WWF *for a living planet*®

Mai Po Nature Reserve

Morning Bird Count

Five-year Summary Graphs

(September 2005 – August 2010)

CONTENTS

Chapter			Page
1.	**INTRODUCTION**		**1**
	1.1	**Background**	**1**
	1.2	**Aims**	**1**
2.	**METHOD**		**1**
	2.1	**Data Collection**	**1**
	2.2	**Data Analysis**	**1**
	2.3	**Yearly Abundance Graphs**	**2**
	2.4	**Monthly Abundance Graphs**	**2**
3.	**GRAPHS**		**3**
	3.1	**Total Bird Abundance**	**3**
	3.2	**Bird Groups**	**4-7**
	3.3	**Individual Species of Interest**	**8-39**
4.	**REFERENCES & BIBLIOGRAPHY**		**40**

This publication should be cited as:
WWF-HK, 2010. **Mai Po Nature Reserve Morning Bird Count Five-year Summary Graphs: September 2005 to August 2010**. World Wide Fund For Nature Hong Kong, Hong Kong.

[Cover photo: Flock of Black-faced Spoonbill and Egrets at *Gei wai* #6. Photo by: Neil Fifer]

Author:
Ms. Katherine Leung, Reserve Officer, Mai Po Nature Reserve, WWF Hong Kong.

Field Surveyors:
Mr. Roger Lee, Ms. Katherine Leung, Mr. Bena Smith.

Appendix

I. Morning Bird Count Methodology 41
II. Summary on Species Graph Selection 43

Graphs

1. Total Bird Abundance 3

Bird Groups

2. Cormorant (Great Cormorant *Phalacrocorax carbo*) 4
3. Ardeids, etc. 4
4. Ducks, Grebes, etc. 5
5. Waders 5
6. Rails, Coot, etc. 6
7. Birds of Prey 6
8. Wetland Dependent, Other 7
9. Non Wetland Dependent 7

Individual Species of Interest – Ardeids, etc.

10. Black-faced Spoonbill *Platalea minor* 8
11. Grey Heron *Ardea cinerea* 8
12. Black-crowned Night Heron *Nycticorax nycticorax* 9
13. Chinese Pond Heron *Ardeola bacchus* 9
14. Purple Heron *Ardea purpurea* 10
15. Yellow Bittern *Ixobrychus sinensis* 10
16. Eastern Great Egret *Ardea modesta* 11
17. Little Egret *Egretta garzetta* 11
18. Intermediate Egret *Egretta intermedia* 12
19. Striated Heron *Butorides striatus* 12
20. Eastern Cattle Egret *Bubulcus coromandus* 13

Individual Species of Interest – Ducks, Grebes, etc.

21. Little Grebe *Tachybaptus ruficollis* 13
22. Eurasian Teal *Anas crecca* 14
23. Garganey *Anas querquedula* 14
24. Eurasian Wigeon *Anas Penelope* 15
25. Northern Pintail *Anas acuta* 15
26. Northern Shoveler *Anas clypeata* 16
27. Tufted Duck *Aythya fuligula* 16
28. Spot-billed Ducks (Indian and Chinese) *Anas poecilorhyncha* & *A. zonorhyncha* 17

Individual Species of Interest – Rails, Coot, etc.

29. Eurasian Coot *Fulica atra* 17
30. Common Moorhen *Gallinula chloropus* 18
31. White-breasted Waterhen *Amaurornis phoenicurus* 18

Individual Species of Interest – Waders

32. Black-winged Stilt *Himantopus himantopus* 19
33. Common Sandpiper *Actitis hypoleucos* 19

Individual Species of Interest – Birds of Prey

34. Black Kite *Milvus migrans* 20
35. Western Osprey *Pandion haliaetus* 20
36. Eastern Buzzard *Buteo japonicus* 21
37. Eastern Marsh Harrier *Circus spilonotus* 21
38. Greater Spotted Eagle *Aquila clanga* 22
39. Eastern Imperial Eagle *Aquila heliaca* 22

Individual Species of Interest – Wetland Dependent, Other

40. Common Kingfisher *Alcedo atthis* 23
41. White-throated Kingfisher *Halcyon smyrnensis* 23
42. Pied Kingfisher *Ceryle rudis* 24
43. Eastern Yellow Wagtail *Motacilla tschutschensis* 24
44. Oriental Reed Warbler *Acrocephalus orientalis* 25
45. Red-billed Starling *Spodiopsar sericeus* 25
46. Collared Crow *Corvus torquatus* 26

Individual Species of Interest – Non Wetland Dependent

47. Large-billed Crow *Corvus macrorhynchus* 26
48. Azure-winged Magpie *Cyanopica cyana* 27
49. Eurasian Magpie *Pica pica* 27
50. Oriental Turtle Dove *Streptopelia orientalis* 28
51. Spotted Dove *Streptopelia chinensis* 28
52. Asian Koel *Eudynamis scolopacea* 29
53. Greater Coucal *Centropus sinensis* 29
54. White Wagtail *Motacilla alba* 30
55. Olive-backed Pipit *Anthus hodgsoni* 30
56. Chinese Bulbul *Pycnonotus sinensis* 31
57. Red-whiskered Bulbul *Pycnonotus jocosus* 31
58. Long-tailed Shrike *Lanius schach* 32
59. Black Drongo *Dicrurus macrocercus* 32
60. Siberian Stonechat *Saxicola maurus* 33
61. Common Tailorbird *Orthotomus sutorius* 33
62. Oriental Magpie Robin *Copsychus saularis* 34
63. Masked Laughingthrush *Garrulax perspicillatus* 34
64. Dusky Warbler *Phylloscopus fuscatus* 35
65. Yellow-browed Warbler *Phylloscopus inornatus* 35
66. Plain Prina *Prinia inornata* 36
67. Yellow-bellied Prinia *Prinia flaviventris* 36
68. Great Tit *Parus major* 37
69. Japanese White-eye *Zosterops japonica* 37
70. Scaly-breasted Munia *Lonchura punctulata* 38
71. Eurasian Tree Sparrow *Passer montanus* 38
72. Black-collared Starling *Gracupica nigricollis* 39
73. Crested Myna *Acridotheres cristatellus* 39

1. INTRODUCTION

1.1 Background

1.1.1 Birds are a key fauna group at Mai Po Nature Reserve (MPNR) and reliable data upon species, abundance and their main areas of use is essential to successfully manage habitats for their benefit. Therefore in June 2003 WWF commenced systematic morning bird counts at all *gei wai* and ponds inside the Reserve.

1.1.2 The 'Morning Bird Count' fulfils a number of important functions:

1. Systematically records all bird species at Mai Po (waterbirds, wetland-dependant and terrestrial based);
2. Generates detailed bird location data to inform habitat management; and
3. Collects basic waterbird breeding records.

1.1.3 A satisfactory database has been built up to allow simple trend analyses. Thus, this document has been compiled to bring together the 5-year data set collected from September 2005 to August 2010. Although data from the period June 2003 to August 2005 is available, methodological changes hinder comparisons, hence that data is not considered in this summary report.

1.2 Aims

1.2.1 The aims of this summary are to:

1. Show yearly changes in the abundance of bird group/species in MPNR over the 5 year period from 2005 - 2010;
2. Illustrate the seasonal changes in abundance of different bird groups/species in MPNR.
3. Inform the review process of the 2006-2010 Mai Po habitat management plan.

2. METHOD

2.1 Data Collection

2.1.1 Data collection followed the standardised baseline monitoring protocol (Appendix I). Only Category A bird data (refer to Appendix I for definition) was analyzed. Each survey year starts from 01 September.

2.2 Data Analysis

2.2.1 Throughout the five-year period, a cumulative total of 189 bird species (including 5 from captive origin) was recorded under Category A (Table 1). Among these 189 bird species, graphs are derived for those which are “frequently recorded”, i.e. present in at least 30% of the total number of counts in the 5-year period (recorded in 36 of the 120 counts) and present in at least 2 of the 5 survey years. Rationale is stated for those species where the above principle was not applied (Appendix II).

Table 1. Summary on number of species recorded in 2005-10.

Bird Group	2005-06	2006-07	2007-08	2008-09	2009-10	Cumulative
Cormorant	1	1	1	1	1	**1**
Ardeids, etc.	13	13	12	13	13	**13**
Gulls and Terns	2	2	1	3	7	**8**
Ducks, Grebes, etc.	13	14	11	11	13	**20**
Rails, Coot, etc.	3	3	4	3	4	**5**
Waders	32	33	31	35	36	**39**
Birds of Prey	10	12	14	11	11	**16**
Wetland Dependent, Other	9	11	12	11	11	**12**
Non Wetland Dependent	48	52	45	49	55	**75**
Total	**131**	**141**	**131**	**137**	**151**	**189**

2.3 Yearly Abundance Graphs

Index

2.3.1 The cumulative total of each survey year was used to derive an index to allow comparison of annual fluctuations within a particular group/species. For the vast majority of species, survey year 2005-06 was used as the baseline year (=100), however for a few species 2006-07 was used.

2.3.2 All index bars are divided proportionally into 4 seasons according to the cumulative total count of each 3-month period, as follows:

1. Autumn (yellow) : 01-September to 30-November;
2. Winter (blue) : 01-December to 28-February;
3. Spring (green) : 01-March to 31-May;
4. Summer (red) : 01-June to 31-August

Seasonal mean count

2.3.3 Mean counts for each season are shown on the graphs in *italic* numbers.

2.4 Monthly Abundance Graphs

Mean

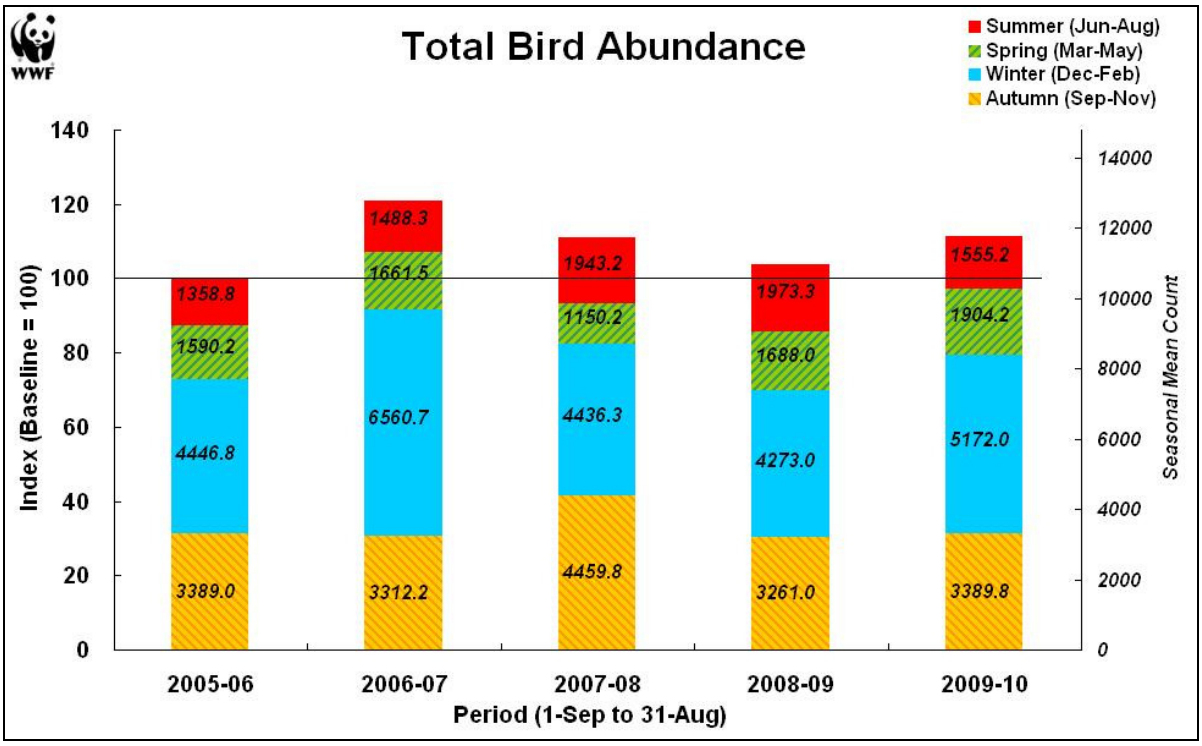
2.4.1 According to the survey methodology, counts are conducted in both the first and second halves of each month. The mean from each half-month is shown with standard error bars (in black).

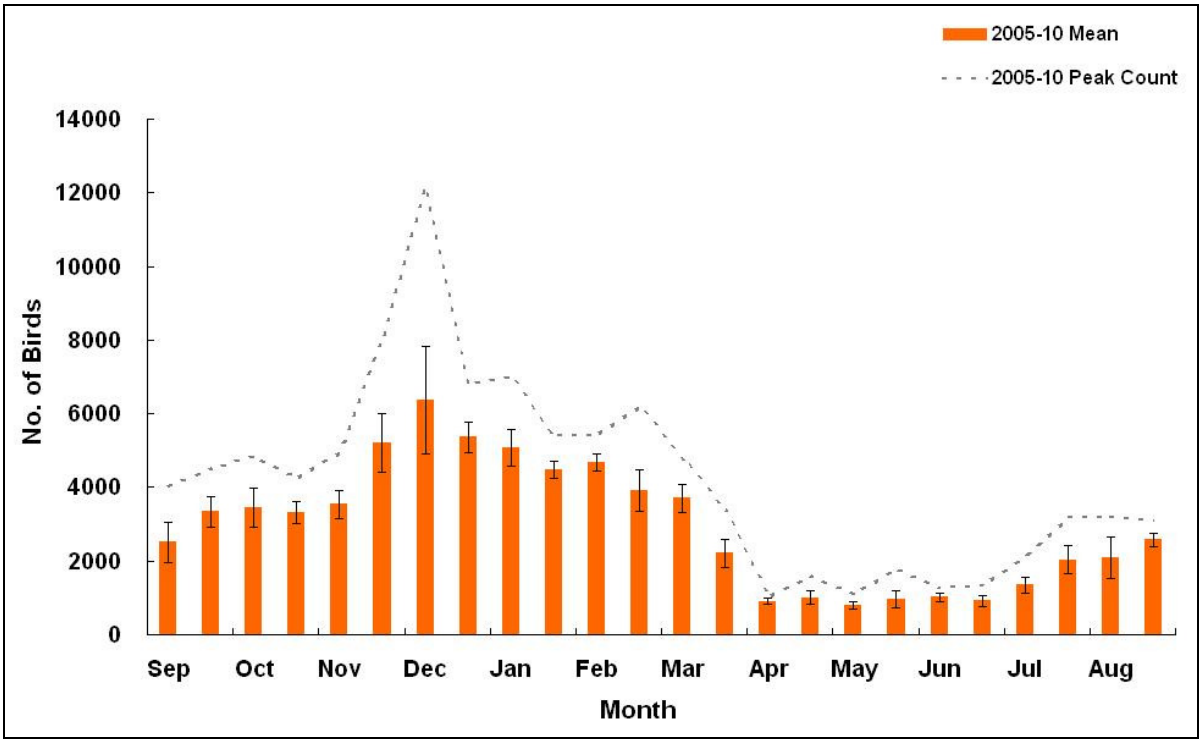
Peak count

2.4.2 The peak count is the highest number recorded for the group/species in the particular half-month period (grey dotted line).

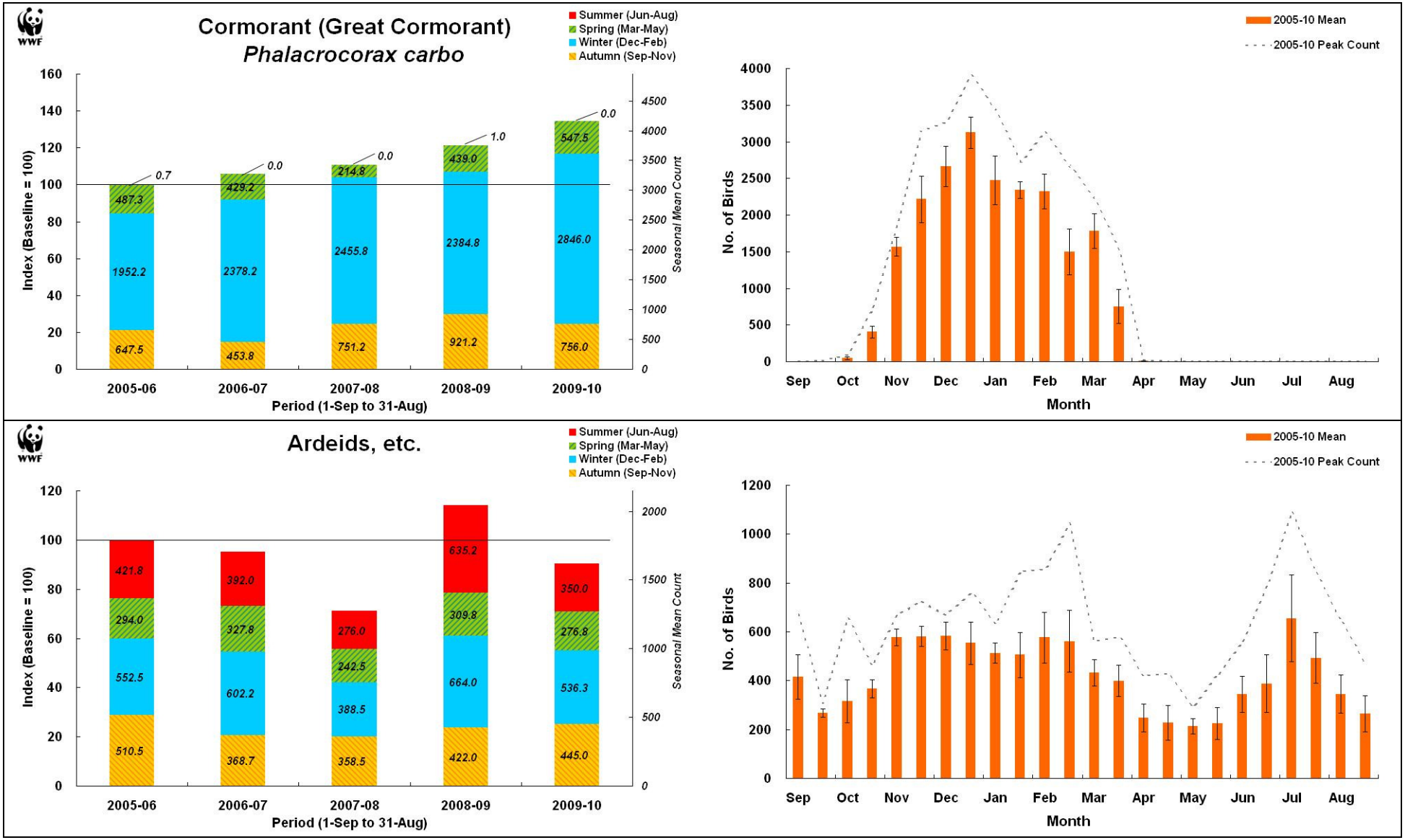
3. GRAPHS

3.1 Total Bird Abundance

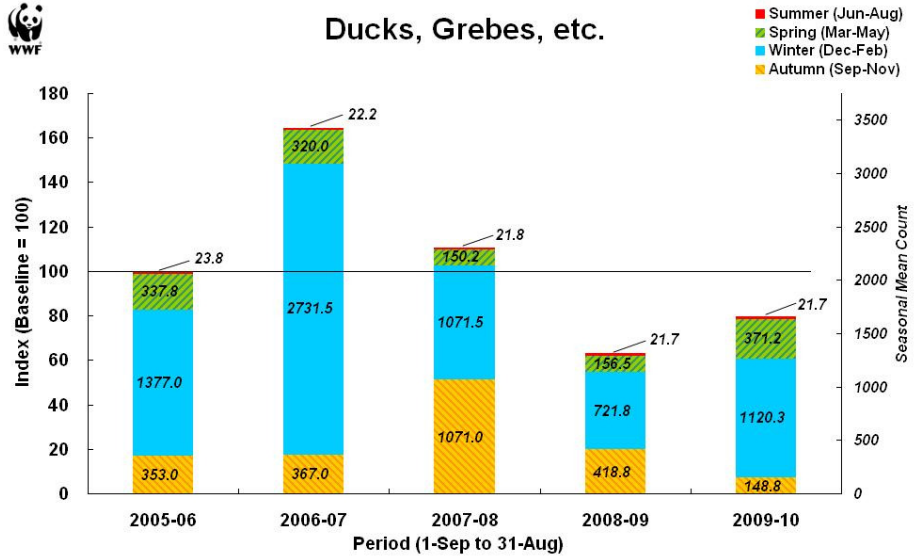


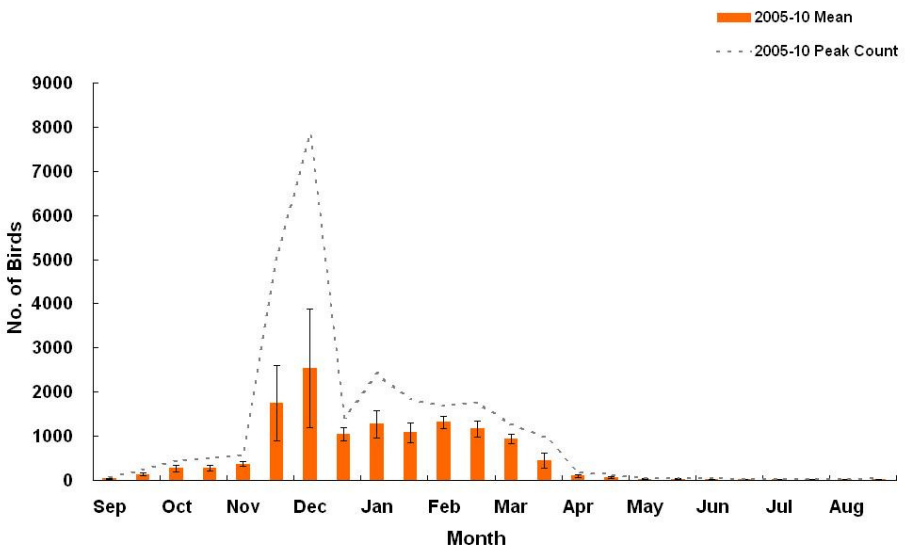


3.2 Bird Groups

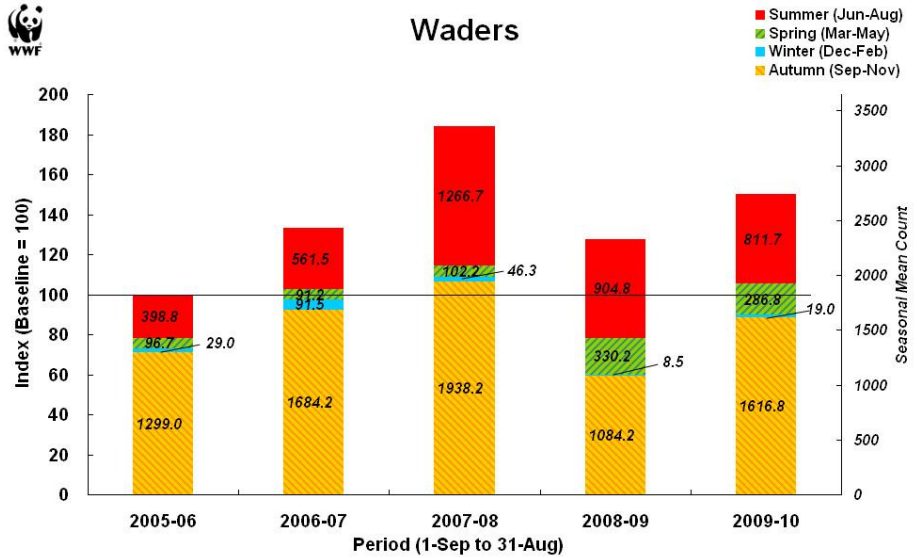


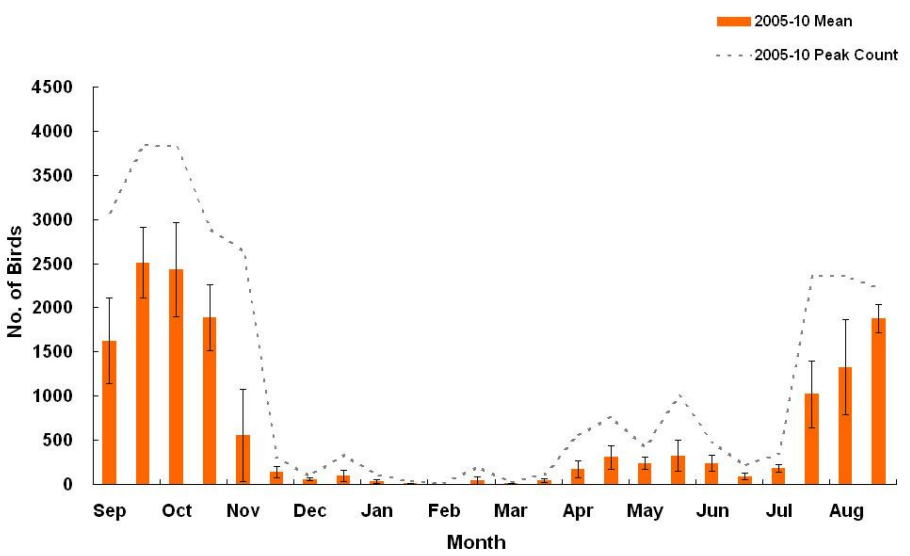
3.2 Bird Groups (cont')





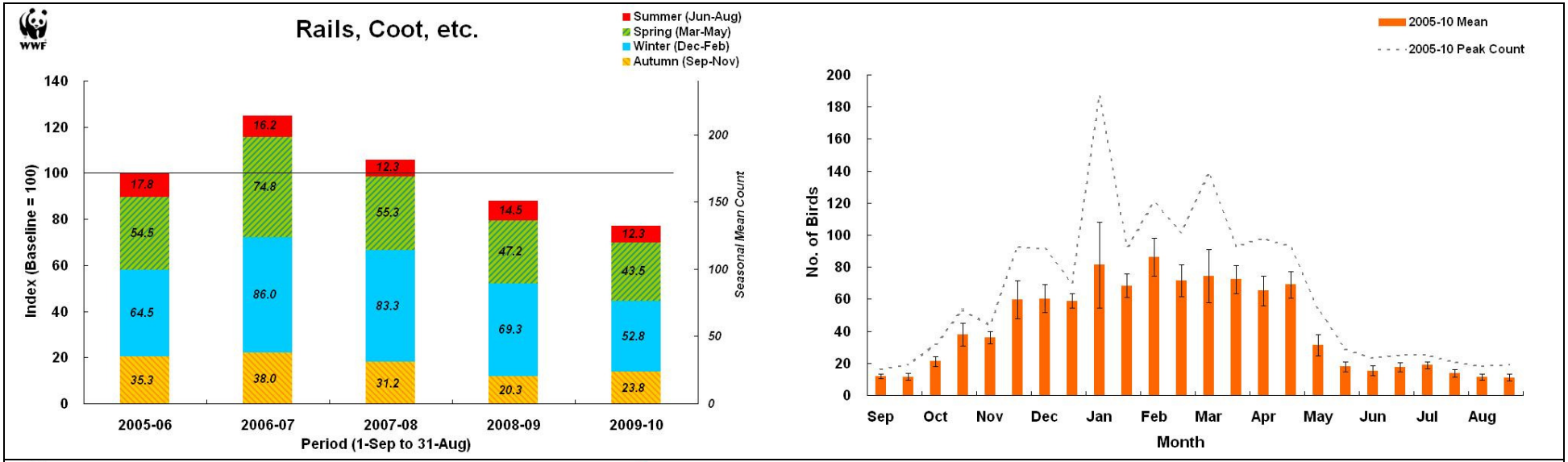
Note: An exceptional high count of >7,500 roosting ducks from *Gei wai* #16/17 recorded on 01-Dec-2006.

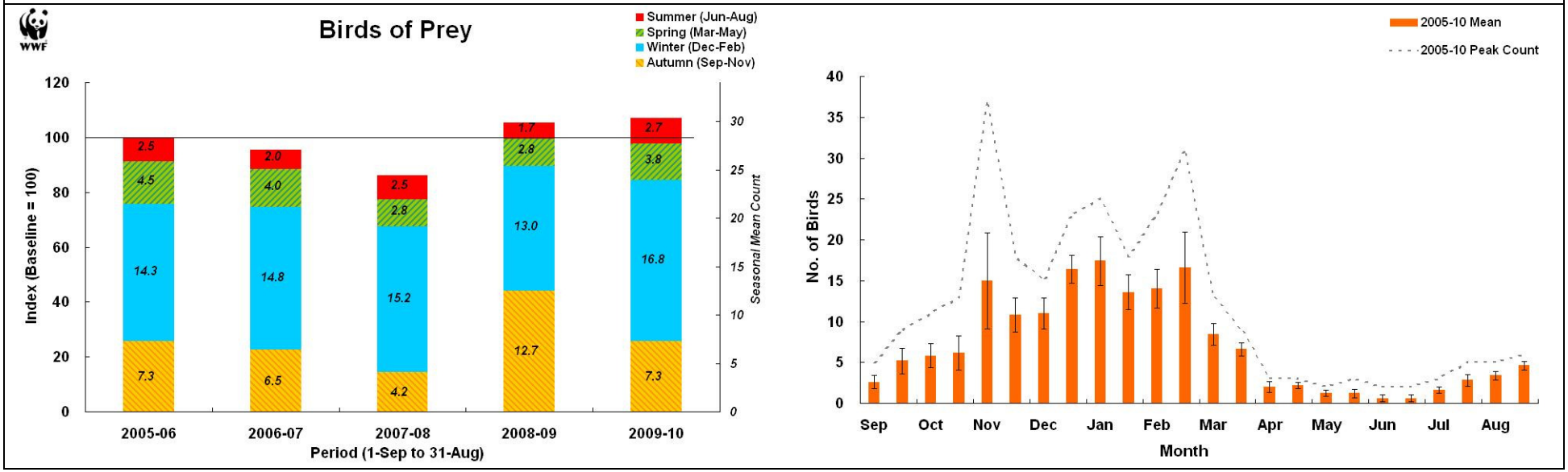




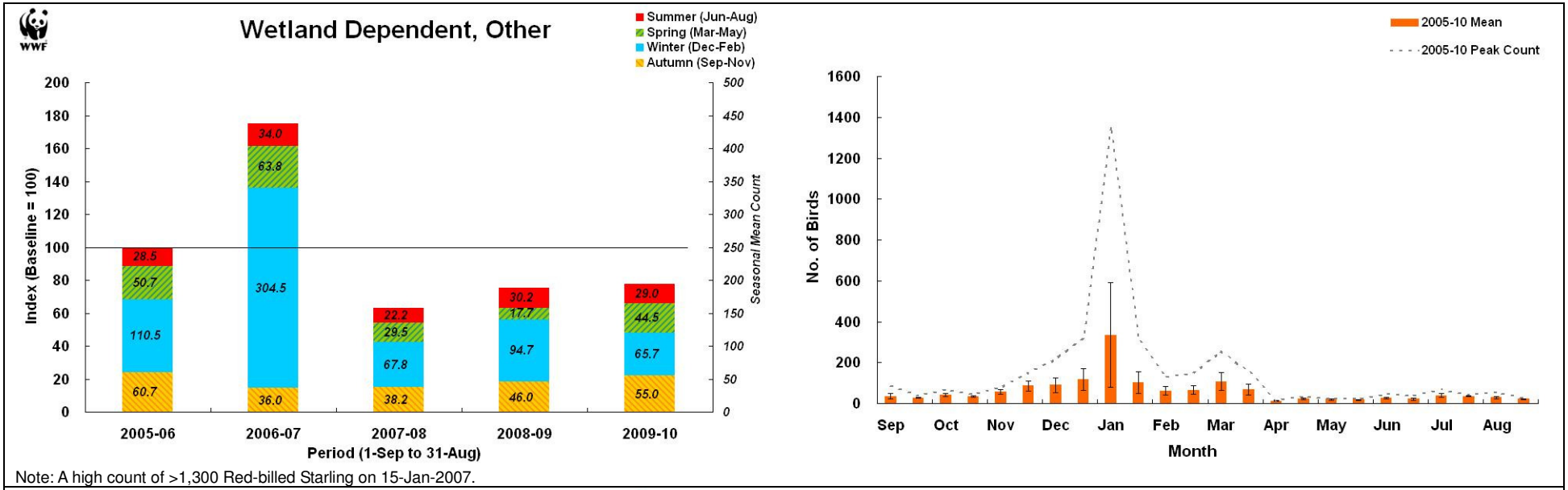
Note: Waders use the MPNR roosts at high tide, hence the low number recorded in spring is due to absence of suitable high tides during the designated count period (early morning).

3.2 Bird Groups (cont')

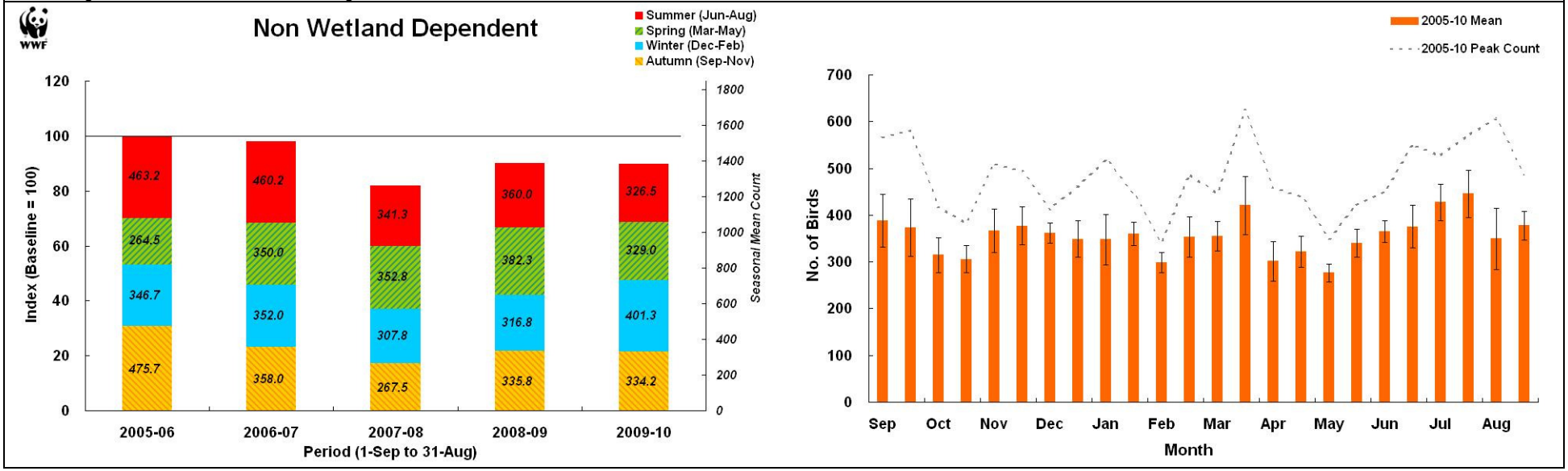




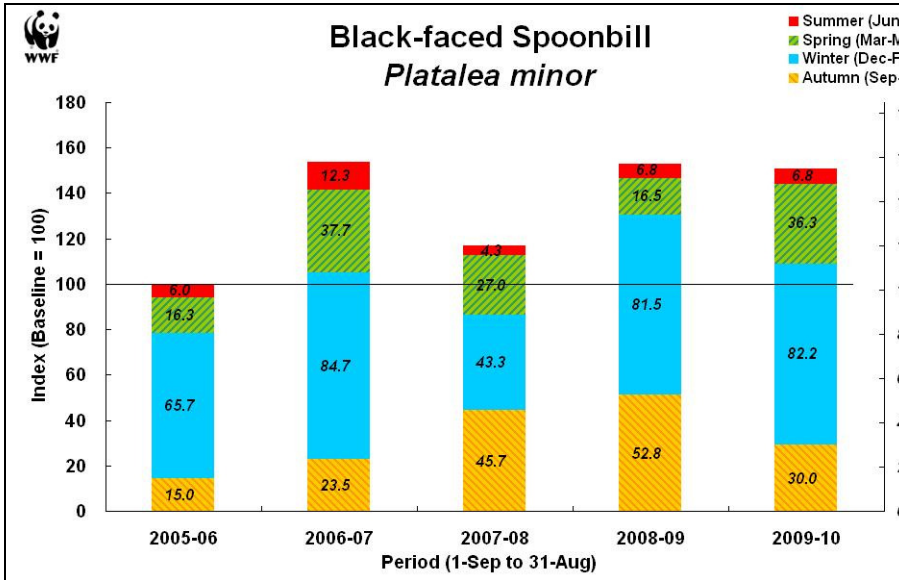
3.2 Bird Groups (cont')

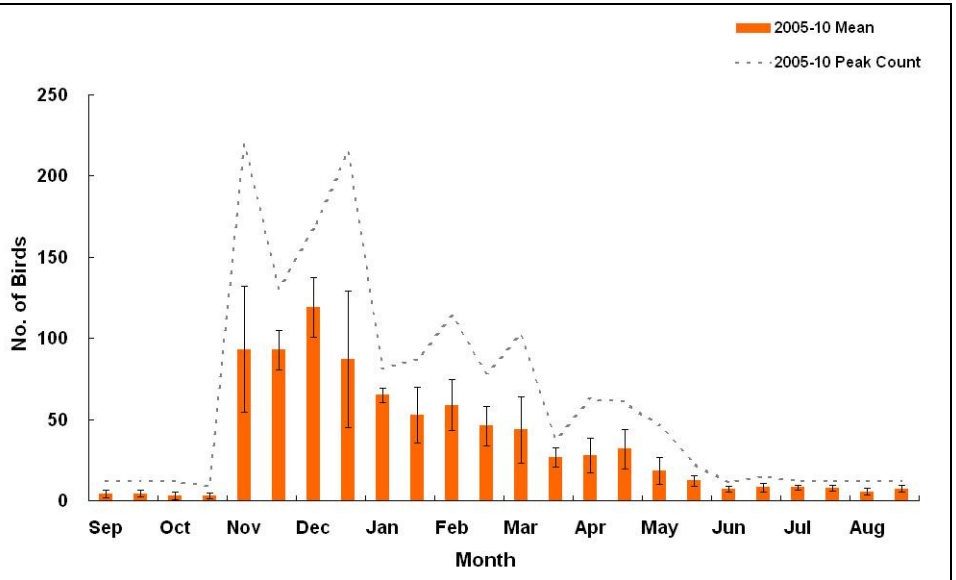


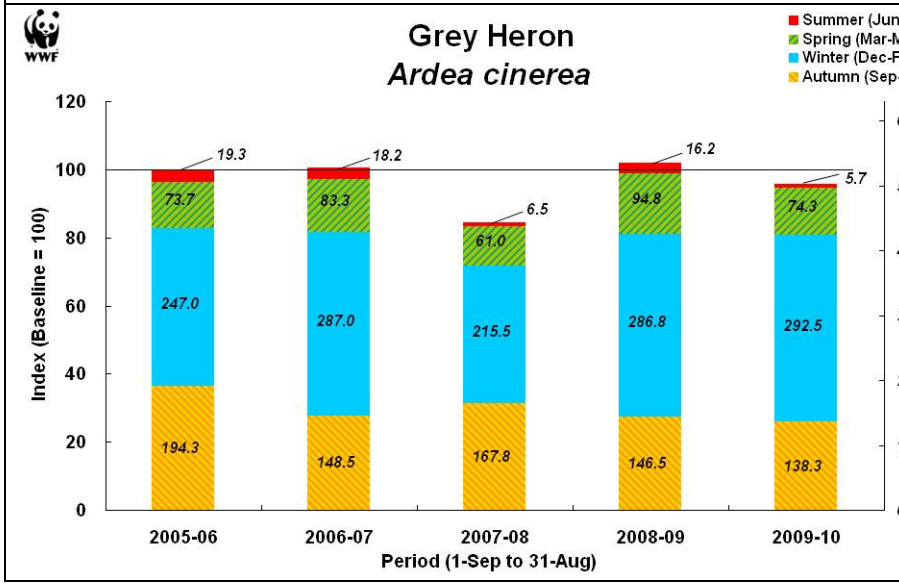
Note: A high count of >1,300 Red-billed Starling on 15-Jan-2007.

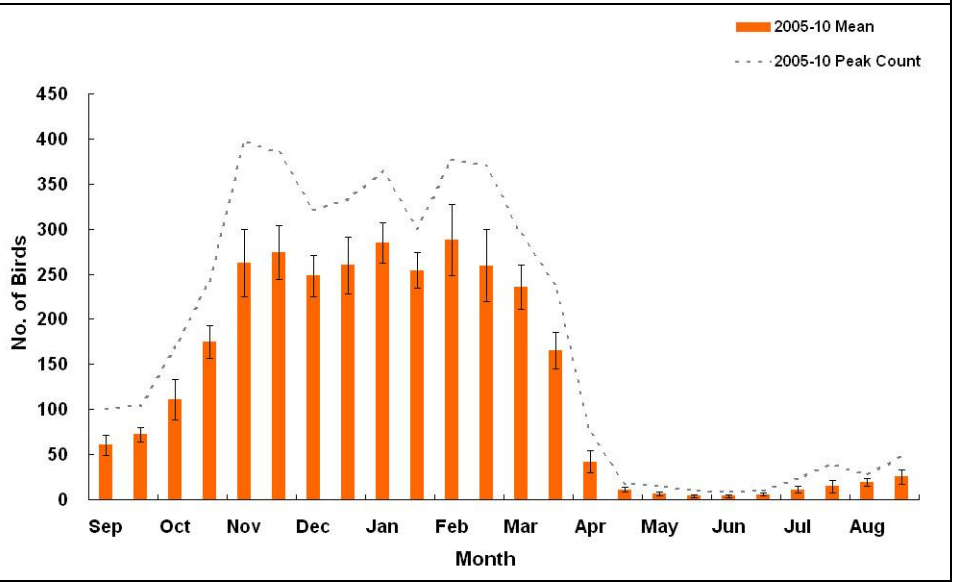


3.3 Individual Species of Interest

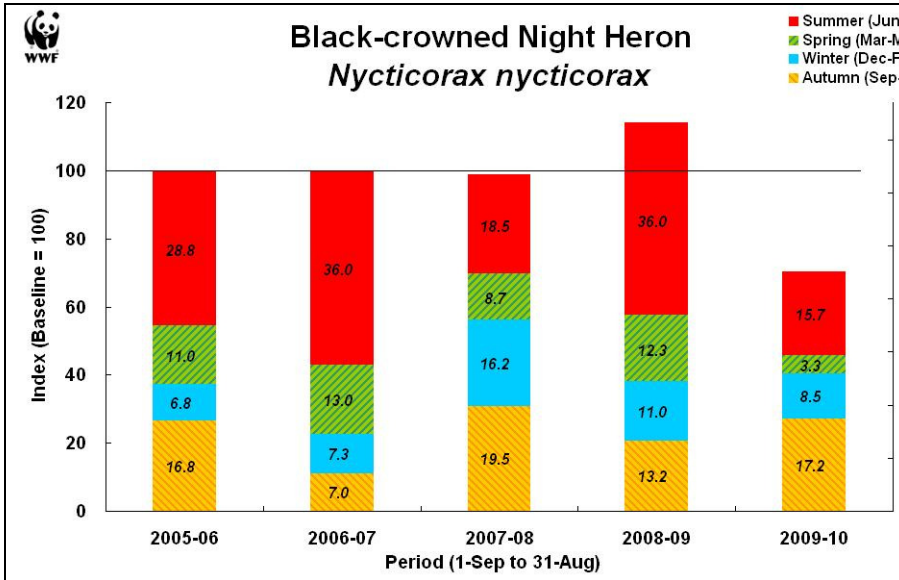


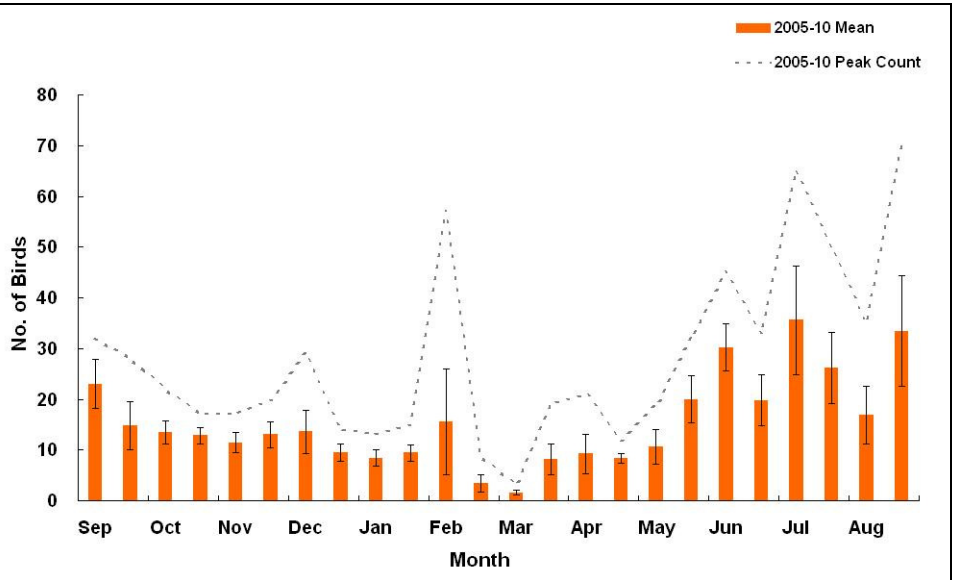


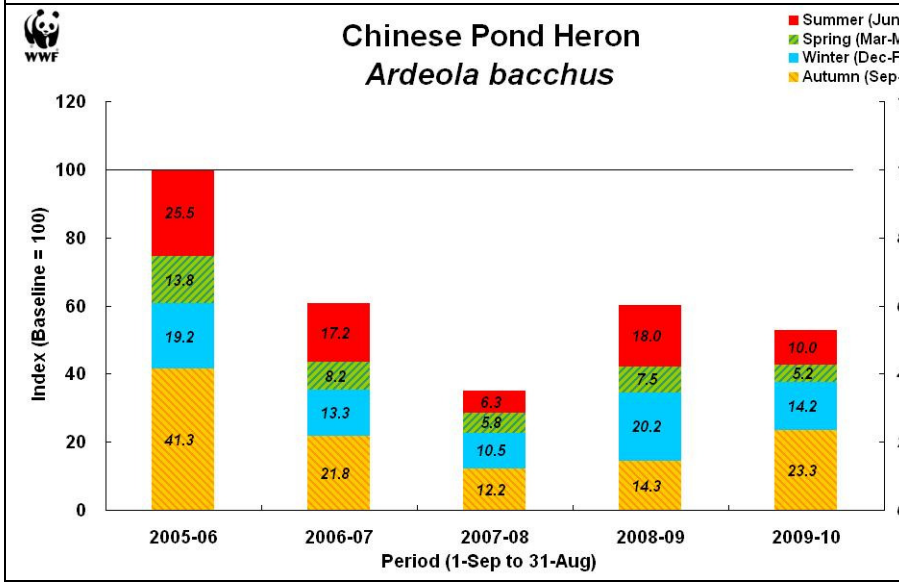


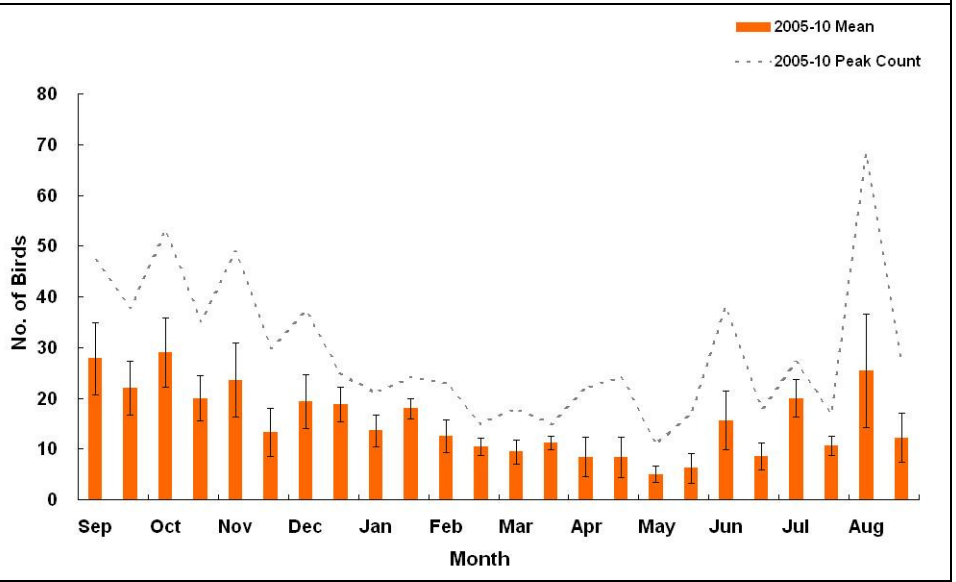


3.3 Individual Species of Interest (cont')

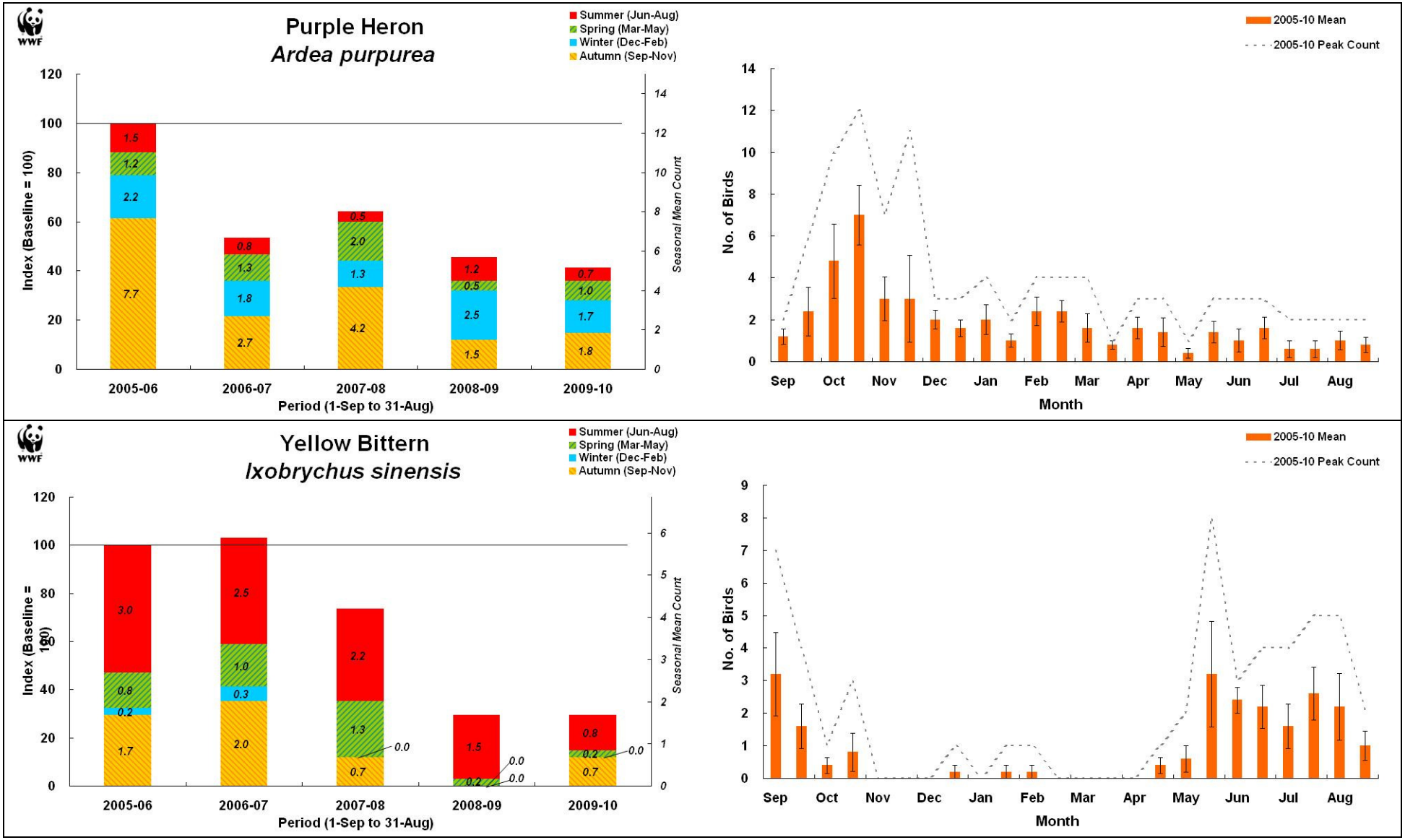




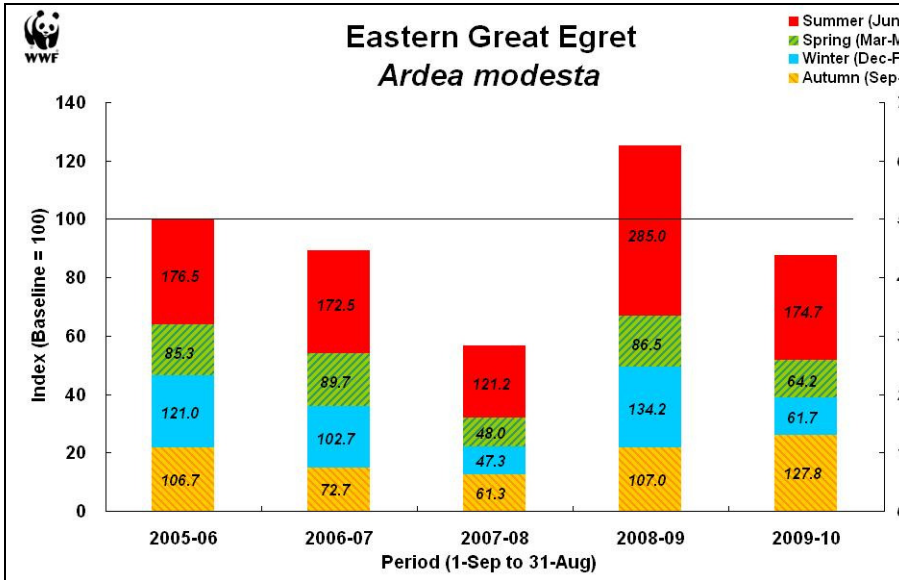


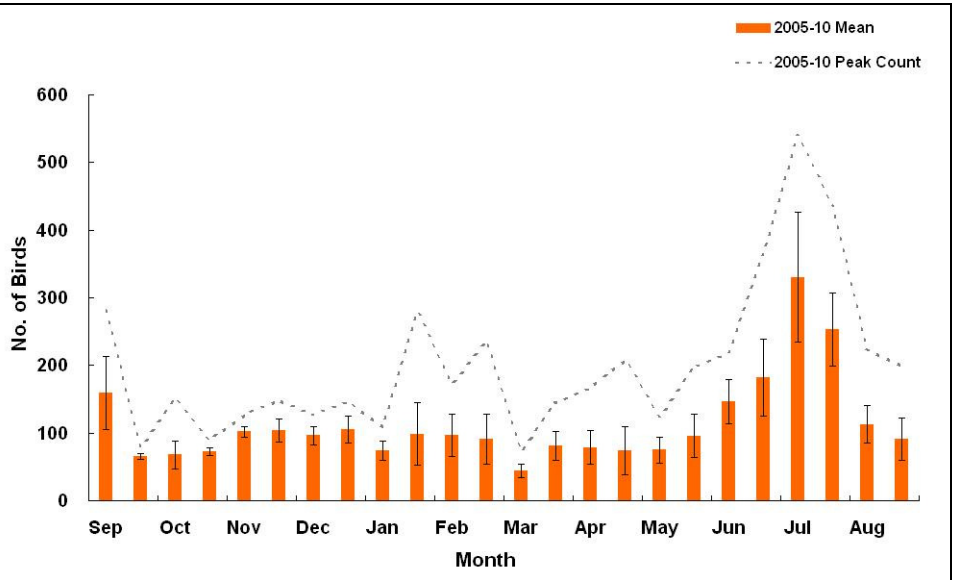


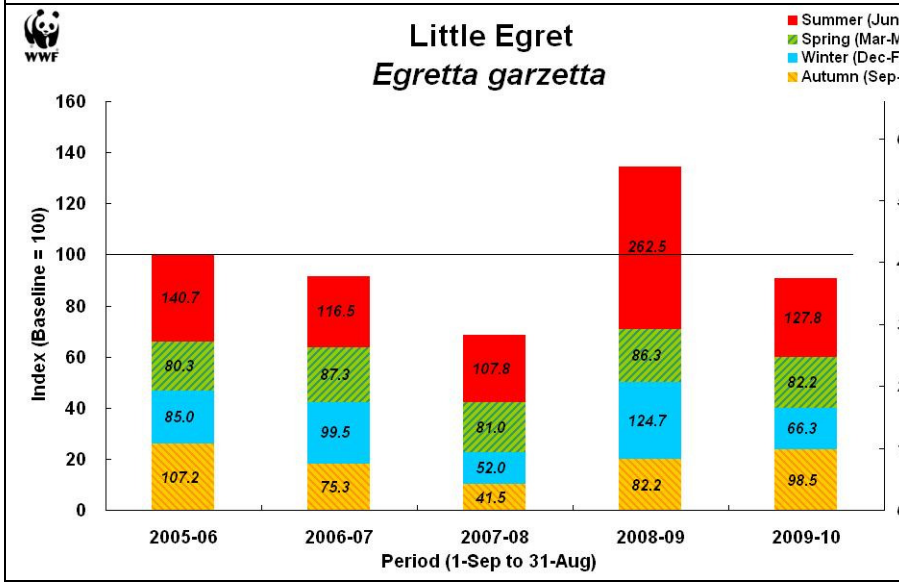
3.3 Individual Species of Interest (cont')

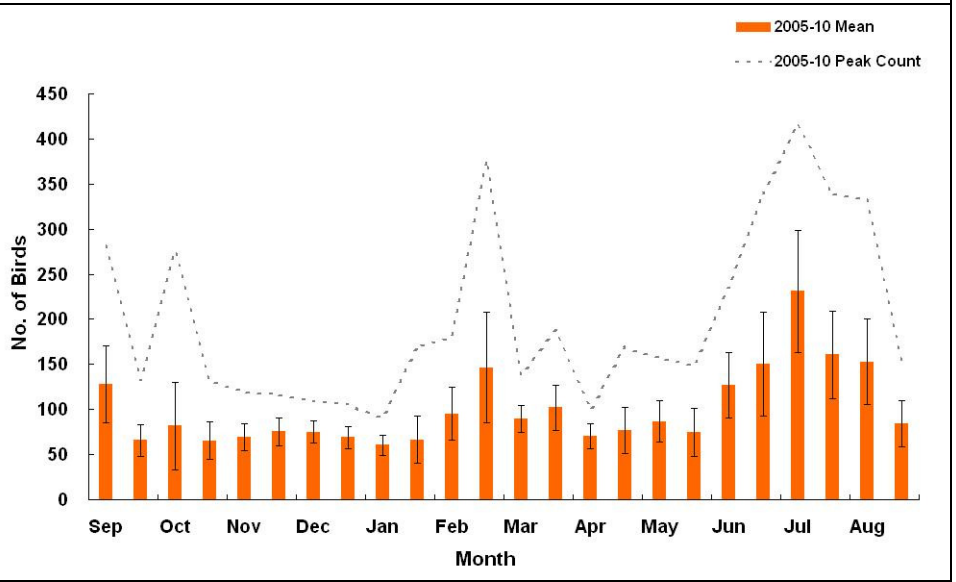


3.3 Individual Species of Interest (cont')

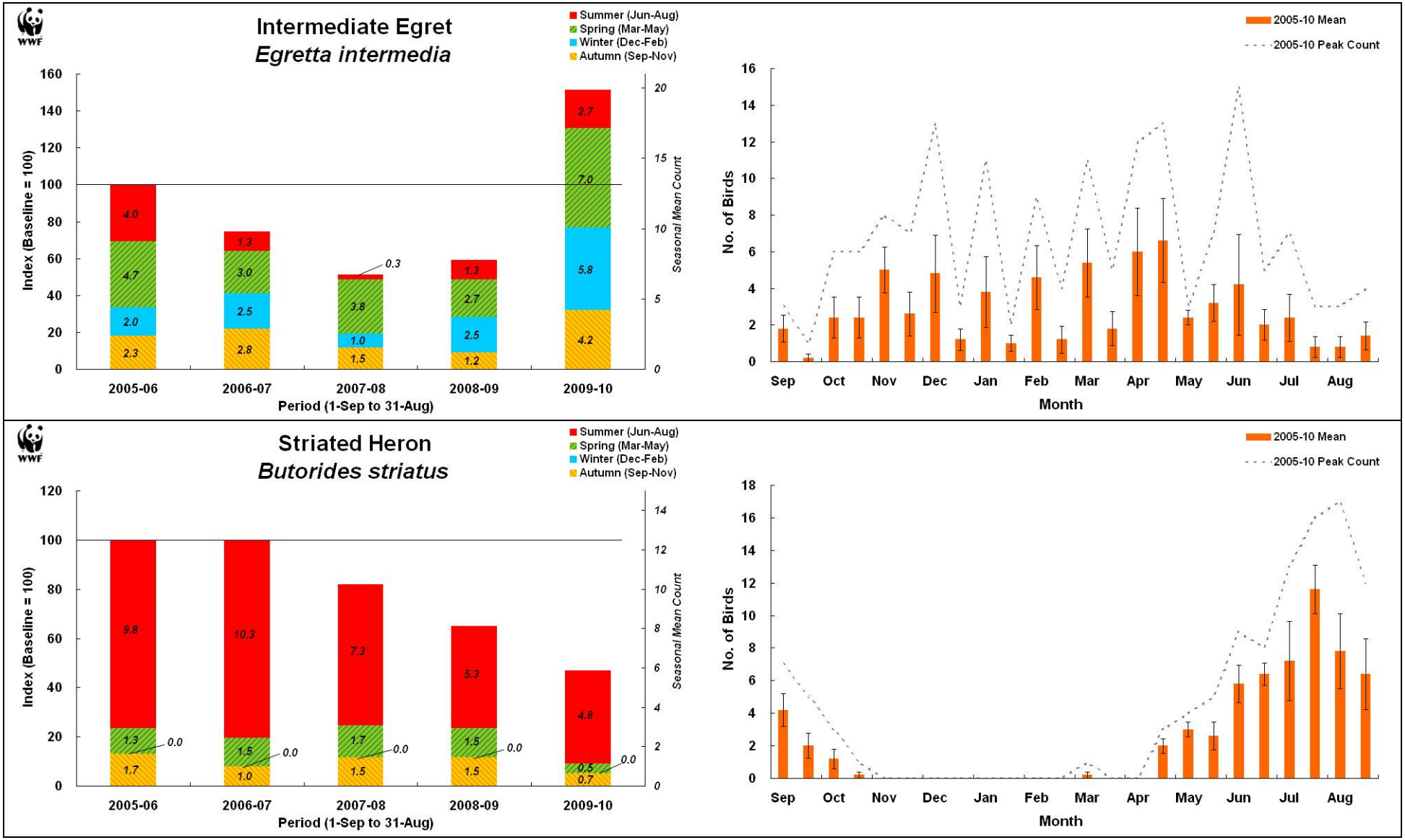




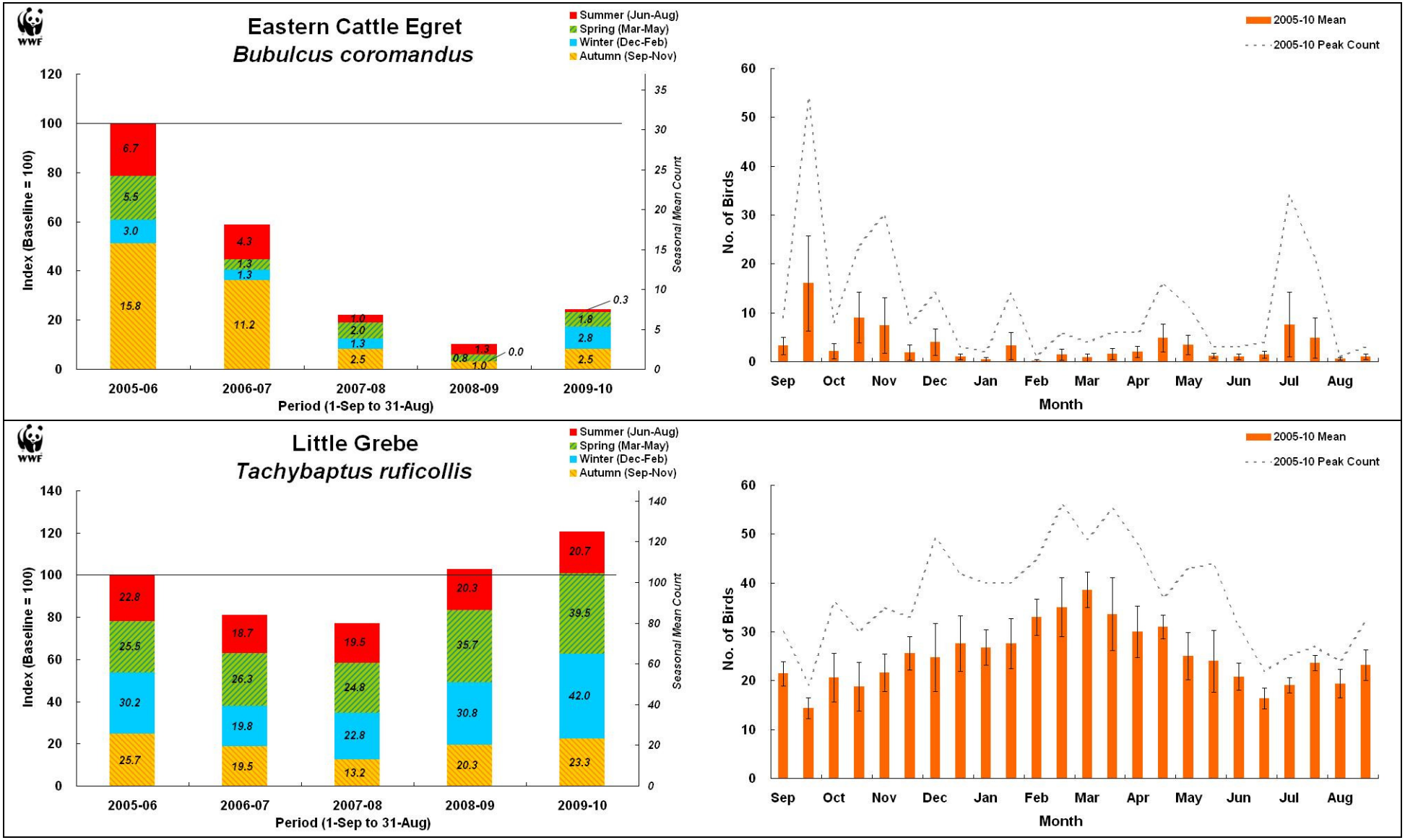




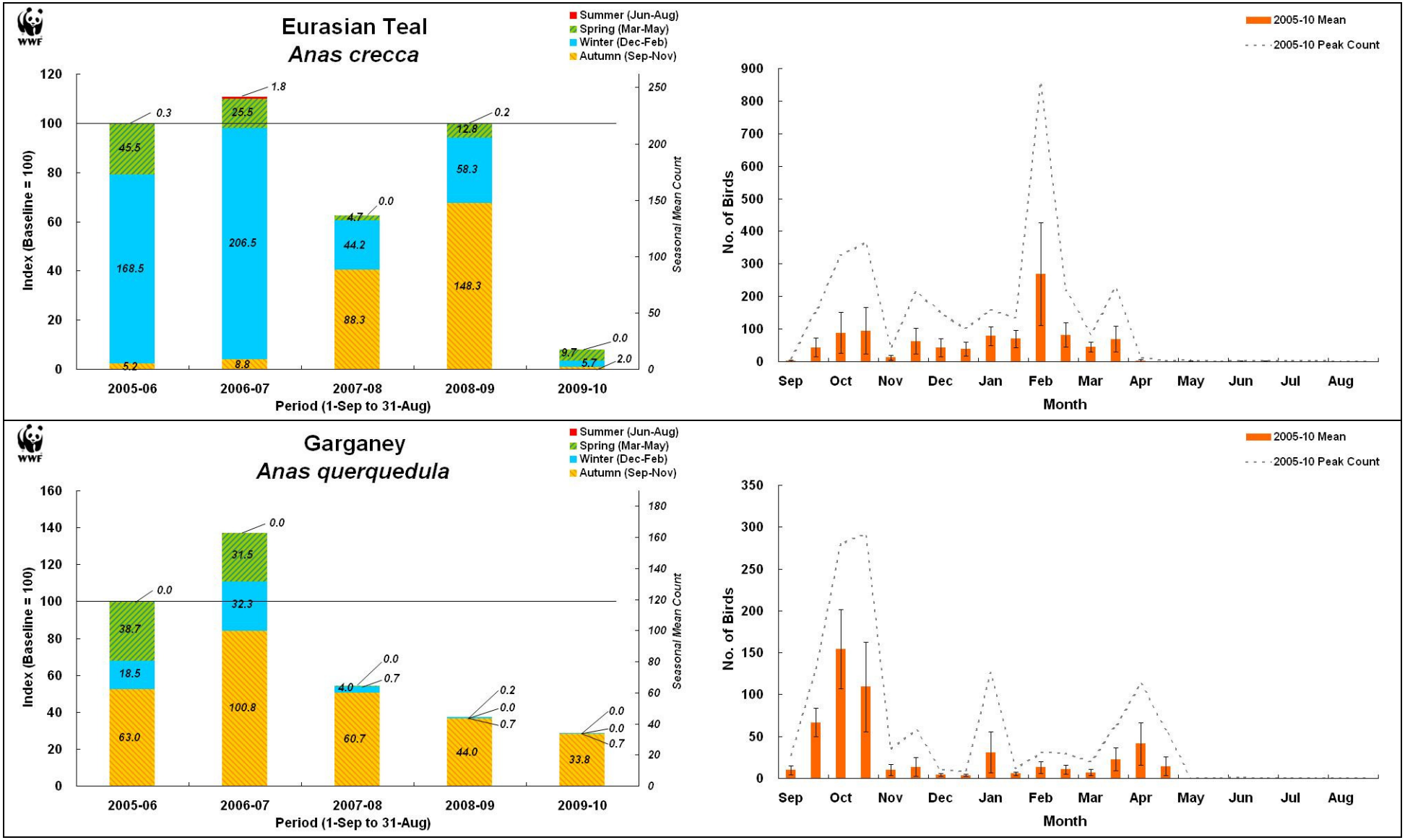
3.3 Individual Species of Interest (cont')



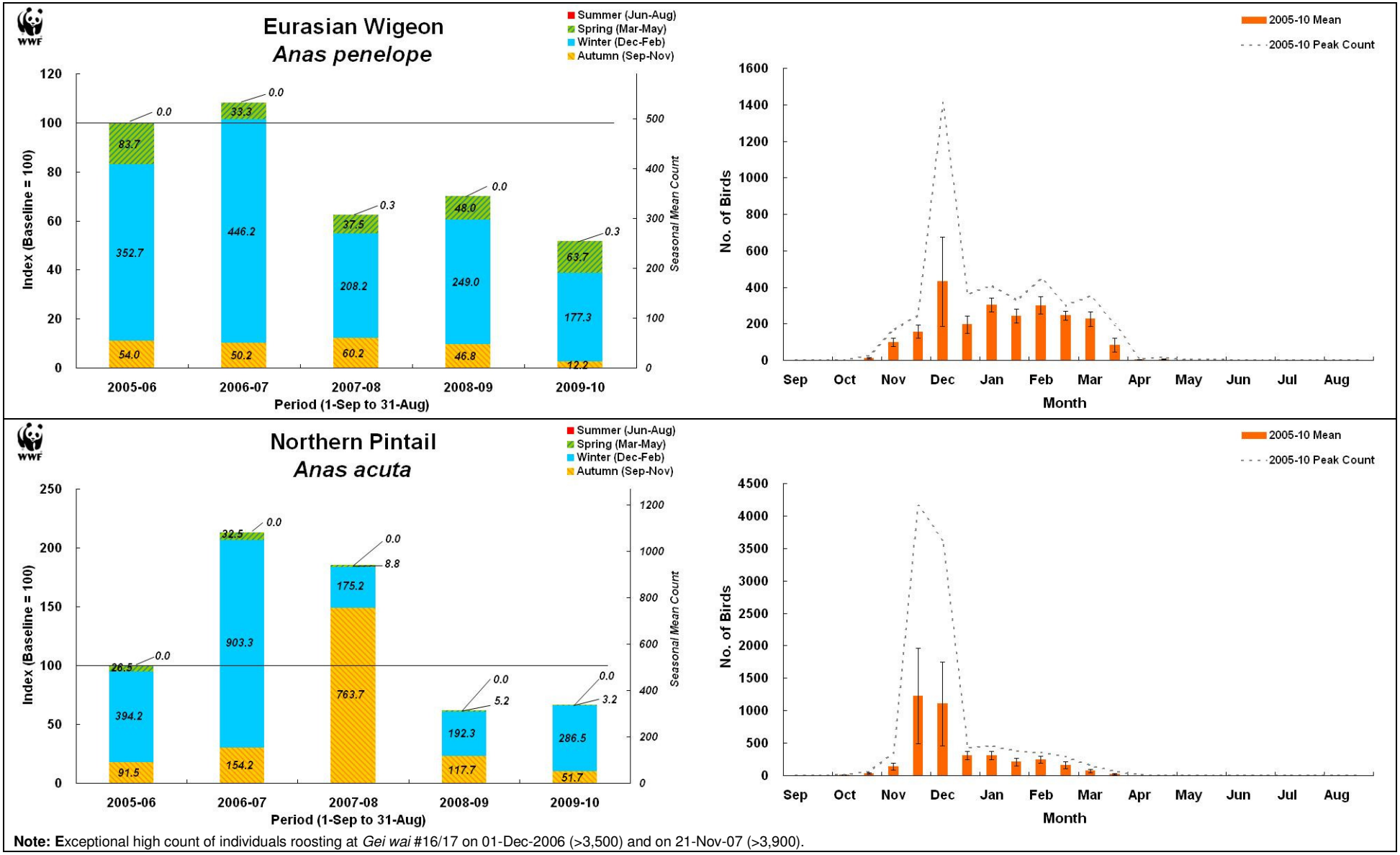
3.3 Individual Species of Interest (cont')



3.3 Individual Species of Interest (cont')

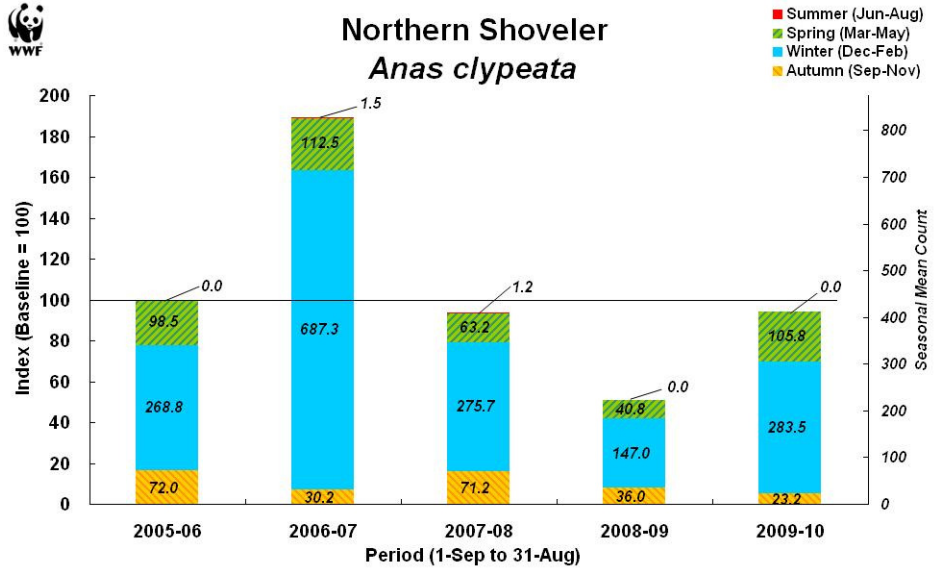


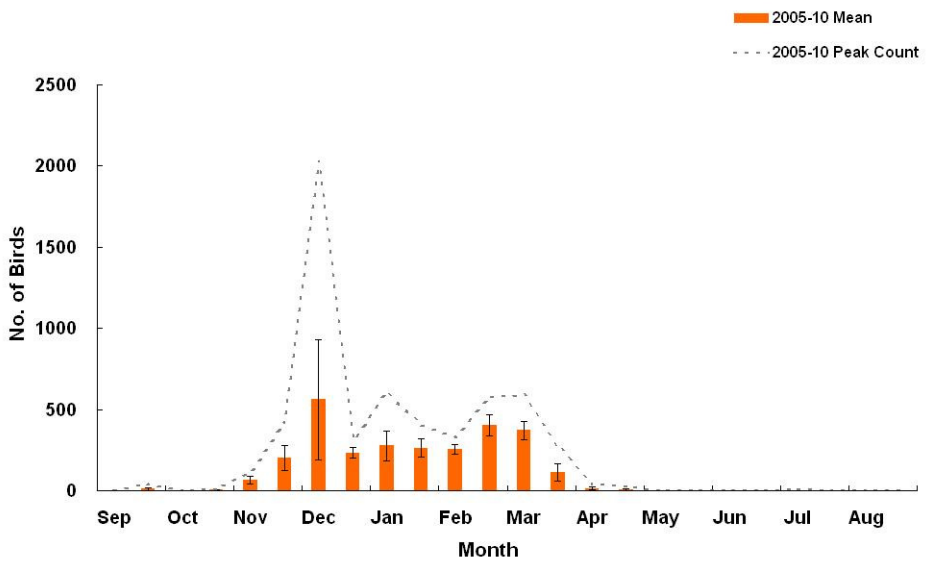
3.3 Individual Species of Interest (cont')



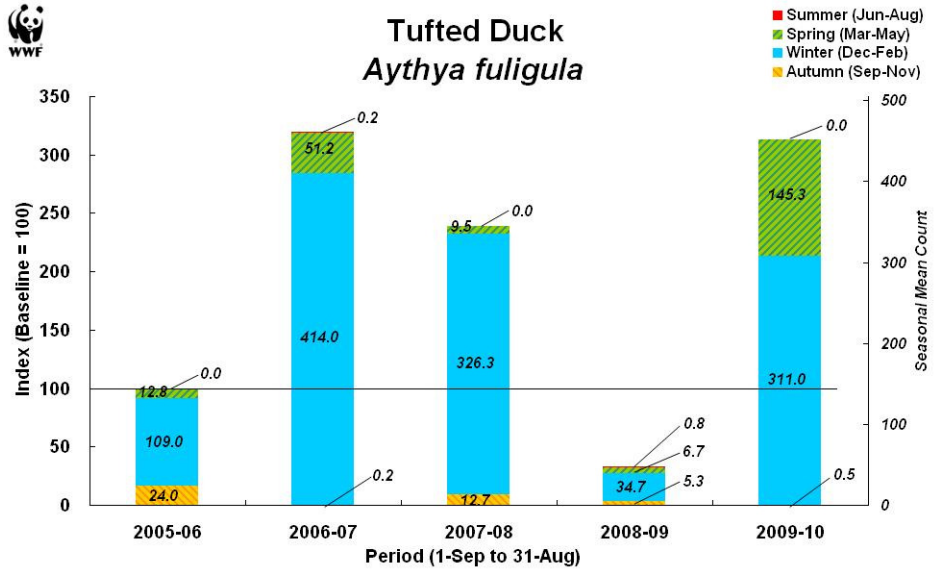
Note: Exceptional high count of individuals roosting at *Gei wai* #16/17 on 01-Dec-2006 (>3,500) and on 21-Nov-07 (>3,900).

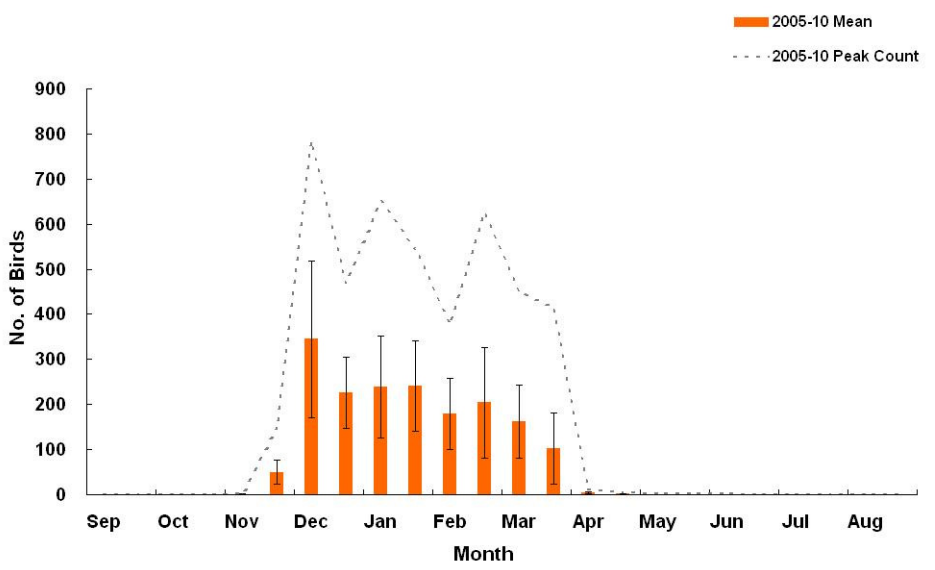
3.3 Individual Species of Interest (cont')



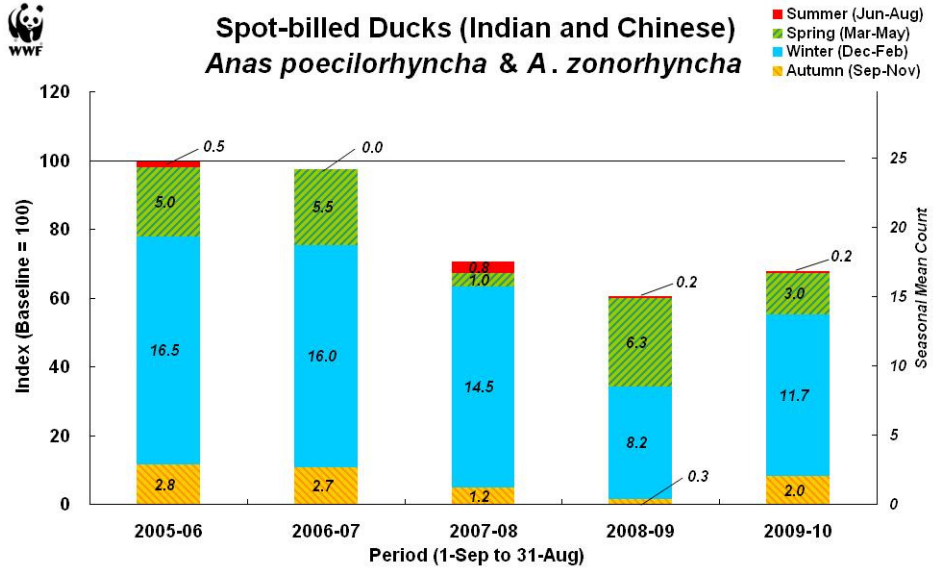


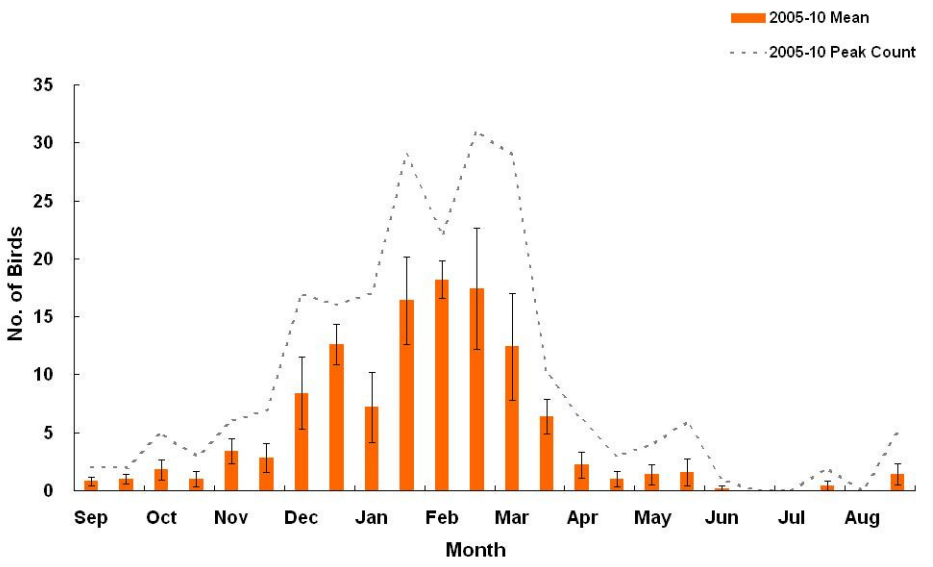
Note: An exceptional high count of >2,000 individuals roosting at *Gei wai* #16/17 on 01-Dec-2006.



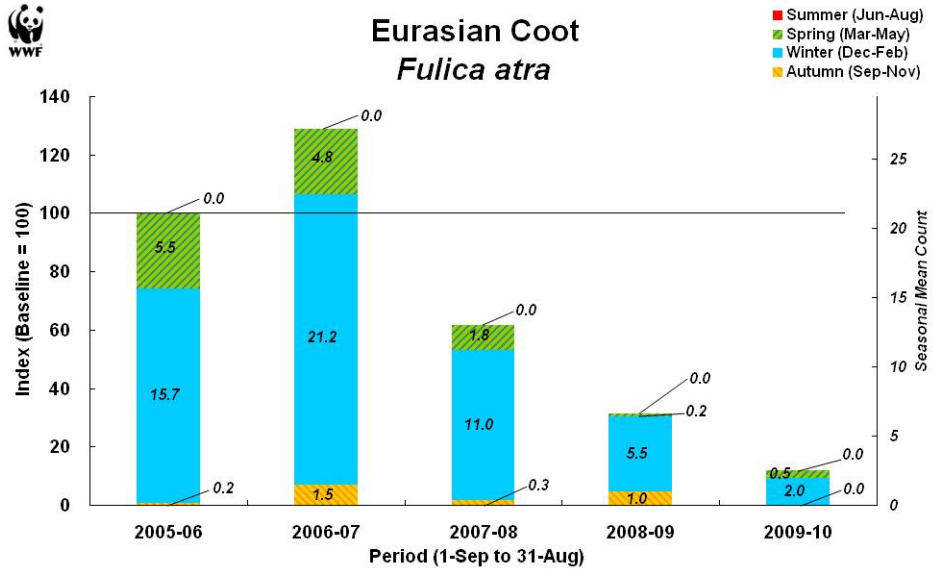


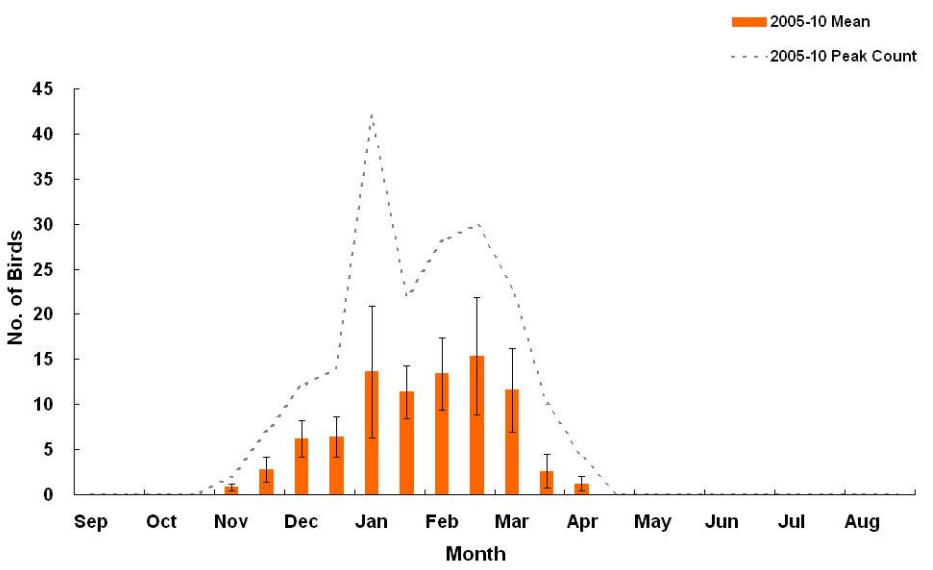
3.3 Individual Species of Interest (cont')



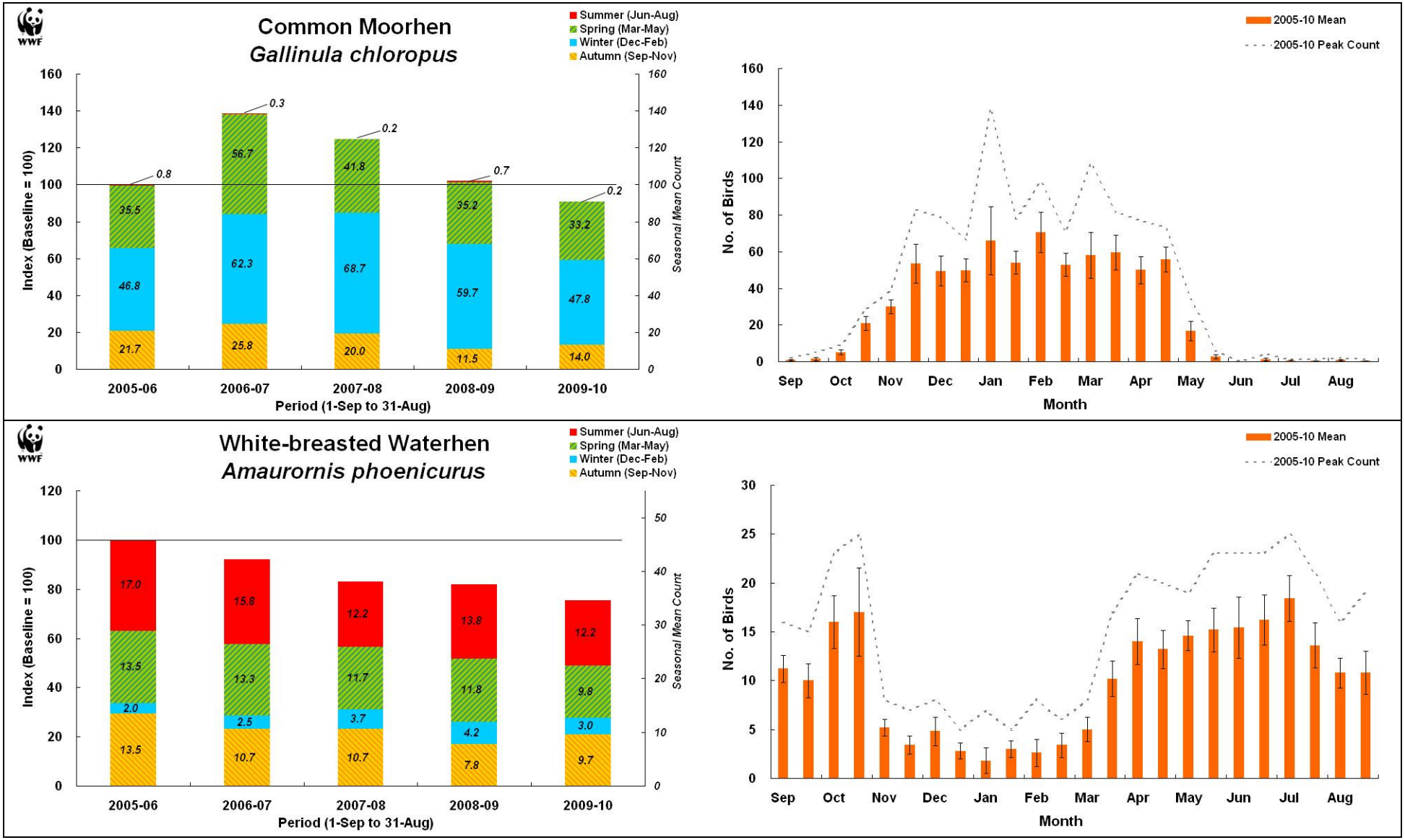


Note: Data for these 2 species is combined as they were not differentiated in the 2005 and 2006 counts.

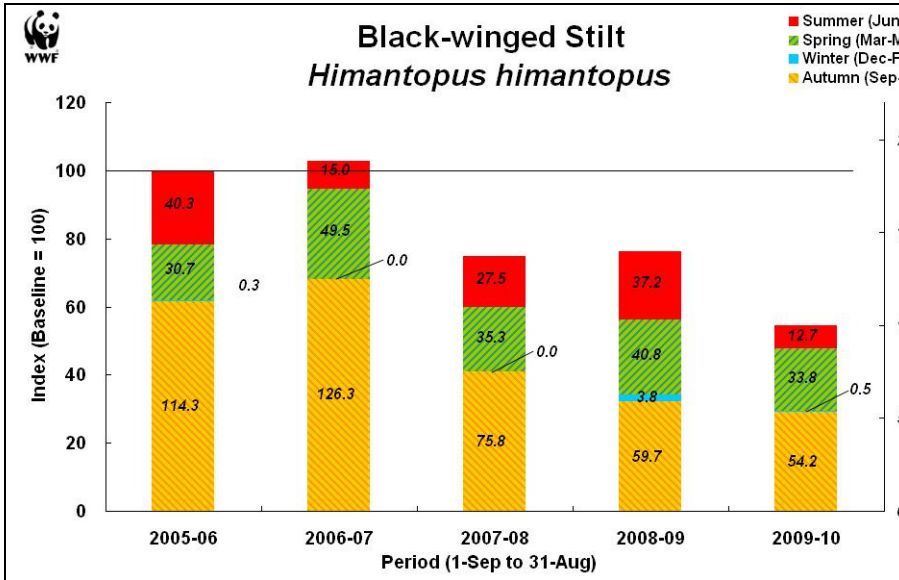


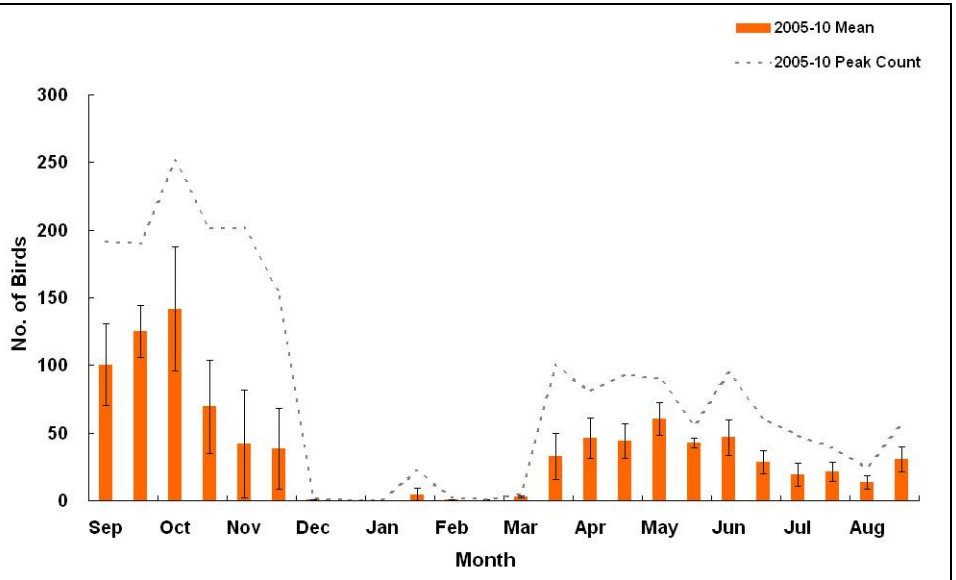


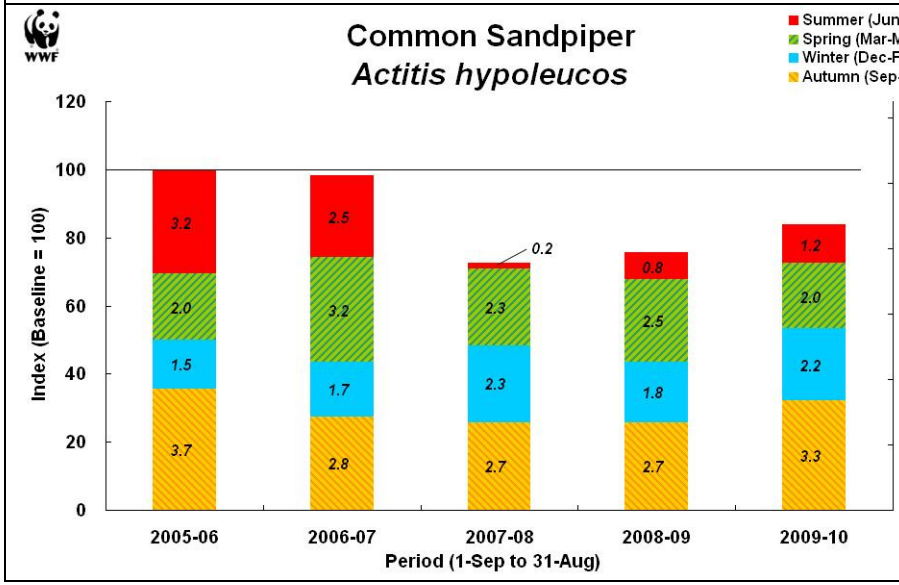
3.3 Individual Species of Interest (cont')

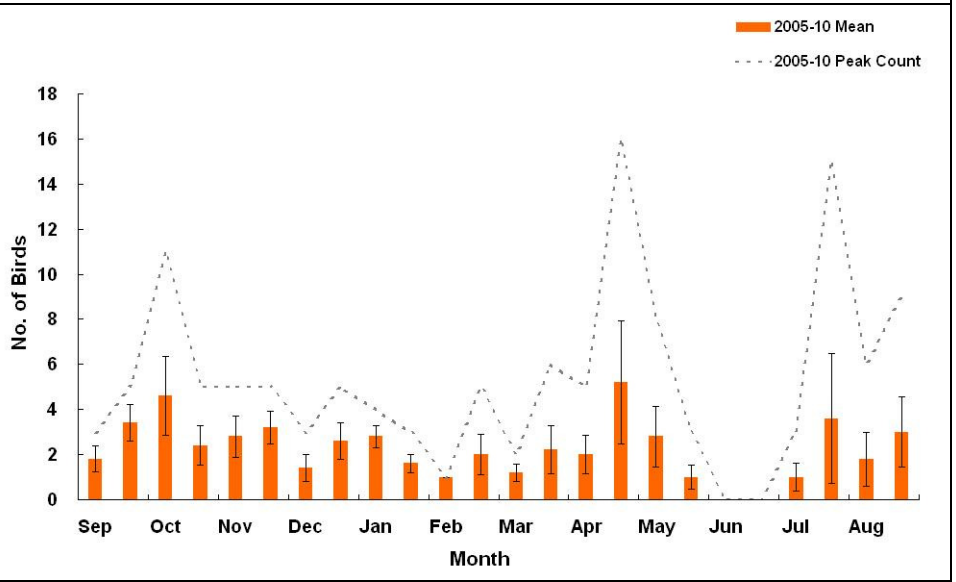


3.3 Individual Species of Interest (cont')

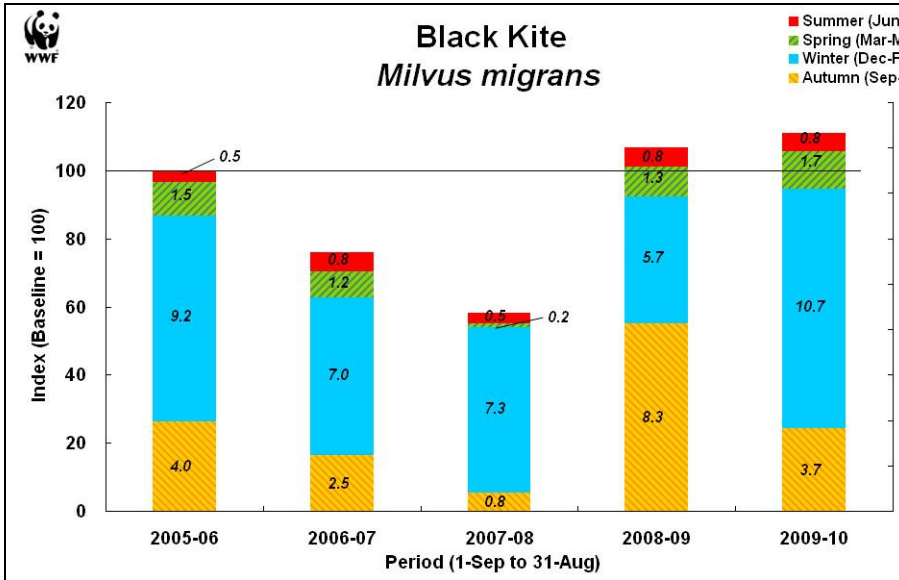


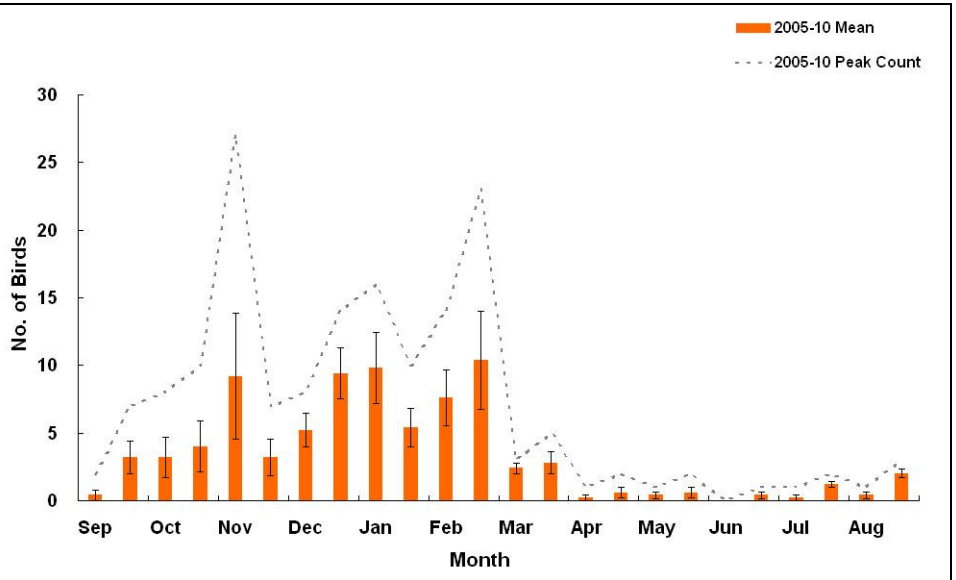


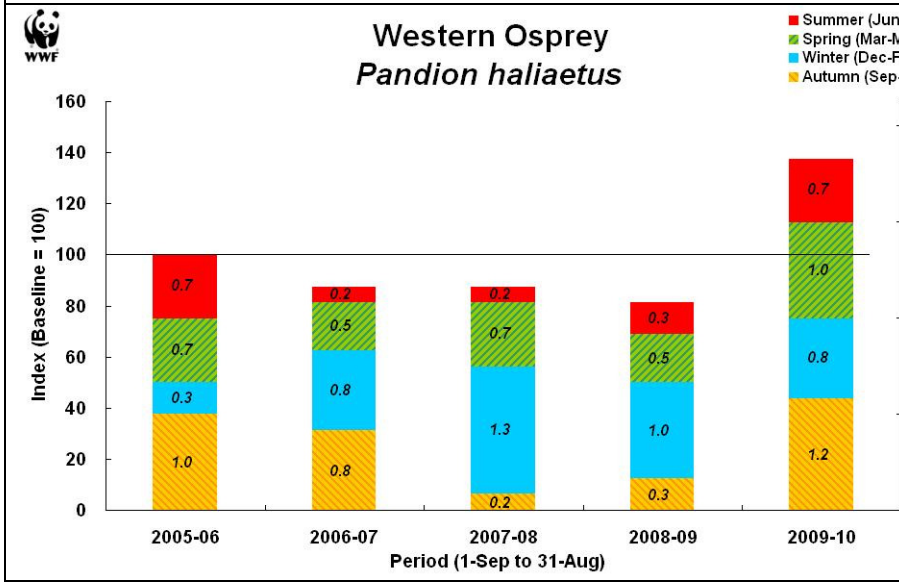


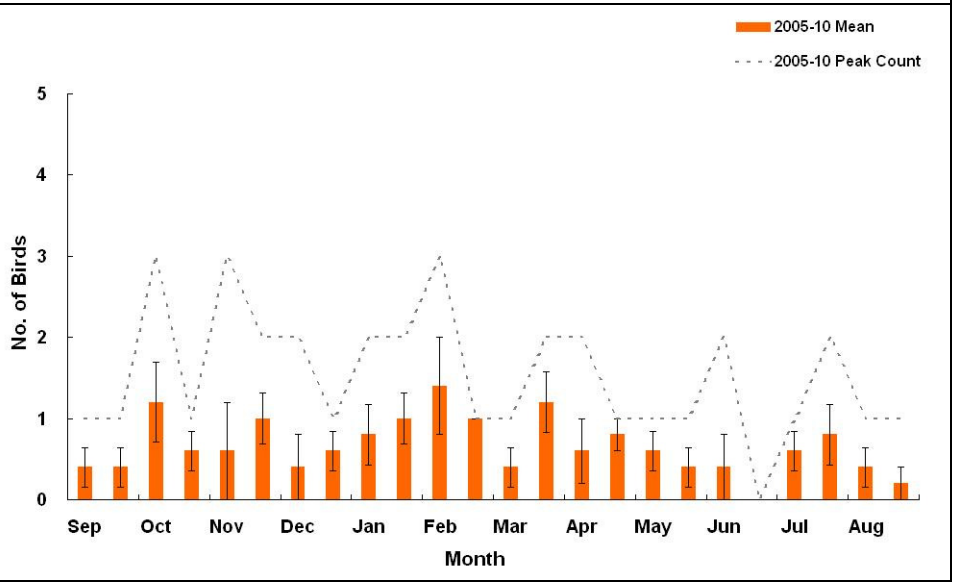


3.3 Individual Species of Interest (cont')

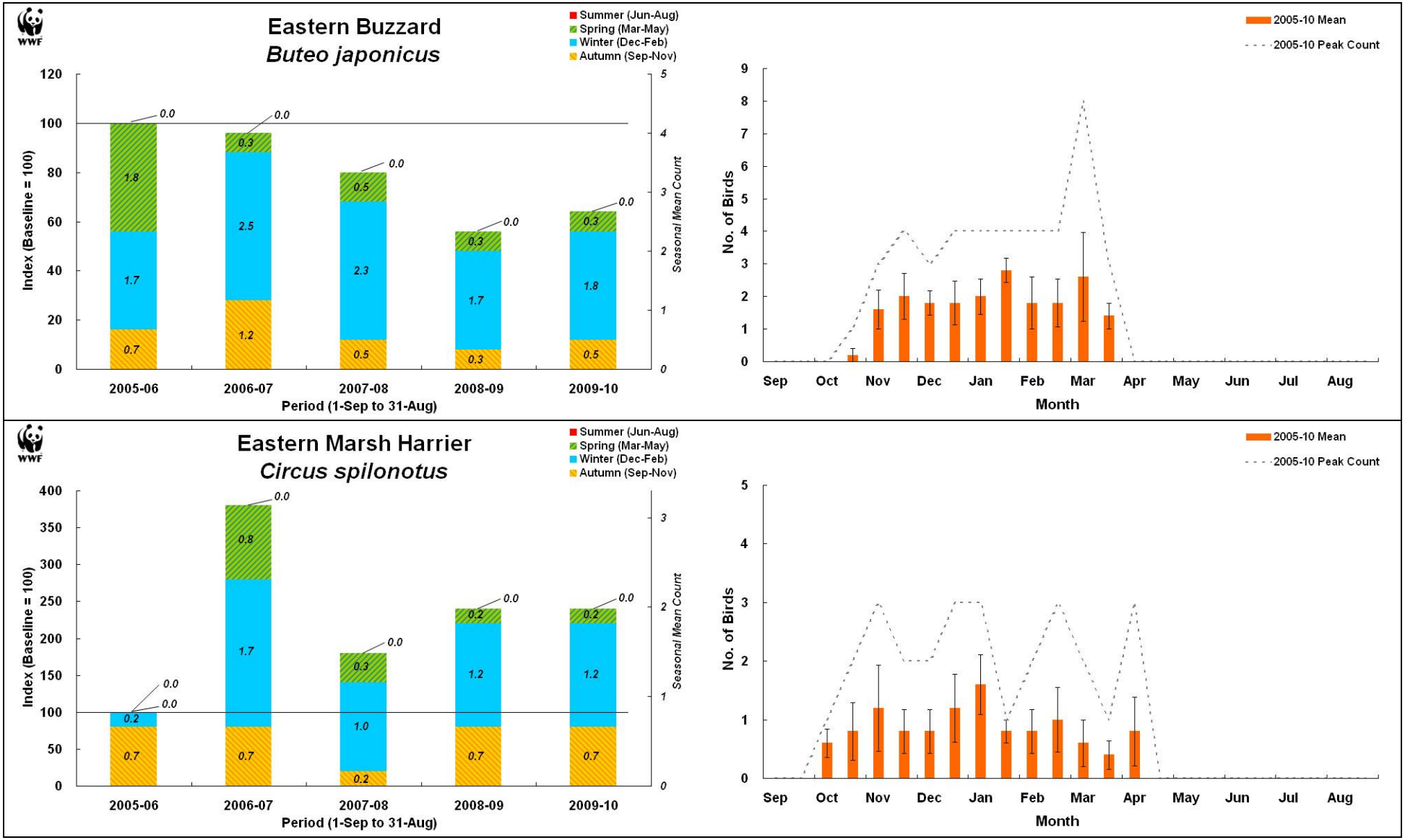




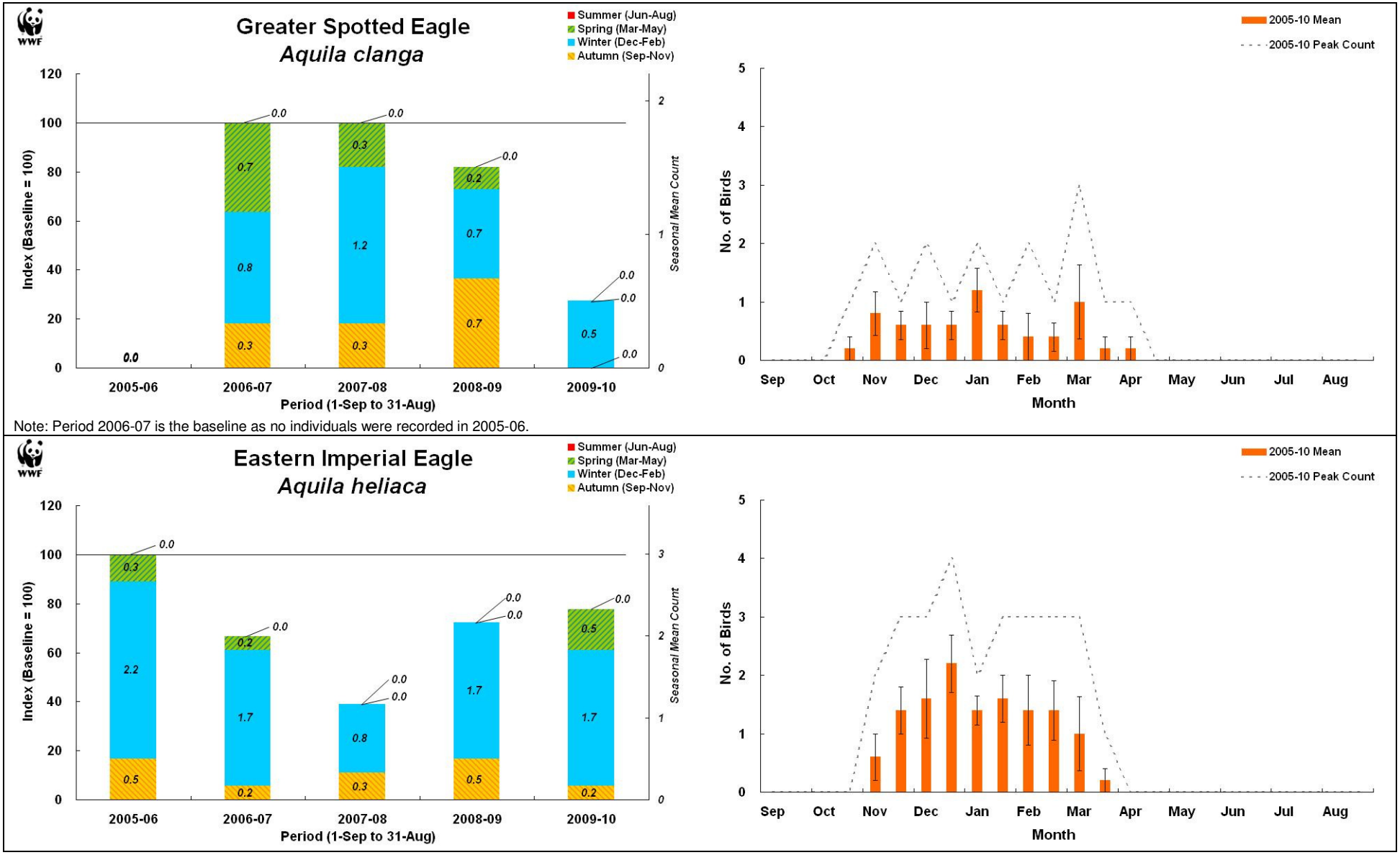




3.3 Individual Species of Interest (cont')

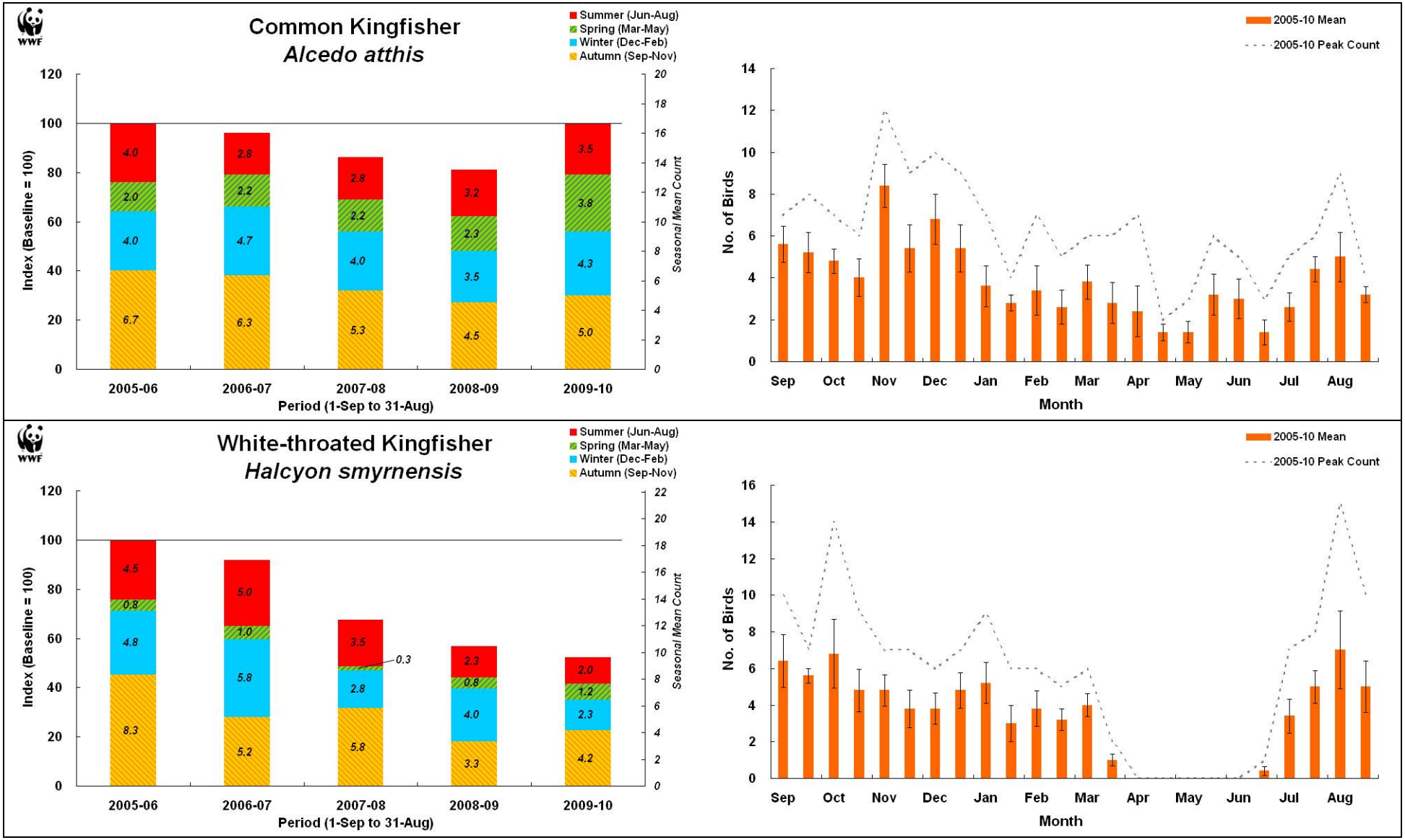


3.3 Individual Species of Interest (cont')

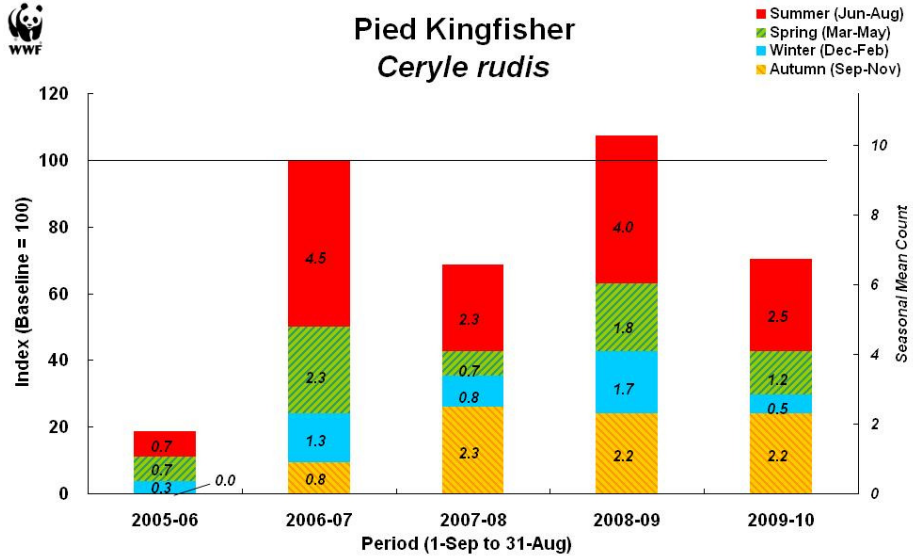


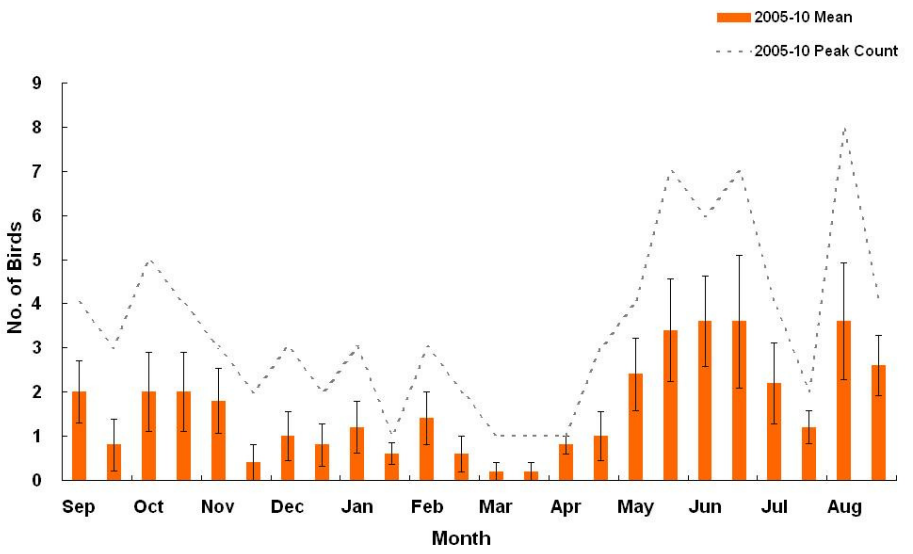
Note: Period 2006-07 is the baseline as no individuals were recorded in 2005-06.

3.3 Individual Species of Interest (cont')

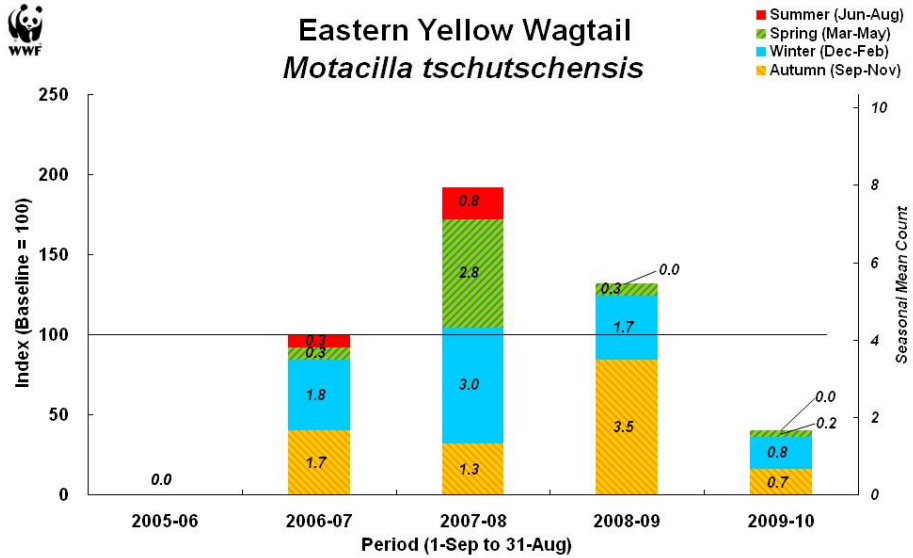


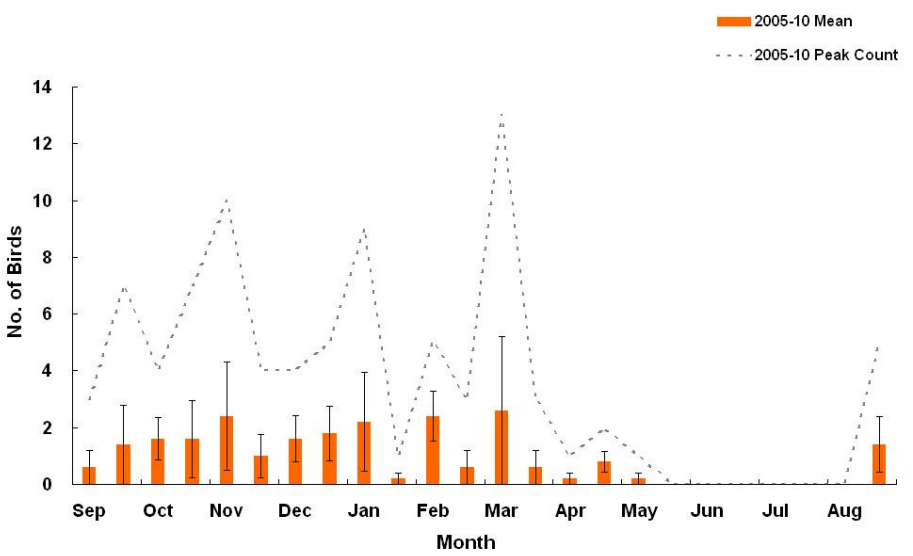
3.3 Individual Species of Interest (cont')





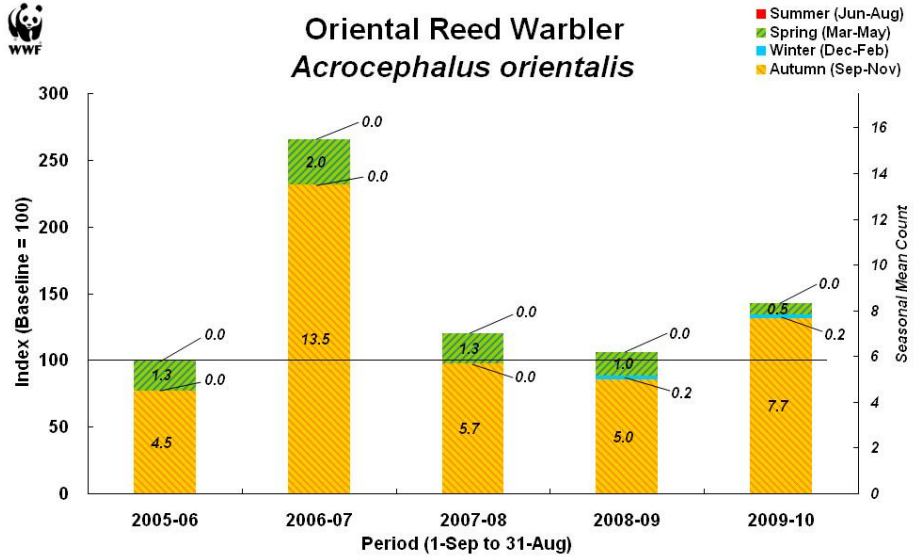
Note: Period 2006-07 is the baseline due to methodology change in recording this species.

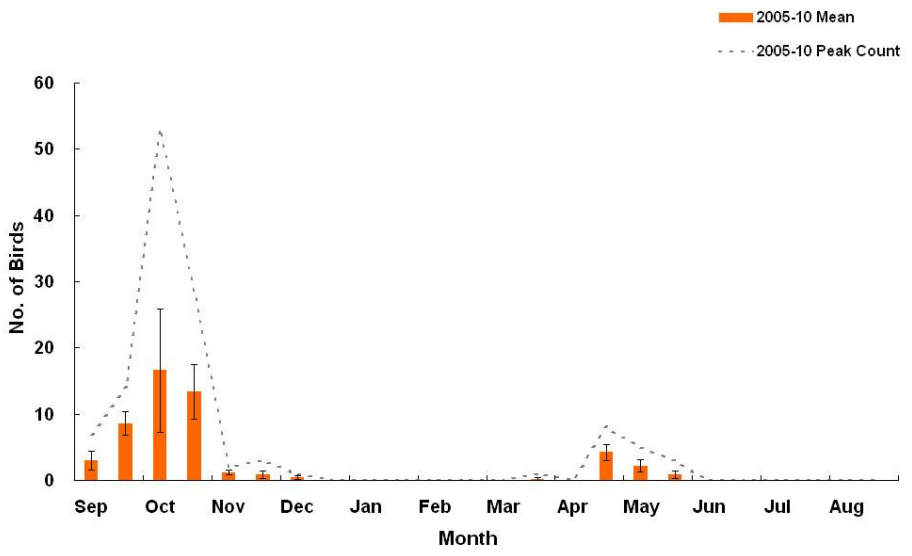




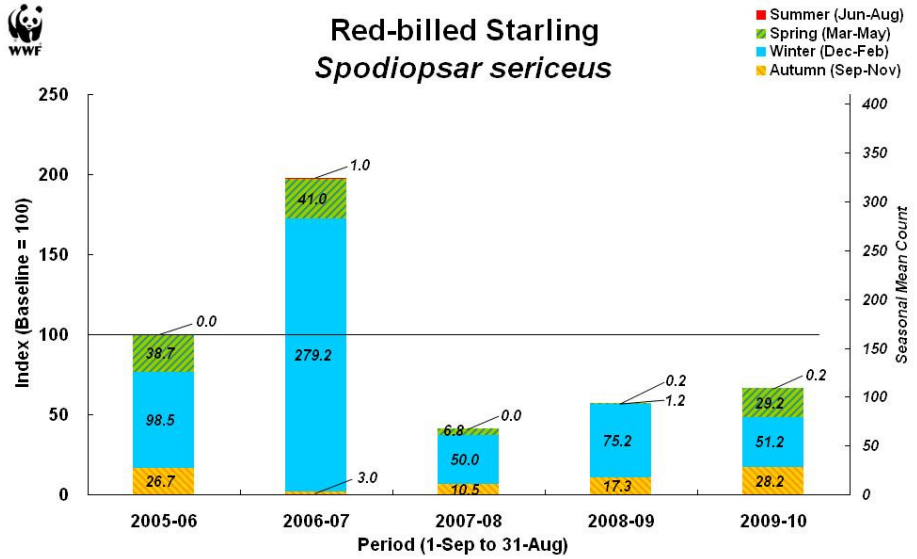
Note: Period 2006-07 is the baseline as no individuals were recorded in 2005-06. This species was more regularly recorded flying over (Category B) than roosting (Category A).

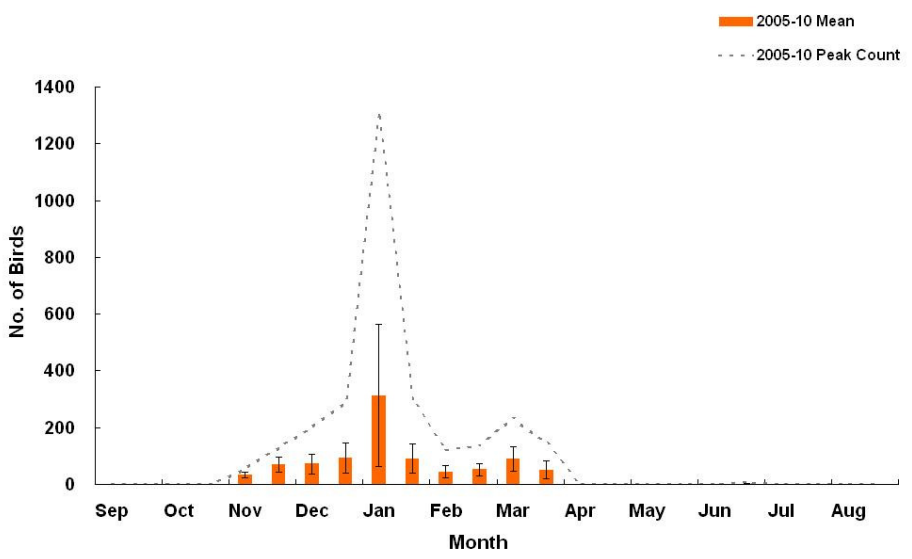
3.3 Individual Species of Interest (cont')





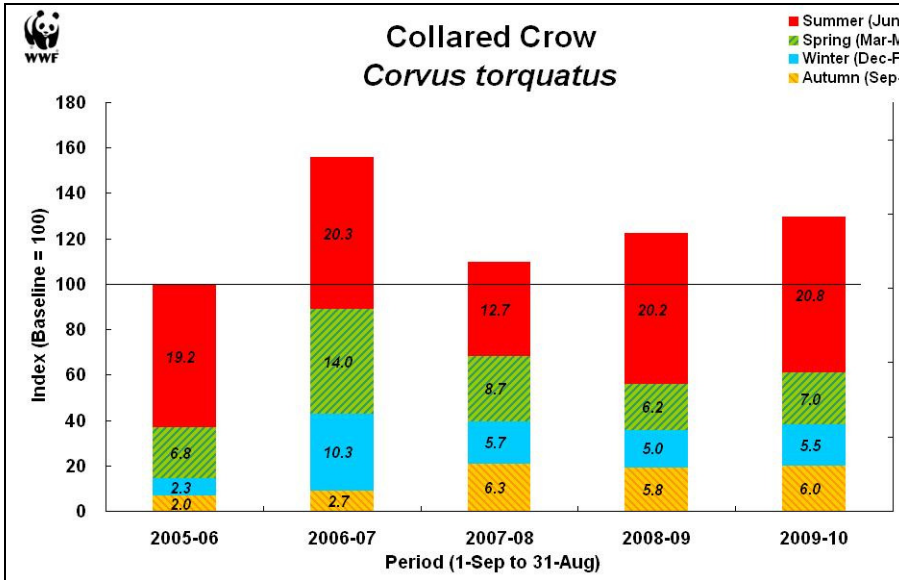
Note: A high count of 53 individuals on 06-Oct-06.

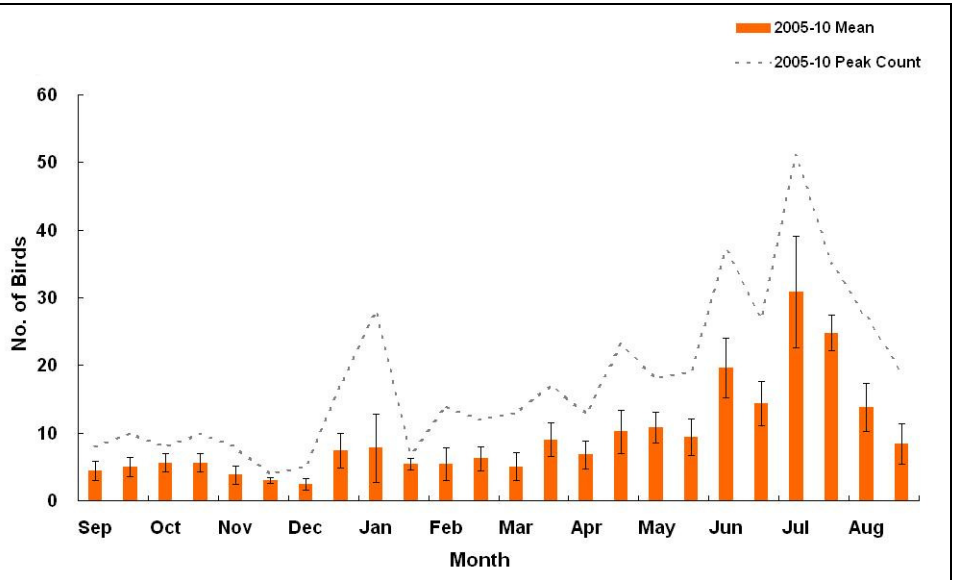


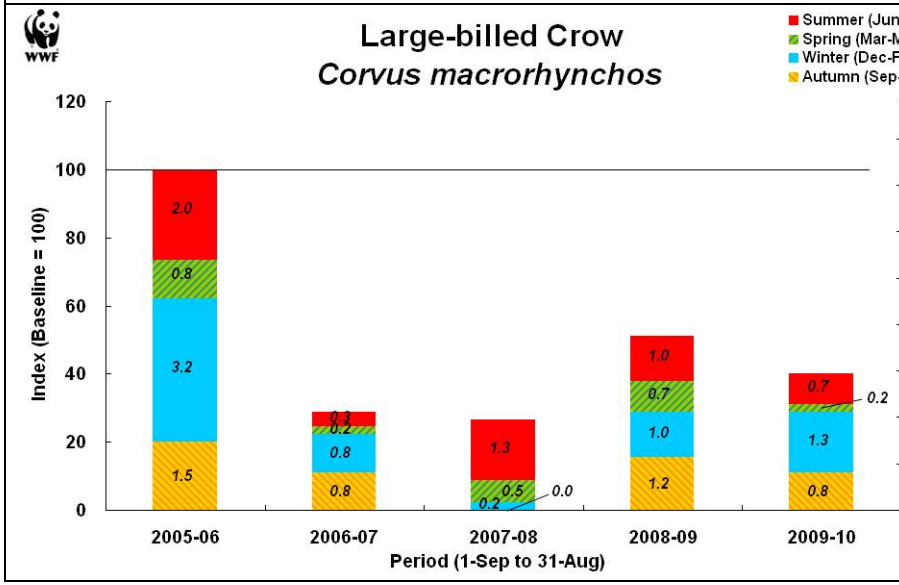


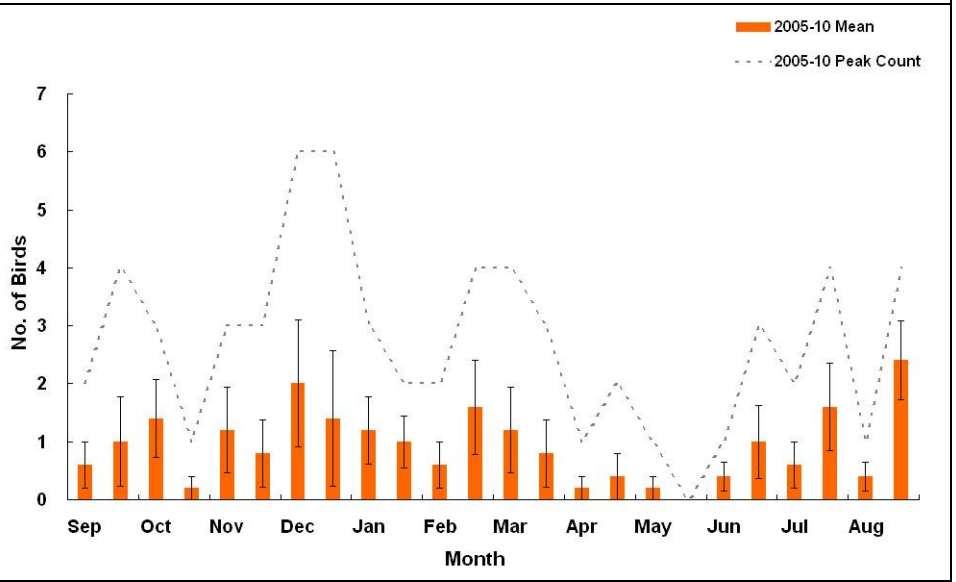
Note: This species was more regularly recorded flying over (Category B) than roosting (Category A). An exceptional high count of >1,300 individuals on trees along AFCD path on 15-Jan-2007.

3.3 Individual Species of Interest (cont')

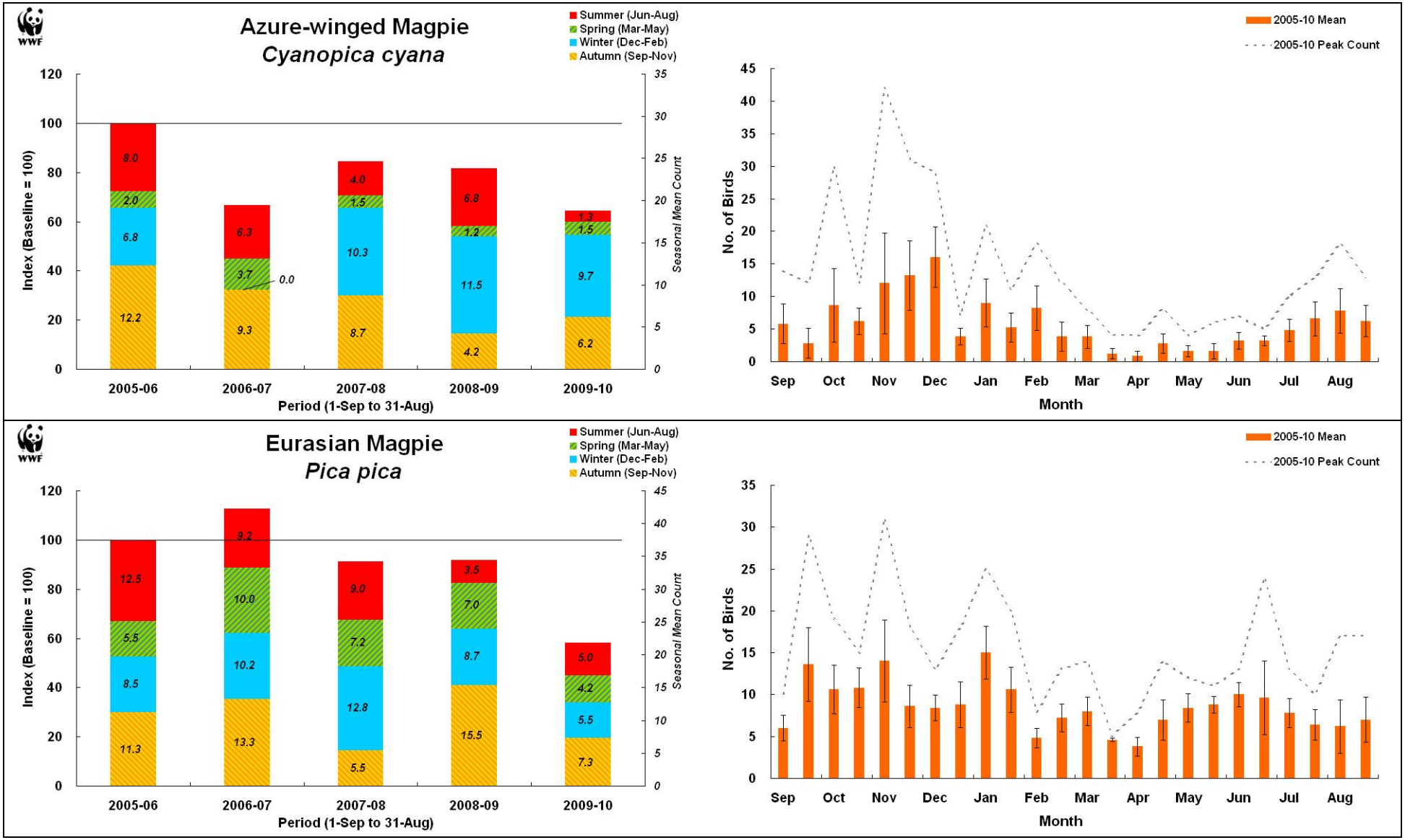




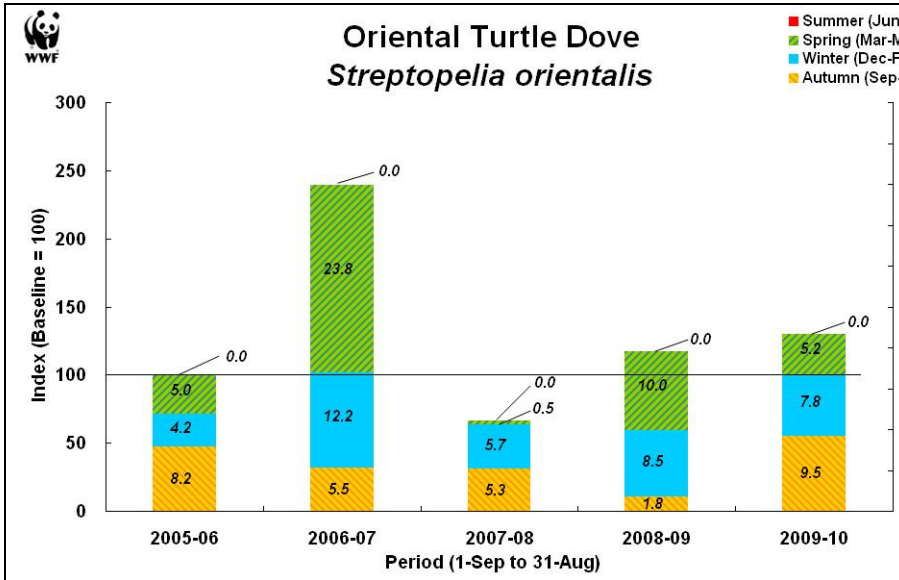


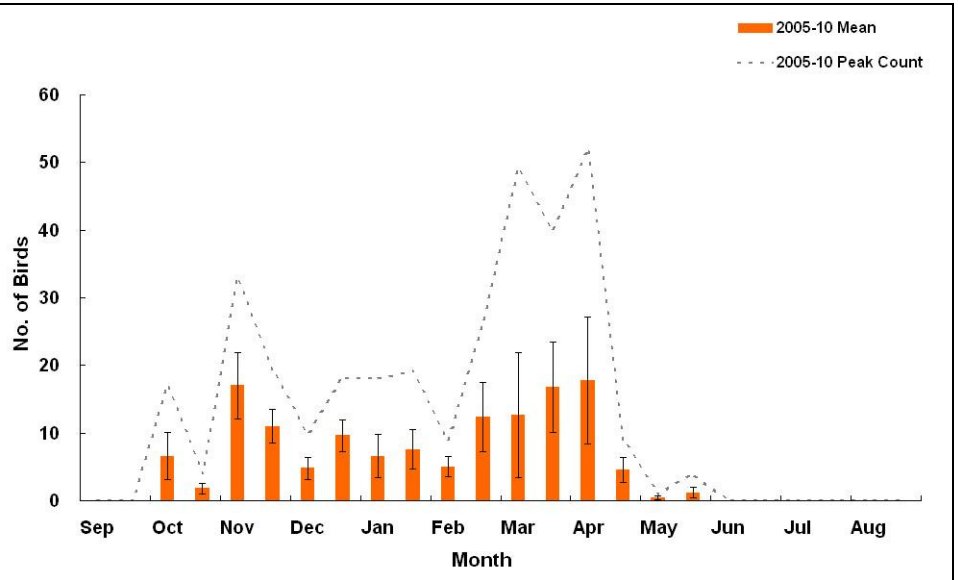


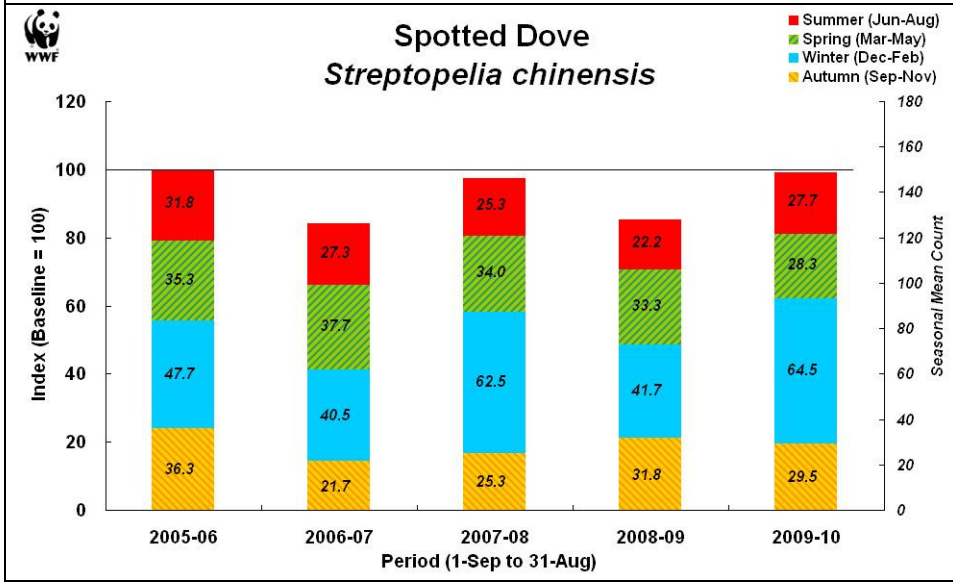
3.3 Individual Species of Interest (cont')

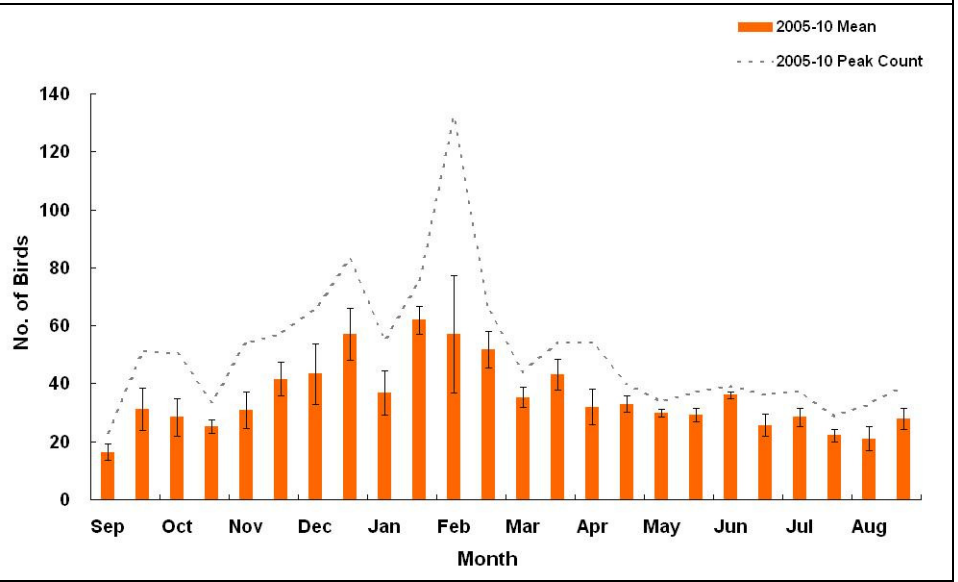


3.3 Individual Species of Interest (cont')

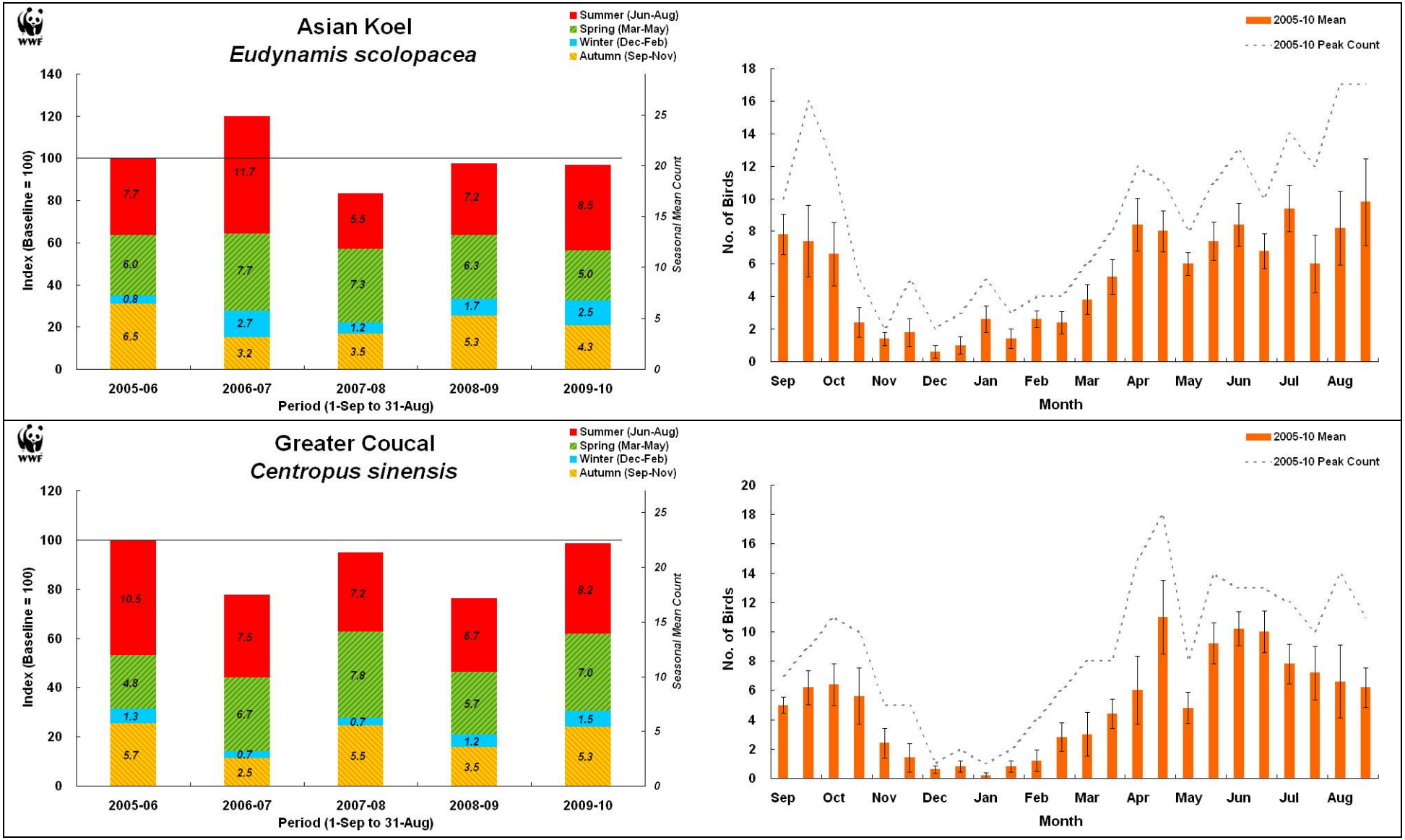




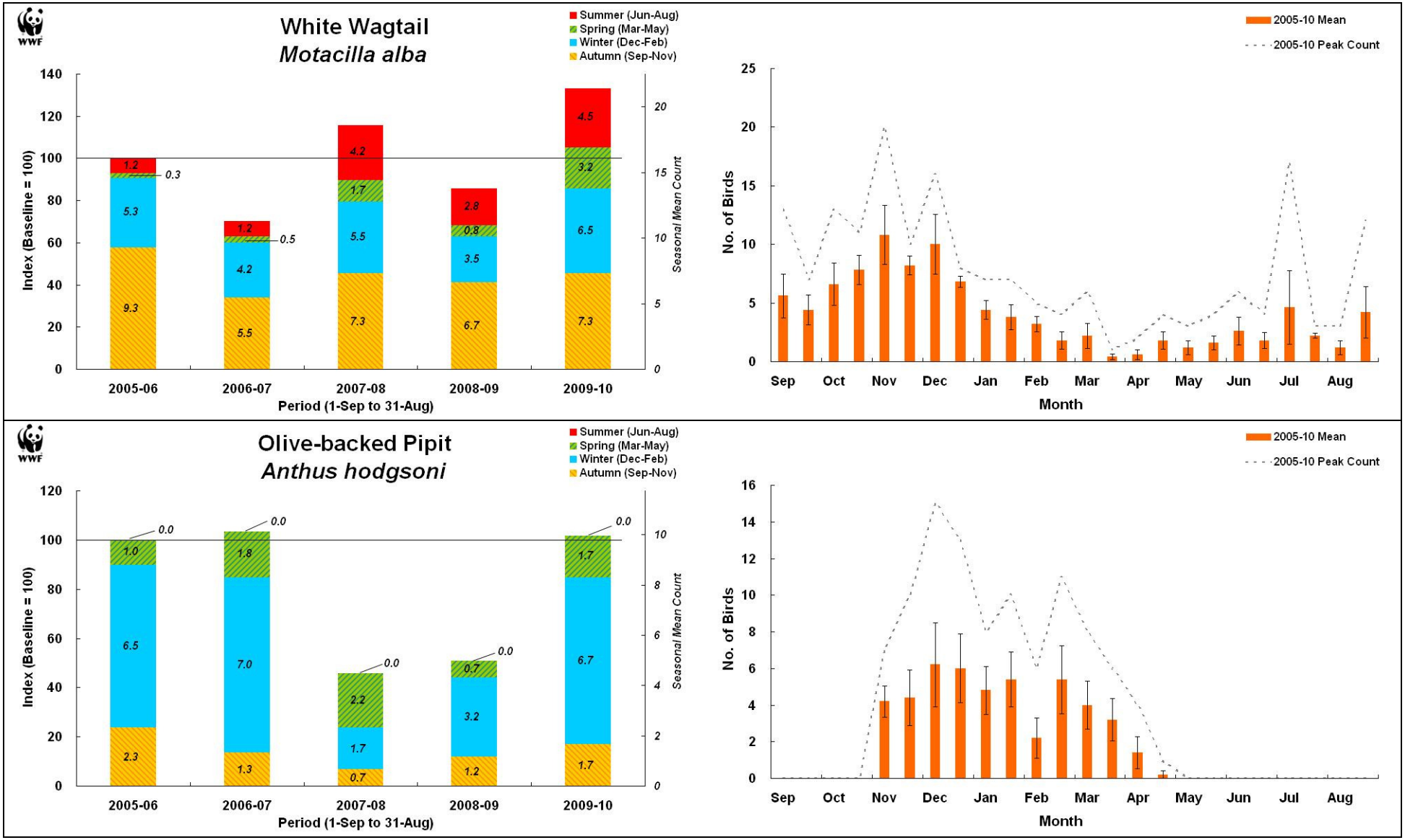




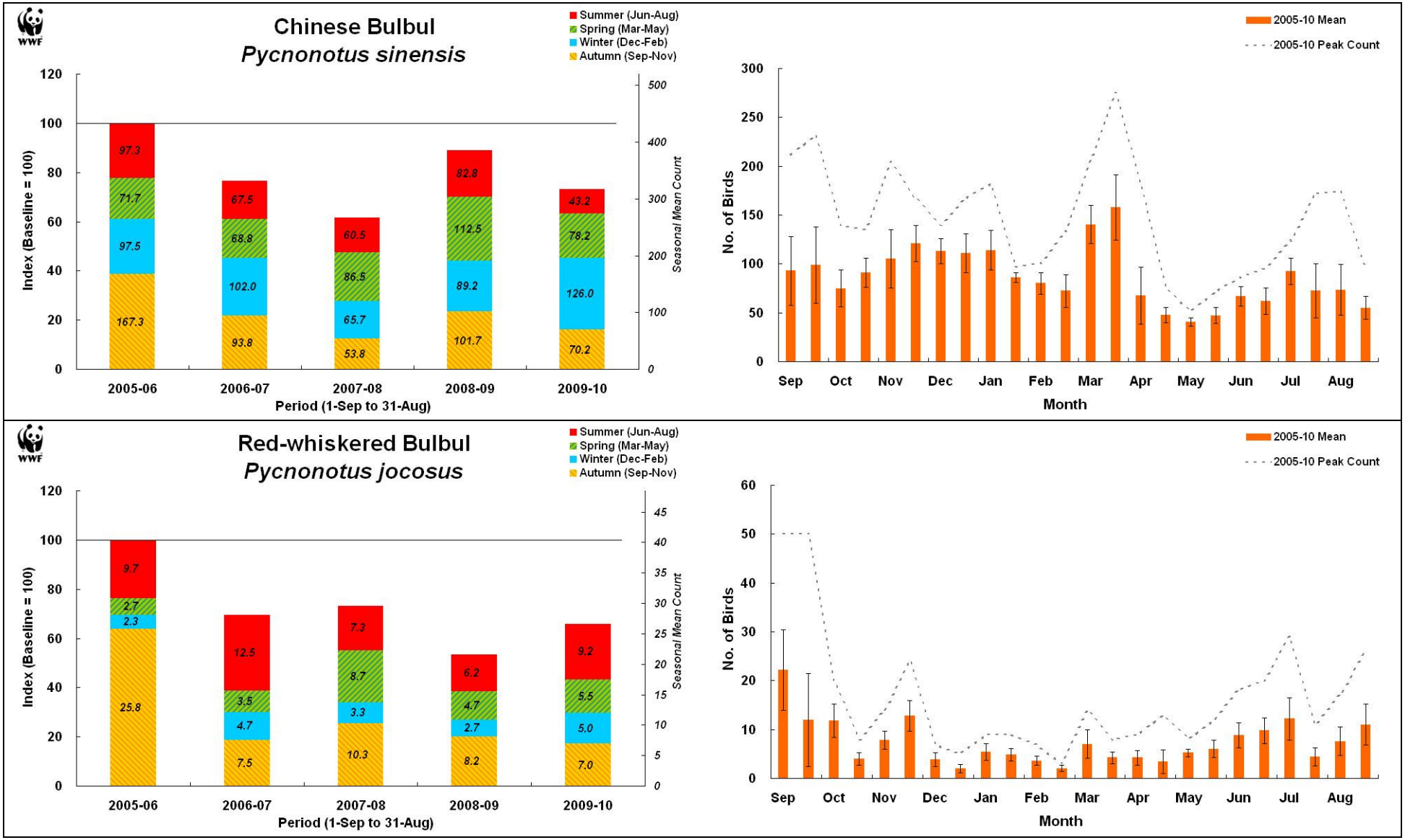
3.3 Individual Species of Interest (cont')



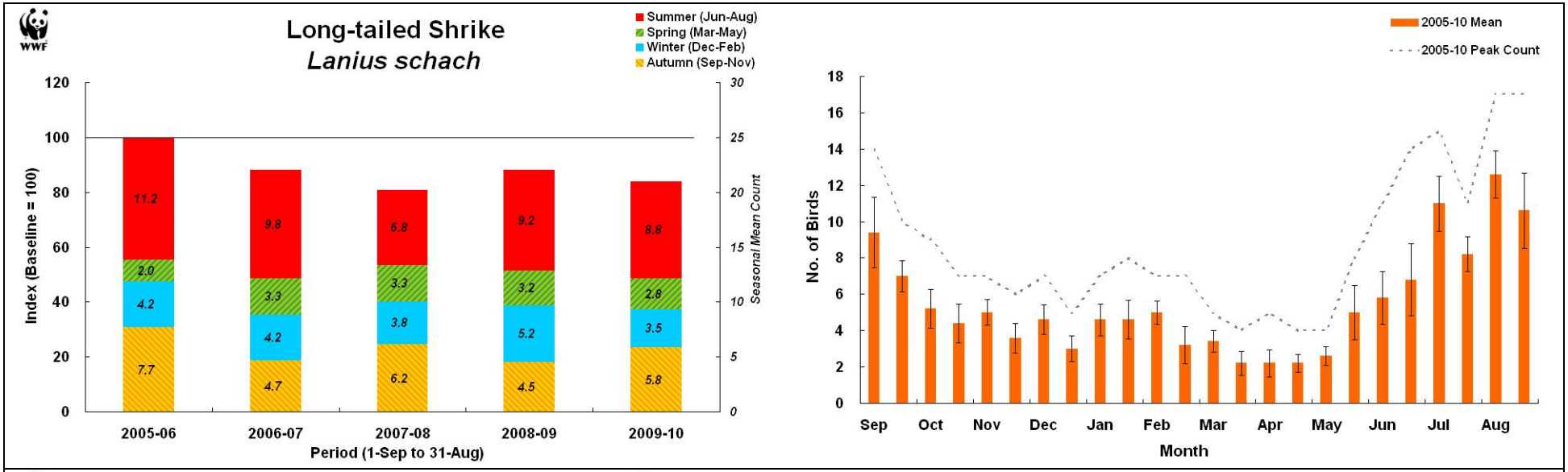
3.3 Individual Species of Interest (cont')

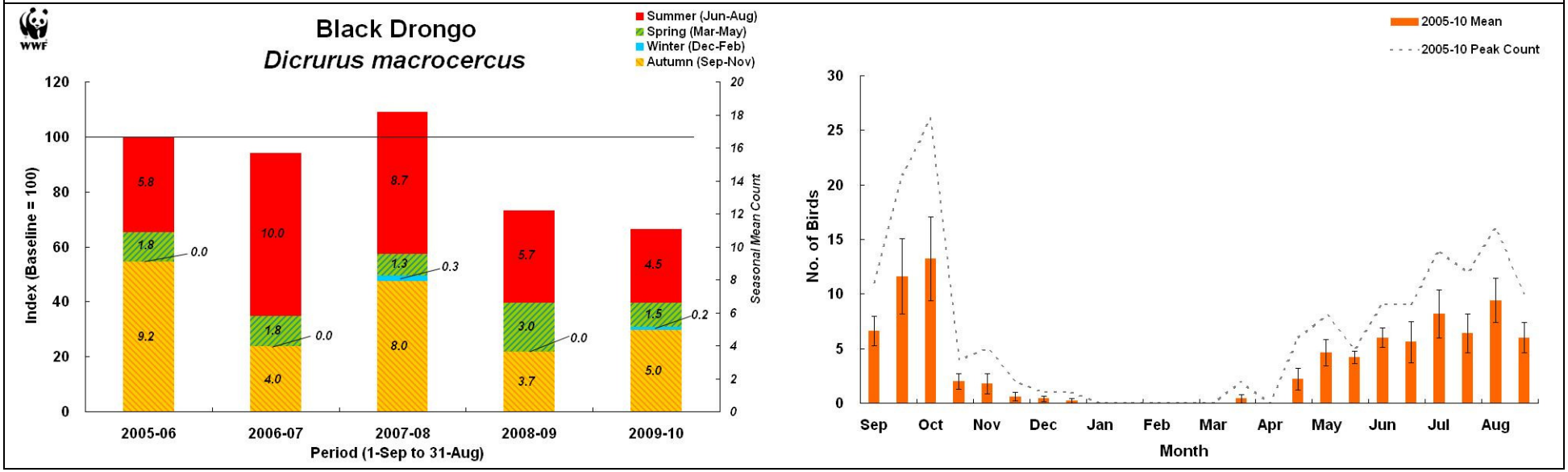


3.3 Individual Species of Interest (cont')

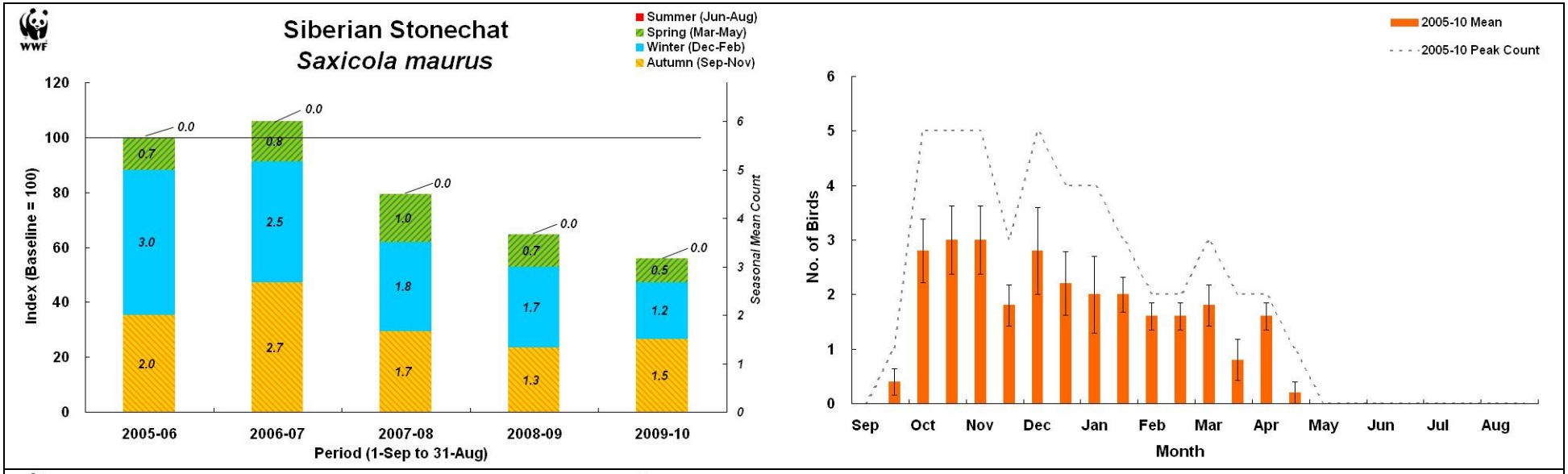


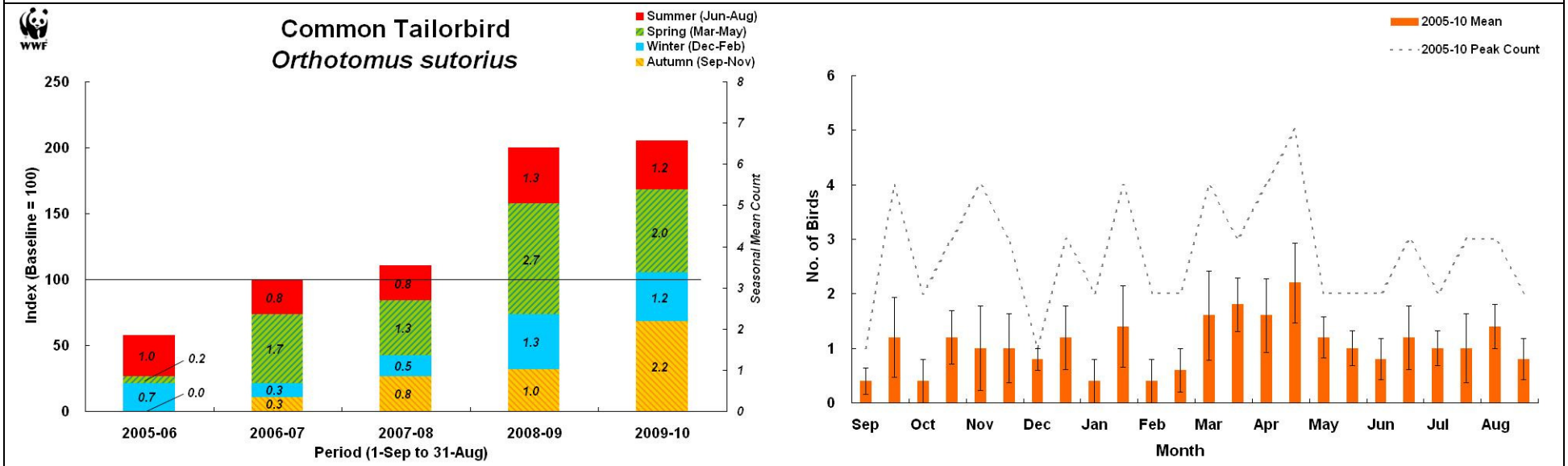
3.3 Individual Species of Interest (cont')





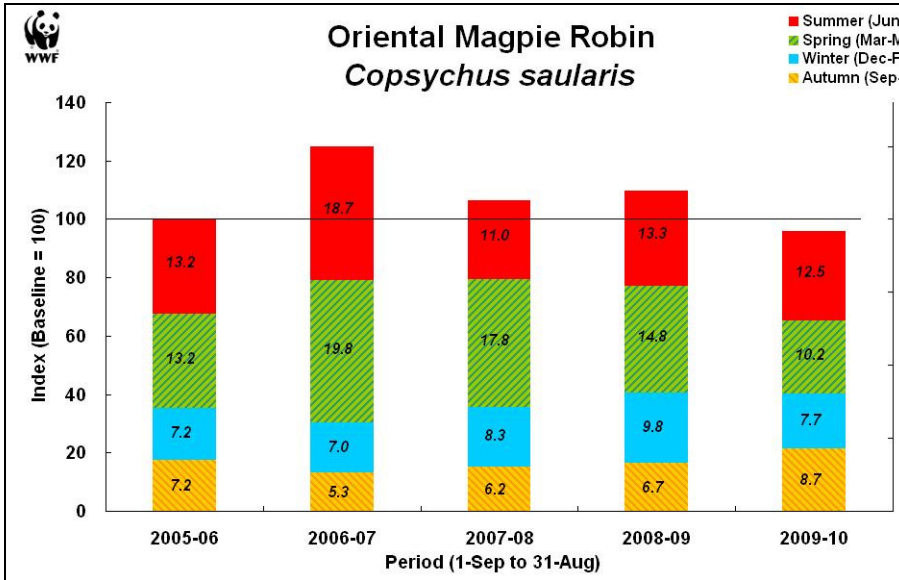
3.3 Individual Species of Interest (cont')

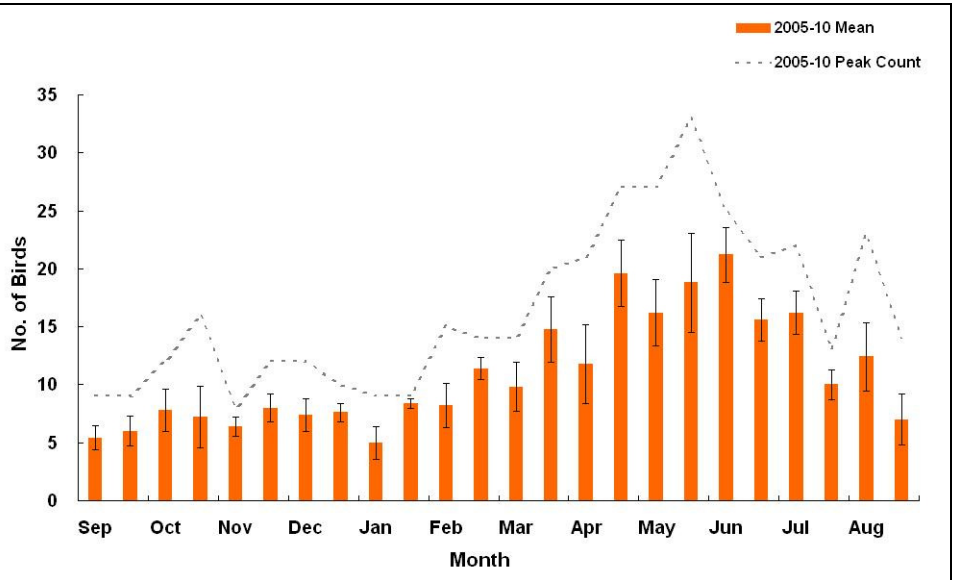


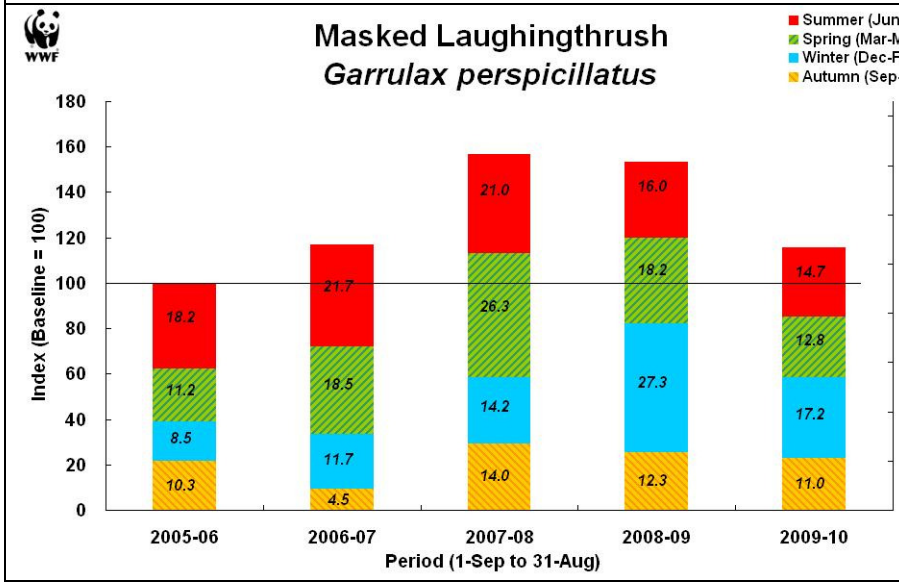


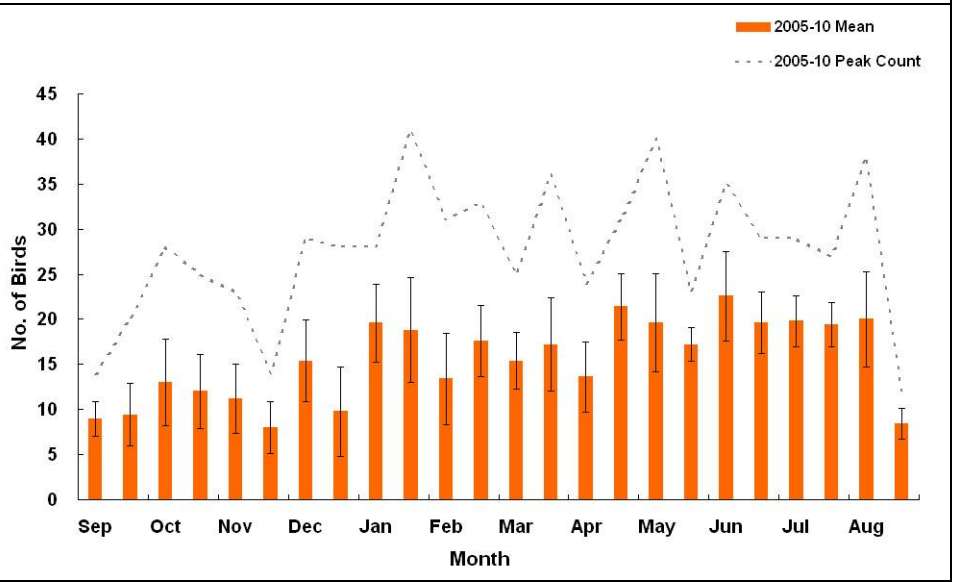
Note: Period 2006-07 is the baseline year because vocalisation was used to record individuals from September 2006 onwards

3.3 Individual Species of Interest (cont')

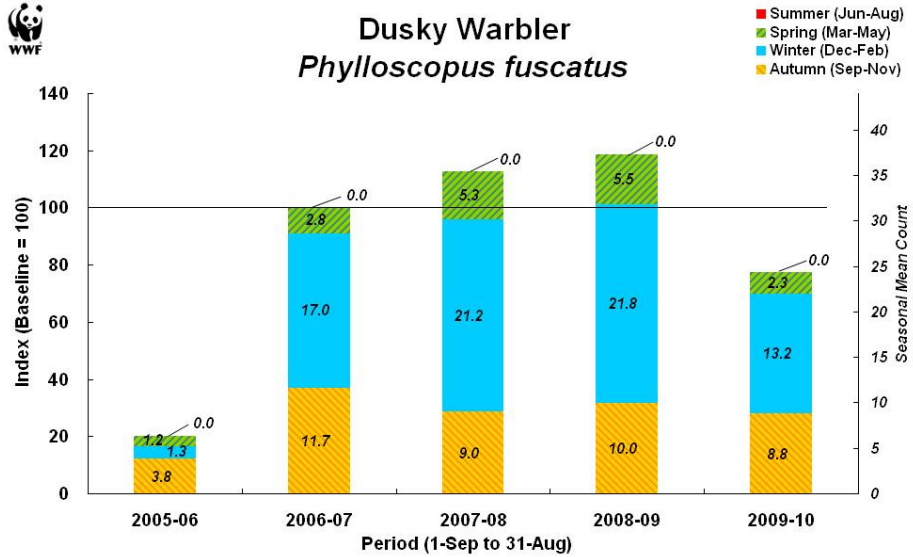


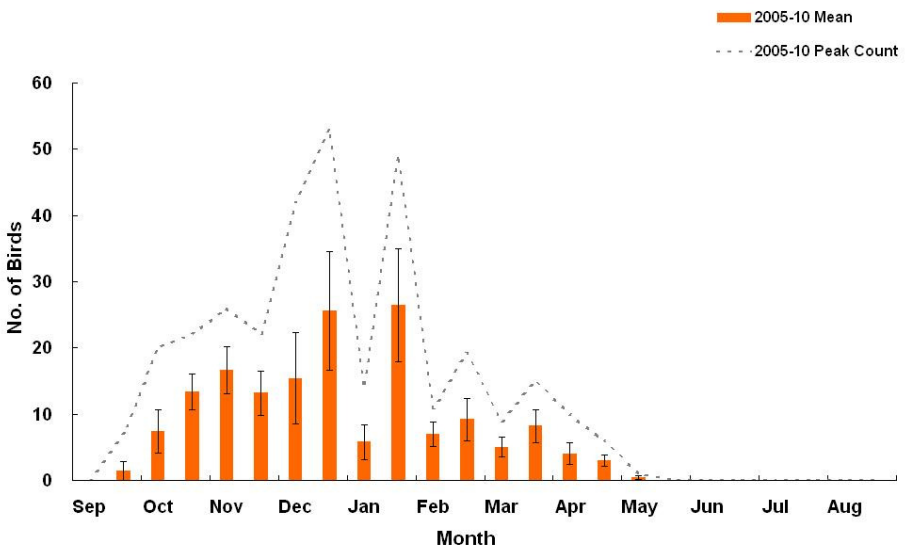




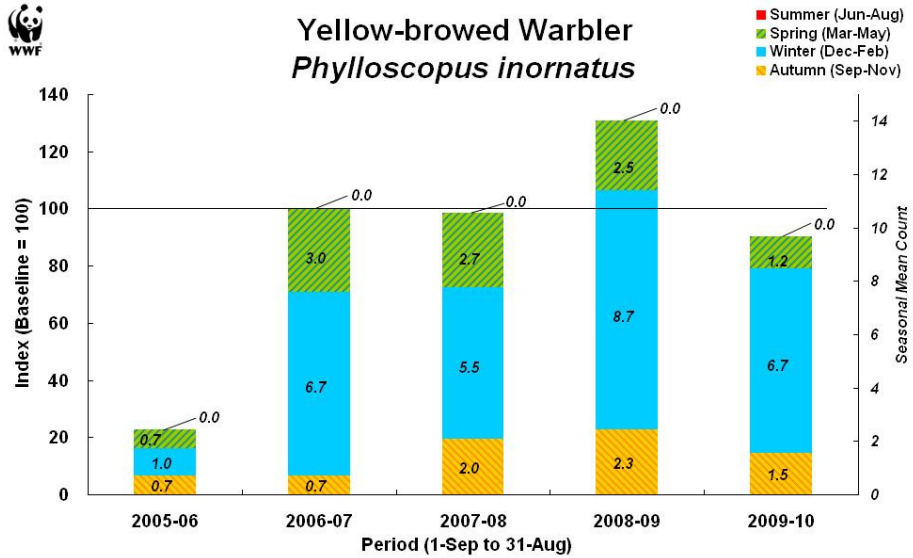


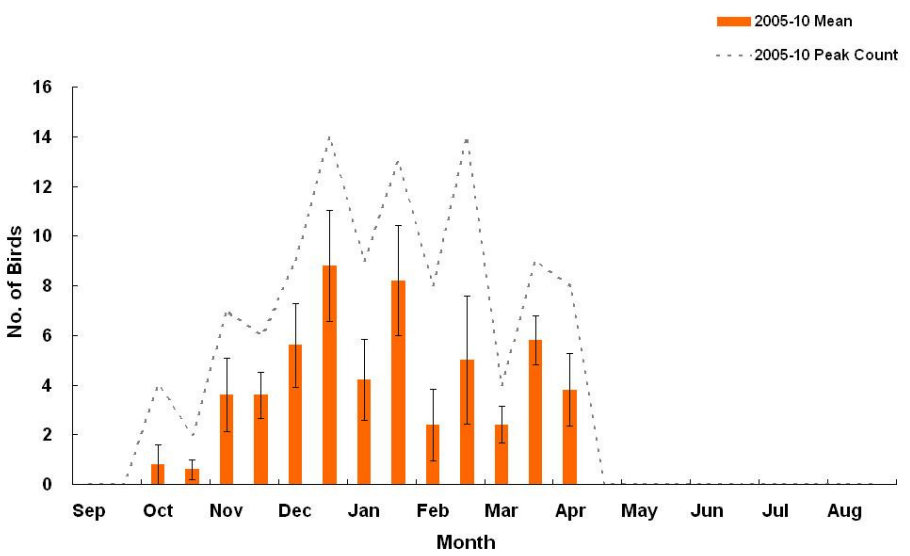
3.3 Individual Species of Interest (cont')





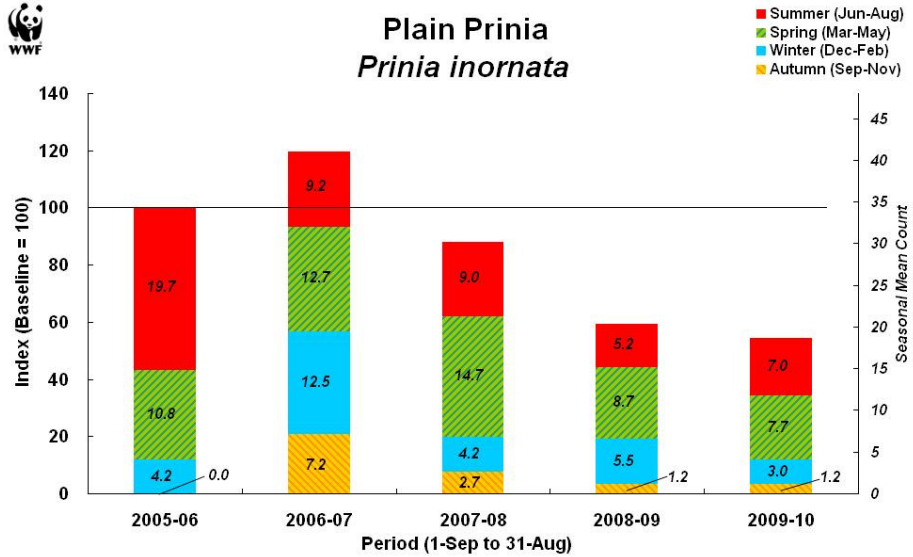
Note: Period 2006-07 is the baseline year because vocalisation was used to record individuals from September 2006 onwards

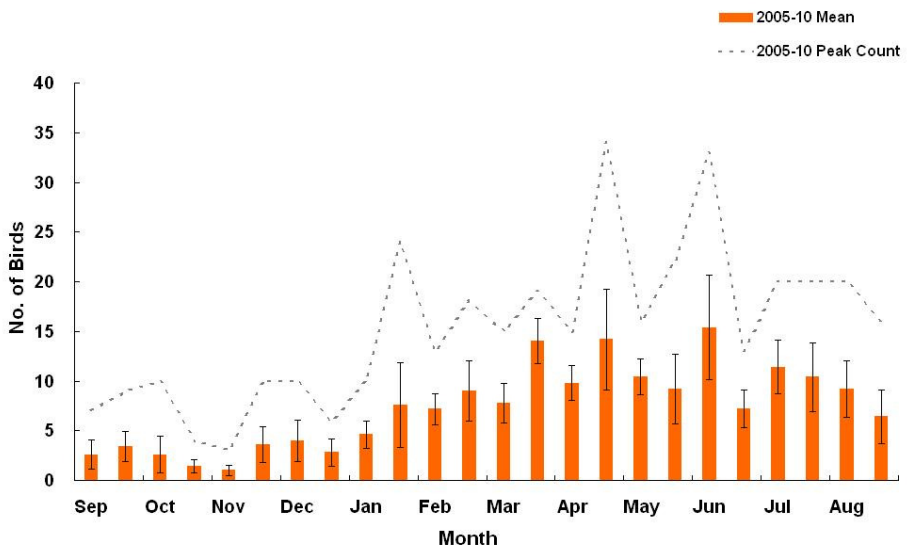




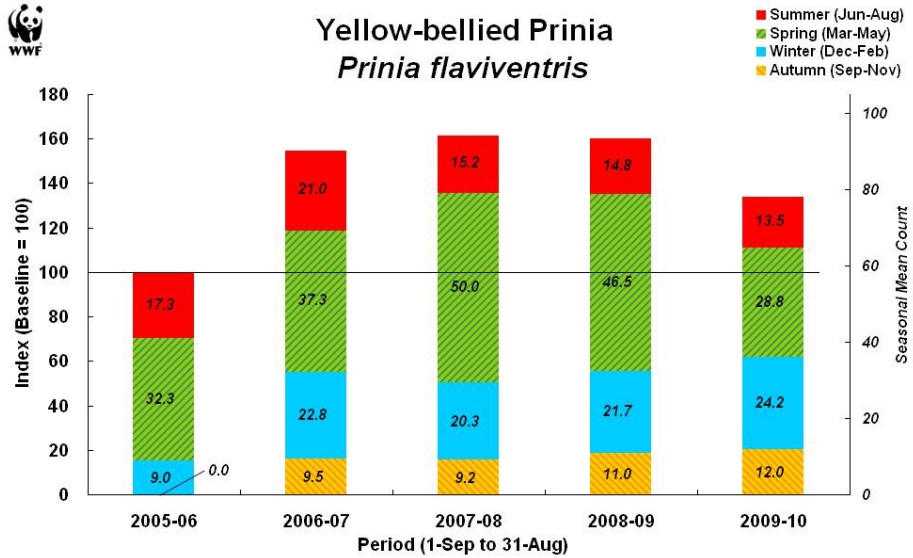
Note: Period 2006-07 is the baseline year because vocalisation was used to record individuals from September 2006 onwards

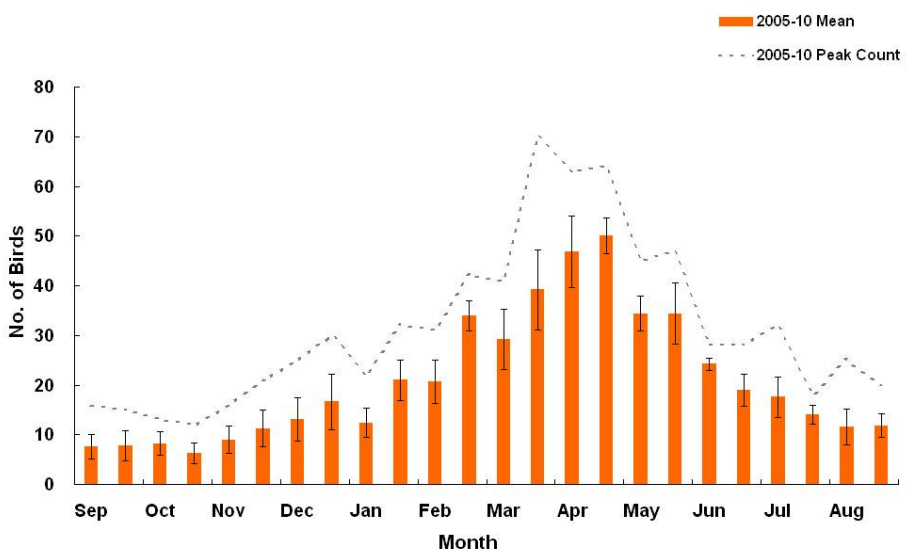
3.3 Individual Species of Interest (cont')





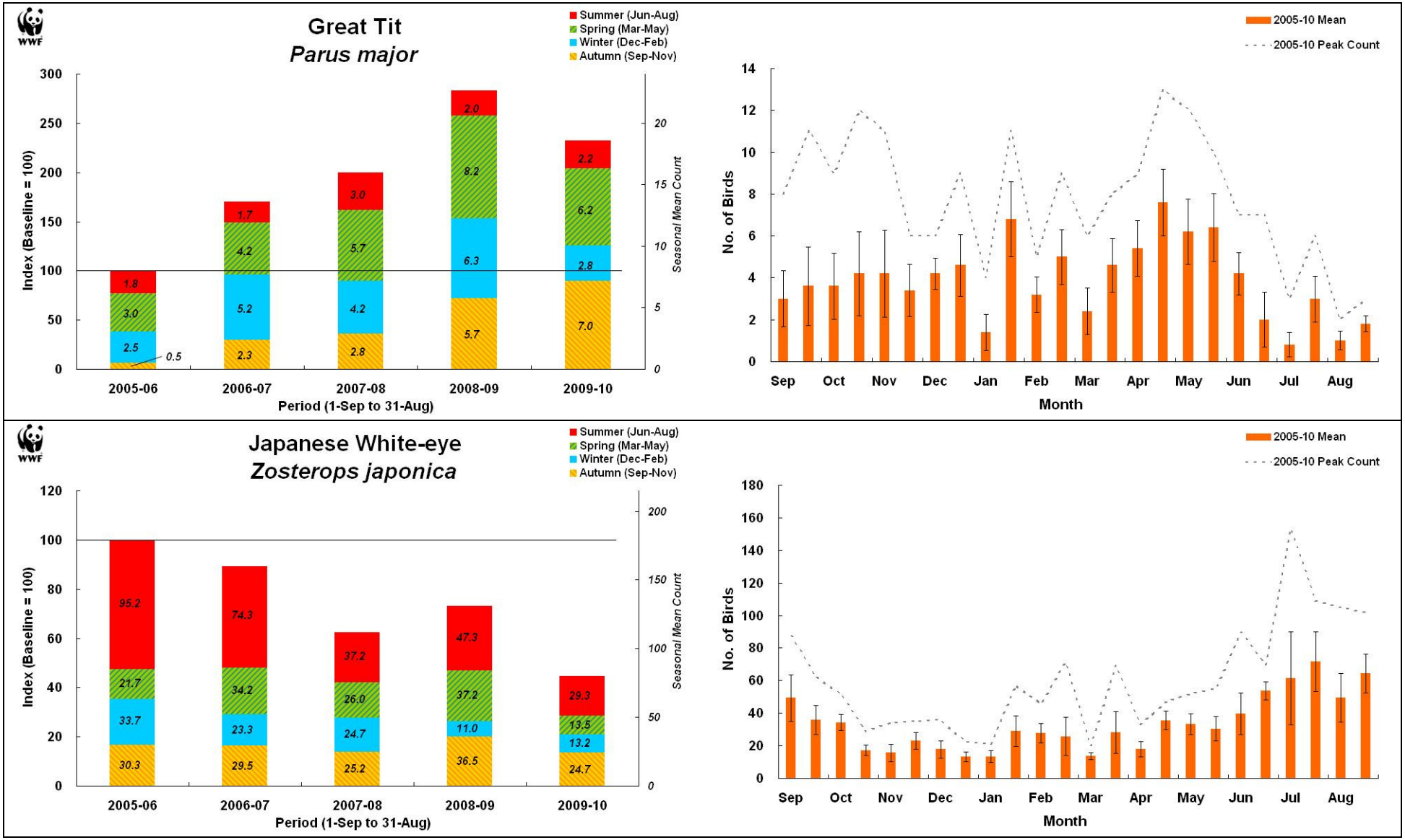
Note: Mostly recorded by volcalisation.



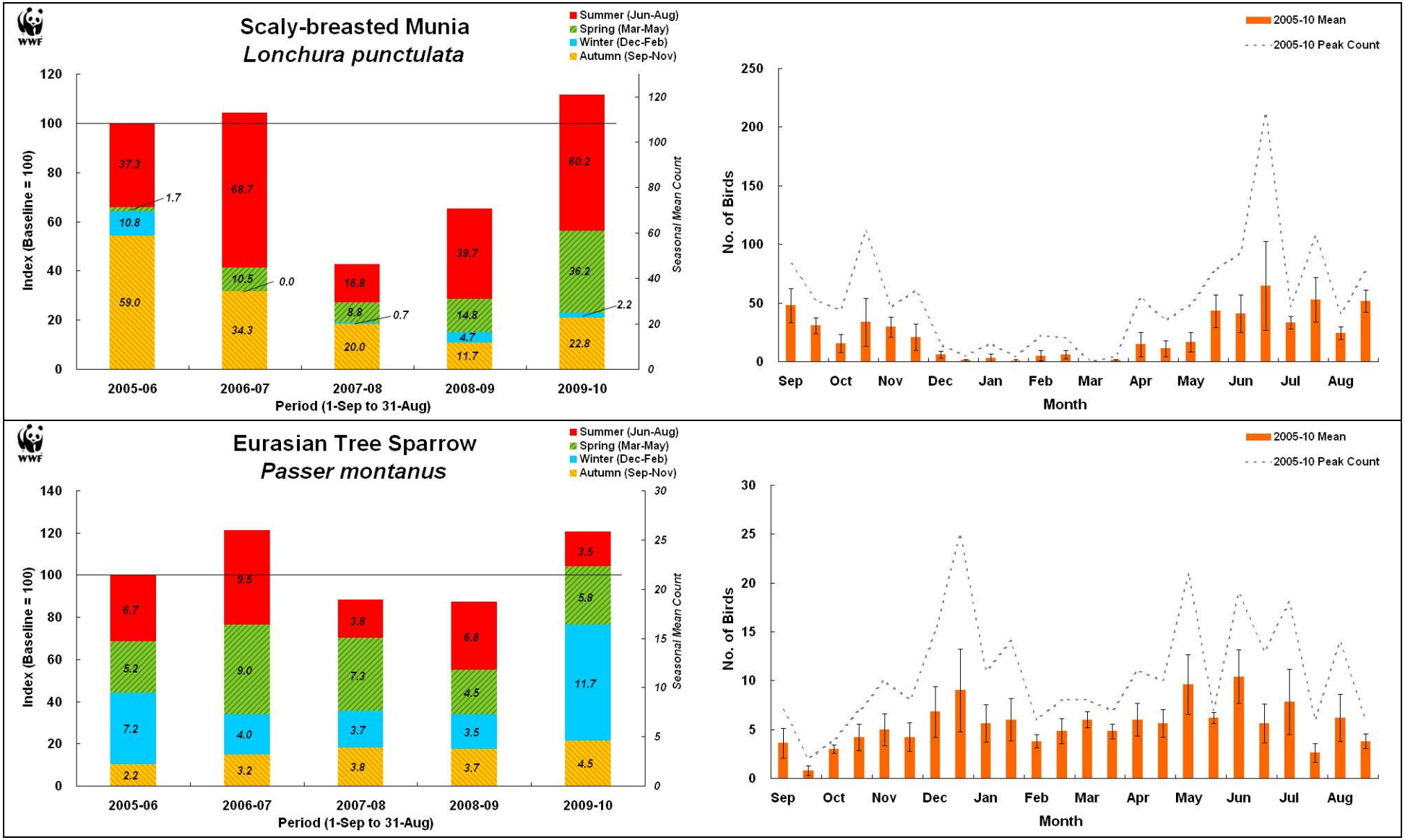


Note: Mostly recorded by volcalisation.

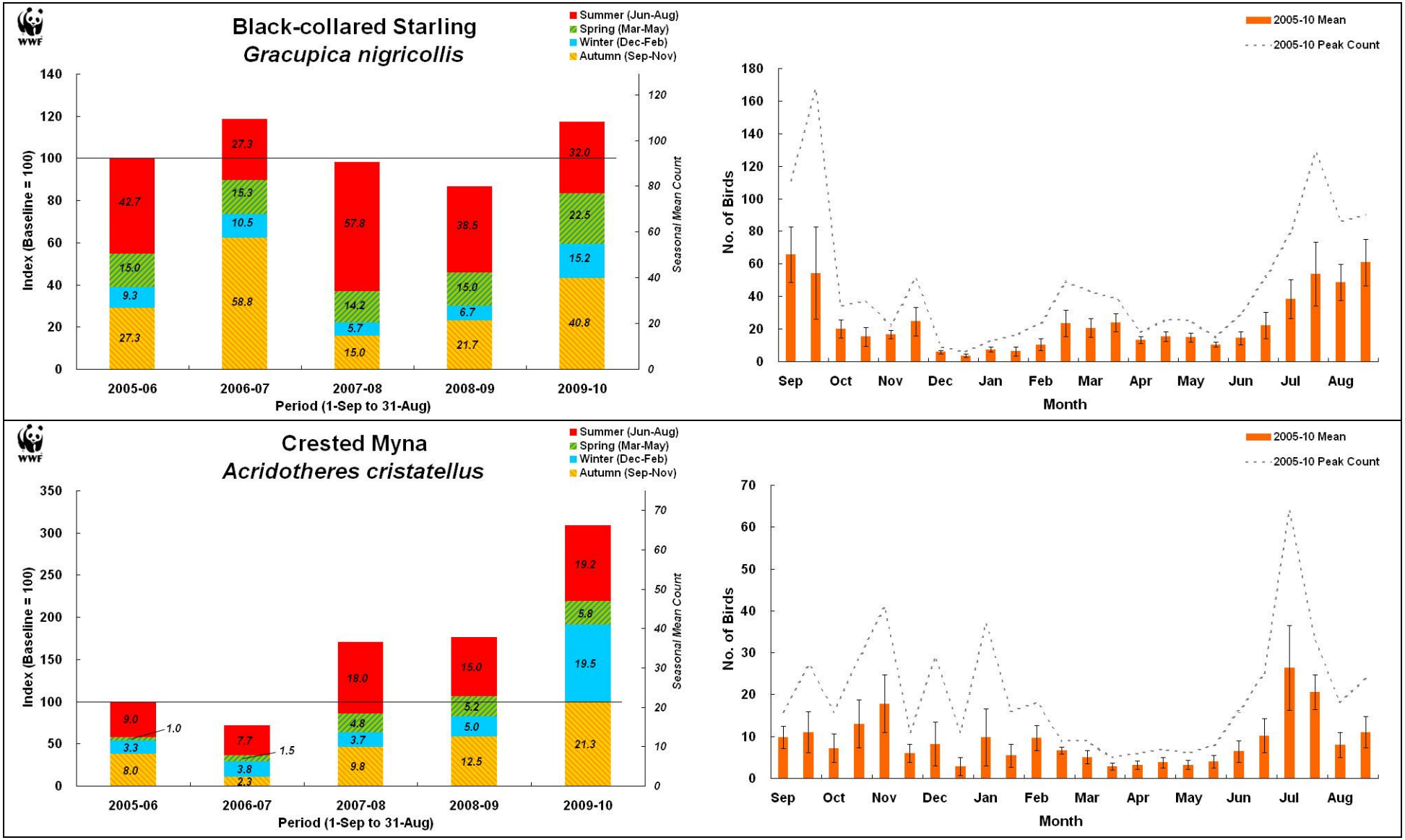
3.3 Individual Species of Interest (cont')



3.3 Individual Species of Interest (cont')



3.3 Individual Species of Interest (cont')



4. REFERENCES & BIBLIOGRAPHY

Carey, G.J. 2002. **Waterbird Count Handbook. A Guide for Participants in Waterbird Counts in Hong Kong**. Hong Kong Bird Watching Society, Hong Kong.

Carey, G.J., Chalmers, M.L., Diskin, D.A., Kennerley, P.R., Leader, P.J., Leven, M.R., Lewthwaite, R.W., Melville, D.S., Turnbull, M. and Young, L. 2001. **The Avifauna of Hong Kong**. Hong Kong Birdwatching Society, Hong Kong.

Fellowes, J.R., Lau, M.W.N., Dudgeon, D., Reels, G., Ades, G.W.J., Carey, G.J., Chan, B.P.L., Kendrick, R.C., Lee, K.S., Leven, M.R., Wilson, K.D.P. & Yu, Y.T. (2002). **Wild Animals to Watch: Terrestrial and Freshwater Fauna of Conservation Concern in Hong Kong**. *Memoirs of the Hong Kong Natural History Society* 25: 123-159.

Fowler, J., Cohen, L. and Jarvis, P. 1998. **Practical Statistics for Field Biology**. 2nd Ed. Wiley, Chichester.

WWF-HK. 2006. **Management Plan for Mai Po Marshes Wildlife Education Centre and Nature Reserve 2006-2010**. The World Wide Fund for Nature Hong Kong. Hong Kong.

WWF-HK, 2007. **Research and Monitoring Programme Plan for the Mai Po Nature Reserve : 2007 - 2011**. The World Wide Fund For Nature Hong Kong, Hong Kong.

WWF-HK, 2007. **Baseline Ecological Monitoring Plan : Mai Po Nature Reserve : 2007-2011**. World Wide Fund For Nature Hong Kong, Hong Kong.

APPENDIX I – Morning Bird Count Methodology

(selected sections from WWF Baseline Ecological Monitoring Programme 2007-11")

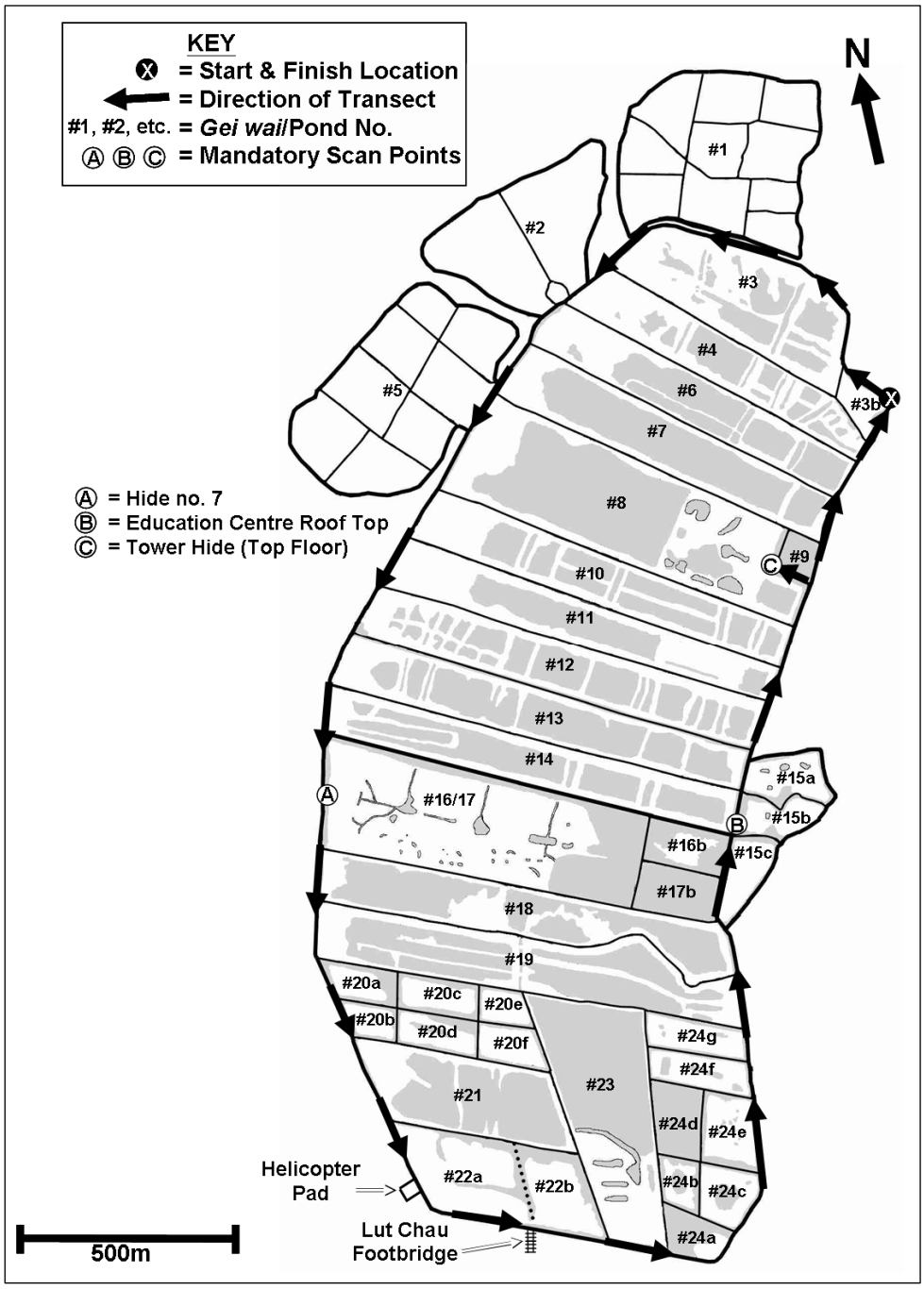
METHODOLOGY	
Location of sample collection	A transect encircling MPNR by following the FCA road and perimeter paths (Figure 1). The transect starts on the Frontier Closed Area (FCA) road at the eastern end of *gei wai* #3b, then runs anti-clockwise by continuing along the FCA road towards southern MPNR. The transect switches to a wide concrete path at the helicopter pad by *gei wai* #22a, then to a rough vegetated path at *gei wai* #22b (by Lut Chau footbridge) and finally onto a concrete path at Sub-pond #16b. The transect terminates at the starting position and is approximately 6.14 km in length.
Sampling technique	The entire transect route is cycled and all birds recorded. Records are divided into two categories; Category A - all non-flying birds inside the MPNR *gei wai*/ponds (numbered 1 - 24), and Category B - "Other" birds, both flying and non-flying, seen outside MPNR or not recorded under Category A (i.e. an Imperial Eagle soaring above Deep Bay or a migrating flock of Blue-tailed Bee-eaters flying above MPNR). Birds located on the Reserve perimeter trees belong to Category A, but those on the FCA fence belong to Category B. The recorder should stop at several locations alongside each *gei wai*/pond (where possible) to provide uninterrupted views into the open water and water channels. Cycling speed should be slow enough to allow the recorder to stop quickly if needed, observe bird movements between waterbodies (to avoid double counting) and listen for birdcalls. Three mandatory scan points are used to count birds; Hide 7 (*gei wai* #16/17), Education Centre rooftop (Sub-pond #15b) and the top floor of the Tower Hide (*gei wai* #8) (Figure 1). All factors likely to significantly influence the data i.e. a drained *gei wai*, recent vegetation cutting on islands, disturbances, etc. should be noted.
Sample type /specification	Category A. Each sample will consist of a total count for each species of non-flying birds and their location within MPNR during one transect. Category B. Each sample will consist of a total combined count for (1) each species of flying and non-flying birds outside MPNR during one transect and (2) each species of flying birds inside MPNR during one transect.
Sampling period /timing	All months of the year. Each count commences 15 minutes before sunrise and counts should last no more than 3 hours although 30-60 minutes longer may be necessary between December and February in respect of higher Great Cormorant numbers.
Frequency of sampling during sampling period	Two samples to be collected each month. Count dates are selected according to the following criteria: 1. One of the two monthly counts should be conducted within a 7-day period either side of the official HKBWS Monthly Waterbird Count to enable a direct comparison between MPNR, the Ramsar Site and Deep Bay waterbird numbers. 2. There should be at least a 7-day interval between counts. 3. One of the counts should be conducted on or before the 15th day of each month and the other after the 15th day. 4. Both counts should be conducted on the best available high tides in Deep Bay. A tide is regarded as acceptable if the tide height reaches >2.0m during the first hour of the survey so there is a greater chance of encountering shorebirds on *gei wai* #16/17. If this is not possible than a further consideration should be if the tide reaches >2.0m by the expected time of arrival at *gei wai* #11 (approx. 2 hours after the survey starts) so at least some shorebirds are encountered. 5. Where no early morning high tides are available (i.e. January, February and March) the count should be undertaken on the morning following a high over-night tide (>2.0m).

Special considerations

Weather conditions – The count should not be started if Typhoon Signal 3 (T3) or higher and/or any rainstorm warning (Amber, Red or Black) is in effect. If any signal/warning is issued during the count, the recorder should decide to either continue/abandon the count by assessing local weather condition and the remaining time duration of the count. Under unusual or exceptional circumstances when visibility is especially poor (i.e. morning mist or air pollution), such that the recorder can not see clearly into the central areas of the *gei wai*, the count should be postponed.

Transect Route.

Figure 1. Transect Route.



APPENDIX II – Summary on Species Graph Selection

Bird Group/Species	No. of count present/Total no. of counts 05-06	06-07	07-08	08-09	09-10	Graph derived? (Y/N)
Cormorant (Great Cormorant *Phalacrocorax carbo*)	**18/24**	**15/24**	**15/24**	**22/24**	**14/24**	Y.
Ardeids, etc.	**24/24**	**24/24**	**24/24**	**24/24**	**24/24**	Y
Black-faced Spoonbill *Platalea minor*	19/24	22/24	24/24	22/24	23/24	Y
Eurasian Spoonbill *Platalea leucorodia*	1/24	9/24	2/24	5/24	4/24	N.
Black-crowned Night Heron *Nycticorax nycticorax*	24/24	24/24	23/24	23/24	24/24	Y.
Chinese Pond Heron *Ardeola bacchus*	24/24	23/24	24/24	24/24	24/24	Y.
Grey Heron *Ardea cinerea*	24/24	24/24	23/24	24/24	24/24	Y.
Purple Heron *Ardea purpurea*	20/24	20/24	17/24	15/24	18/24	Y.
Striated Heron *Butorides striatus*	12/24	11/24	13/24	11/24	11/24	Y.
Eastern Cattle Egret *Bubulcus coromandus*	18/24	14/24	14/24	7/24	10/24	Y.
Eastern Great Egret *Ardea modesta*	24/24	24/24	24/24	24/24	24/24	Y.
Intermediate Egret *Egretta intermedia*	17/24	14/24	14/24	18/24	22/24	Y.
Little Egret *Egretta garzetta*	24/24	24/24	24/24	24/24	24/24	Y.
Eurasian Bittern *Botaurus stellaris*	2/24	1/24	0/24	1/24	3/24	N.
Yellow Bittern *Ixobrychus sinensis*	12/24	13/24	8/24	5/24	8/24	Y.
Gulls and Terns	**3/24**	**5/24**	**1/24**	**8/24**	**12/24**	N.
Black-headed Gull *Chroicocephalus ridibundus*	2/24	4/24	1/24	8/24	6/24	N.
Heuglin's Gull *Larus fuscus*	0/24	0/24	0/24	0/24	3/24	N.
Saunders's Gull *Chroicocephalus saundersi*	0/24	1/24	0/24	0/24	0/24	N.
Slaty-backed Gull *Larus schistisagus*	0/24	0/24	0/24	0/24	1/24	N.
Caspian Gull *Larus cachinnans*	0/24	0/24	0/24	0/24	1/24	N.
Caspian Tern *Hydroprogne caspia*	0/24	0/24	0/24	2/24	1/24	N.
Gull-billed Tern *Gelochelidon nilotica*	1/24	0/24	0/24	2/24	6/24	N.
Whiskered Tern *Chlidonias hybrida*	0/24	0/24	0/24	0/24	1/24	N.
Ducks, Grebes, etc.	**24/24**	**24/24**	**24/24**	**24/24**	**24/24**	Y.
Eurasian Teal *Anas crecca*	12/24	18/24	14/24	15/24	9/24	Y.
Eurasian Wigeon *Anas penelope*	12/24	14/24	15/24	11/24	17/24	Y.
Falcated Duck *Anas falcata*	0/24	1/24	0/24	0/24	0/24	N.
Ferruginous Duck *Aythya nyroca*	1/24	1/24	0/24	0/24	0/24	N.
Gadwall *Anas strepera*	2/24	9/24	1/24	2/24	2/24	N.
Garganey *Anas querquedula*	15/24	16/24	9/24	8/24	7/24	Y.
Greater Scaup *Aythya marila*	0/24	0/24	0/24	0/24	2/24	N.
Hybrid Duck*	2/24	0/24	0/24	0/24	0/24	N.
Lesser Whistling Duck *Dendrocygna javanica*	0/24	6/24	0/24	0/24	0/24	N.
Mallard *Anas platyrhynchos*	1/24	0/24	1/24	2/24	3/24	N.
Mandarin Duck *Aix galericulata*	0/24	0/24	0/24	0/24	0/24	N.
Northern Pintail *Anas acuta*	12/24	13/24	12/24	11/24	12/24	Y.
Northern Shoveler *Anas clypeata*	14/24	19/24	18/24	13/24	13/24	Y.
Philippine Duck *Anas luzonica*	0/24	0/24	0/24	0/24	3/24	N.
Spot-billed Duck spp. *A. poecilorhyncha* / *A. zonorhyncha*	18/24	4/24	1/24	0/24	0/24	┐
Indian Spot-billed Duck *Anas poecilorhyncha*	0/24	1/24	2/24	0/24	0/24	**Y.** Combined.
Chinese Spot-billed Duck *Anas zonorhyncha*	0/24	8/24	9/24	13/24	17/24	┘
Tufted Duck *Aythya fuligula*	10/24	12/24	10/24	17/24	14/24	Y.
Greater White-fronted Goose *Anser albifrons*	2/24	0/24	0/24	0/24	0/24	N.
Lesser White-fronted Goose *Anser erythropus*	0/24	3/24	0/24	0/24	0/24	N.
Great Crested Grebe *Podiceps cristatus*	0/24	0/24	0/24	2/24	5/24	N.
Little Grebe *Tachybaptus ruficollis*	24/24	24/24	24/24	24/24	24/24	Y.
Rails, Coot, etc.	**24/24**	**24/24**	**24/24**	**24/24**	**24/24**	Y.
Common Moorhen *Gallinula chloropus*	18/24	18/24	17/24	20/24	19/24	Y.
Eurasian Coot *Fulica atra*	10/24	11/24	8/24	8/24	5/24	Y.
Slaty-breasted Rail *Rallus striatus*	0/24	0/24	0/24	0/24	1/24	N.
Watercock *Gallicrex cinerea*	0/24	0/24	1/24	0/24	0/24	N.
White-breasted Waterhen *Amaurornis phoenicurus*	23/24	22/24	23/24	24/24	21/24	Y.

* - captive origin

APPENDIX II – Summary on Species Graph Selection (cont')

Bird Group/Species	No. of count present/Total no. of counts 05-06	06-07	07-08	08-09	09-10	Graph derived? (Y/N)
Waders	**24/24**	**24/24**	**24/24**	**24/24**	**24/24**	Y.
Black-winged Stilt *Himantopus himantopus*	17/24	18/24	16/24	16/24	19/24	Y.
Common Sandpiper *Actitis hypoleucos*	18/24	18/24	18/24	18/24	18/24	Y.
Pied Avocet *Recurvirostra avosetta*	8/24	7/24	8/24	8/24	9/24	
Black-tailed Godwit *Limosa limosa*	8/24	7/24	11/24	11/24	11/24	
Eurasian Curlew *Numenius arquatus*	7/24	7/24	9/24	9/24	8/24	
Whimbrel *Numenius phaeopus*	6/24	7/24	6/24	10/24	11/24	**N.** Data affected by lack of morning high tide in spring.
Common Greenshank *Tringa nebularia*	14/24	16/24	19/24	19/24	20/24	
Common Redshank *Tringa totanus*	11/24	13/24	14/24	14/24	15/24	
Marsh Sandpiper *Tringa stagnatilis*	9/24	7/24	7/24	10/24	12/24	
Wood Sandpiper *Tringa glareola*	12/24	12/24	12/24	7/24	8/24	
Grey-headed Lapwing *Vanellus cinereus*	3/24	1/24	0/24	1/24	1/24	N.
Northern Lapwing *Vanellus vanellus*	4/24	0/24	0/24	1/24	0/24	N.
Little Ringed Plover *Charadrius dubius*	6/24	6/24	6/24	13/24	4/24	N.
Greater Sand Plover *Charadrius leschenaultii*	6/24	4/24	5/24	6/24	5/24	N.
Lesser Sand Plover *Charadrius mongolus*	0/24	0/24	0/24	2/24	2/24	N.
Pacific Golden Plover *Pluvialis fulva*	2/24	4/24	7/24	6/24	4/24	N.
Grey Plover *Pluvialis squatarola*	3/24	3/24	8/24	6/24	6/24	N.
Oriental Pratincole *Glareola maldivarum*	1/24	1/24	1/24	3/24	1/24	N.
Ruddy Turnstone *Arenaria interpres*	0/24	0/24	1/24	0/24	1/24	N.
Asian Dowitcher *Limnodromus semipalmatus*	2/24	2/24	3/24	3/24	5/24	N.
Bar-tailed Godwit *Limosa lapponica*	3/24	1/24	1/24	3/24	4/24	N.
Eastern Curlew *Numenius madagascariensis*	0/24	2/24	0/24	1/24	0/24	N.
Green Sandpiper *Tringa ochropus*	1/24	1/24	3/24	1/24	3/24	N.
Grey-tailed Tattler *Tringa brevipes*	2/24	0/24	3/24	2/24	2/24	N.
Spotted Redshank *Tringa erythropus*	5/24	2/24	4/24	5/24	8/24	N.
Terek Sandpiper *Xenus cinereus*	4/24	4/24	8/24	6/24	2/24	N.
Great Knot *Calidris tenuirostris*	1/24	1/24	1/24	2/24	4/24	N.
Red Knot *Calidris canutus*	1/24	0/24	2/24	2/24	2/24	N.
Broad-billed Sandpiper *Limicola falcinellus*	0/24	1/24	0/24	1/24	1/24	N.
Curlew Sandpiper *Calidris ferruginea*	5/24	2/24	6/24	6/24	6/24	N.
Dunlin *Calidris alpina*	1/24	1/24	0/24	0/24	1/24	N.
Ruff *Philomachus pugnax*	1/24	1/24	2/24	1/24	2/24	N.
Sharp-tailed Sandpiper *Calidris acuminata*	4/24	3/24	2/24	1/24	1/24	N.
Red-necked Stint *Calidris ruficollis*	1/24	2/24	5/24	2/24	4/24	N.
Long-toed Stint *Calidris subminuta*	0/24	1/24	2/24	2/24	1/24	N.
Common Snipe *Gallinago gallinago*	3/24	2/24	2/24	3/24	1/24	N.
Pintail / Swinhoe's Snipe *Gallinago stenura / G. megala*	0/24	1/24	0/24	0/24	0/24	N.
Greater Painted-snipe *Rostratula benghalensis*	0/24	0/24	0/24	1/24	2/24	N.
Pheasant-tailed Jacana *Hydrophasianus chirurgus*	1/24	3/24	1/24	0/24	1/24	N.
Birds of Prey	**22/24**	**22/24**	**22/24**	**21/24**	**23/24**	Y.
Besra *Accipiter virgatus*	4/24	5/24	13/24	6/24	6/24	N.
Chinese Sparrowhawk *Accipiter soloensis*	1/24	0/24	1/24	0/24	0/24	N.
Black Kite *Milvus migrans*	17/24	16/24	14/24	17/24	21/24	Y.
Black-winged Kite *Elanus caeruleus*	0/24	0/24	1/24	0/24	1/24	N.
Bonelli's Eagle *Aquila fasciata*	1/24	1/24	3/24	1/24	1/24	N.
Eastern Buzzard *Buteo japonicus*	9/24	10/24	9/24	8/24	9/24	Y.
Eastern Marsh Harrier *Circus spilonotus*	3/24	9/24	7/24	8/24	9/24	Y.
Pied Harrier *Circus melanoleucos*	1/24	1/24	0/24	1/24	1/24	N.
Greater Spotted Eagle *Aquila clanga*	0/24	7/24	8/24	8/24	3/24	**Y.** Regularly recorded.
Eastern Imperial Eagle *Aquila heliaca*	8/24	7/24	6/24	7/24	7/24	**Y.** Regularly recorded.
Japanese Sparrowhawk *Accipiter gularis*	0/24	1/24	0/24	0/24	0/24	N.
Western Osprey *Pandion haliaetus*	13/24	11/24	10/24	11/24	17/24	Y.
Common Kestrel *Falco tinnunculus*	0/24	1/24	1/24	0/24	0/24	N.
Eurasian Hobby *Falco subbuteo*	0/24	0/24	1/24	0/24	0/24	N.
Peregrine Falcon *Falco peregrinus*	5/24	2/24	7/24	8/24	4/24	N.
Asian Barred Owlet *Glaucidium cuculiodes*	0/24	0/24	1/24	2/24	0/24	N.

APPENDIX II – Summary on Species Graph Selection (cont')

Bird Group/Species	No. of count present/Total no. of counts 05-06	06-07	07-08	08-09	09-10	Graph derived? (Y/N)
Wetland Dependent, Other	**24/24**	**24/24**	**24/24**	**24/24**	**24/24**	Y.
Black-capped Kingfisher *Halcyon pileata*	7/24	10/24	2/24	2/24	3/24	N.
Common Kingfisher *Alcedo atthis*	24/24	21/24	22/24	22/24	24/24	Y.
White-throated Kingfisher *Halcyon smyrnensis*	19/24	18/24	18/24	18/24	17/24	Y.
Pied Kingfisher *Ceryle rudis*	5/24	19/24	15/24	19/24	16/24	Y.
Eastern Yellow Wagtail *Motacilla tschutschensis*	0/24	9/24	11/24	7/24	8/24	Y.
Grey Wagtail *Motacilla cinerea*	2/24	1/24	2/24	0/24	0/24	N.
Zitting Cisticola *Cisticola juncidis*	1/24	2/24	3/24	5/24	3/24	N.
Black-browed Reed Warbler *Acrocephalus bistrigiceps*	0/24	3/24	2/24	9/24	4/24	N.
Chinese Penduline-Tit *Remiz consobrinus*	0/24	0/24	5/24	8/24	3/24	N.
Oriental Reed Warbler *Acrocephalus orientalis*	6/24	9/24	8/24	8/24	8/24	Y.
Collared Crow *Corvus torquatus*	22/24	24/24	23/24	24/24	24/24	Y.
Red-billed Starling *Spodiopsar sericeus*	10/24	11/24	10/24	10/24	11/24	Y.
Non Wetland Dependent	**24/24**	**24/24**	**24/24**	**24/24**	**24/24**	Y.
Eurasian Collared Dove *Streptopelia decaocto*	0/24	0/24	0/24	0/24	1/24	Y.
Oriental Turtle Dove *Streptopelia orientalis*	13/24	14/24	11/24	13/24	15/24	N.
Red Turtle Dove *Streptopelia tranquebarica*	0/24	1/24	0/24	2/24	0/24	N.
Domestic Pigeon *Columba livia*	2/24	1/24	2/24	4/24	5/24	N.
Spotted Dove *Spilopelia chinensis*	24/24	24/24	24/24	24/24	24/24	Y.
Asian Koel *Eudynamys scolopaceus*	21/24	22/24	21/24	22/24	23/24	Y.
Indian Cuckoo *Cuculus micropterus*	2/24	3/24	2/24	2/24	1/24	N.
Large Hawk Cuckoo *Hierococcyx sparverioides*	0/24	1/24	0/24	0/24	0/24	N.
Oriental Cuckoo *Cuculus optatus*	0/24	0/24	1/24	0/24	0/24	N.
Plaintive Cuckoo *Cacomantis merulinus*	0/24	1/24	0/24	1/24	0/24	N.
Greater Coucal *Centropus sinensis*	21/24	21/24	17/24	20/24	21/24	Y.
Blue-tailed Bee-eater *Merops philippinus*	0/24	0/24	0/24	1/24	0/24	N.
Savanna Nightjar *Caprimulgus affinis*	0/24	1/24	0/24	0/24	0/24	N.
Barn Swallow *Hirundo rustica*	2/24	8/24	5/24	8/24	6/24	N.
House Swift *Apus nipalensis*	0/24	1/24	0/24	0/24	0/24	N.
Eurasian Wryneck *Jynx torquilla*	1/24	2/24	0/24	0/24	1/24	N.
Oriental Skylark *Alauda gulgula*	0/24	2/24	0/24	0/24	0/24	N.
White Wagtail *Motacilla alba*	16/24	18/24	23/24	21/24	22/24	Y.
Olive-backed Pipit *Anthus hodgsoni*	10/24	10/24	8/24	10/24	10/24	Y.
Red-throated Pipit *Anthus cervinus*	0/24	1/24	2/24	1/24	0/24	N.
Richard's Pipit *Anthus richardi*	1/24	0/24	0/24	3/24	3/24	N.
Chinese Bulbul *Pycnonotus sinensis*	24/24	24/24	24/24	24/24	24/24	Y.
Red-whiskered Bulbul *Pycnonotus jocosus*	22/24	22/24	22/24	21/24	23/24	Y.
Sooty-headed Bulbul *Pycnonotus aurigaster*	1/24	0/24	0/24	0/24	0/24	N.
Brown Shrike *Lanius cristatus*	1/24	0/24	0/24	1/24	2/24	N.
Long-tailed Shrike *Lanius schach*	23/24	24/24	24/24	24/24	24/24	Y.
Siberian Stonechat *Saxicola maurus*	14/24	13/24	14/24	11/24	13/24	Y.
Daurian Redstart *Phoenicurus auroreus*	3/24	2/24	5/24	7/24	8/24	N.
Oriental Magpie Robin *Copsychus saularis*	24/24	24/24	24/24	24/24	24/24	Y.
Siberian Rubythroat *Luscinia calliope*	2/24	5/24	2/24	4/24	2/24	N.
Common Blackbird *Turdus merula*	2/24	3/24	3/24	3/24	3/24	N.
Dusky Thrush *Turdus eunomus*	0/24	0/24	0/24	0/24	1/24	N.
Grey-backed Thrush *Turdus hortulorum*	2/24	2/24	0/24	0/24	2/24	N.
Pale Thrush *Turdus pallidus*	0/24	0/24	0/24	0/24	2/24	N.
Masked Laughingthrush *Garrulax perspicillatus*	24/24	21/24	24/24	24/24	24/24	Y.
Arctic Warbler *Phylloscopus borealis*	3/24	2/24	2/24	0/24	2/24	N.
Common Tailorbird *Orthotomus sutorius*	8/24	13/24	16/24	18/24	17/24	Y.
Dusky Warbler *Phylloscopus fuscatus*	11/24	14/24	15/24	15/24	13/24	Y.
Manchurian Bush Warbler *Cettia canturians*	0/24	1/24	3/24	0/24	1/24	N.
Pale-legged Leaf Warbler *Phylloscopus tenellipes*	1/24	0/24	0/24	1/24	0/24	N.
Pallas's Leaf Warbler *Phylloscopus proregulus*	0/24	0/24	1/24	1/24	3/24	N.
Russet Bush Warbler *Bradypterus mandelli*	0/24	0/24	0/24	1/24	0/24	N.
Yellow-browed Warbler *Phylloscopus inornatus*	8/24	10/24	9/24	13/24	11/24	Y.
Plain Prinia *Prinia inornata*	16/24	23/24	23/24	22/24	21/24	Y.
Yellow-bellied Prinia *Prinia flaviventris*	16/24	24/24	24/24	24/24	24/24	Y.
Asian Brown Flycatcher *Muscicapa dauurica*	7/24	3/24	7/24	5/24	4/24	N.
Grey-streaked Flycatcher *Muscicapa griseisticta*	1/24	0/24	0/24	0/24	1/24	N.
Red-throated Flycatcher *Ficedula albicilla*	0/24	0/24	1/24	3/24	1/24	N.
Great Tit *Parus major*	15/24	23/24	21/24	20/24	22/24	Y.

APPENDIX II – Summary on Species Graph Selection (cont')

Bird Group/Species	No. of count present/Total no. of counts 05-06	06-07	07-08	08-09	09-10	Graph derived? (Y/N)
Non Wetland Dependent						
Japanese White-eye *Zosterops japonica*	24/24	24/24	24/24	23/24	24/24	Y.
Black-faced Bunting *Emberiza spodocephala*	6/24	5/24	6/24	4/24	4/24	N.
Little Bunting *Emberiza pusilla*	0/24	0/24	1/24	0/24	0/24	N.
Yellow-breasted Bunting *Emberiza aureola*	0/24	1/24	0/24	0/24	0/24	N.
Scaly-breasted Munia *Lonchura punctulata*	17/24	16/24	15/24	16/24	19/24	Y.
White-rumped Munia *Lonchura striata*	0/24	0/24	0/24	2/24	0/24	N.
Chestnut Munia *Lonchura atricapilla* *	0/24	0/24	0/24	0/24	1/24	N.
White-headed Munia *Lonchura maja* *	0/24	0/24	0/24	0/24	1/24	N.
Eurasian Tree Sparrow *Passer montanus*	22/24	21/24	22/24	22/24	22/24	Y.
Yellow-fronted Canary *Crithagra mozambica* *	0/24	1/24	0/24	0/24	0/24	N.
Red-and-Green Macaw *Ara chloroptera* *	0/24	0/24	0/24	0/24	6/24	N.
Chinese Grosbeak *Eophona migratorius*	1/24	0/24	1/24	0/24	0/24	N.
Black-collared Starling *Gracupica nigricollis*	24/24	24/24	24/24	24/24	24/24	Y.
White-cheeked Starling *Spodiopsar cineraceus*	9/24	5/24	6/24	4/24	8/24	N.
White-shouldered Starling *Sturnia sinensis*	5/24	4/24	5/24	4/24	7/24	N.
Common Myna *Acridotheres tristis*	0/24	0/24	0/24	0/24	1/24	N.
Crested Myna *Acridotheres cristatellus*	18/24	19/24	23/24	21/24	24/24	Y.
Black-naped Oriole *Oriolus chinensis*	1/24	0/24	0/24	1/24	1/24	N.
Black Drongo *Dicrurus macrocercus*	13/24	16/24	16/24	13/24	15/24	Y.
Hair-crested Drongo *Dicrurus hottentottus*	0/24	0/24	0/24	0/24	1/24	N.
Azure-winged Magpie *Cyanopica cyanus*	18/24	12/24	17/24	20/24	17/24	Y.
Eurasian Magpie *Pica pica*	24/24	24/24	24/24	22/24	23/24	Y.
Carrion Crow *Corvus corone*	0/24	1/24	0/24	0/24	0/24	N.
Daurian Jackdaw *Coloeus dauuricus*	0/24	3/24	0/24	0/24	0/24	N.
House Crow *Corvus splendens*	3/24	0/24	0/24	0/24	0/24	N.
Large-billed Crow *Corvus macrorhynchos*	17/24	7/24	5/24	12/24	11/24	Y.

* - captive origin