Appendix 5 -

Nature Conservation Management for Long Valley

BIRD MONITORING PROGRAMME

Programme 2008/10	Spring and Summer	March 2009 – August 2009

Summary Report –Spring and Summer 2009 (March to August)

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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 aims 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 spring and summer 2009 (i.e. from March 2009 to August 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 Fig. 1 and Fig. 2 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 and 2, 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, March, April and May were considered as spring which is the main bird migration season and June, July and August were considered as summer. Surveys in the core part of Long Valley and the northern part of Long Valley were done once a week from March to May and August while surveys for both areas were conducted once per two weeks from

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June to July. A total of 22 surveys were conducted for the whole area of Long Valley as shown below:

2009 Mar: 3, 10, 17, 27, 31;
2009 Apr: 7, 14, 21, 28;
2009 May: 6, 12, 19, 26;
2009 Jun: 12, 25, 30;
2009 Jul: 13, 23;
2009 Aug: 7, 18, 21, 29.

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).

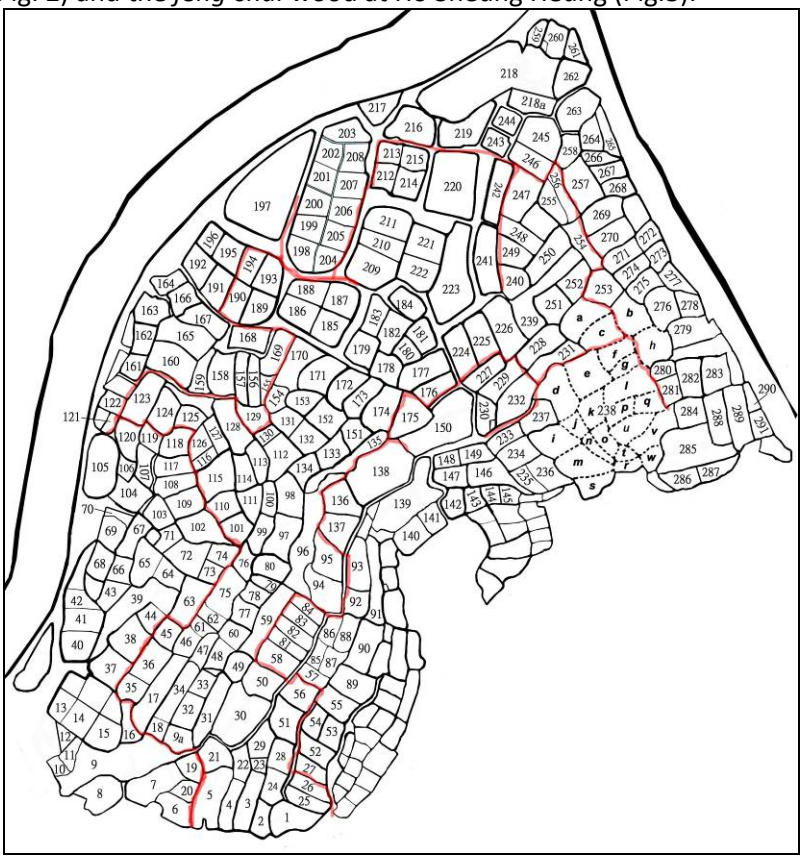

Figure 1. The transect (red line) and field numbers at the core part of Long Valley.

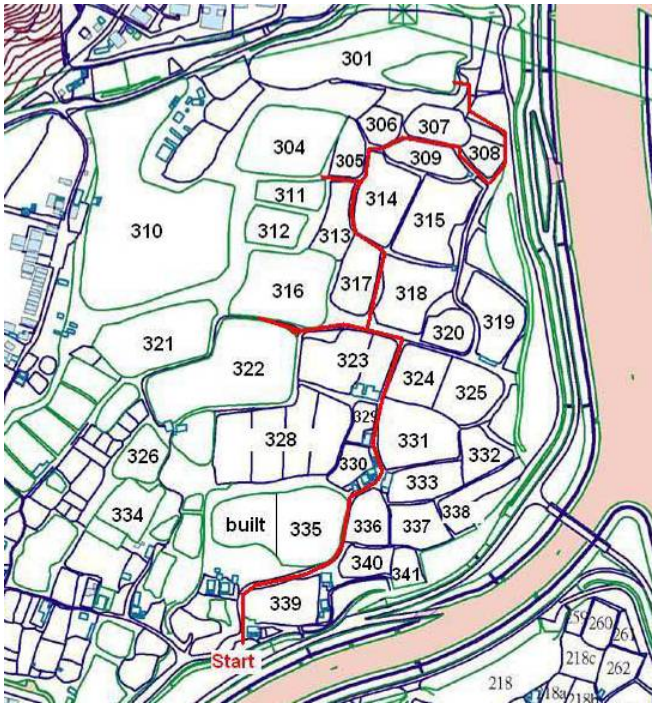

Figure 2. The transect (red line) and field numbers at the northern part of Long Valley in Ho Sheung Heung.

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

Statistical Analysis

2.4. Multidimensional scaling (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.

2.5. 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.

3. Results

Overview

3.1. The total numbers of birds recorded in the core part of Long Valley area from spring 2009 to summer 2009 showed some fluctuations across months (Table 1). The peak counts in this period were 398 on 7th April and 470 on 23rd July in spring and summer respectively. The lowest counts were 181 on 12th May and 173 on 7th August respectively. In general, the total number decreased from the start of spring and reached the lowest toward summer. The number then increased afterwards with fluctuations. The number of birds recorded in summer was found higher than the previous years. (Table 1 and Fig. 9).

Table 1. Numbers in each count, monthly mean figures with SD of birds counted at the core part of Long Valley, spring and summer 2009 and the mean figures (with SD) from 2006 to 2008.

	Spring			Summer		
	March	April	May	June	July	August
Numbers of bird counted in each survey	376, 358, 353, 323, 316	398, 282, 251, 213	204, 181, 179, 161	322, 216, 288	313, 470	173, 316, 246, 191
2009: Mean (SD)	345(25)	286(80)	181(18)	275(54)	392(111)	232(64)
2008: Mean (SD)	458(78)	330(130)	191(101)	73*	199(47)	328(112)
2007: Mean (SD)	459(71)	292(29)	200(91)	170(19)	270(43)	430(99)
2006: Mean (SD)	289(36)	322(37)	133(44)	268(79)	96(66)	161(34)
Note: Value with asterisk means that only one count was made in the particular month.						

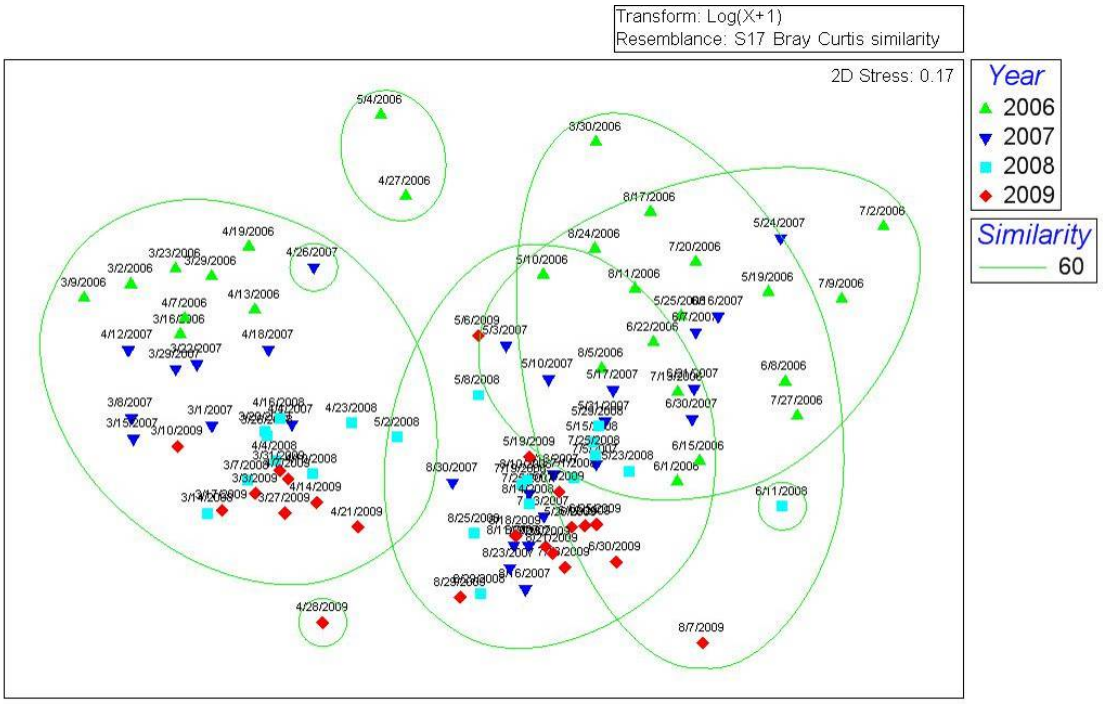

Figure 4. nMDS plot showing the comparison of bird communities in spring and summer between 2006 and 2009.

From the NMDs plot, the bird communities in Long Valley were briefly clustered into groups and there was a changing trend from 2006 to 2009 (Figure 4). ANOSIM showed that there were significant differences between the bird communities between years from 2006 to 2009. The percentages of dissimilarity of bird communities between years in spring and summer ranged from. 42 to 51 %. Wood Sandpiper *Tringa glareola* and Yellow Wagtail *Motacilla flava* were the two species which contributed the highest percentage to the percentages of dissimilarity of bird communities, both species were at a rising trend in their number from 2006 to 2009.

Table 2. Percentage of similarity of bird communities in core part of Long Valley between springs and summers from 06 to 09 by SIMPER.

	2006	**2007**	**2008**
2007	50		
2008	49	42	
2009	51	45	42

3.2. The total numbers of birds recorded in the northern part of Long Valley also fluctuated (Fig. 10). The peak count in spring 2009 was 205 on 17th March 2009 while that in summer 2009 was 193 on 25th June 2009. The lowest count in autumn 2009 was 95 on 19th May 2009 while that in summer 2009 was 96 on 29th August 2009. The number of birds counted fluctuated less obviously compared to that in the core part of Long Valley. The trend was generally gentle throughout spring and summer 2009 without significant peak. (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, spring and summer 2009 and the mean figure (with SD) in 2008.

	Spring			Summer		
	March	April	May	June	July	August
Numbers of bird counted	140, 109, 205, 165, 119	120, 136, 135, 119	113, 112, 95, 100	107, 193, 123,	130, 168	183, 143, 103, 96
2009: Mean (SD)	148(39)	128(9)	105(9)	141(46)	149(27)	131(40)
2008: Mean (SD)	151(29)	141(44)	117(16)	298*	162(40)	136(16)
Note: Value with asterisk means that only one count was made in the particular month.						

3.3. For the *feng-shui* wood, the peak count in spring 2009 was 114 on 6th May 2009 while the lowest count was 43 on 19th May 2009 (Table 4). The highest count in summer 2009 was 75 on both 23rd July 2009 and 16th August 2009 while the lowest was 27 on 12th June 2009 (Table 4). Bird abundance fluctuated throughout spring and summer. It decreased gently and reached the lowest at mid-summer. The Shannon indexes of birds counted in the *feng-shui* wood were 2.80 (0.23) and 2.01 (0.28) in spring and summer 2009 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, spring and summer 2009 and the mean figure (with SD) in 2008.

	Spring			Summer		
	March	April	May	June	July	August
Numbers of bird counted in each survey	83, 73, 109, 74, 85	106, 78, 65, 108	114, 52, 43, 60	27, 34, 59	61, 75	40, 75, 58, 38
2009: Mean (SD)	85(15)	89(21)	67(32)	40(17)	68(10)	53(17)

2008: Mean (SD)	80(19)	88(13)	65(12)	48*	40(17)	55(12)
Note: Value with asterisk means that only one count was made in the particular month.						

Table 5. Mean numbers of species and diversity indices (Shannon index) of birds counted in Ho Sheung Heung *feng-shui* wood, spring and summer in 2008 and 2009.

	Spring		Summer	
	No. of species	Index	No. of species	Index
2009: Mean (SD)	16.8 (2.94)	2.80 (0.23)	10.3 (1.58)	2.01 (0.28)
2008: Mean (SD)	15.8 (2.76)	2.37 (0.21)	11.6 (1.06)	2.05 (0.21)

Managed area

3.4. 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 CA remained unchanged 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 spring and summer 2009.

Months	Area of managed fields (sq. ft.)	Area of unmanaged fields (sq. ft.)	Total	% of fields managed
March	963,100	3,239,956	4,203,056	22.9
April	963,100	3,239,956	4,203,056	22.9
May	963,100	3,239,956	4,203,056	22.9
June	963,100	3,239,956	4,203,056	22.9
July	963,100	3,239,956	4,203,056	22.9
August	963,100	3,239,956	4,203,056	22.9

3.5. The mean bird density in managed fields in spring and summer 2009 were 10.9 (SD=5.6) and 12.3 (SD=9.3) respectively, they were lower 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 spring 2007, 2008 and 2009 were 0.65, 2.30 and 1.85 respectively. The ratios of summer 2007, 2008 and 2009 are 1.63, 5.63 and 2.32 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 spring and summer from 2007 to 2009.

	Spring 07	Summer 07	Spring 08	Summer 08	Spring 09	Summer 09
Managed fields	9.3 (6.4)	6.7 (3.5)	12.4 (10.9)	21.4 (11.5)	10.9 (5.6)	12.3 (9.3)
Unmanaged fields	14.4 (5.9)	4.1 (2.2)	5.4 (2.6)	3.8 (1.8)	5.9 (2.5)	5.3 (2.3)
Ratio	0.65	1.63	2.30	5.63	1.85	2.32

3.6. From the nMDS plot, the bird communities recorded from the managed and unmanaged areas are clearly separated (Figure 5). ANOSIM showed that the difference is significant ($P<0.001$). From SIMPER, the dissimilarity between bird assemblages in managed and unmanaged fields is 59.59%. SIMPER also showed that Little Egret *Egretta gazetta* (13.3%),

Chinese Pond Heron *Ardeola bacchus* (9.1%) and Wood Sandpiper (6.2%) are typical species in managed area while Masked Laughingthrush *Garrulux persipicillatus* (7.6%) and Spotted Dove *Streptopeilia chinensis* (6.9%) are typical species in unmanaged area due to their consistence presence in managed and unmanaged area respectively.

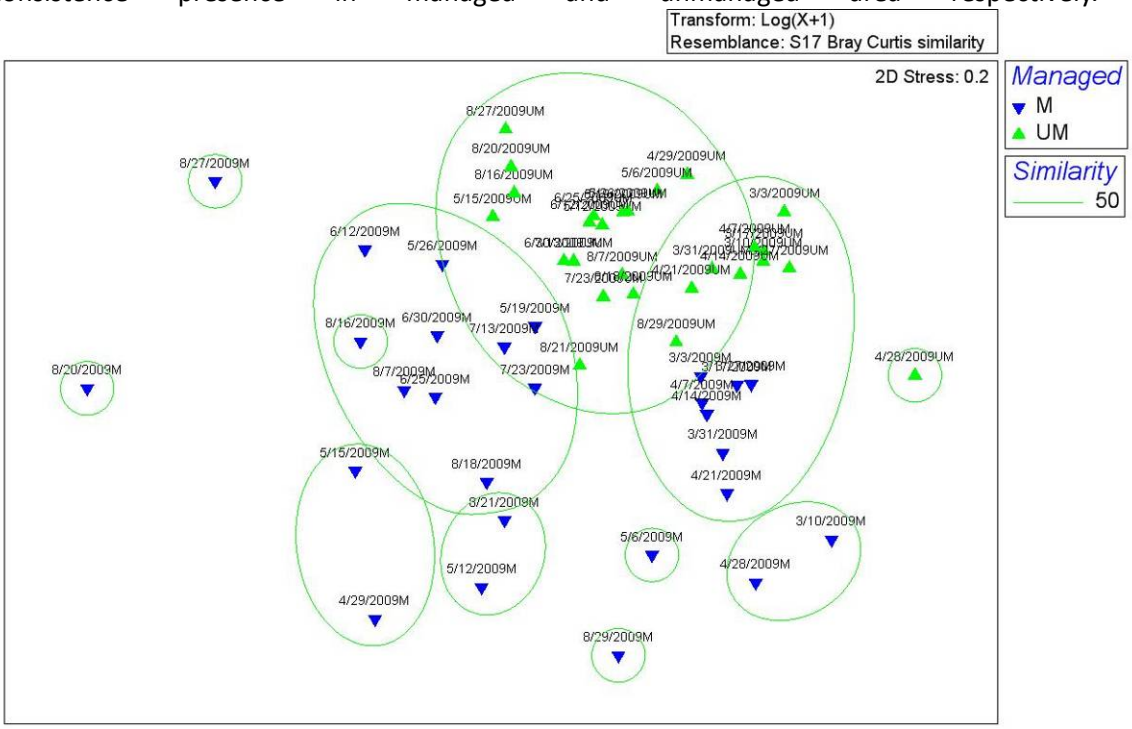

Figure 5. nMDS plot showing the bird assemblages recorded from managed and unmanaged fields.

3.7. 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 field (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 are all over 75% (Table 8). SIMPER show that Yellow-bellied Prinia *Prinia flaviventris* (32.8%), Little Egret (6.6%) and Chinese Bulbul *Pyncnonotus sinensis* (5.8%) are typical species in Fish Pond; Little Egret (27.2%), Wood Sandpiper (18.4%) and Chinese Pond Heron (10.4%) are typical species in Shallow Water Habitat; Wood Sandpiper (14.3%), Little Egret (14.2%) and Chinese Pond Heron (13.7%) are typical species in Wet Agricultural Land; Black-winged Stilt *Himantopus himantopus* (43.6%), Little Egret (24.7%) and Wood Sandpiper (4.8%) are typical species in Water Flea Pond; Lastly, Masked Laughingthrush (7.6%), Spotted Dove (6.9%) and Chinese Pond Heron (6.3%) are typical in Unmanaged Farmlands.

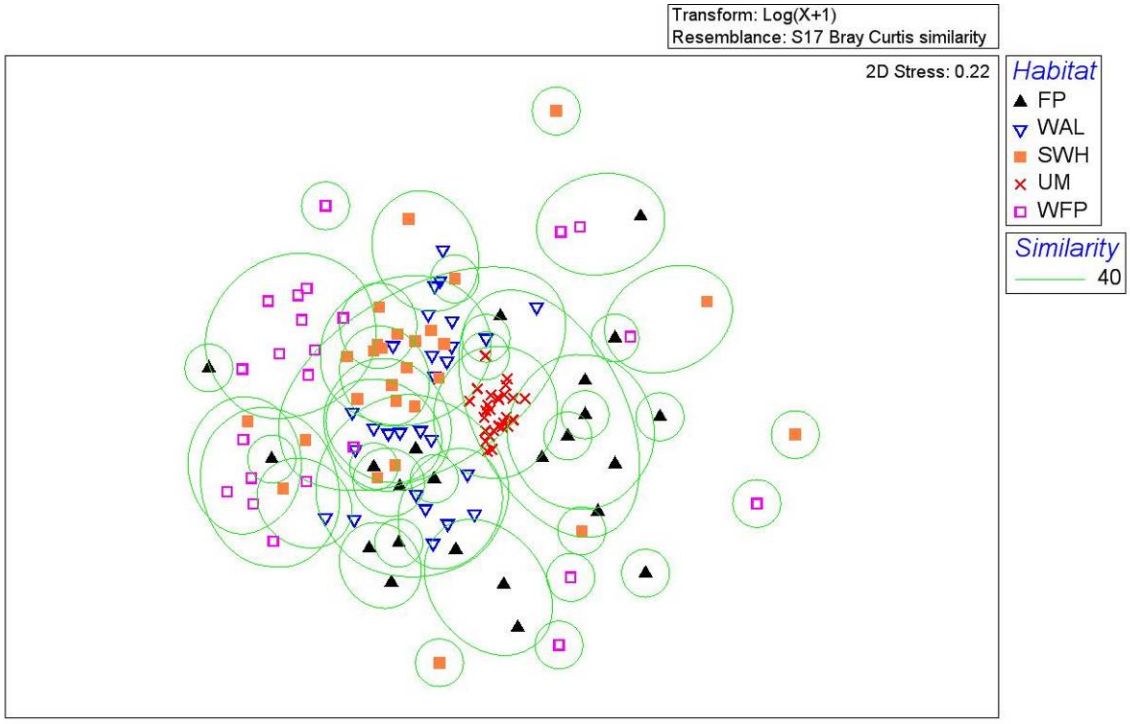

Figure 6. NMDS plot showing the bird assemblages recorded from different habitats. (FP: Fish Pond; SWH: Shallow Water Habitat; UM: Unmanaged fields; WAL: Less Intensive Wet Agricultural Land; WFP: Water Flea Pond)

Table 8. The dissimilarities of bird assemblages between each habitat type in spring and summer 2009.

	SWH	**WFP**	**WAL**	**UM**
WFP	87.46			
WAL	78.33	87.63		
UM	81.27	91.19	76.21	
FP	88.00	92.13	85.84	82.71

Less Intensive Wet agricultural land (WAL)

3.8. 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 across months (Table 9).

Table 9. Total area of managed WAL in the core and northern part of Long Valley in spring and summer 2009.

Months	Total area of managed fields (sq. ft.)
March	206,600
April	206,600
May	212,600
June	212,600
July	212,600
August	212,600

3.9. The management practice of WAL in spring and summer 2009 comprised of planting of

Paddy Rice, Water Chestnut, Chinese Arrowhead, Water Lily and Lotus.

3.10. The mean bird density in the managed WAL in spring 2009 was 35.1 (SD=22.7) which was 117% higher than that in spring 2008 while it was 31% lower than that in spring 2007 (Table 10).

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

	Spring 2007	Spring 2008	Spring 2009
Managed fields	51.1 (35.5)	16.2 (14.3)	35.1 (22.7)
Control fields	39.3 (38.9)	13.4 (16.7)	7.8 (5.4)

3.11. The mean bird density in the managed WAL in summer 2009 was 74.8 (SD=72) which was 146% higher than that in summer 2008 while it was 20% lower than that in summer 2007 (Table 11).

Table 11. Mean (SD) bird density (per 100,000 sq. ft.) in WAL and its control fields in summer 2007-2009.

	Summer 2007	Summer 2008	Summer 2009
Managed fields	93.0 (113.3)	30.4 (20.3)	74.8 (72.0)
Control fields	10.2 (8.0)	9.5 (6.6)	4.0 (3.7)

3.12. 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 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, Little Egret and Chinese Pond Heron with contributing percentage of 14.3%, 14.2% and 13.7% respectively; the typical species in unmanaged WAL are Spotted Dove, Wood Sandpiper and Oriental Magpie Robin *Copsychus saularis* with contributing percentage of 31.9%, 14.2% and 13.8% respectively.

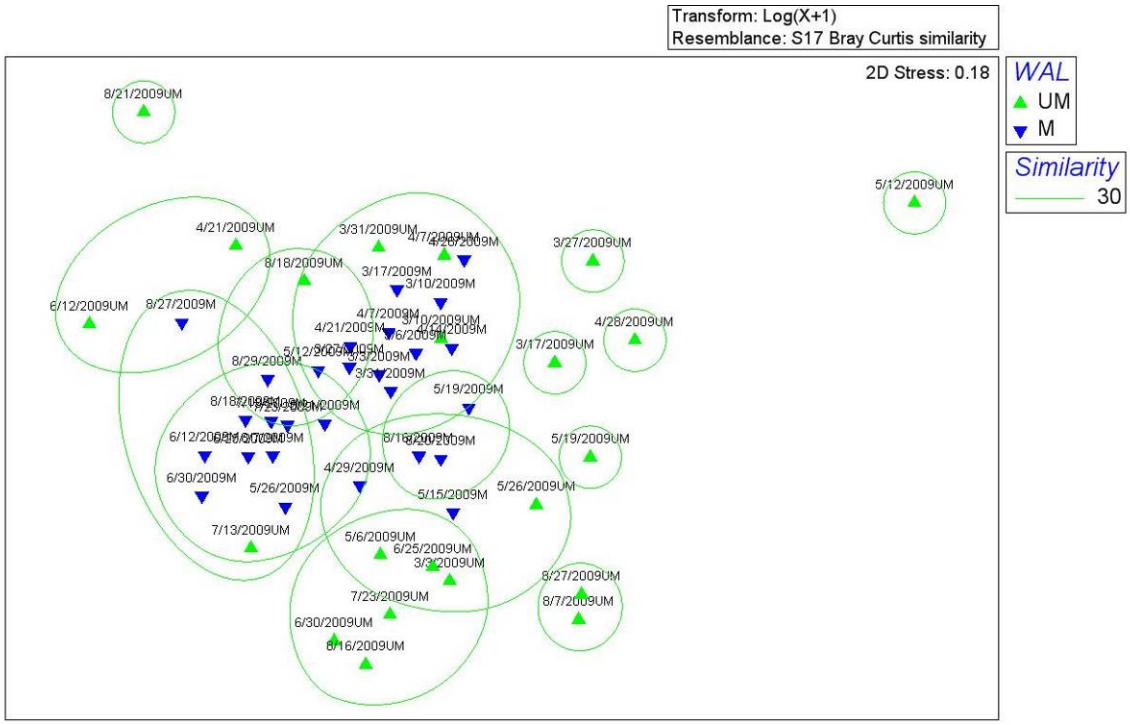

Figure 7. nMDS plot showing bird assemblages recorded from managed WAL and unmanaged agricultural lands (selected control fields).

Shadow Water Habitat (SWH)

3.13. 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 spring and summer 2009.

Months	Total area of managed fields (sq. ft.)
March	296,600
April	296,600
May	312,500
June	312,500
July	312,500
August	312,500

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

3.15. The mean bird densities recorded in managed SWH were 28.4 (SD=20.7) and 22.0 (SD=16.0) in spring and summer 2009 respectively. There were 26% and 131% increase compared to that in spring 2007 and 2008 respectively (Table 13), while 100% and 30% increase compared to that in summer 2007 and 2008 respectively.

Table 13. Mean (SD) bird density (per 100,000 sq. ft.) in managed SWH in spring and summer 2007-2009.

	2007	2008	2009
Spring	22.6 (21.4)	12.3(13.3)	28.4 (20.7)
Summer	11.0 (12.9)	16.9(9.2)	22.0 (16.0)

3.16. SWH in Long Valley were divided into two types in view of the status of vegetation: (i) SWH with high density (>50%) vegetation; (ii) SWH with low density (<50%) or none vegetation. For each type, five fields were chosen for analysis to investigate the impact of density of vegetation on birds inhabiting shallow water habitats.

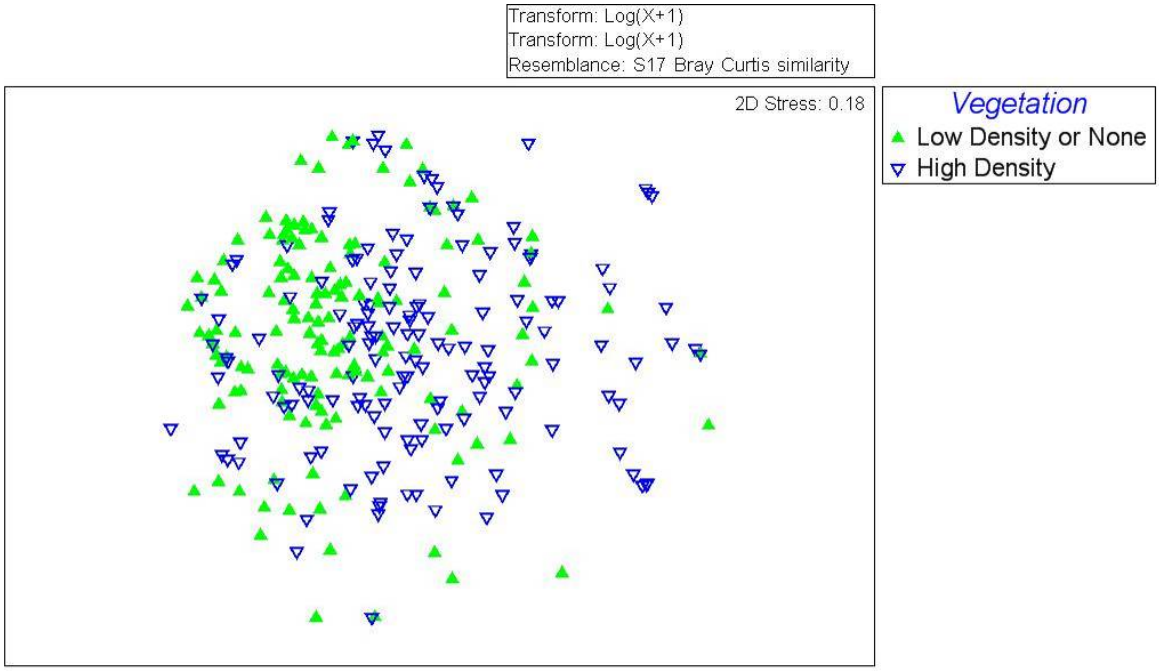

Figure 8. nMDS plot showing bird assemblages recorded in SWH with high density and low density or none vegetation.

The bird communities from two types of shallow water habitats were not clearly clustered (Fig. 8). However, ANOSIM showed significant differences ($P<0.001$). The percentage of dissimilarity of bird communities between two groups of SWH was 87% by SIMPER. Wood Sandpiper, Common Snipe *Gallinago gallinago* and Little Egret contributed the highest percentages to the dissimilarity. Among these three species, Wood Sandpiper and Little Egret were more abundant in SWH with low density or no vegetation, while Common Snipe was more abundant in that with high density vegetation.

Fish Pond

3.17. The managed area of fish pond remained at 134,128 sq. ft. in the current study period. Practices included fish farming and margin planting (Table 14).

Table 14. Total area of managed fish pond in the core and northern part of Long Valley in spring and summer 2009.

Months	Total area of managed fields (sq. ft.)
March	134,128
April	134,128
May	134,128
June	134,128
July	134,128
August	134,128

3.18. The mean bird densities in managed fishponds in spring and summer 2009 were about 8 to 12 times higher than that in spring and summer 2008 (Table 15 and 16).

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

	Spring 2008	Spring 2009

Managed fields	1.1 (1.0)	14.3 (8.5)
Control fields	0.1 (0.1)	4.8 (4.2)

Table 16. Mean (SD) bird density (per 100,000 sq. ft.) in managed fish ponds and its control fields in summer 2008 and 2009.

	Summer 2008	Summer 2009
Managed fields	1.6 (2.1)	15.7 (8.9)
Control fields	0.3 (0.2)	3.2 (2.9)

Water Flea Pond

3.19. In the period from March to August 2009, 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 densities recorded in spring and summer 2009 are the highest among three years, 2007 to 2009 (Table 17). It is also noted that the mean bird density in water flea ponds was generally higher in spring than in summer (Table 17).

Table 17. Mean (SD) bird density (per 100,000 sq. ft.) in water flea ponds in spring and summer 2006 - 2008

	2007	2008	2009
Spring	0.5 (0.4)	0.47 (0.45)	16.2 (10.5)
Summer	1.2 (1.3)	2.1 (2.8)	5.6 (4.8)

4. Discussion

4.1. The trend of the bird abundance in the core part of Long Valley in spring 2009 was similar to those in previous years which the abundance of bird decreased steadily from early spring (i.e. March) to late spring (May) due to the departure of winter visitors. In summer 2009, the abundance of birds fluctuated greater than previous years with unexpectedly high number of birds record in July. This was mainly because there were 108 and 281 White-rumped Munia *Lonchura striate* recorded in the two surveys in July. They were attracted by the planting of rice in different fields including 75, 77, 242, 257 and 266 in the core part of Long Valley.

4.2. There was a trend that the bird communities in the core part of Long Valley in spring and summer changed from 2006 to 2009 as shown by the result of SIMPER (Fig. 4). Wood Sandpiper and Yellow Wagtail contributed the highest percentages among all species and both species were at a rising trend in their abundance. There are two possible reasons for the gradual changes in the bird communities: (i) The management measures in Long Valley was increasingly effective, more individuals of target species, e.g. Wood Sandpiper, were attracted; (ii) There were progressively larger area being managed in Long Valley since 2006, the maximum capacity for target species rose and thus there were higher number of target bird species.

4.3. By nMDS plot, the bird communities between managed and unmanaged fields were spatially separated and there were significantly different by ANOSIM (Refer to 3.6). SIMPER showed that three target species, Little Egret, Chinese Pond Heron and Wood Sandpiper are typical

species in managed area which contribute 13.3%, 9.1% and 6.2% respectively, while Masked Laughingthrush and Spotted Dove are typical species in unmanaged area. This implied that current management practises were effective and essential in attracting these target wetland bird species. Comparing the bird assemblages in different managed habitats by nMDS, they were spatial clustered and were significantly different by ANOSIM. And different bird species were particularly attractive to certain habitat types. For example, majority of Black-winged Stilts in Long Valley were founding Water Flea Pond. Therefore maintaining diversity of managed habitat types in Long Valley is beneficial in enhancing its bird diversity.

4.4. The bird density in managed fields in spring and summer 2009 were lower than that in 2008 but higher than that in 2007 (Refer to 3.5). And by calculating the ratio of mean bird density in managed fields to that in unmanaged fields, it showed a similar result that birds in managed fields in spring and summer 2009 were less concentrated than that in 2008 but greater than that in 2007. This may be because of the expansion of managed area causing a dilution effect as birds are distributed in a larger managed area as the managed area in spring and summer 2009 is about 2 times than that in 2008.

4.6. The mean figure of Shannon index of birds counted in the core part of Long Valley in spring 2009 is 3.06 (SD=0.14) which was similar to that in 2008 (3.05, SD=0.15) but higher than that in 2007 (2.72, SD=0.34) (Refer to Appendix 1). It meant that the species richness recorded in spring 2009 is similar to that in 2008 but greater than in 2007. Species recorded in spring 2009 but not in spring 2008 and 2007 includes Little Swift *Apus affinis*, Blue-tailed Bee-eater *Merops philipinensis*, Asian Barred Owlet *Glaucidium cuculoides*, Pale Martin *Riparia diluta*, Chestnut Bunting *Emberiza rutila*, Common Starling *Sturnus vulgars*, Grey-capped Greenfinch *Carduelis sinica*, Striated Heron *Butorides striatus* and Rose-ringed Parakeet *Psittacula krameri*. The mean figure of Shannon index of birds recorded in summer 2009 was 2.70 (SD=0.38) which was slightly lower than that in 2008 (2.77, SD=0.12) but higher than that in 2007 (2.58, SD=0.39) (Refer to Appendix 1). However, the number of species recorded in summer 2009 was the highest compared to the previous two summers, which means that the species were found less evenly distributed in the core part of Long Valley though more species were recorded this year. The species recorded in summer 2009 but not in 2008 and 2007 include Grey-headed Lapwing *Vanellus cinereus*, Large Hawk Cuckoo *Hierococcux sparverioides*, Chinese Francolin *Francolinus pintadeanus*, Pied Kingfisher *Ceryle rudis*, Great Tit *Parus major* and Striated Heron.

4.7. The mean number of birds per unit area in managed WAL in spring and summer 2009 were higher than that in the control fields (Refer to Table 10 and 11). Wood Sandpiper, White-rumped Munia, Little Egret, Chinese Pond Heron and Scaly-breasted Munia were the main components causing the difference between the managed and controlled fields according to the result of SIMPER. The effectiveness of managed WAL to birds was more prominent in summer than in spring. A possible reason was that paddy rice, which was managed under the current project, got matured during the summer time and more residential birds such as White-rumped Munia and Scaly-breasted Munia were attracted to those fields, which explaining why the bird density recorded in managed WAL was higher in summer than that in spring.

4.8. There were considerable increases of mean bird density in SWH in spring and summer 2009 than that in the previous two years (Table 13). There was approximately 30% of increment in the area of managed SWH and many of them are spatially concentrated, e.g. fields 238e, 238f, 238g, 238i, 238j, 238k, 238l, 238n, 238o, 238p, 238q were all managed SWH and they were in close proximity. It is suggested that with the same area of SWH, those spatially

concentrated together is more attractive to birds than that are scattered around, thus this increased the mean bird density in managed SWH .

4.9. The mean bird density in managed fish ponds showed significant increment in spring 2009 and summer 2009 than those in previous years (Refer to 3.18). This may due to the size of managed fish ponds doubled. In managed fish ponds, we could see a diversity of bird species with several species slightly higher in abundances, including Yellow-bellied Prinia, Black-Collared Starling, White-breasted Waterhen, Chinese Pond Heron and Japanese White-eye *Zosterops japonicus.*

4.10 For the water flea ponds, there was a surge in the mean bird density in spring and summer 2009 than that in the two previous years (Table 17). This was probably because of the high abundance of Black-winged Stilt presence in the water flea ponds. They were regularly seen feeding in the water flea ponds during the surveys. This indicated that the food sources (i.e. aquatic invertebrates) in the water flea ponds were highly attractive to the Black-winged Stilt. A comparison of the bird communities in the water flea ponds between surveys in previous years will be included in the summary report to understand more about the changes in the bird communities and abundance of birds in the water flea ponds.

4.11 By comparing the bird communities recorded from selected SWHs with different vegetation density, the effects of different SWHs management measures could be better understood (Refer to 3.16). The analysis showed a significant difference between the bird communities in two types of SWH. And SIMPER also revealed that Wood Sandpiper and Little Egret prefer SWH with low density or no vegetation, while Common Snipe prefers SWH with high vegetation density.

4.12. There are some notable sightings recorded in spring and summer 2009 (Status follows Carey *et. al.* 2002 unless otherwise stated). They include:

Black-tailed Godwit *Limosa limosa*
Uncommon passage migrant in spring. One individual was photographed on 30th Apr in the field 221. This was the first record of this species in Long Valley.

Blue-tailed Bee-eater *Merops philippinus*
Scarce passage migrant. One sighting was record on 6th May.

Collared Crow *Corvus torquatus*
Uncommon and localized resident and most frequently recorded in the Deep Bay area. This status of this species was recently uplisted as 'near threatened' (IUCN 2009). This species were regularly recorded in Long Valley in small number. One individual was seen on 10th Mar and 21st Apr and two were seen on 30th Jun.

Citrine Wagtail *Motacilla citreola*
Scarce passage migrant. One individual was sighted on 3rd Mar, 17th Mar and 7th Apr.

Eurasian Spoonbill *Platalea leucorodia*
Scarce to uncommon winter visitor. One individual was photographed on 4th Apr in the field 221. This was the first record of this species in Long Valley

Pale Martin *Riparia diluta*
This species was formerly recognized as Sand Marin *Riparia riparia*. However, it was clarified

that all the individuals formerly seen should be belonged to Pale Martin *Riparia diluta* (HKBWS 2009). This species should be regarded as uncommon spring and scarce autumn passage migrant. Three individuals were recorded on 31st Mar in the field 223.

Rose-ringed Parakeet *Psittacula krameri*
Scarce feral resident. One individual was seen on 17th Mar in field 13. This was the first record of this species in Long Valley.

Chinese Egret *Egretta eulophotes*
Scarce spring passage migrant. This is a globally threatened species listed as Vulnerable (IUCN 2009). One individual was photographed on 5th Apr in field 238i. This was the first record of this species in Long Valley.

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). One individual was seen on 31st Mar, 7th and 28 Apr.

Far Eastern Curlew *Numernius madagascariensis*
Scarce passage migrant, primarily in spring. One individual was photographed on 10th Apr (HKBWS 2009). This was the first record of this species in Long Valley.

4.13. Figure 11 to 17 showed the distribution map of different bird groups in the core and northern part of Long Valley during the study period. From the figures, managed wetland habitats were still attractive to birds though specific preference on managed habitats was not detected, except Greater Painted Snipe. Fig. 13 showed that Greater Painted Snipes recorded are confined to several specific farmlands and those farmland groups are separated from each other. Since the reporting period was the breeding season of Greater Painted Snipes, we can interpret that there were at least three breeding pairs/groups in Long Valley.

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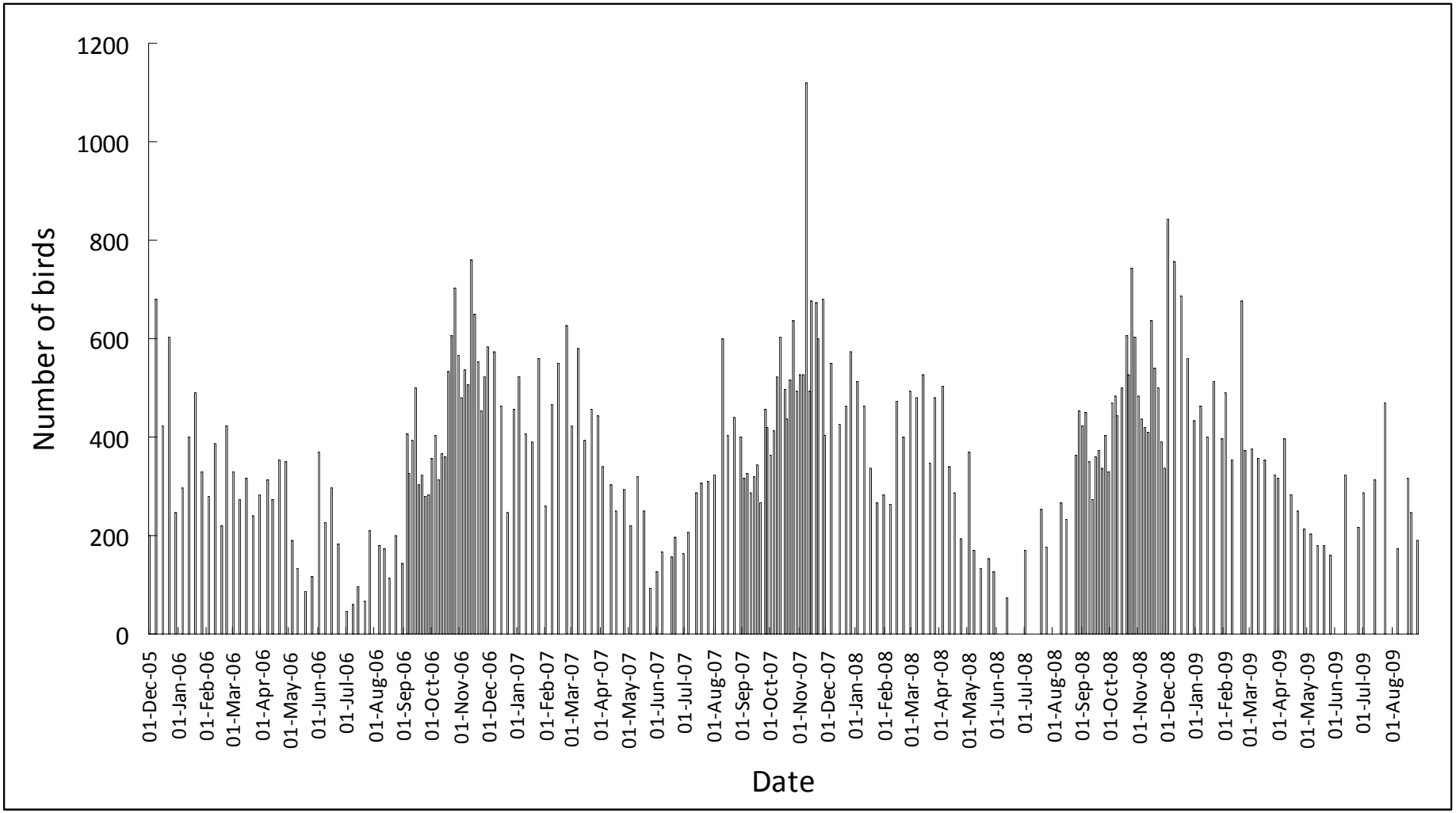

Figure 9. Total numbers of birds recorded in the core part of Long Valley from December 2005 to August 2009.

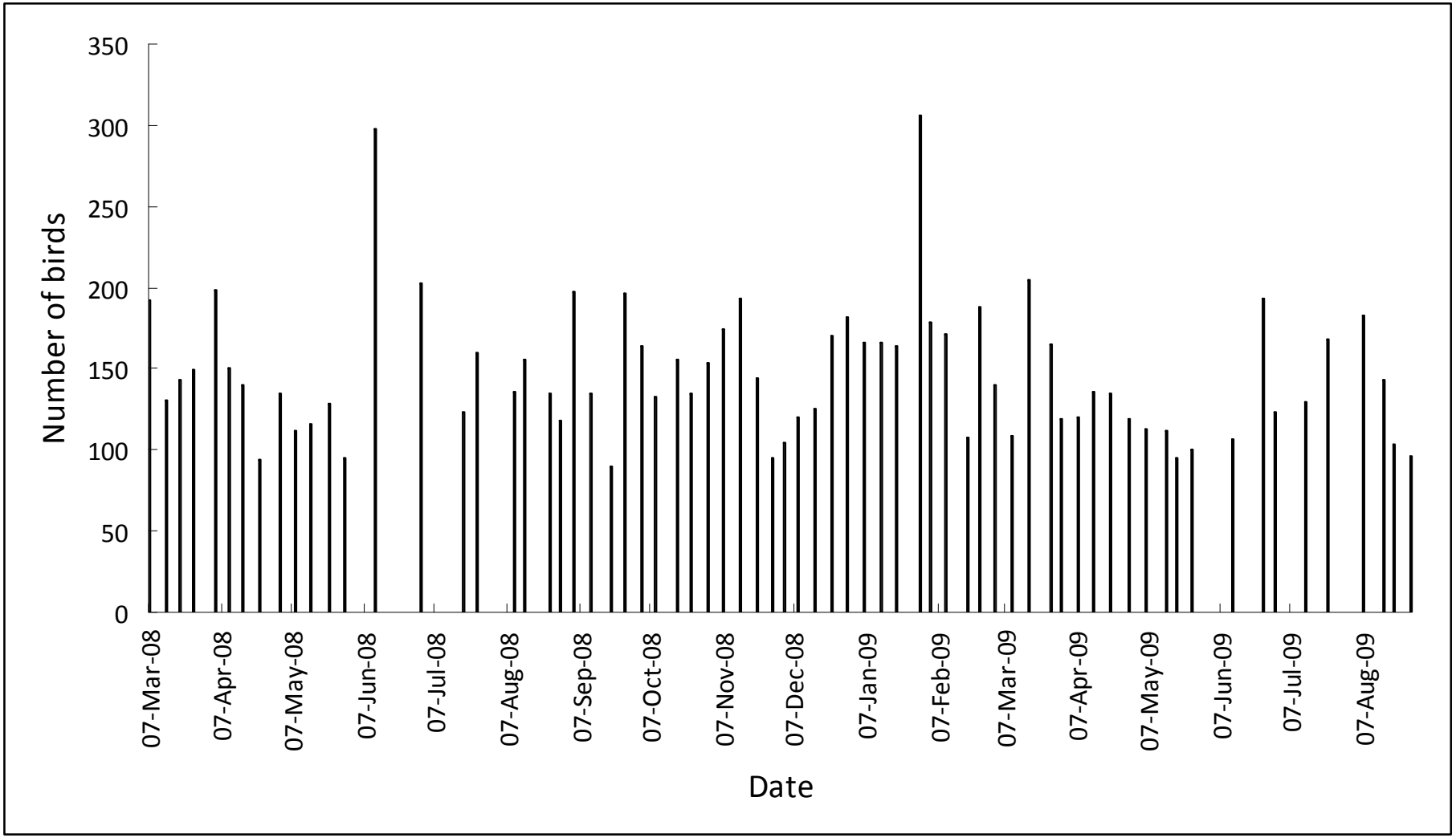

Figure 10. Total number of birds recorded in the northern part of Long Valley from March 2008 to August 2009.

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

Spring 2007				Spring 2008				Spring 2009			
Date	Total no.	No. of species	Index	Date	Total no.	No. of species	Index	Date	Total no.	No. of species	Index
1 Mar	423	43	3.11	7 Mar	474	46	3.21	3 Mar	376	46	3.27
8 Mar	579	37	2.75	14 Mar	528	46	3.01	10 Mar	358	37	2.88
15 Mar	395	47	3.02	20 Mar	347	37	3.06	17 Mar	353	48	3.23
22 Mar	456	37	2.65	26 Mar	478	39	2.83	27 Mar	323	41	3.01
29 Mar	443	32	2.79	4 Apr	500	51	3.30	31 Mar	316	48	3.12
4 Apr	318	37	2.93	10 Apr	339	48	3.20	7 Apr	398	46	3.13
12 Apr	304	34	2.98	16 Apr	285	47	3.01	14 Apr	282	38	3.06
18 Apr	251	34	3.04	23 Apr	190	40	3.20	21 Apr	251	38	3.07
26 Apr	293	35	2.76	2 May	370	37	2.83	28 Apr	213	37	2.74
3 May	220	25	2.56	8 May	171	34	3.11	6 May	204	34	2.94
10 May	316	25	2.30	15 May	134	27	2.88	12 May	181	35	3.11
17 May	248	19	1.98	23 May	152	30	2.99	19 May	179	33	3.08
24 May	93	15	2.42	29 May	126	30	3.06	26 May	161	36	3.19
31 May	124	21	2.94								
	319 (132)	31.5 (9.25)	2.72 (0.34)		315 (150)	39.4 (7.77)	3.05 (0.15)		277 (83)	39.8 (5.42)	3.06 (0.14)

Summer 2007				Summer 2008				Summer 2009			
Date	Total no.	No. of species	Index	Date	Total no.	No. of species	Index	Date	Total no.	No. of species	Index
7 Jun	166	18	2.04	11 Jun	73	22	2.71	12 Jun	322	33	2.81
16 Jun	152	19	1.78	1 Jul	169	28	2.96	25 Jun	216	33	2.85
21 Jun	197	21	2.08	19 Jul	253	31	2.83	30 Jun	288	36	2.38
30 Jun	164	22	2.41	25 Jul	176	24	2.68	13 Jul	313	33	3.07
5 Jul	207	25	2.76	10 Aug	266	28	2.76	23 Jul	470	29	1.87
13 Jul	280	27	3.01	14 Aug	230	24	2.59	7 Aug	173	23	2.58
18 Jul	291	32	2.69	25 Aug	363	31	2.90	18 Aug	316	32	2.72
25 Jul	301	32	3.07	29 Aug	452	29	2.69	21 Aug	246	32	3.01
2 Aug	325	31	2.71					29 Aug	191	33	2.98
11 Aug	592	32	2.70								
16 Aug	403	29	2.69								
23 Aug	433	38	2.88								
30 Aug	396	31	2.72								
	301 (130)	27.5 (6.05)	2.58 (0.39)		248 (118)	27.1 (3.40)	2.77 (0.12)		282 (90)	31.4 (3.89)	2.70 (0.38)

Appendix 2. Total numbers, numbers of species and diversity indices (Shannon index) of birds counted in agricultural fields in northern part of Long Valley, spring and summer 2008 and 2009.

Spring 2008				Spring 2009			
Date	Total no.	No. of species	Index	Date	Total no.	No. of species	Index
7 Mar	192	30	2.92	3 Mar	140	36	3.27
14 Mar	131	28	3.04	10 Mar	109	37	3.11
20 Mar	130	36	3.32	17 Mar	205	41	3.11
26 Mar	149	33	3.16	27 Mar	165	34	2.85
4 Apr	199	35	3.12	31 Mar	119	40	3.38
10 Apr	130	41	3.39	7 Apr	120	35	3.21
16 Apr	140	37	3.26	14 Apr	136	42	3.30
23 Apr	94	29	3.11	21 Apr	135	32	2.84
2 May	135	31	3.07	28 Apr	119	34	3.10
8 May	111	29	3.06	6 May	113	30	3.04
15 May	116	26	2.90	12 May	112	27	2.89
23 May	128	29	2.96	19 May	95	31	3.03
29 May	95	27	2.96	26 May	100	29	3.06
Mean (SD)	135 (31.5)	31.6 (4.46)	3.10 (0.15)		128 (29.6)	34.6 (4.86)	3.09 (0.17)

Spring 2008				Summer 2009			
Date	Total no.	No. of species	Index	Date	Total no.	No. of species	Index
11 Jun	298	33	2.31	12 Jun	107	24	2.78
1 Jul	203	29	2.95	25 Jun	193	28	2.66
19 Jul	123	22	2.39	30 Jun	123	24	2.62
25 Jul	160	25	2.73	13 Jul	130	26	2.78
10 Aug	135	32	3.13	23 Jul	168	26	2.78
14 Aug	156	32	3.14	7 Aug	183	25	2.79
25 Aug	135	28	2.99	18 Aug	143	25	2.78
29 Aug	118	28	2.88	21 Aug	103	26	2.89
				29 Aug	96	25	2.96
Mean (SD)	166 (59.8)	28.6 (3.78)	2.82 (0.32)		138 (35.7)	25.4 (1.24)	2.78 (0.10)

Appendix 3. Total numbers, numbers of species and diversity indices (Shannon index) of birds counted in the *feng-shui* wood in Ho Sheung Heung, spring and summer 2008 and 2009.

Spring 2008				Spring 2009			
Date	Total no.	No. of species	Index	Date	Total no.	No. of species	Index
7 Mar	79	19	2.48	3 Mar	83	18	2.85
14 Mar	89	18	2.48	10 Mar	73	22	3.22
20 Mar	98	15	2.16	17 Mar	109	19	2.73
26 Mar	53	13	2.10	27 Mar	74	18	2.97
4 Apr	85	15	2.42	31 Mar	85	18	2.53
10 Apr	105	17	2.44	7 Apr	106	20	2.99
16 Apr	73	16	2.47	14 Apr	78	15	2.95
23 Apr	88	19	2.59	21 Apr	65	16	2.91
2 May	49	12	2.05	28 Apr	108	17	2.96
8 May	79	20	2.67	6 May	114	18	2.46
15 May	73	16	2.49	12 May	52	12	2.57
23 May	67	15	2.40	19 May	43	13	2.77
29 May	56	11	2.02	26 May	83	13	2.48
Mean (SD)	76.5 (17.1)	15.8 (2.76)	2.37 (0.21)		82.5 (23.1)	16.8 (2.94)	2.80 (0.23)

Summer 2008				Summer 2009			
Date	Total no.	No. of species	Index	Date	Total no.	No. of species	Index
11 Jun	48	12	2.13	12 Jun	60	8	1.67
1 Jul	52	12	2.13	25 Jun	27	10	2.05
19 Jul	21	12	1.54	30 Jun	34	11	2.10
25 Jul	48	10	2.16	13 Jul	59	13	2.60
10 Aug	53	12	2.16	23 Jul	61	11	1.99
14 Aug	61	12	2.06	7 Aug	75	9	1.80
25 Aug	67	13	2.19	18 Aug	40	12	1.79
29 Aug	39	10	1.99	21 Aug	75	10	2.26
				29 Aug	58	9	1.86
Mean (SD)	48.6 (14.0)	11.6 (1.06)	2.05 (0.21)		52.7 (16.9)	10.3 (1.58)	2.01 (0.28)

Appendix 4. Species list and average abundance of birds counted in the core part of Long Valley during the reporting period.

Bird Species	Average Abundance	Bird Species	Average Abundance
Asian Barred Owlet	0.14	Eurasian Tree Sparrow	4.14
Barn Swallow	14.05	Great Egret	0.86
Besra	0.05	Great Tit	0.05
Black Drongo	1.23	Greater Coucal	0.55
Black Kite	0.36	Greater Painted Snipe	1.41
Black-collared Starling	10.68	Green Sandpiper	0.50
Black-crowned Night Heron	0.27	Grey Heron	0.14
Black-faced Bunting	0.09	Grey Wagtail	0.14
Black-winged Stilt	8.68	Grey-capped Greenfinch	0.05
Blue-tailed Bee-eater	0.27	Grey-headed Lapwing	0.18
Bluethroat	0.45	Hill Myna	0.05
Cattle Egret	7.73	Indian Cuckoo	0.41
Chestnut Bunting	0.05	Japanese Bush Warbler	0.05
Chinese Bulbul	2.86	Japanese White-eye	0.59
Chinese Francolin	0.32	Large Hawk Cuckoo	0.59
Chinese Pond Heron	9.68	Little Bunting	0.09
Chineses Bulbul	0.18	Little Egret	12.23
Cinnamon Bittern	0.09	Little Ringed Plover	5.55
Citrine Wagtail	0.14	Little Swift	4.41
Collared Crow	0.18	Long-tailed Shrike	5.77
Common Blackbird	0.05	Long-toed Stint	0.18
Common Buzzard	0.09	Masked Laughingthrush	9.45
Common Kingfisher	0.32	Olive-backed Pipit	1.05
Common Koel	1.00	Oriental Magpie Robin	5.27
Common Magpie	0.64	Oriental Pratincole	0.05
Common Moorhen	0.32	Oriental Reed Warbler	0.05
Common Myna	0.77	Oriental Turtle Dove	0.05
Common Sandpiper	1.05	Pacific Golden Plover	0.14
Common Snipe	7.45	Pacific Swift	0.14
Common Starling	0.05	Pale Martin	0.14
Common Stonechat	2.36	Pied Kingfisher	0.14
Common Tailorbird	0.45	Pintail Snipe	2.27
Commoon Moorhen	0.05	Plain Prinia	2.82
Crested Myna	9.68	Plaintive Cuckoo	0.64
Dusky Warbler	1.41	Red-billed Starling	4.68

Red-necked Stint	0.23	Red-throated Pipit	5.18
Red-whiskered Bulbul	2.23	White-rumped Munia	32.77
Richard's Pipit	1.95	White-shouldered Starling	1.41
Rock Dove	2.05	White-throated Kingfisher	1.00
Rose-ringed Parakeet	0.05	Wood Sandpiper	29.55
Scaly-breasted Munia	13.86	Yellow Bittern	0.05
Sooty-headed Bulbul	2.00	Yellow Wagtail	11.77
Spotted Dove	9.77	Yellow-bellied Prinia	6.27
Striated Heron	0.09	Yellow-breasted Bunting	0.14
White Wagtail	6.09	Yellow-browed Warbler	0.18
White-breasted Waterhen	2.95	Zitting Cisticola	1.14

Appendix 5. Species list and average abundance of birds counted in the northern part of Long Valley during the reporting period.

Bird Species	Average Abundance	Bird Species	Average Abundance
Asian Barred Owlet	0.09	Greater Coucal	0.64
Asian House Martin	0.18	Greater Painted Snipe	0.14
Azure-winged Magpie	0.09	Green Sandpiper	1.68
Barn Swallow	10.27	Grey Heron	0.59
Besra	0.05	Grey Wagtail	0.27
Black Bittern	0.05	Hair-crested Drongo	0.05
Black Drongo	0.55	Hill Myna	0.05
Black Kite	0.23	Indian Cuckoo	0.41
Black-collared Starling	11.41	Japanese White-eye	7.05
Black-crowned Night Heron	0.68	Large Hawk Cuckoo	0.73
Black-faced Bunting	0.18	Large-billed Crow	0.14
Black-winged Stlit	0.05	Lesser Coucal	0.18
Blue Magpie	0.05	Little Egret	4.82
Bluethroat	0.05	Little Ringed Plover	0.09
Bonelli's Eagle	0.05	Little Swift	0.32
Brown Shrike	0.05	Long-tailed Shrike	2.91
Cattle Egret	2.05	Masked Laughingthrush	8.95
Chinese Bulbul	6.95	Olive-backed Pipit	1.05
Chinese Francolin	0.27	Oriental Magpie Robin	4.50
Chinese Pond Heron	6.50	Pale Martin	0.14
Collared Crow	0.05	Pied Kingfisher	0.50
Common Kingfisher	0.77	Pintail Snipe	0.09
Common Koel	2.00	Plain Prinia	1.14
Common Magpie	2.91	Plaintive Cuckoo	0.36
Common Moorhen	0.09	Red-throated Pipit	0.09
Common Sandpiper	0.64	Red-whiskered Bulbul	4.41
Common Stonechat	0.64	Richard's Pipit	0.05
Common Tailorbird	1.86	Scaly-breasted Munia	5.77
Crested Goshawk	0.05	Sooty-headed Bulbul	0.73
Crested Myna	5.05	Spotted Dove	4.41
Daurian Redstart	0.05	Striated Heron	0.09
Dusky Warbler	0.91	White Wagtail	2.59
Eurasian Tree Sparrow	8.45	White-breasted Waterhen	2.82
Great Egret	0.68	White-rumped Munia	0.55
Great Tit	0.09	White-shouldered Starling	0.50

White-throated Kingfisher	0.68	Yellow-bellied Prinia	4.45
Wood Sandpiper	1.86	Yellow-billed Grosbeak	0.05
Yellow Wagtail	1.95	Yellow-browed Warbler	0.68

Appendix 6. Species list and average abundance of birds counted in the *feng-shui* wood in Ho Sheung Heung during the reporting period.

Bird Species	**Average Abundance**	**Bird Species**	**Average Abundance**
Barn Swallow	3.14	Japanese White-eye	10.27
Black-collared Starling	0.27	Large Hawk Cuckoo	0.32
Black-naped Monarch	0.09	Large-billed Crow	0.05
Bonelli's Eagle	0.05	Little Egret	0.14
Chinese Bulbul	7.86	Little Swift	0.55
Chinese Francolin	0.09	Long-tailed Shrike	0.14
Common Buzzard	0.05	Masked Laughingthrush	3.05
Common Koel	1.05	Oriental Magpie Robin	4.32
Common Tailorbird	4.14	Plain Prinia	0.09
Crested Goshawk	0.05	Plaintive Cuckoo	0.23
Crested Myna	0.82	Red-whiskered Bulbul	16.45
Emarald Dove	0.05	Rock Dove	0.14
Eurasian Tree Sparrow	5.68	Scaly-breasted Munia	0.36
Fork-tailed Sunbird	0.77	Scarlet-backed Flowerpecker	1.05
Great Tit	1.45	Sooty-headed Bulbul	0.36
Greater Coucal	0.59	Spotted Dove	3.45
Grey Wagtail	0.09	White Wagtail	0.32
Grey-backed Thrush	0.23	Yellow-bellied Prinia	0.41
Indian Cuckoo	0.14	Yellow-browed Warbler	0.59

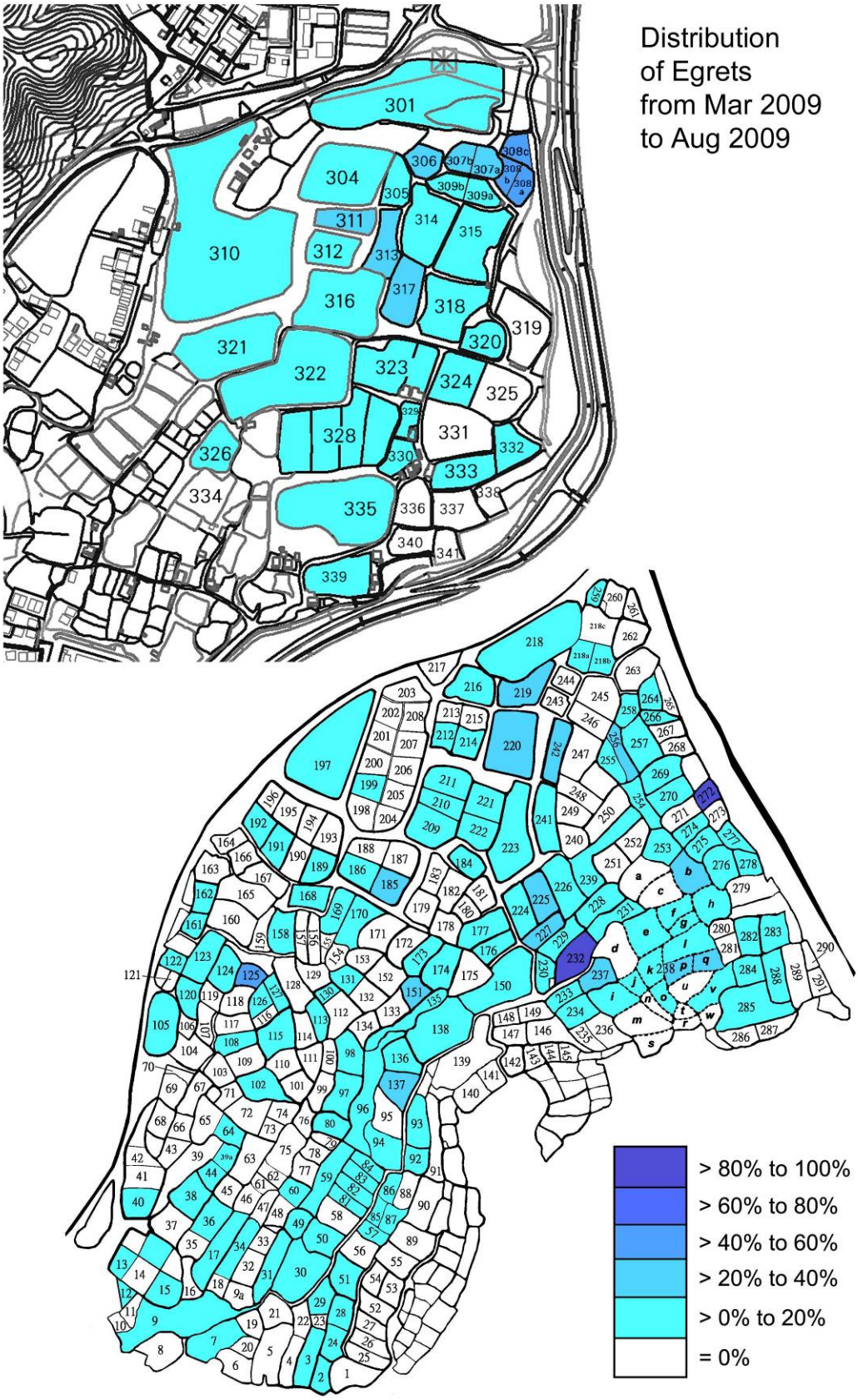

Figure 11. Distribution map of Ardeids in the core and northern part of Long Valley during spring and summer 2009.

Figure 12. Distribution map of snipes in the core and northern part of Long Valley during spring and summer 2009.

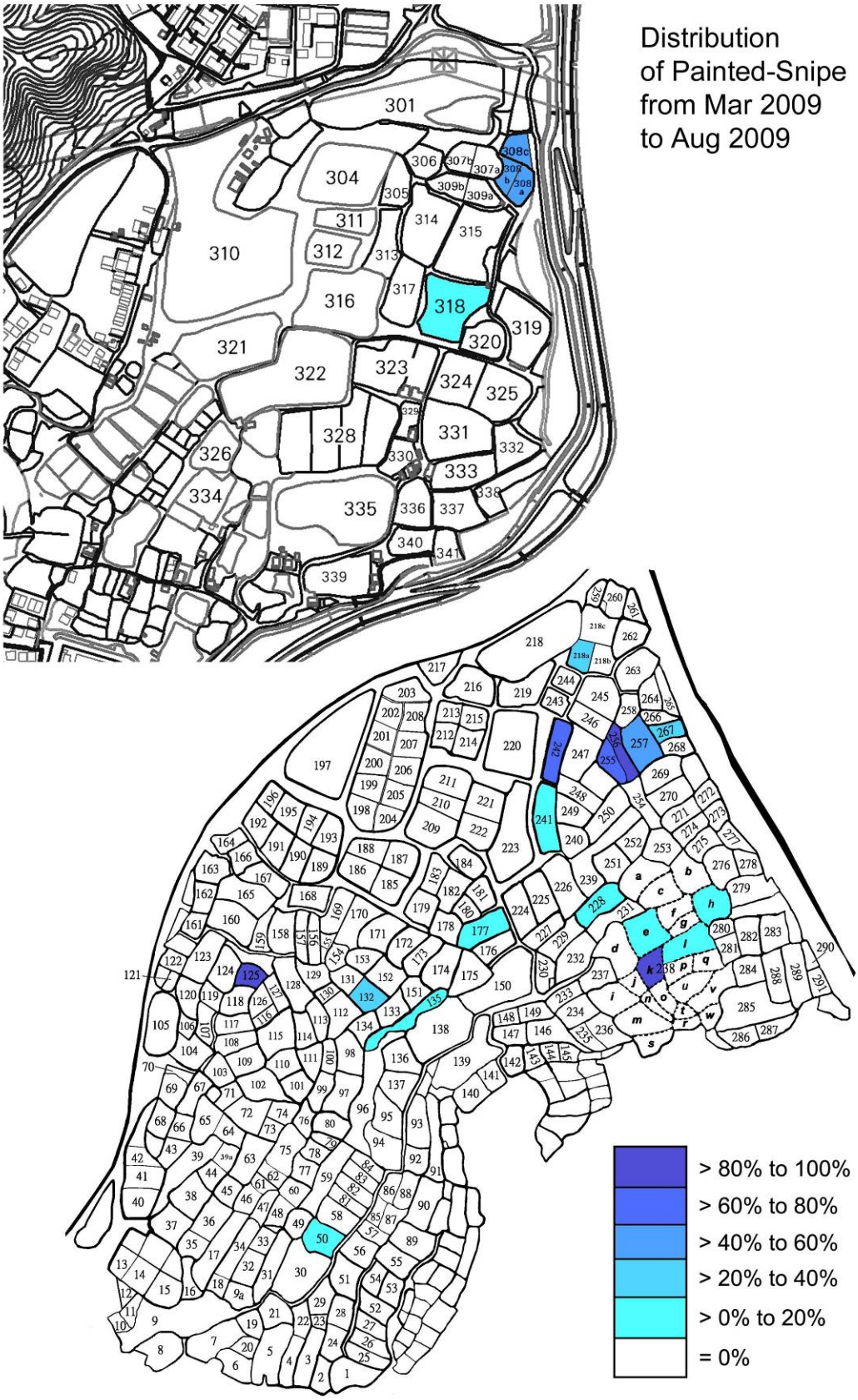

Figure 13. Distribution map of Greater Painted Snipe in the core and northern part of Long Valley during spring and summer 2009.

Figure 14. Distribution map of waders in the core and northern part of Long Valley during spring and summer 2009.

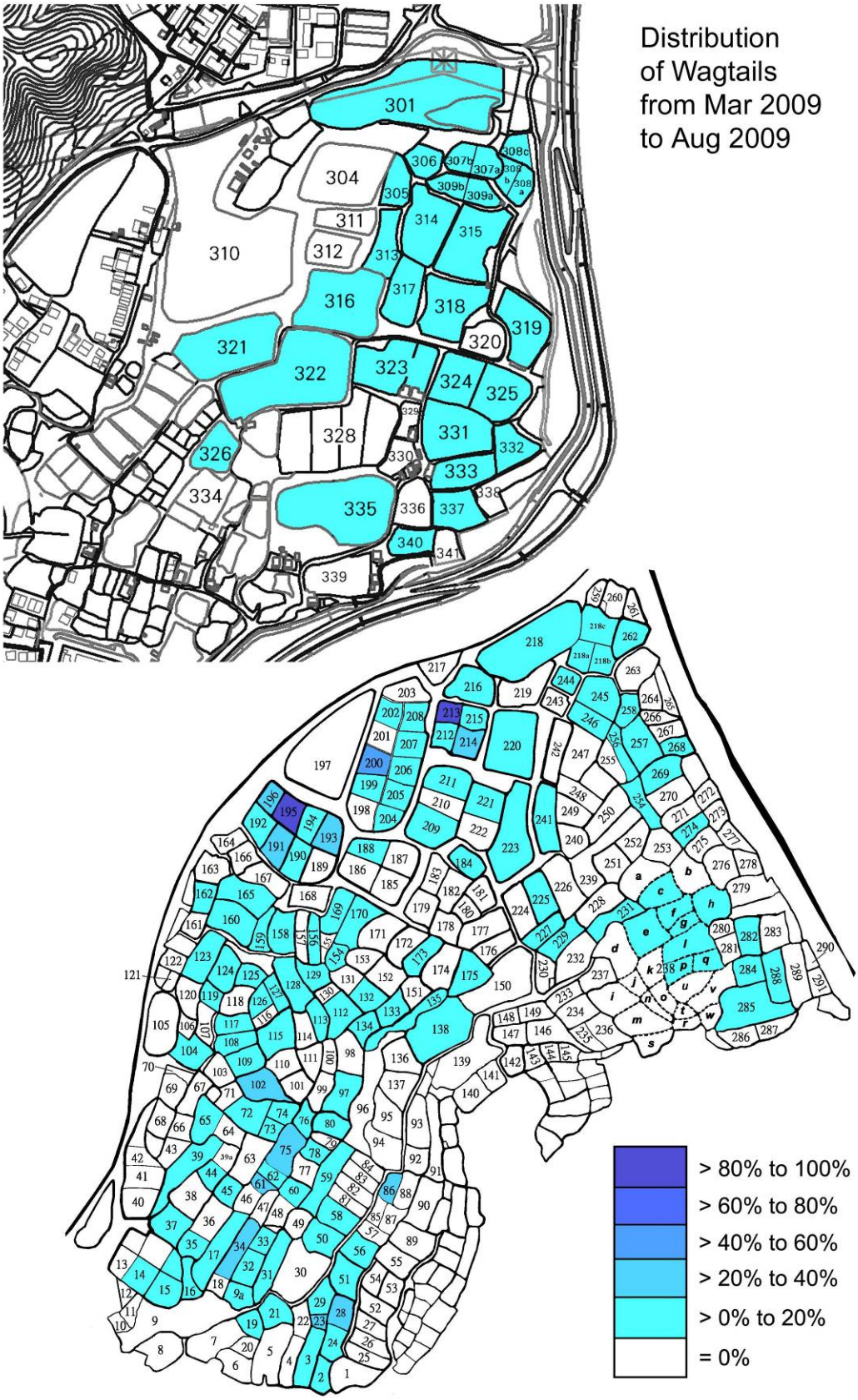

Figure 15. Distribution map of wagtails in the core and northern part of Long Valley during spring and summer 2009.

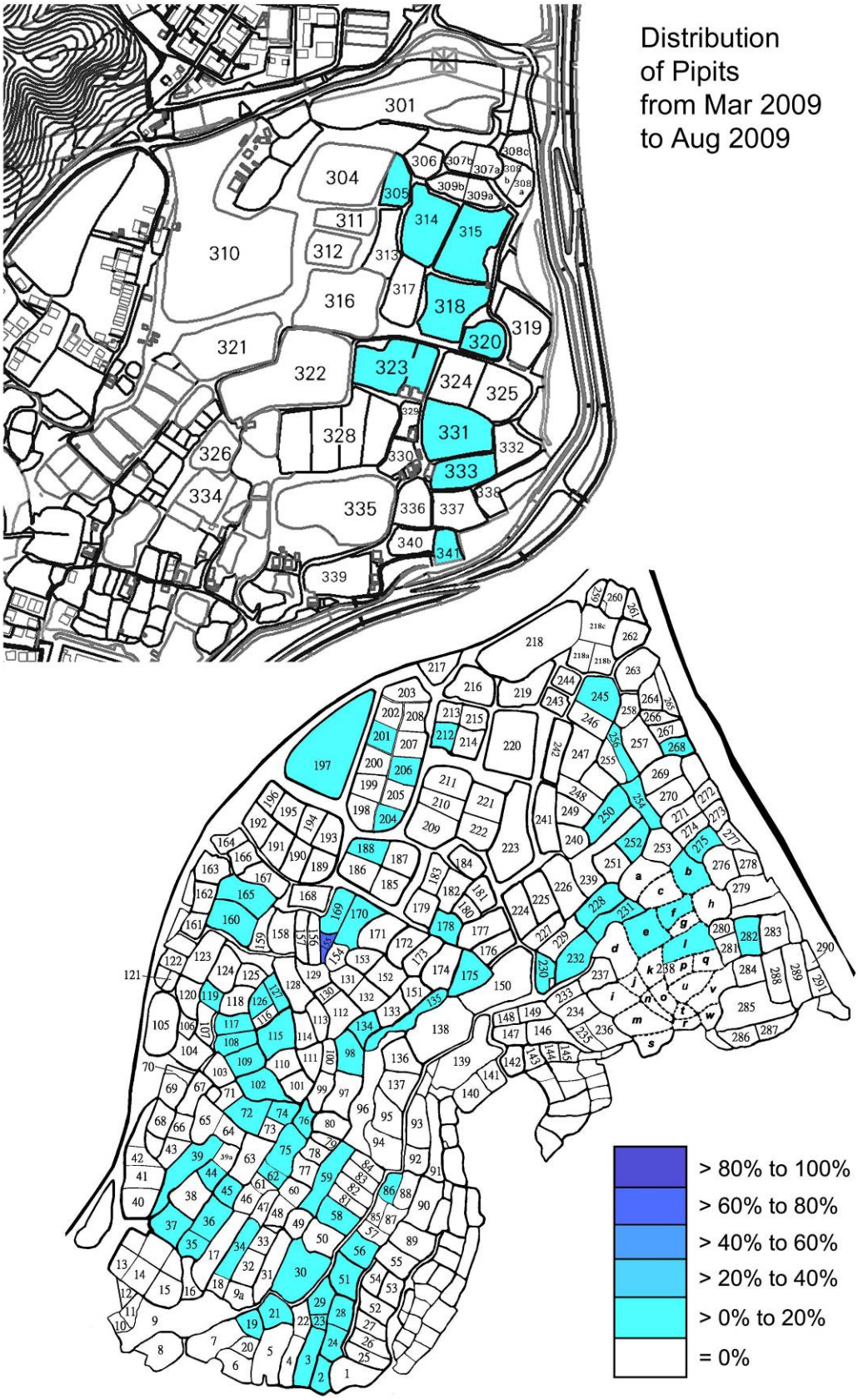

Figure 16. Distribution map of pipits in the core and northern part of Long Valley during spring and summer 2009.

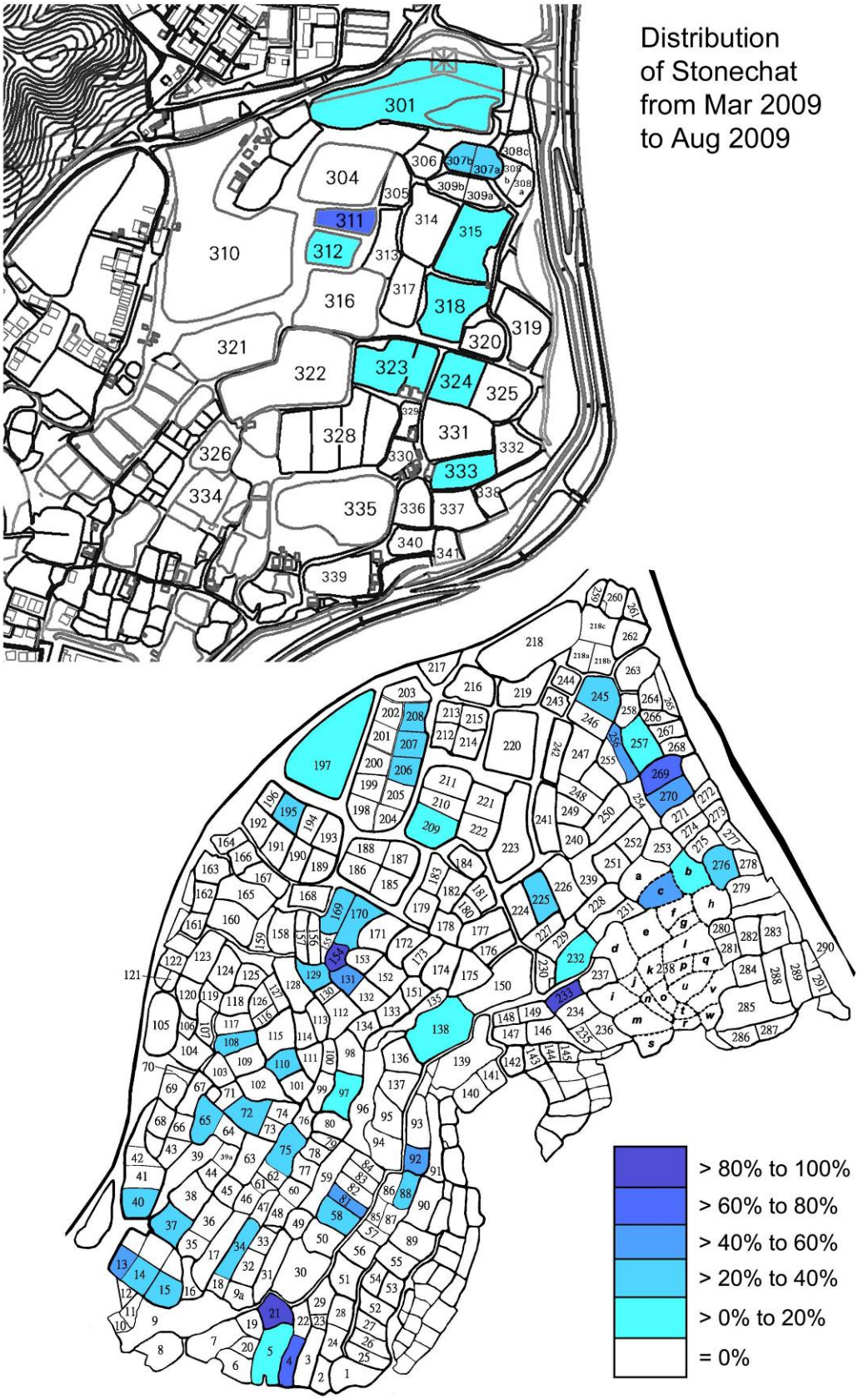

Figure 17. Distribution map of Common Stonechat in the core and northern part of Long Valley during spring and summer 2009.