CHAPTER 1

INTRODUCTION

1.1 OVERVIEW OF THE ASIAN PARADISE FLYCATCHER

The Asian Paradise Flycatcher (*Terpsiphone paradisi* Linnaeus, 1758) also known as the Common Paradise Flycatcher or Paradise Flycatcher, belongs to the family *Corvidae*, subfamily *Dicrurinae*. It is a small to medium sized passerine bird (13-32 cm) which has general different morphologies. The majority of species in this subfamily are insectivorous birds that often catch insects in the air, on the ground, and from perches. All species of *Terpsiphone* are insectivorous and have a broad-based, pointed bill. The wide gape and fringe of stiff rictal bristles enables them to catch small insects. All species in this genus have colourful plumage, especially males which are typically more brightly coloured and have a greatly elongated central pair of tail feathers than females, which are drab and have short tail feathers. This genus is widespread in Asia and Africa and consists of twelve species. Two species occur in Thailand: the Asian Paradise Flycatcher (*Terpsiphone paradisi*) and the Japanese Paradise Flycatcher (*Terpsiphone atrocaudata* Eyton, 1839) (Sibley and Monroe, 1990; King *et al*., 1995; Khobkhet, 2001).

The Asian Paradise Flycatcher is distributed across Turkistan, Afghanistan, throughout Manchuria, China, Southeast Asia, India, Sri Lanka, and the Greater Sundas, Andaman, and Nicobar Islands (Figure 1.1) (Sibley and Monroe, 1990; King *et al*., 1995). It inhabits evergreen and deciduous forests, and secondary growth from

sea level to 1,500 m. (Lekagul and Round, 1991; Khobkhet, 2001; Robson, 2004). Males are notable in having a greatly elongated central pair of tail feathers extending up to 25 cm beyond the rest of the tail and a conspicuous broad blue eye-rings and bill (Figure 1.2-1.3). They have two colour morphs, rufous and white. Rufous birds have predominantly bright rufous upper parts, glossy black crown with grey on the throat and sides of the head, and wing and tail feathers devoid of shaft streaks. White morphs are predominantly white with a glossy black head and throat with black shaft streaks on the wing and tail feathers. Young males also have rufous upper parts and a glossy black crown with grey on the throat and sides of the head, but lack long central tail streamers (Lekagul and Round, 1991; King *et al*., 1995; Mizuta, 1998; Khobkhet, 2001; Robson, 2004). In this study, there were males with three types of characteristics which were identical to those noted by Mizuta (1998) and Mizuta and Yamagishi (1998). These were rufous-plumaged males with a long central pair of tail feathers (referred to as RL) (Figure 1.4), white-plumaged males with a long pair of central tail feathers (WL) (Figure 1.5) and rufous-plumaged males with short tails (RS) (Figure 1.6). Females resemble young males, but their eye-rings and bill are not as bright as those of males, so this can be used to distinguish them (Figures 1.7) (Lekagul and Round, 1991; King *et al*., 1995; Mizuta, 1998; Khobkhet, 2001; Robson, 2004).

The Asian Paradise Flycatcher is monogamous and both males and females take part in nest building, incubation, brooding, and feeding of the nestlings. Previous studies found that long-tailed males start their breeding attempts earlier and have larger clutch-sizes than short-tailed males. These males may have higher reproductive success than males with short tail feathers. The elongation of tail feathers in males

may be maintained by female mate choice (Mizuta, 1998; Mizuta and Yamagishi, 1998). This does not clarify why long-tailed males start their breeding earlier and have higher reproductive success than males with short tail feathers. Mate preference and breeding success in birds can depend on many factors such as territory size, mate experience, male morphology, or sexual display which includes acoustic signals. These factors are likely to reflect male quality, as old males have demonstrated their quality through their capacity to settle on the best territories and increased foraging efficiency that benefit their mate and help their offspring to survive and have better reproductive success. Several studies of breeding habitat selection of birds have suggested that older individuals (second-time or older breeders) often breed in better habitats than first-time breeders and are able to pair and breed earlier than younger males. Older males are more experienced which is likely to increase with age which should result in greater foraging efficiency (Arvidsson *et al.*, 1997; Evans, 1997a; 1997b; Faivre *et al.*, 2001; Part, 2001). Previous studies have found that female song birds may also use the male song as a cue to find a high-quality territory since early arriving males may obtain the best territories and these males have a more complex song and repertoire than late-arriving males (Lampe and Espmark, 2003). Females of several species of birds tend to select males on the basis of male display characters, complexity of song, and territory quality as criteria to find high quality males.

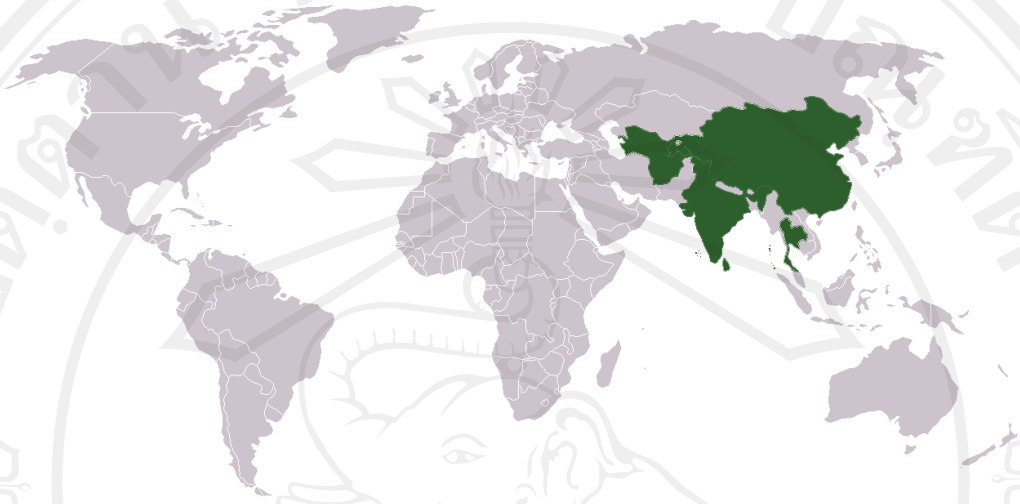

Figure 1.1 Distribution of the Asian Paradise Flycatcher. Sources: Sibley and Monroe (1990); King *et al*. (1995) and Khobkhet (2001).

Figure 1.2 Mature male with greatly elongated central pair of tail feathers at the Chiang Dao Wildlife Research Station, Chiang Mai Province.

Figure 1.3 Mature male showing the conspicuous broad blue eye-rings and bill at the Chiang Dao Wildlife Research Station, Chiang Mai Province.

Figure 1.4 Rufous morph male at the Chiang Dao Wildlife Research Station, Chiang Mai Province.

Figure 1.5 White morph male at the the Roi Chan Pan Wang Forest Protection Unit, Trang Province.

Figure 1.6 Rufous morph male with short tail feathers at the Chiang Dao Wildlife Research Station, Chiang Mai Province.

Figure 1.7 Mature female of at the Chiang Dao Wildlife Research Station, Chiang Mai Province.

1.2 STUDY SITES

Field work was conducted the Chiang Dao Wildlife Research Station, Chiang Mai Province and Khao Pra-Bang Khram Wildlife Sanctuary, Krabi and Trang Provinces, Thailand (Figure 1.8) from 2005 to 2009.

1.2.1 CHIANG DAO WILDLIFE RESEARCH STATION

Chiang Dao Wildlife Research Station is located in Chiang Dao Wildlife Sanctuary at Tahm village, Chiang Dao Subdistrict, Chiang Dao District, Chiang Mai Province, northern Thailand (19°21'N, 98°55'E) at an elevation of 490-700 meters above sea level.

The vegetation type is bamboo with mixed evergreen + deciduous seasonal hardwood forest on limestone bedrock characterized by many woody climbers, with abundant seedlings, saplings, and mature evergreen and deciduous tree species (Figure 1.9), as well as several species of bamboo. The herbaceous ground flora is dense and diverse with many creepers, vines, and numerous gingers, *e.g. Etlingera littoralis* (Kon.) Gise. (Zingiberaceae), *Costus speciosus* J. E. Sm. (Zingiberaceae) (Figure 1.10) (Maxwell, 1992). There are many trails which makes it easy to walk around the forest, but some trails are quite steep and slippery. There are many small streams in the forest, but most of them are dry in the dry season (Figure 1.11).

There are three seasons, the hot-dry season from March to April, the rainy season from May to October, and the cool-dry season from November to February. The average annual rainfall per year is 106.5 mm. The average annual temperature ranges from 18.3 ^{o}C – 36.5 ^{o}C. The average temperature in hot-dry season is 29 ^{o}C, in rainy season 28 ^{o}C, and in the cool-dry season 23.2 ^{o}C (Thai Meteorological Department, 2010).

The research in Chiang Dao Wildlife Research Station was carried out from 2005-2006 and 2008.

Figure 1.8 Map of Thailand showing the locations of the study sites. Source: Backside of CMU Herbarium label combined with the seven floristic parts of Thailand, from Flora of Thailand 7: 4 (2002) inside cover.

Figure 1.9 Mixed evergreen + deciduous seasonal forest at the Chiang Dao site at an elevation of 600 meters above sea level.

Figure 1.10 The ground flora at the Chiang Dao site is dense with many herbs, shrub, and seeding saplings; elevation 550 meters above sea level.

Figure 1.11 A small seasonal stream on limestone bedrock at the Chiang Dao site at 525 meters above sea level.

1.2.2 KHAO PRA - BANG KHRAM WILDLIFE SANCTUARY

Khao Pra–Bang Khram Wildlife Sanctuary located in Khlong Thom Nuea Subdistrict, Khlong Thom District, Krabi Province, southern Thailand (7^{o}55'N, 99°15'E) an elevation of 25-75 meters above sea level (Maxwell, 2009). It covers an area of about 156 km^2 with only 25 km^2 of forested land in Krabi and Trang provinces.

Khao Pra – Bang Khram Wildlife Sanctuary has the five forest protection units.

1. Hin Phoeng Forest Protection Unit, Khlong Phon Subdistrict, Khlong Thom District, Krabi Province.
2. Khao Pra Forest Protection Unit, Phru Din Na Subdistrict, Khlong Thom District, Krabi Province.

3. Thung Sai Thong Forest Protection Unit, Thung Sai Thong Subdistrict, Lam Thap District, Krabi Province.
4. Roi Chan Pan Wang Forest Protection Unit, Ao Tong Subdistrict, Wang Wiset District, Trang Province.
5. Tone Chee Forest Protection Unit, Ao Tong Subdistrict, Wang Wiset District, Trang Province.

The vegetation is primary, evergreen, seasonal, hardwood + bamboo forest. This forest is found above the swamp forest and mostly on sandstone bedrock above *c.* 25 m elevation. The flora includes many species of trees, treelets, shrubs, woody climbers, and bamboos. The ground flora is generally dense and evergreen. Herbs are plentiful with *Hedyotis pachycarpa* Ridl. (Rubiaceae), *Staurogyne merguensis* O.K. (Acanthaceae), and *Etlingera littoralis* (Kon.) Gise. (Zingiberaceae). Seedlings and saplings of woody species are abundant. Treelets and shrubs are numerous with *Clausnea excavata* Burm. f. var. *excavate* (Rutaceae), *Leea indica* (Burm. f.) Merr. (Leeaceae). Woody Climbers are numerous and include *Tectaria loureiri* (Fin. & Gagnep.) Pierre *ex* Craib (Dilleniaceae), *Uvaria cordata* (Dun.) Alst. (Annonaceae), and *Entada rheedei* Spreng. (Leguminosae, Mimosoideae). The canopy is 15-25 m high with *Enicosanthum fuscum* (King) A.S. (Annonaceae), *Schima wallichii* (DC.) Korth. (Theaceae). Bamboos are typical common found including *Dinochloa scandens* (Bl.) O.K. and *Thyrsostachys oliveri* Gamb. (Maxwell, 2009).

There are nature trails at Thung Tiao, located nearby the office of Khao Pra–Bang Khram Wildlife Sanctuary. The vegetation in this area is mainly consisted with a small remnant patch of lowland rain forest. The ground floras were dense and diverse with bamboos, many creepers, vines, and numerous gingers (Figures 1.12-

1.13). The nature trails can walk throughout the forest, and have many stream (Figure 1.14), but some of them dry when the raining stop (Mizuta, 1998; Mizuta and Yamagishi, 1998).

The climate is seasonal due to the influence of the tropical monsoon, with two seasons, viz. the hot-dry season from January to April and the rainy season from May to December. The average annual rainfall is 145.8 mm. The average annual temperature ranges from 19.8 ^{o}C – 33.9 ^{o}C. The average temperature in the hot-dry season is 27.3 ^{o}C and in rainy season it is 26.6 ^{o}C (Thai Meteorological Department, 2010).

Biodiversity consists of 136 species of mammals, 119 species of reptiles, and 318 species of birds including the Gurney's Pitta, a very rare resident in Thailand and extreme southern tip of Burma. There has sightseeing in this area, Emerald Pool (known in Thai as Sa Morakot). One of the most popular and beautiful tourist spot in southern. The water is very clean and clear to see throughout the bottom that has intensity of emerald sediment. The water and sediment flow from a warm stream in the lowland forest of Kao Nor Ju Jee to the pool and precipitation to the bottom that tourist can swimming.

The study sites in Khao Pra–Bang Khram Wildlife Sanctuary were conducted along natural trails in Thung Tiao, Roi Chan Pan Wang Forest Protection Unit, and the Thung Sai Thong Forest Protection Unit from 2008-2009. The vegetation in Roi Chan Pan Wang and Thung Sai Thong is similar to Thung Tiao.

Figure 1.12 Primary, evergreen, seasonal, hardwood forest in the Emerald Pool area.

Figure 1.13 The ground flora dense with many shrub, saplings, and rattan at the Emerald Pool.

Figure 1.14 A small permanent stream in Swamp forest at Thung Tiao.

1.3 OBJECTIVES

Some aspects of the breeding ecology of the Asian Paradise Flycatcher between rufous and white morph are not definite. Information on its acoustic communication during the breeding season is rather limited. This research was conducted to develop a comprehensive understanding of this species with four objectives.

1. To compare the behaviour and breeding activity of the Asian Paradise Flycatcher at two different areas, northern and southern, in Thailand.

2. To correlate the different male morphs with territory size, song structure, and mate choice.

3. To determine the structure and meaning of acoustic communication during the breeding season.

4. To define, measure, and compare the species requirements for nesting sites in these two areas.