

Appendix 12-5

Methodology and Results of Bird Transect and Point Count Surveys

Methodology

LMC Loop

In LMC Loop point counts at 13 locations were carried out once monthly along two transects through accessible areas of the key habitats, targeting the reed marsh in particular (**Figure 12-2**). The points were at least 100m apart, and all birds seen or heard within an estimated 50m radius during a five minute period were recorded. Surveys commenced within 60 minutes of sunrise.

In addition, two evening surveys specifically looking for for roosting Great Bitterns were carried out on 19th November and 10th February. From a suitable vantage point the reed marsh and airspace above was scanned for 30 minutes either side of sunset with the aim of recording Great Bitterns, which are most easily visible at this time based on previous experience at Mai Po NR.

Methodology and results of bird trapping surveys are provided in **Appendix 12-4**.

LMC Meander

In addition, point counts at three locations along LMC Meander were also carried out (**Figure 12-2**) for periods of five minutes. All birds seen or heard from the meander or its banks were recorded.

HHW wetland areas

Transect counts were carried out once-monthly in the wetland areas surrounding LMC Loop within the Assessment Area. The route followed and the numbers assigned to each pond are illustrated in **Figure 12-2**; due to the large area of ponds, the transect was divided into two (Ponds 1-40 and Ponds 41-102) and each section either carried out simultaneously by two observers or on separate days. As indicated in Figure 12-2, the route included surveys of three freshwater marsh and reed marsh areas (M1, M2 and M3), including the area (M1) closest to the alignment of the Eastern Connection Road.

Surveys of Ponds 1-13 provided data for the alignment of the proposed Western Connection Road. No bird surveys were deemed necessary along the alignment of the Western Connection Road away from fish pond and wet agriculture areas (i.e. along LMC Road), as the habitats are highly disturbed and anthropogenic. Dates of all transect/point count surveys are presented in **Table A12-12**.

In addition to data on bird numbers and presence being collected, the condition of each pond was assessed in terms of the percentage of the pond bottom exposed and whether this was wet or dry, the length of pond edge showing below the long-term water level and the percentage of the pond surface with emergent vegetation. Percentage figures were estimated to the nearest 25%. If any of these measurements were above zero, the data was recorded.

In addition, data collected as part of the ongoing Ramsar Site Waterbird Monitoring Programme were also analysed. The methodology used for this is the same.

Wet Agricultural Areas and Ma Tso Lung

In addition, transect surveys through the wet agriculture areas at Lok Ma Chau Tsuen and Chau Tau Tsuen, and in the area of Ma Tso Lung potentially impacted by the Eastern Connection Road were also carried out. During transect surveys, all species were counted, apart from those common and widespread in suitable habitat throughout Hong Kong; for the latter species, presence or absence only was noted.

Table A12-12 Dates of transect, Great Bittern (GB) roost counts and point count surveys, June 2009 to May 2010.

Month	LMC Loop/LMC Meander	Fish Ponds	LMC/Chau Tau Tsuen	Ma Tso Lung
January	28 th	25 th , 29 th	20 th , 30 th	20 th
February	10 th (GB), 25 th	13 th , 21 st	10 th	10 th
March	29 th	7 th , 18 th	4 th	4 th
April	21 st	19 th , 20 th	19 th	20 th
May	27 th	12 th ,	14 th	14 th
June	29 th	24 th	26 th	26 th
July	21 st	10 th , 20 th	10 th	26 th
August	20 th	31 st	20 th	9 th
September	28 th	25 th	25 th	21 st
October	19 th	15 th , 16 th	15 th	17 th
November	19 th (GB), 20 th	5 th , 15 th	5 th	8 th
December	31 st	30 th	28 th , 31 st	28 th

Results

The occurrence of all species recorded in the six recording areas is presented in **Table A12-13**. The presence of bird species according to habitats in the study area is detailed in **Appendix 12-2**.

Table A12-13 Bird species recorded in survey areas during point counts and trapping (LMC Loop) and transect surveys (other areas), June 2009 to May 2010.

Species	LMC Loop	LMC Meander	WCR (Ponds 1-13)	HHW wetland area		LMC Tsuen	Chau Tau Tsuen	Ma Tso Lung
				Fish ponds	Marsh areas			
Little Grebe		√	√	√				
Great Cormorant	√	√	√	√	√			
Grey Heron	√	√	√	√	√			
Great Egret	√	√	√	√	√			
Intermediate Egret	√			√	√			
Little Egret	√	√	√	√	√	√	√	√
Cattle Egret				√		√		
Chinese Pond Heron	√	√	√	√	√	√	√	√
Striated Heron				√				
Black-crowned Night Heron		√	√	√				
Eurasian Wigeon	√			√				
Common Teal	√			√				
Garganey				√				
Tufted Duck				√				
Osprey	√							
Black Kite	√		√	√				√
Eastern Marsh Harrier	√	√		√	√			

Species	LMC Loop	LMC Meander	WCR (Ponds 1-13)	HHW wetland area		LMC Tsuen	Chau Tau Tsuen	Ma Tso Lung
				Fish ponds	Marsh areas			
Common Buzzard	√			√				
Imperial Eagle		√						
Common Kestrel					√			
White-breasted Waterhen	√	√	√	√	√	√	√	√
Common Moorhen	√	√		√			√	
Eurasian Coot			√					
Greater Painted-snipe	√							
Black-winged Stilt		√		√				
Oriental Pratincole				√				
Little Ringed Plover	√			√		√	√	
Marsh Sandpiper				√				
Common Greenshank	√							
Green Sandpiper				√	√	√	√	
Wood Sandpiper	√	√		√	√	√	√	
Common Sandpiper	√		√	√	√			
Eurasian Woodcock				√			√	√
Pintail Snipe				√		√		
Swinhoe's Snipe	√					√		
Common Snipe	√			√	√	√		
Red-necked Stint				√				
Temminck's Stint				√				
Long-toed Stint				√				
Curlew Sandpiper				√				
Whiskered Tern				√				
Rock Dove				√				
Oriental Turtle Dove	√			√	√			√
Spotted Dove	√			√	√	√	√	
Large Hawk Cuckoo						√		
Indian Cuckoo	√			√				
Plaintive Cuckoo	√		√	√		√		√
Common Koel	√			√	√			√
Greater Coucal	√			√	√			√
Lesser Coucal	√							
Little Swift	√							
Pied Kingfisher				√				
Common Kingfisher		√	√	√	√	√		
White-throated Kingfisher	√	√	√	√	√	√		√
Eurasian Wryneck	√			√				√
Barn Swallow	√			√	√	√	√	√
Red-rumped Swallow	√			√				

Species	LMC Loop	LMC Meander	WCR (Ponds 1-13)	HHW wetland area		LMC Tsuen	Chau Tau Tsuen	Ma Tso Lung
				Fish ponds	Marsh areas			
Asian House Martin				√				
Yellow Wagtail	√			√	√	√	√	
Citrine Wagtail				√				
Grey Wagtail				√				√
White Wagtail	√		√	√	√	√	√	√
Richard's Pipit	√			√				
Olive-backed Pipit	√		√	√		√	√	√
Red-throated Pipit	√			√		√		
Red-whiskered Bulbul	√	√			√			
Chinese Bulbul	√	√		√	√		√	
Sooty-headed Bulbul	√	√		√			√	√
Brown Shrike	√			√				
Long-tailed Shrike	√						√	
Siberian Rubythroat	√							√
Bluethroat	√			√	√	√		
Oriental Magpie Robin	√			√	√		√	
Daurian Redstart						√		√
Common Stonechat	√		√	√	√	√	√	√
Scaly Thrush								√
Common Blackbird						√		√
Grey-backed Thrush								√
Pale Thrush						√		
Masked Laughingthrush	√			√	√			
Japanese Bush Warbler	√							√
Brownish-flanked Bush Warbler	√							
Russet Bush Warbler	√							
Black-browed Reed Warbler	√			√	√			
Oriental Reed Warbler	√			√				
Zitting Cisticola	√		√	√	√			
Bright-capped Cisticola	√			√	√			
Yellow-bellied Prinia	√			√	√			
Plain Prinia	√			√	√			
Common Tailorbird				√	√			
Dusky Warbler	√			√	√	√	√	√
Pallas's Leaf Warbler							√	√
Yellow-browed Warbler	√		√			√	√	√
Arctic Warbler				√				
Red-throated Flycatcher								√
Black-naped Monarch								√
Chinese Penduline Tit	√	√		√	√			

Species	LMC Loop	LMC Meander	WCR (Ponds 1-13)	HHW wetland area		LMC Tsuen	Chau Tau Tsuen	Ma Tso Lung
				Fish ponds	Marsh areas			
Great Tit				√				√
Buff-bellied Flowerpecker				√				√
Scarlet-backed Flowerpecker				√				√
Japanese White-eye	√			√	√			
Chestnut-eared Bunting				√				
Little Bunting	√		√	√	√			
Yellow-breasted Bunting	√							
Black-faced Bunting	√			√	√	√		√
Yellow-billed Grosbeak	√		√	√				√
White-rumped Munia				√				
Scaly-breasted Munia	√		√	√	√			√
Eurasian Tree Sparrow	√			√				√
Red-billed Starling	√	√	√	√	√	√		
White-cheeked Starling				√		√		
Black-collared Starling	√			√	√			
White-shouldered Starling	√	√	√	√	√	√	√	√
Common Myna	√			√				
Crested Myna	√			√	√			
Black Drongo	√			√	√			
Hair-crested Drongo								√
Blue Magpie				√				√
Grey Treepie								√
Common Magpie	√	√		√	√			
Large-billed Crow	√			√				√
Collared Crow	√	√		√				

LMC Loop

Although five large ardeid species were recorded utilising habitats in LMC Loop, the numbers involved were very low (no more than two individuals of each species), reflecting the lack of suitable open water foraging areas. Even the marsh areas were unsuitable for larger waterbirds, as both were entirely covered in emergent vegetation. The dominance of habitats lacking structural diversity and open water is also reflected in how few species of ducks and waders were recorded, while the waders that were noted largely comprised species adapted to some degree to freshwater wetlands with emergent vegetation (Greater Painted-snipe, Wood Sandpiper and two species of snipe). Low numbers of these, also, were recorded.

The reed marsh areas in LMC Loop supported some species relatively widespread in HK such as Siberian Rubythroat, Common Stonechat, Brownish-flanked Bush Warbler, prinias and Zitting Cisticola. In addition, however, the rarer reedbed-associated passerine species Bluethroat, Black-browed and Oriental Reed Warbler, Chinese Penduline Tit and Yellow-breasted Bunting were also recorded. Peak counts of Bluethroat (four) and Chinese Penduline

Tit (27) were noteworthy, and both species were present throughout the winter period. These four species are all restricted in range in HK by virtue of their preference for or strong association with reed marsh or wetland habitat. Of these, Yellow-breasted Bunting is listed as Vulnerable by BirdLife International, while Bluethroat is listed as of Local Concern and Chinese Penduline Tit as of Regional Concern by Fellowes *et al.* (2002).

Other species recorded utilising the reed marsh area included wetland-dependant species, comprising Purple Heron, Yellow Bittern, Eastern Marsh Harrier and Pied Harrier (the latter recorded while carrying out trapping surveys). All of these are listed as of Local Concern by Fellowes *et al.* (2002), apart from Purple Heron, which is listed as of Regional Concern. However, only single records of Purple Heron and Yellow Bittern were obtained, while a notable absentee was Great Bittern, which, despite winter evening surveys on 19 November 2009 and 10 February 2010 (**Table A12-12**) to determine whether the reedbed supported a roost, as is the case at Mai Po NR, was not recorded.

Three small ponds present in the central part of LMC Loop. In addition to poor water quality, they are covered in vegetation, which limits their value to wildlife. A post-breeding concentration of juvenile White-breasted Waterhens and Common Moorhens was present in the late summer, there were occasional records of single small egrets and herons, a single migrant Pheasant-tailed Jacana was recorded in October and White-throated Kingfisher was occasionally recorded throughout the year.

The scattered groups of trees and shrubs in LMC Loop provided suitable habitat for relatively common and widespread species such as doves, cuckoos, bulbuls, Long-tailed Shrike, Oriental Magpie Robin, Masked Laughingthrush, *Phylloscopus* warblers, Japanese White-eye, Black-collared Starling, Crested Myna, Common Magpie and Large-billed Crow. Of somewhat more interest in this habitat were September and October records of Yellow-billed Grosbeak, a June record of White-cheeked Starling and a July record of a juvenile Red-billed Starling. These species are scarce to very rare breeding species in HK, confined to the Deep Bay area; however, there was no evidence that these species breed in LMC Loop itself. White-shouldered Starling was also recorded in June and July, but this species has increased significantly in numbers in recent years as is now a relatively widespread breeding species in the Deep Bay area, particularly at LMC WCA, where approximately 300 chicks were raised in nest boxes in the 2010 breeding season.

Grassland and grassland-shrubland habitats, which dominate LMC Loop, supported relatively common and widespread species such as Greater and Lesser Coucal, pipits, Sooty-headed Bulbul, shrikes, Common Stonechat, Japanese and Russet Bush Warblers, prinias and buntings.

Both Bright-capped and Zitting Cisticola were present in grassland habitat, both species regarded as of Local Concern by Fellowes *et al.* (2002). However, the former, a grassland specialist, has increased significantly in HK since publication of Carey *et al.* (2001), and appears now to be a fairly widespread, if localised, breeding species in lowland and hill slope grassland in the northern NT. One or two post-breeding birds, including one juvenile, were recorded during monthly surveys from August to October, while up to six birds were recorded in the winter. Zitting Cisticola is more catholic in habitat preferences, and was found not only in grassland but also regularly in areas of reeds in most months. The species is, however, likely to breed in LMC Loop, based on records of up to three birds in June and July.

The airspace above LMC Loop was used by foraging Barn and Red-rumped Swallows, Little and Pacific Swifts and Pale Martins. Bonelli's Eagle was also recorded foraging over the area.

Data from the monthly point counts proved less representative of the numbers of passerines present in the reedbed than the data provided by the trapping (**Appendix 12-4**), though broadly speaking the point counts do provide a representative picture of the range of species. The main value of the point counts is that they were able to provide data regarding general bird use of LMC Loop, not only reedbed and grassland passerine species, but also waterbirds and raptors, as well as aerial species foraging in the airspace above the LMC Loop and birds using Shenzhen River.

Although point counts recorded a range of ardeid and shorebird species, the number of months each was present, the very small number of individuals and the habitats utilized indicate that LMC Loop is not of importance for these species. Use of the reed marsh by Pied and Eastern Marsh Harriers as a foraging and roost site was indicated by early morning records of these species. LMC Loop appears to be a site at which Lesser Coucal occurs regularly; however, although listed as a species of conservation concern, this is not the case in HK, where it is fairly widespread and abundant. The importance of the reed marsh to Bluethroat and Chinese Penduline Tit is revealed in that both species were recorded throughout most of the non-breeding season. Use of the site by starlings and Yellow-billed Grosbeak appears to be opportunistic, and none of these species appear to breed or roost on site. Finally, Collared Crow was recorded once, though as there is very little open water present, LMC Loop is not of significance to this species

Species recorded in Shenzhen River channel were Grey Heron, Common Teal and Little Ringed Plover. Observations of Little Egret, Chinese Pond Heron and Northern Pintail foraging in the river channel were made at other times. In all cases, however, very low numbers were recorded, and the river does not appear to be of significance to waterbirds as a foraging area.

However, large waterbirds were regularly seen flying up and down Shenzhen River in early morning, indicating it had some significance as part of the flight line corridor through the area. Such observations were also made during the flight line counts (see **Appendix 12-3**).

Species of conservation importance recorded during point count surveys are listed in Table **A12-14**.

Table A12-14 Avifauna of conservation importance recorded during point count surveys in LMC Loop June 2009 to May 2010, the number of months recorded and the habitat in which present.

Species	Number of Months Recorded	Habitats
Purple Heron 草鷺	2	Reed Marsh
Grey Heron	1	Shenzhen River
Great Egret 大白鷺	4	Plantation
Intermediate Egret 中白鷺	2	Grassland
Little Egret 小白鷺	2	Plantation, Pond
Chinese Pond Heron 池鷺	3	Plantation, Pond
Yellow Bittern 黃葦鶯	1	Reed Marsh
Common Teal	2	Shenzhen River
Pied Harrier 鵲鶯	1	Reed Marsh
Eastern Marsh Harrier 白腹鶯	2	Reed Marsh

Species	Number of Months Recorded	Habitats
Japanese Quail 鶉鴉	2	Grassland
Pheasant-tailed Jacana 水雉	1	Pond
Greater Painted-snipe 彩鶉	1	Grassland
Black-winged Stilt	1	Grassland
Little Ringed Plover	3	Shenzhen River
Wood Sandpiper 林鶉	2	Pond
Swinhoe's Snipe 大沙錐	1	Grassland
Lesser Coucal 小鴉鶉	5	Grassland
White-throated Kingfisher 白胸翡翠	5	Pond
Red-throated Pipit	2	Pond, Grassland
Bluethroat	5	Reed Marsh
Zitting Cisticola	6	Reed Marsh, Grassland
Bright-capped Cisticola	7	Grassland
Chinese Penduline Tit	6	Reed Marsh
Yellow-breasted Bunting	1	Reed Marsh
Yellow-billed Grosbeak	2	Plantation
Red-billed Starling	2	Grassland/Shrubland, Plantation
White-shouldered Starling	1	Plantation
Collared Crow	1	Plantation

LMC Meander

The range of species recorded utilising LMC Meander is relatively narrow and the numbers recorded are small (see **Table A12-14a**). Little Grebes are present for much of the year, and may breed in the dense vegetation, while small numbers of Great Cormorants were recorded foraging occasionally in the dry season. Despite the very large number of these birds using the Meander as a route indicator on the way to HHW, very few actually stop to forage. Very small numbers of ardeids were recorded foraging, though these did include a presumed migrant Purple Heron in October. The trees and bushes in the quieter areas are, however, utilized as daytime roosting areas in the dry season by ardeids and cormorants. Both Eastern Marsh Harrier and Imperial Eagle were recorded foraging over the densely-vegetated banks, while Common Moorhen were occasionally present in the dry season. Two species of kingfisher were recorded fishing, while bulbuls, Chinese Penduline Tit, Red-billed and White-cheeked Starling and Collared Crow were recorded in vegetation along the banks. The numbers of each species recorded foraging or roosting in LMC Meander other than those widespread in HK are listed in **Table A12-14a**.

Table A12-14a Bird species and numbers recorded foraging or roosting in LMC Meander June 2009 to May 2010.

	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Little Grebe		1					3					
Great Cormorant						3		3	10			
Grey Heron			1	1	4	1	1	1	1			
Purple Heron					1							
Great Egret	1	2		1		1					1	
Little Egret				1		2						
Chinese Pond Heron	2		2	7	2		1				1	

	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Night Heron	3		1									
Imperial Eagle								1				
Eastern Marsh Harrier								1				
White-breasted Waterhen		1			2							
Common Moorhen							1	1				1
Wood Sandpiper										1		
Common Kingfisher	1											
White-throated Kingfisher					1							
Chinese Penduline Tit											2	
Red-billed Starling										1		
White-shouldered Starling											1	
Collared Crow										1		

HHW Wetland Areas

The occurrence of birds in fish pond areas near LMC Loop is summarised in **Table A12-13**. The monthly means of data collected during the two counts carried out as part of this study and the Ramsar Site WMP has been summed to produce these figures.

The number of species recorded in the fish pond area is high due to the mixture of wetland habitats in the form of marsh, fish pond and reed marsh, and dry habitats such as pond bunds, shrubs and trees. The range of waterbird species was very wide and in accordance with previous surveys carried out as part of the Ramsar Site Waterbird Monitoring Programme and current understanding of the function of this habitat, comprising ardeids, raptors and waders. Ducks were relatively few in number, possibly due to distance from Inner Deep Bay. Many of the species are wetland-dependent and/or of conservation significance in that they are recognized by Fellowes *et al.* (2002), are members of a species for which the Deep Bay area supports internationally important numbers (Wetlands International 2013) or are recognized by BirdLife International as globally-threatened. The most significant of the latter is Black-faced Spoonbill, listed as Endangered, which was recorded foraging at HHW.

The overall distribution of waterbirds in the area as recorded during transect surveys is illustrated in **Figures A12-22-25**. Overall, fewest birds were recorded in the fish ponds along Ha Wan Tsuen Road to the southwest of LMC Loop and Boundary Fence Road to the southeast. Most of these ponds are small, rather disturbed or unmanaged with heavily vegetated banks. The exceptions to this were ponds 11, 12 and 21 near the junction of these two roads, as these ponds regularly held roosting cormorants.

The figure for ardeids in the wet season (**Figure A12-23**) indicates that highest numbers were concentrated in fish ponds to the northeast of LMC Loop. Numbers of other wetland-dependent species in this period (**Figure A12-25**) were substantially lower, as is to be expected in the wet season, but the only two ponds with more than seven birds recorded were also in the same area. These ponds may be somewhat less disturbed than others in the area.

Ardeid distribution in the dry season (**Figure A12-22**) was not dissimilar to that in the wet season, though with a slightly wider spread of favoured ponds largely as a result of either draindown causing concentrations of birds at or near certain ponds or the presence of daytime roosts. The latter phenomenon influences significantly the distribution pattern of other wetland-dependent species in the dry season (**Figure A12-24**), with greatest numbers occurring in ponds that are favoured daytime roost sites, in particular for Great Cormorants

(ponds 12, 37, 69 and 82). Aside from these ponds, the largest number of wetland-dependent species was concentrated in the central area of ponds to the northeast of LMC Loop.

In the freshwater and reed marsh areas (M1, M2 and M3), a total of 22 wetland-associated or wetland-dependent species were recorded. The most abundant species were Grey Heron (total of 47 during the 12 counts), Great Cormorant (17) and Great Egret (12), all of which were recorded at diurnal roosts. A total of 19 Chinese Pond Herons were recorded both foraging and roosting in these marsh areas.

In terms of the marsh area closest to and potentially impacted by the eastern connection road (M1), in addition to common and widespread species recorded commonly throughout HK in areas of suitable habitat, the following were recorded (total number of individuals in parentheses): Great Cormorant (17), Grey Heron (1), Great Egret (1), Chinese Pond Heron (6), White-breasted Waterhen (4), Oriental Turtle Dove (9), White-throated Kingfisher (3), Yellow Wagtail (4), Bluethroat (2), Common Stonechat (5), Black-browed Reed Warbler (3), Bright-capped Cisticola (2), Dusky Warbler (6), Chinese Penduline Tit (7) and Red-billed Starling (10). The lack of open water areas resulted in Great Cormorant, Grey Heron, Great Egret and White-throated Kingfisher only being seen at diurnal roost in trees surrounding the marsh or on wires above the marsh. Chinese Pond Heron and White-breasted Waterhen were recorded foraging in the marsh. There were no records of larger reed-associated species such as the small bitterns, Great Bittern or Purple Heron. However, reedbed-associated passerines of conservation significance were recorded, these being Bluethroat and Chinese Penduline Tit. Overall, however, numbers of these species were relatively low, especially compared to the reed marsh in LMC Loop.

Wet Agriculture Areas

A total of 31 species were recorded in the wet agricultural area at LMC Tsuen, including 12 wetland-dependent species such as smaller ardeids (Little and Cattle Egret, Chinese Pond Heron), White-breasted Waterhen, Little Ringed Plover, small sandpipers and snipe, and kingfishers. The mixture of active and inactive fields together with the proximity to the fish pond area at HHW results in a wide range of species occurring, though the small size of the wetland area means that numbers are relatively low compared with, for example, Long Valley.

In contrast, a total of 22 species were recorded in the wet agricultural area at Chau Tau Tsuen, of which seven are wetland-dependent. This area lacked such species as Cattle Egret, snipe and kingfishers, though Common Moorhen was recorded, a species absent at LMC Tsuen. In general, the wet agriculture area at LMC Tsuen is of lower ecological value than that at Chau Tau Tsuen as it is significantly smaller, lies further away from HHW and lacks long inactive wet fields.

Ma Tso Lung

The range of species recorded in the Ma Tso Lung area was typical of the mix of lowland village, village-edge and shrubland habitats present, and largely comprised relatively common and widespread resident and migrant species. Although a significant area of the valley comprises seasonally wet grassland and marsh, these habitats almost entirely lack structural and thus microhabitat diversity; consequently, their ecological value to birds is significantly compromised. Only five wetland-dependent species were recorded, with that of most interest being White-throated Kingfisher, of which records occurred in the breeding season (the time of year when this species is least dependent on wetlands).

