Maturation and spawning of Black sea bream, *Acanthopagrus schlegeli*, in Jeonnam marine ranching area

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Introduction

- Order: Perciformes
  Family: Sparidae
  *Acanthopagrus schlegeli* (Black sea bream)

- Distribution: Japan/ East Sea and East China Sea in Korea waters, Hokkaido Sea of Japan and Taiwan

- Habitat depth: 50m

- The objective of this study
  - to examine maturity and spawning of Black sea bream in Jeonnam marine ranching area
Annual catch of Black sea bream in Jeonnam province, Korea
Protandry fish?
The male fish convert into female fish according to growth

e.g) Black sea bream, Yellow tailed anemone, etc
A picture is early sex-changers conversion of hermaphrodite from female to male.

B picture is late sex-changers of hermaphrodite.
Material and Method


- **Area**

  Sampling area of *Acanthopagrus schlegeli* caught by the longline fishery in the Jeonnam marine ranching area.

- **Methods**

  - **Maturity stages**: divided four stages (immature, maturing, mature, spent)

  - **GSI (Gonadosomatic index)**: \( \text{GSI} = \frac{\text{GW}}{\text{BW}} \times 10^3 \)

  *GW* (Gonado Weight), *BW* (Body Weight)
Material and Method

♀ Egg diameter

♀ Fecundity: Wet weight method

\[ F_c = \frac{A - B}{C} \times e \]

A: Gonado weight, B: Gonado skin weight, C: Gonado a piece, e: C eggs number

♀ 50% sexual maturity:

\[ P = \frac{1}{1 + \exp(a - bFL)} \]

P: predicted mature proportion, a, b: coefficients of the logistic equation
Result

Length-frequency of Black sea bream in Jeonnam marine ranching area

- Male (9~37 cm)
- M/F (18~42 cm)
- F/M (17~45 cm)
- Female (22~52 cm)

Hermaphrodite - M/F (early sex-changers), F/M (late sex-changers)
Monthly changes in maturity stages of female and male Black sea bream
Monthly changes in gonadosomatic index of female and male Black sea bream
Monthly changes in egg diameter of Black sea bream
### Absolute and relative fecundities according to fork length of Black sea bream

<table>
<thead>
<tr>
<th>Fork length (cm)</th>
<th>Absolute fecundity (eggs)</th>
<th>Relative fecundity (egg/cm)</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Range</td>
<td>Mean</td>
<td>Range</td>
</tr>
<tr>
<td>32.0~33.9</td>
<td>839,596 - 1,249,647</td>
<td>1,044,622</td>
<td>26,074 - 37,192</td>
</tr>
<tr>
<td>34.0~35.9</td>
<td>813,241 - 1,562,674</td>
<td>1,198,910</td>
<td>31,761 - 43,650</td>
</tr>
<tr>
<td>36.0~37.9</td>
<td>1,291,193 - 1,613,035</td>
<td>1,426,934</td>
<td>35,472 - 43,129</td>
</tr>
<tr>
<td>38.0~39.9</td>
<td>1,874,608 - 2,079,899</td>
<td>1,782,405</td>
<td>49,202 - 52,128</td>
</tr>
<tr>
<td>40.0~41.9</td>
<td>2,079,899 - 2,894,913</td>
<td>2,487,406</td>
<td>51,868 - 68,927</td>
</tr>
</tbody>
</table>

**Relationship between fork length and fecundity of Black sea bream**

\[ F = 1.1263FL^{3.8996} \]

\[ R^2 = 0.736 \]
Logistic functions fitting the proportion of maturing and mature female and male of Black sea bream

Female

\[
S(L) = \frac{1}{1 + \exp(5.782 - 0.224 \times L)} \times 100
\]

\[
FL_{50} = 25.8\text{cm}
\]

Male

\[
S(L) = \frac{1}{1 + \exp(13.170 - 0.693 \times L)} \times 100
\]

\[
FL_{50} = 19.0\text{cm}
\]
Spawning season

Monthly sex ratio

- Female
- F/M
- Male
- M/F

Frequency (%)

Month

0% 20% 40% 60% 80% 100%
Discussion

According to the growth, sex ratio of female was increased because male converts into female through sexual conversion.

Black sea-bream is protandry fish and they change genders as they grow and mature at the same time.


- National Fisheries Research and Development Institute (NFRDI, 2002)
  - Spawning period: May ~ Jul.

Maturity stages

Immature (Jul. – Oct.), Maturing (Nov. – Feb.),

Mature (Mar.– Jun.) , Spent (Jul.)

Relationship between fecundity and fork length

\[ F_c = 1.1263 \cdot FL^{3.8996} \quad (R^2 = 0.736) \]

Fork length at 50% maturity

: Female - 25.8cm, Male – 19.0cm

Sex ratio of female is higher than male in the spawning season
Thank you