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THE STUDY ON SPECIES DIVERSITY, SEASONAL STATUS AND SIMILARITY OF BIRDS IN SALT FIELD AREAS IN BANG KAEW SUB-DISTRICT, MUANG DISTRICT, SAMUT SONGKHAM PROVINCE AND BAN PAK TALAY SUB-DISTRICT, BAN LAEM DISTRICT, PHETCHABURI PROVINCE.

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ABSTRACT

The main objectives of this research were to study species diversity, seasonal status, and similarity of birds in research areas to make the map of species diversity of migratory birds with geographic information system in research areas. The data was carried out by field survey in two salt field areas from October 2018 – December 2018. The data were analyzed to find out the similarity and study seasonal status of birds. The result of this research found that 6 orders, 11 families and 42 species of birds were found in two salt field areas. The maximum number of bird species of 29 were found in order *Charadriiformes*. Six orders, 9 families 26 species of birds were found in salt field areas in Bang Kaew Sub-district, Muang District, Samut Songkram Province and 4 orders, 9 families 36 species of birds were found in salt field areas in Ban Pak Talay, Pak Talay Sub-district, Ban Laem District, Phetchaburi. According to bird seasonal status, in salt field areas of Bang Kaew Sub-district, Muang District, Samut Songkham Province, there were 4 resident birds, 18 migratory birds and 4 resident and migratory birds. In salt field areas in Ban Pak Talay, Pak Talay Sub-district, Ban Laem District, Phetchaburi, there were 4 resident birds, 27 migratory birds and 5 resident and migratory birds. According to bird similarity, similarity index between 2 salt field areas was 0.645. For making the map of species diversity of migratory birds, the maximum species of shorebirds which foraged for invertebrates in water- evaporated-field and sub-water- evaporated-field were found in salt field areas. So, salt field areas of Bang Kaew Sub-district, Muang District, Samut Songkham Province can be developed for being birding sites in local community's eco-tourism and knowledge center as the salt field areas in Ban Pak Talay, Pak Talay Sub-district, Ban Laem District, Phetchaburi Province because the birds are as indicators of natural balance and richness of foods in ecosystem.

Keywords: Species diversity of birds, bird seasonal status, similarity of birds, Salt field areas.

1. INTRODUCTION

The salt field areas play an important role as a gathering place of birds after their flying back from foraging on the mudflat. The distance between salt field areas and the mudflat is not quite far, so the birds can save their energy for flying. Especially, during a couple of weeks before flying back home, the birds need to store body fat as much as they can in order to not to be exhausted during their migration. And they still have enough energy to find their mate (Royal Forest Department of Thailand, 2011). The salt field areas of Bang Kaew sub-district, Muang district, Samut Songkham Province are close to the seacoast of the inner gulf of Thailand. In these areas, the shorebirds such as Pacific Golden Plover (*Pluvialis fulva*), Little Ringed Plover (*Charadrius dubius*) and Eurasian Curlew (*Numenius arquata*) including near-threatened species, Black-tailed Godwit (*Limosa limosa*), Red-necked Stint (*Calidris ruficollis*), Curlew Sandpiper (*Calidris ferruginea*) and Eurasian Curlew (*Numenius arquata*) were found in the areas (Charoenpokaraj N. & Chitman P., 2017).

The salt fields in Ban Pak Talay, Pak Talay Sub-district, Ban Laem District, Petchburi Province is close to the inner gulf of Thailand. It is Thailand's popular shorebird biding site and well know to both Thai and foreign

birders. The birds, especially, are at global concerned status such as Black-faced Spoonbill (*Platalea minor*), Nordmann's Greenshank (*Tringa guttifer*), Great Knot (*Calidris tenuirostris*), Eurasian Curlew (*Numenius arquata*) and Spoon-billed Sandpiper (*Calidris pygmeus*), critically endangered species, were found in the area every year (Learning Center and Ecosystem of birds Baan Pak Talay, 2017). The numbers of salt field areas have been reducing due to the construction of department stores and real estate projects including with high production cost of sea salt (Charoenrit B., 2017). That caused of selling land property and changing land use purposes which affected to food site of birds. Due to those reasons, the researchers aimed to study species diversity, seasonal status and similarity of birds in salt field areas in Bnag Kaew sub-district, Muang district, Samut Songkhram Province and Ban Pak Talay, Pak Talay Sub-district, Ban Laem District, Phetchaburi Province.

2. LITERARY REVIEW

Salt Field areas near the inner gulf of Thailand, where many shorebirds were foraging and resting during the high tide. The shorebirds such as Little Ringed Plover (*Charadrius dubius*), Grey Plover (*Pluvialis squatarola*), Red-necked Stint (*Calidris ruficollis*), Curlew Sandpiper (*Calidris ferruginea*), Common Greenshank (*Tringa nebularia*) were found in the salt fields in the inner gulf of Thailand (Erftemeijer, P; L. A. & Jugmongkol, R., 1999). The birds made use of the salt fields areas such as water- evaporated- salt field and sub-water- evaporated- salt field (Silpasathdumrong T., 2008). In the salt fled areas, the small-size and large-size birds such as Grey Heron (*Ardea cinerea*), Great Egret (*Ardea alba*) and Little Cormorant (*Microcarbo niger*) foraged in the water pond called “Na Wang” which was 30 centimeters in deep. Moreover, many birds such as Spoon-billed Sandpiper (*Calidris pygmeus*), Nordmann's Greenshank (*Tringa guttifer*), Great Knot (*Calidris tenuirostris*), Eurasian Curlew (*Numenius arquata*) and Painted Stork (*Mycteria leucocephala*) which were endangered and near-threatened species were also found in the areas (Department of Marine and Coastal Resources, 2014).

Chaipun P. & Wichianlert W. (2018) studied species diversity and abundance of birds in salt field areas and aquaculture farms in Bang Kaew sub-district, Muang district, Samut Songkhram province from November 2017 - January 2018. The result found that in the salt filed areas, there were 6 orders, 13 families and 34 species of birds. In term of bird seasonal status, 9 resident birds, 16 migratory birds and 9 resident and migratory birds were found in the salt field areas. Bird similarity index between salt field areas and aquaculture farms was 0.727.

Round et al. (2007) studied water birds and shorebirds in the wetlands in central region and the south of Thailand in January 2006. The result of the research found that the birds could be found the most in the inner gulf of Thailand comparing to other wetlands. 52,042 of water birds and shorebirds were found. It was 68 percent of all birds in all surveyed areas. The birds which were in global threatened status such as thirty-five Chinese Egrets (*Egretta eulophotes*), one Black-faced Spoonbills (*Platalea minor*), twenty-two Nordmann's Greenshanks (*Tringa guttifer*), Spoon-billed Sandpiper (*Calidris pygmeus*) were found. The birds which were in global near-threatened status were Black-headed Ibis (*Threskiornis melanocephalus*), Asian Dowitcher (*Limnodromus semipalmatus*) and Black-tailed Godwit (*Limosa limosa*).

3. METHODS

Area study

One salt field area in Bang Kaew Sub-district, Muang District, Samut Songkram Province and one salt field area in Ban Pak Talay, Pak Talay Sub-district, Ban Laem district, Phetchaburi province.

Data Collection and Analysis Method

1. Observe and survey the birds and their activity characteristics by using binoculars, birding spotting scope and camera then identified bird species as found according to the books “A Guide to the Birds of Thailand” (Lekagul, B., & Round, P. D. ,1991), “A Field Guide to the Birds of Thailand and South-East Asia” Robson, C. (2008). One survey was made each month from October 2018 - December 2018. The survey was conducted from 7a.m. - 6 p.m. depending on high and low tide by considering various factors that caused the highest numbers of birds in salt field areas during high tide (Sutibut S., 2009). Because the shorebirds have come for food and rested

in the salt filed areas during the high tide. Record the species of birds and their activity characteristics sighted directly and from their calls by using point transect method.

2. Classify bird species and bird seasonal status according to the checklist of birds of Thailand by Bird Conservation Society of Thailand (2018)

3. Study bird seasonal status (Khobkhet, O. 1984), classified the global threatened status by using IUCN guidelines (1994) and classified them according to migratory birds found in Thailand (Chanittawong W. & Chaipakdee M., 2005)

4. Analysis of the similarity of birds (Odum, E.P., 1983).

5. Make species diversity map of migratory birds with geographic information system in research areas.

6. Conclusion and report the results.

4. RESULTS

In term of bird species diversity in the salt filed areas in Bang Kaew Sub-district, Samut Songkhram and Baan Pak Talay, Pak Talay Sub-district, Ban Laem District, Phetchaburi Province from October 2018 – December 2018, 6 orders, 11 families and 42 species were found. Six orders, 9 families and 26 species were found in salt field areas in Bang Kaew sub-district. Four orders, 9 families and 36 species were found in salt fields areas in Baan Pak Talay, Pak Talay sub-district. The birds in *Charadriiformes* and *Scolopacidae* were found the most as shown in figure 1 and 2.

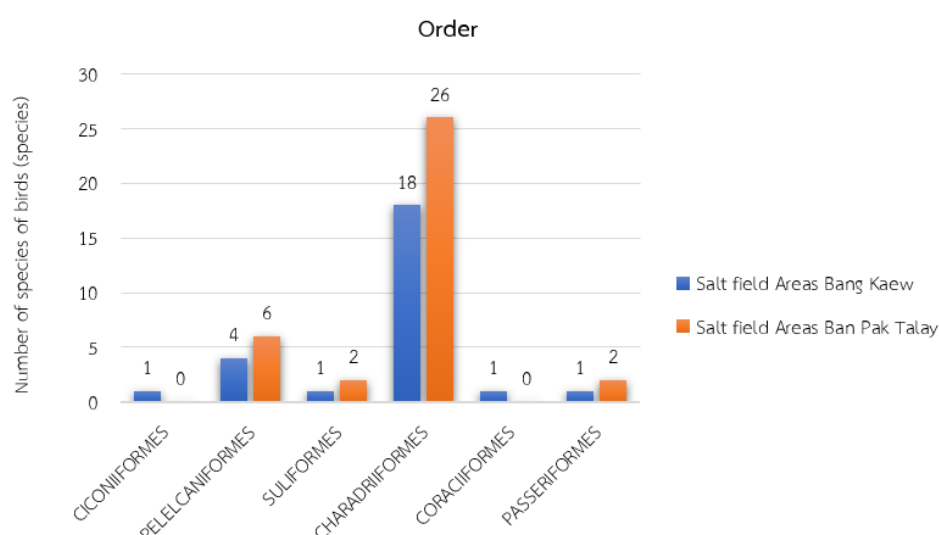


Figure 1 Chart showed the comparison of bird orders in salt field areas in Bang Kaew Sub-district, Muang District, Samut Songkhram Province and Ban Pak Talay, Pak Talay Sub-district, Ban Laem District, Phetchaburi Province from October 2018 - December 2018.

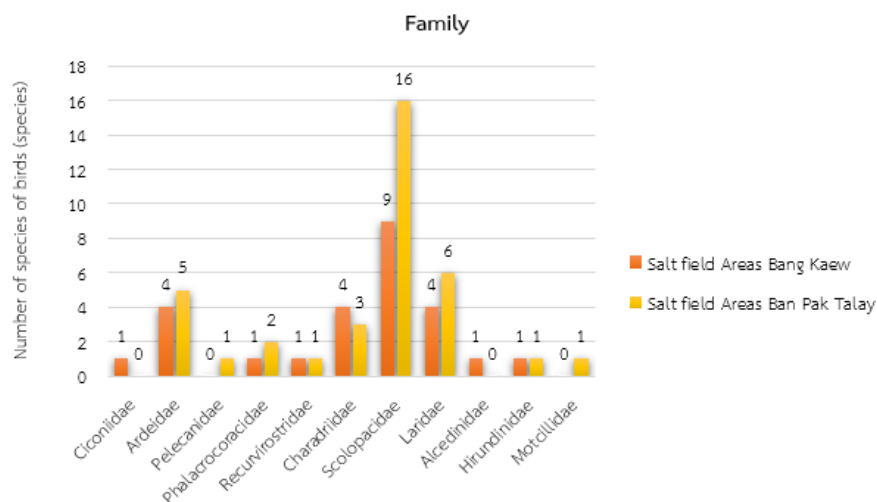


Figure 2 Chart showed the comparison of bird families in salt field areas in Bang Kaew Sub-district, Muang District, Samut Songkhram province and Ban Pak Talay, Pak Talay Sub-district, Ban Laem District, Phetchaburi Province from October 2018 - December 2018.

Accord to bird seasonal status, 6 resident birds, 31 migratory birds and 5 resident and migratory birds were found in the salt field areas in Bang Kaew Sub-district, Muang District, Samut Songkhram Province and in Baan Pak Talay, Pak Talay Sub-district, Ban Laem District, Phetchaburi Province. Four resident birds, 18 migratory birds and 4 resident and migratory birds were found in the salt field areas in Bang Kaew sub-district. Four bird species, Painted Stork (*Mycteria leucocephala*), Eurasian Curlew (*Numenius arquata*), Curlew Sandpiper (*Calidris ferruginea*) and Red-necked Stint (*Calidris ruficollis*), were in Near-threatened status (NT). One bird species, Great Knot (*Calidris tenuirostris*) was in Endangered status (EN).

Four resident birds, 27 migratory birds and 5 resident and migratory birds were found in Baan Pak Talay, Pak Talay sub-district, Ban Laem district, Phetchaburi province. Five bird species, Spot-billed Pelican (*Pelecanus philippensis*), Black-tailed Godwit (*Limosa limosa*), Eurasian Curlew (*Numenius arquata*), Curlew Sandpiper (*Calidris ferruginea*) and Red-necked Stint (*Calidris ruficollis*) were in Near-threatened status (NT). One bird species, Chinese Egret (*Egretta eulophotes*), was in Vulnerable status (VU). One bird species, Great Knot (*Calidris tenuirostris*), was in Endangered status (EN). One bird species, Spoon-billed Sandpiper (*Calidris pygmeus*), was in Critically Endangered status (CR).

Bird similarity index in salt field areas in Bang Kaew Sub-district, Samut Songkhram Province and Baan Pak Talay, Pak Talay Sub-district, Petchaburi Province was 0.645 due to both salt field areas were suitable for being foraging and resting areas for shorebirds and sea birds during the high tide. That made the bird similarity quite close to each other.

In term of migratory bird species diversity, the highest numbers of bird species, 14 bird species in December, were found in the salt field areas in Bang Kaew Sub-district, Muang District, Samut Songkhram Province. The highest numbers of bird species, 20 bird species in October, was found in Baan Pak Talay, Pak Talay Sub-district, Petchaburi Province. Because it was the migratory season for migratory birds as shown in figure 3.



Figure 3 Map showed the diversity of migratory birds in Bang Kaew Sub-district, Muang District, Samut Songkhram Province and Ban Pak Talay, Pak Talay Sub-district, Ban Laem District, Phetchaburi Province from October - December 2018.

5. CONCLUSION AND DISCUSSION

Conclusion

According to bird species diversity in salt field areas in Bang Kaew Sub-district, Muang District, Samut Songkhram Province, 6 orders, 9 families and 26 species were found. In term of bird seasonal status, there were 4 resident birds, 18 migratory birds and 4 resident birds and migratory birds. In the salt field areas in Ban Pak Talay, Pak Talay Sub-district, Ban Laem District, Phetchaburi Province, there were 4 orders, 9 families and 36 species. In term of bird seasonal status, 4 resident birds, 27 migratory birds, 5 resident birds and migratory birds were found. The bird similarity index between 2 the salt field areas was 0.645.

Discussion

The results of the study found that the maximum bird species in 2 the salt field areas were shorebirds such as Lesser Sand Plover (*Charadrius mongolus*), Eurasian Curlew (*Numenius arquata*), Whimbrel (*Numenius phaeopus*), Eastern Black-tailed Godwit (*Limosa melanuroides*), Curlew Sandpiper (*Calidris ferruginea*) and so on were found. It is related to Erftemeijer, P. L. A. & Jugmongkol, R. (1999) who said that in the salt fields in the inner Gulf of Thailand, many shorebirds have come for food and rested in the salt water area during the high tide. The maximum bird species of shorebirds which foraged for invertebrates in water-evaporated-field and sub-water-evaporated-field were found in salt field areas. It was related to Plailek, W., Chitman, P., & Charoenpokaraj, N. (2016). who studied species diversity of birds along the nature trail at Bang Kaew Sub-district. There were 31 migratory bird species such as Whimbrel (*Numenius phaeopus*), and Red-necked Stint (*Calidris ruficollis*) were found. So, the birds are as indicators of natural balance of local ecosystem. Because the birds are of value to the environment in regards to pollination, spreading plant seeds and destroying harmful crop bugs. It is related to Silpasathdumrong T. (2008) who said that in the salt field, there will be the shorebirds to make use in water-evaporated-field and sub-water- evaporated-field for food and rested in the salt water area. Bird species of birds that were in near-threatened status (NT) namely Spot-billed Pelican (*Pelecanus philippensis*), Eastern Black-tailed Godwit (*Limosa melanuroides*), Eurasian Curlew (*Numenius arquata*), Curlew Sandpiper (*Calidris ferruginea*) and Red-necked Stint (*Calidris ruficollis*). It is related to Charoenpokaraj N. & Chitman P. (2017) who said that in the salt field areas in Bang Kaew Sub-district, Muang District, Samut Songkhram province, Eastern Black-tailed Godwit (*Limosa melanuroides*), Red-necked Stint (*Calidris ruficollis*), Curlew Sandpiper (*Calidris ferruginea*) and Eurasian Curlew (*Numenius arquata*) were in near - threatened status (NT).

Due to the numbers of shorebirds and sea bird species found in both salt field areas bird species in both salt field areas were quite close to each other and near-threatened bird species were found the areas. So, the salt filed areas in Bang Kaew Sub-district, Muang District, Samut Songkhram Province should be developed to be birding site as salt field areas in Ban Pak Talay, Pak Talay Sub-district, Ban Laem District, Phetchaburi Province for both Thai and foreign birders including with students and university students for being bio-diversity

knowledge resource in term of supporting the local communities to protect and conserve these salt field areas to make profit of income for the communities by adding birding activity into eco-touring program.

Suggestion

1. The period of one -year-survey should be added into next research program. The study will be covered all three seasons including with the season of bird migration season which is from October – April every year to make use of bird data for organizing birding activity for tourists and make income for local communities.

2. The Remote Sensing (RS) program should be used to get the actual area conditions and match the study period.

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