

Food Habits of Little Egrets (*Egretta garzetta*) at a Colony in Pattani, Southern Thailand

Somsak Buatip^{1,2}, *Wanchamai Karntanut*¹ and *Cornelis Swennen*¹

The breeding range of the Little Egret (*Egretta garzetta*) extends from East Asia north to Korea and Japan (northern limits about 40°N), through Asia south of the Himalayas, the Philippines, North and East Australia, the Middle East to Western Europe (northern limit c. 53°N), and North and southern Africa (HANCOCK *ET AL.*, 1978). Thus the range of the species covers temperate, subtropical and tropical climate zones, encompassing a great variety of wetland types. A wide variety of small wetland animals, mainly fish, are taken as food (BAUER & GLUTZ VON BLOTZHEIM, 1966; ALI & RIPLEY, 1987; DEL HOYO *ET AL.*, 1992). Little Egrets feed in freshwater and tidal areas, mangroves, *etc.*, in the Thai–Malay Peninsula, although there is no detailed information on their diet (WELLS, 1999). The present study deals with the food of Little Egrets during two apparently discrete breeding periods, at a recently established colony in southern Thailand. The first breeding period commenced in December during the rainy season (November through December), and the second period started about 3.5 months later in mid-March during the dry season (March through August) (BUATIP *ET AL.*, 2013).

Material and Methods.—The Pattani water bird colony is located beside the provincial Central Prison (6°52'N, 101°15'E), close to the shore of Pattani Bay, Gulf of Thailand. Both brackish and freshwater habitats were present in proximity to the colony and Little Egrets fed in both wetland types. The study was conducted during two successive breeding periods during November 2008 to February 2009, the second during March–June, 2009).

After the chicks had hatched, fresh food pellets regurgitated beside nests were collected and individually placed in plastic bags. The pellets were moistened with water and preserved with 10% formaldehyde soon after collection. After the fieldwork was finished, food items in the pellets and their habitat types were identified in the laboratory using identification keys and descriptions in BANNER & BANNER (1966), CARPENTER & NIEM (1998, 1999a, 1999b), CHAN-ARD (2003), DAS (2010), COX *ET AL.* (1998), HAMARAINEN & PINRATANA (1999), KIMURA *ET AL.* (2008), KOTTELAT *ET AL.* (1993), MURDY (1989), SATAPOOMIN & POOVACHIRANON (1997), SEBASTIAN & PETER (2009) and SMITH (1945). Scientific names of fish species were updated by following ESCHMEYER (2013) and KOTTELAT (2013). Total lengths of intact specimens were also measured; they were externally dried with tissues and weighed.

Results and Discussion.—A total of 246 fresh pellets collected and examined contained identifiable specimens of 3,230 prey items belonging to 57 different taxa (Table 1). Fish were numerically the most important prey (82.7%), followed by crustaceans (15.6%), while amphibians (0.85%), insects (0.72%), and reptilians (0.03%) contributed. A total of 45 fish

¹ Faculty of Science and Technology, Prince of Songkla University, Pattani 9400, Thailand

² Email: somsak-b@bunga.pn.psu.ac.th

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species were identified. The most numerous prey species in the pellets were of the alien species *Oreochromis niloticus* (1st breeding period average length 48 mm; 2nd breeding period 56 mm) followed by *Trichopodus trichopterus* (1st average length 48 mm; 2nd 56mm), *Puntius brevis* (1st 45 mm; 2nd 59 mm), *Trichopsis vittata* (1st 29 mm; 2nd 36 mm), *Anabas testudineus* (1st 55 mm; 2nd 39 mm), *Aplocheilichthys panchax* (1st 29 mm; 2nd 45 mm).

Food items identified from freshly regurgitated pellets were dominated by a wide variety (45 species) of small fish (82.7% of items), followed by shrimps (15.6%). Insects, amphibians and reptiles did not play a substantial role in the food. The high number of species represented in the diet reflects the relatively high aquatic species richness of the area. This contrasts with the many fewer fish species found in food of the Little Egret in temperate areas as quoted in BAUER & GLUTZ VON BLOTZHEIM (1966), CRAMP & SIMMONS (1977), ALI & RIPLEY (1987), and DEL HOYO *ET AL.* (1992). It also shows that the Little Egret appears to be a rather generalist piscivore. Brackish waters predominate in and near coastal wetland habitats on marine sediments of Holocene origin, and brackish-water species likewise predominated in the diet (Table 1). Most prey items were small, with a mean length of 43 mm ($N = 2,662$) and rarely reached 100 mm or more (Table 1). The range of fish species in the diet probably reflected merely the relative abundance of the various species in the surroundings rather than specific avoidance of, or preference for, any particular prey species. However, this was not tested statistically. That in relatively short time a large colony (> 4,000 pairs) could be established at Pattani is owed not only to the result of the near-complete protection offered by its proximity to the local prison, a relatively secure site, but also to the high biological productivity of the surroundings. (BUATIP *ET AL.*, 2013).

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Table 1 (continued).

Food Items	First period (January–February 2009)						Second period (April–May 2009)						Habitat of prey
	N	Weight		Length		% of each species	N	Weight		Length		% of each species	
		Mean (g)	Range (g)	Mean (mm)	Range (mm)			Mean (g)	Range (g)	Mean (mm)	Range (mm)		
<i>Notopterus notopterus</i>	7	5.35	3.76–7.47	91.5	82–105	0.34	1					0.09	F
Enggulidae													
<i>Stolephorus</i> sp.	9	3.24	2.95–3.69	79.3	76–83	0.43	2	7.43	100			0.17	BM
<i>Thryssa hamiltonii</i>													BM
Cyprinidae													
<i>Cylocheilichthys apogon</i>	11	2.92	0.32–7.31	58.7	34–88	0.53							F
<i>Devario regina</i>	2	0.3	0.15–0.45	34	32–35	0.10							F
<i>Esomus metallicus</i>	5	1.8	0.33–3.10	57.7	40–78	0.24	3					0.26	F
<i>Labio barbatus siamensis</i>	8	1.58	0.45–5.79	53.2	36–80	0.39	3					0.26	F
<i>Leptobarbus</i> sp.							11	2.65	1.10–4.60	62.6	50–85	0.95	F
<i>Mystacoleucus obtusirostris</i>	9	1.39	0.42–2.94	45.3	40–56	0.43							F
<i>Osteochilus vittatus</i>	10	0.59	0.32–0.88	41.7	36–49	0.48	1	0.87	44			0.09	F
<i>Puntius brevis</i>	245	0.9	0.02–2.22	44.72	26–57	11.82	18	2.58	0.05–4.76	58.89	43–78	1.55	F
<i>Rasbora borapetensis</i>	124	0.28	0.03–1.27	35.6	13–90	5.98	6					0.52	F
<i>Rasbora paviana</i>	15	0.21	0.03–0.50	26.43	13–52	0.72	1	1.08	50			0.09	F
Cobitidae													
Cobitidae sp.	3	0.44	0.35–0.52	55	50–56	0.14							F
Siluridae													
<i>Ompok bimaculatus</i>							1					0.09	F
<i>Ompok siluroides</i>	2					0.10							F
Clariidae													
<i>Clarias</i> sp. (cf. <i>batrachus</i>)	20	4.03	0.39–11.25	65.2	19–125	0.97	5					0.43	F
Bagridae													
<i>Mystus</i> sp.	2	1.76	1.02–2.50	50.5	49–52	0.10							?
Mugilidae													
<i>Moolgarda cumnensis</i>	11	1.08	0.54–1.60	41.17	33–47	0.53	13	2.58	0.35–10.17	43.8	35–53	1.12	BM

Table 1 (continued).

Food Items	First period (January–February 2009)						Second period (April–May 2009)						Habitat of prey	
	N	Weight		Length		% of each species	N	Weight		Length		% of each species		
		Mean (g)	Range (g)	Mean (mm)	Range (mm)			Mean (g)	Range (g)	Mean (mm)	Range (mm)			
Hemiramphidae														
<i>Hyporhamphus quoyi</i>							1							BM
Aplocheilidae														
<i>Aplocheilus panchax</i>	148	0.22	0.01–0.80	28.6	18–43	7.14	8	0.86	0.57–1.17	44.6	37–52	0.69		FB
Ambassidae														
<i>Ambassis interruptus</i>	17	1.1	0.20–2.38	40.8	18–55	0.82	12	1.56	0.39–3.26	45.2	27–60	1.04		BM
<i>Ambassis vachelli</i>	3					0.14								BM
<i>Parambassis siamensis</i>	1	0.15		26		0.05	1	0.24			27	0.09		F
Latidae														
<i>Lates calcarifer</i>	1	0.49		41		0.05	6	6.78	1.28–18.64	74.4	52–107	0.52		BM
Sillaginidae														
<i>Sillago sihama</i>	2	20.75	17.07–24.43	145.5	136–155	0.10								BM
<i>Sillago</i> sp.	1					0.05								M
Leiognathidae														
<i>Nichequula gerreoides</i>	1					0.05								BM
Haemulidae														
<i>Pomadourus maculatus</i>							1	11.49			100	0.09		BM
Gerreidae														
<i>Gerres</i> sp.							5	4.62	2.44–6.02	62.3	60–65	0.43		?
Nandidae														
<i>Pristolepis fasciata</i>	31	1.73	0.49–6.40	44.9	32–89	1.50	2					0.17		F
Cichlidae														
<i>Oreochromis niloticus</i>	328	2.54	0.02–17.27	47.9	14–112	15.83	93	4.7	0.22–11.81	56.09	19–92	8.03		FB
<i>Oreochromis</i> sp.	12	4.3	1.31–17.28	66.5	50–100	0.58	22	3.95	0.26–12.56	48.33	28–70	1.90		?
Eleotridae														
<i>Butis butis</i>							2	1.78	1.28–2.31	74	73–75	0.17		BM

Table 1 (continued).

Food Items	First period (January–February 2009)						Second period (April–May 2009)						Habitat of prey
	N	Weight (g)		Length (mm)		% of each species	N	Weight (g)		Length (mm)		% of each species	
		Mean	Range	Mean	Range			Mean	Range	Mean	Range		
Gobiidae													
<i>Parapocryptes serperaster</i>	2	5.64	4.12–7.16	100	100	0.10	5	6.83	2.46–14.06	120	90–160	0.43	BM
<i>Pseudapocryptes elongatus</i>													
<i>Gobiidae</i> sp.1	124	0.35	0.02–1.29	32.52	14–56	5.98	208	0.32	0.03–2.37	28.8	16–62	17.96	?
<i>Gobiidae</i> sp.2							82	0.33	0.21–0.65	33.6	30–38	7.08	?
Siganidae													
<i>Siganus</i> sp.	1					0.05	18	0.3	0.18–0.44	29	23–34	1.55	BM
Anabantidae													
<i>Anabas testudineus</i>	33	3.97	1.09–8.38	55.4	45–86	1.59	162	1.33	0.20–4.75	38.61	21–58	13.99	F
Osphronemidae													
<i>Betta</i> sp.	98	0.33	0.07–0.73	28.92	18–40	4.73	1		0.19		23	0.09	?
<i>Trichopodus trichopterus</i>	327	2.02	0.18–13.92	48	20–93	15.78	28	3.7	0.26–13.66	55.8	25–100	2.42	F
<i>Trichopsis vittata</i>	128	0.38	0.06–1.53	28.7	13–52	6.18	85	0.62	0.15–1.26	35.7	24–45	7.34	F
Channidae													
<i>Channa striata</i>	61	5.48	0.34–34.23	75.9	40–152	2.94	68	2.87	0.10–7.69	69.1	25–105	5.87	F
Amphibia													
Ranidae													
<i>Rana</i> sp.	3					0.14	24	3.2	0.85–10.65	61.7	38–120	2.07	F
Reptilia													
Scincidae													
Scincidae sp.							1		0.31		55	0.09	
Total number of items	2,072						1,158						
Percentage (%) to total number of food items	64.15						35.85						

REFERENCES

- ALI, S., AND D. D. RIPLEY. 1987. *Compact Handbook of the Birds of India and Pakistan*. 2nd edition, Oxford University Press. 737 pp.
- BANNER, A. H. AND D. M. BANNER. 1966. The Alpheid shrimp of Thailand. *The Siam Society Monograph Series*. No. 3: 1–168.
- BAUER, K. M., AND U. N. GLUTZ VON BLOTZHEIM. 1966. *Handbuch der Vögel Mitteleuropas*. Bd 1. Akademische Verlagsgesellschaft, Frankfurt am Main. 483 pp.
- BUATIP, S., W. KARNTANUT, AND C. SWENNEN. 2013. Nesting period and breeding success of the Little Egret in the Pattani province, Thailand. *Forktail* 29: 120–123.
- CARPENTER, K. E., AND V. H. NIEM. 1998. *FAO species identification guide for fishery purposes. The living marine resources of the Western Central Pacific. Cephalopods, crustaceans, holothurians and sharks*. Rome, FAO. 2: 687–1396.
- CARPENTER, K. E., AND V. H. NIEM. 1999a. *FAO species identification guide for fishery purposes. The living marine resources of the Western Central Pacific. Batoid fishes, chimaeras and bony fishes part 1 (Elopidae to Linophrynidae)*. Rome, FAO. 3: 1397–2068.
- CARPENTER, K. E., AND V. H. NIEM. 1999b. *FAO species identification guide for fishery purposes. The living marine resources of the Western Central Pacific. bony fishes part 2 (Mugilidae to Carangidae)*. Rome, F AO. 4: 2069–2790.
- CHAN-ARD, T. 2003. *A Photographic Guide to Amphibians in Thailand*. Darnsutha Press Co., Ltd., Bangkok. 176 pp. (in Thai)
- COX, M. J., P. P. VAN DIJK, J. NABHITABHATA, AND K. THIRAKHUPT. 1998. *A Photographic Guide to Snakes and other Reptiles of Thailand and Southeast Asia*. Asia Books, Bangkok. 144 pp.
- CRAMP, S., AND K. E. L. SIMMONS. 1977. *Handbook of the Birds of Europe, the Middle East, and North Africa: the Birds of the Western Palearctic*. Vol 1. Oxford University Press, Oxford. 722 pp.
- DAS, I. 2010. *A Field Guide to the Reptiles of Thailand & South-East Asia*. Asia Books, Bangkok. 376 pp.
- DEL HOYO, J., A. ELLIOTT, AND J. SARGATAL (eds). 1992. *Handbook of the Birds of the World*, Vol 1. Lynx Edicions, Barcelona. 696 pp.
- ESCHMEYER, W. N. (ed). *Catalog of Fishes*. California Academy of Science (<http://research.calacademy.org/research/ichthyology/catalog/fishcatmain.asp>). Electronic version accessed 31 May 2013.
- HAMALAINEN, M. AND A. PINRATANA. 1999. *Atlas of the Dragonflies of Thailand: Distribution Map by Provinces*. Chok Chai Creation Printing Group, Bangkok. 176 pp.
- HANCOCK, J., H. ELLIOTT, AND R. GILLMOR. 1978. *The Herons of the World*. London Editions Limited. 304 pp.
- KIMURA, S., R. KIMURA AND K. IKEJIMA 2008. Revision of the genus *Nuchequula* with descriptions of three new species (Perciformes: Leiognathidae). *Ichthyological Research* 55: 22–42.
- KOTTELAT, M., A. J. WHITTEN, S. N. KARTIKASARI AND S. WIRJOATMODJO. 1993. *Freshwater fishes of Western Indonesia and Sulawesi*. Periplus Editions, Hong Kong xxxviii + 259 pp. Pls. 1–84.
- KOTTELAT, M. 2013. The fishes of the inland waters of southeast Asia: a catalogue and core biography of the fishes known to occur in freshwaters, mangroves and estuaries. *The Raffles Bulletin of Zoology*, Supplement No. 27, 1–663.
- MURDY, E. O. 1989. A taxonomic revision and cladistic analysis of the oxudercine gobies (Gobiidae: Oxudercinae). *Records of the Australian Museum*. Supplement. No. 11: 1–93.
- SATAPOOMIN, U. AND S. POOVACHIRANON. 1997. *Fish fauna of mangroves and seagrass beds in the West Coast of Thailand, the Andaman Sea*. Phuket Marine Biological Center. Technical Paper. No. 2/1997. 63 pp.
- SEBASTIAN, P. A. AND K. V. PETER. 2009. *Spiders of India*. Universities Press, India. 614 pp.
- SMITH, H. M. 1945. The fresh-water fishes of Siam, or Thailand. *Bulletin of the United States National Museum* No. 188: i–xi + 1–622, Pls. 1–9.
- WELLS, D. R. 1999. *Handbook of the Birds of the Thai-Malay Peninsula. Vol. 1 Non-passerines*. Academic Press, London. 648 pp.