Globally significant fish in the Yellow Sea Ecoregion

A table of indicator fish species and their global significance

<table>
<thead>
<tr>
<th>Scientific names</th>
<th>Common names</th>
<th>Criterion 1: Endemism</th>
<th>Criterion 2: Vulnerable</th>
<th>Criterion 3: Commercially Important</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Acipenser sinensis</em></td>
<td>Chinese sturgeon</td>
<td>K</td>
<td>C</td>
<td>K</td>
</tr>
<tr>
<td><em>Cancer magister</em></td>
<td>Blue crab</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td><em>Gnathia balthica</em></td>
<td>Baltic prawn</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td><em>Gorelophorus chinensis</em></td>
<td>Largehead hairtail</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td><em>Pseudopleuronectes yokohamae</em></td>
<td>Japanese anchovy</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td><em>Trachurus japonicus</em></td>
<td>Japanese horse mackerel</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td><em>Engraulis japonica</em></td>
<td>Japanese pilchard</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td><em>Zoarces viviparus</em></td>
<td>Chub mackerel</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td><em>Gracilobrama javana</em></td>
<td>Redwing searobin</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td><em>Xenocara mexicana</em></td>
<td>Swordtail squid</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
</tbody>
</table>

Notes:
- Each indicator species was assessed against Criterion 1, 2, and 3. When an indicator species meets Criterion 1 according to available data in China, then it is indicated by C (China).
- Note 1: In Criterion 1 and 3, C indicates that a criterion is applicable to the corresponding species according to data from China, K: South Korea, J: Japan.
- Note 2: IUCN CH indicates the species is classified as Critically Endangered in the IUCN Red List of Threatened Species.

Note 3: Cva: the species is commercially important by value in South Korea, Jva: the species is commercially important by value in Japan.

Note 4: Cuv: the species is commercially important by volume in China.

Fish of the Yellow Sea Ecoregion

About the area

The Yellow Sea Ecoregion is one of the world’s largest areas of continental shelf. The Yellow Sea Ecoregion encompasses the Bohai Sea, the Yellow Sea and the East China Sea. It is a transboundary area and extends from the coasts of China, North Korea, and South Korea, at a depth of 200m.

Valuable nutrients flow from the Yangtze and Yellow rivers and combine with sunlight and shallow waters to create an area that teems with abundant marine life.

Diversity of fish species

In the Yellow Sea alone, 276 species of fish have been recorded. Compositions of about 100 commercial fisheries species in the Yellow Sea are: 66% demersal fish (bottom dwellers), 18% pelagic fish (swimming in the water column), 7% cephalopods (octopus and squid), and 7% crustaceans (shrimps), of which 45% are warm-water species, 46% warm-temperate species, and 9% cold temperate species. In the Bohai Sea, 109 species of fish are found and data in South Korea shows that 339 species of fish are on the record for the Yellow Sea.

Fish and People

Fish - A source of food and income and a foundation of life for coastal communities

Fisheries in the Yellow Sea Ecoregion generate a significant income as well as are a major source of food. A wide variety of fish, over 100 species, have commercial value. In China, the total fisheries output value from five provinces and municipalities along the Yellow Sea is about 80 billion RMB in 1991 accounting for about 1/3 of the national fisheries output. In South Korea, the catches from the Yellow Sea and the East China Sea on average for the last 30 years account for 30% of the national fisheries production. Fisheries also have helped to support coastal communities to maintain their livelihoods and community structure.

Threats to Fish and Fisheries

Fish in the Yellow Sea Ecoregion is one of the most intensively exploited fisheries resources in the world. Increasing pollution and extensive reclamation of coastal areas have also affected reproduction of fish.

A case of Small Yellow Croaker – From the one of the most abundant fish to up to 80% reduction

Small yellow croaker was one of the most abundant species in total fish catch in 1950’s and 1960’s in the Yellow Sea. In South Korea, it accounted for about 1/3 of the total catch in 1960’s. However, the catch of small yellow croaker dramatically declined in following years because of overfishing. In China, small yellow croaker was the most dominant species in 1959 by occupying 97% in the catch, but it declined to only 9% in 1981. In South Korea, catch of small yellow croaker was similarly reduced by more than 80% between 1957 and 1983 while fishing intensity double from 1970’s to 1980’s. In the 1990’s, data from China shows some signs of recovery of small yellow croaker.

What is an ecoregion?

Biodiversity is not spread evenly across the earth but follows complex patterns determined by climate, geology and the evolutionary history of the plant. These patterns are called ecoregions. WWF defines an ecoregion as a large unit of land or water containing a geographically distinct assemblage of species, natural communities, and environmental conditions.

The boundaries of an ecoregion are not fixed and sharp, but rather encompass an area within which important ecological and evolutionary processes most strongly interact.

Fish of the Yellow Sea Ecoregion and their habitats

About the area

There is a 70-80 metre deep depression in the central part of the Yellow Sea. This depression holds a cold water mass throughout the year that provides an important habitat for cold-temperate fish species that are otherwise found in more northern seas.

A unique cold water mass in the centre of the Yellow Sea

Habitats in the Yellow Sea Ecoregion

Valuable nutrients flow from the Yangtze and Yellow rivers and combine with sunlight and shallow waters to create an area that teems with abundant marine life.
The Yellow Sea Ecoregion - a Global Treasure, a Global Concern

Global Treasure
Yellow Sea Ecoregion (203) has been selected by WWF as one of the Global 200 ecoregions, areas that are key to global biodiversity conservation. This marine ecosystem is also one of the Large Marine Ecosystems (LMEs) of the world.

Global Concern
The global importance of the Yellow Sea Ecoregion has been recognised by governments and the international community in recent years. Starting in 1992, the Chinese and South Korean governments together developed a transboundary approach to the management of the Yellow Sea area with the assistance of UNDP/UNEP, the World Bank, and NOAA. In 2005, a UNDP/GEF project, the Yellow Sea Large Marine Ecosystem project, was officially launched with participation of the Chinese and South Korean governments.

Methodology - finding priority fish species and their Ecologically Important Areas

Cooperation among scientific experts from China, South Korea, and Japan
Scientists from fisheries and ocean research institutes in China, South Korea and Japan have worked together to review and identify priority fish species and their habitats of global significance. Together they have set a common methodology and reached an agreement on priorities.

Biological Assessment
Using a further set of criteria, experts then prioritised the previously selected indicator species and their habitat. To do this, scientists took into account representativeness of habitat, endemism, threatened status, commercial importance, intact habitat, and genetic diversity. According to this common criterion, each scientist analysed nationally available data to select appropriate indicator species and their important habitat. Then they compiled national biological assessment papers based on data from China, South Korea, and Japan.

In addition to fish, scientists have added some squid and crab species that are important to fisheries in the Yellow Sea Ecoregion.

Priority Area Analysis
Using a further set of criteria, experts then prioritised the previously selected indicator species and their habitat. Scientists agreed that spawning aggregation areas are particularly important areas because they are geographically small but well defined and also they are critical areas to maintain populations. Scientists also pointed out that cold-water mass area is a unique and an important habitat because they support those isolated cold temperate species populations.

Experts then mapped the important habitat areas of each indicator species. This allowed scientists to visualise areas that are important for more than one species.

Results
Fish Ecologically Important Areas (FEIAs) are areas that experts deem critical for fish species. 40 indicator species were assessed under the criteria to identify globally significant species and their habitat. Of these indicator species, 14 species met the endemism criterion, 22 species met vulnerable species criterion, and 23 species met commercially important species criterion. Those indicator species that met any of these criteria were identified as globally significant species. Then habitat areas of these globally significant species, where those areas are critical for the survival of the species, were identified as indicator species ecologically important areas. In total, 16 FEIAs were identified.

An ecoregional approach helps ensure that we do not overlook areas that are particularly unique or threatened, allowing for smarter trade-offs and greater positive impacts that are more likely to endure over time.

A call to actions
The analysis and results provided key data for developing a regional conservation strategy and monitoring its successes. In particular, the results will help to:
1) Establish a network of representative marine protected areas at the ecoregional scale;
2) Evaluate effectiveness of existing protected areas;
3) Monitor status of biodiversity.

In order to conserve these globally significant fish species and their habitats, various stakeholders need to take concerted actions. Community-based organisations, the scientific community, national and local government agencies, legislative bodies, nongovernmental organisations including religious groups, the general public, the media, donor communities, industries, consumers, and youth groups all have important roles to play.

For example, national and local government agencies can contribute by strengthening cross-sectoral coordination in the establishment and improvement of the management of MPAs. Filling major knowledge gaps in ecology and human impacts on indicator species is also an important action to take.

Meanwhile, in 2002, WWF and other conservation NGOs and research institutes in China, South Korea and Japan began an assessment of Yellow Sea biodiversity. The objective of this regional partnership was to prioritise conservation actions based on scientific data.

An urgent need: Identifying conservation priorities at a transboundary ecoregional scale

In order to conserve the full array of biodiversity and ensure the use of its services by people are sustainable, it is necessary to conduct assessments beyond political boundaries and at an ecoregional scale.

Ecosystem project, was officially launched with participation of the Chinese and South Korean governments.

Scientific experts from China, South Korea, and Japan and other countries cooperate to analyse priority areas.

Important areas for a single fish species (Takifugu obscurus) according to Korean data.

Fish Ecologically Important Areas (FEIAs) were identified by overlapping important areas for many different species.