Nature Conservation Management for Long Valley 2010-2012

BIRD MONITORING PROGRAMME

Programme 2010/12

March 2011 to February 2012

Summary Report – March 2011 to February 2012

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1. Background

- 1.1. The Environment and Conservation Fund (ECF) supports a joint project: Nature Conservation Management for Long Valley 2010-2012, 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 2010.
- 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 the period from March 2011 to February 2012 which covers spring, summer, autumn and winter.

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 Fig. 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.

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2.2. Surveys in the core part and northern part of Long Valley were done once a week in except that they were conducted once per two weeks in June and July. A total of 56 surveys were conducted for the core area and northern part of Long Valley respectively as shown below:

2011 March: 8, 14, 22, 28 2011 April: 5,11 18, 26 2011 May: 3, 9, 16, 23, 30 2011 June: 6, 20 2011 July: 4, 18 2011 August: 1, 8, 15, 22, 29 2011 September: 5, 12, 19, 26 2011 October: 4, 10, 17, 24, 31 2011 November: 7, 14, 21, 28 2011 December: 5, 12, 19, 26 2012 January: 3, 9, 16, 23, 30 2012 February: 6, 13, 20, 27

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

2.4. Non-parametric 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 managed fields and unmanaged fields and (2) managed wetland habitats and control fields.

2.5. 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 managed fields and unmanaged fields and (2) managed wetland habitats and control fields.

3. Results

Overview

3.1. For the core part of Long Valley, the peak counts of number of birds in this report period (i.e. March 2011 to February 2012) in four seasons were 777 on 14 March, 273 on 22 August, 905 on 17 October and 944 on 5 December respectively. The lowest abundance recorded were 212 on 23 May, 182 on 20 Jun, 293 on 12 September and 380 on 23 January respectively. Notably, the number of birds recorded in spring , i.e. March, April and May, 2011 were considerably higher than that recorded in previous years (Table 1).

Table 1. Numbers in each count, monthly mean number of birds counted at the core part of Long
Valley, spring, summer, autumn 2011 and winter 2011/2012, and the mean numbers (SD in
parenthesis) in from spring 2006 to winter 2011/2012

	Spring 2011			Summer 2011		
	March	April	May	June	July	August
Numbers of bird counted	700,777,	682,496,	542,446,	209,182	219,199	213,236,
in each survey	741,774	509,553	352,212,			250,
-			232			273,258
2011: Mean (SD)	748(36)	560(85)	357(140)	196(19)	209(14)	246(23)
2010: Mean (SD)	387(93)	348(99)	225(93)	314(60)	223(0.71)	438(64)
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)
	Autumn 2011			Winter 2011/2012		
	September	October	November	December	January	February
Numbers of bird counted	299,293	716,744,	627,871,	944,626,	709,608	627,655,
in each survey	494,505	905,887,	843,840	672,546	657,380,	484,523
		833			554	
2011: Mean (SD)	398(118)	817(84)	795(113)	697(173)	582(127)	572(82)
2010: Mean (SD)	808(374)	831(119)	807(147)	834(275)	713(159)	589(67)
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)

3.2. The highest number of species recorded in four seasons in the report period were 57 on 14 March, 41 on 29 August, 63 on 14 November and 61 on 19 December respectively. The number of species recorded in spring 2011 was higher than that in previous years whereas the numbers of species recorded in other seasons were similar (Table 2).

Table 2. Mean numbers of species (SD in parenthesis) counted in core part of Long Valley, from spring 2007 to winter 2011/2012.

	<u>Spring</u>	<u>Summer</u>
	No. of species	No. of species
2011: Mean (SD)	44 (10)	32 (5)
2010: Mean (SD)	39 (6)	32 (3)
2009: Mean (SD)	40 (5)	27 (3)
2008: Mean (SD)	39 (8)	27 (3)
2007: Mean (SD)	32 (9)	28 (6)
	Autumn	Winter
	<u>Autumn</u> No. of species	<u>Winter</u> No. of species
2011: Mean (SD)	<u>Autumn</u> No. of species 53 (8)	Winter No. of species 49 (6)
2011: Mean (SD) 2010: Mean (SD)	<u>Autumn</u> No. of species 53 (8) 54 (6)	<u>Winter</u> No. of species 49 (6) 50 (4)
2011: Mean (SD) 2010: Mean (SD) 2009: Mean (SD)	<u>Autumn</u> No. of species 53 (8) 54 (6) 43 (8)	<u>Winter</u> No. of species 49 (6) 50 (4) 45 (4)
2011: Mean (SD) 2010: Mean (SD) 2009: Mean (SD) 2008: Mean (SD)	<u>Autumn</u> No. of species 53 (8) 54 (6) 43 (8) 40 (6)	<u>Winter</u> No. of species 49 (6) 50 (4) 45 (4) 44 (3)

- 3.3 For the agricultural land in the northern part of Long Valley, the peak counts in four seasons were 326 on 14 March, 240 on 11 July and 29 August, 568 on 17 October and 422 on 20 February respectively. The number of birds counted in spring, summer and autumn 2011 were higher than that counted in previous years (Table 3).
- 3.4 The number of species recorded in agricultural land in the northern part of Long Valley in winter 2011/2012 is higher than that recorded in previous years whereas the number of species recorded were similar for other three seasons (Table 4).

and autumn 2011 and	u whiter 201	1/2012, all	u ine mean i	iumbers (S	D in paren	ulesis)
from 2008 to 2012.						
		Spring 2011	<u>1</u>	<u>S</u>	ummer 201	1
	March	April	May	June	July	August
Numbers of bird	291,326,	152,144,	171,211,	112,205	240,169	135,90,
counted	162,152	184,251	102,228,			154,222,
			217			240
2011: Mean (SD)	257(71)	183(49)	186(52)	159(66)	205(50)	168(62)
2010: Mean (SD)	189(23)	163(49)	148(53)	66(21)	94(13)	77(17)
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)
	Autumn 2011 Winter 2011/2012					
	September	October	November	December	January	February
Numbers of bird	189,263,	383,456,	445,225,	328,343,	286,368,	334,258,
counted	229,244	568,468,	193,249	394,318,	193,136,	422,305
		404			292	
2011: Mean (SD)	231(31)	456(72)	278(114)	346(34)	255(91)	330(69)

Table 3. Numbers in each count in northern part of Long Valley, in spring, summer and autumn 2011 and winter 2011/2012 and the mean numbers (SD in parenthesis)

Table 4. Mean numbers of species (SD in parenthesis) counted in agricultural lands in the northern part of Long Valley, from spring 2008 to winter 2011/2012.

362(52)

202 (60)

152(43)

304(42)

142 (74)

140(34)

253(30)

125 (28)

201(70)

295(24)

136 (55)

162(36)

	<u>Spring</u>	Summer
	No. of species	No. of species
2011: Mean (SD)	31 (6)	25 (5)

217(55)

144 (32)

148(14)

2010: Mean (SD)

2009: Mean (SD)

2008: Mean (SD)

158(78)

122 (41)

155(52)

2010: Mean (SD)	32 (6)	32 (3)	
2009: Mean (SD)	35 (5)	25 (1)	
2008: Mean (SD)	32 (4)	29 (4)	
	<u>Autumn</u>	Winter	
	No. of species	No. of species	
2011: Mean (SD)	37 (5)	41 (5)	
2010: Mean (SD)	34 (8)	36 (3)	
2009: Mean (SD)	31 (7)	32 (5)	
2008: Mean (SD)	34 (6)	35 (6)	

3.5 For the *feng-shui* wood, the peak count in spring was 106 on 26 April, in summer was 81 on 29 August, in autumn was 177 on 7 November and in winter was 127 on 20 February. The number of birds recorded in autumn 2011 was higher than that recorded in previous years wheras the number of birds recorded in spring, summer and winter were similar across years (Table 5). The number of species recorded in the *feng-shui* wood were similar across years (Table 6).

Table 5. Numbers in each count in the *feng-shui* wood, from spring 2011 to winter 2012 and the mean numbers (SD in parenthesis) from spring 2008 to winter2011/2012.

	Spring 201	1		Summer 2011			
	March	April	May	June	July	August	
Numbers of bird	67,92,	33,44,	41,44,	23,43	38,40	29,31,	
counted	90,34	50,106	35,42,			77,56,	
			71			81	
2011: Mean (SD)	71 (27)	59 (33)	47(14)	33(14)	39(1)	55(25)	
2010: Mean (SD)	77(28)	52(14)	51(16)	5(0.71)	8(10)	30(36)	
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)	
	Autumn 2011			Winter 2011/2012			
	September	October	November	December	January	February	
Numbers of bird	112,94,	150,120,	177,101,	108,72,	69,99,	69,94,	
counted	113,90	169,124,	81,71	87,82	46,23	127,46	
		144			98		
2011: Mean (SD)	102 (12)	141 (20)	108 (48)	88(15)	67(33)	84 (35)	
2010: Mean (SD)	51(13)	71(36)	75(12)	72(27)	74(35)	114(21)	
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 6. Mean numbers of species (SD in parenthesis) counted in the *feng-shui* wood from spring 2008 to winter2011/2012.

	Spring	Summer
	No. of species	No. of species
2011: Mean (SD)	10.2 (1.72)	8.7 (1.9)
2010: Mean (SD)	10.3 (2.87)	5.7 (4.7)
2009: Mean (SD)	16.8 (2.94)	10.3(1.58)
2008: Mean (SD)	15.8 (2.76)	11.6 (1.06)
	Autumn	Winter
	No. of species	No. of species
2011: Mean (SD)	11.5 (1.7)	11.9 (2.7)
2010: Mean (SD)	9.08 (2.57)	11.2(1.99)
2009: Mean (SD)	11.1 (2.8)	13.5 (2.7)

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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 HKBWS and CA were different among months in the current study period (Table 7).

Table 7. Total surveyed area of managed and unmanaged fields in the core and northern part of Long Valley by the HKBWS and CA from March 2011 to February 2012.

Months	Area of managed	Area of unmanaged	Total	% of fields
	fields (sq. ft.)	fields (sq. ft.)		managed
March	1,061,280	3,141,776	4,203,056	25.3
April	1,061,280	3,141,776	4,203,056	25.3
May	1,076,025	3,127,031	4,203,056	25.6
June	1,063,675	3,139,381	4,203,056	25.3
July	1,082,275	3,139,381	4,203,056	25.3
August	1,082,275	3,120,781	4,203,056	25.7
September	1,082,275	3,120,781	4,203,056	25.7
October	1,082,275	3,120,781	4,203,056	25.7
November	1,082,275	3,120,781	4,203,056	25.7
December	1,289,295	2,913,761	4,203,056	30.7
January	1,289,295	2,913,761	4,203,056	30.7
February	1,289,295	2,913,761	4,203,056	30.7

3.5. During the study period, the mean bird density in managed fields was the highest in autumn while it was the lowest in summer (Table 8). 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 mean densities of birds in the current study period rose in spring and autumn while they dropped in summer and winter compared with previous years. In this study period, the ratio increased in summer and autumn while it dropped in spring and winter. The values in this study period lie within the range of variation in previous years.

Table 8. 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 from spring 2007 to winter 2011/2012

goo,	10 mmeer =0	11/2012			
	Spring 2007	Spring 2008	Spring 2009	Spring 2010	Spring 2011
Managed fields	9.3 (6.4)	12.4 (10.9)	10.9 (5.6)	13.1 (6.1)	23.9 (13.3)
Unmanaged fields	14.4 (5.9)	5.4 (2.6)	5.9 (2.5)	6.1 (2.5)	11.4 (4.6)
Ratio	0.65	2.30	1.85	2.1	1.8
	Summer	Summer	Summer	Summer	Summer
	2007	2008	2009	2010	2011
Managed fields	6.7 (3.5)	21.4 (11.5)	12.3 (9.3)	10.1 (5.9)	8.7 (5.8)
Unmanaged fields	4.1 (2.2)	3.8 (1.8)	5.3 (2.3)	8.0 (2.3)	5.4 (2.8)
Ratio	1.63	5.63	2.32	1.3	1.5
	Autumn	Autumn	Autumn	Autumn	Autumn 2011
	2007	2008	2009	2010	Autumn 2011
Managed fields	19.0 (9.5)	30.6 (9.7)	37.6 (10.8)	31.7 (10.4)	37.4 (15.8)

Unmanaged fields	20.3 (6.4)	8.1 (2.8)	10.5 (4.6)	15.3 (5.6)	16.1 (5.3)
Ratio	0.94	3.78	3.58	2.1	2.4
	Winter	Winter	Winter	Winter	Winter
	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012
Managed fields	22.9 (11.4)	36.6 (13.1)	22.5 (9.9)	33.1 (11.6)	27.7 (12.5)
Unmanaged fields	15.7 (3.0)	11.1 (3.1)	9.2 (4.0)	11.6 (4.1)	16.0 (4.0)
Ratio	1.46	3.30	2.43	2.9	2.2

3.6. From the NMDS plot, the bird communities recorded from the managed and unmanaged areas are clearly separated (Fig. 4). ANOSIM showed that the difference is significant (P<0.001). From SIMPER, the dissimilarity between bird assemblages in managed and unmanaged fields is 82.5%. SIMPER also showed that Wood Sandpiper (12.0%), Chinese Pond Heron (11.3%), Black-collared Starling (11.2%) and White Wagtail (6.9%) are typical species in managed area while White Wagtail (13.6%), Yellow Wagtail (10.8%), Black-collared Starling (9.9%) and Spotted Dove (6.7%) are typical species in unmanaged area.



Figure 4. NMDS plot showing the bird assemblages recorded from managed and unmanaged fields.

Less Intensive Wet agricultural land (LI-WAL)

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

Table 9. Total area of managed LI-WAL in the core and northern part of Long Valley from spring 2011 to winter 2011/2012.

Months	Total area of managed fields (sq. ft.)
March	233,380
April	233,380
May	248,125
June	235,775
July	249,475

August	268,075	
September	268,075	
October	268,075	
November	268,075	
December	268,075	
January	268,075	
February	268,075	

- 3.8. The management practice of LI-WAL from spring 2011 to winter 2011/2012 comprised of planting of Paddy Rice, Water Chestnut, Chinese Arrowhead, Water Caltrop, Water Bamboo, Lotus, Lotus Flower and Water Lily.
- 3.9. The mean bird density in the managed LI-WAL dropped by 72%, 9%, 33% in summer, autumn and winter 2011 compared with the seasons in previous year respectively while in spring 2011, it rose by 47% from the previous year (Table 10).

Table 10. Mean (SD) bird density (per 100,000 sq. ft.) in LI-WAL and its control fields from spring 2007 to winter 2011/2012.

fields from spring	g 2007 to willa	21 2011/2012.			
	Spring	Spring	Spring	Spring	Spring
	2007	2008	2009	2010	2011
Managed fields	51.1 (35.5)	16.2 (14.3)	35.1 (22.7)	16.0 (25.7)	23.5 (18.9)
Control fields	39.3 (38.9)	13.4 (16.7)	7.8 (5.4)	16.3 (13.6)	10.2 (7.5)
	Summer	Summer	Summer	Summer	Summer
	2007	2008	2009	2010	2011
Managed fields	93.0 (113.3)	30.4 (20.3)	74.8 (72.0)	26.8 (25.7)	7.4 (0.8)
Control fields	10.2 (8.0)	9.5 (6.6)	4.0 (3.7)	9.4 (11.5)	9.5 (0.7)
	Autumn	Autumn	Autumn	Autumn	Autumn
	2007	2008	2009	2010	2011
Managed fields	11.2 (5.8)	37.4 (16.2)	65.6 (27.5)	60.4 (42.2)	54.7 (33.3)
Control fields	1.3 (2.0)	5.7 (3.2)	17.0 (11.8)	26.6 (20.9)	19.2 (12.4)
	Winter	Winter	Winter	Winter	Winter
	07/08	08/09	09/10	10/11	11/12
Managed fields	11.6 (12.8)	41.6 (12.8)	25.1 (11.6)	77.3 (44.6)	52.0 (47.3)
Control fields	2.3 (2.6)	8.1 (1.8)	11.6 (7.9)	21.5 (16.5)	19.3 (10.5)

Shallow water habitat (SWH)

3.10. The management practice of different fields of SWH started in different months in the current study period (Table 11).

Table 11. Total area of managed SWH in the core and northern part of Long Valley from spring 2011 to winter 2011/2012.

Months	Total area of managed fields (sq. ft.)
March	276,840
April	276,840
May	276,840
June	276,840
July	263,140
August	263,140
September	263,140
October	263,140
November	263,140

December	470,160
January	470,160
February	470,160

- 3.11. The management practice of SWH included marsh management, seasonal inundation, vegetation control, water level maintenance, ploughing and weeding.
- 3.12. The mean bird density of 2011 had 151%, 251%, 40% and 15% increase compared with the same seasons of 2010 respectively.

Table 12. Mean (SD) bird density (per 100,000 sq. ft.) in managed SWH from spring 2007 to winter 2011/2012.

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	2007 (07/08	2008 (08/09	2009 (09/10	2010 (10/11	2011 (11/12
	for winter)	for winter)	for winter)	for winter)	for winter)
Spring	22.6 (21.4)	12.3 (13.3)	28.4 (20.7)	16.0 (11.3)	40.2 (21.7)
Summer	11.0 (12.9)	16.9 (9.2)	22.0 (16.0)	5.73 (5.11)	20.1 (13.9)
Autumn	4.6 (4.9)	26.2 (14.2)	33.1 (12.2)	45.1 (13.5)	63.3 (30.3)
Winter	2.3 (1.7)	28.0 (16.9)	19.9 (13.4)	31.4 (20.8)	36.8 (18.0)
Spring Summer Autumn Winter	22.6 (21.4) 11.0 (12.9) 4.6 (4.9) 2.3 (1.7)	12.3 (13.3) 16.9 (9.2) 26.2 (14.2) 28.0 (16.9)	28.4 (20.7) 22.0 (16.0) 33.1 (12.2) 19.9 (13.4)	16.0 (11.3) 5.73 (5.11) 45.1 (13.5) 31.4 (20.8)	40.2 (21.7) 20.1 (13.9) 63.3 (30.3) 36.8 (18.0)

Fish pond (FP)

3.13. The managed area of FP remained at 148,550 sq. ft. in the current study period (Table 13). These practices included fish pond restoration, water lily planting and draining.

Table 13. Total area of managed fish pond in the core and northern part of Long Valley in from March 2011 to February 2012.

Months	Total area of managed fields (sq. ft.)
March	148,550
April	148,550
May	148,550
June	148,550
July	148,550
August	148,550
September	148,550
October	148,550
November	148,550
December	148,550
January	148,550
February	148,550

3.14. The mean bird densities in managed FP recorded in 2011 were decreased from 2010 by 32%, 13%, 47% and 68% in spring, summer, autumn and winter respectively (Table 14).

Table 14. Mean (SD) bird density (per 100,000 sq. ft.) in managed FP and its control fields from spring 2008 to winter 2011/2012.

	Spring 2008	Spring 2009	Spring 2010	Spring 2011
Managed fields	1.1 (1.0)	14.3 (8.5)	11.9 (9.0)	8.1 (2.9)
Control fields	0.1 (0.1)	4.8 (4.2)	5.2 (5.0)	13.1 (6.7)
	Summer 2008	Summer 2009	Summer 2010	Summer 2011
Managed fields	1.6 (2.1)	15.7 (8.9)	6.3 (3.3)	5.5 (2.4)
Control fields	0.3 (0.2)	3.2 (2.9)	13.3 (14.5)	4.7 (5.3)

	Autumn 2008	Autumn 2009	Autumn 2010	Autumn 2011
Managed fields	11.2 (7.8)	10.1 (11.6)	20.0 (13.6)	10.7 (3.8)
Control fields	2.1 (3.0)	1.0 (1.8)	13.7 (16.7)	7.9 (5.6)
	Winter 08/09	Winter 09/10	Winter 10/11	Winter 11/12
Managed fields	24.9 (18.0)	19.6 (17.3)	29.3 (18.2)	9.3 (2.1)
Control fields	5.4 (3.3)	1.5 (1.5)	16.9 (14.6)	17.4 (32.1)

Water flea pond (WFP)

- 3.15. In the period from March 2011 to February 2012, five WFP of total area 64,000 sq. ft. were managed. Water level management, fertilizers and fish stocking were done in this period.
- 3.16. The mean bird density in managed WFP rose from previous years by 11% and 26% in summer and autumn while the mean density dropped by 42% and 26% in spring and winter (Table 15).

Table 15. Mean (SD) bird density (per 100,000 sq. ft.) in WFP from spring to spring 2007 to winter 2011/2012.

	2007 (07/08	2008 (08/09	2009 (09/10	2010 (10/11	2011 (11/12
	for winter)				
Spring	0.5 (0.4)	0.47 (0.45)	16.2 (10.5)	49.3 (27.7)	28.7 (30.6)
Summer	1.2 (1.3)	2.1 (2.8)	5.6 (4.8)	10.2 (7.40	11.3 (5.1)
Autumn	4.9 (2.5)	26.1 (19.1)	28.0 (19.3)	34.9 (23.2)	43.9 (28.2)
Winter	4.3 (2.1)	35.6 (17.8)	36.3 (21.1)	50.6 (28.8)	37.3 (20.2)

Summary – March 2010 to February 2012

- 3.17 During this project period, a total of 174 species were recorded in the whole project site (both core and northern part of Long Valley) by surveys (Appendix 4). With casual sightings by bird watchers and photographers included, there were 24 species that were new record in the project site including Taiga Bean Goose, Tundra Bean Goose, Blue-throated Bee-eater, Eurasian Eagle Owl, Greyleg Goose, Gadwall, White-bellied Sea Eagle, Curlew Sandpiper, Black-headed Gull, Eurasian Collared Dove, Himalayan Swiftlet, Silver-backed Needletail, Asian Paradise Flycatcher, Japanese Paradise Flycatcher, Chestnut Bulbul, Russet Bush Warbler, Middendorff's Grasshopper Warbler, White-browed Laughingthrush, Grey-streaked Flycatcher, Dark-sided Flycatcher, Chestnut Munia, Brambling, Common Rosefinch and Crested Bunting.
- 3.18 For the core area of Long Valley, the mean number of birds recorded in this project period (2010-2012) in spring, autumn and winter were higher than that recorded in previous years (Fig. 5). The mean number of species recorded were in an increasing trend from 2005 to 2012 in all four seasons (Fig. 6).



Figure 5. Mean number of birds recorded in core part of Long Valley for each season between December 2005 to February 2012.



Figure 6. Mean number of species recorded in core part of Long Valley for each season between December 2005 to February 2012.

3.19 For the agricultural land in the northern part of Long Valley, the mean number of bird recorded were higher in spring, summer and winter 2010 and 2011 than in 2008 and 2009 (Fig. 7). The mean number of species of birds recorded stable from 2008 to 2011 (Fig. 8).



Figure 7. Mean number of birds recorded in agricultural land in the northern part of Long Valley for each season between March 2008 to February 2012.



Figure 8. Mean number of species recorded in agricultural land in the northern part of Long Valley for each season between March 2008 to February 2012.

3.20 For the *feng-shui* wood in the northern part of Long Valley, the mean number of bird recorded were similar across years for all seasons, except that the mean number of bird recorded in autumn 2011 was exceptionally high (Fig. 9). The mean number of species recorded in the *feng-shui* wood were in a slight decreasing trend from 2008 to 2011 (Fig 10).



Figure 9. Mean number of birds recorded in *feng-shui* wood in the northern part of Long Valley for each season between March 2008 to February 2012.



Figure 10. Mean number of species recorded in *feng-shui* wood in the northern part of Long Valley for each season between March 2008 to February 2012.

4. Discussion

4.1. The management in the core part and the northern part of Long Valley was effective in attracting birds, passage migrants, in spring and autumn. In spring 2011, the mean number of birds recorded in March 2011 was the highest since 2005 with mean number of 748 birds recorded. This was 63% to 159% higher than the mean number of birds recorded in previous years. Moreover, the mean number of species in spring was the highest in 2011. High diversity of passage migrants or winter visitors were attracted during this period including Citrine Wagtail, Pale Thrush, Ruddy-breasted Crake, Water Rail, Yellow-browed Bunting, Bright-capped Cisticola, Eurasian Wryneck, Eurasian Skylark, Pacific Golden Plover, Common Greenshank, Grey-headed Lapwing, Japanese Yellow Bunting, Japanese Quail and Oriental

Pratincole. Similarly, the mean number of species in autumn 2010 and 2011 were higher than that recorded in 2007 to 2009 (Table 2). This indicated that Long Valley is important for many passage migrant. There is an increasing trend for the number of species recorded in all seasons (Fig. 6). We recommend continued surveys to reveal more bird species in Long Valley.

- 4.2. One important achievement of this project was to determine the effectiveness of planting paddy rice to enhance bird diversity in Long Valley. In autumn, high abundance and diversity of seed-eating birds were attracted to fields that rice paddy was planted. These species includes Black-faced Bunting, Chestnut-eared Bunting, Little Bunting, Yellow-breasted Bunting, Yellow-browed Bunting, Eurasian Skylark, White-rumped Munia, Russet Sparrow, Scaly-breasted Munia, Crested Bunting, Rustic Bunting and Chinese Penduline Tit. As there has been very little rice paddy remained in Hong Kong and nearby region, it is recommended that more resources should be put on planting rice paddy so as to provide food resources and microhabitats for passage migrants and winter visitors.
- 4.3 In managed fields, the management to enhance bird abundance and diversity remained effective. The abundance of birds in managed fields was higher than that in unmanaged fields (Table 8), and the bird communities between managed and unmanaged fields were significantly different (Fig. 4). Therefore management is needed to maintain or further enhance the ecological value, particularly in term of bird abundance and diversity, in Long Valley.
- 4.4 Management of LI-WAL and SWH were effective in increasing bird abundance, considerable increase in mean bird density in SWH was of particular interest. Maintenance of SWH should be one of the major priorities for future management in Long Valley, as it provides important habitats to various target bird species, especially waders.
- 4.5 Long Valley is one of the most important areas for birds in Hong Kong as it provide suitable habitats for many wetland and agricultural land associated birds species. Intensive daytime bird surveys has been conducted since 2005, however we have very limited information on the activity of birds in Long Valley at night time. Availability of night roosting sites for waders may be an important factor affecting bird abundance and diversity in Long Valley. It would be worthwhile to conduct more night time surveys to investigate the occurrence of birds and habitat preference of birds in Long Valley.
- 4.6 Intensive bird surveys has been conducted since 2005, yet during this project period, March 2010 to February 2012, 24 new species were newly found in Long Valley. It is likely that more bird species will be discovered if intensive bird surveys continue to be done in the future. Understanding of bird fauna in Long Valley provides unique and crucial information on bird fauna in Hong Kong.
- 4.7 Intensive surveys were done since 2008 in agricultural lands in the northern part of Long Valley and there was an increasing trend in the mean number of birds recorded. Despite separated from the core part by Sheung Yue River, birds can easily travel between the northern part and the core part of Long Valley. Therefore agricultural lands in the northern part of Long Valley are important to birds in Long Valley and

increase the capacity of bird fauna in the whole Long Valley area.

- 4.8 Owing to the nature of forest birds, the variation of number and species of birds recorded in the *feng-shui* wood was high. Though the *feng-shui* wood is at relatively early stage of forest succession, more forest-associated bird species, including Grey-streaked Flycatcher, Chestnut Bulbul, Black-naped Monarch, Common Emerald Dove and Mountain Tailorbird, were found in *feng-shui* wood.
- 4.9 There are some notable sightings recorded from spring 2011 to winter 2011/2012 (Status follows Carey et. al. 2001 unless stated otherwise). They include:

Asian Paradise Flycatcher Terpsiphone paradise

Scarce spring and autumn migrant, rare winter visitor. This is the first record in Long Valley, sighted by bird watcher on 21-Sep-11.

Black-faced Spoonbill Platalea minor

Common winter visitor to Deep Bay and listed as Endangered in IUCN red list. One individual was recorded on 5 Dec 11.

Black-headed Gull Larus ridibundus

Abundant winter visitor and scarce to common passage migrant. This is the first record in Long Valley, sighted by bird watcher on 29-Jan-12.

Chestnut-eared Bunting Emberiza fucata

Scarce migrant and rare in winter. Three individuals were recorded on 31 Oct 11 and 14 Nov 11. Two individuals were recorded on 13 Feb 12, 20 Feb 12 and 27 Feb 12. One individual was recorded on 12 Dec 11 and 9 Jan 12.

Crested Bunting Melophus lathami

Rare resident nowadays due to changes in land use. An altitudinal migrant. Favours cultivated land especially rice stubble in winter. This is first recorded in Long Valley on 14 Nov 10 with two individuals. The species was then recorded on 13 Nov 11.

Curlew Sandpiper Calidris ferruginea

Abundant spring migrant and uncommon autumn spring migrant. This is the first record in Long Valley, recorded by bird watcher on 30-Apr-11.

Eurasian Sparrowhawk *Accipiter nisus* Scarce passage migrant. One individual was recorded on 10 Oct 11 and 7 Nov 11.

Grey-headed Lapwing *Vanellus cinereus* Scarce winter visitor. One individual was recorded 28 Mar 11.

Greylay Goose Anser anser

Only four records in Hong Kong. This is the first record in Long Valley, recorded by bird watcher on 20-Oct-11.

Grey-streaked Flycatcher Muscicapa griseisticta

Uncommon passage migrant. One individual was recorded on 26 Sep 11 and 24 Oct 11. This is the first record in Long Valley.

Japanese Yellow Bunting Emberiza sulphurata

Scarce and irregular spring passage migrant and is listed as Vulnerable in IUCN Red List. One individual was recorded on 28 Mar 11 and three individuals were recorded on 5 Apr 11.

Lanceolated Warbler Locustella lanceolata

Scarce autumn migrant. Two individual were recorded on 10 Oct 11 and one individual was recorded on 26 Sep 11.

Middendorff's Grasshopper Warbler *Locustella ochotensis*

Very rare winter visitor. One individual was recorded on 4 Oct 11. This is the first record in Long Valley.

Northern Lapwing *Vanellus vanellus* Irregular and scarce winter visitor. One individual was recorded on 12 Dec 11.

Russet Sparrow *Passer rutilans* Scarce migrant and winter visitor. One individual was recorded on 31 Oct 11.

Schrenck's Bittern *Ixobrychus eurhythmus* Scarce passage migrant. One individual was recorded on 30 May 11.

Silver-backed Needletail *Hirundapus cochinchinensis* Uncommon spring passage migrant. This is the first record in Long Valley, recorded by bird watcher on 5-Apr-11.

White-bellied Sea Eagle *Haliaeetus leucogaster* Uncommon resident in coastal areas and offshore islands. This is the first record in Long Valley by project team on 3-Nov-11.

White-browed Laughingthrush *Garrulax sannio* Scarce and very localised resident population of captive origin. Eight individuals were seen on 7 Nov 11. This is the first record in Long Valley.

Yellow-browed Bunting Emberiza chrusophrus

Scarce winter visitor and spring migrant. One individual was recorded on 8 Mar 11 and 26 Sep 11.

4.10 Figure 14 to 41 showed the distribution map of different bird groups in dry (September to February) and wet (March to August) season in the core and northern part of Long Valley during the project period. From Fig 22-25, it is worth noticing that Greater Painted Snipe used to occur in #96, and very often, in large group. However, since #96 was converted into active dry agricultural land in early summer 2011, it is hard to discover Greater Painted Snipe in Long Valley and most of them are scattered. From Fig 26-29, managed fields have higher wader density that unmanaged fields. Wagtails especially Yellow and Citrine Wagtail favours Water Cress farmland, this is shown in Fig 30-33 that most of the wagtails were concentrated on unmanaged farmlands and also coherent with the SIMPER result in 3.6. Pipits also got similar

result as wagtails that unmanaged farmlands have higher pipit density. The situation is obvious in farmlands in the northern part of Long Valley. However, further observation and investigation is needed to find out the reason of this phenomenon.

5. References

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Figure 11. Total numbers of birds recorded in the core part of Long Valley from December 2005 to February 2012



Figure 12. Total number of birds recorded in the northern part of Long Valley from March 2008 to February 2012



Figure 13. Total number of birds recorded in the *feng-shui* Wood of the northern part of Long Valley from March 2008 to February 2012



Figure 14. Distribution map of Egrets and Herons in the core and northern part of Long Valley during Mar 10 to Aug 10.



Figure 15. Distribution map of Egrets and Herons in the core and northern part of Long Valley during Sep 10 to Feb 11.



Figure 16. Distribution map of Egrets and Herons in the core and northern part of Long Valley during Mar 11 to Aug 11.



Figure 17. Distribution map of Egrets and Herons in the core and northern part of Long Valley during Sep 11 to Feb 12.



Figure 18. Distribution map of Snipes (*Gallinago* sp.) in the core and northern part of Long Valley during Mar 10 to Aug 10.



Figure 19. Distribution map of Snipes (*Gallinago* sp.) in the core and northern part of Long Valley during Sep 10 to Feb 11.



Figure 20. Distribution map of Snipes (*Gallinago* sp.) in the core and northern part of Long Valley during Mar 11 to Aug 11.



Figure 21. Distribution map of Snipes (*Gallinago* sp.) in the core and northern part of Long Valley during Sep 11 to Feb 12.



Figure 22. Distribution map of Greater Painted-Snipe in the core and northern part of Long Valley during Mar 10 to Aug 10.



Figure 23. Distribution map of Greater Painted-Snipe in the core and northern part of Long Valley during Sep 10 to Feb 11.



Figure 24. Distribution map of Greater Painted-Snipe in the core and northern part of Long Valley during Mar 11 to Aug 11.



Figure 25. Distribution map of Greater Painted-Snipe in the core and northern part of Long Valley during Sep 11 to Feb 12.



Figure 26. Distribution map of Waders in the core and northern part of Long Valley during Mar 10 to Aug 10.



Figure 27. Distribution map of Waders in the core and northern part of Long Valley during Sep 10 to Feb 11.



Figure 28. Distribution map of Waders in the core and northern part of Long Valley during Mar 11 to Aug 11.



Figure 29. Distribution map of Waders in the core and northern part of Long Valley during Sep 11 to Feb 12.



Figure 30. Distribution map of Wagtails in the core and northern part of Long Valley during Mar 10 to Aug 10.



Figure 31. Distribution map of Wagtails in the core and northern part of Long Valley during Sep 10 to Feb 11.



Figure 32. Distribution map of Wagtails in the core and northern part of Long Valley during Mar 11 to Aug 11.



Figure 33. Distribution map of Wagtails in the core and northern part of Long Valley during Sep 11 to Feb 12.



Figure 34. Distribution map of Pipits in the core and northern part of Long Valley during Mar 10 to Aug 10.



Figure 35. Distribution map of Pipits in the core and northern part of Long Valley during Sep 10 to Feb 11.



Figure 36. Distribution map of Pipits in the core and northern part of Long Valley during Mar 11 to Aug 11.



Figure 37. Distribution map of Pipits in the core and northern part of Long Valley during Sep 11 to Feb 12.



Figure 38. Distribution map of Stonechats in the core and northern part of Long Valley during Mar 10 to Aug 10.



Figure 39. Distribution map of Stonechats in the core and northern part of Long Valley during Sep 10 to Feb 11.



Figure 40. Distribution map of Stonechats in the core and northern part of Long Valley during Mar 11 to Aug 11.



Figure 41. Distribution map of Stonechats in the core and northern part of Long Valley during Sep 11 to Feb 12.

7. Appendix

Number	English Name	Scientific Name	Average Abundance
014	Grey Heron	Ardea cinerea	0.5
016	Great Egret	Ardea modesta	0.82
017	Intermediate Egret	Egretta intermedia	0.13
018	Little Egret	Egretta garzetta	3.95
021	Cattle Egret	Bubulcus coromandus	0.73
022	Chinese Pond Heron	Ardeola bacchus	9.02
023	Striated Heron	Butorides striata	0.02
024	Black-crowned Night Heron	Nvcticorax nvcticorax	0.04
026	Yellow Bittern	Ixobrychus sinensis	0.16
027	Schrenck's Bittern	Ixobrychus eurhythmus	0.02
028	Cinnamon Bittern	Ixobrychus cinnamomeus	0.14
036	Black-faced Spoonbill	Platalea minor	0.32
047	Common Teal	Anas crecca	0.18
053	Northern Shoveler	Anas clypeata	0.04
064	Black Baza	Aviceda leuphotes	0.02
067	Black Kite	Milvus migrans	0.41
077	Japanese Sparrowhawk	Accipiter gularis	0.05
078	Besra	Accipiter virgatus	0.11
079	Eurasian Sparrowhawk	Accipiter nisus	0.04
080	Common Buzzard	Buteo japonicus	0.18
085	Common Kestrel	Falco tinnunculus	0.18
085.5	Amur Falcon	Falco amurensis	0.04
086	Eurasian Hobby	Falco subbuteo	0.04
087	Peregrine Falcon	Falco peregrinus	0.04
089	Japanese Quail	Coturnix japonica	0.11
093	Slaty-breasted Rail	Gallirallus striatus	0.05
094	Eastern Water Rail	Rallus indicus	0.14
099	Ruddy-breasted Crake	Porzana fusca	0.2
101	White-breasted Waterhen	Amaurornis phoenicurus	4.11
103	Common Moorhen	Gallinula chloropus	1.36
106	Greater Painted-Snipe	Rostratula benghalensis	2.11
107	Black-winged Stilt	Himantopus himantopus	0.02
108	Pied Avocet	Recurvirostra avosetta	0.14
109	Oriental Pratincole	Glareola maldivarum	0.04
110	Northern Lapwing	Vanellus vanellus	0.02
111	Grey-headed Lapwing	Vanellus cinereus	0.02
112	Pacific Golden Plover	Pluvialis fulva	0.05
116	Little Ringed Plover	Charadrius dubius	1.91
124	Whimbrel	Numenius phaeopus	0.02
127	Spotted Redshank	Tringa erythropus	0.43
129	Marsh Sandpiper	Tringa stagnatilis	0.09
130	Common Greenshank	Tringa nebularia	0.18
133	Green Sandpiper	Tringa ochropus	1.46
134	Wood Sandpiper	Tringa glareola	9.84
136	Common Sandpiper	Actitis hypoleucos	0.77
139	Red-necked Phalarope	Phalaropus lobatus	0.05
142/143	Pintail Snipe/Swinhoe's Snipe	Gallinago stenura /	1.54

Appendix 1. List of bird species and their average abundance recorded in regular bird survey in the core part of Long Valley during March 2011 to February 2012.

		Gallinago megala	
144	Common Snipe	Gallinago gallinago	6.11
153	Long-toed Stint	Calidris subminuta	0.05
155	Sharp-tailed Sandpiper	Calidris acuminata	0.04
191	Rock Dove	Columba livia	0.93
192	Oriental Turtle Dove	Streptopelia orientalis	0.13
192.5	Eurasian Collared Dove	Streptopelia decaocto	0.04
193	Red Turtle Dove	Streptopelia tranquebarica	0.07
194	Spotted Dove	Spilopelia chinensis	6.04
200	Rose-ringed Parakeet	Psittacula krameri	0.02
202	Large Hawk Cuckoo	Hierococcyx sparverioides	0.07
204	Indian Cuckoo	Cuculus micropterus	0.05
207	Plaintive Cuckoo	Cacomantis merulinus	0.3
208	Common Koel	Eudynamys scolopaceus	0.7
209	Greater Coucal	Centropus sinensis	0.5
216	Asian Barred Owlet	Glaucidium cuculoides	0.02
226	Little Swift	Apus nipalensis	0.41
228	Pied Kingfisher	Ceryle rudis	0.09
229	Common Kingfisher	Alcedo atthis	1.04
230	White-throated Kingfisher	Halcyon smyrnensis	0.68
236	Eurasian Hoopoe	Upupa epops	0.04
238	Eurasian Wryneck	Jynx torquilla	0.04
247	Eurasian Skylark	Alauda arvensis	0.23
251	Barn Swallow	Hirundo rustica	0.71
252	Red-rumped Swallow	Cecropis daurica	0.05
255	Yellow Wagtail	Motacilla tschutschensis	7.04
256	Citrine Wagtail	Motacilla citreola	0.3
257	Grey Wagtail	Motacilla cinerea	0.39
258	White Wagtail	Motacilla alba	8.05
259	Richard's Pipit	Anthus richardi	1.32
260	Olive-backed Pipit	Anthus hodgsoni	0.71
261	Red-throated Pipit	Anthus cervinus	2.41
262	Pechora Pipit	Anthus gustavi	0.07
263	Buff-bellied Pipit	Anthus rubescens	0.05
270	Red-whiskered Bulbul	Pycnonotus jocosus	1.07
271	Chinese Bulbul	Pycnonotus sinensis	3.32
272	Sooty-headed Bulbul	Pycnonotus aurigaster	1.29
278	Brown Shrike	Lanius cristatus	0.25
279	Long-tailed Shrike	Lanius schach	3.57
283	Siberian Rubythroat	Luscinia calliope	0.3
285	Bluethroat	Luscinia svecica	3.48
287	Oriental Magpie Robin	Copsychus saularis	3.79
289	Daurian Redstart	Phoenicurus auroreus	0.02
292	Common Stonechat	Saxicola maurus	4.46
303	Common Blackbird	Turdus merula	0.43
202	Bele Thrush	Turaus hortulorum	0.00
212	Pale I nrush	<i>Turaus patitaus</i>	1.04
225	Jananasa Duah Washing	Garruax perspicillatus	1.04
323	Japanese Bush Warbler	Logustella langeolata	0.09
222	Pallas's Grasshopper Warbler	Locustella conthicla	0.04
332	Middendorff's Greeshopper	Locustella ochotonsis	0.27
555	whole of a structure of a structure of a structure of a structure of the s	Locusiena ocnoiensis	0.02

	Warbler		
335	Black-browed Reed Warbler	Acrocephalus bistrigiceps	0.36
340	Oriental Reed Warbler	Acrocephalus orientalis	0.48
343	Zitting Cisticola	Cisticola juncidis	1.25
344	Golden-headed Cisticola	Cisticola exilis	0.18
345	Yellow-bellied Prinia	Prinia flaviventris	6.43
346	Plain Prinia	Prinia inornata	2.73
347	Common Tailorbird	Orthotomus sutorius	0.54
349	Dusky Warbler	Phylloscopus fuscatus	3.93
352	Pallas's Leaf Warbler	Phylloscopus proregulus	0.02
354	Yellow-browed Warbler	Phylloscopus inornatus	0.27
356	Arctic Warbler	Phylloscopus borealis	0.02
369	Asian Brown Flycatcher	Muscicapa dauurica	0.02
377	Red-throated Flycatcher	Ficedula albicilla	0.07
387	Chinese Penduline-Tit	Remiz consobrinus	0.04
389	Great Tit	Parus major	0.02
397	Japanese White-eye	Zosterops japonicus	0.66
401	Chestnut-eared Bunting	Emberiza fucata	0.21
402	Little Bunting	Emberiza pusilla	0.14
403	Yellow-browed Bunting	Emberiza chrysophrys	0.04
406	Yellow-breasted Bunting	Emberiza aureola	0.41
409	Japanese Yellow Bunting	Emberiza sulphurata	0.05
410	Black-faced Bunting	Emberiza spodocephala	0.39
420	White-rumped Munia	Lonchura striata	1.57
421	Scaly-breasted Munia	Lonchura punctulata	4.11
423	Russet Sparrow	Passer rutilans	0.02
424	Eurasian Tree Sparrow	Passer montanus	2.5
427	Red-billed Starling	Spodiopsar sericeus	0.88
432	White-cheeked Starling	Spodiopsar cineraceus	0.2
433	Black-collared Starling	Gracupica nigricollis	7.52
434	White-shouldered Starling	Sturnia sinensis	0.46
435	Common Myna	Acridotheres tristis	0.23
436	Crested Myna	Acridotheres cristatellus	5.39
437	Black-naped Oriole	Oriolus chinensis	0.02
438	Black Drongo	Dicrurus macrocercus	1.32
441.5	Azure-winged Magpie	Cyanopica cyanus	0.05
444	Common Magpie	Pica pica	0.79
447	Large-billed Crow	Corvus macrorhynchos	0.09
448	Collared Crow	Corvus torquatus	0.23

Number	English Name	Scientific Name	Average Abundance
002	Little Grebe	Tachybaptus ruficollis	0.25
010	Great Cormorant	Phalacrocorax carbo	0.32
014	Grey Heron	Ardea cinerea	0.79
015	Purple Heron	Ardea purpurea	0.04
016	Great Egret	Ardea modesta	0.95
018	Little Egret	Egretta garzetta	2.14
021	Cattle Egret	Bubulcus coromandus	4.59
022	Chinese Pond Heron	Ardeola bacchus	5.21
024	Black-crowned Night Heron	Nycticorax nycticorax	0.57
026	Yellow Bittern	Ixobrychus sinensis	0.09
047	Common Teal	Anas crecca	0.3
067	Black Kite	Milvus migrans	0.8
078	Besra	Accipiter virgatus	0.05
080	Common Buzzard	Buteo japonicus	0.18
085	Common Kestrel	Falco tinnunculus	0.14
086	Eurasian Hobby	Falco subbuteo	0.04
089	Japanese Quail	Coturnix japonica	0.05
093	Slaty-breasted Rail	Gallirallus striatus	2.8
094	Eastern Water Rail	Rallus indicus	0.02
101	White-breasted Waterhen	Amaurornis phoenicurus	2.18
103	Common Moorhen	Gallinula chloropus	0.64
105	Pheasant-tailed Jacana	Hydrophasianus chirurgus	0.11
106	Greater Painted-Snipe	Rostratula benghalensis	0.07
107	Black-winged Stilt	Himantopus himantopus	0.8
116	Little Ringed Plover	Charadrius dubius	2.29
127	Spotted Redshank	Tringa erythropus	0.05
128	Common Redshank	Tringa totanus	0.13
130	Common Greenshank	Tringa nebularia	0.2
133	Green Sandpiper	Tringa ochropus	0.91
134	Wood Sandpiper	Tringa glareola	7.66
136	Common Sandpiper	Actitis hypoleucos	0.63
144	Common Snipe	Gallinago gallinago	1.39
192	Oriental Turtle Dove	Streptopelia orientalis	0.66
194	Spotted Dove	Spilopelia chinensis	0.05
196	Emerald Dove	Chalcophaps indica	0.02
204	Indian Cuckoo	Cuculus micropterus	0.02
207	Plaintive Cuckoo	Cacomantis merulinus	0.07
208	Common Koel	Eudynamys scolopaceus	0.29
209	Greater Coucal	Centropus sinensis	0.13
226	Little Swift	Apus nipalensis	2.77
228	Pied Kingfisher	Ceryle rudis	0.48
229	Common Kingfisher	Alcedo atthis	1
230	White-throated Kingfisher	Halcyon smyrnensis	0.63
236	Eurasian Hoopoe	Upupa epops	0.02
238	Eurasian Wryneck	Jynx torquilla	0.05
251	Barn Swallow	Hirundo rustica	10.93
252	Red-rumped Swallow	Cecropis daurica	0.07
255	Yellow Wagtail	Motacilla tschutschensis	4.3
256	Citrine Wagtail	Motacilla citreola	0.11

Appendix 2. List of bird species recorded in regular bird survey in the northern part of Long Valley during March 2011 to February 2012.

258	White Wagtail	Motacilla alba	8.38
259	Richard's Pipit	Anthus richardi	1.84
260	Olive-backed Pipit	Anthus hodgsoni	7.8
261	Red-throated Pipit	Anthus cervinus	1.82
262	Pechora Pipit	Anthus gustavi	0.02
270	Red-whiskered Bulbul	Pycnonotus jocosus	13.29
271	Chinese Bulbul	Pycnonotus sinensis	19.86
272	Sooty-headed Bulbul	Pycnonotus aurigaster	6.5
278	Brown Shrike	Lanius cristatus	0.02
279	Long-tailed Shrike	Lanius schach	2.77
283	Siberian Rubythroat	Luscinia calliope	0.07
287	Oriental Magpie Robin	Copsychus saularis	10.46
289	Daurian Redstart	Phoenicurus auroreus	0.38
292	Common Stonechat	Saxicola maurus	0.02
303	Common Blackbird	Turdus merula	1.32
305	Grey-backed Thrush	Turdus hortulorum	0.07
312	Masked Laughingthrush	Garrulax perspicillatus	1.41
331	Lanceolated Warbler	Locustella lanceolata	0.02
332	Pallas's Grasshopper Warbler	Locustella certhiola	0.02
340	Oriental Reed Warbler	Acrocephalus orientalis	4.91
343	Zitting Cisticola	Cisticola juncidis	0.79
345	Yellow-bellied Prinia	Prinia flaviventris	2.18
346	Plain Prinia	Prinia inornata	0.34
347	Common Tailorbird	Orthotomus sutorius	0.61
349	Dusky Warbler	Phylloscopus fuscatus	3.73
352	Pallas's Leaf Warbler	Phylloscopus proregulus	0.16
354	Yellow-browed Warbler	Phylloscopus inornatus	1.11
369	Asian Brown Flycatcher	Muscicapa dauurica	0.16
377	Red-throated Flycatcher	Ficedula albicilla	0.02
384	Black-naped Monarch	Hypothymis azurea	0.02
389	Great Tit	Parus major	0.36
395	Fork-tailed Sunbird	Aethopyga christinae	0.02
397	Japanese White-eye	Zosterops japonicus	11.77
402	Little Bunting	Emberiza pusilla	1.21
410	Black-faced Bunting	Emberiza spodocephala	0.21
418	Yello-billed Grosbeak	Eophona migratoria	0.63
420	White-rumped Munia	Lonchura striata	0.21
421	Scaly-breasted Munia	Lonchura punctulata	3.66
424	Eurasian Tree Sparrow	Passer montanus	26.5
427	Red-billed Starling	Spodiopsar sericeus	7.02
432	White-cheeked Starling	Spodiopsar cineraceus	0.95
433	Black-collared Starling	Gracupica nigricollis	7.86
434	White-shouldered Starling	Sturnia sinensis	1.29
435	Common Myna	Acridotheres tristis	0.61
436	Crested Myna	Acridotheres cristatellus	12.05
438	Black Drongo	Dicrurus macrocercus	1.73
444	Common Magpie	Pica pica	1.14
447	Large-billed Crow	Corvus macrorhynchos	0.32
448	Collared Crow	Corvus torquatus	0.04

Number	English Name	Scientific Name	Average Abundance
192	Oriental Turtle Dove	Streptopelia orientalis	0.21
194	Spotted Dove	Spilopelia chinensis	2.54
202	Large Hawk Cuckoo	Hierococcyx sparverioides	0.18
204	Indian Cuckoo	Cuculus micropterus	0.04
207	Plaintive Cuckoo	Cacomantis merulinus	0.02
208	Common Koel	Eudynamys scolopaceus	0.29
209	Greater Coucal	Centropus sinensis	0.18
210	Lesser Coucal	Centropus bengalensis	0.02
216	Asian Barred Owlet	Glaucidium cuculoides	0.09
226	Little Swift	Apus nipalensis	1.7
251	Barn Swallow	Hirundo rustica	0.5
254	Forest Wagtail	Dendronanthus indicus	0.02
260	Olive-backed Pipit	Anthus hodgsoni	5.11
265	Black-winged Cuckooshrike	Coracina melaschistos	0.02
270	Red-whiskered Bulbul	Pycnonotus jocosus	9.29
271	Chinese Bulbul	Pycnonotus sinensis	13.36
272	Sooty-headed Bulbul	Pycnonotus aurigaster	1.29
278	Brown Shrike	Lanius cristatus	0.07
283	Siberian Rubythroat	Luscinia calliope	0.32
287	Oriental Magpie Robin	Copsychus saularis	2.13
302	Japanese Thrush	Turdus cardis	0.29
303	Common Blackbird	Turdus merula	0.96
305	Grey-backed Thrush	Turdus hortulorum	0.32
312	Masked Laughingthrush	Garrulax perspicillatus	1.07
315	Hwamei	Garrulax canorus	0.07
316	White-browed Laughingthrush	Garrulax sannio	0.14
325	Manchurian Bush Warbler	Cettia canturians	0.02
345	Yellow-bellied Prinia	Prinia flaviventris	0.04
347	Common Tailorbird	Orthotomus sutorius	0.82
349	Dusky Warbler	Phylloscopus fuscatus	0.41
352	Pallas's Leaf Warbler	Phylloscopus proregulus	0.39
354	Yellow-browed Warbler	Phylloscopus inornatus	1.09
356	Arctic Warbler	Phylloscopus borealis	0.04
367	Grey-streaked Flycatcher	Muscicapa griseisticta	0.04
369	Asian Brown Flycatcher	Muscicapa dauurica	0.21
384	Black-naped Monarch	Hypothymis azurea	0.02
389	Great Tit	Parus major	1.54
394	Scarlet-backed Flowerpecker	Dicaeum cruentatum	0.66
395	Fork-tailed Sunbird	Aethopyga christinae	1.89
397	Japanese White-eye	Zosterops japonicus	14.55
402	Little Bunting	Emberiza pusilla	0.05
418	Chinese Grosbeak	Eophona migratoria	0.63
424	Eurasian Tree Sparrow	Passer montanus	3.95

Appendix 3. List of bird species recorded in regular bird survey in *Feng-shui* Wood of the northern part of Long Valley during March 2011 to February 2012.

Appendix 4. List of bird species recorded in regular bird survey in the whole project site during March 2010 to February 2012.

Number	English Name	Scientific Name
002	Little Grebe	Tachybaptus ruficollis
010	Great Cormorant	Phalacrocorax carbo
014	Grey Heron	Ardea cinerea
015	Purple Heron	Ardea purpurea
016	Great Egret	Ardea modesta
017	Intermediate Egret	Egretta intermedia
018	Little Egret	Egretta garzetta
021	Cattle Egret	Bubulcus coromandus
022	Chinese Pond Heron	Ardeola bacchus
023	Striated Heron	Butorides striata
024	Black-crowned Night Heron	Nycticorax nycticorax
026	Yellow Bittern	Ixobrychus sinensis
027	Schrenck's Bittern	Ixobrychus eurhythmus
028	Cinnamon Bittern	Ixobrychus cinnamomeus
036	Black-faced Spoonbill	Platalea minor
045	Gadwall	Anas strepera
047	Common Teal	Anas crecca
053	Northern Shoveler	Anas clypeata
064	Black Baza	Aviceda leuphotes
067	Black Kite	Milvus migrans
071	Crested Serpent Eagle	Spilornis cheela
075	Crested Goshawk	Accipiter trivirgatus
077	Japanese Sparrowhawk	Accipiter gularis
078	Besra	Accipiter virgatus
079	Eurasian Sparrowhawk	Accipiter nisus
080	Common Buzzard	Buteo japonicus
085	Common Kestrel	Falco tinnunculus
085.5	Amur Falcon	Falco amurensis
086	Eurasian Hobby	Falco subbuteo
087	Peregrine Falcon	Falco peregrinus
089	Japanese Quail	Coturnix japonica
093	Slaty-breasted Rail	Gallirallus striatus
094	Eastern Water Rail	Rallus aquaticus
099	Ruddy-breasted Crake	Porzana fusca
101	White-breasted Waterhen	Amaurornis phoenicurus
103	Common Moorhen	Gallinula chloropus
105	Pheasant-tailed Jacana	Hydrophasianus chirurgus

106	Greater Painted Snipe	Rostratula benghalensis
107	Black-winged Stilt	Himantopus himantopus
108	Pied Avocet	Recurvirostra avosetta
109	Oriental Pratincole	Glareola maldivarum
110	Northern Lapwing	Vanellus vanellus
111	Grey-headed Lapwing	Vanellus cinereus
112	Pacific Golden Plover	Pluvialis fulva
116	Little Ringed Plover	Charadrius dubius
124	Whimbrel	Numenius phaeopus
127	Spotted Redshank	Tringa erythropus
128	Common Redshank	Tringa totanus
129	Marsh Sandpiper	Tringa stagnatilis
130	Common Greenshank	Tringa nebularia
133	Green Sandpiper	Tringa ochropus
134	Wood Sandpiper	Tringa glareola
136	Common Sandpiper	Actitis hypoleucos
139	Red-necked Phalarope	Phalaropus lobatus
142 / 143	Pintail Snipe / Swinhoe's Snipe	Gallinago stenura / Gallinago megala
144	Common Snipe	Gallinago gallinago
150	Red-necked Stint	Calidris ruficollis
153	Long-toed Stint	Calidris subminuta
155	Sharp-tailed Sandpiper	Calidris acuminata
191	Rock Dove	Columba livia
192	Oriental Turtle Dove	Streptopelia orientalis
192.5	Eurasian Collared Dove	Streptopelia decaocto
193	Red Turtle Dove	Streptopelia tranquebarica
194	Spotted Dove	Spilopelia chinensis
196	Emerald Dove	Chalcophaps indica
200	Rose-ringed Parakeet	Psittacula krameri
202	Large Hawk Cuckoo	Hierococcyx sparverioides
204	Indian Cuckoo	Cuculus micropterus
207	Plaintive Cuckoo	Cacomantis merulinus
208	Common Koel	Eudynamys scolopaceus
209	Greater Coucal	Centropus sinensis
210	Lesser Coucal	Centropus bengalensis
216	Asian Barred Owlet	Glaucidium cuculoides
221	Himalayan Swiftlet	Aerodramus brevirostris
225	Pacific Swift	Apus pacificus
226	Little Swift	Apus nipalensis
228	Pied Kingfisher	Ceryle rudis

229	Common Kingfisher	Alcedo atthis
230	White-throated Kingfisher	Halcyon smyrnensis
234	Blue-tailed Bee-eater	Merops philippinus
236	Eurasian Hoopoe	Upupa epops
238	Eurasian Wryneck	Jynx torquilla
247	Eurasian Skylark	Alauda arvensis
250	Pale Martin	Riparia diluta
251	Barn Swallow	Hirundo rustica
252	Red-rumped Swallow	Cecropis daurica
254	Forest Wagtail	Dendronanthus indicus
255	Yellow Wagtail	Motacilla tschutschensis
256	Citrine Wagtail	Motacilla citreola
257	Grey Wagtail	Motacilla cinerea
358	Pale-legged Leaf Warbler	Phylloscopus tenellipes
258	White Wagtail	Motacilla alba
259	Richard's Pipit	Anthus richardi
260	Olive-backed Pipit	Anthus hodgsoni
261	Red-throated Pipit	Anthus cervinus
262	Pechora Pipit	Anthus gustavi
263	Buff-bellied Pipit	Anthus rubescens
265	Black-winged Cuckoo-shrike	Coracina melaschistos
270	Red-whiskered Bulbul	Pycnonotus jocosus
271	Chinese Bulbul	Pycnonotus sinensis
272	Sooty-headed Bulbul	Pycnonotus aurigaster
273	Chestnut Bulbul	Hemixos castanonotus
278	Brown Shrike	Lanius cristatus
279	Long-tailed Shrike	Lanius schach
283	Siberian Rubythroat	Luscinia calliope
285	Bluethroat	Luscinia svecica
287	Oriental Magpie Robin	Copsychus saularis
289	Daurian Redstart	Phoenicurus auroreus
292	Common Stonechat	Saxicola maurus
297	Blue Rock Thrush	Monticola solitarius
301	Scaly Thrush	Zoothera aurea
302	Japanese Thrush	Turdus cardis
303	Common Blackbird	Turdus merula
305	Grey-backed Thrush	Turdus hortulorum
306	Pale Thrush	Turdus pallidus
308	Dusky Thrush	Turdus eunomus
312	Masked Laughingthrush	Garrulax perspicillatus

315	Hwamei	Garrulax canorus
316	White-browed Laughingthrush	Garrulax sannio
325	Japanese Bush Warbler	Cettia canturians
329	Russet Bush Warbler	Bradypterus mandelli
331	Lanceolated Warbler	Locustella lanceolata
332	Pallas's Grasshopper Warbler	Locustella certhiola
333	Middendorff's Grasshopper Warbler	Locustella ochotensis
335	Black-browed Reed Warbler	Acrocephalus bistrigiceps
340	Oriental Reed Warbler	Acrocephalus orientalis
343	Zitting Cisticola	Cisticola juncidis
344	Bright-capped Cisticola	Cisticola exilis
345	Yellow-bellied Prinia	Prinia flaviventris
346	Plain Prinia	Prinia inornata
347	Common Tailorbird	Orthotomus sutorius
349	Dusky Warbler	Phylloscopus fuscatus
352	Pallas's Leaf Warbler	Phylloscopus proregulus
354	Yellow-browed Warbler	Phylloscopus inornatus
356	Arctic Warbler	Phylloscopus borealis
367	Grey-streaked Flycatcher	Muscicapa griseisticta
369	Asian Brown Flycatcher	Muscicapa dauurica
377	Red-throated Flycatcher	Ficedula albicilla
384	Black-naped Monarch	Hypothymis azurea
387	Chinese Penduline Tit	Remiz consobrinus
389	Great Tit	Parus major
394	Scarlet-backed Flowerpecker	Dicaeum cruentatum
395	Fork-tailed Sunbird	Aethopyga christinae
397	Japanese White-eye	Zosterops japonicus
401	Chestnut-eared Bunting	Emberiza fucata
402	Little Bunting	Emberiza pusilla
403	Yellow-browed Bunting	Emberiza chrysophrys
406	Yellow-breasted Bunting	Emberiza aureola
409	Japanese Yellow Bunting	Emberiza sulphurata
410	Black-faced Bunting	Emberiza spodocephala
418	Yellow-billed Grosbeak	Eophona migratoria
420	White-rumped Munia	Lonchura striata
421	Scaly-breasted Munia	Lonchura punctulata
423	Russet Sparrow	Passer rutilans
424	Eurasian Tree Sparrow	Passer montanus
427	Red-billed Starling	Spodiopsar sericeus
428	Chestnut-cheeked Starling	Agropsar philippensis

429	Purple-backed Starling	Agropsar sturninus
431	Common Starling	Sturnus vulgaris
432	White-cheeked Starling	Spodiopsar cineraceus
433	Black-collared Starling	Gracupica nigricollis
434	White-shouldered Starling	Sturnia sinensis
435	Common Myna	Acridotheres tristis
436	Crested Myna	Acridotheres cristatellus
437	Black-naped Oriole	Oriolus chinensis
438	Black Drongo	Dicrurus macrocercus
440	Hair-crested Drongo	Dicrurus hottentottus
441.5	Asian Azure-winged Magpie	Cyanopica cyanus
444	Common Magpie	Pica pica
447	Large-billed Crow	Corvus macrorhynchos
448	Collared Crow	Corvus torquatus
744	Pied Bushchat	Saxicola caprata
785	White-headed Munia	Lonchura maja