ORIGINAL PAPER

The species and abundance of coral reef fish at Yao islands, Phang Nga province, Thailand.

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Abstract. The species and abundance of coral reef fish at Yao islands, Phang Nga province, held under the Plant Genetic Conservation Project Under the Royal Initiation of Her Royal Highness Princess Maha Chakri Sinrindhorn, was carried out from 3 to 11 April 2021 at Yao Islands. There were five stations as St1 (Yao Noi island), St2 (Nok island), St3 (Yao Yai island), St4 (Khai Nok island), and St5 (Khai Nai island). The aims of this study were to illustrated the species and abundance of coral reef fish at Yao islands, Phang Nga province. The data of reef fishes was collected using Video Census method on five replicates of 30 meters long transect. A total of 19,006 fishes were counted and identified as 93 species from 23 families. The Twin demoiselle (*Neopomacentrus sororius*) was the predominant fish species, 380 ± 238 fishes/150 m.^{2}, representing 50.1% of the total fish abundance. The next abundance fish was Silver demoiselle (*N. anabatoides*), 190 ± 125 fish/150 m.^{2}, representing 25.0% of the total fish abundance. The results showed that the coral reef fish community at Yao islands are under highly stress by arthritogenic causes, especially sedimentation from land. This study updates the species list of coral reef fish at Yao islands after 8 years, from 18 species to 93 species. Moreover, this information can be used as a database for the local administrator to manage coral reef resources of Yao islands.

Keywords: Checklist, Species richness, Koh Khai, Koh Yao Noi, Diversity

1. Introduction

The Yao islands are located in Phang Nga Bay, Phang Nga province, Thailand. They had high biodiversity and were widely known tourist attractions. Seawater was turbid all year due to sediments from mangrove forests and urban areas surrounding the Yao islands. There are shallow coral communities developed on many parts of the islands. The total area of coral communities is approximately 2,436 acres which these coral reefs developed in turbid water. (Marine and Coastal Resources Research and Development Institute, 2013) The seafloor of the east side of Yao island is sandy clay that causes turbid water. This coral community, then, has low coral diversity and less complexity than the west side of Yao islands. Especially, Koh Khai Nok and Koh Khai Nai where located in the west side of Yao island, seawater is clearer than in the east side of Yao islands, thus coral reefs can develop better than in the east side of Yao islands (Chanseang et al., 1999).a Continued degradation of coral reefs from natural disasters and human activities tends to have more impact from past to present, and degradation of coral reefs also means reductions in reef fish (Coker et al., 2013). Coral lifeforms create complexity of coral

reef habitats those suitable for reef fish to use as habitats, foraging and nurseries. If coral reef structures changed, these could affect the coral reef fish community in terms of habitat used and food source (Munday et al, 2008). The Excellence Center for Biodiversity of Peninsular Thailand (2013) surveyed coral reef status after coral reef bleaching caused by high sea temperatures in 2010 and documented that the coral reef of Thailand was damaged severely. In addition, Wilson et al. in 2006 investigated the impact on coral reef fish communities from coral reef loss, they predicted that if a 10% of coral reefs decline, the coral reef fish populations be decline by about 62% (Wilson et al., 2006).

In term of reef habitat utilization, this was evident from coral reef fishes being specific with their habitat, such as coral goby (*Gobiodon* spp.) inhabited specifically with staghorn coral. Therefore, when coral bleaching occurs, staghorn coral (*Acropora* spp.) is the first to be bleached and may die which has an impact on coral goby. Coral reef ecosystems are highly biodiverse ecosystems of both flora and fauna, especially coral reef fish (Munday et al, 2008). In particular, 4,000–5,000 species of reef fish were reported (Lieske and R Myers, 2001) out of a total of over 16,000 marine fish species (Eschmeyer et al., 2010). The coral reef fishes are divided into two groups based on how do they using their habitats: the first is permanent residents, which use the coral reef all their lives without migration, for example, cardinalfish (Apogonidae), butterflyfish (Chaetodontidae), wrasse fish (Labridae), damsel fish (Pomacentridae), and parrotfish (Scaridae). The second is temporal residents, who come to take advantage of coral reefs for food sources, such as jackfish (Carangidae), snappers (Lutjanidae), and rabbitfish (Siganidae) (Songploy et al., 2006). Considering the diversity of fish on the Andaman coast of Thailand, there were approximately 1,746 species of marine fish from 189 families, of which 983 species were coral reef fish (56.2% of all marine fish) reported on the southern Andaman coast of Thailand (Satapoomin, 2011). While the study of coral reef fish at Yao islands is rare, only a study by the Marine and Coastal Resources Research and Development Institute (2015), there were only 18 species from 15 families of fishes be reported. The aim of this study was to illustrated the species and abundance of coral reef fish at Yao islands, Phang Nga province. This result will also be used as a baseline data to support the management decision of the local administrator to plan policies for the sustainable use of the coral reef resources at Yao islands.

2. Materials and Methods

2.1 Study area

The coral reef fish data were collected from 3 to 11 of April 2021 at Yao Islands on five stations at Yao Noi island (St1), Nok island (St2), Yao Yai island (St3), Khai Nok island (St4), and Khai Nai island (St5) (Figure1). SCUBA diving was performed along the survey line 30 meters, with 5 replicates on each station.

2.1 Coral reef fish community

Reef fish data were collected using the Video Census method adapted from Hill & Wilkinson (2004). The field of view on the census line was 30x5 meters (Figure 2), it was 750 squamates for each station or 3,750 squamates in the total census. Video data of coral reef fish were analyzed by identified and counted in the laboratory. The identification of coral reef fish was carried out using comparing photographs with documents by Burgess et al. (1988), Allen (1991), Allen (1999), and Fishbase (Froses and Pauly, 2022).

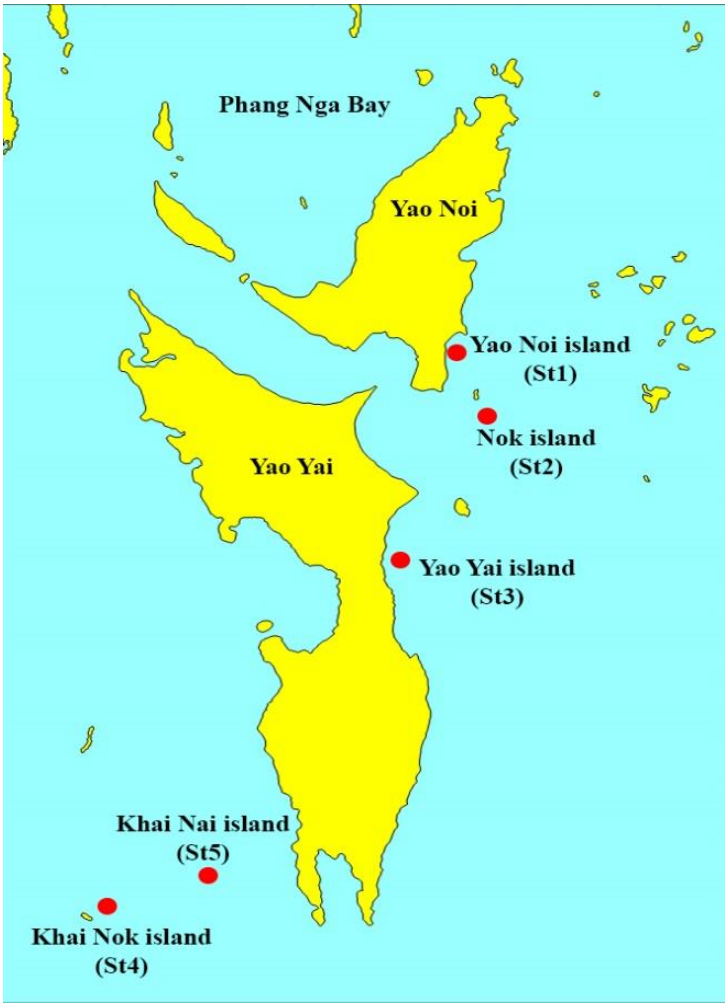

Figure 1 Study area at Yao islands, Phang Nga province, Thailand

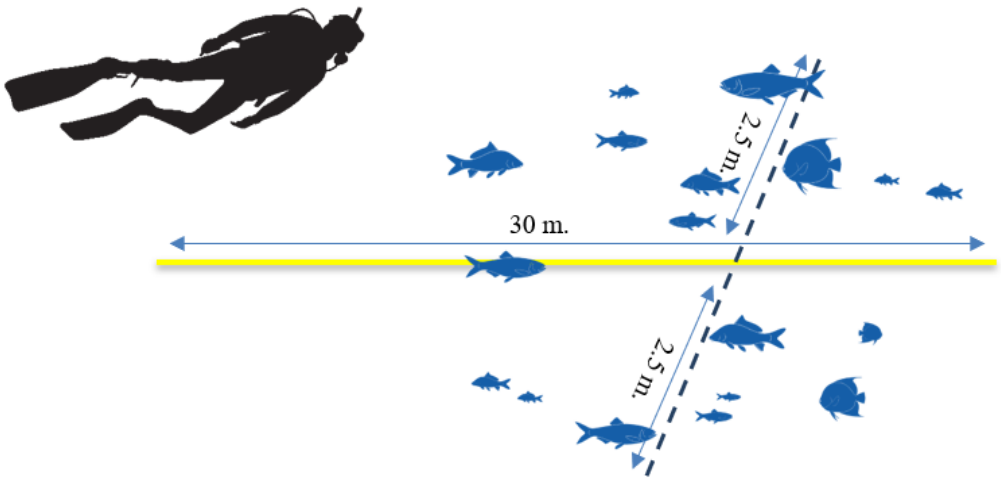

Figure 2 Coral reef fish data were collected using the Video Census method

3. Results

This study recorded 19,006 fishes from 93 species and 23 families (Table 1). Pomacentridae is a predominant family of coral reef fish at Yao islands (25 species), followed by Labridae (20 species) (Figures 3). The Twin demoiselle (*Neopomacentrus sororius*) was the predominant coral reef fish species at Yao islands (380 ± 238 idvs /150 m.^{2}), representing 50.1% of the total fish abundance. The next dominant species was silver demoiselle (*N. anabatoides*), which was found 190 ± 125 idvs /150 m.^{2}, representing 25.0% of the total fish abundance of Yao islands. In terms of occurrence, however, Bengal sergeant (*Abudefduf bengalensis*), Thai damsel (*Pomacentrus polyspinus*), and Bubblefin wrasse (*Halichoeres nigrescens*) are common which can be found on every station.

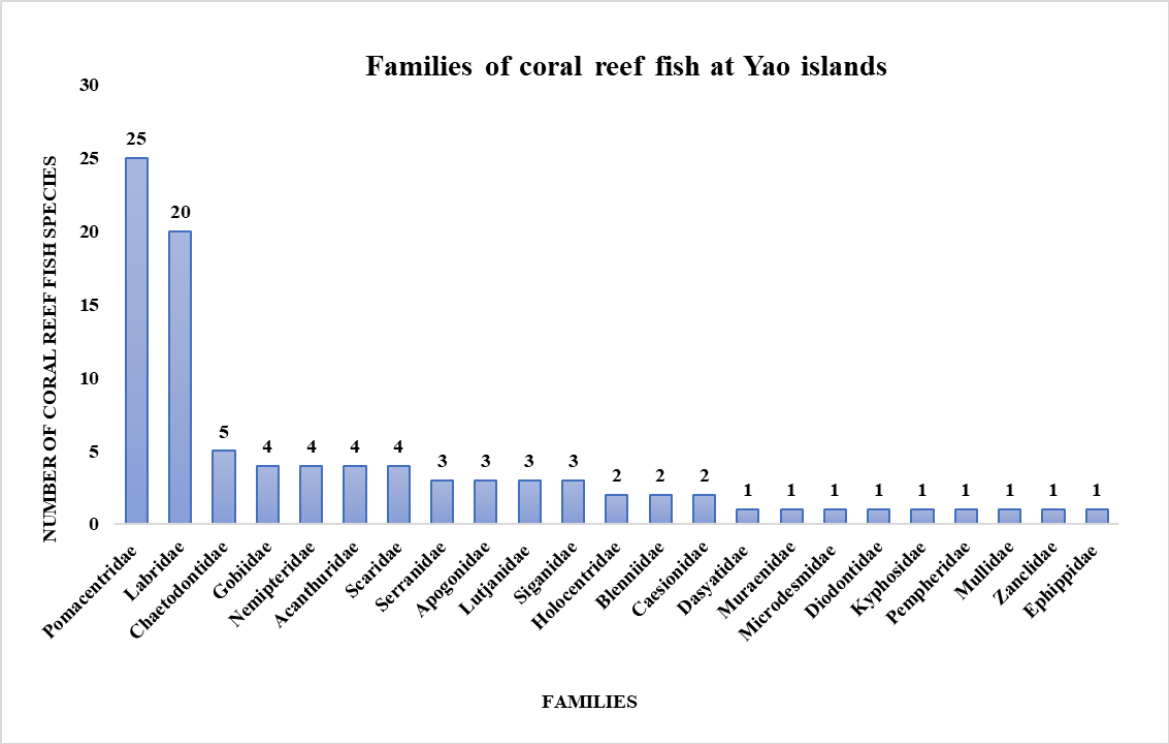

Figure 3 Number of species of coral reef fish families at Yao islands

Table 1. Species list and abundance of coral reef fish at Yao islands, Phang Nga province
Remark** Coral reef fish which can be found on every station

Taxa	Yao Noi	Nok	Yao Yai	Khai Nok	Khai Nai	Total Num.
Family Dasyatidae						
Taeniura lymma	0	0	0	0	1	1
Family Muraenidae						
Gymnothorax javanicus	0	0	0	0	1	1

Table 1. Species list and abundance of coral reef fish at Yao islands, Phang Nga province
Remark** Coral reef fish which can be found on every station

Family Holocentridae						
Sargocentron rubrum	1	0	0	0	0	1
Myripristis hexagona	0	0	0	1	0	1
Family Gobiidae						
Istigobius decoratus	0	0	0	1	0	1
Istigobius ornatus	2	0	0	0	0	2
Istigobius nigroocellatus	0	3	0	0	0	3
Cryptocentrus caeruleomaculatus	0	0	1	0	0	1
Family Microdesmidae						
Parioglossus philippinus	64	0	0	0	0	64
Family Blenniidae						
Salarias fasciatus	0	0	0	2	5	7
Ecsenius bicolor	0	0	0	0	1	1
Family Diodontidae						
Diodon liturosus	0	1	0	0	0	1
Family Kyphosidae						
Kyphosus cinerascens	0	0	0	0	4	4
Family Pempheridae						
Pempheris vanicolensis	0	0	0	11	9	20
Family Serranidae						
Cephalopholis boenak	0	0	0	2	3	5
Cephalopholis formosa	0	0	1	3	3	7
Cephalopholis polyspila	0	0	0	1	4	5
Family Apogonidae						
Ostorhinchus endekataenia	3	0	0	10	0	13
Ostorhinchus cavitensis	0	0	0	0	2	2
Taeniamia macroptera	0	0	0	0	11	11
Family Lutjanidae						
Lutjanus biguttatus	0	1	0	102	25	128
Lutjanus lemniscatus	0	1	1	3	3	8
Lutjanus decussatus	0	0	0	3	5	8
Family Caesionidae						
Caesio cuning	0	0	0	0	9	9
Caesio teres	0	2	0	0	0	2
Family Nemipteridae						
Scolopsis ciliata	0	0	0	16	18	34
Scolopsis margaritifera	0	0	0	2	2	4
Scolopsis vosmeri	0	0	0	0	2	2
Scolopsis bilineatus	0	0	0	7	3	10
Family Mullidae						
Parupeneus barberinus	0	0	0	6	4	10

Table 1. Species list and abundance of coral reef fish (cont.)
Remark** Coral reef fish which can be found on every station

Taxa	Yao Noi	Nok	Yao Yai	Khai Nok	Khai Nai	Total Num.
Family Acanthuridae						
Acanthurus auranticavus	0	0	0	1	0	1
Acanthurus triostegus	0	0	0	1	0	1
Acanthurus lineatus	0	0	0	2	5	7
Naso unicornis	0	0	0	1	0	1
Family Zanclidae						
zanclus cornutus	0	0	0	3	2	5
Family Chaetodontidae						
Chaetodon andamanensis	0	0	0	4	2	6
Chaetodon collare	6	0	0	4	2	12
Chaetodon octofasciatus	1	7	0	8	6	22
Chaetodon decussatus	0	0	0	6	0	6
Chaetodon trifascialis	0	0	0	2	3	5
Family Pomacentridae						
*Abudefduf bengalensis***	1	2	1	2	1	7
Abudefduf sexfasciatus	0	0	0	4	3	7
Abudefduf vaigiensis	0	0	0	3	5	8
Chromis cinerascens	0	0	0	0	2	2
Amphiprion ocellaris	2	58	0	0	0	60
Amphiprion akallopisos	0	2	0	0	0	2
Amphiprion perideraion	0	0	0	0	1	1
Amblyglyphidodon indicus	0	0	0	0	2	2
Stegastes lacrymatus	0	0	0	7	16	23
Hemiglyphidodon plagiometopon	2	0	1	8	2	13
Neoglyphidodon melas	2	5	0	0	0	7
Neopomacentrus anabatoides	0	0	0	1650	3108	4758
Neopomacentrus cyanomos	0	15	0	0	0	15
Neopomacentrus filamentosus	0	33	0	2047	130	2210
Neopomacentrus bankieri	33	477	0	3	1	514
Neopomacentrus sororius	6	0	0	3956	5554	9516
Pomacentrus chrysurus	1	0	0	6	3	10
Pomacentrus adelus	8	13	0	99	11	131
Pomacentrus moluccensis	0	0	0	5	7	12
Pomacentrus coelestis	0	1	0	17	4	22
*Pomacentrus polyspinus***	1	1	1	1	9	13
Pomacentrus nagasakiensis	0	15	11	0	3	29
Pomacentrus tripunctatus	0	0	3	29	5	37
Plectroglyphidodon obreptus	3	2	0	49	50	104
Dischistodus perspicillatus	0	0	0	0	6	6

Table 1. Species list and abundance of coral reef fish (cont.)
Remark** Coral reef fish which can be found on every station

Taxa	Yao Noi	Nok	Yao Yai	Khai Nok	Khai Nai	Total Num.
Family Labridae						
Cheilinus chlorourus	0	0	0	2	1	3
Halichoeres biocellatus	0	0	0	1	0	1
Halichoeres bicolor	2	0	0	1	3	6
Halichoeres chloropterus	1	1	0	89	41	132
Halichoeres leucurus	0	0	0	40	0	40
Halichoeres marginatus	0	0	0	47	30	77
Halichoeres nigrescens **	19	17	45	10	7	98
Halichoeres chrysotaenia	0	0	0	10	13	23
Halichoeres hortulanus	0	0	0	0	9	9
Halichoeres argus	0	0	0	20	9	29
Hemigymnus melapterus	0	0	0	14	4	18
Labroides dimidiatus	0	0	0	11	3	14
Stethojulis strigiventer	0	0	0	34	74	108
Stethojulis trilineata	0	0	0	1	0	1
Stethojulis bandanensis	0	0	0	4	2	6
Thalassoma lunare	0	0	0	136	170	306
Epibulus insidiator	0	0	0	1	0	1
Coris caudimacula	0	0	0	15	23	38
Bodianus neilli	0	0	0	4	2	6
Leptojulis cyanopleura	0	0	0	2	0	2
Family Ephippidae						
Platax teira	0	0	0	0	1	1
Family Scaridae						
Scarus quoyi	0	0	0	2	0	2
Scarus ghobban	0	0	0	4	4	8
Scarus rivulatus	0	0	0	67	36	103
Chlorurus sordidus	0	0	0	0	7	7
Family Siganidae						
Siganus guttatus	0	0	0	0	2	2
Siganus javus	8	0	1	1	3	13
Siganus canaliculatus	8	0	0	1	2	11
Total (species)	**21**	**20**	**10**	**65**	**69**	**19,006**

4. Discussion

The species and abundance of coral reef fishes at Yao islands, Phang Nga province on five stations, Yao Noi island, Nok island, Yao Yai island, Khai Nok island, and Khai Nai island, were investigated in April 2021. There were 19,006 fish from 93 species and 23 families be recorded. This result agrees with the study of Keawsang et al. (2015), in which they studied species diversity of fish on HTMS Phrathong wreck and adjacent area at Phang Nga province. They found that Pomacentridae is the predominant family of fish in that areas. While the Marine and Coastal Resources Research and Development Institute in 2015, reported 18 species from 15 families. there are at least 75 species from 12 families be added to the previous recorded and then representing 9.5% of coral reef fishes in the Andaman sea. In terms of occurrence, however Bengal sergeant (*A. bengalensis*), Thai damsel (*P.polyspinus*), and Bubblefin wrasse (*H. nigrescens*) are common and can be found on every station. In terms of species richness of each station, Khai Nok (St4) and Khai Nai (St5) had higher richness (65 and 69 species) than Yao Noi (St1) and Nok (St2), while Yao Yai island (St3) had lowest species richness that found ten species. Differences in the abundance and diversity of coral reef fish result from differences in habitat structures and geography (Beger and Possingham, 2008; Meenapha et al., 2015; Meenapha et al., 2018; Meenapha et al., 2021). The geography of the Yao islands is separated into two groups. First, the islands are located on the east side of Yao islands (Yao Noi island (St1), Nok island (St2), and Yao Yai island (St3)). Second is the islands located on the west side of Yao islands (Khai Nok island (St4) and Khai Nai island (St5)). Yao Noi island, Nok island, and Yao Yai island it influenced by sediments from Phang Nga Bay, the sea floor is sandy clay and has high turbidity, while Khai Nok island and Khai Nai island are clear seawater, caused not impacted by sediments from mangroves and urban, and coral reefs are well-developed and covered by staghorn corals (Chanseang et al., 1999). While the coral reefs of Yao Noi island, Nok island, and Yao Yai island are covered by massive coral (*Porites lutea*, *Symphyllia* sp., and *Heliopora coerulea*) (Marine and Coastal Resources Research and Development Institute, 2013; Phongsuwan, 2017) which resulted in differences in the abundance and diversity of coral reef fish. between coral reef fish and habitat structure on coral reefs at Kut Islands, Trat Province, Thailand. *Porites lutae* is the dominant coral species in Kut coral reefs and has high coverage. Despite the stations where *Porites lutae* has high coverage, the diversity of coral reef fish was lower than in stations with high coral diversity. Considering the coral cover, the east side of the Yao islands was massive coral covered, which has no complexity in its habitat, on the other hand, the west side of the Yao islands was branching coral covered, which has more complexity than the east side. As a result, founded coral reef fish on the west side more than on the east side of the Yao islands (Chanseang et al., 1999; Marine and Coastal Resources Research and Development Institute, 2013; Phongsuwan, 2017).

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