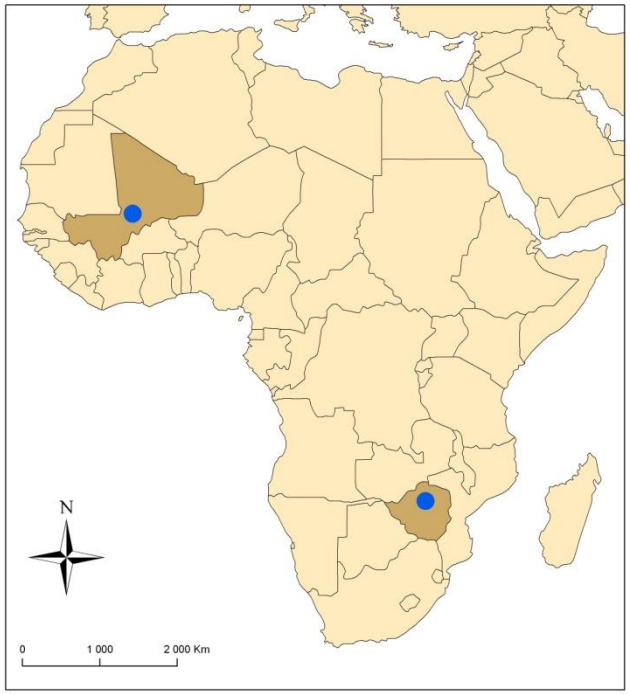




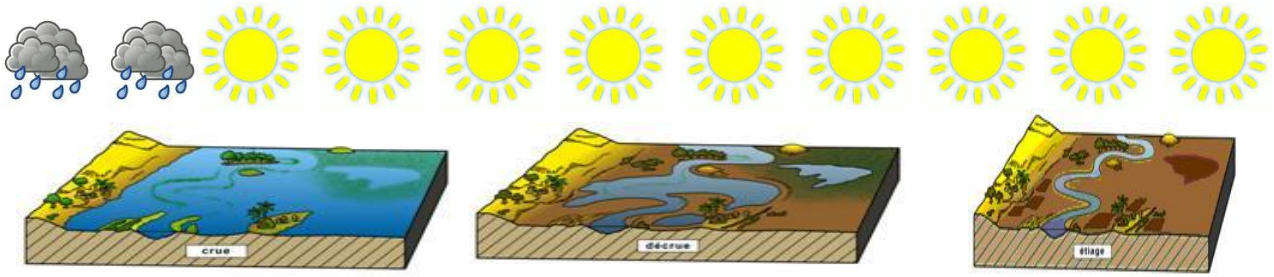
Seasonal pattern in Tropical areas ?

2 longitudinal studies:

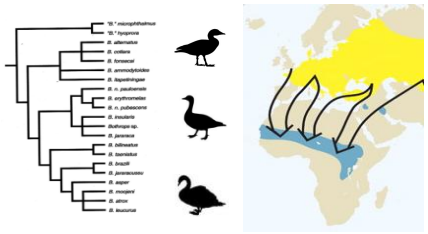
Inner Niger Delta, Mali
Chivero and Manyame, Zimbabwe

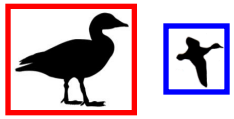


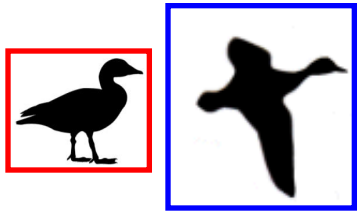
Mali

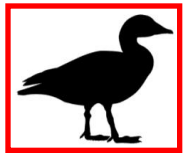


Risk Factors





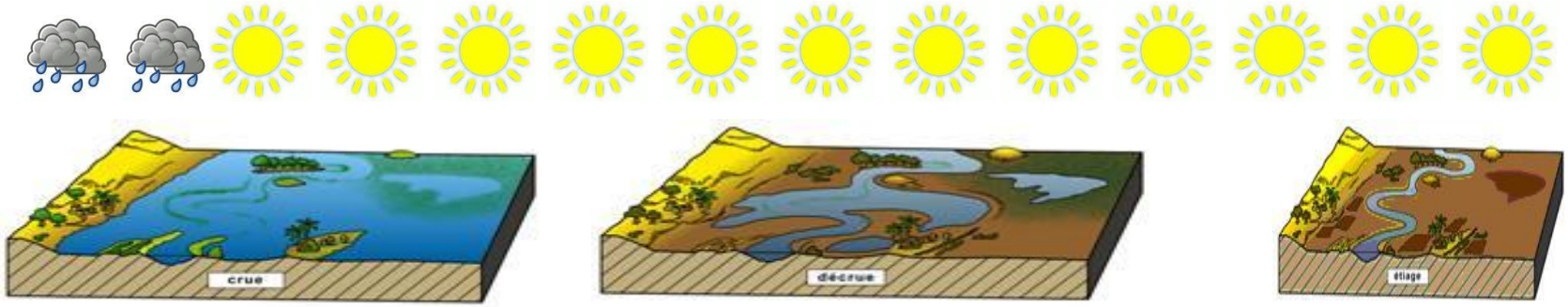




	Juil - Nov	Dec - Avr	Mai–Juin
Abundance	–	+ +	+
Density	– –	+	+ +
% Juveniles	+	–	– –
Temperature	–	+	– –

Mali

Samplings



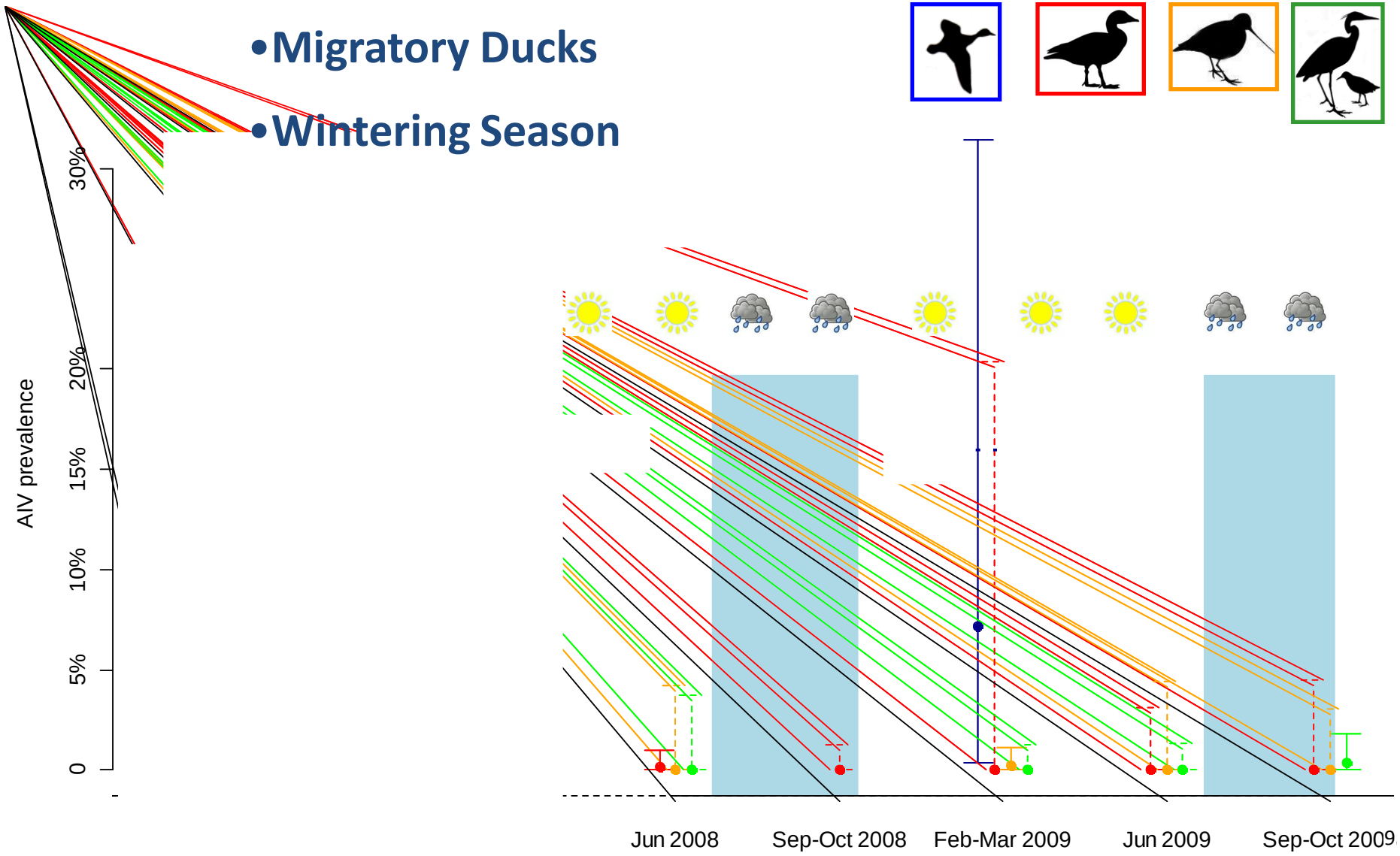
n = 932

n = 700

n = 1250

Mali - Results

- Migratory Ducks
- Wintering Season



Mali

Conclusions

- No HPAIV detected
- Circulation in Dry season >> Rainy season
- Highest prevalences in Migratory ducks
- AIV detected during all seasons though not every year and at low prevalences <1%

Ministère de l'Environnement et de l'Assainissement du Mali

Laboratoire Central Vétérinaire Bamako

Wetlands International

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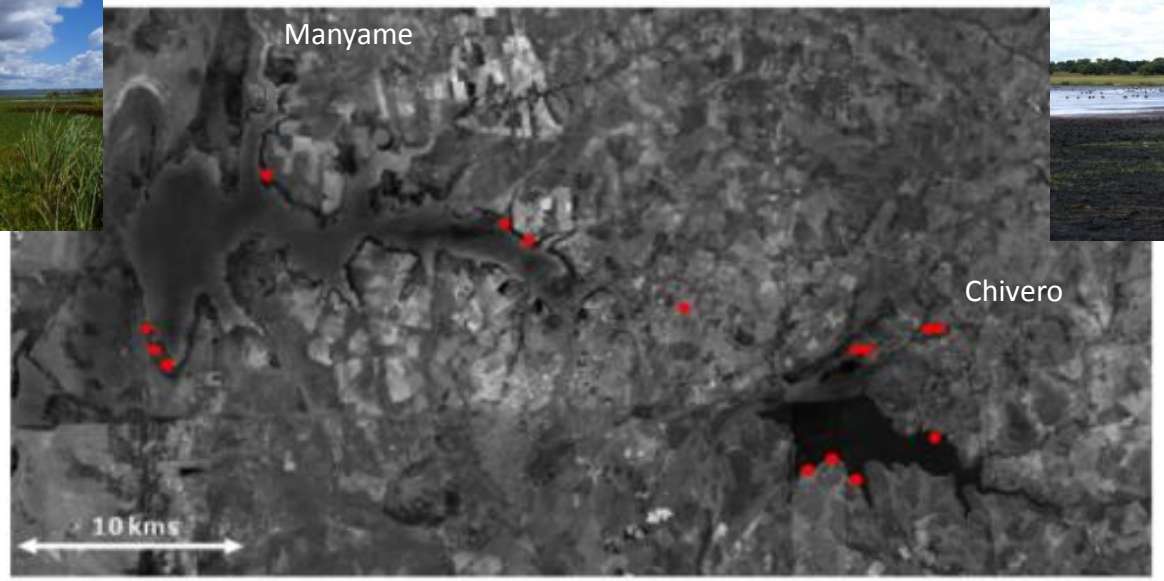
MINISTÈRE DES AFFAIRES ÉTRANGÈRES ET EUROPÉENNES

Zimbabwe: study site:

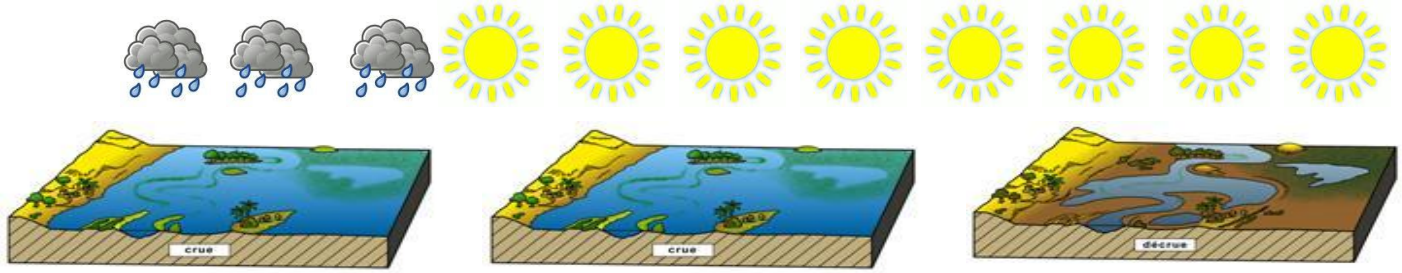
Manyame Catchment

Zimbabwe

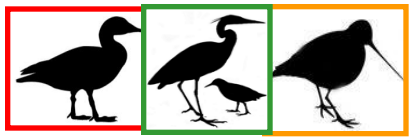


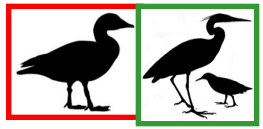
Zimbabwe

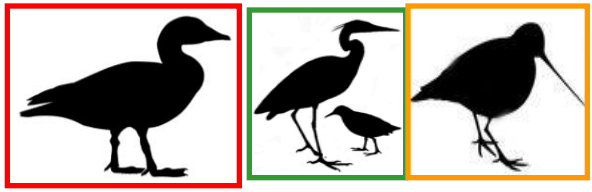
No palearctic ducks



Risk Factor



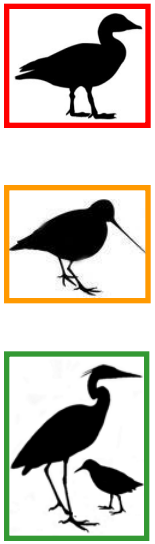


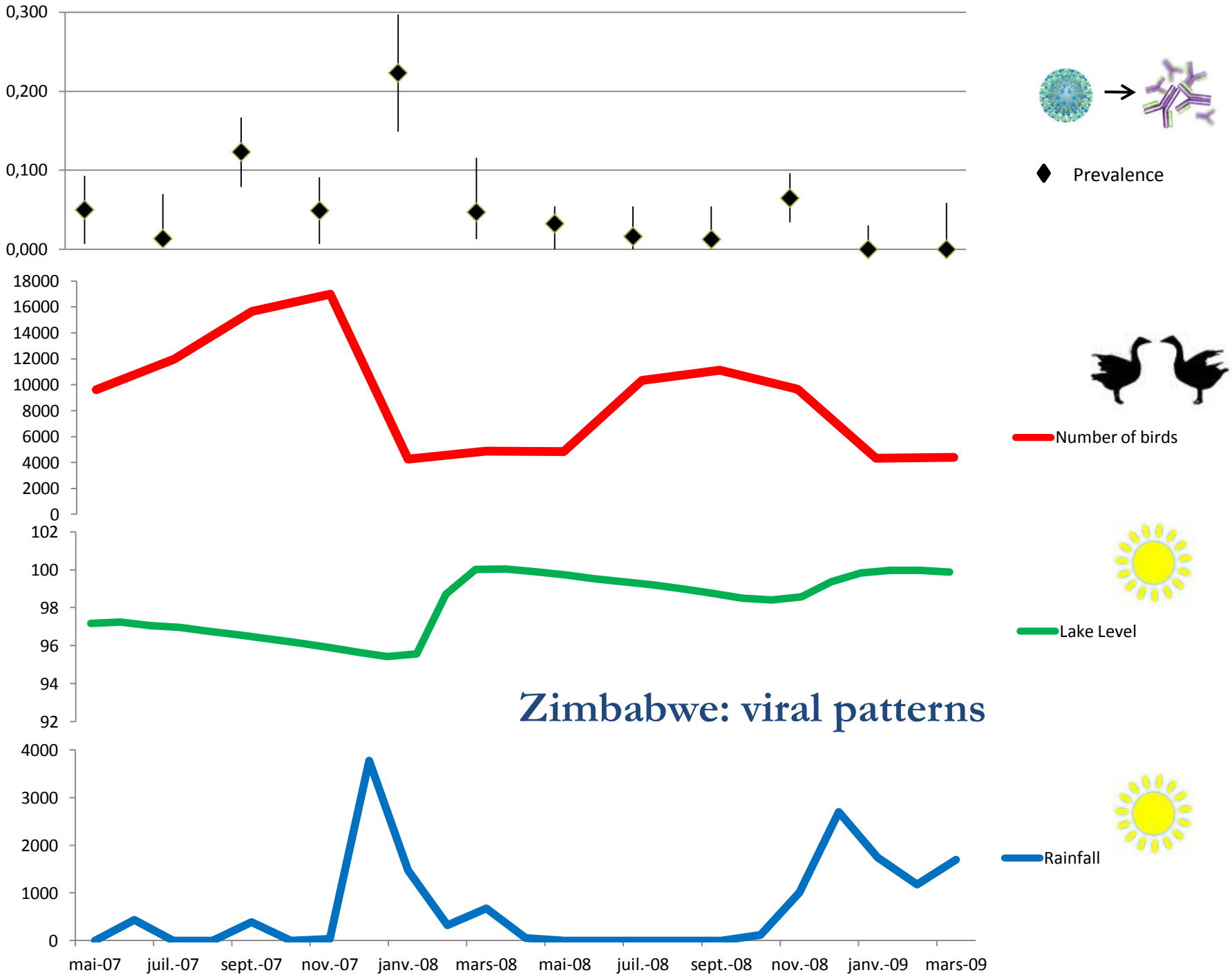


	Nov-March	April-Jul	Jul-Oct
Aboundance	+	+	++
Density	+	+	++
% Juveniles	?	?	?
Temperature	++	-	++

Zimbabwe: describe communities

- Regular focal counts at 15 sites; 4 counts per site; 30mn per counts; every 2 months, 2 years (on-going);
- 360hrs of observation for 108 000 birds observed;
- Regular sampling every two months; 12 counting sessions, aroudn 2000 live brods sampled

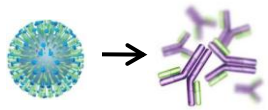




Zimbabwe: viral patterns

Zimbabwe: viral profile, waterfowl abundance, environmental factors

- Persistence of LPAI in waterfowl for 20 consecutive months (Caron et al. 2010)



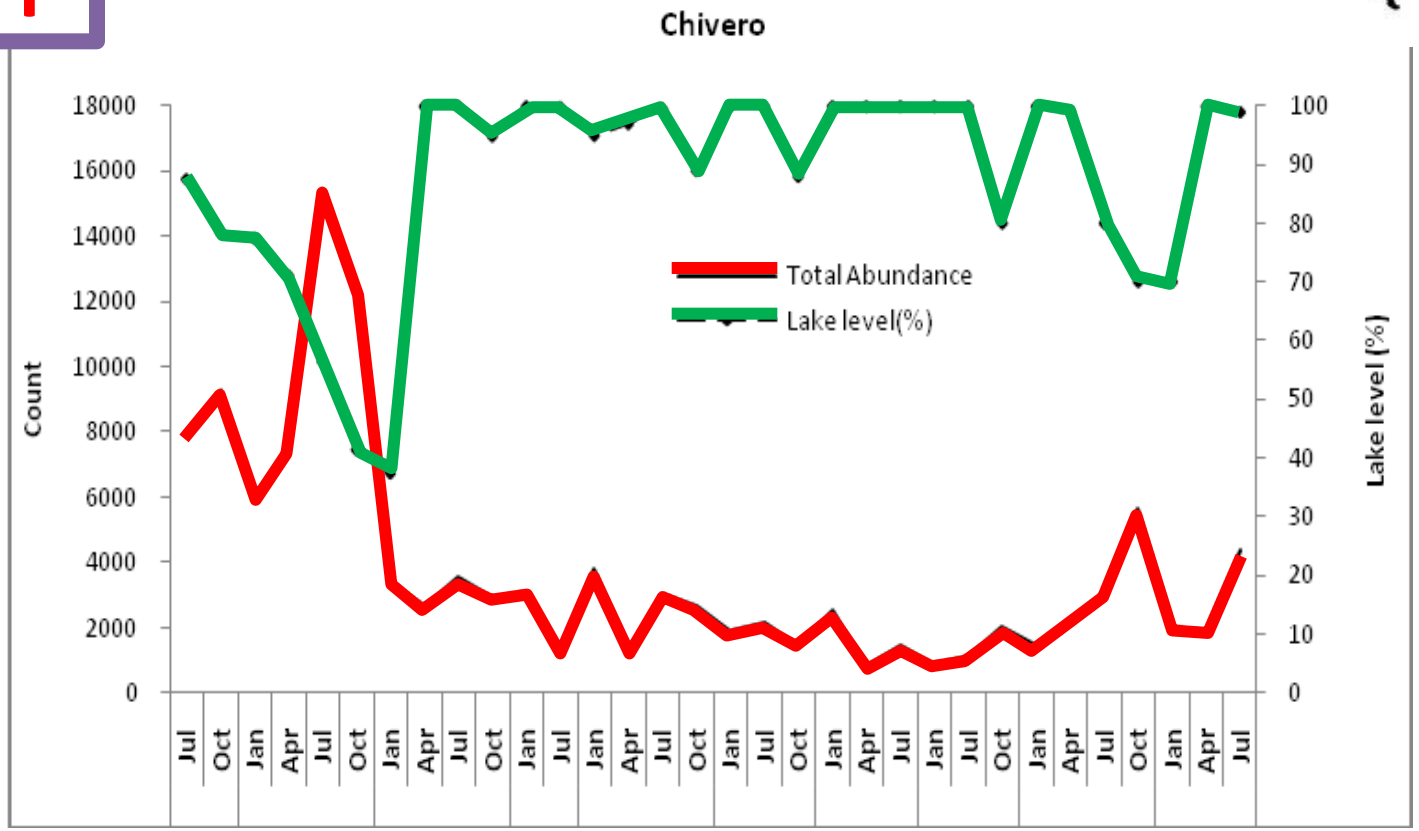
- Seasonal profile: effect of dry season

- Related to higher waterfowl density (Caron et al. 2010b)

- Determined by rainfall → lake level

Zimbabwe: long term relation waterfowl abundance/lake level

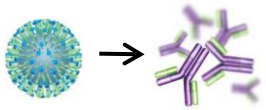
BUT



Ten year database: 1993-2003
Mundava, pers.comm

- Strong Inter-annual variability
- Difficult viral patterns difficult to predict

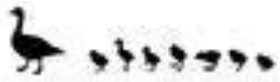
Zimbabwe: Multiple strains detected in different bird families



BUT

	May-07	Jul-07	Sep-07	Nov-07	Jan-08	Mar-08	May-08	Jul-08	Sep-08	Nov-08	Jan-09	Mar-09	Total
Swab positive	p=5	p=2	p=26	p=5	p=34	p=4	p=4	p=2	p=2	p=16	p=0	p=0	p=100
Anseriformes	4*na 1*H7	2*na	17*na 2*H7	5*na	3*na 3*H5	2*na	4*H7	2*na	1*na	3*na	0	0	39*na 3*H5 7*H7
Charadriiformes	0	0	5*na 1*H7	0	14*na 4*H5 2*H7	2*na	0	0	0	8*na	0	0	29*na 4*H5 3*H7
Passeriformes	0	0	1*na	0	5*na 1*H5	0	0	0	1*na	5*na	0	0	12*na 1*H5
Coraciiformes	0	0	0	0	1*na 1*H5	0	0	0	0	0	0	0	1*na 1*H5

- LPAI Strain dynamics
- Should influence the level of LPAI circulation



Role of the « proportion of Juveniles » in the waterfowl population in the LPAI epidemiology

Zimbabwe

Josphine Mundava

22 November 2011, Montpellier

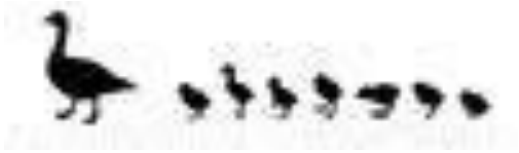
Background

All-year round persistence AIV in waterfowl communities of southern Africa has been shown and there is need to understand the ecological drivers of the reservoir WB community for better equipment for surveillance and control.

- Which ecological drivers shape waterbird communities and how do they vary in time?

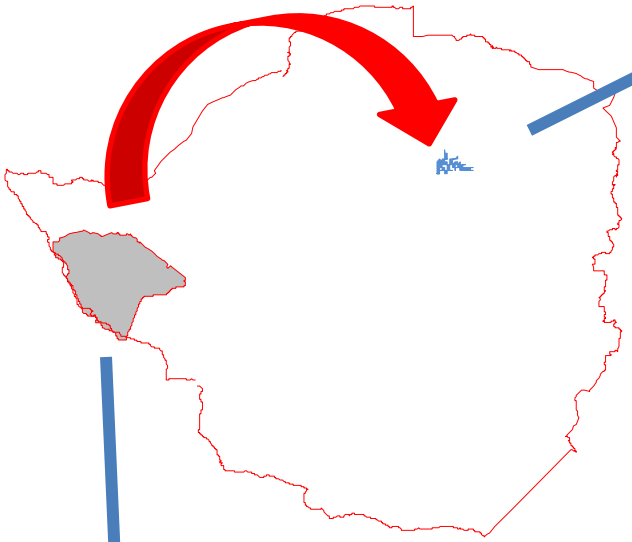
- What are the potential implications of these drivers in terms of AIV presence in the waterbird communities?

→ Role of proportion of Juveniles in the population

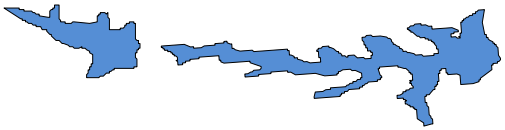


Study sites

May June



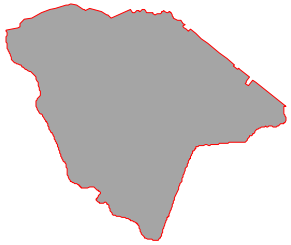
Chivero



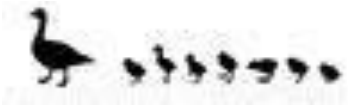
Manyame

• Lake Chivero and Manyame used as post-breeding staging sites. Large bodies that can sustain large numbers of birds in the dry season

Hwange NP used as main breeding site...lots of temporary pans on Kalahari sands ....



Hwange National Park



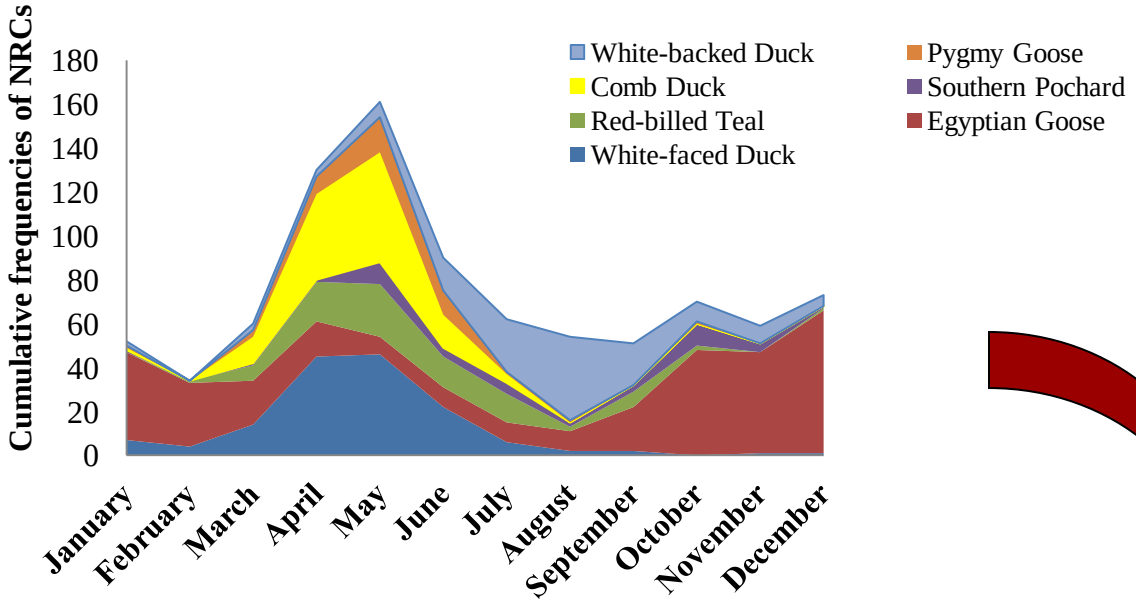
N

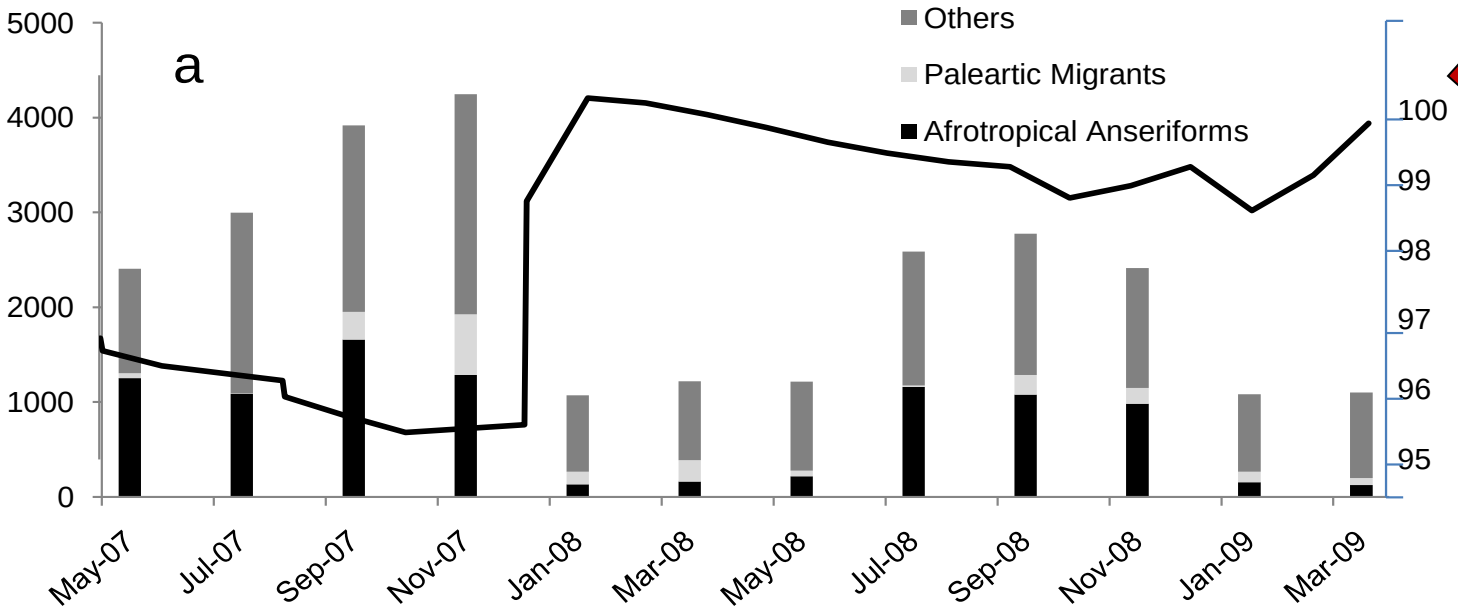
METHODS

- Breeding record data (n>1000) on duck species in Zimbabwe

- Targeted LPAI duck sampling (fecal sampling) for possible role of juveniles in breeding and non-breeding site

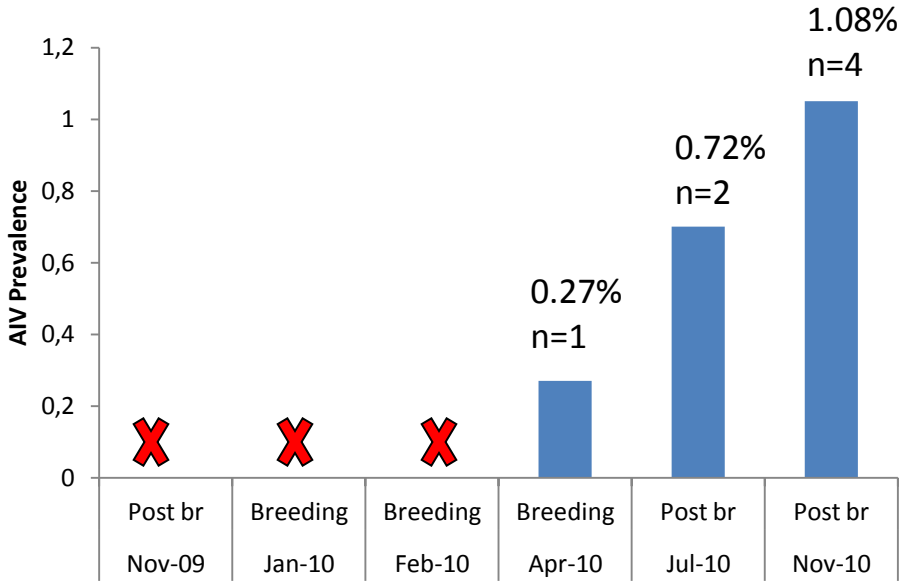
Breeding data..Hwange pans & similar sites



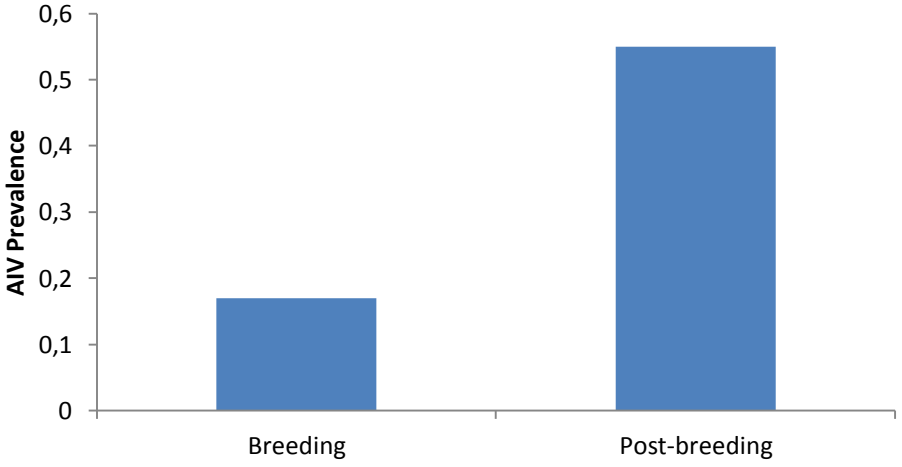


Census data..Chivero & Manyame

- Overall, we had 1079 samples of 8 species.
- 608 samples duck-breeding season
- 912 in the duck post-breeding period.
- 3 bird species infected: Egyptian Goose, Red-billed Teal and White-faced Duck
- Overall breeding season...prevalence (0.16%, n=1).
- Post-breeding prevalence..(0.54%, n=6)
- The White-faced Duck was the most infected with 2.2% prevalence (n=4) in November 2010.

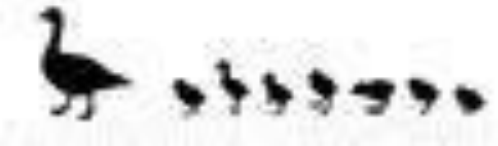


Global system prevalence: 0.65%, n=7



Discussion

- Ducks mainly breeding in pans and temporary water probably due to low disturbance and lack of permanent predators *(Woodall, 1974; Irwin, 1981)*
- At the national level results suggest AIV presence in the late breeding season with peaks in the late post-breeding period...early breeding seasons had no viral presence.
- Absence in the early breeding season may be due to breeding behaviour (e.g. Family group) including dispersal ..no new infections due to sparse distribution and little probability of transmission.
- Permanent water sources refuge in the dry season when water sources elsewhere have dried up… Ducks progressively congregate around these sources as the dry season progresses.
- It results in a gradual influx/congregation of juvenile, still immunologically naive for more pathogens and maybe be responsible for higher AIV circulation in the post breeding season...about 75% of WFD counted in this period were juveniles.



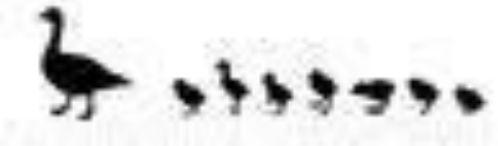
Discussion

- Several species have their breeding seasons at the same time and results in amplified prevalence in the post-breeding periods

- This result is in agreement with the effect of the breeding season in Europe and North America when young ducks congregate in late summer, before the autumn migration.

- However, the synchronisation of breeding is lesser than in the northern hemisphere and we observe a lesser peak in AIV prevalence.

- So far…. Avian influenza pathogens are circulating in the waterbird populations in Zimbabwe with a suggestion of a role played by juvenile birds in AIV prevalence....there probably are many other factors influencing prevalence besides breeding and these may include changes in bird communities and environmental factors (Caron et al. 2010).



Conclusion

	Mali	Zimbabwe
Climate	Dry>Wet	Dry>Wet
Foraging behaviour		
Host density	+	+
Seasonal aggregation		
Taxonomy	*Anas*	
Geographical origin		
Age		
Demographic rates		+
Seasonal peaks in prevalence		
Timing and origin of migrants	Pal. Migr	?

Seasonal circulation

Low prevalences:

Significativity ?

Relative Importance ?

Quantitative study:

Waterfowl

Acknowledgements

Research platform – PCP Zimbabwe

- Department of veterinary Services of Zimbabwe
- Parks and Wildlife Management Authority of Zimbabwe
- Uni. Of Zimbabwe and Bulawayo (NUST)

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Mammal Research Institute, Uni. Of Pretoria

Onderstepoort Veterinary Laboratory, Pretoria

Wetlands International, Sévaré, Mali