Nature Conservation Management for Long Valley

BIRD MONITORING PROGRAMME

Programme 2008/10	Autumn and Winter	September 2008 - Februrary2009

Summary Report – Autumn 2008 and Winter 2008/2009 (September to February)

Y.H. Sung [1], C. C. Pang [1] and Billy C.H. Hau [1]

1. Background

1.1. The Environmental and Conservation Fund (ECF) supports a joint project: Nature Conservation Management for Long Valley, which aim to enhance the conservation value of this freshwater wetland especially for birds through a management agreement (MA) scheme between the Hong Kong Bird Watching Society (HKBWS), The Conservancy Association (CA) and the local farming community since March 2008.

1.2. The aim of this project is to conserve and enhance the agricultural freshwater wetland and habitat diversity for avifauna and other freshwater wetland-dependent species in Long Valley. The effectiveness of the management practices is reflected by the utilization in the area by birds and the regular Bird Monitoring Programme gathers such data.

1.3. This report presents the results of the bird monitoring programme conducted in autumn 2008 and winter 08/09 (i.e. from September 2008 to February 2009).

2. Methodology

Transect Counts

2.1. The bird monitoring programme in both the core and northern parts of Long Valley was conducted by regular transect counts following routes shown in Figure 1, 2 and 3 in order to obtain comparable results and complete coverage of all farmlands in the shortest time. All birds encountered in the transects, including seen and heard, were recorded with the species (common) name and

[1] Division of Ecology and Biodiversity, School of Biological Sciences, The University of Hong Kong

field (i.e. farming plot) number, following Figure 1, 2 and 3, where the birds were located. Birds flying in the sky were also marked down but not allocated to any specific field. Bird calls heard which could not be exactly located to a field number was marked as 'Heard'. Transect count was also done in Ho Sheung Heung *feng-shui* wood area (Fig. 3). Surveys were separated into two parts: (1) The core part of Long Valley and (2) The northern part of Long Valley and Ho Sheung Heung *feng-shui* wood. Total surveying time for each of the two parts was maintained at about 3.0 hours and they were conducted simultaneously in the morning.

2.2. In this study, September, October and November were considered as autumn which is the main bird migration season while December, January and February were considered as winter. Surveys in the core part of Long Valley were done twice per week from Sep to Nov while surveys were conducted once per week in the northern part of Long Valley in that period. Surveys in both areas were done once per week from Dec to Feb. A total of 25 surveys were conducted for the whole area of Long Valley (38 surveys for the core part of Long Valley) as shown below:

2008 Sep: (2), 4, (9), 11, (16), 19, (23), 26, (29);
2008 Oct: 3, (7), 9, (14), 19, (21), 25, (28), 31;
2008 Nov: (4), 7, (11), 14, (18), 21, (25), 28;
2008 Dec: 3, 9, 16, 23, 30;
2009 Jan: 6, 13, 20, 30;
2009 Feb: 3, 10, 19, 24.

2.3. Each survey was conducted by two surveyors accredited by HKBWS. One surveyor covers the core part of Long Valley (Fig. 1) and the other surveys the northern part of Long Valley (Fig. 2) and the *feng-shui* wood at Ho Sheung Heung (Fig.3).

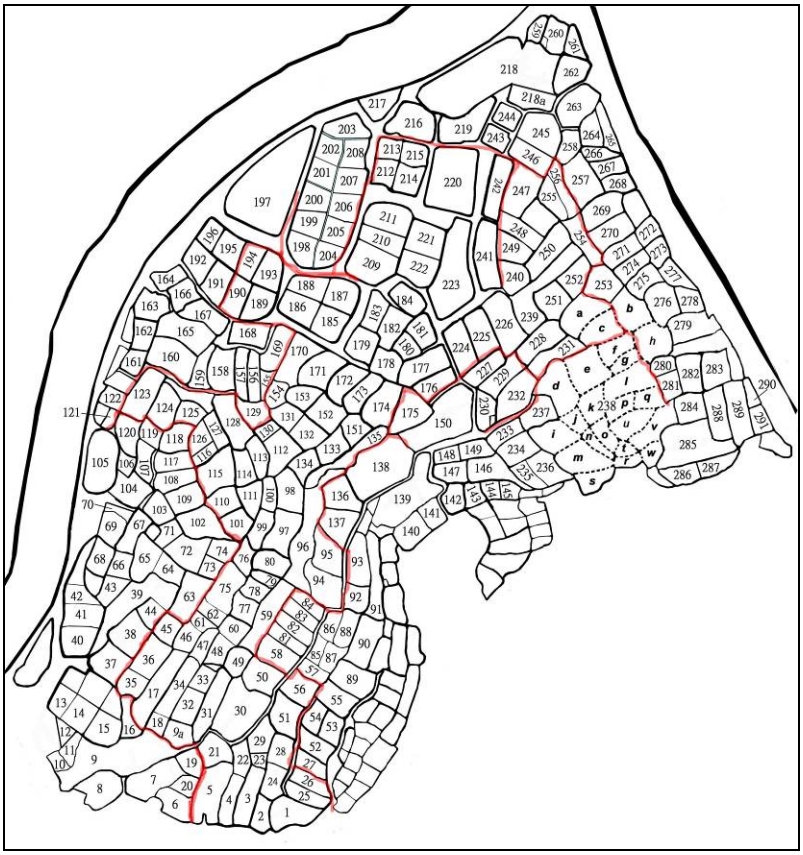


Figure 1. The transect (red line) and field numbers at the core part of Long Valley in this study.

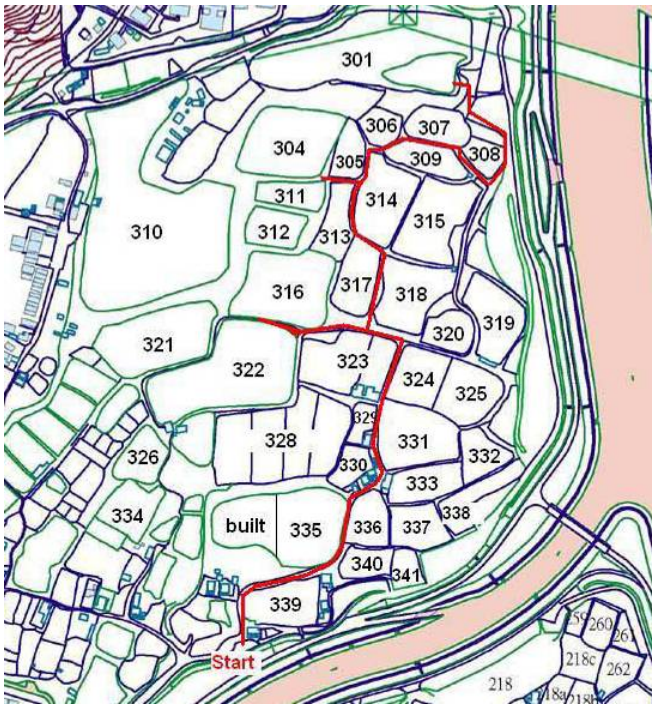


Figure 2. The transect (red line) and field numbers at the northern part of Long Valley in Ho Sheung Heung.

Figure 3. The transect (red line) at the Ho Sheung Heung *feng-shui* wood.

Statistical Analysis

2.4. Multidimensional scaling (nMDS) and Analysis of similarities (ANOSIM) will be used to define and test the differences in bird assemblages and abundance in the following groups: (1) between years; (2) between managed fields and unmanaged fields and (3) between habitats.

2.5. Similarity percentage (SIMPER) will be applied to calculate the contribution of individual species toward the differences in the bird communities in the following comparisons: (1) between years; (2) between managed fields and unmanaged fields and (3) between habitats.

2.6. Comparison of bird density between managed wet agricultural land and unmanaged wet agricultural land were done by nMDS and ANOSIM.

3. Results

Overview

3.1. The total numbers of birds recorded in the core part of Long Valley area from autumn 2008 to winter 08/09 fluctuated like in the previous two years. The peak counts in autumn 2008 and winter 08/09 were 744 on 25th October 2008 and 844 on 3rd December 2008 respectively. The lowest count in autumn 2008 was 275 on 11th September 2008 while that in winter 08/09 was 375 on 24th February 2009. In general, the total number increased from the beginning of autumn and reached the highest toward winter. The number then decreased toward the end of winter with some fluctuations. The pattern was rather similar to those in the last three years since the start of the monitoring programme (Table 1 and Fig. 11).

Table 1. Numbers in each count, monthly mean figures with SD of birds counted at the core part of Long Valley, autumn 2008 and winter 08/09 and the mean figures (with SD) in 2006 and 2007.

	Autumn 2008			Winter 08/09		
	September	October	November	December	January	February
Number of birds counted in each survey	423, 451, 349, 275, 360, 374, 337, 402, 330	470, 485, 443, 499, 608, 528, 744, 605, 485	436, 420, 409, 636, 540, 499, 390, 366	844, 757, 688, 559, 432	464, 524, 512, 396	490, 607, 678, 375
2008: Mean (SD)	367(53)	541(95)	458(96)	656(193)	474(58)	538(133)
2007: Mean (SD)	343(65)	499(88)	634(205)	504(69)	373(110)	407(104)
2006: Mean (SD)	352(76)	468(138)	561(94)	436(136)	470(83)	476(158)

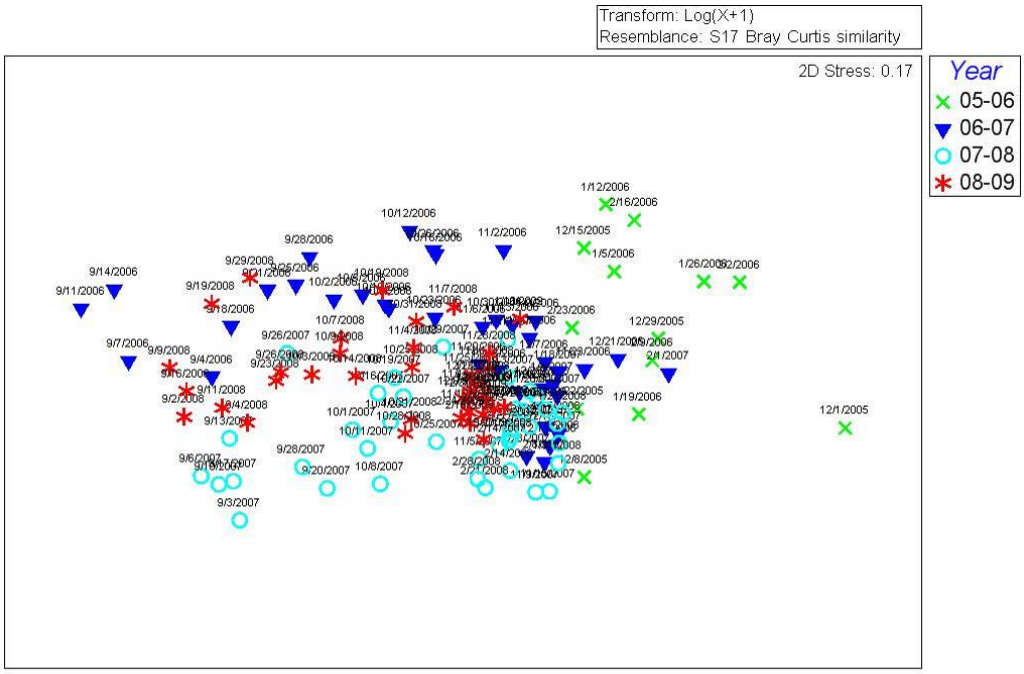


Figure 4. nMDS plot showing the comparison of bird communities in autumn and winter between 05/06, 06/07, 07/08 and 08/09.

3.2. Bird communities in core part of Long Valley in autumn and winter from 2005 to 2009 were compared using nMDS plot (Fig. 4). The bird assemblages are clustered into groups of different years in the plot. ANOSIM showed that there are significant differences between communities obtained in different years ($P<0.001$) which indicates there is significant difference on the species composition and abundance in autumns and winters from 05/06 to 08/09. The percentages of similarity of bird communities in autumn and winter between years range from 35 %to 42% (Table 2). However, it is not obvious that any particular species contributing to the dissimilarities between groups by SIMPER.

Table 2. Percentage of similarity of bird communities in core part of Long Valley between autumns and winters from 05/06 to 08/09 by SIMPER.

	05/06	**06/07**	**07/08**	**08/09**
05/06				
06/07	35			
07/08	39	36		
08/09	42	38	36	

3.3. The total numbers of birds recorded in the northern part of Long Valley also

fluctuated. The peak count in autumn 2008 was 197 on 4th September 2008 while that in winter 08/09 was 306 on 30th Jan. The lowest count in autumn 2008 was 90 on 20th September 2008 while that in winter 08/09 was 104 on 3rd December 2008. The number of birds counted fluctuated less obviously compared to that in the core part of Long Valley. The trend was generally gentle throughout autumn 2008 and winter 08/09 without significant peak. (Table 3 and Fig. 12).

Table 3. Number in each count, monthly mean figures with SD of birds counted in northern part of Long Valley, autumn 2008 and winter 08/09

	Autumn 2008			Winter 08/09		
	September	October	November	December	January	February
Number of birds counted in each survey	197, 135, 90, 196	164, 133, 156, 135, 154	174, 193, 144, 95	104, 120, 125, 170, 182	166, 166, 164, 306	179, 171, 108, 188
2008: Mean (SD)	155(52)	148(14)	152(43)	140(34)	201(70)	162(36)

3.4. For the *feng-shui* wood, the peak count in autumn 2008 was 103 on both 7th November 2008 and 28th November 2008 while the lowest count was 37 on 20th September 2008 (Table 4). The highest count in winter 08/09 was 175 on 10th February 2009 while the lowest was 49 on 30th December 2008. Bird abundance fluctuated throughout autumn and winter. It increased gently and reached the peak at mid-winter (i.e. the end of January and early February). The Shannon indexes of birds counted in the *feng-shui* wood were 2.04 (0.26) and 2.19 (0.19) in autumn 2008 and winter 08/09 respectively (Table 5).

Table 4. Number in each count, monthly mean figures with SD of birds counted in the Ho Sheung Heung *feng-shui* wood, autumn 2008 and winter 08/09.

	Autumn 2008			Winter 08/09		
	September	October	November	December	January	February
Number of birds counted in each survey	97, 50, 37, 97	69, 47, 39, 72, 74	103, 70, 56,103	64, 97, 75, 100, 49	58, 136, 59, 112	130,175, 83, 74
Mean (SD)	70(31)	60(16)	83(24)	77(22)	91(39)	116(47)

Table 5. Mean number of species and diversity indices (Shannon index) of birds counted in Ho Sheung Heung *feng-shui* wood, autumn 2008 and winter 08/09.

	Autumn 2008		Winter 08/09	
	No. of species	Index	No. of species	Index
Mean (SD)	13.1 (3.4)	2.04 (0.26)	15.5 (2.6)	2.19 (0.19)

Managed area

3.5. The surveyed area of the core part of Long Valley was 3,182,166 sq.ft. and that of the northern part of Long Valley was 1,020,889 sq.ft. Therefore, the total surveyed area is 4,203,056 sq.ft. The total area of agricultural fields in both parts of Long Valley managed by the HKBWS and the CA was gradually increasing in the current study period (Table 6).

Table 6. Total surveyed area of managed and unmanaged fields in the core and northern part of Long Valley by the HKBWS and CA in autumn 2008 and winter 08/09.

Months	Area of managed fields (sq. ft.)	Area of unmanaged fields (sq. ft.)	Total	% of fields managed
September	897,960	3,314,796	4,203,056	21.4
October	897,960	3,314,796	4,203,056	21.4
November	957,160	3,274,496	4,203,056	22.8
December	903,460	3,328,196	4,203,056	21.5
January	903,460	3,282,496	4,203,056	21.5
February	949,160	3,262,906	4,203,056	22.6

3.6. The mean bird density in managed fields in autumn 08 and winter 08/09 were 30.6 and 36.6 respectively, they were higher than that in the previous two years (Table 7). The ratio of mean bird density in managed fields to that in unmanaged fields of the same year reflected the utilization of managed fields by birds. The ratios of autumn 2006, 2007 and 2008 were 1.83, 0.94 and 3.78 respectively. The ratios of winter 06/07, 07/08 and 08/09 are 0.96, 1.46 and 3.30 respectively.

Table 7. Mean (SD) bird density (per 100,000 sq. ft.) in all managed and unmanaged fields and ratio of mean bird density in managed fields to that in unmanaged fields in autumn and winter from 2006 to 2009.

	Autumn 06	Winter 06/07	Autumn 07	Winter 07/08	Autumn 08	Winter 08/09

Managed fields	26.9 (12.1)	17.2 (8.1)	19.0 (9.5)	22.9 (11.4)	30.6 (9.7)	36.6 (13.1)
Unmanaged fields	14.7 (4.3)	18.0 (4.1)	20.3 (6.4)	15.7 (3.0)	8.1 (2.8)	11.1 (3.1)
Ratio	1.83	0.96	0.94	1.46	3.78	3.30

3.7. From the nMDS plot, bird assemblages recorded from the managed and unmanaged areas are clearly separated (Fig. 5). ANOSIM showed that the difference is significant (P<0.001). From SIMPER, the dissimilarity between bird assemblages in managed and unmanaged fields is 50%. SIMPER also showed that Wood Sandpiper (12.9%), Little Egret (7.7%) and Black-winged Stilt (7.3%) are typical species in managed area while Yellow Wagtail (7.4%) and Oriental Magpie Robin (5.6%) are typical species in unmanaged area due to their consistence presence in managed and unmanaged area respectively.

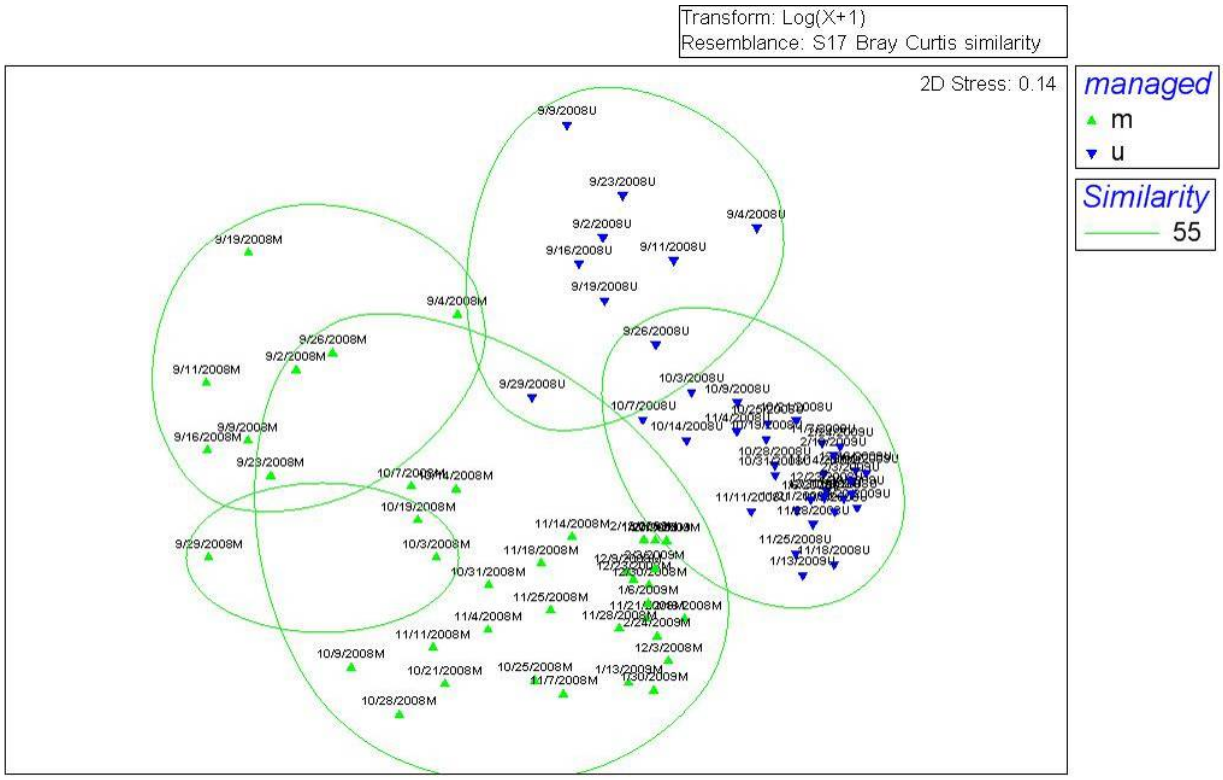


Figure 5. nMDS plot showing the bird assemblages recorded from managed and unmanaged fields.

3.8. Bird assemblages were clustered by nMDS plot according to different managed habitats, including fish pond (FP), shallow water habitat (SWH), wet agricultural land (WAL), water flea pond (WFP) and unmanaged fields (UM). It is shown that bird assemblages in different habitats are clearly separated (Fig. 6.

By ANOSIM, the bird assemblages between different habitats are significant different (P<0.001). From SIMPER, the dissimilarities between each type of habitat are all over 50% (Table 8). SIMPER show that Yellow-bellied Prinia (24.8%), Little Egret (14.4%) and Chinese Pond Heron (12.0%) are typical species in Fish Pond; Wood Sandpiper (28.6%), Common Snipe (15.0%) and Little Egret (11.2%) are typical species in Shallow Water Habitat; Wood Sandpiper (29.0%), Common Snipe (11.0%) and Scaly-breasted Munia (9.5%) are typical species in Wet Agricultural Land; Black-winged Stilt (78.1%), Little Egret (6.4%) and Common Sandpiper (3.4%) are typical species in Water Flea Pond; Lastly, Yellow Wagtail (7.6%), White Wagtail (6.5%) and Black-collared Starling (5.3%) are typical in Unmanaged Farmlands.

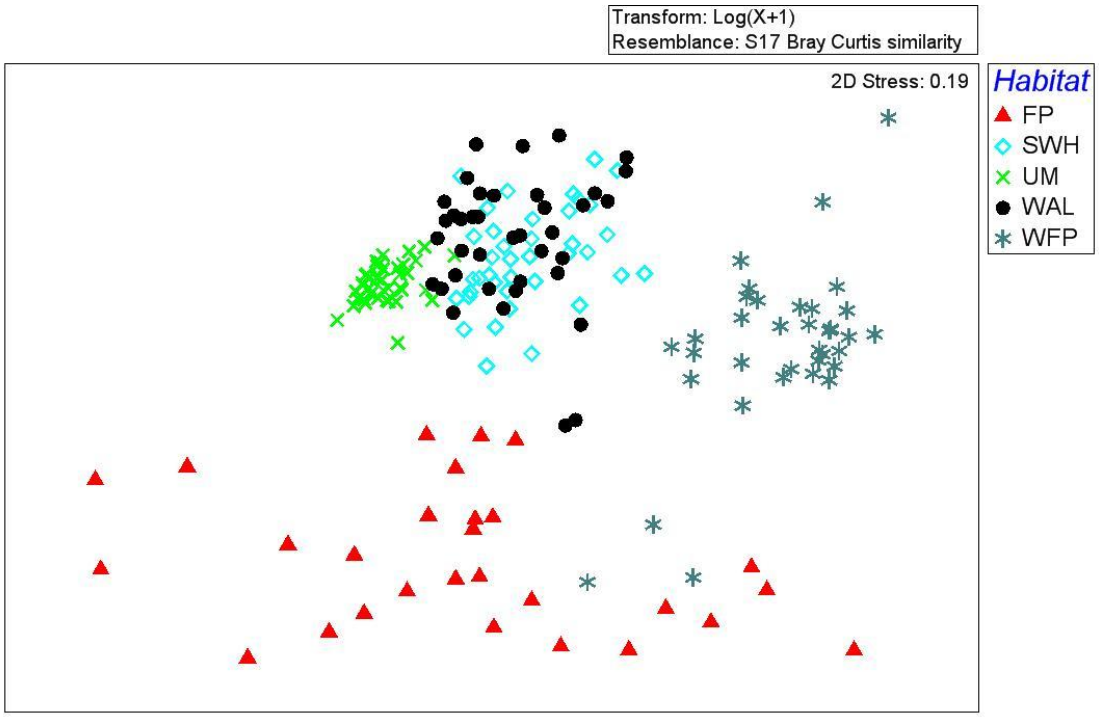


Figure 6. NMDS plot showing the bird assemblages recorded from different habitats. (FP: Fish Pond; SWH: Shallow Water Habitat; UM: Unmanaged fields; WAL: Wet Agricultural Land; WFP: Water Flea Pond)

Table 8. The dissimilarities of bird assemblages between each habitat type in autumn 2008 and winter 08/09.

	SWH	WFP	WAL	UM
SWH				
WFP	84.41			
WAL	59.21	85.65		
UM	68.76	92.16	67.56	
FP	88.06	92.01	88.63	88.08

Wet Agricultural Land (WAL)

3.9. In the current study period, the management practices of WAL fields were classified into two periods. Since Wet Agricultural Land (during migratory period) is also included in this session, the total area of managed fields of WAL fields is 210,560 sq. ft. from September 2008 to November 2008 while it is 156,860 sq. ft. from December 2008 to February 2009. (Table 9).

Table 9. Total area of managed WAL in the core and northern part of Long Valley in autumn 2008 and winter 08/09.

Months	Total area of managed fields (sq. ft.)
September	210,560
October	210,560
November	210,560
December	156,860
January	156,860
February	156,860

3.10. The management practice of WAL in autumn 2008 and winter 08/09 comprised of planting of Paddy Rice, Water Chestnut, Chinese Arrowhead, Water Caltrop, Water Lily and Lotus.

3.11. The mean bird density in the managed WAL in autumn 2008 is 37.4 (16.2) which is 334% higher than that in autumn 2007 while it is 748% higher than that in autumn 2006 (Table 10).

Table 10. Mean (SD) bird density (per 100,000 sq. ft.) in WAL and its control fields in autumn 2006-2008.

	Autumn 2006	Autumn 2007	Autumn 2008
Managed fields	5.0 (4.9)	11.2 (5.8)	37.4 (16.2)
Control fields	2.5 (2.5)	1.3 (2.0)	5.7 (3.2)

3.12. The mean bird density in the managed WAL in winter 08/09 is 41.6 (8.1) which is 359% higher than that in winter 07/08 while it is 457% higher than that in winter 06/07 (Table 11).

Table 11. Mean (SD) bird density (per 100,000 sq. ft.) in WAL and its control fields in winter 06/07 – 08/09.

	Winter 06/07	Winter 07/08	Winter 08/09
Managed fields	9.1 (6.2)	11.6 (12.8)	41.6 (12.8)
Control fields	4.0 (8.3)	2.3 (2.6)	8.1 (1.8)

3.13. The bird assemblages in the managed WAL and unmanaged WAL (Selected control fields) were compared and analyzed by nMDS plot (Fig. 7). The bird assemblages were clearly separated from the figure and ANOSIM showed that there is significant difference between these two bird communities (p = 0.001). By SIMPER, the typical species in managed WAL are Wood Sandpiper, Common Snipe with contributing percentage of 23% and 10% respectively; the typical species in unmanaged WAL are Yellow Wagtail, White Wagtail with contributing percentage of 41% and 21% respectively.

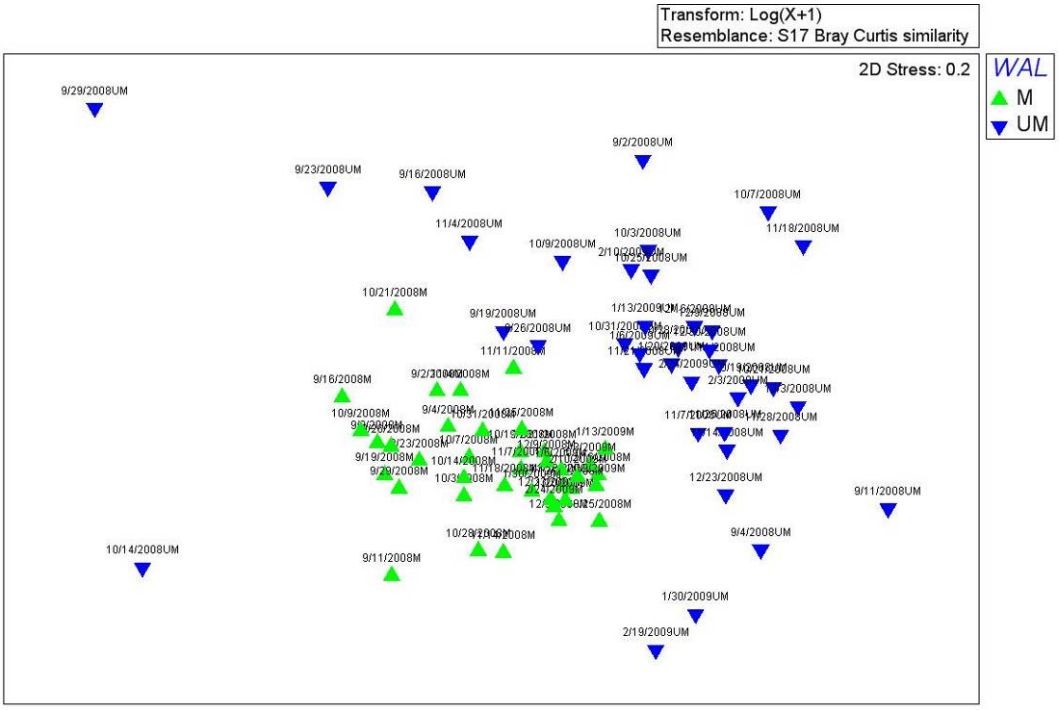


Figure 7. nMDS plot showing bird assemblages recorded from managed wet agricultural lands and unmanaged agricultural lands.

Shallow Water Habitat (SWH)

3.14. The management practice of different fields of SWH started in different months in the current study period (Table 12).

Table 12. Total area of managed SWH in the core and northern part of Long Valley in autumn 2008 and winter 08/09.

Months	Total area of managed fields (sq. ft.)
September	296,600
October	296,600
November	312,500
December	312,500
January	312,500
February	312,500

3.15. The management practice of SWH included water level maintenance, ploughing and weeding.

3.16. The mean bird densities recorded in managed SWH are 26.2 (SD = 14.2) and 28.0 (SD = 16.9) in autumn 2008 and winter 08/09 respectively. There were 336% and 570% increase in the mean bird density in managed SWH in autumn 2008 comparing to that in autumn 2006 and 2007 respectively (Table 13). There were 467% and 1217% increase in the mean bird density in managed SWH in winter 08/09 comparing to that in winter 06/07 and 07/08 respectively.

Table 13. Mean (SD) bird density (per 100,000 sq. ft.) in managed SWH in autumn 2006 – 2008 and winter 06/07 – 08/09.

	2006 (06/07 for winter)	2007 (07/08 for winter)	2008 (08/09 for winter)
Autumn	7.8 (5.5)	4.6 (4.9)	26.2 (14.2)
Winter	6.0 (6.7)	2.3 (1.7)	28.0 (16.9)

Fish Pond

3.17. The managed area of fish pond started in different months in the current study period, these practices included fish pond resumption and margin planting (Table 14).

Table 14. Total area of managed fish pond in the core and northern part of Long Valley in autumn 2008 and winter 08/09.

Months	Total area of managed fields (sq. ft.)
September	45,100
October	45,100
November	88,400
December	88,400
January	88,400

February	134,100

3.18. The mean bird densities in managed fishponds in autumn 2008 and winter 08/09 were about 5 to 8 times higher than that in spring and summer 2008 (Table 15).

Table 15. Mean (SD) bird density (per 100,000 sq. ft.) in managed fishponds from spring 2008 to winter 08/09

	Spring 2008	Summer 2008	Autumn 2008	Winter 08/09
Managed FP	1.1 (1.0)	1.6 (2.1)	11.2 (7.8)	24.9 (18.0)

Water flea pond

3.19. During the study period, five water flea ponds of total area 64,000 sq. ft. were managed. Water level management, fertilizers and fish stocking were done in this period.

3.20. It is shown that the mean bird density in managed water flea ponds recorded in autumn 2008 and winter 08/09 were the highest among three years, 2006 to 2008 (Table 16). It is also noted that the mean bird density in water flea ponds is generally higher in winter than in autumn (Table 16).

Table 16. Mean (SD) bird density (per 100,000 sq. ft.) in water flea ponds in autumn 2006 – 2008 and winter 06/07 – 08/09.

	2006 (06/07 for winter)	2007 (07/08 for winter)	2008 (08/09 for winter)
Autumn	4.9 (2.4)	4.9 (2.5)	26.1 (19.1)
Winter	5.4 (2.7)	4.3 (2.1)	35.6 (17.8)

4. Discussion

4.1. The trend of bird abundance in the core part of Long Valley in autumn 2008 and winter 08/09 were similar to those in the previous two years as the numbers increased steadily from early autumn (i.e. September) and reached the peak in early winter (Fig. 8). The trend started to drop after the peak and towards February. Migrants and winter visitors started to pass through or reach Long Valley from early autumn and it explains the increasing number of birds recorded in Long Valley. However, the trend in the northern part of Long Valley was less fluctuating than that in the core part and was

comparatively gentler without significant peak (Fig. 9). It is probably because the area of the agricultural lands in the northern part is much smaller than in the core part where fewer migrants would utilize the northern part, so that the number of wintering birds did not out-number the residential birds. Though a high count was obtained on 30th Jan 2009 in the northern part of Long Valley, it was considered as an exceptional case as the fish ponds were drained on that day which attracted a lot of egrets to prey on the trapped fish (Fig. 9). It was not considered to be related to the seasonal variation of bird abundance.

4.2. In early December, the total number of birds recorded in the core part of Long Valley was exceptionally high. There were 844, 757 and 688 birds recorded on 3rd, 9th and 16th December respectively (Refer to Appendix 2). A possible reason was that a cold spell which brought more migrants and visitors, including Black-browed Reed Warbler *Acrocephalus bistrigiceps*, Cinnamon Bittern *Ixobrychus cinnamomeus*, to the core part of Long Valley. And water drainage was undertaken in certain fish ponds in the core part of Long Valley, this attracted more waterbirds by providing good foraging habitats. Large number of Little Egret *Egretta garzetta*, Chinese Pond Heron *Ardeola bacchus* were recorded.

4.3. The bird assemblages in autumn and winter between 05/06, 06/07, 07/08 and 08/09 are significantly different (Fig. 4). From the result of SIMPER, there are several species which become more abundant in Long Valley as there are increasing trends on their contributing percentage to the similarity percentage increases. These species includes Wood Sandpiper and Little Ringed Plover which are our target species of the management. This indicates that management practises are effective to attract more of these species.

4.4. By nMDS plot, the bird assemblages between managed and unmanaged fields are spatially separated and there are significant different by ANOSIM (Fig. 5). SIMPER showed that three target species, Wood Sandpiper, Little Egret and Black-winged Stilt are typical species in managed area which contribute 12.9%, 7.7% and 7.3% respectively, while Yellow Wagtail and Oriental Magpie Robin are typical species in unmanaged area. This implies that current management practises are effective and essential in attracting these target species.

4.5. The mean value of bird abundance in the *feng-shui* wood is 70 (SD = 24) in autumn and 93 (SD = 37) in winter (Refer to Appendix 4). More birds and bird species were recorded during the winter than in autumn. It is likely because of the arrival and staying of wintering birds such as warblers, flycatchers and thrushes. In this autumn and winter, most of the birds recorded in FSW were common birds which could also be found in urban area, e.g. Chinese Bulbul *Pycnonotus sinensis*, Common Tailorbird *Orthotomus sutorius*, Eurasian Tree Sparrow *Passer montanus*, Japanese White-eye *Zosterops japonicus*, Oriental Magpie Robin *Copsychus saularis,* Red-whiskered Bulbul *Pyxcnonotus jocosus* and Spotted Dove *Strepopelia chinensis*. However, the attractiveness of the *feng-shui* wood to birds appears weak as the diversity of woodland-dependent species was not high. The management practice i.e. planting tree seedlings is not yet effective as the tree seedlings were only planted in April 2007 by the CA. The management effect would unlikely be apparent before the canopy of the planted area is formed, which means more than 10 years from now if the planting site will not be burned in the future. Prolonged monitoring is needed to evaluate the ecological value of the regenerating *feng-shui* wood and its attractiveness to birds.

4.6. The bird density in managed fields in autumn 08 and winter 08/09 were higher than that in the two previous years (Table 7). And by calculating the ratio of mean bird density in managed fields to that in unmanaged fields, it showed that birds were more concentrated in managed fields than in unmanaged fields in both autumn 2008 and winter 08/09 when compare to those in autumn 2006 and 2007 and winter 06/07 and 07/08 respectively. Furthermore, the different typical species shown by SIMPER further showed that the management practises in managed fields were effective in attracting target bird species including Wood Sandpiper, Little Egret and Black-winged Stilt.

4.7. Bird assemblages were tested to be different in different habitat types including fish pond, shallow water habitat, wet agricultural land, water flea pond and unmanaged fields by ANOSIM (Fig. 6). For example, majority of Black-winged Stilts in Long Valley were founding Water Flea Pond. This implied that maintaining diversity of managed habitat types in Long Valley is beneficial in enhancing its bird diversity. With increasing information on habitat utilization of birds in the future, the proportions of managed habitat types can be adjusted to raise the capacity for target species.

4.8. The bird densities in managed wet agricultural lands were much higher in autumn 2008 and winter 08/09 than those in previous years (Table 10 and 11). Also, it was found that the bird assemblages in managed wet agricultural lands was significantly different from that in unmanaged wet agricultural lands in autumn 2008 and winter 08/09 by applying ANOSIM test (Fig. 7). SIMPER showed that Wood Sandpiper, Yellow Wagtail, Little Egret, Common Snipe and Chinese Pond Heron contributed the difference the most. By looking into the trends of these species recorded from January 2005 to February 2009, it was found that Chinese Pond Heron, Little Egret and Wood Sandpiper were particularly more abundant in autumn 2008 and winter 08/09 compared to the previous years (Refer to Appendix 5). These species were considered to be contributing to the high bird density in managed wet agricultural lands and shallow water habitats. They were also found to be more concentrated in the managed fields than in unmanaged fields.

4.9. The bird density in managed water flea ponds in autumn 2008 and winter 08/09 were apparently higher than the previous two years (Table 16). A possible reason was that there were exceptional high number of Black-winged Stilt occurred in Long Valley and mainly inhabited in water flea ponds in autumn 2008 and winter 08/09 (Refer to 4.11).

4.10. In the surveys on 31st October 2008, a total of 45 Black-winged Stilt were recorded which is the highest count of this species since the regular bird survey started in 2006. In previous years, the year highest counts of Black-winged Stilt were 38 on 14th September 2006 and 8 on 9th November 2007. Over 90% of these individuals were found in managed fields especially the water flea ponds. In previous years when managed water flea ponds were planted with Water Chestnut and Chinese Arrow-head, the number of Black-winged Stile recorded is low. In summer 2008, most of the crops died due to heavy rainfall and then a high number of Black-winged Stilt was recorded. It is believed that the number of Black-winged Stilt utilizing the water flea pond is correlated with the presence/absence of these crops. This finding is good for the future management of water flea ponds.

4.11. There are some notable sightings recorded in autumn 2008 and winter 08/09. They includes:

Citrine Wagtail *Motacilla citreola*

A scarce passage migrant and winter visitor which favours freshwater marsh area. One sighting was recorded on 25th October, 28th October, 31st October, 14th November, 18th November, 21st November, 3rd December, 9th December, 30th December, 3rd January, 13th January, 3rd February, 24th February and two sightings was recorded on 16th December. These sightings were possibly from the same individual which spent the winter in Long Valley.

Black-faced Spoonbill *Platalea minor*

A globally threatened species listed as Endangered by BirdLife International and a common winter visitor and scarce summer visitor to Deep Bay. Two individuals were seen foraging in field 223 on 8th December which was drained at that time. This is the first record of this species in Long Valley.

Grey-tailed Tattler *Heteroscelus brevipes*

A passage migrant which is common in spring, scarce in autumn and rare in summer. One sighting was seen on 29th September in a managed shallow water habitat field 124, which is a first record in Long Valley.

Willow Warbler *Phylloscopus trochilus*

A photo of an individual was taken in Long Valley by a bird photographer. This is the first record for this species in Hong Kong.

Yellow-crested Cockatoo *Cacatua sulphurea*

A common resident on northern Hong Kong Island. This species is listed in Category D which indicated this species is introduced. One sighting of this species was made on 30th December and 13th January which very probably belongs to the same bird. This is the first record of this species in Long Valley.

Kentish Plover *Charadrius alexandrinus*

An abundant winter visitor with small numbers on passages. This species favours intertidal mudflat, for example mudflat in Deep Bay and was rarely seen in Long Valley. One individual was seen on 19th October in a managed shallow water habitat field 124.

Pheasant-tailed Jacana *Hydrophasianus chirurgus*

A Scarce passage migrant, mainly in autumn. One sighting was recorded on 25th October in a managed shallow water habitat field 226.

4.13. Figure 10 to 16 showed the distribution map of different bird groups in the core and northern part of Long Valley during the study period. Managed wetland habitats, i.e. water flea ponds, WAL and SWH could effectively attract waders. The number of *Gallinago* sp., in northern part of Long Valley is very low and they were attracted to managed WAL and SWH in the core part of Long Valley. Besides managed SWH, Ardeids' utilization of the mitigation wetland managed by AFCD is also high. Wagtails and pipits were attracted to active conventional agricultural fields. The habitat preference of Common Stonechat could not be detected in which the result is similar to that in previous study period i.e. spring and summer 2008. The distribution of Greater Painted Snipe is slightly different from that recorded in pervious study period. This species is more widely spread in spring and summer and congregated in autumn and winter. This may due to their behavioural difference between seasons. Since spring and summer are breeding season, they nest separately. While in autumn and winter, Greater Painted Snipes aggregate in which the number could go up to more than a dozen. This can explain the distributional difference between seasons.

Reference

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 Bird Watching Society, Hong Kong.

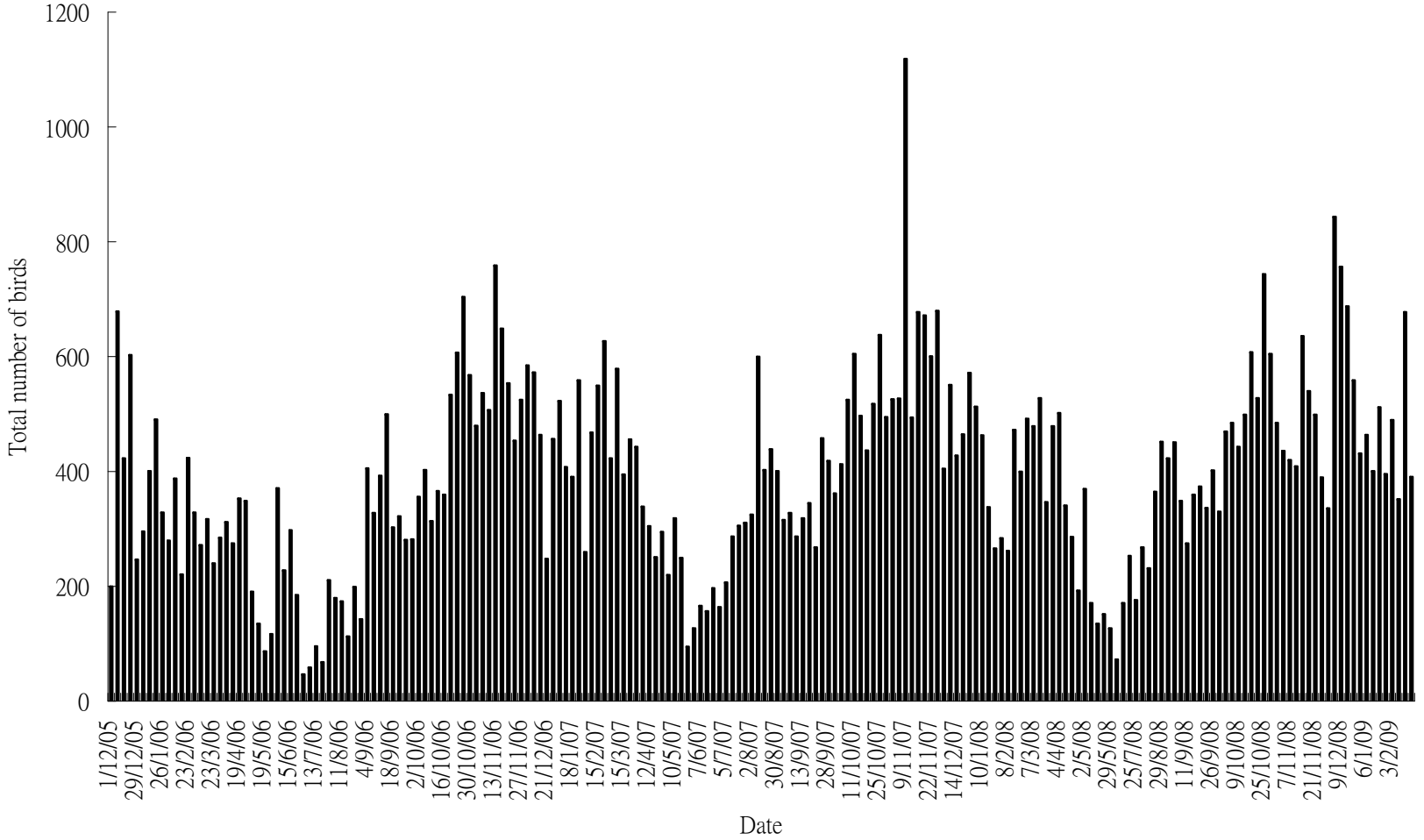


Figure 8. Total numbers of birds recorded in the core part of Long Valley from December 2005 to February 2009.

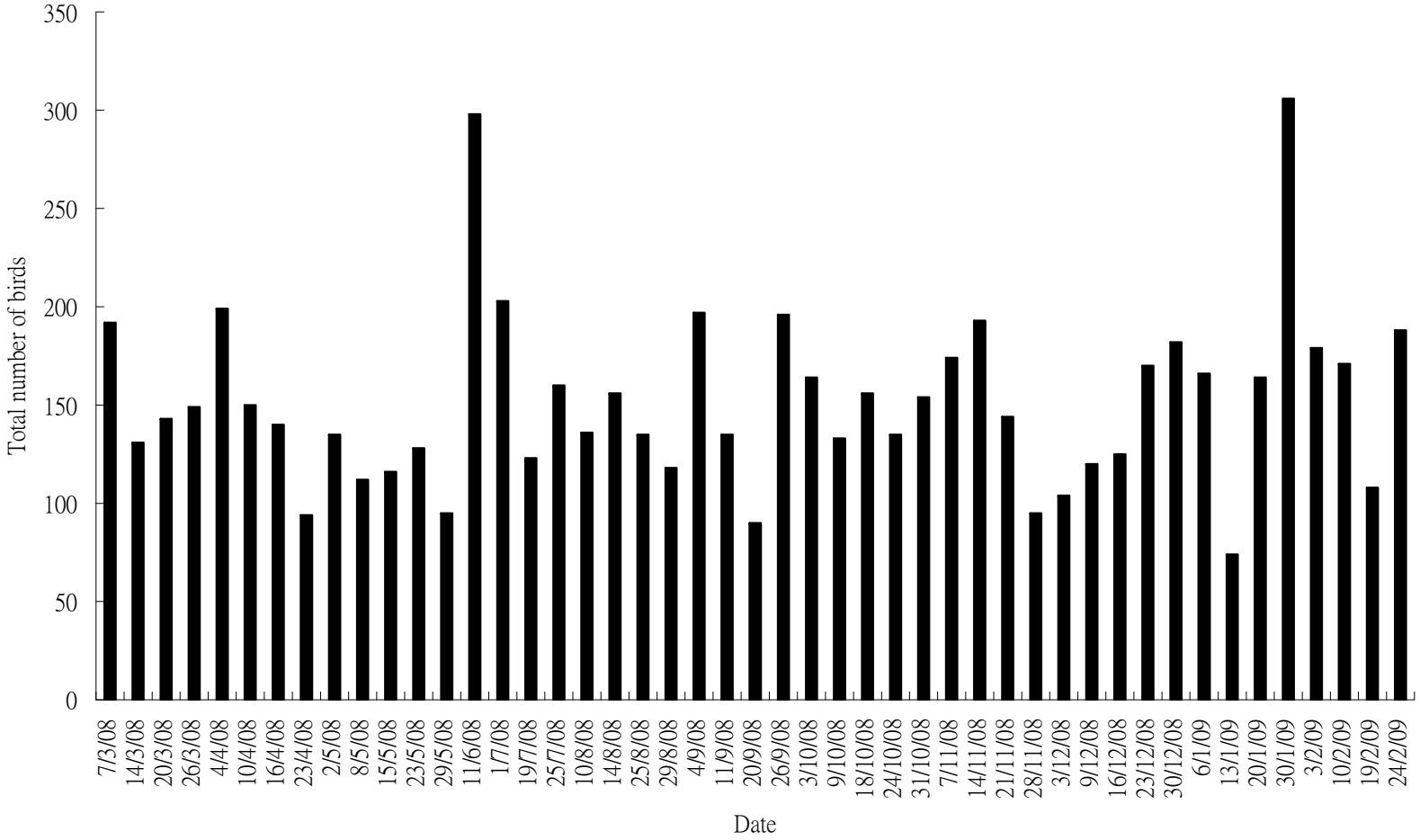


Figure 9. Total number of birds recorded in the northern part of Long Valley from March 2008 to February 2009.

Appendix 1. Total number, number of species and diversity indices (Shannon index) of birds counted in the core part of Long Valley, Autumn 2006, 2007 and 2008.

autumn 2006				autumn 2007				autumn 2008			
Date	Total no.	No. of species	Index	Date	Total no.	No. of species	Index	Date	Total no.	No. of species	Index
4 Sep	406	32	2.87	3 Sep	312	33	3.11	2 Sep	423	34	3.02
7 Sep	328	26	2.67	6 Sep	323	38	2.99	4 Sep	451	37	2.92
11 Sep	393	23	2.37	10 Sep	286	34	3.00	9 Sep	349	29	2.66
14 Sep	500	31	2.56	13 Sep	313	37	3.20	11 Sep	275	33	2.83
18 Sep	303	36	3.04	17 Sep	338	40	3.00	16 Sep	360	29	2.54
21 Sep	321	35	2.81	20 Sep	266	37	3.07	19 Sep	374	35	2.58
25 Sep	281	31	2.89	26 Sep	454	40	2.91	23 Sep	337	34	2.89
28 Sep	282	32	2.86	28 Sep	416	41	2.81	26 Sep	402	39	2.76
2 Oct	356	43	2.95	1 Oct	362	37	3.02	29 Sep	330	31	2.65
5 Oct	403	37	2.92	4 Oct	413	46	3.04	3 Oct	470	40	2.78
9 Oct	314	35	3.09	8 Oct	525	45	3.19	7 Oct	485	40	2.89
12 Oct	366	34	2.71	11 Oct	599	45	2.97	9 Oct	443	41	2.90
16 Oct	349	33	2.74	16 Oct	497	39	2.74	14 Oct	499	45	3.08
19 Oct	534	35	2.88	19 Oct	437	38	2.67	19 Oct	608	40	2.79
23 Oct	593	42	2.86	22 Oct	518	42	3.03	21 Oct	528	51	3.23
26 Oct	704	43	2.71	25 Oct	636	43	2.94	25 Oct	744	49	2.99
30 Oct	568	41	2.93	29 Oct	493	41	2.91	28 Oct	605	51	2.87
2 Nov	478	33	2.55	1 Nov	526	46	3.00	31 Oct	485	39	2.94
6 Nov	536	45	2.83	5 Nov	526	50	3.14	4 Nov	436	46	3.10
9 Nov	504	48	2.98	9 Nov	1089	60	2.94	7 Nov	420	45	3.12
13 Nov	756	46	2.71	13 Nov	494	47	3.21	11 Nov	409	41	3.02
16 Nov	641	47	2.89	15 Nov	665	46	2.94	14 Nov	636	46	3.03
20 Nov	554	47	3.10	19 Nov	380	42	4.16	18 Nov	540	47	3.05
23 Nov	449	38	2.82	22 Nov	601	50	3.12	21 Nov	499	47	3.12
27 Nov	525	42	2.82	26 Nov	680	50	3.08	25 Nov	390	41	3.14
30 Nov	585	38	2.58	28 Nov	405	37	2.97	28 Nov	336	42	2.99
Mean	463	37	2.81		483	42	3.04		455	40	2.92
(SD)	(133)	(7)	(0.17)		(171)	(6)	(0.26)		(109)	(6)	(0.18)

Appendix 2. Total number, number of species and diversity indices (Shannon index) of birds counted in the core part of Long Valley, winter 06/07, 07/08 and 08/09.

winter 06/07				winter 07/08				winter 08/09			
Date	Total no.	No. of species	Index	Date	Total no.	No. of species	Index	Date	Total no.	No. of species	Index
1 Dec	200	25	2.32	06 Dec	551	49	3.131	3 Dec	844	48	2.78
8 Dec	623	46	3.15	14 Dec	428	44	3.201	9 Dec	757	47	2.81
15 Dec	464	50	3.30	21 Dec	465	42	3.13	16 Dec	688	48	3.05
21 Dec	243	42	3.14	27 Dec	572	45	2.969	23 Dec	559	46	3.12
28 Dec	457	43	3.08	03 Jan	513	45	2.941	30 Dec	432	44	3.24
4 Jan 07	394	36	2.82	10 Jan	463	48	3.27	6 Jan	464	42	3.14
11 Jan	408	45	3.08	17 Jan	338	43	3.101	13 Jan	524	43	2.64
18 Jan	391	42	3.02	24 Jan	266	39	3.169	20 Jan	512	40	2.84
25 Jan	558	44	2.80	31 Jan	284	40	3.136	30 Jan	396	39	3.11
1 Feb	260	31	2.53	08 Feb	262	33	3.089	3 Feb	490	45	3.16
8 Feb	466	40	3.07	14 Feb	473	40	3.028	10 Feb	607	41	2.52
15 Feb	550	44	2.91	21 Feb	400	47	3.405	19 Feb	678	48	2.91
23 Feb	624	45	2.86	28 Feb	492	42	2.956	24 Feb	375	49	3.22
Mean	434	41	2.9		423	43 (4.3)	3.1		564	44	3.0
(SD)	(138)	(6.9)	(0.27)		(106)		(0.13)		(143)	(3.3)	(0.23)

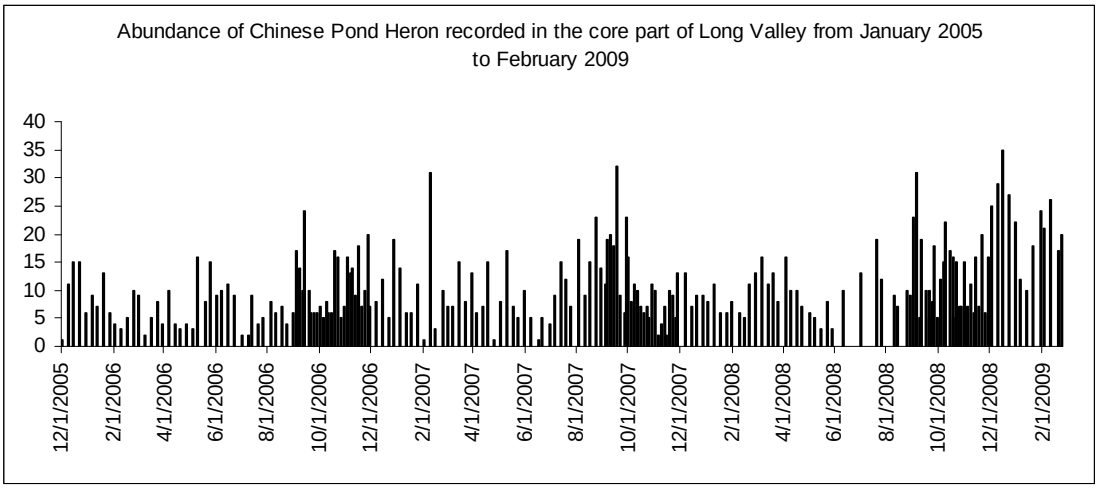
Appendix 3. Total number, number of species and diversity indices (Shannon index) of birds counted in the northern part of Long Valley, autumn 2008.

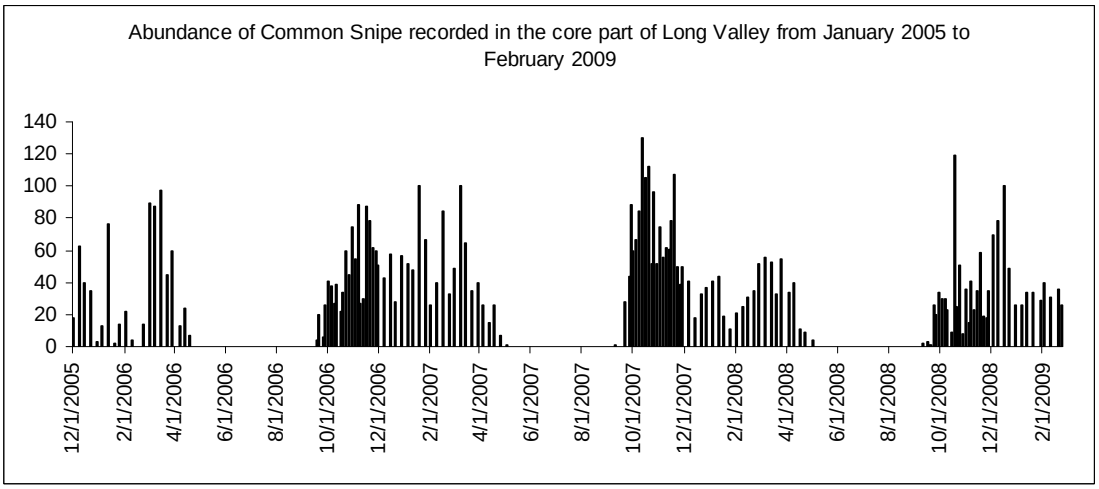
Autumn 2008				Winter 08/09			
Date	Total no.	No. of species	Index	Date	Total no.	No. of species	Index
4 Sep	197	40	3.272	3 Dec	104	30	3.036
11 Sep	135	24	2.308	9 Dec	120	34	3.271
20 Sep	90	22	2.817	16 Dec	125	29	3.073
26 Sep	196	37	3.023	23 Dec	170	37	3.3
3 Oct	164	31	2.86	30 Dec	182	39	3.142
9 Oct	133	31	3.139	6 Jan	166	33	3.146
18 Oct	156	33	3.156	13 Jan	74	21	2.763
24 Oct	135	35	3.251	20 Jan	164	35	3.034
31 Oct	154	40	3.314	30 Jan	306	41	2.768
7 Nov	174	36	3.163	3 Feb	179	36	3.241
14 Nov	193	40	3.363	10 Feb	171	47	3.45
21 Nov	144	43	3.345	19 Feb	108	35	3.146
28 Nov	95	30	3.068	24 Feb	188	41	3.352
Mean (SD)	151 (34.6)	34 (6.3)	3.08 (0.3)		158 (57.2)	35.2 (6.4)	3.13 (0.2)

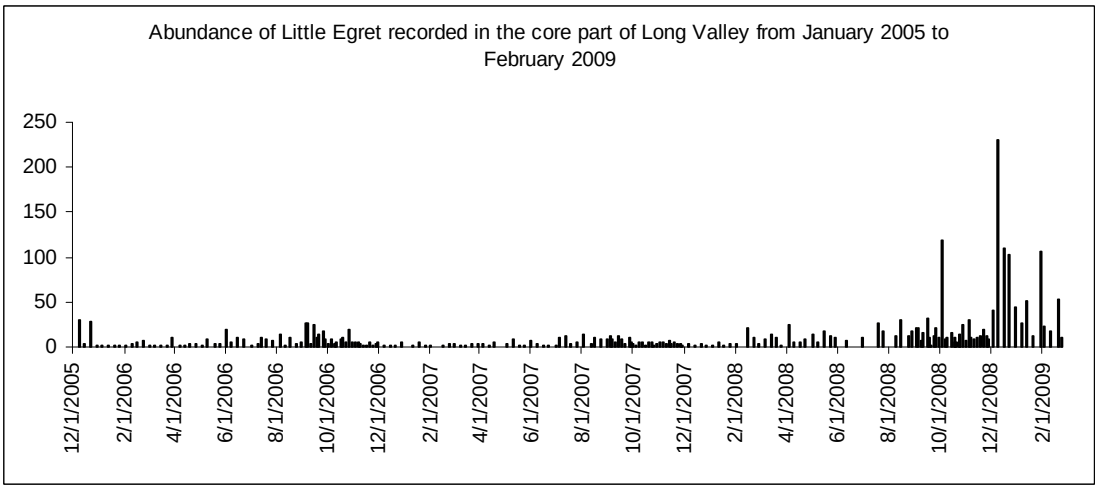
Appendix 4. Total number, number of species and diversity indices (Shannon index) of birds counted in the *feng-shui* wood in northern part of Long Valley, spring and summer 2008.

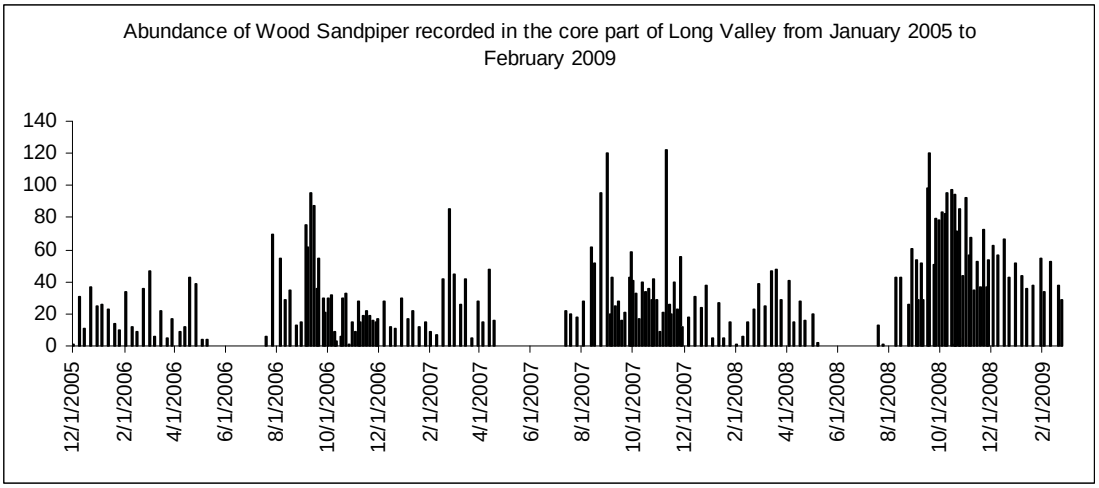
Autumn 2008				Winter 08/09			
Date	Total no.	No. of species	Index	Date	Total no.	No. of species	Index
4 Sep	97	14	2.134	3 Dec	64	14	2.386
11 Sep	50	10	2.002	9 Dec	97	14	2.146
20 Sep	37	9	1.574	16 Dec	75	14	2.266
26 Sep	97	12	1.823	23 Dec	100	18	2.18
3 Oct	69	9	1.786	30 Dec	49	9	1.668
9 Oct	47	12	1.984	6 Jan	58	15	2.367
18 Oct	39	13	2.185	13 Jan	136	18	2.12
24 Oct	72	9	1.878	20 Jan	59	15	2.294
31 Oct	74	13	2.042	30 Jan	112	17	2.212
7 Nov	103	15	1.99	3 Feb	130	19	2.422
14 Nov	70	17	2.32	10 Feb	175	18	2.019
21 Nov	56	18	2.503	19 Feb	83	16	2.199
28 Nov	103	19	2.362	24 Feb	74	15	2.187
Mean (SD)	70 (24)	13.1 (3.4)	2.04 (0.26)		93 (37)	15.5 (2.6)	2.19 (0.19)

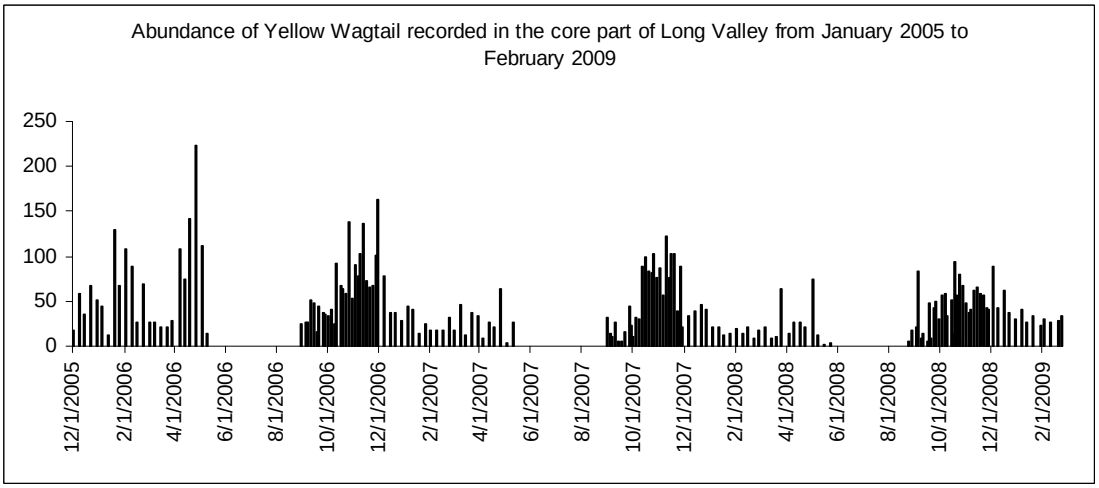
Appendix 5. Abundance of top five species recorded from January 2005 to February 2009 which contributed the most in the SIMPER test for wet agricultural land and shallow water habitat.








Abundance of Wood Sandpiper recorded in the core part of Long Valley from January 2005 to February 2009
140
120
100
80
60
40
20
0
12/1/2005
2/1/2006
4/1/2006
6/1/2006
8/1/2006
10/1/2006
12/1/2006
2/1/2007
4/1/2007
6/1/2007
8/1/2007
10/1/2007
12/1/2007
2/1/2008
4/1/2008
6/1/2008
8/1/2008
10/1/2008
12/1/2008
2/1/2009


Abundance of Yellow Wagtail recorded in the core part of Long Valley from January 2005 to February 2009
250
200
150
100
50
0
12/1/2005
2/1/2006
4/1/2006
6/1/2006
8/1/2006
10/1/2006
12/1/2006
2/1/2007
4/1/2007
6/1/2007
8/1/2007
10/1/2007
12/1/2007
2/1/2008
4/1/2008
6/1/2008
8/1/2008
10/1/2008
12/1/2008
2/1/2009

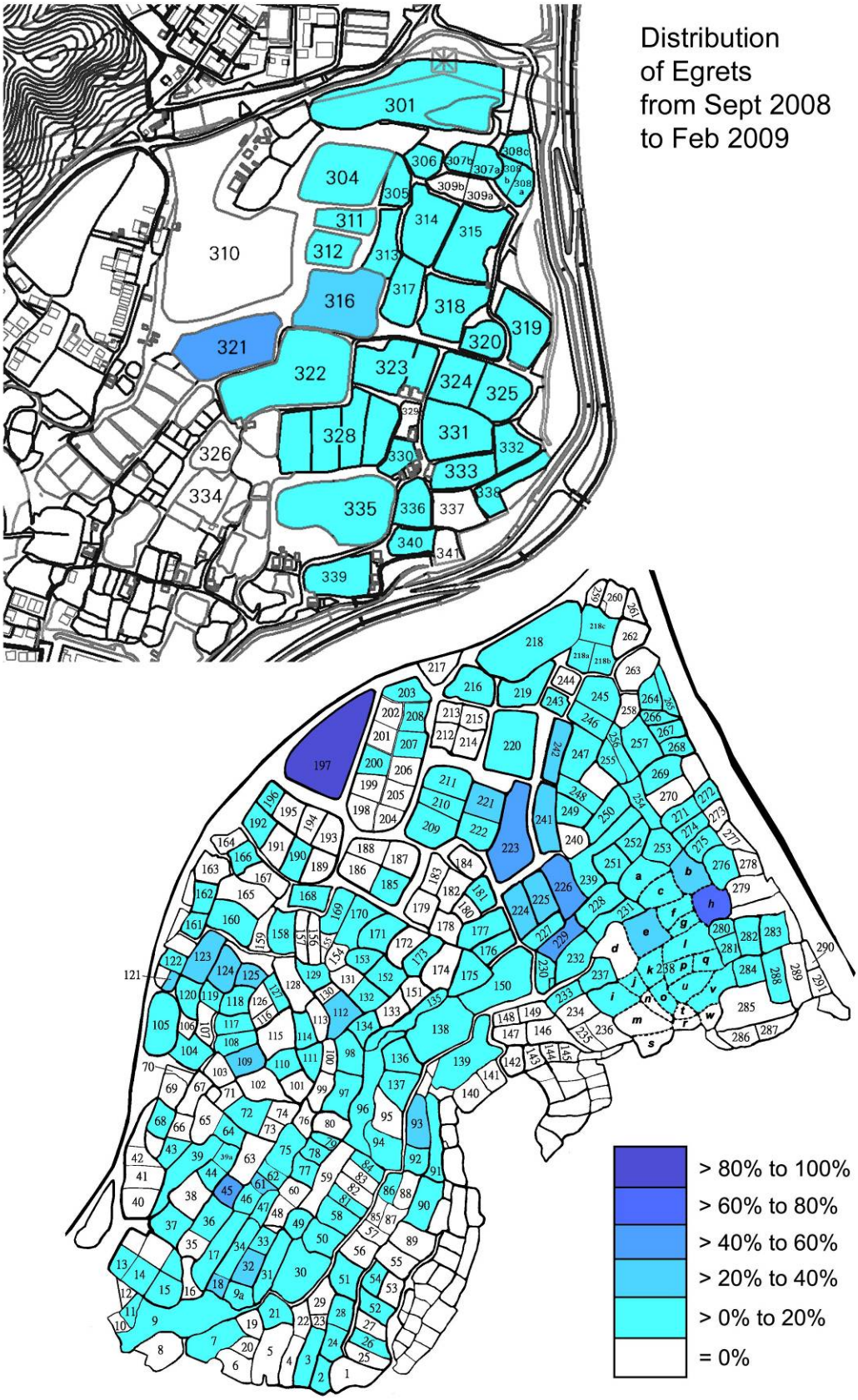


Figure 10. Distribution map of Ardeids in the core and northern part of Long Valley during autumn 2008 and winter 08/09.

Figure 11. Distribution map of *Gallinago* sp. in the core and northern part of Long Valley during autumn 2008 and winter 08/09.

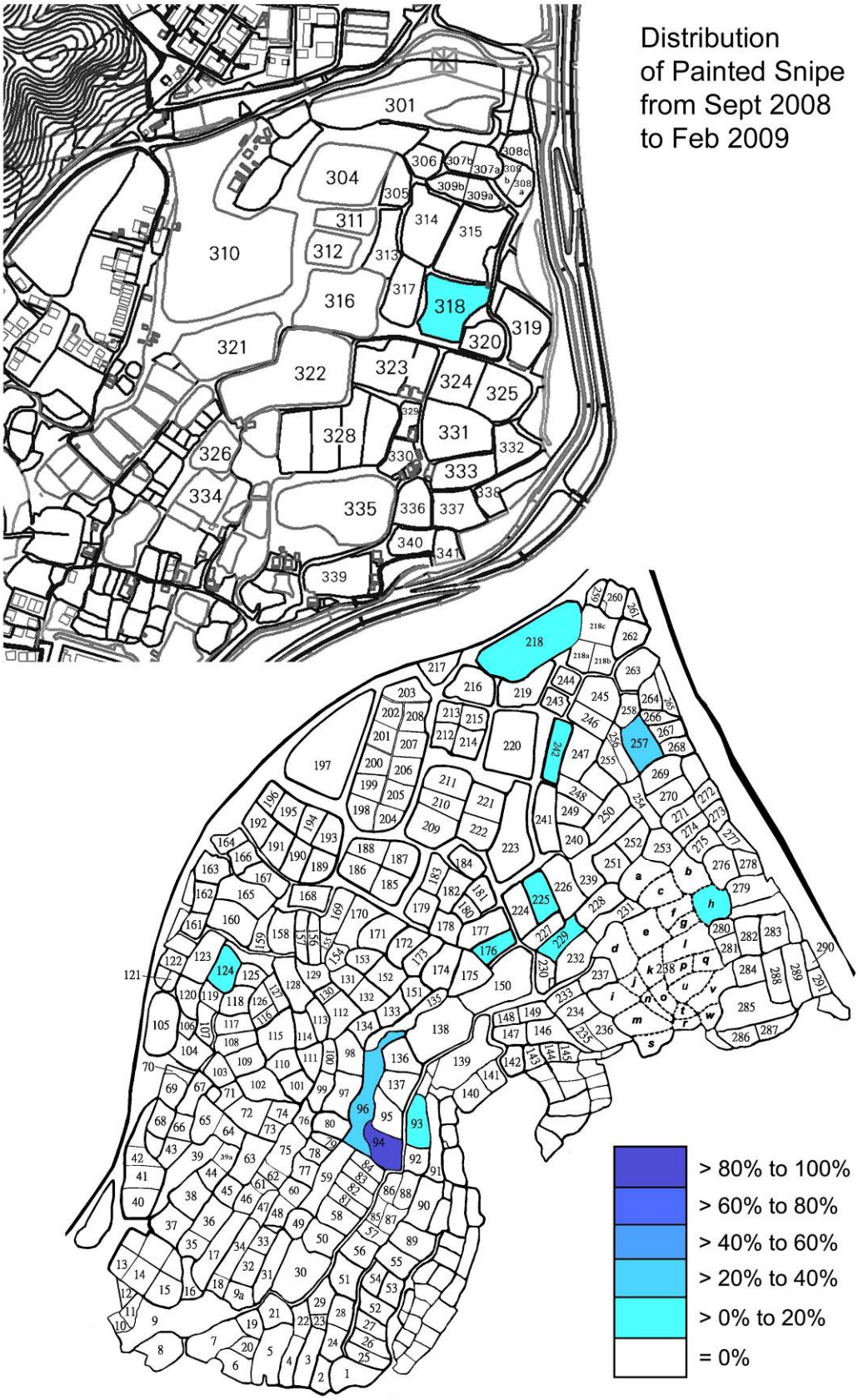


Figure 12. Distribution map of Greater Painted Snipe in the core and northern part of Long Valley during autumn 2008 and winter 08/09.

Figure 13. Distribution map of waders in the core and northern part of Long Valley during autumn 2008 and winter 08/09.

Figure 14. Distribution map of wagtails in the core and northern part of Long Valley during autumn 2008 and winter 08/09.

Figure 15. Distribution map of pipits in the core and northern part of Long Valley during autumn 2008 and winter 08/09.

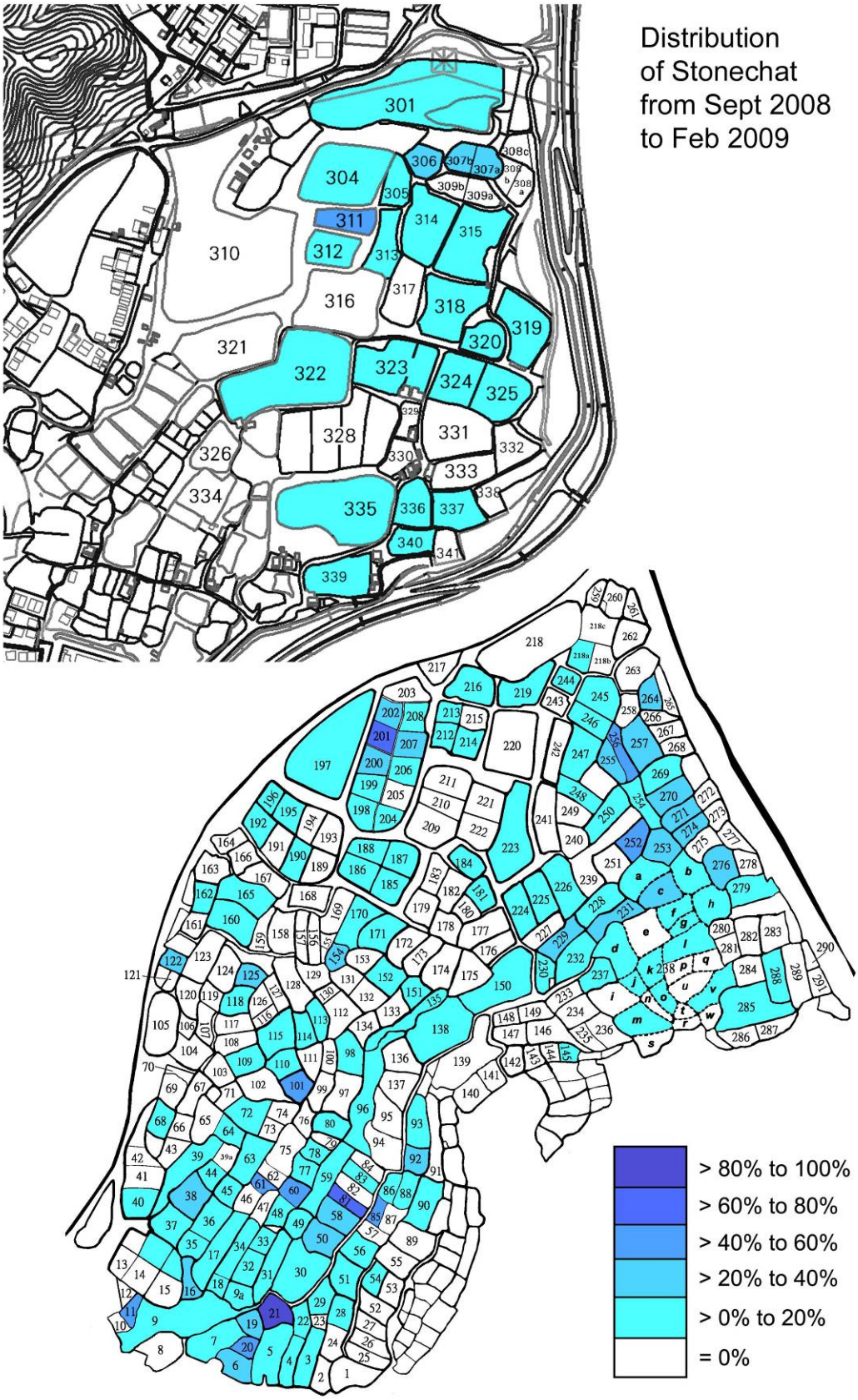


Figure 16. Distribution map of Common Stonechat in the core and northern part of Long Valley during autumn 2008 and winter 08/09.

Appendix 6. Table showing the species list and the average abundance (number of count per survey) of each species recorded in the core area of Long Valley

Common Name	Total Count	Average Abundance
Arctic Warbler	1	0.03
Asian Barred Owlet	2	0.05
Barn Swallow	26	0.67
Besra	3	0.08
Black Drongo	106	2.72
Black Kite	19	0.49
Black-browed Reed Warbler	11	0.28
Black-collared Starling	252	6.46
Black-crowned Night Heron	6	0.15
Black-faced Bunting	8	0.21
Black-headed Bunting	1	0.03
Black-winged Stilt	172	4.41
Bluethroat	21	0.54
Bright-capped Cisticola	2	0.05
Bunting sp.	6	0.15
Cattle Egret	86	2.21
Chestnut-eared Bunting	4	0.10
Chinese Bulbul	64	1.64
Chinese Pond Heron	339	8.69
Cinnamon Bittern	2	0.05
Citrine Wagtail	16	0.41
Collared Crow	9	0.23
Common Blackbird	14	0.36
Common Buzzard	15	0.38
Common Greenshank	5	0.13
Common Kingfisher	31	0.79
Common Koel	13	0.33
Common Magpie	33	0.85
Common Moorhen	22	0.56
Common Myna	14	0.36
Common Sandpiper	53	1.36
Common Snipe	353	9.05
Common Stonechat	312	8.00
Common Tailorbird	19	0.49
Common Teal	18	0.46
Crested Myna	204	5.23
Crested Serpent Eagle	1	0.03
Daurian Redstart	3	0.08

Common Name	Total Count	Average Abundance
Dusky Warbler	279	7.15
Eastern Marsh Harrier	1	0.03
Eurasian Hobby	3	0.08
Eurasian Tree Sparrow	41	1.05
Eurasian Wigeon	1	0.03
Eurasian Wryneck	1	0.03
Great Cormorant	4	0.10
Great Egret	43	1.10
Great Tit	1	0.03
Greater Coucal	9	0.23
Greater Painted Snipe	33	0.85
Green Sandpiper	41	1.05
Grey Heron	62	1.59
Grey Wagtail	7	0.18
Grey-tailed Tattler	1	0.03
Hair-crested Drongo	1	0.03
Hill Myna	1	0.03
Intermediate Egret	3	0.08
Japanese Bush Warbler	2	0.05
Japanese Sparrowhawk	1	0.03
Japanese White-eye	12	0.31
Kentish Plover	1	0.03
Large-billed Crow	7	0.18
Little Bunting	1	0.03
Little Egret	275	7.05
Little Ringed Plover	184	4.72
Little Swift	6	0.15
Locustella sp.	1	0.03
Long-tailed Shrike	159	4.08
Marsh Sandpiper	14	0.36
Masked Laughingthrush	76	1.95
Northern Lapwing	2	0.05
Northern Shoveler	3	0.08
Olive-backed Pipit	109	2.79
Oriental Magpie Robin	269	6.90
Oriental Pranticole	2	0.05
Oriental Reed Warbler	17	0.44
Oriental Turtle Dove	14	0.36
Pallas's Grasshopper Warbler	10	0.26
Peregrine Falcon	1	0.03

Common Name	Total Count	Average Abundance
Pheasant-tailed Jacana	1	0.03
Pied Kingfisher	5	0.13
Pintail Snipe	116	2.97
Plain Prinia	86	2.21
Plaintive Cuckoo	8	0.21
Red Turtle Dove	3	0.08
Red-billed Starling	53	1.36
Red-rumped Swallow	1	0.03
Red-throated Pipit	184	4.72
Red-whiskered Bulbul	39	1.00
Richard's Pipit	132	3.38
Rock Dove	14	0.36
Scaly-breasted Munia	135	3.46
Siberian Rubythroat	10	0.26
Sooty-headed Bulbul	27	0.69
Spotted Dove	263	6.74
Striated Heron	1	0.03
Swinhoe's Snipe	1	0.03
White Wagtail	699	17.92
White-breasted Waterhen	97	2.49
White-cheeked Starling	2	0.05
White-rumped Munia	19	0.49
White-shouldered Starling	3	0.08
White-throated Kingfisher	47	1.21
Wood Sandpiper	609	15.62
Yellow Bittern	2	0.05
Yellow Wagtail	686	17.59
Yellow-bellied Prinia	124	3.18
Yellow-billed Grosbeak	1	0.03
Yellow-breasted Bunting	12	0.31
Yellow-browed Warbler	7	0.18
Yellow-crested Cuckatoo	1	0.03
Zitting Cisticola	131	3.36

Appendix 7. Table showing the species list and the average abundance (number of count per survey) of each species recorded in the northern part of Long Valley

Common Name	Total Count	Average Abundance
Arctic Warbler	1	0.04
Asian Barred Owlet	1	0.04
Baillon's Crake	1	0.04
Barn Swallow	5	0.19
Besra	2	0.08
Black Drongo	13	0.50
Black Kite	10	0.38
Black-browed Reed Warbler	3	0.12
Black-collared Starling	80	3.08
Black-crowned Night Heron	3	0.12
Black-faced Bunting	3	0.12
Black-naped Monarch	1	0.04
Black-winged Stilt	2	0.08
Bluethroat	2	0.08
Brown Shrike	3	0.12
Bunting sp.	1	0.04
Cattle Egret	28	1.08
Chinese Bulbul	49	1.88
Chinese Francolin	1	0.04
Chinese Pond Heron	87	3.35
Chinese Spotbill	2	0.08
Collared Crow	1	0.04
Common Blackbird	11	0.42
Common Buzzard	5	0.19
Common Kingfisher	26	1.00
Common Koel	11	0.42
Common Magpie	38	1.46
Common Moorhen	6	0.23
Common Sandpiper	9	0.35
Common Snipe	2	0.08
Common Stonechat	61	2.35
Common Tailorbird	26	1.00
Crested Myna	40	1.54
Crested Serpent Eagle	1	0.04
Daurian Redstart	13	0.50
Dusky Warbler	86	3.31
Eurasian Tree Sparrow	38	1.46
Eurasian Wryneck	1	0.04
EurasianWoodcock	1	0.04

Common Name	Total Count	Average Abundance
Great Cormorant	4	0.15
Great Egret	9	0.35
Great Tit	7	0.27
Greater Coucal	9	0.35
Greater Painted Snipe	1	0.04
Green Sandpiper	51	1.96
Grey Heron	47	1.81
Grey Wagtail	10	0.38
Intermediate Egret	1	0.04
Japanese Bush Warbler	1	0.04
Japanese White-eye	34	1.31
Large-billed Crow	6	0.23
Lesser Coucal	1	0.04
Little Bunting	1	0.04
Little Egret	53	2.04
Little Grebe	4	0.15
Little Ringed Plover	13	0.50
Little Swift	1	0.04
Long-tailed Shrike	31	1.19
Masked Laughingthrush	45	1.73
Olive-backed Pipit	58	2.23
Oriental Magpie Robin	115	4.42
Oriental Reed Warbler	3	0.12
Oriental Turtle Dove	2	0.08
Pied Kingfisher	18	0.69
Plain Prinia	32	1.23
Radde's Warbler	1	0.04
Red-billed Starling	15	0.58
Red-throated Flycatcher	16	0.62
Red-throated Pipit	17	0.65
Red-whiskered Bulbul	39	1.50
Richard's Pipit	20	0.77
Scaly-breasted Munia	27	1.04
Siberian Rubythroat	1	0.04
Snipe sp.	1	0.04
Sooty-headed Bulbul	7	0.27
Spotted Dove	77	2.96
Tern sp.	1	0.04
Unidentified Warbler	1	0.04
Water Rail	2	0.08
White Wagtail	163	6.27

Common Name	Total Count	Average Abundance
White-breasted Waterhen	40	1.54
White-rumped Munia	4	0.15
White-throated Kingfisher	19	0.73
Wood Sandpiper	47	1.81
Yellow Bittern	1	0.04
Yellow Wagtail	98	3.77
Yellow-bellied Prinia	48	1.85
Yellow-billed Grosbeak	5	0.19
Yellow-browed Warbler	38	1.46
Yellow-Crested Cockatoo	1	0.04
Zitting Cisticola	10	0.38

Appendix 8. Table showing the species list and the average abundance (number of count per survey) of each species recorded in the Fung Shui Wood

Common Name	Total Count	Average Abundance
Arctic Warbler	1	0.04
Asian Brown Flycatcher	1	0.04
Asian Stubtail Warbler	1	0.04
Barn Swallow	5	0.19
Besra	1	0.04
Black Kite	6	0.23
Black-collared Starling	6	0.23
Black-faced Bunting	2	0.08
Black-naped Monarch	9	0.35
Bonelli's Eagle	1	0.04
Bunting sp.	2	0.08
Chinese Bulbul	26	1.00
Collared Crow	1	0.04
Common Blackbird	4	0.15
Common Buzzard	2	0.08
Common Kestrel	2	0.08
Common Koel	2	0.08
Common Magpie	1	0.04
Common Myna	1	0.04
Common Tailorbird	25	0.96
Crested Myna	10	0.38
Dusky Warbler	2	0.08
Emerald Dove	1	0.04
Eurasian Tree Sparrow	18	0.69
Fork-tailed Sunbird	13	0.50
Great Cormorant	1	0.04
Great Egret	1	0.04
Great Tit	20	0.77
Grey Heron	1	0.04
Grey-backed Thrush	7	0.27
Japanese Bush Warbler	1	0.04
Japanese White-eye	26	1.00
Large-billed Crow	4	0.15
Little Egret	2	0.08
Long-tailed Shrike	7	0.27
Masked Laughingthrush	16	0.62
Olive-backed Pipit	1	0.04
Oriental Magpie Robin	24	0.92
Pallas's Leaf Warbler	4	0.15

Common Name	Total Count	Average Abundance
Red-flanked Bluetail	1	0.04
Red-throated Flycatcher	1	0.04
Red-whiskered Bulbul	26	1.00
Rock Dove	1	0.04
Rubythroat	1	0.04
Rufous-tailed Robin	1	0.04
Scaly-breasted Munia	5	0.19
Scarlet-backed Flowerpecker	23	0.88
Spotted Dove	24	0.92
Thrush sp.	1	0.04
White Wagtail	6	0.23
White-rumped Munia	3	0.12
Yellow-bellied Prinia	6	0.23
Yellow-billed Grosbeak	1	0.04
Yellow-browed Warbler	15	0.58