

A REPORT ON THREE YEARS OF BIRD BANDING IN TAIWAN

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Introduction

Systematic study of the birds of Taiwan was begun by Swinhoe in 1854. He reported 18 species in 1863 and concluded that the Taiwan fauna was almost entirely of the Him alaya Chinese type. In the intervening years up to 1939 several European and Japanese ornithologists collected many thousands of birds from Taiwan, providing large collections of Taiwan birds for several museums around the world. A detailed historical review and bibliography of ornithological studies for Taiwan was given in English by Hachisuka and Udagawa in 1950 (1). The same authors also presented in 1951 detailed descriptions in English for the 401 birds belonging to 3 species reported for Taiwan (2). Chen in 1956 provided a taxonomic key with detailed descriptions in Chinese for 407 birds of Taiwan (3).

Hachisuka and Udagawa (1) presented much valuable information on migratory pathways of birds found in Taiwan (Fig. 1). Generalizations of this kind are based on studies of distribution and seasonal movements of birds. Exact information based on recovery of banded birds, however, has only recently become available.

In 1963 the Migratory Animal Pathological Survey (MAPS) was organized by Dr. C. M. Barnes, pathologist and Director of MAPS, and Dr. H. E. McClure, ornithologist, with the support of the United States Government. The immediate objective of MAPS was to establish and coordinate a major international bird banding effort in eastern Asia as a foundation for studies on the role of birds in transmission of disease. The MAPS headquarters was in Tokyo until 1966 when it moved to Bangkok at the time that Dr. McClure became Director. During 1964 bird banding teams were organized at Kyung Hee University, Seoul, Korea; Yamashina Institute of Ornithology, Tokyo, Japan; Tunghai University, Taichung, Taiwan; Philippine National Museum, Manila, and Silliman University, Dumaguete, Philippines; U. S. Component of the SEATO Medical Research Center, Bangkok, Thailand; and the University of Malaya, Kuala Lumpur, Malaya. Cooperative banding of birds has also been established in Okinawa, Sabah (North Borneo), Sarawak, Singapore, and HongKong. Annual conferences for team leaders have been held in Taiwan (1964), Malaya (1965), and Japan (1966).

In May 1964 Tunghai University was given a grant to support a banding program in cooperation with the MAPS project. A field team composed of four Tunghai biology graduates was formed under the direction of Professor Johnson T. F. Chen and the present writer. Dr. McClure gave the team training in basic techniques. Mr. Zuh-ming Dien, Curator of Birds at the Taiwan Museum, kindly assisted in the study of their collection of birds. A reference collection of bird skins for Tunghai University was begun and now numbers about 150 species.

Methods

Large concentrations of migratory birds are located with the help of local residents and professional bird catchers who also assist in catching the birds for banding.

These people have a long-standing economic dependence on the bird migrations as a source of food for sale or for family consumption. Birds are bought from the people at fixed prices, depending upon the size of the bird. Buying birds, therefore, is one of the team's major expenses and the principal method of obtaining migratory species. Information on mass movements of birds is quickly relayed to the team by these cooperating local residents.

The largest numbers of birds have been taken from sugar cane fields where they roost by the thousands. Large mist nets are placed at the edge of a field which has previously been found to serve as a roosting place for large numbers of the desired species. The roosting birds are frightened by rattling the cane in various ways and are caught in the nets as they fly short distances. Since the birds arrive at the roost at evening dusk and leave at dawn, some professional netters may work all night and with repeated disturbances to the birds may catch a total of more than two thousand birds from one field. Other netters prefer to work only at dusk or at dawn in order not to disturb the roost so much that the birds might change roosting places. The work in sugar cane fields has been carried on mostly in Taichung and Tainan Counties but has more recently been extended into Miaoli, Nantou and Chiayi Counties.

Professional bird netters have also helped to catch birds in wheat and rice harvest fields in Taichung County. The use of a hawk whistle with perfect timing causes the frightened birds to dip suddenly in flight from a grainfield where they have been feeding, so that they fly into the nets placed at the edge of the field. This method has yielded principally munias, sparrows and warblers. House swifts have been netted in large numbers under bridges near Taichung City in the early hours after dawn.

Other methods utilizing the help of local residents include; catching shrikes by bamboo perch trap near Hengchun, Pingtung County; catching hawks by strong light at night with arrow gun in southern Pingtung County; banding egret and heron nestlings in Hsinchu and Ilan Counties; and catching birds by night with flash-light and handnet during the dark phases of the moon in the dry Hsilo River bed.

General mist-netting of birds by the team in varied habitats has provided small samples of most of the 130 species banded to date. Small numbers of shorebirds have been netted at Tatu River mouth in Taichung County each winter although strong winds greatly reduce netting efficiency. Mountain habitats have been sampled in Nantou, Chiayi and Ilan Counties. Three mountain banding stations were established in August, 1966 above Wushe in Nantou County from an altitude of 1100 to 2700 meters.

The captured bird is banded and released as quickly as possible. An aluminum band is placed around the right tarsus of the bird and its number recorded along with the name of species, age, sex, body measurements, and other pertinent information. Generally, five birds per species per habitat per season have complete body measurements taken and provide ectoparasite samples and blood smears. Ectoparasites are taken by dusting the bird with dry-die at the time of banding

and five minutes later ruffling the feathers over a piece of paper to collect the parasites for preservation in alcohol. Thin blood smears are taken by clipping a toenail to get a drop of blood. These samples are sent along with a copy of the monthly banding record to Dr. McClure in Bangkok for forwarding to specialists around the world.

A comprehensive manual of procedures and techniques prepared by Dr. McClure has guided the MAPS project (4).

Results

During the past three years through April 1967, a little more than 100,000 birds of 130 species have been banded. Approximately 90% of this total is composed of migratory birds, of which four species (*Hirundo rustica*, 26,000; *Motacilla flava*, 24,000; *Emberiza spodocephala*, 12,000 and *Lanius cristatus*, 10,000) account for 72,000 of the banded total. Four more species (*Bubulcus ibis*, 4,500; *Riparia paludicola*, 1,900; *Nycticorax nycticorax*, 2,200; and *Egretta garzetta*, 1,600) total 10,200 birds banded. Table 1 presents the yearly totals for each species banded. About 1,500 of these birds of 120 species have provided samples of ectoparasites (mostly feather mites and biting lice) and blood smears.

The number of foreign recoveries of Taiwan-banded birds is increasing at an accelerating rate as the MAPS program enlarges. Each band is stamped with a Hong Kong post office box number by way of which the band is returned to headquarters in Bangkok. The Bangkok office then sends the details of banding and recovery of the bird to the teams concerned with that species. Information on 74 foreign recoveries has been received already as well as 5 Taiwan recoveries of foreign-banded birds, altogether comprising nine species. Table 2 summarizes this recovery data. Birds banded in Taiwan have been recovered as far north as Point Barrow, Alaska (4,000 miles), in Siberia and Korea, and from Bangkok through the Malaysian archipelago to the Philippines and Caroline Islands.

The field work developed slowly in 1964 yielding a total of only 806 birds of 42 species banded in seven months. In March 1965, however, contact with professional bird catchers in Taichung County greatly changed the perspective for the work. Working in isolated wheat harvest fields in March and in sugar cane fields throughout April, more than 9,000 birds were banded. Work in heronries from June to September resulted in banding a total of 1,800 nestlings of three species, of which 20 recoveries were reported during the winter from several islands of the Philippines and from Sabah (North Borneo). In September 1,350 red-tailed shrikes were banded in southern Taiwan enroute from the China mainland to the Philippines. A total of 19,959 birds of 66 species was banded in 1965.

In 1966, with the help of local residents and bird-netters, the team banded a total of 26,403 migratory swallows, buntings and wagtails from sugar cane roosts. Local residents helped to catch 8,784 shrikes with perch-traps. Farmers near the heronries climbed trees to help in the banding of 6,083 egret and heron nestlings. A total of 45,354 birds of 96 species was banded in 1966. In the first four months of 1967, a total of 35,000 birds of 40 species has been banded.

Data is being gathered on the status, distribution, and ecology of local species. Special problems such as plumage changes, social behavior, altitudinal migration, and population size are

being pursued and will be reported at a later date.

Discussion

The primary objective of the MAPS banding program is to gain specific information on the time and extent of bird migrations in eastern Asia. Such information will make possible more effective studies on the role of birds as disease vectors over long distances. The possibility that resident species of birds may serve as reservoirs and amplifiers of disease agents is also considered.

The responsibility of the Tunghai University bird banding team extends to all of Taiwan. Although most habitats have been sampled, birds have not been banded in Kaohsiung, Hualien and Taitung Counties. Particular attention during the coming year must be given to a survey of the birds of the latter two counties on the East Coast.

As should be expected, a number of new findings have resulted from these field studies. These will be reported in a later publication. One case, however, is noteworthy here. The gray faced buzzard, *Butastur indicus*, had very meager reports from Taiwan in the past, whereas our banding team discovered that this bird is hunted and killed by the thousands in southern Taiwan every October and again in several places on the return flight in April. Many specimens prepared by local taxidermists for sale in the shops at Sun Moon Lake, Kuantulin, and elsewhere. The same species has produced many recoveries from the Philippines of birds banded in Miyako, Ryukus, during their October passage from breeding quarters in Japan.

The cattle egret, present by the tens of thousands from April to September, is sighted in the winter. Cattle egrets banded as nestlings in Hsinchu and Ilan Counties have recovered in the Philippines, North Borneo and the West Caroline Islands up to 1500 miles distance from their nesting site. The few cattle egrets wintering in Taiwan may come from southern Japan where they are known to breed. However, two cattle egrets banded in July in Hsinchu County have been captured in December and January in southern Taiwan. On the other hand, one cattle egret banded as a nestling on August 25 was captured in Luzon, Philippines on October 22, about 500 miles away two months later. These data question the validity of the theory that the late hatching cattle egrets may be the ones sighted in Taiwan during the winter. In any case, other conditions weakening the bird may account for its failure to join in the long migratory flight.

According to Hachisuke and Udagawa (1), about 270 subspecies belonging to 250 species of birds may be expected to have regular occurrence in Taiwan. About half of these birds have been reported year around. In some cases, the "resident" species may be migratory, the summer and winter populations made up of different birds. The Tunghai team has banded 131 species of birds belonging to 40 families. Observations on an additional 70 species including an additional 10 families have been recorded.

With the extension of work on the shorebirds and in the mountains, it is hoped that a more comprehensive review of the status of Taiwan birds may soon be possible.

Summary

The Migratory Animal Pathological Survey (MAPS) with headquarters in Bangkok has sup-

ported a bird banding program at Tunghai University since May 1964. During three years 100,000 birds of 132 species have been banded. About 90% of these birds are migratory. Yellow wagtails, barn swallows and black-faced buntings netted in sugar cane roosts account for 65,000 of the total number of birds banded. The brown shrike caught by farmers with perch traps totals 10,000 birds banded. Nestling cattle egrets, little egrets and night herons account for 10,000 of the total. Ectoparasites and blood smears were taken from about 1500 birds of 120 species and these were provided to specialists in taxonomy around the world.

Foreign recoveries of birds banded in Taiwan total 74 birds of 8 species. Taiwan recoveries of birds banded in other countries total 5 birds of three species. The more distant recoveries include yellow wagtails from Alaska (4000mi) and Siberia (2800mi); barn swallows from Malaya (2000mi) and the Philippines (1000mi); a dunlin and a tree pipit from Sakhalin (2400mi); cattle egrets from the Philippines (1000mi), North Borneo (1000mi) and West Caroline Islands (1500mi); little egrets from the Philippines (1000mi); brown shrikes from the Philippines (1000mi); a black-faced bunting from Korea (1100mi); and a brown thrush from Japan (800mi).

ACKNOWLEDGEMENTS

The development of the MAPS bird banding program has truly been a team effort. Appreciation is expressed to those individuals already mentioned in the introduction to this paper, to the Tunghai University Administration for their encouragement and assistance, and to the U.S. Navy Medical Research Unit in Taipei (NAMRU-2) for assistance in communication with MAPS headquarters and for some financial assistance during the past year. Mr. Sheldon R. Severinghaus, Biology Department lecturer in ornithology, has served as field supervisor for the past year. He has taken major responsibility in the writing of narrative reports of the banding work which have been helpful in writing the present paper. A special debt of gratitude is owed to the research assistants of the Biology Department who have carried out most of the field work and record-keeping for this program. Mr. Kuo-wei Kang has served throughout the three years of the project. Mr. Ryh-ping Yang, Mr. Chen-hsiung Lin, and Mr. Hsi-chang Tang served during the first two years. Mr. Mao-cheng Chao, Mr. Ching-teh Wang and Miss Wan-tsih Huang have served as research assistants during the past year. Two other members of the team have given invaluable assistance in the record-keeping and organization of the work. Miss Delores Kang served as secretary during the second year. Mr. Hsien-chang Meng has served as secretary-accountant during the past year. Mr. Meng has also participated in the field activities.

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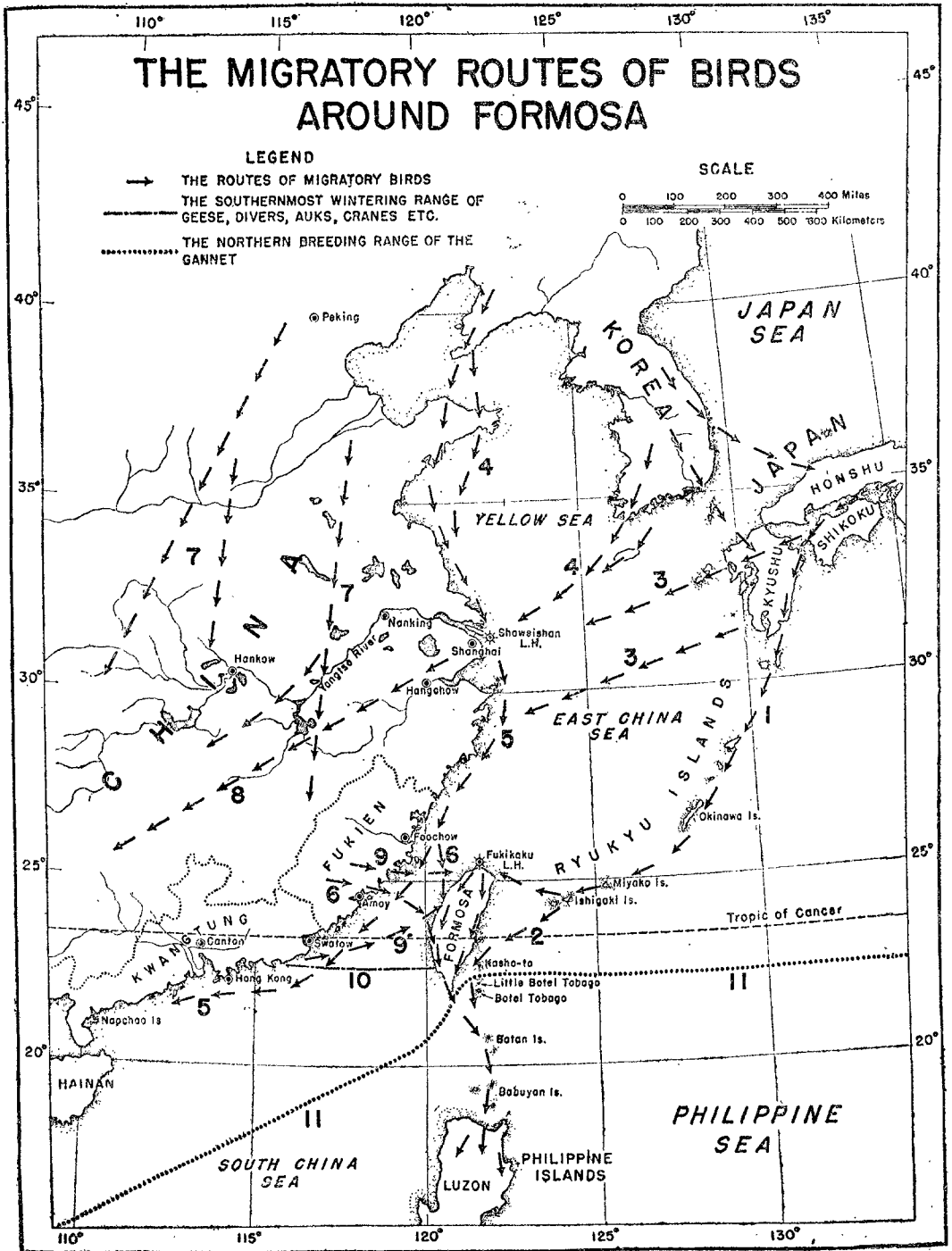


Figure 1. Hachisuka and Udagawa, 1950.

Table 1. Summary of banding in Taiwan from May 1964 to May 1967.

Taxonomic nomenclature and sequence follow that of the MAPS Annual Narrative Report for 1965.

Family/Species	May-Dec 1964	Jan-Dec 1965	Jan-Dec 1966	Jan-May 1967	Total
ARDEIDAE					
<i>Bubulcus ibis</i> Cattle Egret	11	1203	3235		
<i>Egretta garzetta</i> Little Egret	3	270	1042		
<i>Ixobrychus cinnamomeus</i> Cinnamon Bittern			2		
<i>Ixobrychus sinensis</i> Chinese Little Bittern			2		
<i>Nycticorax nycticorax</i> Black-crowned Night Heron	2	338	1806		
ANATIDAE					
<i>Anas crecca</i> Teal	6				
ACCIPITRIDAE					
<i>Accipiter soloensis</i> Chinese Goshawk			2		
<i>Accipiter virgatus affinis</i> Large Besara Sparrow Hawk			1		
<i>Accipiter virgatus gularis</i> Japanese Sparrow Hawk			4		
<i>Butastur indicus</i> Gray-faced Buzzard		18	2	5	
<i>Circus aeruginosus</i> Marsh Harrier		1			
<i>Circus cyaneus</i> Hen Harrier			1		
PHASIANIDAE					
<i>Coturnix chinensis</i> Painted Quail					
TURNICIDAE					
<i>Turnix suscitator</i> Formosan Button Quail	1	22	9		
<i>Turnix sylvatica</i> Little Button Quail		93	4		
RALLIDAE					
<i>Amaurornis phoenicurus</i> White-breasted Waterhen	1				
<i>Porzana fusca fusca</i> Common Ruddy Crake		1	3		
<i>Rallus striatus</i> Formosan Blue-breasted Rail			2		

Table 1. -continued-

Family/Species	1964	1965	1966	1967 Total
ROSTRATULIDAE				
<i>Rostratula benghalensis</i> Painted Snipe		10	14	
CHARADRIIDAE				
<i>Charadrius alexandrinus</i> Kentish Plover	8	1	40	
<i>Charadrius dubius</i> Little Ringed Plover	3	2	10	
SCOLOPACIDAE				
<i>Actitis hypoleucos</i> Common Sandpiper		1		
<i>Calidris alpina</i> Eastern Dunlin	86	1	34	
<i>Calidris ruficollis</i> Little Stint			1	
<i>Calidris temminckii</i> Temminck's Stint			1	
<i>Capella gallinago</i> Common Snipe		1	2	
<i>Philomachus pugnax</i> Ruff	1			
<i>Tringa ochropus</i> Green Sandpiper		1		
GLAREOLIDAE				
<i>Glareola maldivarum</i> Eastern Pratincole			10	
LARIDAE				
<i>Chlidonias hydrida</i> Whiskered Tern			1	
COLUMBIDAE				
<i>Chalcophaps indica</i> Emerald Dove			3	
<i>Columba pulchricollis</i> Ashy Wood Pigeon			1	
<i>Streptopelia chinensis</i> Spotted-necked Dove	3	4	1	
CUCULIDAE				
<i>Centropus toulou</i> Lesser Coucal		1	4	
TYTONIDAE				
<i>Tyto longimembris</i> Chinese Grass Owl				1

Table 1. -continued-

Family/Species	1964	1965	1966	1967 Total
STRIGIDAE				
<i>Ninox scutulata</i> Brown Hawk Owl			1	
<i>Otus scops</i> Scops Owl			2	
APRIMULGIDAE				
<i>rimulgus affinis</i> Savanna Nightjar		20		
PODIDAE				
<i>affinis</i> House Swift		776	59	
CEDINIDAE				
<i>Cdo atthis</i> Common Kingfisher		8	2	
ITONIDAE				
<i>egalaima oorti</i> Müller's Barbet				1
CIDAE				
<i>lcanus</i> Black-naped Green Woodpecker				1
ALAUDIDAE				
<i>uda gulgula</i>		489	4	
IRUNDINIDAE				
<i>undo rustica</i> Barn Swallow		881	15,536	
<i>rundo striolata</i> Striated Swallow		55	165	
<i>paria paludicola</i> Brown-throated Sand Martin		88	757	
AMPEPHAGIDAE				
<i>microcotus roseus</i> Ashy Minivet			1	
ICRURIDAE				
<i>Dicrurus macrocercus</i> Black Drongo	3	2	38	
CORVIDAE				
<i>Garrulus glandarius</i> Jay				1
<i>Nucifraga caryocatactes</i> Nutcracker				

Table 1. -continued-

Family/Species	1964	1965	1966	1967 Total
PARIDAE				
<i>Aegithalos concinnus</i> Red-headed Tit			1	
<i>Parus ater</i> Coal Tit			1	
<i>Parus major</i> Great Ti		3		
<i>Parus monticolus</i> PGreen-backed Tit			5	
SITTIDAE				
<i>Suropaea</i> taEuropean Nuthatch			3	
TIMALIIDAE				
<i>Tinodura morrisoniana</i> cFormosan Barwing				
<i>Ticlippe brunnea</i> VcGould's Nun Babbler	1	16		
<i>Ticlippe cinereices</i> Tit Babblerp			7	
<i>Ticlippe nipalensis</i> Mountain Nun Babbler	41	118	33	
<i>Garrulax albogularis</i> White-throated Laughing Thrush		1		
<i>Garrulax canorus</i> Hwamei		6	3	
<i>Garrulax morrisonianus</i> Formosan Laughing Thrush			5	
<i>Garrulax poecilorrhynchus</i> Rufous Laughing Thrush				
<i>Heterophasia auricularis</i> White-eared Sibia			5	
<i>Lliocichla steerei</i> Steere's Babbler			32	
<i>Pomatorhinus ruficollis</i> Lesser Scimitar Babbler	5	5	7	
<i>Stachyris ruficeps</i> Red-headed Tree Babbler	16	34	7	
<i>Yuhina brunneiceps</i> Formosan Yuhina			42	
<i>Yuhina xantholeuca</i> White-bellied Crosted Babbler		3	1	
PARADOXORNITHIDAE				
<i>Paradoxornis verreauxi</i> Golden Parrotbill			18	
<i>Paradoxornis webbiana</i> Webb's Parrotbill		4	10	

Table 1. -continued-

Family/Species	1964	1965	1966	1967 Total
PYCNONOTIDAE				
<i>Hypsipetes madagascariensis</i> Black Bulbul			2	
<i>Pycnonotus sjnensis</i> Chinese Bulbul	45	798	1157	
<i>Pycnonotus taiwanus</i> Styan's Bulbul			2	
<i>Spizixos semitorques</i> Finch-billed Bulbul			5	
TROGLODYTIDAE				
<i>Troglodytes Troglodytes</i> House Wren				1
TURDIDAE				
<i>Enicurus scouleri</i> Little Forktail			1	
<i>Erithacus calliope</i> Ruby Throat		117		
<i>Monticola solitaria</i> Blue Rock Thrush	1	24	89	1
<i>Myiomela leucura</i> White-tailed Blue Robin		1		
<i>Phoenicurus auroreus</i> Daurian Redstart		1		1
<i>Tarsiger indicus</i> White-breasted Busho				
<i>Tarsiger johnstoniae</i> Johnstone's Bush robin			8	
<i>Tarsiger cyanurus</i> Red-flanked Bluetail				
<i>Turdus chrysolaus</i> Brown Thrush		4	14	
<i>Turdus niveiceps</i> Formosan Thrush				
<i>Turdus obscurus</i> Grey-headed Thrush			1	
<i>Turdus pallidus</i> Pale Thrush		3	4	4
<i>Zoothera dauma</i> White's Ground Thrush				1

Table 1. -continued-

Family/Species	1964	1965	1966	1967	Total
SYLVIIDAE					
<i>Acrocephalus arundinaceus</i> Great Reed Warbler		3	31		
<i>Acrocephalus bistrigiceps</i> Von Schrenck's Reed Warbler			5		
<i>Cettia acanthizoides</i> Yellow-bellied Bush Warbler	8		2		
<i>Cettia diphone</i> Bush Warbler	7	24	8		2
<i>Cettia fortipes</i> Formosan Bush Warbler			3		
<i>Cisticola exilis</i> Pale-headed Fantail Warbler		1	1		
<i>Cisticola juncidis</i> Streaked Fantail Warbler	23	72	19		
<i>Locustella fasciolata</i> Gray's Grasshopper Warbler	1				
<i>Phylloscopus borealis</i> Arctic Willow Warbler	46	4	5		
<i>Phylloscopus fuscatus</i> Dusky Willow Warbler		1			
<i>Prinia flaviventris</i> Yellow-bellied Wren Warbler	34	49	24		
<i>Prinia subflava</i> Brown Wren Warbler	27	126	39		4
<i>Regulus ignicapillus</i> Firecrest					4
<i>Seicercus albogularis</i> Yellow-bellied Flycatcher Warbler					1
MUSCICAPIDAE					
<i>Hypothymis azurea</i> Black-naped Blue Flycatcher		11			
<i>Muscicapa cyanomelana</i> Japanese Blue Flycatcher			1		
<i>Muscicapa griseisticta</i> Gray-spotted Flycatcher			3		
<i>Muscicapa hyperythra</i> Rufous-breasted Blue Flycatcher					
<i>Muscicapa mugimaki</i> Mugimaki Flycatcher			2		
<i>Muscicapa rufilata</i> Ferruginous Flycatcher			7		
<i>Terpsiphone atrocaudata</i> Japanese Paradise Flycatcher	1				

Table 1. -continued-

Family/Species	1964	1965	1966	1967 Total
MOTACILLIDAE				
<i>Anthus gustavi</i> Petchora Pipit	1			
<i>Anthus hodgsoni</i> Tree Pipit	1	353	310	
<i>Motacilla alba</i> Pied Wagtail	1	79	108	
<i>Motacilla cinerea</i> Gray Wagtail	1	214	613	
<i>Motacilla flava</i> Yellow Wagtail		1825	5969	
<i>Motacilla grandis</i> Japanese Wagtail		1		
LANIIDAE				
<i>Lanius bucephalus</i> Bull-headed Shrike	2	2		
<i>Lanius cristatus</i> Brown Shrike	2	1350	8784	
<i>Lanius schach</i> Schach Shrike	1	1	1	
STURNIDAE				
<i>Sturnus sinensis</i> Chinese Starling				
ZOSTEROPIDAE				
<i>Zosterops palpebrosa</i> Oriental White-eye	120	310	26	
FRINGILLIDAE				
<i>Emberiza aureola</i> Yellow-breasted Bunting			60	
<i>Emberiza rutila</i> Chestnut Bunting	1			
<i>Emberiza spodocephala</i> Black-faced Bunting	3	2630	4630	
<i>Emberiza sulphurata</i> Japanese Yellow Bunting		38	208	
<i>Erythrura vinacea</i> Rose Finch			4	
<i>Pyrrhula erythaca</i> Formosan Bullfinch				
<i>Pyrrhula nipalensis</i> Kuroda's Bullfinch			1	
PLOCEIDAE				
<i>Lonchura ferruginosa</i> Chestnut Munia	13	1	1	
<i>Lonchura punctulata</i> Spotted Munia	10	2483	512	
<i>Lonchura striata</i> Sharp-tailed Munia	252	1157	14	

Table 2. (a) Foreign recoveries of birds banded in Taiwan.

Species	May-Dec.	Jan-Dec;	Jan-Feb.	Distance Place	Distance (miles)
	1965	1966	1967		
<i>Bubulcus ibis</i> Cattle Egret	13	41	6	Philippines Luzon (47) Palawan (1) Mindanao (1) Other Is. (8)	400-1100
	1			Sabah (N. Borneo)	1000
		1	1	Palau Is. (W. Caroline Is.)	1500
<i>Egretta garzetta</i> Little Egret		3		Philippines Luzon (2) Negros (1)	500-1000
<i>Calidris alpina</i> Eastern Dunlin	1			Sakhalin U. S. S. R.	2400
<i>Hirundo rustica</i> Barn Swallow		1 1	1	Philippines Malaya	500-1000 2000
<i>Turdus chrysolaus</i> Brown Thrush		1		Japan	800
<i>Anthus hodgsoni</i> Tree Pipit		1		Sakhalin, USSR	2000
<i>Motocilla flava</i> Yellow Wagtail		1 1		Alaska Yakutian, USSR	4000 2800
<i>Lanius cristatus</i> Brown shrike		1		Philippines Luzon	500
Totals	15	51	8		

Table 2. (b) Taiwan recoveries of birds banded in other countries.

<i>Butastur indicus</i> Gray-faced Buzzard	1	1		Miyako, Ryukus	350
<i>Lanius cristatus</i> Brown Shrike		2		Philippines	500-1000
<i>Emberiza spodocephala</i> Black-faced Bunting		1		South Korea	1100