

# Maturity and Spawning of the Small Yellow Croaker, *Larimichthys polyactis*

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# 1. Introduction



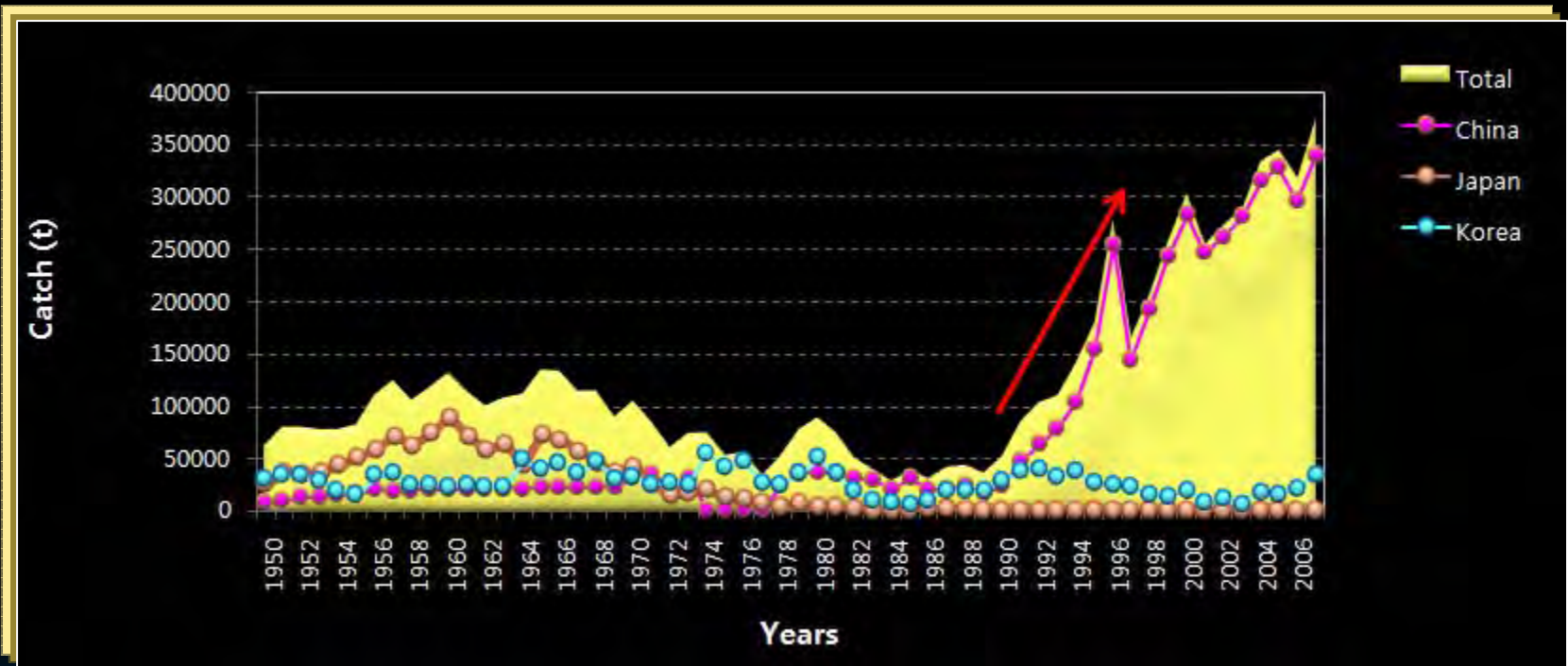
## ❖ Small yellow croaker

### • **Geographic Distribution**

- Northwest Pacific Ocean : Yellow and East China seas

- Depth : surface - 160 m
- water temperature : 7 - 25 °C
- Feeds : crustaceans, euphausiids and decapods
- Maximum size : 42 cm

## ❖ Annual Yield



Commercially important demersal fish in China, Korea.

- Largest catches country ; China, Korea

The annual catch of small yellow croaker has been rapidly increased in china since 1990, based on FAO fishery statistics

# ❖ Previous study..

- ✓ Age and growth

Bae, 1960; Ikeda, 1964; Hwang & Choi, 1980; Lee, 2000; Kim et al., 2006

- ✓ Estimation of the survival rate

Lee, 1997

- ✓ Fluctuations in Biomass

Zhang et al., 1992b

- ✓ Embryonic development, Larvae and Juveniles reared in aquarium

Myoung., 2004

- ✓ Seasonal, diel and ontogenetic variation in feeding patterns

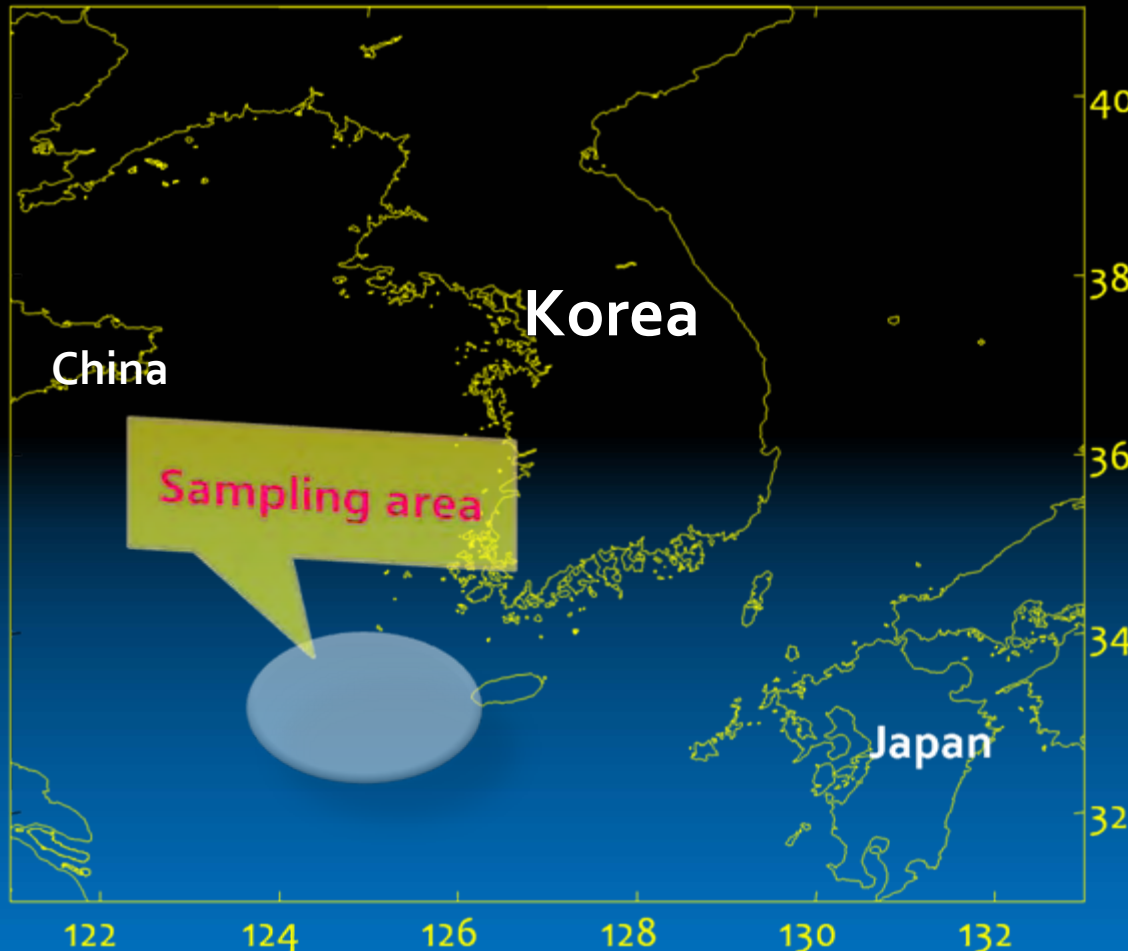
Xue et al., 2005

- Reproductive Biology of this species has been poorly known.
- The purpose of this study
  - Suggest that spawning period, maturation size and sex ratio of small yellow croaker.

## 2. Materials and methods

### ❖ Sampling

-The small yellow croaker caught by trawls, lift nets and gill nets in the Yellow and East China Seas from January 2005 to December 2008.



### ❖ Measurement

- Total Length : 0.1 cm
- Total weight : 0.1 g
- Gonad weight : 0.01 g

## 2. Materials and methods (cont'd)

- A total of 5,939 specimens of small yellow croaker were collected between Jan. 2005 and Dec. 2008.

- May to Aug ; very few specimens throughout sampling period.

Table 1. Number of specimen of Small yellow croaker.

	Female	Male		Female	Male
2005. Jan	287	76	2007. Sep	71	48
Feb	102	17	Oct	70	50
Mar	95	25	Nov	98	22
Aug	48	12	Dec	144	37
Sep	73	17	2008. Jan	90	30
Oct	94	26	Feb	378	171
Nov	95	25	Mar	287	132
Dec	75	44	Apr	290	60
2006. Jan	46	14	May	29	0
Feb	72	18	Jun	34	26
Mar	66	24	Jul	34	18
Apr	96	21	Aug	81	37
Nov	87	33	Sep	217	76
Dec	84	32	Oct	337	140
2007. Jan	108	12	Nov	404	164
Feb	32	28	Dec	266	154
Aug	49	11	Total.	4,339	1,600

### ❖ Sexual Maturation & Spawning period

#### ➤ The stages of gonad development

: using a maturity scale and gonadosomatic index

- Immature stage
- Maturing stage
- Mature stage
- Ripe & spent Stage

➤ A four maturity stages were determined by eye through the observation and histological observation of the gonad





### ❖ Spawning season

- Gonadosomatic Index

$$GSI = (GW / TW) \times 100$$

GW = gonad weight

TW = total weight

### ❖ Maturation Size (Total length at 50 % group maturity)

$$P_i = 1 / 1 - e^{-b_0 - b_i TL}$$

$P_i$  = maturity rate at

$i$  class interval of total length

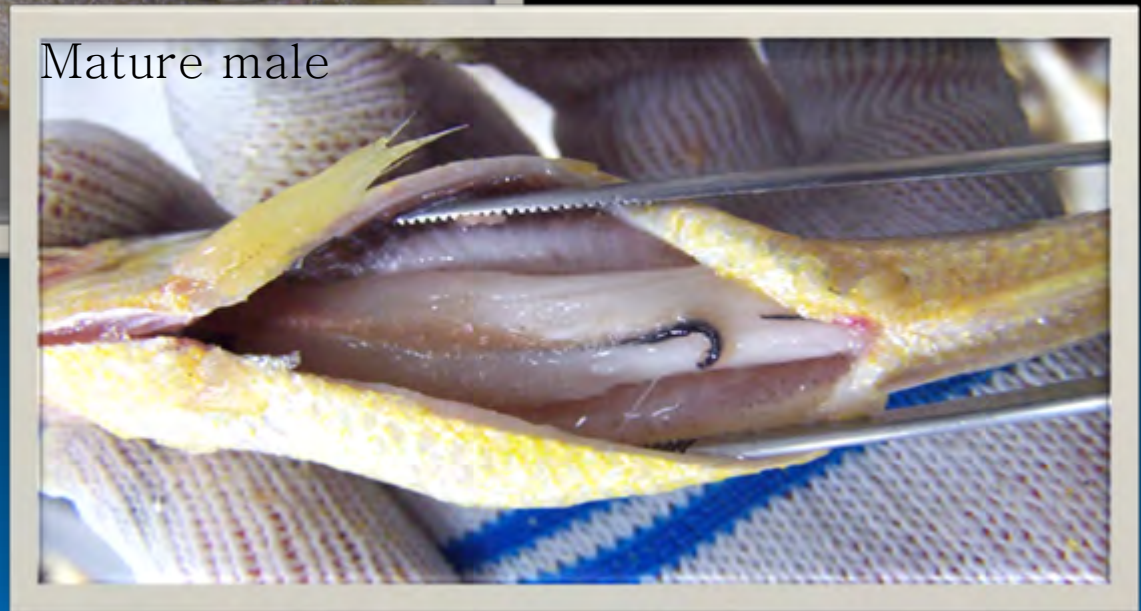
### ❖ Monthly change of Egg diameter

- Fixed in Gilson's sol.
- Using IMAGE ANALYZER( $\mu\text{m}$ )



### ❖ Sex ratio

-Significant deviations of the 1:1 proportion were tested using the  $\chi^2$  – test



### 3. Results & Discussion

#### ➤ The stages of gonad development - **Female**

- Immature stages of females were shown every month
- Ripe stages of females were High proportions from March to April

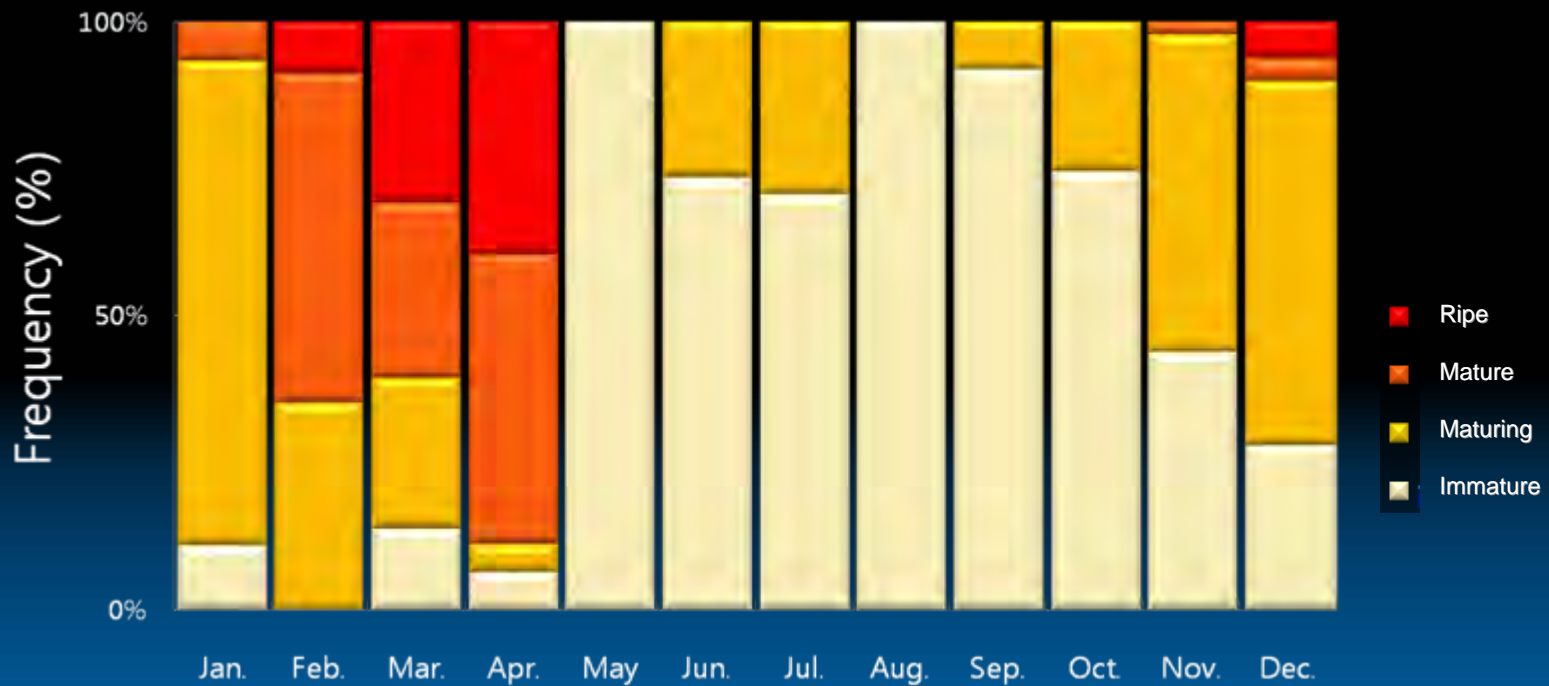


Fig. 1. Monthly changes of maturity stages for Small yellow croaker



### 3. Results & Discussion (cont'd)

#### ➤ The stages of gonad development - **Male**

- Mature stages of males were observed Jan - Apr and Nov, Dec.
- Ripe stages of males were high proportions from March to April.

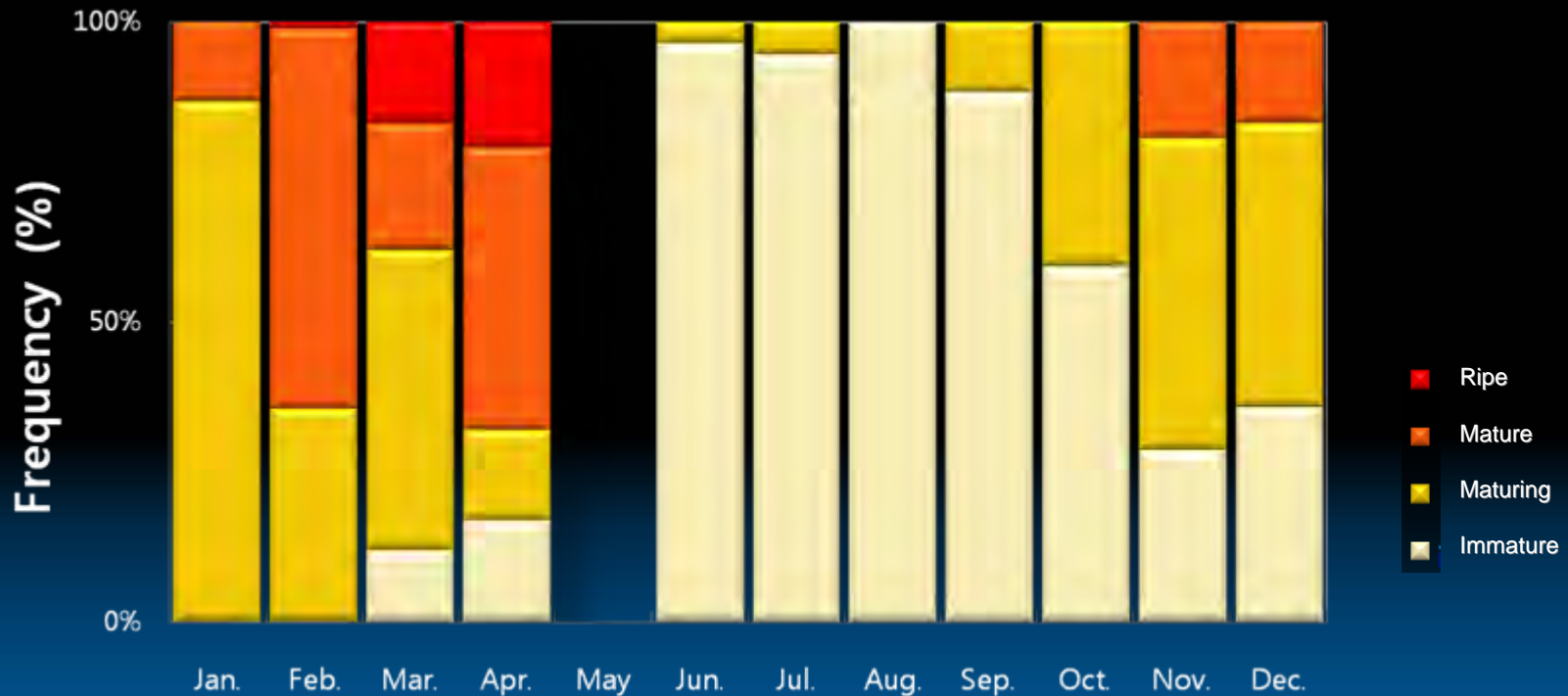


Fig. 2 Monthly changes of maturity stages for Small yellow croaker

## ➤ Gonadosomatic Index

-began to increase in December and reached to a maximum between March and May, then decrease from June

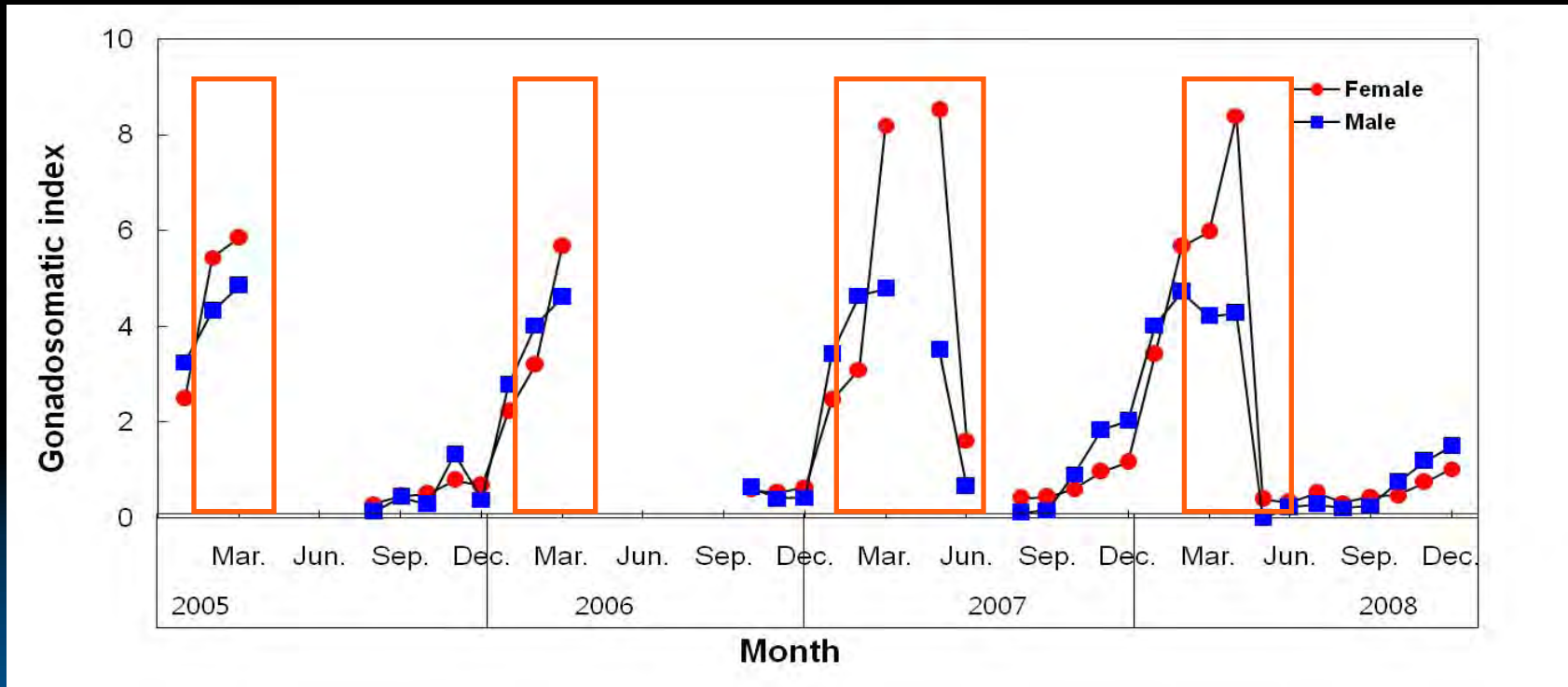


Fig. 3. Monthly changes of gonadosomatic index for Small yellow croaker

#### ➤ Monthly change of Egg diameter

-reached to a maximum April , then decrease from **May**.



Fig. 4. Monthly changes of egg diameter for small yellow croaker

## ➤ Maturation size

The estimated mean length at maturity for both male and female was 17.62 cm in total length.

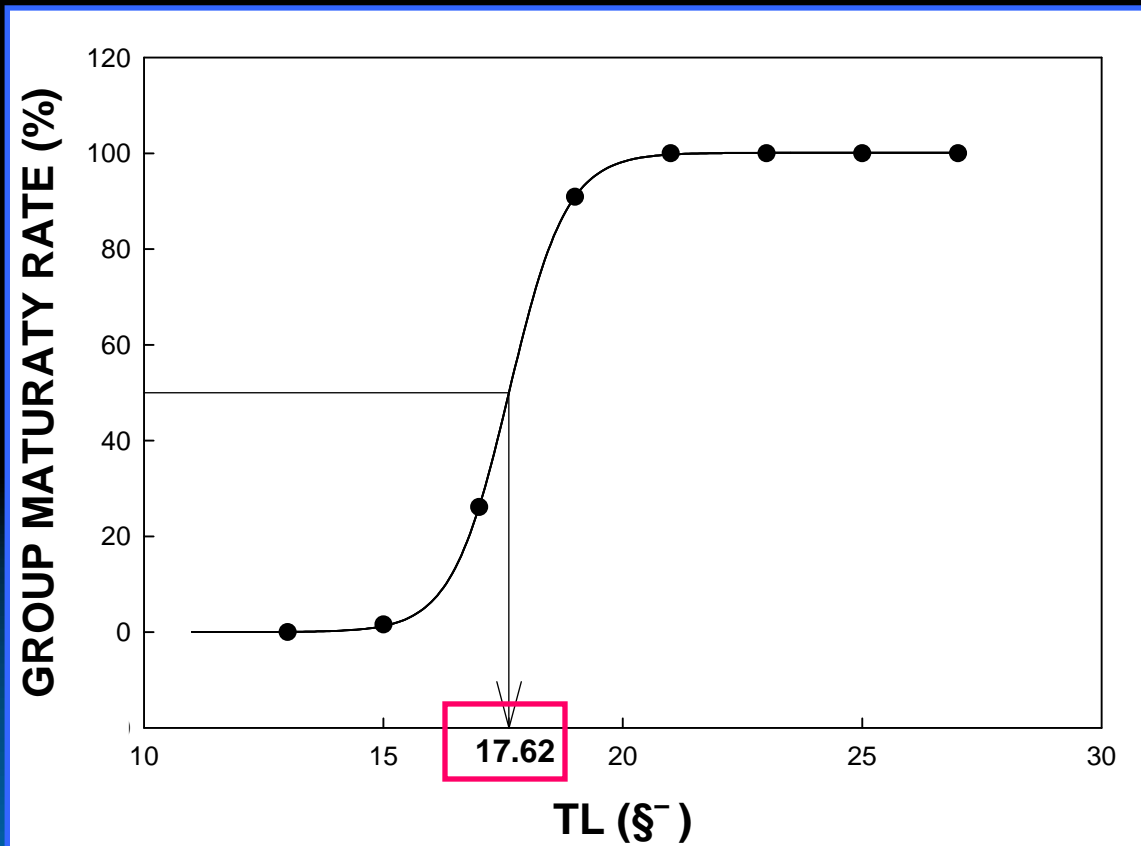


Fig. 5. Relationship between total length and group maturity of Small yellow croaker



## ➤ Sex ratio

- Sex ratio of females to males was 1 : 2.7
- The proportion of females was significant higher than males

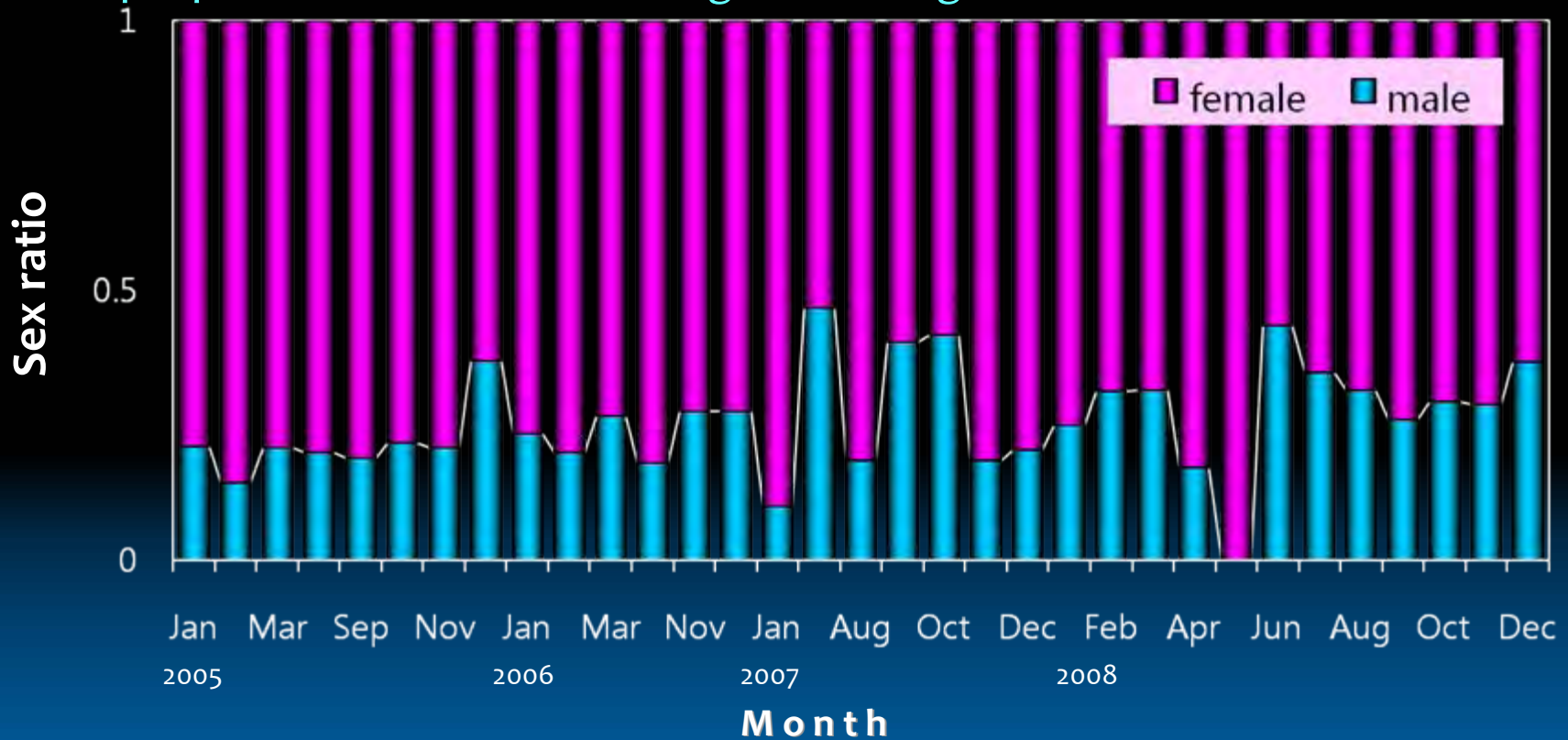


Fig. 6. Sex ratio of Small yellow croaker

#### ❖ Spawning period

March - June

In present study, we elucidated the spawning season and diel reproductive periodicity of female and male small yellow croaker in East china sea on the basis of Gonadosomatic Index and histological examination of gonad.

The spawning season : **from March to June.**

- **In previous studies, the spawning season of small yellow croaker was shown to last from Apr. to Jun., in the Yellow sea and Japan sea.**

Spawning season	Area	Author
Apr - Jun	Yellow sea	Park, 1981
May	Yellow sea	Bae, 1960
Apr - Jun	Japan sea	Yamada, 1940

#### ❖ Maturation size

17.6 cm

- The total length of small yellow croaker at the first maturity was 12.8 cm .
- Matured small yellow croaker are roughly 50% at 17.6 cm.
- - In previous studies, the Maturation size of small yellow croaker was shown 19.1 cm, 18.3 cm, 20 cm.

Maturation size	Area	Author
19.1 cm (T.L)	Yellow sea	Park, 1981
18.3 cm (B.L)	Yellow sea	Bae, 1960
20.0 cm (T.L)	Japan sea	Yamada, 1940

## ❖ Sex ratio

**Male : Female = 1 : 2.7**

Sex ratio	Area	Author
M : F = 1 : 2	Yellow sea	Park, 1981
M : F = 1 : 2.2	Yellow sea	Bae, 1960

The proportion of females was significant higher than males !!



- ❖ Spawning period : from March to June
- ❖ Maturation size : 17.6 cm
- ❖ Sex ratio (Male : Female ) = 1 : 2.7
  - Sex ratio was significant ( $\chi^2$  – test ,  $p < 0.05$ )

Thanks for your time and  
attention !