

Nature Conservation Management for Long Valley

BIRD MONITORING PROGRAMME

Programme 2008/10	Autumn and Winter	September 2009 – February 2010
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Summary Report – Autumn and Winter 2009-2010 (September to February)

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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 2009 to winter 2010 (i.e. from September 2009 to February 2010).

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 Fig. 1, Fig. 2 and Fig. 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 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 times for each of the two parts were 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 and December, January and February were considered as winter. Surveys in the core part of Long Valley were done twice a week and once a week in the northern part of Long Valley from September to November while surveys for both areas were conducted once a week from December to February. A total of 38 and 26 surveys were conducted for the core area and northern part of Long Valley respectively as shown below:

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2009 Sep: 1, (4), 8, (10), 16, (18), (21), 24, (28);
 2009 Oct: 2, 7, (9), 13, (16), 23, (27), 29;
 2009 Nov: (2), 6, 10, (13), (17), 20, 24, (27);
 2009 Dec: 2, 9, 17, 21, 30
 2010 Jan: 8, 11, 19, 30
 2010 Feb: 2, 11, 18, 22

Dates of additional surveys done in the core part of Long Valley were in parentheses.

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

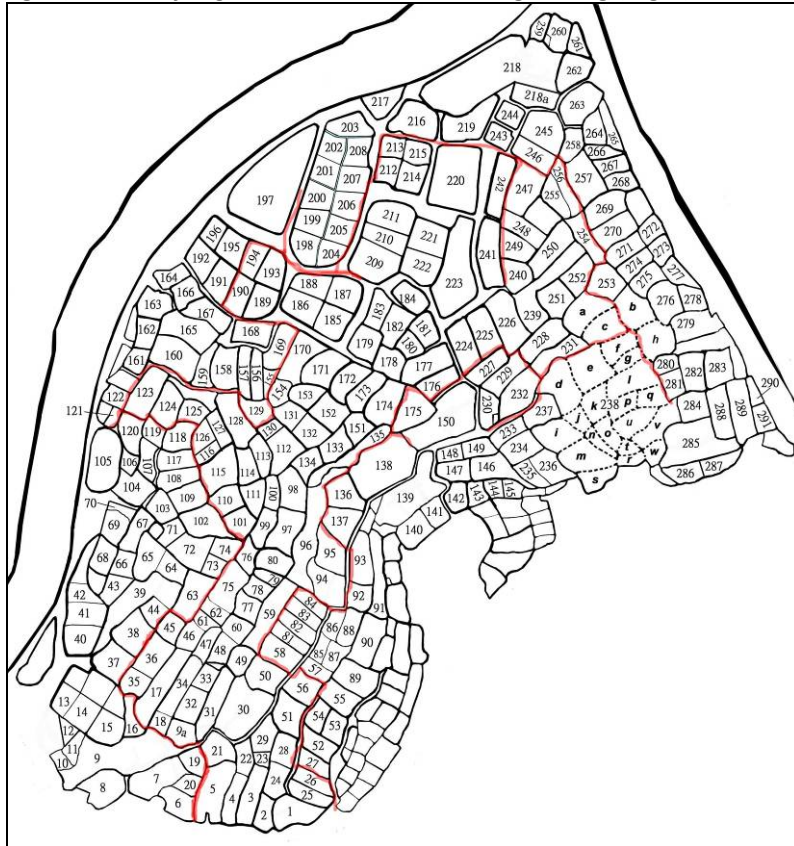


Figure 1. The transect (red line) and field numbers at the core part of Long Valley in this study.

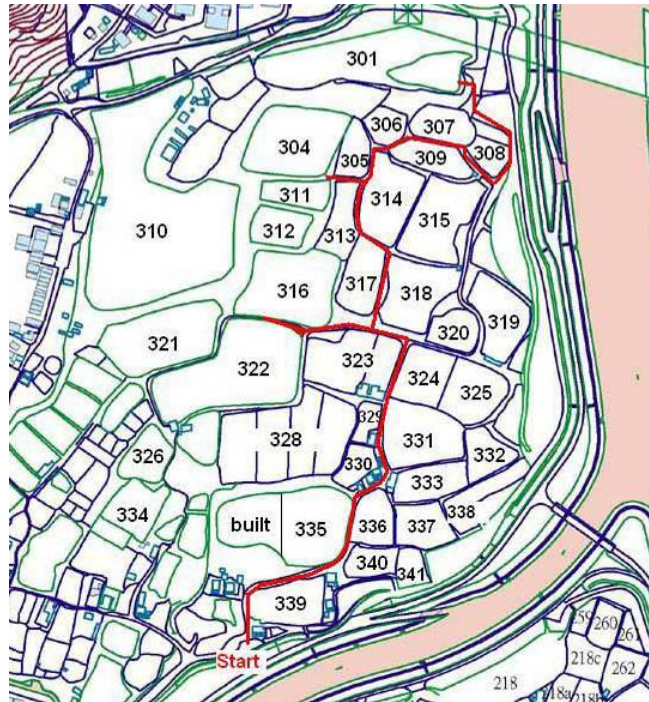


Figure 2. The transect (red line) and field numbers at the northern part of Long Valley in Ho Sheung Heung.



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

Statistical Analysis

- 2.6. Multidimensional scaling (MDS) 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.

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

3. Results

Overview

- 3.1. The total numbers of birds recorded in the core part of Long Valley area from autumn 2009 to winter 2010 showed some fluctuations across months. The peak counts in this period were 916 on 28th September and 556 on 28th January while the lowest counts were 286 on 1st September and 250 on 17th December in autumn and winter respectively. The number of birds recorded in September and October 09 were found higher than the previous years while the number dropped a bit more in winter time. (Table 1 and Fig. 8).

Table 1. Numbers in each count, monthly mean figures with SD of birds counted at the core part of Long Valley, autumn 2009 and winter 2010 and the mean figures (with SD) from 2006 to 2010.

	Autumn 2009			Winter 2009/2010		
	September	October	November	December	January	February
Numbers of bird counted in each survey	286, 302, 340, 382, 642, 546, 433, 449, 916	480, 844, 658, 837, 867, 623, 444, 591, 490	317, 639, 554, 425, 440, 536, 504, 489	449, 494, 250, 378, 392	436, 345, 444, 556	531, 395, 317, 439
2009: Mean (SD)	477(200)	648(166)	488(97)	393(92)	445(86)	398(58)
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)

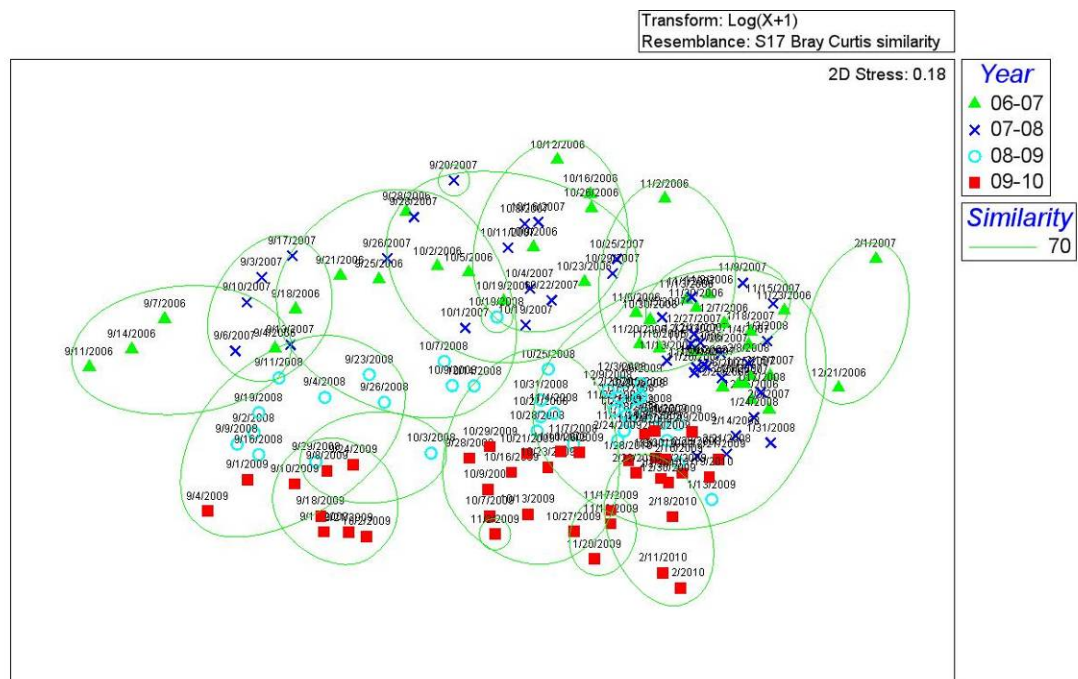


Figure 4. nMDS plot showing the comparison of bird communities in autumn and winter between 06/07 and 09/10.

From the NMDs plot, the bird communities in Long Valley were clustered into groups and there is a changing trend from 06/07 to 09/10. ANOSIM showed that there were significant differences between the bird communities between years from 06/07 to 09/10. The percentages of dissimilarity of bird communities between years in autumn and winter ranged from 35 to 40 %. Wood Sandpiper, Black-winged Stilt, White Wagtail and Scaly-breasted Munia contributed the highest percentage to the percentages of dissimilarity of bird communities between 09/10 and the previous years, they were at rising trend in their number from 06/07 to 09/10.

Table 2. Percentage of dissimilarity of bird communities in core part of Long Valley between autumns and winters from 06/07 to 09/10 by SIMPER.

	06/07	07/08	08/09
07/08	39		
08/09	38	37	
09/10	40	40	35

- 3.3. The total numbers of birds recorded in the northern part of Long Valley fluctuated as previous periods. The peak count in autumn 2009 was 257 on 24th November 2009 while that in winter 09/10 was 267 on 2nd December 2009. The lowest count in autumn 2009 was 84 on 8th September 2009 while that in winter 09/10 was 80 on 17th December 2009, both were exceptional windy days. The number of birds counted fluctuated less obviously compared to that in the core part of Long Valley. The trend was generally gentle throughout the study period with slight peak at winter times. (Table 3 and Fig. 9).

Table 3. Numbers in each count, monthly mean figures with SD of birds counted in northern part of Long Valley, autumn 2009 and winter 09/10 and the mean figure (with SD) in 2008.

	Autumn 2009		Winter 09/10			
	September	October	November	December	January	February
Numbers of bird counted	96, 84, 134, 175	113, 155, 123, 135, 195	164, 250, 138, 257	267, 144, 80, 114, 103	137, 89, 155, 118	180, 99, 79, 187
2009: Mean (SD)	122 (41)	144 (32)	202 (60)	142 (74)	125 (28)	136 (55)
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 2009 was 125 on 24th November 2009 while the lowest count was 36 on 2nd October 2009 (Table 4). The highest count in winter 09/10 was 98 on both 2nd and 7th December 2009 while the lowest was 43 on 9th December 2009 (Table 4). Bird abundance fluctuated throughout autumn and winter. It peaked at late autumn and early winter which was the one of main migration seasons in the year. It then levelled off during the winter time. The Shannon indexes of birds counted in the *feng-shui* wood were 1.92 (SD=0.29) and 2.07 (SD=0.31) in autumn 2009 and winter 09/10 respectively (Table 5).

Table 4. Numbers in each count, monthly mean figures with SD of birds counted in the Ho Sheung Heung *feng-shui* wood, autumn 2009 and winter 09/10 and the mean figure (with SD) in 2008.

	Autumn 2009		Winter 09/10			
	September	October	November	December	January	February
Numbers of bird	55, 56, 54,	36, 90, 56,	61, 80, 57,	98, 43, 47,	60, 60, 50,	68, 57, 95,

counted in each survey	50	49, 70	125	45, 45	62	68
2009: Mean (SD)	54 (3)	60 (21)	81 (31)	56 (24)	58 (5)	72 (16)
2008: Mean (SD)	70(31)	60(16)	83(24)	77(22)	91(39)	116(47)

Table 5. Mean numbers of species and diversity indices (Shannon index) of birds counted in Ho Sheung Heung *feng-shui* wood, autumn 2009 and winter 09/10 and the mean figure (with SD) in 2008.

	Autumn		Winter	
	No. of species	Index	No. of species	Index
2009: Mean (SD)	11.1 (2.8)	1.92 (0.29)	13.5 (2.7)	2.07 (0.31)
2008: 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 were different among months 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 2009 and winter 09/10.

Months	Area of managed fields (sq. ft.)	Area of unmanaged fields (sq. ft.)	Total	% of fields managed
September	728,850	3,474,206	4,203,056	17.3
October	728,850	3,474,206	4,203,056	17.3
November	728,850	3,474,206	4,203,056	17.3
December	683,150	3,519,906	4,203,056	16.3
January	683,150	3,519,906	4,203,056	16.3
February	683,150	3,519,906	4,203,056	16.3

- 3.6. The mean bird density in managed fields in autumn 2009 and winter 09/10 were 37.6 (SD=10.8) and 22.5 (SD=9.9) respectively, it was the highest among autumns but lowest among winters (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 2007, 2008 and 2009 were 0.94, 3.78 and 3.58 respectively. The ratios of winter 07/08, 08/09 and 09/10 are 1.46, 3.30 and 2.43 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 2007 to 2010.

	Autumn 07	Winter 07/08	Autumn 08	Winter 08/09	Autumn 09	Winter 09/10
Managed fields	19.0 (9.5)	22.9 (11.4)	30.6 (9.7)	36.6 (13.1)	37.6 (10.8)	22.5 (9.9)
Unmanaged fields	20.3 (6.4)	15.7 (3.0)	8.1 (2.8)	11.1 (3.1)	10.5 (4.6)	9.2 (4.0)
Ratio	0.94	1.46	3.78	3.30	3.58	2.43

3.7 From the nMDS plot, the bird communities 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 55.57%. SIMPER also showed that Black-winged Stilt (13.35%), Wood Sandpiper (12.11%) and Common Snipe (8.29%) are typical species in managed area while White Wagtail (6.85%), Wood Sandpiper (6.20%) and Yellow Wagtail (6.00%) are typical species in unmanaged area.

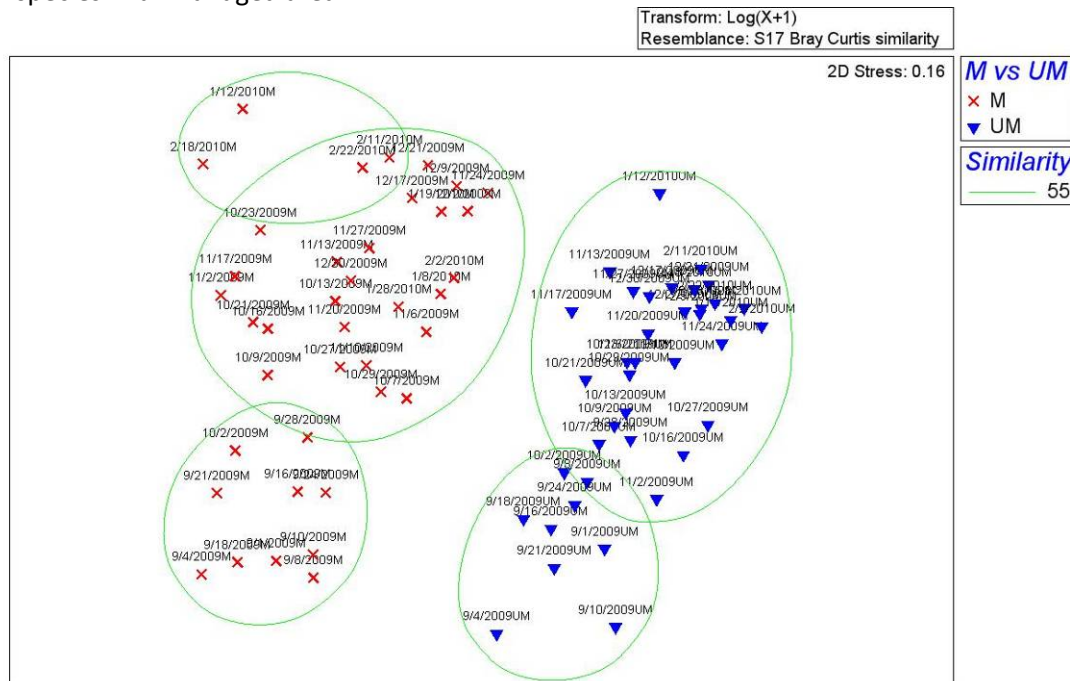


Figure 5. nMDS plot showing the bird assemblages recorded from managed and unmanaged fields.

3.8. Bird assemblages were clustered by nMDS plot according to different managed habitats, including fish pond (FP), shallow water habitat (SWH), less intensive wet agricultural land (WAL), water flea pond (WFP) and unmanaged fields (UM). It is shown that bird assemblages in different habitats are roughly 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 ranged from 66.14% to 91.61% (Table 8). SIMPER show that Grey Heron (23.69%), Chinese Pond Heron (15.31%) and Little Egret (14.37%) are typical species in Fish Pond; Wood Sandpiper (24.67%), Common Snipe (16.48%) and Black-winged Stilt (13.09%) are typical species in Shallow Water Habitat; Wood Sandpiper (18.61%), Scaly-breasted Munia (13.15%) and Common Snipe (12.02%) are typical species in Less Intensive Wet Agricultural Land; Black-winged Stilt (77.79%), Little Egret (5.02%) and Great Egret (3.56%) are typical species in Water Flea Pond; Lastly, White Wagtail (7.01%), Woody Sandpiper (5.95%) and Yellow Wagtail (5.94%) are typical in Unmanaged Farmlands.

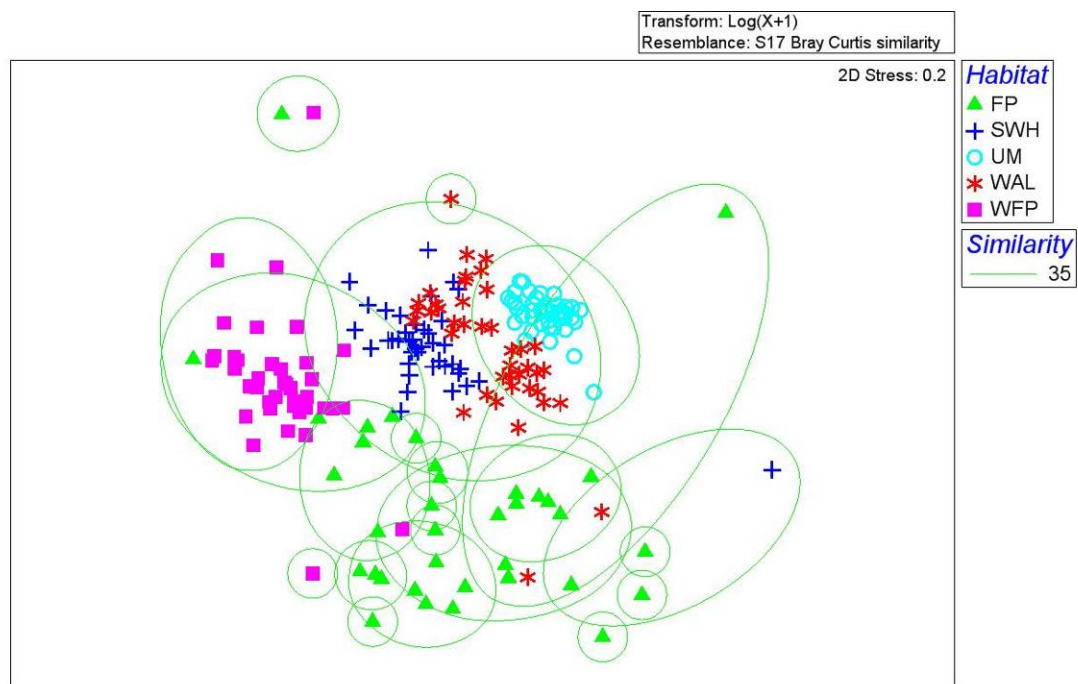


Figure 6. NMDS plot showing the bird assemblages recorded from different habitats. (FP: Fish Pond; SWH: Shallow Water Habitat; UM: Unmanaged fields; WAL: Less Intensive Wet Agricultural Land; WFP: Water Flea Pond)

Table 8. The dissimilarities of bird assemblages between each habitat type in autumns and winters 09-10.

	SWH	WFP	WAL	UM
WFP	78.05			
WAL	66.14	87.70		
UM	72.82	91.61	68.77	
FP	85.10	87.12	86.24	88.16

Less Intensive Wet agricultural land (WAL)

- 3.9. In the current study period, the management practices of different WAL fields were started at different months. Therefore, the total areas of managed WAL were different among months (Table 9).

Table 9. Total area of managed WAL in the core and northern part of Long Valley in autumn 2009 and winter 09/10.

Months	Total area of managed fields (sq. ft.)
September	253,950
October	253,950
November	253,950
December	200,250
January	200,250
February	200,250

- 3.10. The management practice of WAL in autumn 2009 and winter 09/10 comprised of planting of Paddy Rice, Water Chestnut, Chinese Arrowhead, Water Lily and Lotus.

- 3.11. The mean bird density in the managed WAL in autumn 2009 is 65.6 (SD=27.5) which is 75.4% higher than that in autumn 2008 and 486% higher than that in autumn 2007 (Table 10).

Table 10. Mean (SD) bird density (per 100,000 sq. ft.) in WAL and its control fields in autumn 2007-2009.

	Autumn 2007	Autumn 2008	Autumn 2009
Managed fields	11.2 (5.8)	37.4 (16.2)	65.6 (27.5)
Control fields	1.3 (2.0)	5.7 (3.2)	17.0 (11.8)

- 3.12. The mean bird density in the managed WAL in winter 09/10 is 25.1 (SD=11.6) which is 39.75 lower than that in winter 08/09 while it is 116% higher than that in winter 07/08 (Table 11).

Table 11. Mean (SD) bird density (per 100,000 sq. ft.) in WAL and its control fields in winter 07/08-09/10.

	Winter 07/08	Winter 08/09	Winter 09/10
Managed fields	11.6 (12.8)	41.6 (12.8)	25.1 (11.6)
Control fields	2.3 (2.6)	8.1 (1.8)	11.6 (7.9)

- 3.13. The bird assemblages in the managed WAL and unmanaged WAL (Selected controlled fields) were compared and analyzed by nMDS plot (Fig. 7). The bird assemblages were separated from the figure and ANOSIM showed that there is significant difference between these two bird communities ($p = 0.001$). By SIMPER, Wood Sandpiper (8.31%), Scaly-breasted Munia (7.54%), Common Snipe (6.47%) and White-rumped Munia (5.82%) contributed the most to the difference of bird communities between managed WAL and unmanaged WAL where the average abundance of these species were higher in managed WAL.

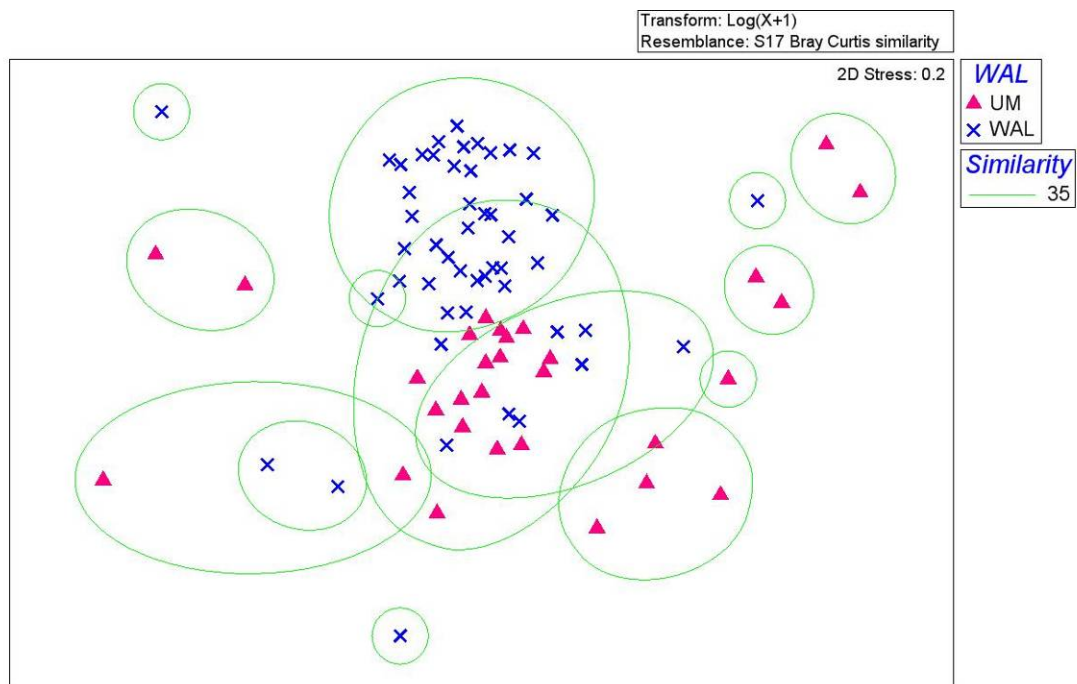


Figure 7. nMDS plot showing bird assemblages recorded from managed less intensive wet agricultural lands and selected unmanaged agricultural lands.

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 2009 and winter 09/10.

Months	Total area of managed fields (sq. ft.)
September	276,800
October	276,800
November	276,800
December	284,800
January	284,800
February	284,800

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

- 3.16. The mean bird densities recorded in managed Shallow Water Habitat are 33.1 (SD=12.2) and 19.9 (SD=13.4) in autumn 2009 and winter 09/10 respectively. There were 26.3% and 620% increase in the mean bird density in managed SWH in autumn 2009 comparing to that in autumn 2007 and 2008 respectively (Table 13). There were 28.9% decrease and 765% increase in the mean bird density in managed SWH in winter 09/10 comparing to that in winter 08/09 and 07/08 respectively.

Table 13. Mean (SD) bird density (per 100,000 sq. ft.) in managed SWH in autumn and winter 2008-2010.

	2007 (07/08 for winter)	2008 (08/09 for winter)	2009 (09/10 for winter)
Autumn	4.6 (4.9)	26.2 (14.2)	33.1 (12.2)
Winter	2.3 (1.7)	28.0 (16.9)	19.9 (13.4)

Fish Pond

- 3.18. The managed area of fish pond remained at 134,128 sq. ft. in the current study period. These practices included fish pond restoration, fish farming resumption, fish pond enhancement and margin planting (Table 14).

Table 14. Total area of managed fish pond in the core and northern part of Long Valley in autumn 2009 and winter 09/10.

Months	Total area of managed fields (sq. ft.)
September	134,100
October	134,100
November	134,100
December	134,100
January	134,100
February	134,100

- 3.19. The mean bird densities in managed fishpond fields in autumn 2009 and winter 09/10 were about 9.8% and 21.3% decrease than that in autumn 2008 and winter 08/09 (Table 15 and 16).

Table 15. Mean (SD) bird density (per 100,000 sq. ft.) in managed fish ponds and its control fields in autumn 2008-2009.

	Autumn 2008	Autumn 2009
Managed fields	11.2 (7.8)	10.1 (11.6)
Control fields	2.1 (3.0)	1.0 (1.8)

Table 16. Mean (SD) bird density (per 100,000 sq. ft.) in managed fish ponds and its control fields in winter 08/09-09/10.

	Winter 08/09	Winter 09/10
Managed fields	24.9 (18.0)	19.6 (17.3)
Control fields	5.4 (3.3)	1.5 (1.5)

Water flea pond

- 3.20. In the period from September 2009 to February 2010, 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.
- 3.21. It is shown that the mean bird density in managed water flea ponds recorded in autumn 2009 and winter 09/10 were the highest among three years, 2007 to 2009 (Table 17). It is also noted that the mean bird density in water flea ponds is generally higher in winter than in autumn (Table 17).

Table 17. Mean (SD) bird density (per 100,000 sq. ft.) in water flea ponds in autumn and winter 2008-2010.

	2007 (07/08 for winter)	2008 (08/09 for winter)	2009 (09/10 for winter)
Autumn	4.9 (2.5)	26.1 (19.1)	28.0 (19.3)
Winter	4.3 (2.1)	35.6 (17.8)	36.3 (21.1)

4. Discussion

- 4.1. The trend in the abundance of birds in the core part of Long Valley in spring 2009 was similar to those in previous years, which it was highest in autumn, and it fluctuated within winter owing to the influx of passage migrant mainly in October and November.
- 4.2. The management in Long Valley is effective in attracting birds in autumn. Firstly, the mean abundance of bird recorded in autumn 2009 was the highest, this indicated more birds were attracted to Long Valley in general. Secondly, there was significant difference in the bird communities between years. This showed the effectiveness of management as the number of Wood Sandpiper and Black-winged Stilt both rose in the trend. The increase in the number of Wood Sandpiper should be attributed to increase in area of managed shallow water habitat and less intensive wet agricultural land, while the management of water flea pond is effective in attracting Black-winged Stilt. Thirdly, the mean bird density in managed fields in autumn 2009 was highest compared with the previous two autumns. Fourthly, apart from the regular management of SWH and WAL, planting of rice paddy had received success in attracting birds, mainly seed-eating birds. Higher abundance and diversity of birds were attracted to fields planted with rice paddy in autumn 2009, these species includes

Black-faced Bunting, Black-headed Bunting, Chestnut-eared Bunting, Yellow-breasted Bunting, Little Bunting, White-rumped Munia and Scaly-breasted Munia. Bunting species are very probably at a declining trend in the region due to decreased area of suitable habitats, especially rice paddy fields. From the data in autumn 2009, planting of rice paddy is preferable in future management, particularly before the migratory season and so the fruiting of rice is synchronized with the migratory season. Last but not least, a record high number of species in the core part of Long Valley was made on 27th October with a total of 58 species recorded, this showed the attractiveness of Long Valley to a diversity of passage migrant. The previous highest record was 52 species on 5th November 2007. In the survey on 27th October 2010, a number of passage migrant were seen including Black-browed Reed Warbler, Black-headed Bunting, Chestnut-eared Bunting, Hair-crested Drongo, Japanese Quail, Pale-legged Leaf Warbler, Pheasant-tailed Jacana, Slaty-breasted Rail, Temmick's Stint and Yellow-breasted Bunting.

- 4.3. The mean abundance of birds and mean bird density in managed fields in winter 09/10 was the lowest among years (Appendix 1). Yet, the mean bird density in unmanaged fields in winter was the lowest among years at the same time. The drop may be due to yearly fluctuation of bird abundance, temporal variation of migratory season between years or exceptionally unstable weather in winter 09/10. And the Shannon index of birds in winter 09/10 was the highest among years (Appendix 2). Therefore it warrants further investigation and monitoring to see whether these data reflect the effectiveness of management in Long Valley.
- 4.4. Maintaining habitat diversity is important in maintaining high bird diversity in Long Valley. In the comparison of bird communities between habitats, different habitats were characterised by different species, for example, Grey Heron in fish pond; Wood Sandpiper in SWH and WAL; Black-winged Stilt in Water Flea Pond; White Wagtail in unmanaged farmlands. This revealed that the importance of maintaining habitat diversity in Long Valley.
- 4.5. The mean bird density in the managed WAL and SWH in autumn 09 was the highest compared with the previous two years and the extent of increase was apparent that the percentages of increase ranged from 28.9 to 765 (Table 11 and Table 13). In the view of the boost of mean bird density, it is reasonable that there may be still capacity to attract more birds to utilize the managed WAL and SWH in Long Valley.
- 4.6. Black-faced Spoonbill was first recorded in Long Valley in winter 08/09, there had been more sighting of this species in 09/10 (Refer to 4.8). All of the records of this species in winter 09/10 were seen in managed fish ponds or at flight. Therefore the management of fish pond, including fish stocking and drainage, is possibly effective to attract this species to feed in fish pond, and this may provide more suitable feeding ground for this endangered species within Deep Bay area.
- 4.7. The bird surveys in *feng-shui* wood in northern part of Long Valley started in March 08, there were more bird species newly recorded from the surveys. In winter 09/10, three new species in Long Valley were recorded in *feng-shui* Wood including Chestnut Bulbul, and Mountain Tailorbird. Their habitat preference associates to woodland to some extent, which implied the *feng-shui* Wood is able to accommodate woodland associated birds. The surveys in *feng-shui* Wood are recommended to continue, and more species are expected to be recorded in future surveys.
- 4.8. There are some notable sightings recorded in autumn 2009 and winter 2009/2010 (Status

follows Carey et. al. 2002 unless stated otherwise). They include:

Black-faced Spoonbill *Platalea minor*

Common winter visitor to Deep Bay and listed as Endangered in IUCN red list. In the core part of Long Valley, one individual was seen on 13th Nov, 9th Dec, 19th and 28th Jan respectively. Two, three and eight individuals were recorded on 28th Jan, 30th Dec and 12th Jan respectively. In the northern part of Long Valley, one was seen on 22nd Feb.

Black-headed Bunting *Emberiza melanocephala*

Only two accepted record in Hong Kong before 2002. One individual was recorded on 27th Oct, 29th Oct, 10th and 24th Nov. These records probably belonged to the same bird.

Buff-bellied Pipit *Anthus rubescens*

Scarce winter visitor and passage migrant. Up to 18 individuals were recorded in eight surveys conducted in the period from 8th Jan to 22nd Feb in core part of Long Valley, while 18 individuals recorded on 28th Jan was the highest count in the core part of Long Valley. One individual was seen on 10th Nov in the northern part of Long Valley.

Chestnut Bulbul *Hypsipetes castanonotus*

Local common resident and winter visitor. Three individuals were recorded on 8th Jan in *Feng-shui* Wood which was the first recorded of this species. One and two individuals were recorded on 2nd and 11th Feb subsequently.

Chestnut-eared Bunting *Emberiza fucata*

Scarce migrant and rare in winter. One individual was recorded on 23rd Oct, 27th Oct, 29th Oct and 20th Nov respectively.

Citrine Wagtail *Motacilla citreola*

Scarce passage migrant and winter visitor. Two individual was seen on 9th Oct, 21st Dec and 8th Jan, while one individual was on 23rd Oct, 27th Nov, 17th Dec, 30th Dec, 12th and 19th Jan in the core part of Long Valley. In the northern part of Long Valley, one individual was observed on 2nd Dec, 21st Dec, 30th Dec, 8th and 19th January.

Dusky Thrush (Naumann's Thrush) *Turdus naumanni*

Scarce winter visitor. One individual was recorded on 28th Jan, 2nd and 11th Feb. These records are probably from the same individual.

Japanese Quail *Coturnix japonica*

Scarce passage migrant and winter visitor. One individual was seen on 28th Sep, 16th Oct, 21st Oct, 27th Oct, 29th Oct, 10th Nov, 2nd Dec, while two individuals were seen on 7th and 23rd Oct.

Lanceolated Warbler *Locustella lanceolata*

Scarce autumn migrant. An individual was seen on 10th Nov.

Mountain Tailorbird *Orthotomus cuculatus*

Recorded in Hong Kong since 1999 and widespread recorded in the northern and eastern New Territories. One individual was recorded in *Feng-shui* Wood in the northern part of Long Valley on 11th Feb, which was the first record of this species in Long Valley.

Paddyfield Warbler *Acrocephalus agricola*

Only four winter records in Hong Kong before 2002. One individual was recorded in the

survey done on 24th Nov. This was the first record of this species in Long Valley.

Pectoral Pipit *Anthus gustavi*

Scarce passage migrant, chiefly in spring. An individual was recorded on 13th Oct.

Pheasant-tailed Jacana *Hydrophasianus chirurgus*

Scarce passage migrant, mainly in autumn. In the core part of Long Valley, one individual was recorded on 23rd Oct, 27th Oct and 13th Nov, while two were seen on 29th Oct. One individual was seen on 29th Oct in the northern part of Long Valley.

Radde's Warbler *Phylloscopus schwarzi*

Scarce passage migrant in late autumn, with a few winter records. One individual was seen on 24th Nov in the northern part of Long Valley. This was the first record of this species in Long Valley.

Water Rail *Rallus aquaticus*

Scarce winter visitor and spring migrant. An individual was recorded on 6th Nov.

Watercock *Gallicrex cinerea*

Scarce passage migrant with occasional records. An individual was seen on 2nd Dec.

Yellow-breasted Bunting *Emberiza aureola*

Uncommon to common passage migrant. This species is currently listed as Vulnerable and a decreasing population trend is observed (IUCN 2009). Comparatively higher number of this species occurred in autumn 2009. Up to 11 individuals were recorded in a total of 14 surveys conducted between 7th Oct and 27th Nov.

- 4.9 Figure 10 to 17 showed the distribution map of different bird groups in the core and northern part of Long Valley during the study period. From Fig. 10, fields with high bird density are mainly managed fields which shows that managed wetland habitats are attractive to birds. However, wagtails and pipits were exceptional. Fig 15 and 16 showed the distribution of wagtails and pipits respectively, that most of the fields with high bird density are un-managed fields. This is because yellow wagtail favours Water Cress fields while pipits prefer dry fields which both habitats are not managed under the MA project. This coincides with the SIMPER result in 3.7.

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.

IUCN (2010). IUCN Red List of Threatened Species. Version 2010.1. <www.iucnredlist.org>. Downloaded on 21 March 2010.

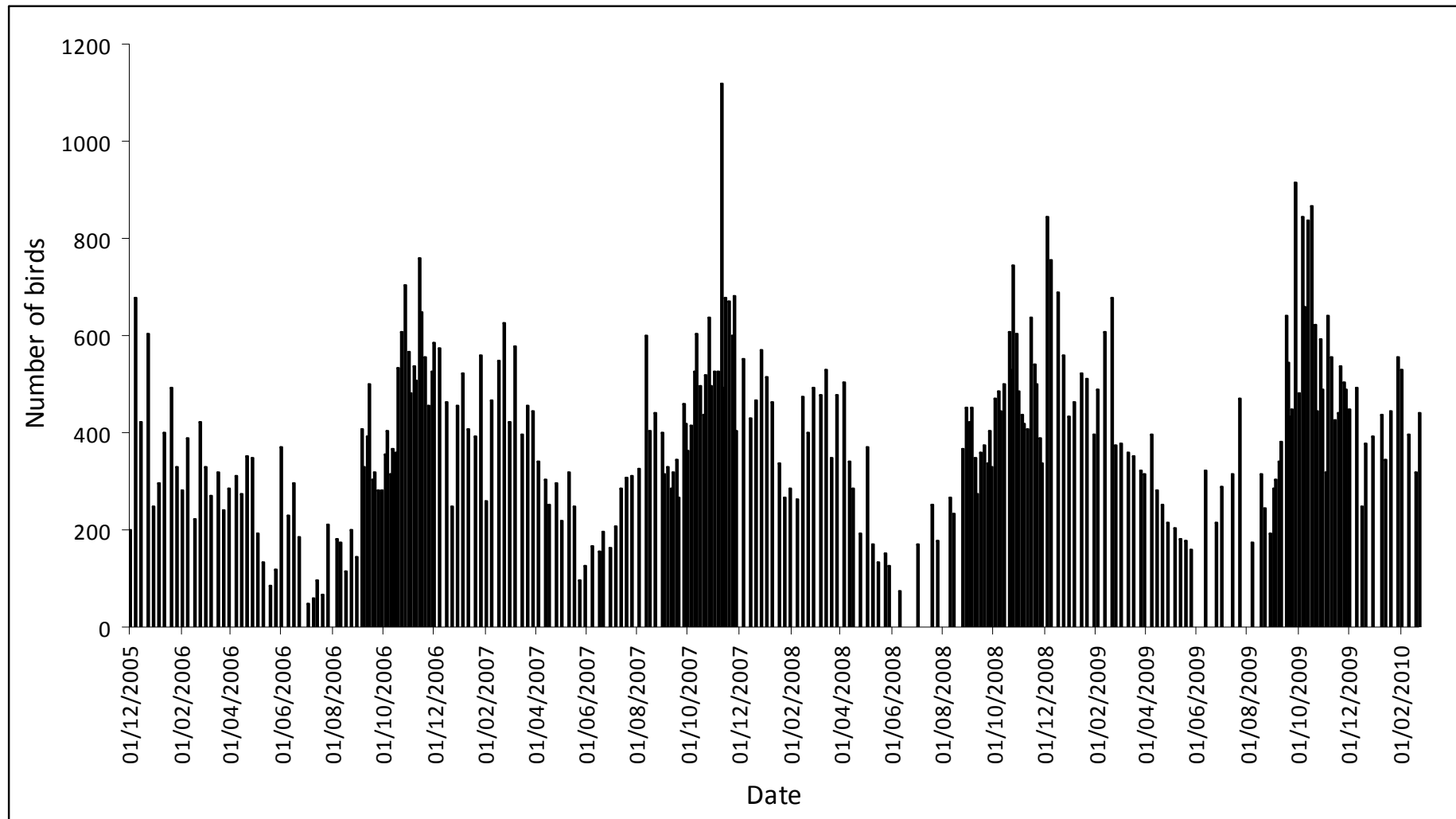


Figure 8. Total numbers of birds recorded in the core part of Long Valley from December 2005 to February 2010.

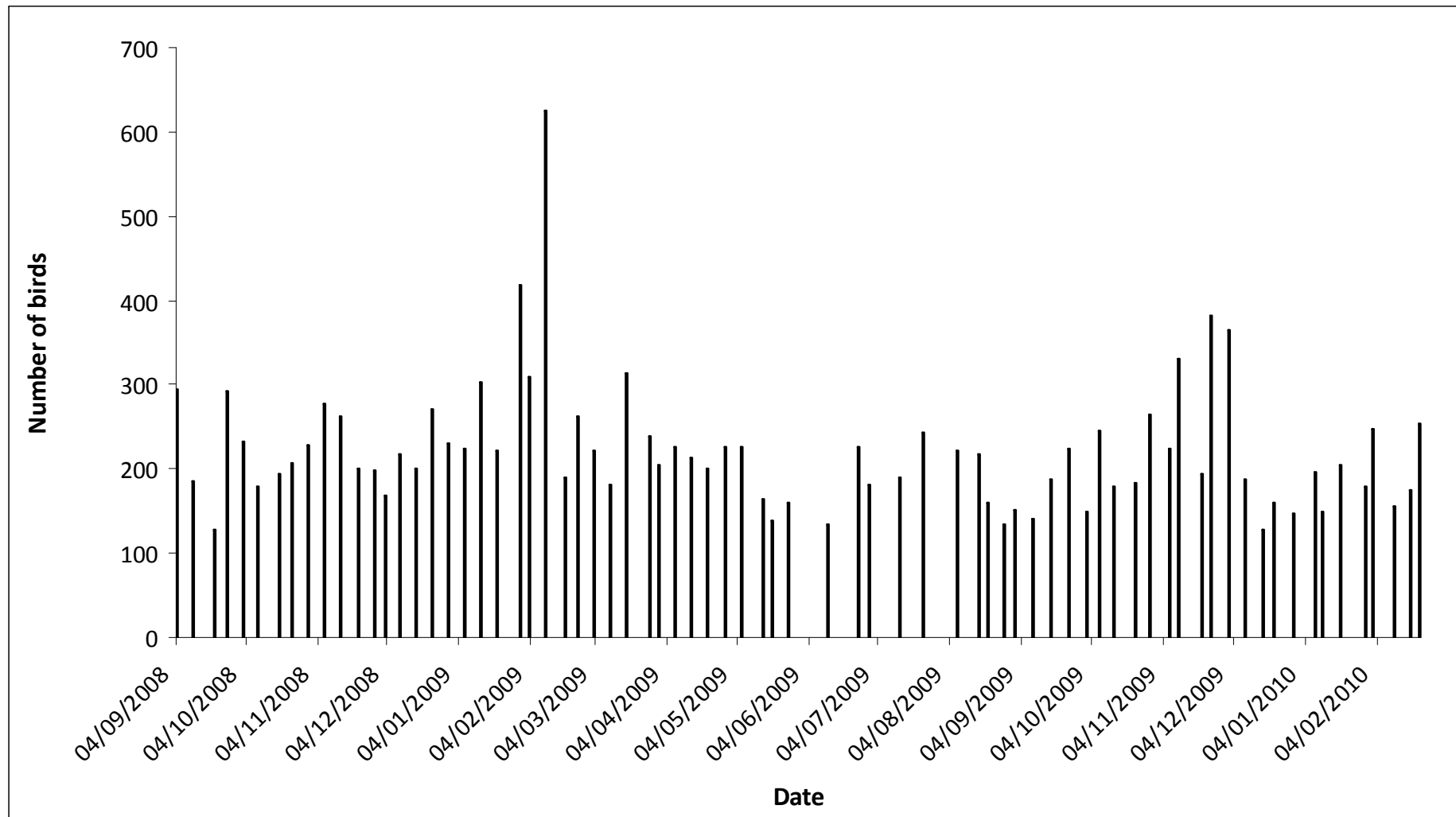


Figure 9. Total number of birds recorded in the northern part of Long Valley from March 2008 to February 2010.

Appendix 1. Total numbers, numbers of species and diversity indices (Shannon index) of birds counted in the core part of Long Valley, autumn 2007, 2008 and 2009.

Autumn 2007				Autumn 2008				Autumn 2009			
Date	Total no.	No. of species	Index	Date	Total no.	No. of species	Index	Date	Total no.	No. of species	Index
3 Sep	312	33	3.11	2 Sep	423	34	3.02	1 Sep	285	34	2.94
6 Sep	323	38	2.99	4 Sep	451	37	2.92	4 Sep	302	31	2.53
10 Sep	286	34	3.00	9 Sep	349	29	2.66	8 Sep	340	34	2.84
13 Sep	313	37	3.20	11 Sep	275	33	2.83	10 Sep	382	31	2.77
17 Sep	338	40	3.00	16 Sep	360	29	2.54	16 Sep	642	41	2.79
20 Sep	266	37	3.07	19 Sep	374	35	2.58	18 Sep	546	41	2.81
26 Sep	454	40	2.91	23 Sep	337	34	2.89	21 Sep	433	34	2.72
28 Sep	416	41	2.81	26 Sep	402	39	2.76	24 Sep	449	33	2.85
1 Oct	362	37	3.02	29 Sep	330	31	2.65	28 Sep	916	43	2.77
4 Oct	413	46	3.04	3 Oct	470	40	2.78	02 Oct	480	36	2.50
8 Oct	525	45	3.19	7 Oct	485	40	2.89	07 Oct	844	46	2.92
11 Oct	599	45	2.97	9 Oct	443	41	2.90	09 Oct	658	43	2.84
16 Oct	497	39	2.74	14 Oct	499	45	3.08	13 Oct	837	50	2.95
19 Oct	437	38	2.67	19 Oct	608	40	2.79	16 Oct	867	49	3.02
22 Oct	518	42	3.03	21 Oct	528	51	3.23	21 Oct	623	48	3.07
25 Oct	636	43	2.94	25 Oct	744	49	2.99	23 Oct	444	51	3.03
29 Oct	493	41	2.91	28 Oct	605	51	2.87	27 Oct	591	58	3.17
1 Nov	526	46	3.00	31 Oct	485	39	2.94	29 Oct	490	43	3.07
5 Nov	526	50	3.14	4 Nov	436	46	3.10	02 Nov	317	34	2.76
9 Nov	1089	60	2.94	7 Nov	420	45	3.12	06 Nov	639	39	2.87
13 Nov	494	47	3.21	11 Nov	409	41	3.02	10 Nov	554	54	3.04
15 Nov	665	46	2.94	14 Nov	636	46	3.03	13 Nov	425	49	3.17
19 Nov	380	42	4.16	18 Nov	540	47	3.05	17 Nov	440	44	2.70
22 Nov	601	50	3.12	21 Nov	499	47	3.12	20 Nov	536	43	2.66
26 Nov	680	50	3.08	25 Nov	390	41	3.14	24 Nov	504	54	3.35
28 Nov	405	37	2.97	28 Nov	336	42	2.99	27 Nov	489	48	3.18
483				455				540			
(171)				(109)				(176)			
(6)				(6)				(8)			
(0.26)				(0.18)				(0.21)			

Appendix 2. Total numbers, numbers of species and diversity indices (Shannon index) of birds counted in the core part of Long Valley, winter 07/08, 08/09 and 09/10.

winter 07/08				winter 08/09				Winter 09/10			
Date	Total no.	No. of species	Index	Date	Total no.	No. of species	Index	Date	Total no.	No. of species	Index
06 Dec	551	49	3.13	3 Dec	844	48	2.78	02 Dec	449	42	3.16
14 Dec	428	44	3.20	9 Dec	757	47	2.81	09 Dec	494	46	3.14
21 Dec	465	42	3.13	16 Dec	688	48	3.05	17 Dec	250	41	3.22
27 Dec	572	45	2.97	23 Dec	559	46	3.12	21 Dec	378	45	3.29
03 Jan	513	45	2.94	30 Dec	432	44	3.24	30 Dec	392	41	3.16
10 Jan	463	48	3.27	6 Jan	464	42	3.14	08 Jan	436	49	3.30
17 Jan	338	43	3.10	13 Jan	524	43	2.64	12 Jan	345	40	2.98
24 Jan	266	39	3.17	20 Jan	512	40	2.84	19 Jan	444	48	2.91
31 Jan	284	40	3.14	30 Jan	396	39	3.11	28 Jan	556	53	3.12
08 Feb	262	33	3.09	3 Feb	490	45	3.16	02 Feb	531	51	3.21
14 Feb	473	40	3.03	10 Feb	607	41	2.52	11 Feb	395	44	3.09
21 Feb	400	47	3.41	19 Feb	678	48	2.91	18 Feb	317	39	3.14
28 Feb	492	42	2.96	24 Feb	375	49	3.22	22 Feb	439	46	3.23
423				564				417			
(106)				(143)				(85)			
43 (4)				44 (3)				45 (4)			
(0.13)				(0.23)				(0.11)			

Appendix 3. Total numbers, numbers of species and diversity indices (Shannon index) of birds counted in agricultural fields in Ho Sheung Heung, autumn 2008 and 2009.

Autumn 2008				Autumn 2009			
Date	Total no.	No. of species	Index	Date	Total no.	No. of species	Index
04 Sep	197	40	3.272	01 Sep	96	21	2.67
11 Sep	135	24	2.308	08 Sep	84	25	2.85
20 Sep	90	22	2.817	16 Sep	134	26	2.76
26 Sep	196	37	3.023	24 Sep	175	30	2.76
03 Oct	164	31	2.86	02 Oct	113	22	2.59
09 Oct	133	31	3.139	07 Oct	155	31	2.91
18 Oct	156	33	3.156	13 Oct	123	30	3.00
24 Oct	135	35	3.251	23 Oct	135	33	3.11
31 Oct	154	40	3.314	29 Oct	195	36	3.10
07 Nov	174	36	3.163	06 Nov	164	38	3.08
14 Nov	193	40	3.363	10 Nov	250	41	3.01
21 Nov	144	43	3.345	20 Nov	138	28	2.99
28 Nov	95	30	3.068	24 Nov	257	44	3.32
Mean (SD)	151 (34.6)	34 (6.3)	3.08 (0.3)		155 (53.2)	31 (7.1)	2.93 (0.2)

Appendix 4. Total numbers, numbers of species and diversity indices (Shannon index) of birds counted in agricultural fields in Ho Sheung Heung, winter 08/09 and 09/10.

Winter 08/09				Winter 09/10			
Date	Total no.	No. of species	Index	Date	Total no.	No. of species	Index
3 Dec	104	30	3.04	02 Dec	267	38	2.94
9 Dec	120	34	3.20	09 Dec	144	32	2.96
16 Dec	125	29	3.07	17 Dec	80	26	2.93
23 Dec	170	37	3.30	21 Dec	114	31	3.01
30 Dec	182	39	3.14	30 Dec	103	32	3.14
6 Jan	166	33	3.15	08 Jan	137	39	3.29
13 Jan	74	21	2.76	11 Jan	89	25	2.60
20 Jan	164	35	3.03	19 Jan	155	35	3.08
30 Jan	306	41	2.77	30 Jan	118	32	3.00
3 Feb	179	36	3.24	02 Feb	180	35	2.96
10 Feb	171	47	3.45	11 Feb	99	32	3.21
19 Feb	108	35	3.15	18 Feb	79	22	2.56
24 Feb	188	41	3.35	22 Feb	187	38	3.12
Mean (SD)	158 (57.2)	35.2 (6.4)	3.13 (0.2)		135 (53.2)	32.1 (5.2)	2.98 (0.21)

Appendix 5. Total numbers, numbers of species and diversity indices (Shannon index) of birds counted in the *feng-shui* wood in Ho Sheung Heung, autumn 2008 and 2009.

Autumn 2008				Autumn 2009			
Date	Total no.	No. of species	Index	Date	Total no.	No. of species	Index
4 Sep	97	14	2.13	01 Sep	55	7	1.37
11 Sep	50	10	2.00	08 Sep	56	8	1.95
20 Sep	37	9	1.57	16 Sep	54	11	2.08
26 Sep	97	12	1.82	24 Sep	50	9	1.77
3 Oct	69	9	1.79	02 Oct	36	10	2.06
9 Oct	47	12	1.98	07 Oct	90	9	1.33
18 Oct	39	13	2.19	13 Oct	56	11	1.91
24 Oct	72	9	1.88	23 Oct	49	11	2.17
31 Oct	74	13	2.04	29 Oct	70	13	2.30
7 Nov	103	15	1.99	06 Nov	61	11	1.88
14 Nov	70	17	2.32	10 Nov	80	12	1.98
21 Nov	56	18	2.50	20 Nov	57	14	2.22
28 Nov	103	19	2.36	24 Nov	125	18	1.98
Mean (SD)	70 (24)	13.1 (3.4)	2.04 (0.26)		65 (23)	11.1 (2.8)	1.92 (0.29)

Appendix 6. Total numbers, numbers of species and diversity indices (Shannon index) of birds counted in the *feng-shui* wood in Ho Sheung Heung, winter 08/09 and 09/10.

Winter 08/09				Winter 09/10			
Date	Total no.	No. of species	Index	Date	Total no.	No. of species	Index
3 Dec	64	14	2.39	02 Dec	98	15	2.12
9 Dec	97	14	2.15	09 Dec	43	11	2.03
16 Dec	75	14	2.27	17 Dec	47	12	2.18
23 Dec	100	18	2.18	21 Dec	45	15	2.37
30 Dec	49	9	1.67	30 Dec	45	11	2.00
6 Jan	58	15	2.37	08 Jan	60	14	2.33
13 Jan	136	18	2.12	11 Jan	60	14	2.28
20 Jan	59	15	2.29	19 Jan	50	10	1.94
30 Jan	112	17	2.21	30 Jan	62	10	1.53
3 Feb	130	19	2.42	02 Feb	68	19	2.26
10 Feb	175	18	2.02	11 Feb	57	14	1.86
19 Feb	83	16	2.20	18 Feb	95	13	1.53
24 Feb	74	15	2.19	22 Feb	68	17	2.53
	93 (37)	15.5 (2.6)	2.19 (0.19)		61 (18)	13.5 (2.7)	2.07 (0.31)

Appendix 7 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
Asian Barred Owlet	2	0.05
Asian Brown Flycatcher	1	0.03
Barn Swallow	63	1.66
Besra	1	0.03
Black Drongo	76	2.00
Black Kite	19	0.50
Black-browed Reed Warbler	9	0.24
Black-collared Starling	482	12.68
Black-crowned Night Heron	3	0.08
Black-faced Bunting	7	0.18
Black-faced Spoonbill	16	0.42
Black-headed Bunting	4	0.11
Black-winged Stilt	1,216	32.00
Bluethroat	15	0.39
Bright-capped Cisticola	2	0.05
Buff-bellied Pipit	76	2.00
Bunting sp.	3	0.08
Cattle Egret	536	14.11
Chestnut-eared Bunting	4	0.11
Chinese Bulbul	178	4.68
Chinese Pond Heron	585	15.39
Chinese Spotbill	1	0.03
Citrine Wagtail	12	0.32
Collared Crow	13	0.34
Common Blackbird	27	0.71
Common Buzzard	15	0.39
Common Greenshank	4	0.11
Common Kestrel	1	0.03
Common Kingfisher	31	0.82
Common Koel	3	0.08
Common Magpie	60	1.58
Common Moorhen	76	2.00
Common Myna	44	1.16
Common Sandpiper	72	1.89
Common Snipe	1,045	27.50
Common Stonechat	271	7.13
Common Tailorbird	20	0.53

Common Teal	309	8.13
Crested Bulbul	8	0.21
Crested Myna	1,262	33.21
Daurian Redstart	5	0.13
Dunlin	3	0.08
Dusky Thrush	3	0.08
Dusky Warbler	316	8.32
Eurasian Tree Sparrow	60	1.58
Eurasian Woodcock	1	0.03
Eurasian Wryneck	1	0.03
Fork-tailed Sunbird	1	0.03
Garganey	2	0.05
Great Cormorant	3	0.08
Great Egret	84	2.21
Greater Coucal	16	0.42
Greater Painted Snipe	52	1.37
Green Sandpiper	53	1.39
Grey Heron	72	1.89
Grey Wagtail	2	0.05
Grey-backed Thrush	1	0.03
Grey-headed Lapwing	2	0.05
Hair-crested Drongo	3	0.08
Intermediate Egret	4	0.11
Japanese Quail	11	0.29
Japanese White-eye	27	0.71
Lanceolated Warbler	1	0.03
Large-billed Crow	2	0.05
Little Bunting	22	0.58
Little Egret	658	17.32
Little Ringed Plover	618	16.26
Little Swift	65	1.71
Long-tailed Shrike	156	4.11
Long-toed Stint	2	0.05
Marsh Sandpiper	31	0.82
Masked Laughingthrush	198	5.21
Olive-backed Pipit	189	4.97
Oriental Magpie Robin	249	6.55
Oriental Reed Warbler	11	0.29
Oriental Turtle Dove	29	0.76
Pacific Golden Plover	1	0.03

Paddyfield Warbler	1	0.03
Pale-legged Leaf Warbler	1	0.03
Pallas's Grasshopper Warbler	7	0.18
Pechora Pipit	1	0.03
Pheasant-tailed Jacana	5	0.13
Pied Avocet	8	0.21
Pied Kingfisher	7	0.18
Pintail / Swinhoe's Snipe	166	4.37
Pintail Snipe	32	0.84
Plain Prinia	109	2.87
Red Turtle Dove	4	0.11
Red-billed Starling	352	9.26
Red-necked Phalarope	1	0.03
Red-necked Stint	4	0.11
Red-throated Flycatcher	7	0.18
Red-throated Pipit	297	7.82
Red-whiskered Bulbul	81	2.13
Richard's Pipit	111	2.92
Rock Dove	16	0.42
Scaly-breasted Munia	1,965	51.71
Scarlet-backed Flowerpecker	1	0.03
Siberian Rubythroat	1	0.03
Slaty-breasted Rail	1	0.03
Sooty-headed Bulbul	79	2.08
Spotted Dove	457	12.03
Spotted Redshank	1	0.03
Striated Heron	1	0.03
Temminck's Stint	4	0.11
Water Rail	1	0.03
Watercock	1	0.03
White Wagtail	984	25.89
White-breasted Waterhen	143	3.76
White-cheeked Starling	4	0.11
White-rumped Munia	1,204	31.68
White-shouldered Starling	3	0.08
White-throated Kingfisher	66	1.74
Wood Sandpiper	2,341	61.61
Yellow Bittern	4	0.11
Yellow Wagtail	1,140	30.00
Yellow-bellied Prinia	116	3.05

Yellow-breasted Bunting	64	1.68
Yellow-browed Warbler	7	0.18
Zitting Cisticola	136	3.58

Appendix 8 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
Asian Barred Owlet	1	0.04
Barn Swallow	30	1.15
Black Drongo	9	0.35
Black Kite	4	0.15
Black-browed Reed Warbler	9	0.35
Black-collared Starling	106	4.08
Black-crowned Night Heron	8	0.31
Black-faced Bunting	5	0.19
Black-faced Spoonbill	1	0.04
Black-winged Stilt	2	0.08
Brown Shrike	2	0.08
Buff-bellied Pipit	1	0.04
Bunting sp.	1	0.04
Cattle Egret	39	1.50
Chinese Bulbul	227	8.73
Chinese Pond Heron	136	5.23
Citrine Wagtail	5	0.19
Common Blackbird	30	1.15
Common Buzzard	6	0.23
Common Kingfisher	18	0.69
Common Koel	6	0.23
Common Magpie	125	4.81
Common Moorhen	9	0.35
Common Myna	2	0.08
Common Sandpiper	2	0.08
Common Snipe	4	0.15
Common Stonechat	38	1.46
Common Tailorbird	24	0.92
Common Teal	15	0.58
Crested Myna	120	4.62
Daurian Redstart	6	0.23
Dusky Warbler	117	4.50
Eurasian Tree Sparrow	105	4.04

Eurasian Wryneck	2	0.08
Great Cormorant	1	0.04
Great Egret	9	0.35
Great Tit	6	0.23
Greater Coucal	4	0.15
Greater Painted Snipe	12	0.46
Green Sandpiper	75	2.88
Grey Heron	75	2.88
Grey Wagtail	12	0.46
Grey-backed Thrush	10	0.38
Hill Myna	2	0.08
Japanese White-eye	187	7.19
Large-billed Crow	5	0.19
Little Egret	112	4.31
Little Grebe	1	0.04
Little Ringed Plover	32	1.23
Long-tailed Shrike	53	2.04
Long-toed Stint	2	0.08
Masked Laughingthrush	236	9.08
Olive-backed Pipit	235	9.04
Oriental Magpie Robin	105	4.04
Oriental Turtle Dove	2	0.08
Pheasant-tailed Jacana	1	0.04
Pied Kingfisher	8	0.31
Pintail Snipe/Swinhoe's Snipe	4	0.15
Plain Prinia	17	0.65
Purple Heron	1	0.04
Radde's Warbler	1	0.04
Red-billed Starling	75	2.88
Red-flanked Bluetail	1	0.04
Red-throated Flycatcher	13	0.50
Red-throated Pipit	6	0.23
Red-whiskered Bulbul	203	7.81
Richard's Pipit	7	0.27
Scaly-breasted Munia	137	5.27
Scarlet Minivet	1	0.04
Scarlet-backed Flowerpecker	7	0.27
Siberian Rubythroat	1	0.04
Sooty-headed Bulbul	7	0.27
Spotted Dove	106	4.08

White Wagtail	244	9.38
White-breasted Waterhen	40	1.54
White-rumped Munia	7	0.27
White-shouldered Starling	1	0.04
White-throated Kingfisher	14	0.54
Wood Sandpiper	257	9.88
Yellow Wagtail	96	3.69
Yellow-bellied Prinia	57	2.19
Yellow-billed Grosbeak	21	0.81
Yellow-browed Warbler	31	1.19
Zitting Cisticola	16	0.62

Appendix 9 Table showing the species list and the average abundance (number of count per survey) of each species recorded in the *feng-shui* wood.

Common Name	Total Count	Average Abundance
Accipiter sp.	1	0.04
Barn Swallow	2	0.08
Black Kite	2	0.08
Black-collared Starling	9	0.35
Black-naped Monarch	1	0.04
Chestnut Bulbul	6	0.23
Chinese Bulbul	227	8.73
Common Blackbird	13	0.50
Common Buzzard	1	0.04
Common Magpie	1	0.04
Common Tailorbird	92	3.54
Crested Myna	16	0.62
Emerald Dove	4	0.15
Eurasian Tree Sparrow	58	2.23
Fork-tailed Sunbird	15	0.58
Great Tit	41	1.58
Grey Wagtail	6	0.23
Grey-backed Thrush	22	0.85
Hair-crested Drongo	1	0.04
Japanese White-eye	239	9.19
Little Bunting	1	0.04
Little Swift	8	0.31
Masked Laughingthrush	58	2.23
Mountain Tailorbird	1	0.04
Olive-backed Pipit	5	0.19
Oriental Magpie Robin	73	2.81

Pallas's Leaf Warbler	4	0.15
Red-billed Starling	30	1.15
Red-flanked Bluetail	2	0.08
Red-throated Flycatcher	1	0.04
Red-whiskered Bulbul	522	20.08
Scaly-breasted Munia	4	0.15
Scarlet-backed Flowerpecker	51	1.96
Spotted Dove	74	2.85
Thrush sp.	2	0.08
White Wagtail	8	0.31
White-breasted Waterhen	1	0.04
White-rumped Munia	3	0.12
Yellow-bellied Prinia	3	0.12
Yellow-billed Grosbeak	6	0.23
Yellow-browed Warbler	23	0.88

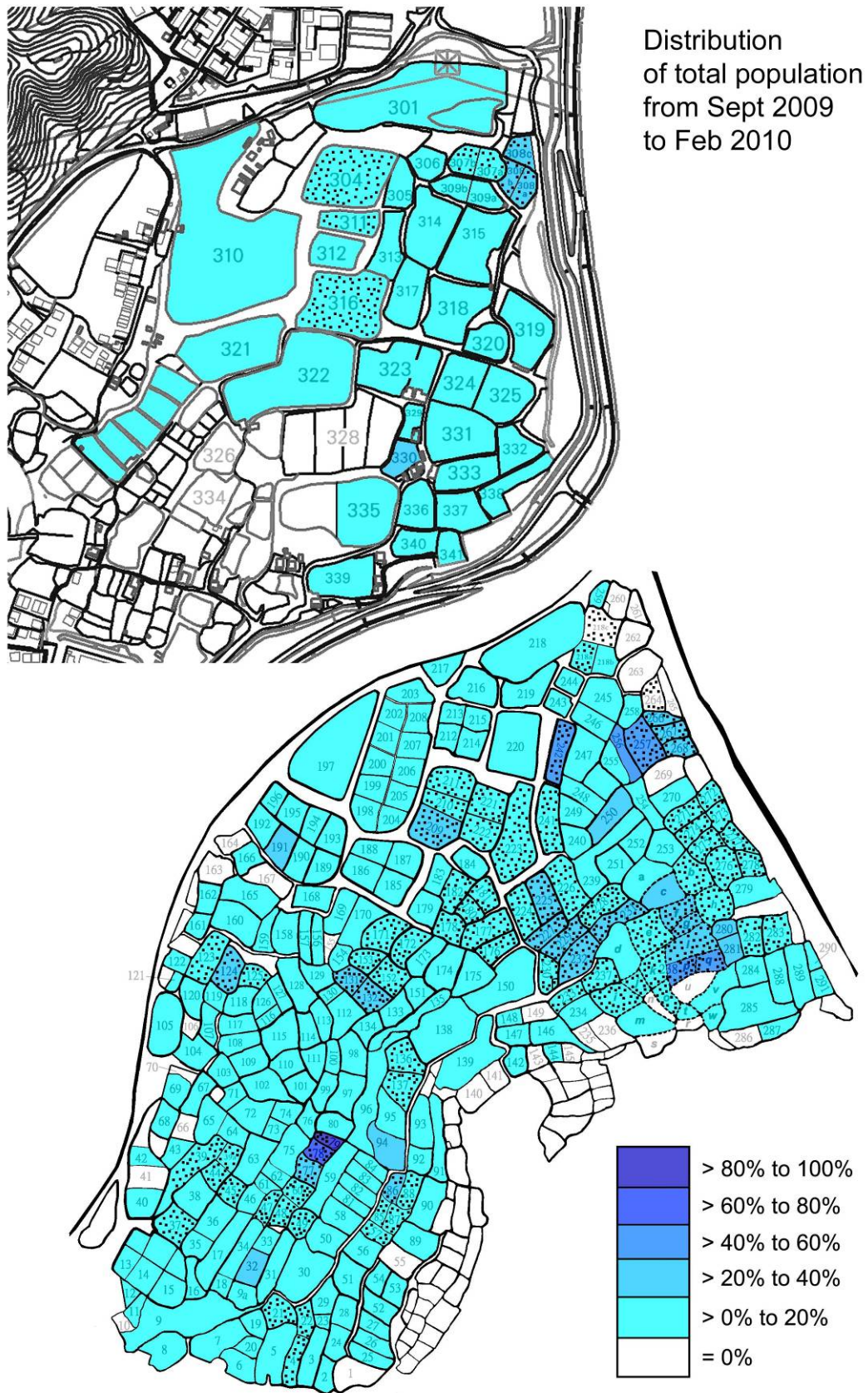


Figure 10. Distribution map of total population in the core and northern part of Long Valley during Sep 09 to Feb 10. Managed fields are marked with dots.



Figure 11. Distribution map of Ardeids in the core and northern part of Long Valley during Sep 09 to Feb 10.



Figure 12. Distribution map of snipes in the core and northern part of Long Valley during Sep 09 to Feb 10.

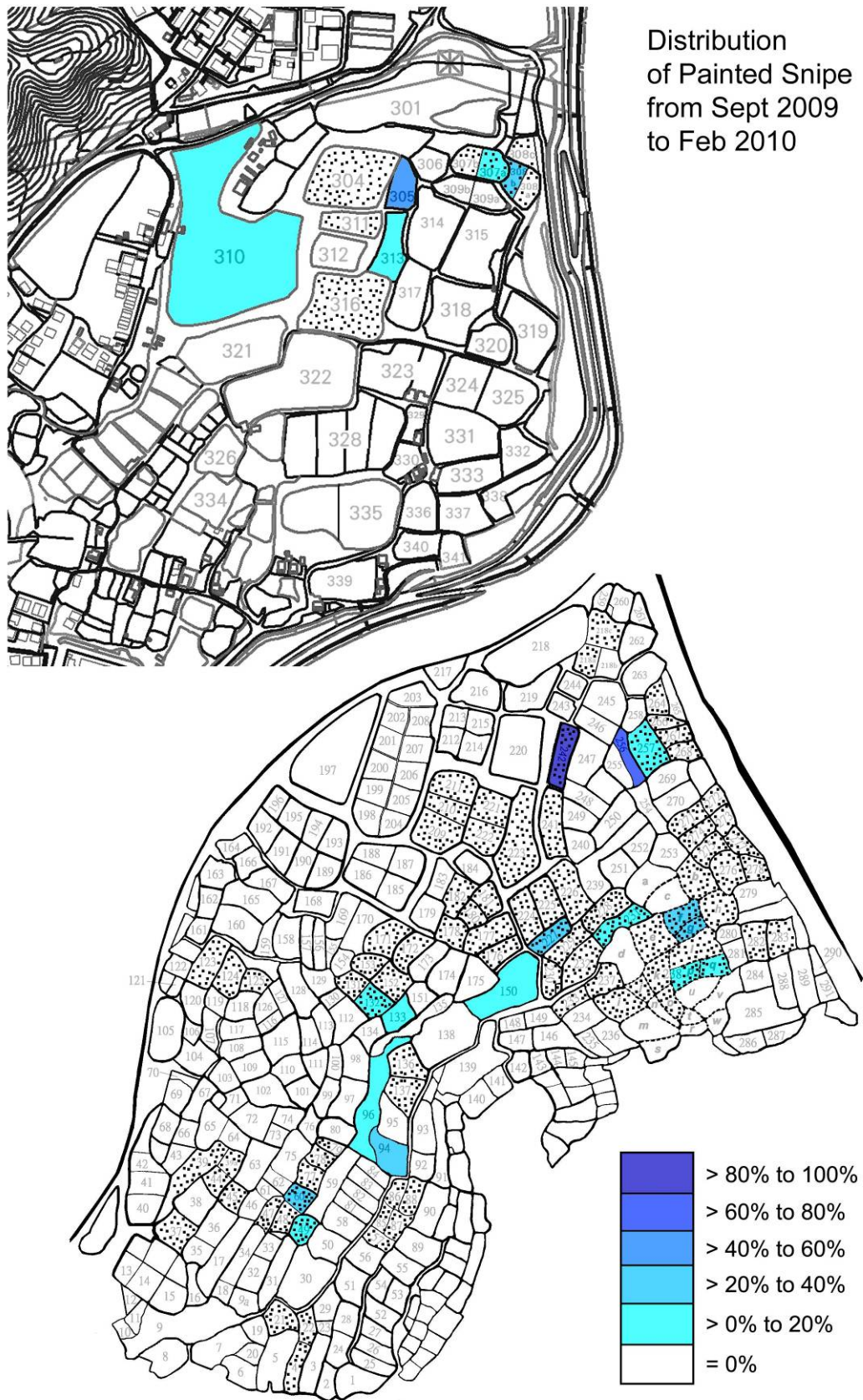


Figure 13. Distribution map of Greater Painted Snipe in the core and northern part of Long Valley during Sep 09 to Feb 10.



Figure 14. Distribution map of waders in the core and northern part of Long Valley during Sep 09 to Feb 10.



Figure 15. Distribution map of wagtails in the core and northern part of Long Valley during Sep 09 to Feb 10.



Figure 16. Distribution map of Pipits in the core and northern part of Long Valley during Sep 09 to Feb 10.

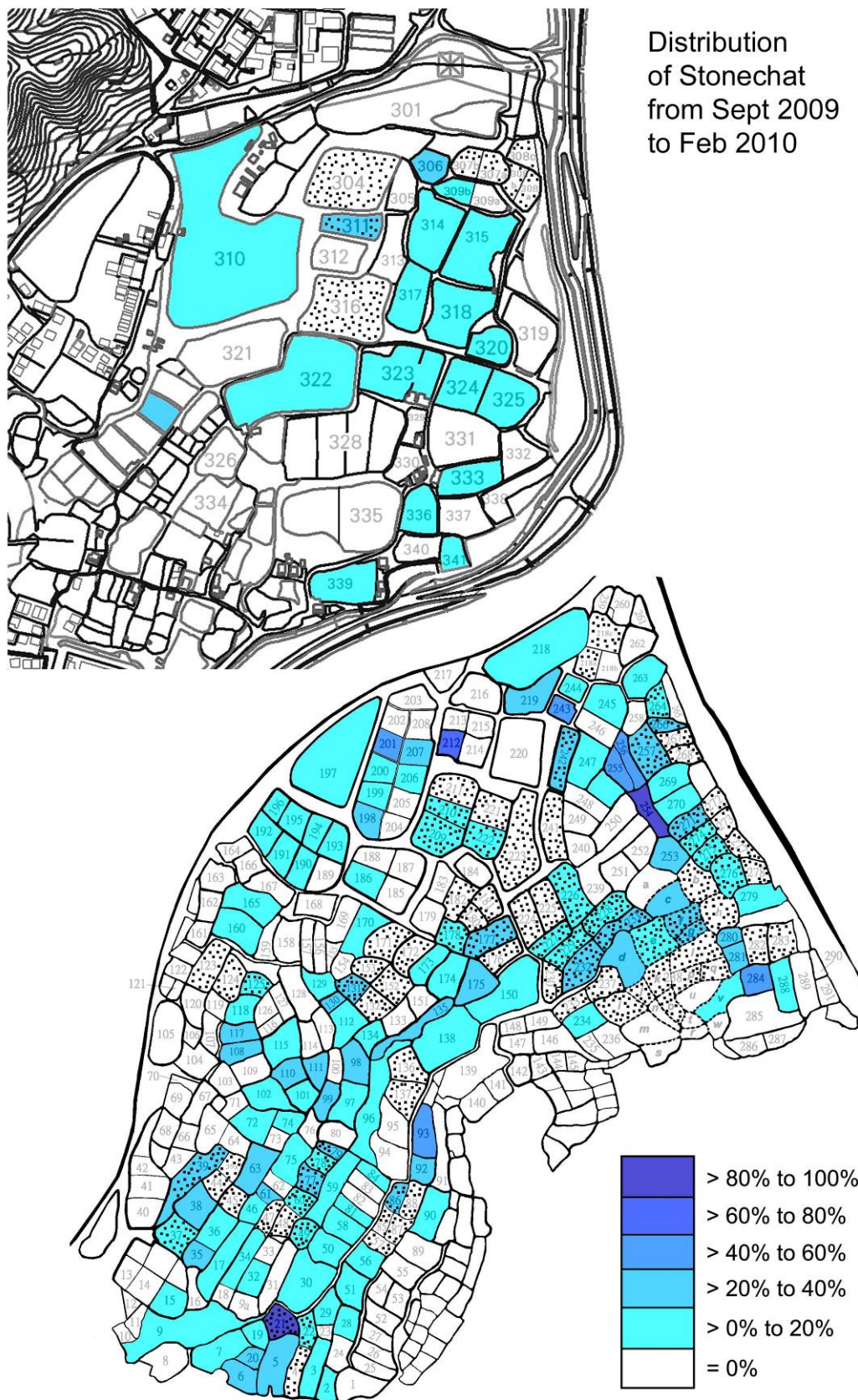


Figure 17. Distribution map of stonechat in the core and northern part of Long Valley during Sep 09 to Feb 10.