

## Original Research Article

### **A Study on some biological aspects of Giant snakehead fish (*Chana micropeltes*) in Huai Suea Ten wetland site in Thailand.**

#### **Abstract**

This research was aimed to study on biological aspects of giant snakehead fish (*Channa micropeltes*) in Huai Suea Ten wetland site, Nam Phong District, Khon Kaen Province in Thailand between April, 2017 and March, 2018. There were 36 fish species belonging to 17 families were observed at 10 sampling sites. Three Chanidae fishes, namely snakehead fish (*Channa striatus*), giant snakehead fish (*Channa lucius*), and forest snakehead fish (*Channa micropeltes*), belonging to the family Chanidae were reported. A total of 230 giant snakehead fish were found in this survey which consisted of 118 males and 112 females. The sex ratio (male: female) was 1: 0.95. The gonadosomatic index value of the female ( $0.79\pm 0.05\%$ ) was higher than that of the male ( $0.25\pm 0.08\%$ ). The body length and body weight of a total of 230 giant snakehead fish observed in this study showed the average of a total body length was  $43.71\pm 11.72$  cm; and the average of the body weight was  $448\pm 173$  g/fish. The condition factors of giant snakehead fish observed in 12 months were in a range of 0.45-0.74% for the male and 0.39-0.70% for the female. The ratio of the body and intestinal length of giant snakehead fish was as 1: 0.70. The stomach digesta components of this fish species consisted of 51.8% of fish fillet, 30.3% of small fish and 17.9% of digested digesta.

#### **Introduction**

Huai Suea Ten wetland site is located in Nam Phong District, Khon Kaen Province where is in the northeast of Thailand. Huai Suea Ten wetland is considered as the aquaculture areas that are a main animal protein source for people who live in Khon Kaen province. Therefore, this wetland has been paid attention by researchers. Sri and Pornpongrungrueng (2013) studied Huai Suea Ten wetland was abundant in both plants and aquatic plant along the water-course bank. However, the native fish species; especially giant snakehead fish, and their biological aspects have not studied yet.

Giant snakehead fish (*Channa micropeltes*) belongs to Chanidae family together with *Channa striatus*, which are fresh water, air breathing, carnivorous fish, which are a valuable source of protein throughout the Asia Pacific region and they are indigenous to many tropical and sub-tropical countries including Thailand (Mohsin and Ambak, 1983). In terms of the ecology system, the snakehead fish is as a prey on the top of the food chain. In Thailand, it is one of the major fish species caught by the local fisherman because it is a high value fish species in the markets. In addition, the juvenile of giant

37 snakehead fish has become highly demanded as the small-scale farmers still count on the traditional  
38 fish culture by catching the fish juvenile from the nature. Consequently, the invasion of the ecology  
39 system in Huai Suea Ten wetland takes place and become an issue recently. In terms of the ecology  
40 system, the giant snakehead fish is as a prey on the top of the food chain. The overfishing is able to  
41 cause the imbalance of the ecology system in Huai Suea Ten wetland. Nevertheless, the information is  
42 limited.

43 It is necessary to understand the biological aspects of giant snakehead fish as a fundamental  
44 information for both of the conservation of snakehead fish and the researches to develop the  
45 snakehead fish culture. This research was aimed to study certain biological aspects, including sex  
46 ratio, relationship between body weight and length, gonadosomatic index, condition factor, and  
47 stomach content of Giant snakehead fish (*Chana micropeltes*) in Huai Suea Ten wetland site in  
48 Thailand.

49

## 50 **Materials and methods**

### 51 **1. Study area**

52 Huai Suea Ten wetland site is located in Nam Phong District, Khon Kaen Province where is  
53 in the northeast of Thailand. It lies between latitude 16° 46' 5"N and longitudes 102° 46' 9" E. It  
54 covers approximately 7,000 km<sup>3</sup> and this area is considered to be economically important for people  
55 who live in Nam Phong District, Khon Kaen Province. There are three seasons namely, raining, and  
56 winter and summer. The annual averages of temperature, humidity and raining volume are  
57 approximately, respectively. The sampling site was divided into 10 sites such as A, B, C, D, E, F, G,  
58 H, I, and J (Figure 1) based on the local fishing pier in Huai Suea Ten wetland.

### 59 **2. Sample collection**

60 This research period was 12 months (an annual survey study) which started from April, 2017  
61 to March, 2018. The samples such as Chinidae fish and other fish species, water were collected  
62 monthly (sampling frequency). The topography and fish habitat in each sampling site was observed  
63 and recorded. The fishes were caught by our research team using and also obtained from the local  
64 fishermen of each sampling site. The fishes were observed and the well-unknown species and were  
65 collected to be identified later. The giant snakehead fish was collected to be used for the other studies  
66 in the aquaculture laboratory in Khon Kaen University, Thailand. The collected samples were fixed  
67 in a 10% formaldehyde solution.

### 68 **3. Water collection and analysis**

69 The water samples (100 ml) were randomly collected at each sampling site with triplicates.  
70 The samples were kept in 4 °C until analysed. Water quality parameters such as temperature, dissolve  
71 oxygen (DO), and pH were measured in each site using Multi meter (YSI model 30A, YSI incorporate,  
72 Ohio, USA) and turbidity was measured using secchi disk. In addition to those parameters, the water  
73 samples were collected to store in the glass bottles for the hardness and alkalinity measurements in the

74 laboratory of aquaculture, Faculty of Agriculture, Khon Kean University, Thailand. The hardness and  
 75 alkalinity measurements of the collected water were conducted according to the method of Boyd  
 76 (1979).

77

#### 78 **4. The experimental procedure**

##### 79 **4.1 Species identification**

80 All fishes collected from the all sampling sites were identified for the species according to  
 81 Nelson (1994). The collected snakehead fish with perfectly physical appearance were measured for  
 82 the average of the total body length and body ratio according to the method of Hubbs and Lagler  
 83 (1947).

##### 84 **4.2 The gender identity and sex ratio (male: female)**

85 The fish collected from each month were identified the gender by examining the external and  
 86 internal sexual organs. The external sex appearance in Giant snakehead fish of male and female  
 87 seemed similar; however, the body size of the male generally bigger than the female. The pelvic and  
 88 anal fins of the female were slightly shorter than that of the male. During the pairing season, the  
 89 abdomen of female was wider than that of male. Additionally, the urogenital pore of female turn pink,  
 90 the body colour of the male became darker than usual. The internal sex appearance, two lobes of ovary  
 91 were found in the body cavity of female and two spermatic tubes were found the body cavity of the  
 92 male. The number of all identified fish were calculated for the sex ratio and tested for the statistical  
 93 difference using Chi-square test (Snedecor and Conbran, 1967). The hypothesis of this study was that  
 94 the sex ratio (male: female) was assumed as 1: 1. The data would be expressed as a monthly average  
 95 and an annual average of the sex ratio. Lastly, the sex ratio of each month would be compared in  
 96 order to be determined whether the sex ratio varied with the specific seasons and areas. The equation  
 97 used in this study:

98

$$99 \quad X^2 = \frac{(O-E)^2}{E}$$

100

101 Where:  $X^2$  = Chi – square of the sex ration (male: female)

102 O = the number of male or female was observed (Observed frequency).

103 E = the number of male or female which was expected to be observed (Expected  
 104 frequency).

105

##### 106 **4.3 The relationship between body weight and body length**

107 The individual male and female fish were measured for the body weight and total body length.  
 108 The values of the body and total body length would be calculated for the relationship between body

109 weight and length that was expressed as the quadratic equation and the coefficient of determination  
110 ( $R^2$ ), based the method of Lagler (1970).

111

$$112 \quad W = aL^b$$

$$113 \quad \text{or } \log W = \log a + b \log L$$

114 Where: W = body weight

115 The equation of logarithm was performed:

$$116 \quad \log W = \log a + b \log L$$

117 Where: W = body weight (g/fish),

118 L = total body length (c),

119 a and b are the constant value

120

121 After the quadratic equation and the coefficient of determination ( $R^2$ ) were calculated, these  
122 were examined whether they were able to describe the dependent variable values (Y) properly,  
123 according to the t equation.

124

$$125 \quad t = \sqrt{\frac{(n-2)R^2}{1-R^2}}$$

126

127 The calculated value of t would be compared to the t value in the t-distribution table at  $t_{0.05} (n-$   
128  $2)$ . In case, the calculated value of t was higher than that of t in the t-distribution table, it indicated  
129 that there was significant relationship between the body weight and body length.

130

#### 131 **4.4 Gonad somatic index (GSI)**

132 The fish were dissected to collect to gonadal organ which was then weighed using a balance  
133 (Sartorius ED124S analytical balance, Goettingen, Germany). The weight of gonad organ was  
134 calculated for GSI, according to Benfey and Sutterlin (1984):

135

$$136 \quad \text{GSI} = \frac{\text{Gonad weight of fish} \times 100}{\text{Fish body weight}}$$

137

138

139 The average of a monthly GSI value collected monthly would be calculated to compared to  
140 the average of an annual GSI value in order to estimate the highest development of the gonad in a  
141 year (a year-round range).

#### 142 **4.5 The condition factor**

143 The body weight and total body length of fish sampled from each month were calculated as  
 144 the condition factor, according to Swingle and Shell (1971).

145

$$146 \quad K = 100 W/L^3$$

147 Where: K = the condition factor

148 W = the fish body weight (g)

149 L = the total length (cm)

150

#### 151 **4.6 The relationship between the body and intestinal lengths and stomach content index**

152 The fish samples were dissected to collect both the tissue and the content/digesta in a whole  
 153 digestive tract including stomach and intestinal contents. The length of intestine was measured for a  
 154 ratio and relationship between the length of digestive tract and the total body length of fish (Nikolskii,  
 155 1963). The digesta was examined for the feed components under the microscope with (5x) using the  
 156 occurrence method, based on Hyslop (1980), so as to sort the type and number of feed components, of  
 157 which values were expressed as percentage (%) of a whole stomach digesta.

158

159

$$160 \quad Li = a Lt^b$$

$$161 \quad \text{or} \quad \log Li = \log a + b \log L$$

162 where: Li =Length of intestine (cm)

163 Lt = total body length (cm)

164 a and b are the constant values.

165

166

## 167 **Results and discussion**

### 168 **The observation of study area and water quality**

169 The water-course bank of Huai Suea Ten wetland was brooked and there was the abundance  
 170 of both plants and aquatic plant along the water-course bank. The ranges of water quality (DO = 2.5-  
 171 5.0 mg/L; pH = 5.5-5.7; temperature = 23-32 °C; alkalinity = 54-66 mg/L; hardness = 57-59 mg/L;  
 172 and turbidity = 30-130 mg/L) measured in all sampling sites in Huai Suea Ten wetland was  
 173 considered in the normal range for the natural fishes.

### 174 **2. Fish species identification and diversity**

175 A study on the general characteristics and taxonomy of fishes is used as the significantly  
 176 important indicators of the fish habitats, fish existence and fish behaviors (Wootton, 1998) that is a  
 177 fundamental information for both of the conservation of certain invaded species and the researches to  
 178 develop the aquaculture industries.

179 Based on the results of the annual survey from April, 2017 to March, 2018 in Huai Suea Ten  
180 wetland site is located in Nam Phong District, Khon Kaen Province, 36 fish species belonging to 17  
181 families were observed in 10 sampling sites (Table 1). The family Chanidae, three fishes such as  
182 snakehead fish (*Channa striatus*), giant snakehead fish (*Channa lucius*) (Figure 2), and forest  
183 snakehead fish (*Channa micropeltes*), were observed in this survey. In addition to the giant snakehead  
184 fish which was the target fish found in this survey, the Cyprinid fishes were the most diverse among  
185 fishes that was counted as 11 species. Three of them belonged to the subfamily Rasborinae; and the  
186 others (8 fishes) belonged to subfamily Cyprinidae. The family of Anabantidae fishes was in the 2<sup>nd</sup>  
187 place which was surpassed by the group of Cyprinid fishes. There were five species found in this  
188 survey. Further, two families of fishes, namely Siluridae and Cobitidae, consisted of two species of  
189 each family were found. The others families including Cleariidae, Notopteridae, Pristolepidae,  
190 Cichlidae, Eleotidae, Belonidae, Tetrodontidae, Mastacembelidae, Symbranchidae, Ambassidae and  
191 Nandidae, which composed of only one species of each family. In Thailand, 10 fish species belonging  
192 family Chanidae; and the giant snakehead fish is the biggest snakehead fish in this family.

#### 193 **The sex ratio (male: female) of giant snakehead fish**

194 According to the annual sampling of giant snakehead fish, a total of 230 giant snakehead fish  
195 were found in this survey which consisted of 118 males and 112 females. The sex ratio (male: female)  
196 was 1: 0.95 (Table 2). The sex ratio was hypothesized that the ratio of the male was equal the female  
197 as 1: 1 at 95% of the confident interval. As a result of Chi-square test in the annual survey, the  
198 calculated value of Chi-square (9.465) was lower that the table value of Chi-square (19.68; df = 11),  
199 indicating there was no a significant difference in the sex ratio of giant snakehead fish ( $p > 0.05$ ).  
200 Based on the result of the monthly survey, the calculated values of Chi-square were lower that the  
201 table value of Chi-square (3.84; df = 1), indicating there was no a significant difference in the sex  
202 ratio of giant snakehead fish ( $p > 0.05$ ).

#### 203 **The relationship between body weight and body length**

204 There was a significantly positive relationship between the body length and body weight of  
205 230 giant snakehead fish ( $R^2 = 0.696$ ) collected from April, 2017 to March, 2018 in Huai Suea Ten  
206 wetland (Figure 6).

#### 207 **Gonadosomatic index (GSI)**

208 The gonadosomatic index (GSI) of each gender collected monthly was used to indicate the  
209 maturity period of giant snakehead fish in a year by comparing the value in each month. The GSI of a  
210 total of 230 giant snakehead fish observed in 12 months showed that GSI of 118 males was in a range  
211 of 0.140-0.361%, and the highest value (0.36%) and lowest of GSI values were found in December,  
212 2017 and April, 2018, respectively (Figure 4). The GSI of 112 females was in a range of 0.299-  
213 1.788%, and the highest value (1.79%) and lowest of GSI values were found in June, 2017 and  
214 December, 2018, respectively. In comparison, the GSI value of the female was higher than that of the

215 male that indicates the gonad (ovary) of female is greater level of gonad development, in terms of the  
216 weight, than that (sperm) of male.

### 217 **The condition factor**

218 The condition factor is an indicator of the health status and maturity which are commonly  
219 varied with the season and several factors such as fish species, fish body size, fish gender, food  
220 availability and the quality of environment (Nikolskii, 1963). The body length and body weight of a  
221 total of 230 giant snakehead fish observed in this study showed that the longest and shortest body  
222 lengths of fish were 14.3 and 73.3 cm, respectively; and the average of a total body length was  
223  $43.71 \pm 11.72$  cm. The heaviest and lightest body weights of fish were 125 and 1,254 g/fish,  
224 respectively; and the average of the body weight was  $448 \pm 173$  g/fish (Table 3). The condition factor  
225 (K) of a total of 230 giant snakehead fish observed in 12 months showed that the condition factor of  
226 the male was in a range of 0.45-0.74%, and the highest value and lowest of condition factor values  
227 were found in June, 2017 and April, 2018, respectively. The condition factor of the female was in a  
228 range of 0.39-0.70%, and the highest value and lowest of condition factor values were found in  
229 October, 2017 and April, 2018, respectively. According to our study, the condition factor in giant  
230 snakehead fish slightly changed during an annual observation due to this fish species generally live in  
231 the wetland all years long.

### 232 **7. The relationship between the body and intestinal lengths and stomach content index**

233 The result of the total body and intestinal lengths of 230 giant snakehead fish showed that the  
234 longest and shortest body length of fish were 14.6 and 73.3 cm, respectively; and average of body  
235 length was  $43.71 \pm 11.72$  cm. The longest and shortest intestinal length of fish were 16.95 and 48.00  
236 cm, respectively; and average of intestinal length was  $30.16 \pm 12.04$  cm. The ratio of the body and  
237 intestinal length of giant snakehead fish was 1: 0.70 (Table 4). The type of stomach content examined  
238 in 230 fish displayed that only 24 fish of which stomach contained the digesta; and the stomach of the  
239 other 206 fish contained no digesta. The components of stomach content included fish fillet, small  
240 fish and digested content which was not able to be identified due to the complete digestion. The  
241 portion of a total stomach content, counted as 100%, comprised of 51.8% of fish fillet, 30.3% of small  
242 fish and 17.9% of digested content (Figure 7). The ratio of the body and intestinal length (1: 0.70) of  
243 giant snakehead fish was in a range of the carnivore fish. Likewise, the stomach digesta components  
244 found in this study indicates that the feeding behavior of giant snakehead fish has not changed which  
245 is carnivore fish.

### 246 **Conclusion**

247 Based on the results of the annual survey from April, 2017 to March, 2018 in Huai Suea  
248 wetland, there were 36 fish species belonging to 17 families were observed in 10 sampling sites.  
249 Three Chanidae fishes, namely snakehead fish (*Channa striatus*), giant snakehead fish (*Channa*  
250 *lucius*), and forest snakehead fish (*Channa micropeltes*), belonging to the family Chanidae were  
251 reported. A total of 230 giant snakehead fish were found in this survey which consisted of 118 males

252 and 112 females. The sex ratio (male: female) was 1: 0.95. The GSI value of the female was higher  
 253 than that of the male that indicates the gonad of female is greater level of gonad development than  
 254 that of male. The body length and body weight of a total of 230 giant snakehead fish observed in this  
 255 study showed that the longest and shortest body lengths of fish were 14.3 and 73.3 cm, respectively;  
 256 and the average of a total body length was  $43.71 \pm 11.72$  cm. The heaviest and lightest body weights  
 257 of fish were 125 and 1,254 g/fish, respectively; and the average of the body weight was  $448 \pm 173$   
 258 g/fish. The condition factors of giant snakehead fish observed in 12 months were in a range of 0.45-  
 259 0.74% for the male and 0.39-0.70% for the female. The ratio of the body and intestinal length of giant  
 260 snakehead fish was as 1: 0.70. The stomach digesta components of this fish species consisted of  
 261 51.8% of fish fillet, 30.3% of small fish and 17.9% of digested digesta.

262

### 263 **Conflict of interest**

264 None

265

### 266 **Reference**

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- 286
- 287





288

289 **Figure 1** Ten sampling sites (10 sites) where the samples were collected in Huai Suea Ten  
290 wetland, Nam Phong District, Khon Kaen Province

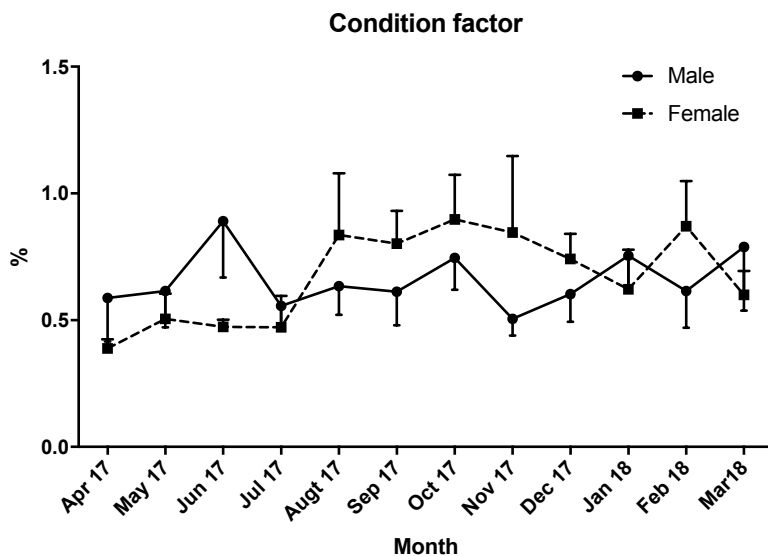
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294 **Figure 2** Giant snakehead fish

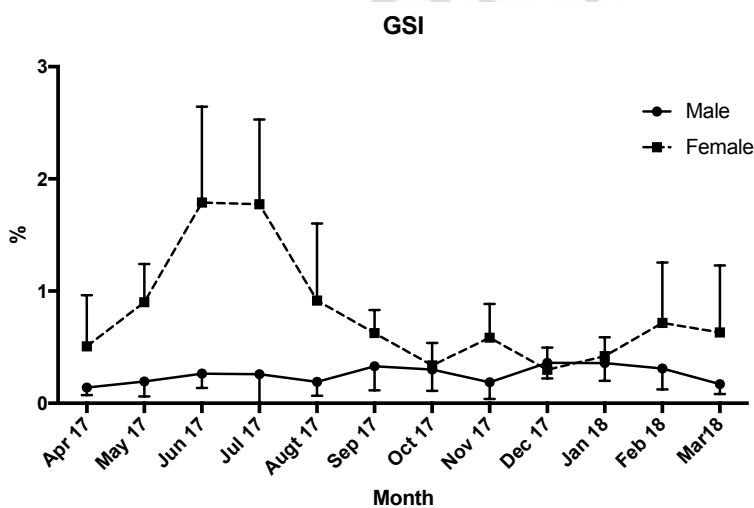


295

296 **Figure 3** the tendency of the condition factor (K) of the giant snakehead fish of male and  
 297 female in Huai Suea Ten wetland, Nam Phong District, Khon Kaen Province from April,  
 298 2017 – March, 2018

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300



301

302 **Figure 4** Gonadosomatic index (%) of the giant snakehead fish of male (n = 118) and female  
 303 (n = 112) in Huai Suea Ten wetland, Nam Phong District, Khon Kaen Province from April,  
 304 2017 – March, 2018

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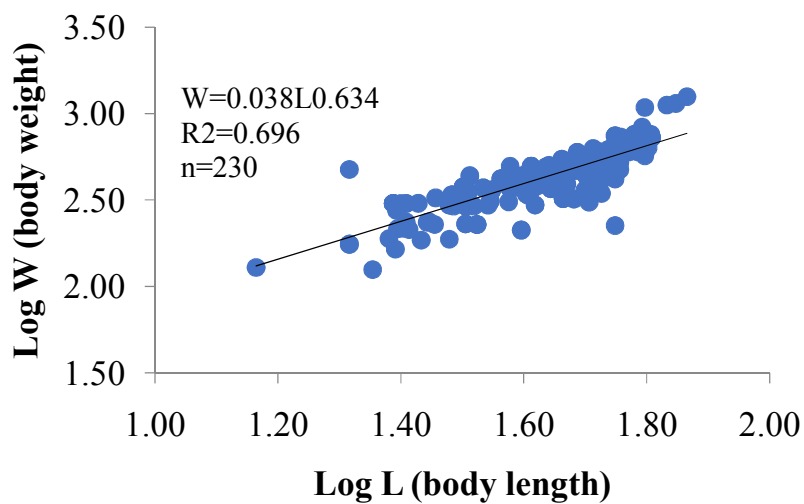
307

308 **Figure 5** the difference of urogenital pore of giant snakehead fish collected during the pairing  
 309 season in Huai Suea Ten wetland, Nam Phong District, Khon Kaen Province

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311

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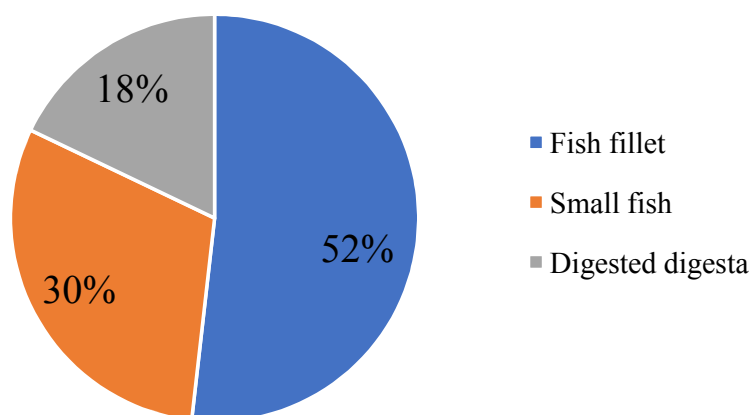
313

314 **Figure 6** the relationship between the body length and body weight of giant snakehead fish  
 315 ( $R^2 = 0.696$ ) in Huai Suea Ten wetland, Nam Phong District, Khon Kaen Province collected  
 316 from April, 2017 – March, 2018

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320

321 **Figure 7** the Type of and amount of stomach content of Giant snakehead fish (n = 230)

322

323 **Table 1** The fish species were observed in all sampling site in Huai Suea Ten wetland, Nam

324 Phong District, Khon Kaen Province

Family	Subfamily	Scientific name		
Notopteridae		<i>Notopterus notopterus</i>		
Cyprinidae	Rasborinae	<i>Esomus metallicus</i>		
		<i>Rasbora rubodorsalis</i>		
		<i>Rasbora borapetensis</i>		
	Cyprininae	<i>Cyclocheilichthys apogon</i>		
		<i>Osteochilus hasselti</i>		
		<i>Labiobarbas spilopleura</i>		
		<i>Puntioplites proctozysron</i>		
		<i>Puntiu sleiacanthus</i>		
		<i>Puntius gonionotus</i>		
		<i>Hampala dispar</i>		
		<i>Cirrhinus molitorella</i>		
		<b>Channidae</b>		<b><i>Channa striatus</i></b>
				<b><i>Channa lucius</i></b>
	<b><i>Channa micropeltes</i></b>			
Anabantidae		<i>Anabas testudineus</i>		
		<i>Trichopsis vittatus</i>		
		<i>Trichogaster trichopterus</i>		
		<i>Trichopsis pumila</i>		
		<i>Betta smaragdina</i>		
Cobitidae		<i>Lepidocephalus hasselti</i>		
		<i>Acanthopsis choirorhynchos</i>		
Siluridae		<i>Ompok bimaculatus</i>		
		<i>Kryopterus bleekeri</i>		

Ambassidae	<i>Ambassis siamensis</i>
Nandidae	<i>Nandus nebulosus</i>
Belonidae	<i>Xenentodon cancila</i>
Bagridae	<i>Mystus vittatus</i>
	<i>Mystus nemurus</i>
Clariidae	<i>Clarias batrachus</i>
Symbranchidae	<i>Monopterus albus</i>
Tetrodontidae	<i>Tetrodo nleiurus</i>
Mastacembelidae	<i>Macrognathus siamensis</i>
Pristolepididae	<i>Pristolepis fasciatus</i>
Cichlidae	<i>Oreochromis niloticus</i>
Eleotridae	<i>Oxyeletris marmoratus</i>
<b>Total = 17 families</b>	<b>36 species</b>

325

326

327

328 **Table 2** the sex ratio of Giant snakehead fish collected in Huai Suea Ten wetland, Nam  
329 Phong District, Khon Kaen Province from April, 2017 – March, 2018

Month/year	Fish number		Total	Sex ratio		Chi-square	H <sub>0</sub>
	Male	Female		Male	Female		
April 17	10	10	20	1	1.00	0.014	accept
May 17	13	8	21	1	0.62	0.945	accept
June 17	10	8	18	1	0.80	0.130	accept
July 27	8	7	15	1	0.86	0.025	accept
August 17	10	7	17	1	0.70	0.385	accept
September 17	9	14	23	1	1.56	1.364	accept
October 17	9	9	18	1	1.00	0.012	accept
November 17	6	12	18	1	2.00	2.327	accept
December 17	9	11	20	1	1.22	0.318	accept
January 18	16	9	25	1	0.56	1.613	accept
February 18	11	6	17	1	0.55	1.222	accept
March 18	7	11	18	1	1.57	1.111	accept
<b>average</b>				1	0.95	9.465	accept
<b>total</b>	118	112	230				

330 **Note:** Chi-square at the confident 95% df1 = 3.84, df11 = 19.68

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334

335 **Table 3** the condition factor (K,%) of the giant snakehead fish of male and female collected  
 336 between April 2017 – March 2018

Month/year	Male				Female			
	Fish number	Length (cm)	weight (g)	K (%)	Fish number	Length (cm)	weight (g)	K (%)
April 17	10	47.2	472.96	0.45	10	47.2	409.49	0.39
May 17	13	46.9	492.01	0.48	8	48.8	518.83	0.45
June 17	10	37.4	387.18	0.74	8	48.0	541.38	0.49
July 17	8	42.9	407.58	0.52	7	53.5	629.81	0.41
August 17	10	46.4	532.15	0.53	7	41.6	449.10	0.62
September 17	9	46.4	500.59	0.50	14	38.7	381.56	0.66
October 17	9	41.2	442.44	0.63	9	36.9	353.81	0.70
November 17	6	45.2	439.77	0.48	12	42.2	426.33	0.57
December 17	9	43.9	436.57	0.51	11	39.3	386.36	0.64
January 18	16	41.7	416.39	0.58	9	45.8	471.16	0.49
February 18	11	46.6	478.70	0.47	6	37.4	362.39	0.69
March 18	7	42.9	423.33	0.54	11	44.9	469.31	0.52
<b>Average</b>		44.05	453.61	0.54±0.0		43.35	442.84	0.55±0.1
<b>Total</b>	118				112			

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347 **Table 4** the ratio of body length and intestinal length of giant snakehead fish in Huai Suea  
 348 Ten wetland, Nam Phong District, Khon Kaen Province collected from April, 2017 – March,  
 349 2018

<b>Class interval of length (cm)</b>	<b>Fish number</b>	<b>Body length (cm)</b>	<b>Intestinal length (cm)</b>	<b>Ratio of body and intestinal length</b>
20.0 – 29.9	19	23.90	16.95	1 : 0.71
30.0 - 39.9	58	33.22	22.46	1 : 0.68
40.0 – 49.9	97	44.66	28.31	1 : 0.63
50.0 - 59.9	47	52.86	35.08	1 : 0.66
60.0 – 69.9	9	61.80	48.00	1 : 0.78
<b>Average</b>		43.29±15.11	30.16±12.04	1 : 0.70
<b>Total</b>	230			

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