

Biological Assessment of Ecologically Important Areas for Fish and Invertebrates in the Yellow Sea Ecoregion

Japan Part

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Assessment was carried out based on Japanese research literature. The Yellow Sea Ecoregion was defined here as the whole of the Bohai Sea, Yellow Sea and East China Sea, but information on Ariake Sound in Kyushu, Japan was included in light of some similarities in fish fauna between the Yellow Sea and Ariake Sound.

Ecological sub-regions

For species composition in demersal fish communities, Mio et al. (1984) divided the offshore waters of the East China Sea and the Yellow Sea into four sub-regions: A: Yellow Sea, B: northern East China Sea, C: southern East China Sea and D: eastern East China Sea. (see Fig. 1). These boundaries were determined by a similarity index C, whose values were calculated from the species composition in the commercial catches by Japanese bottom trawl fisheries in each period of four sampling cruises: February-March 1972 (wintering season), August 1972 (feeding season), November 1973 (pre-wintering season) and November 1974 (pre-wintering season). No remarkable difference in boundaries was observed among the four periods.

Common Criteria for identification of Ecologically Important Areas of the Yellow Sea Ecoregion

The Fish and Invertebrates Taxonomic Group adopted the following common criteria to identify Ecologically Important Areas for fish and Invertebrates in the Yellow Sea Ecoregion (Table 1).

For common names and corresponding scientific names, I followed Fish Base (<http://www.fishbase.org/search.cfm>) or Myoung (2002).

Table 1 List of Adopted Common Criteria for Fish and Invertebrates Taxonomic Group.

Common names in English and corresponding scientific names basically follow FishBase or Myoung (2002).

*: Species listed by Shirakihara, **: Species listed by Drs Jin or Myoung

Adopted Common Criteria	Selected Indicator Species/ Species Groups	Definition of Indicator Species	Definition of Ecologically Important Areas
Criterion 1: representative species / habitat types	Black rock fish**		
	Pointhead flounder*, ** (<i>Cleisthenes pinetorum</i>)	inhabiting sandy bottom	Yellow Sea
	Blue-spotted mud hopper*, ** (<i>Boleophthalmus pectinirostris</i>)	inhabiting muddy bottom	muddy tidal flats
	Small yellow croaker*, ** (<i>Larimichthys polyactis</i>)	migratory and mesopelagic species that were dominant with a wide range of distribution	spawning grounds in coastal waters of Yellow Sea and East China Sea
Criterion 2: endemism and unique species	Small yellow croaker*, ** (<i>Larimichthys polyactis</i>)		
	Pacific cod*, ** (<i>Gadus macrocephalus</i>)	inhabiting the Yellow Sea cold water mass	Yellow Sea cold water mass

assemblages (endemic to Bohai/ Yellow Sea / East China Sea)	Chinese shrimp** (<i>Penaeus chinansis</i>)		spawning grounds in coastal waters of Yellow Sea
	Acetes shrimp**		
	River puffer**		
Criterion 3: species richness	not adapted		
Criterion 4: spp. of special concern (threatened and/or protected spp.)(depleted stocks)	Blackmouth croaker* (<i>Atroubucca nibe</i>)	All are categorized as "endangered" or "Vulnerable" by Japan Fisheries Agency or Japanese Ministry of the Environment	spawning grounds in southern East China Sea
	Redwing searobin * (<i>Lepido trigla microptera</i>)		spawning grounds in Bohai Bay , Haizhou Bay and offshore waters of Hangzhou Bay
	Japanese meagre* (<i>Argyrosomus japonicus</i>)		not specified
	Ghost shark* (<i>Chimaera phantasma</i>)		not specified
	Roughskin sculpin * (<i>Trachidermus fasciatus</i>)		tidal flats and tidal compartments in the river
	Estuary tailfin anchovy * (<i>Coilia nasus</i>)		spawning grounds in upper stream of tidal compartments in the river
Criterion 5-A: commercially important (Valume)	Samll yellow croaker* .** (<i>Larimichthys polyactis</i>)	A high level of catch in weight of Japanese bottom trawl fisheries from 1950s to 1990s	spawning grounds in coastal waters of Yellow Sea and East China Sea
	Daggertooth pike conger* (<i>Muraenesox cinereus</i>)		spawning grounds in coastal waters of East China Sea from Hangzhou Bay to Fuzhou
	Largehead hairtail* (<i>Trichiurus lepturus</i>)		spawning grounds in coastal waters of East China Sea, 28-31.5N and 122-124.5E
	Olive flounder* (<i>Paralichthys olivaceus</i>) as a representitative of flounders		not specified
	Swordtip squid* (<i>Photololigo edulis</i>) as a representitative of squids & cuttlefish		not specified
Criterion 5-B: commercially important (Total value)	Yellow croaker** (<i>Pseudosciaena polyactis</i>)	A high level of total revenue in Yen from Japanese bottom trawl fisheries from 1950s to 1990s	spawning grounds in coastal waters of Yellow Sea and East China Sea
	Chinese shrimp** (<i>Penaeus chinansis</i>)		spawning grounds in coastal waters of Yellow Sea
	Daggertooth pike conger* (<i>Muraenesox cinereus</i>)		spawning grounds in coastal waters of East China Sea from Honchou Bay to Fuchou

	Largehead hairtail* (<i>Trichiurus lepturus</i>)		spawning grounds in coastal waters of East China Sea, 28-31.5N and 122-124.5E
	Olive flounder* (<i>Paralichthys olivaceus</i>) as a representative of flounders		not specified
	Yellowback seabream* (<i>Dentex tumifrons</i>) as a representative of sea breams		spawning grounds in offshore waters of East China Sea
	Swordtip squid* (<i>Photololigo edulis</i>) as a representative of squids & cuttlefish		not specified
Criterion 5-C: commercially important (Unit value)	Chinese shrimp** (<i>Penaeus chinensis</i>)	A high level of price in Yen/kg from Japanese bottom trawl fisheries from 1950s to 1990s	spawning grounds in coastal waters of Yellow Sea
	Daggertooth pike conger* (<i>Muraenesox cinereus</i>)		spawning grounds in coastal waters of East China Sea from Hangzhou Bay to Fuzhou
	Olive flounder* (<i>Paralichthys olivaceus</i>) as a representative of flounders		not specified
	Yellowback seabream* (<i>Dentex tumifrons</i>) as a representative of sea breams		spawning grounds in offshore waters of East China Sea
Criterion 6: intact habitat / ecological processes	River Puffer**		
Additional Criterion species whose genetic diversity are reduced	Chinese shrimp** (<i>Penaeus chinensis</i>)		

Selected Indicator Species

The Fish and Invertebrates Taxonomic Group selected the following Indicator Species according to commonly adopted criteria (Table 2).

Table 2 List of selected Indicator Species

Species Number	Proposed Common Criteria Selected Indicator Spp.	Criterion 1 Representative species/habitat types	Criterion 2 isolated stock or species in the Yellow Sea endemism and unique species assemblages (endemic to Bohai/ Yellow Sea / East China Sea)	Criterion 4 spp. of special concern 1 (threatened, depleted stocks and/or protected spp.)	Criterion 5-A commercially important (Volume)	Criterion 5-B commercially important (Total Value)	Criterion 6-B commercially important (Unit Value)	Criterion 6 intact habitat / ecological processes	Additional Criterion species whose genetic diversity are reduced
[1]	Black rock fish	X**							
[2]	Pointhead founder (<i>Cleisthenes pinetorum</i>)	X*,**							
[3]	Blue-spotted mud hopper (<i>Boleophthalmus pectinirostris</i>)	X*,*							
[4]	Small yellow croaker (<i>Larimichthys polyactis</i>)	X*,**	X**		X*	X*			
[5]	Spanish mackerel or chub mackerel								
[6]	Pacific cod (<i>Gadus macrocephalus</i>)		X*,**						
[7]	Chinese shrimp (<i>Penaeus chinensis</i>)		X**			X*	X*		X**
[8]	Acetes shrimp		X**						
[9]	River puffer		X**					X**	
[10]	Blackmouth croaker (<i>Atrubucca nibe</i>)			X*					
[11]	Redwing searobin (<i>Lepidotrigla microptera</i>)			X*					
[12]	Japanese meagre (<i>Argyrosomus japonicus</i>)			X*					

[13]	Ghost shark (<i>Chimaera phantasma</i>)				X*				
[14]	Roughskin sculpin (<i>Trachidermus fasciatus</i>)				X*				
[15]	Estuary tailfin anchovy (<i>Coilia nasus</i>)				X*				
[16]	Daggertooth pike conger (<i>Muraenesox cinereus</i>)					X*	X*		
[17]	Largehead hairtail (<i>Trichiurus lepturus</i>)					X*	X*		
[18]	Olive flounder (<i>Paralichthys olivaceus</i>) as a representative of flounders					X*	X*	X*	
[19]	Swordtip squid (<i>Photololigo edulis</i>) as a representative of squids & cuttlefish					X*	X*		
[20]	Yellowback seabream (<i>Dentex tumifrons</i>) as a representative of sea breams						X*	X*	

Selected Indicator Species under Criterion 1: Representative species/ habitat types

Definition of Indicator Species under Criterion 1: Numerals in parentheses indicate the species numbers in Table 2 or Table 3. Descriptions are limited to species that I selected as indicator species.

Pointhead flounder (*Cleisthenes pinetorum*) Japanese name: souhachi [2]

This species is selected as a representative of flounders that utilize sandy water bottoms and representative of cold-water species.

Ecologically Important Areas: The Yellow Sea.

Mud hopper (*Boleophthalmus pectinirostris*) Japanese name: mutsugorou [3]

This species is endemic to the Yellow Sea, the East China Sea and Ariake Sound. In the Ariake Sound and adjacent waters and lives in muddy tidal flats. This species was categorized as "Depleted" by

Takita (1994) and "Vulnerable" in the Red Data Book (1991) by the Japanese Ministry of the Environment.

Ecologically Important Areas: muddy tidal flats.

Small yellow croaker (*Larimichthys polyactis*) Japanese name: kiguchi [4]

This species is one of the most abundant species in the region with a wide range of distribution, as suggested by high levels in Japanese commercial catches. This species in the East China Sea and the Yellow Sea was categorized as "Depleted" by Tokimura and Yamada (1994) but inconsistent views on recent stock status are shown from Chinese fishery scientists and Japanese fishery scientists (Meng et al. 2001).

Ecologically Important Areas: spawning grounds in coastal shallow waters of the Yellow Sea and the East China Sea.

Selected Indicator Species under Criterion 2: Endemism and unique species assemblages

Pacific cod (*Gadus macrocephalus*) Japanese name: madara [6]

This species is selected as a representative of fish inhabiting the cold water mass in the Yellow Sea.

Ecologically Important Areas: cold water mass.

Selected Indicator Species under Criterion 3: Species richness

This criterion was not adapted by the Fish and Invertebrates Taxonomic Group.

Selected Indicator Species under Criterion 4: Species of Special Concern (threatened and/or depleted stocks)

Blackmouth croaker (*Atrubucca nibe*) Japanese name: kuroguchi [10]

This species in the East China Sea and the Yellow Sea was categorized as "Endangered" by Yamada and Tokimura (1994).

Ecologically Important Areas: spawning grounds in the southern East China Sea.

Redwing searobin (*Lepidotrigla microptera*) Japanese name: kanagashira [11]

This species in the East China Sea and the Yellow Sea was categorized as "Endangered" by Yamada and Tokimura (1994).

Ecologically Important Areas: spawning grounds in Bohai Bay, Haizhou Bay and offshore waters of Hangzhou Bay in the Yellow Sea (Yamada and Tokimura 1994).

Japanese meagre (*Argyrosomus japonicas*) Japanese name: ohnibe [12]

This species in the East China Sea and the Yellow Sea was categorized as "Endangered" by Tokimura and Yamada (1997).

Ecologically Important Areas: not specified because no information on spawning grounds is available from Japanese literature.

Ghost shark (*Chimaera phantasma*) Japanese name: ginzame [13]

This species in the Yellow Sea was categorized as "Endangered" by the Seikai National Fisheries Research Institute (SNFRI) of Japan (unpublished). Note that no individuals had been caught since 1991 from trawl surveys by the SNFRI (Horikawa and Yamada 1999).

Ecologically Important Areas: not specified

Roughskin sculpin (*Trachidermus fasciatus*) Japanese name: yamanokami [14]

This catadromous species is endemic to the Yellow Sea, the East China sea and Ariake Sound. This species in the Ariake Sound is categorized as "Vulnerable" by Takeshita and Kimura (1995) and also "Vulnerable" in Red Data Book (1991) by the Japanese Ministry of the Environment.

Ecologically Important Areas: Tidal flats and tidal compartments in rivers for the habitats of juveniles and the upper stream of tidal compartments for spawning grounds.

Estuary tailfin anchovy (*Coilia nasus*) Japanese name: etsu [15]

If we follow a view that *C. ectenes* and *C. nasus* are the same species, this species is endemic to the Yellow Sea, the East China Sea and the Ariake Sound. Note that this species in the Ariake Sound is categorized as "Vulnerable" by Takita (1994) and "Rare" in the Red Data Book (1991) by the Japanese Ministry of the Environment.

Selected Indicator Species under Criterion 5: Commercially important

Species were selected by using Japanese trawl fishery catch statistics compiled by the SNFRI or price statistics provided by the Japan Far Seas Trawl Fisheries Association. Species of commercial importance changed year by year. First, I picked up species important in the 1960s, when the fisheries were most active and covered a wider range of waters. The top 5 species were as follows.

By volume (catch in weight)

1. Small yellow croaker (*Larimichthys polyactis*), Japanese name: kiguchi
2. Largehead hairtail (*Trichiurus lepturus*), Japanese name: tachiuo
3. Daggertooth pike conger (*Muraenesox cinereus*), Japanese name: hamo
4. White croaker (*Argyrosomus argentatus*), Japanese name: shiroguchi
5. Flounders, Japanese name: hirame/karei-ru

By total value (revenue)

1. Small yellow croaker (*Larimichthys polyactis*), Japanese name: kiguchi
2. Shrimps, Japanese name: ebi-ru
3. White croaker (*Argyrosomus argentatus*), Japanese name: shiroguchi
4. Daggertooth pike conger (*Muraenesox cinereus*), Japanese name: hamo
5. Largehead hairtail (*Trichiurus lepturus*), Japanese name: tachiuo

By unit value (fish price/kg)

1. Shrimps, Japanese name: ebi-ru
2. Yellow porgy (*Dentex tumifrons*), Japanese name: kidai
3. Olive flounder (*Paralichthys olivaceus*), Japanese name: hirame
4. Red sea bream (*Pagrus major*), Japanese name: madai
5. Tilefishes (*Branchiostegidae spp.*), Japanese name: amadai-ru

Second, to reduce the total number of the indicator species to 20, I selected the following species, adding a species category of squids & cuttlefish whose importance has increased since the 1970s.

Criterion 5-A Commercially important (Volume)

- Small yellow croaker (*Larimichthys polyactis*), Japanese name: kiguchi
- Daggertooth pike conger (*Muraenesox cinereus*), Japanese name: hamo
- Largehead hairtail (*Trichiurus lepturus*), Japanese name: tachiuo
- Olive flounder (*Paralichthys olivaceus*), Japanese name: hirame, as a representative of flounders
- Swordtip squid (*Photololigo edulis*), Japanese name: kensaki-ika, as a representative of squids & cuttlefish

Criterion 5-B Commercially important (Total value)

- Small yellow croaker (*Larimichthys polyactis*), Japanese name: kiguchi
- Chinese shrimp (*Penaeus chinensis*), Japanese name: kourai-ebi, as a representative of shrimp.
- Daggertooth pike conger (*Muraenesox cinereus*), Japanese name: hamo
- Largehead hairtail (*Trichiurus lepturus*), Japanese name: tachiuo
- Olive flounder (*Paralichthys olivaceus*), Japanese name: hirame, as a representative of flounders
- Yellowback seabream (*Dentex tumifrons*), Japanese name: kidai, as a representative of seabreams
- Swordtip squid (*Photololigo edulis*), Japanese name: kensaki-ika, as a representative of squids & cuttlefish

Criterion 5-C Commercially important (Unit value)

- Chinese shrimp (*Penaeus chinensis*), Japanese name: kourai-ebi, as a representative of shrimps
- Olive flounder (*Paralichthys olivaceus*), Japanese name: hirame, as a representative of flounders
- Yellowback seabream (*Dentex tumifrons*), Japanese name: kidai, as a representative of seabreams

Small yellow croaker (*Larimichthys polyactis*) Japanese name: kiguchi [4]

As described under Criterion 1:

Daggertooth pike conger (*Muraenesox cinereus*) Japanese name: hamo [16]

This species in the East China Sea and Yellow Sea was recognized as "Depleted" (Yamada et al. 2001).

Ecologically Important Areas: spawning grounds in coastal waters of the East China Sea from Hangzhou Bay to Fuzhou (Yamada et al. 2001)

Largehead hairtail (*Trichiurus lepturus*) Japanese name: tachiuo [17]

This species in the East China Sea and the Yellow Sea was recognised as "Depleted" by Mi et al. (2001).
Ecologically Important Areas: spawning grounds in the shallow waters of the Bohai Sea, the Yellow Sea, and the East China Sea

Olive flounder (*Paralichthys olivaceus*) Japanese name: hirame [18]

I could not find any Japanese literature on distribution, spawning grounds or recent stock status in the Yellow Sea and the Chinese side of the East China Sea.

Chinese shrimp (*Penaeus chinensis*) Japanese name: kourai-ebi [7]

Inconsistent views on recent stock status were shown by Chinese and Japanese fishery scientists (Meng et al. 2001).

Ecologically Important Areas: spawning grounds in coastal shallow waters of the Bohai Sea and the Yellow Sea.

Swordtip squid (*Photololigo edulis*), Japanese name: kensaki-ika [19]

Yearly changes in abundance of swordtip squid in the East China Sea and the western part of the Japan Sea/East Sea from 1980 to 1999 (Japan Fisheries Agency 2001) shows no significant decreases in population.

Ecologically Important Areas: not specified

Yellowback seabream(*Dentex tumifrons*) Japanese name: kidai [20]

This species in the East China Sea was recognised as "Depleted" (Hirikawa et al. 2001).

Maps and Description of Ecologically Important Areas for Fish and Invertebrates Taxonomic Group

Based on information available from Japanese literature, I have listed Ecologically Important Areas for selected Indicator Species (Table 3).

Table 3 List of Maps and Area Names for Fish and Invertebrates Ecologically Important Areas

Species number		Indicator Spp.							
[1]	No Map	Black rock fish	Not available						
[2]	Map 2	Pointhead founder (<i>Cleisthenes pinetorum</i>)	Shidao 3)	Yanwei 3)					
[3]	No Map	Mud hopper (<i>Boleophthalmus pectinirostris</i>)	Not available						
[4]	Map 4	Small yellow croaker (<i>Larimichthys polyactis</i>)	Wenzhou Bay, China 7)	Sanmen Bay, China 7)	Lusiyang, China 7)	Laizhou Bay, China 7)	Yeonpyeongdo, South Korea 7)	Wido, South Korea 7)	
[5]	No Map	Spanish mackerel or chub mackerel	Not available						
[6]	Map 6	Pacific cod (<i>Gadus macrocephalus</i>)	Yellow Sea Cold Water Mass *						
[7]	Map 7	Chinese shrimp (<i>Penaeus chinensis</i>)	Liaodong Bay, China 9)	Yalujiang Estuary Coastal waters, China 9)	Daqingkou coastal waters, China 9)	Laizhou Bay, China 9)	Shandong Peninsula southern coastal waters 9)	Jeollanam-do coastal waters, South Korea 9)	Gyeonggi-do coastal waters, South Korea 9)
[8]	No Map	Acetes shrimp	Not available						
[9]	No Map	River puffer	Not available						
[10]	Map 10	Blackmouth croaker (<i>Atrubucca nibe</i>)	Coastal waters around Taizhou Bay, Shitang, and Wenzhou Bay, China 10)						
[11]	No Map	Redwing searobin (<i>Lepidotrigla microptera</i>)	Not available						
[12]	No Map	Japanese meagre (<i>Argyrosomus japonicus</i>)	Not available						
[13]	No Map	Ghost shark (<i>Chimaera phantasma</i>)	Not available						
[14]	No	Roughskin sculpin (<i>Trachidermus</i>)	Not available						

	Map	<i>fasciatus</i>)							
[15]	No Map	Estuary tailfin anchovy (<i>Coilia nasus</i>)	Not available						
[16]	Map 16	Daggertooth pike conger (<i>Muraenesox cinereus</i>)	Zhejiang coastal waters, China 18)						
[17]	Map 17	Largehead hairtail (<i>Trichiurus lepturus</i>)	Northern East China Sea coastal waters, China 19)						
[18]	No Map	Olive flounder (<i>Paralichthys olivaceus</i>) as a representative of flounders	not available						
[19]	No Map	Swordtip squid (<i>Photololigo edulis</i>) as a representative of squids & cuttlefish	not available						
[20]	No Map	Yellowback seabream (<i>Dentex tumifrons</i>) as a representative of sea breams	not available						

Ecologically Important Areas for the **Black rock fish**

Information on ecologically important areas is not available from Japanese research literature.

Ecologically Important Area for **Pointhead flounder** (Map 2)

Area Name: Shidao and Yanwei in Yellow Sea

Location: Shandong Province, China

Ecologically Important Areas for the **Mud hopper**

Muddy tidal flats in Yellow Sea and East China Sea, but specific area information is not available from Japanese research literature.

Description of Area: muddy tidal flats

Ecologically Important Area for the **Small yellow croaker** (Map 4)

Area Name: Wenzhou Bay, Sanmen Bay, Lusi, Laizhou Bay, Bohai Bay, Liaodong Bay (China), Yeonpyeongdo, and Wido (South Korea) in the Yellow Sea and the East China Sea

Ecologically Important Areas for the **Spanish/chub mackerel**

Specific information is not available from Japanese research literature.

Fish and Invertebrates Ecologically Important Area for **Pacific cod** (Map 6)

Area Name: Yellow Sea cold water mass

Fish and Invertebrates Ecologically Important Area for the **Chinese shrimp** (Map 7)

Area Name: Liaodong Bay, Yalujiang Estuary Coastal Waters, Daqingkou Coastal Waters, Laizhou Bay, Shandong Peninsula South Coastal Waters (China), Jeollanam-do coastal waters, Gyeonggi-do coastal waters (South Korea) in the Bohai Sea and the Yellow Sea

Fish and Invertebrates Ecologically Important Area for **Acetes shrimp**

Specific information is not available from Japanese research literature.

Fish and Invertebrates Ecologically Important Area for the **River puffer**

Specific information is not available from Japanese research literature.

Fish and Invertebrates Ecologically Important Area for the **Blackmouth croaker**(Map 10)

Area Name: Coastal waters of East China Sea around Taizhou Bay, Shitang, Wenzhou Bay

Fish and Invertebrates Ecologically Important Area for **Redwing searobin**

Area Name: Bohai Bay, Haizhou Bay and offshore waters of Hangzhou Bay in the Yellow Sea

Fish and Invertebrates Ecologically Important Area for **Japanese meagre**

Area Name: East China Sea and Yellow Sea, but Specific information is not available from Japanese research literature.

Fish and Invertebrates Ecologically Important Area for **Ghost shark**

Area Name: Yellow Sea, but Specific information is not available from Japanese research literature.

Area Number: -

Fish and Invertebrates Ecologically Important Area for **Roughskin sculpin**

Area Name: East China Sea and Yellow Sea, but Specific information is not available from Japanese research literature.

Fish and Invertebrates Ecologically Important Area for **Estuary tailfin anchovy**

Area Name: coastal waters and rivers in East China Sea and Yellow Sea, but Specific information is not available from Japanese research literature.

Location (city, province, country nearest to the area, geographical coordinates):-

Fish and Invertebrates Ecologically Important Area for **Daggertooth pike conger** (Map 16)

Area Name: spawning grounds in the coastal waters off the coast of Zhejiang in China

Location (city, province, country nearest to the area, geographical coordinates): 26-31°N

Fish and Invertebrates Ecologically Important Area for **Largehead hairtail** (Map 17)

Area Name: coastal waters of northern East China Sea as spawning grounds

Location (city, province, country nearest to the area, geographical coordinates):28-31.5°N and122-124.5°E

Fish and Invertebrates Ecologically Important Area for **Olive flounder**

Area Name: Specific information is not available from Japanese research literature.

Fish and Invertebrates Ecologically Important Area for **Swordtip squid**

Area Name: Specific information is not available from Japanese research literature.

Fish and Invertebrates Ecologically Important Area for **Yellowback seabream**

Knowledge Gaps and specific studies needed for Fish and Invertebrates

The main source of data for this report was catch statistics from Japanese trawl fisheries. Though these statistics contains information on yearly changes in abundance and distribution of many species, their spatial coverage has recently been limited to waters just around Japan and as a result, no information is available on the latest status of fish in the Yellow Sea.

Knowledge from Japanese trawl fisheries is useful to assess the effects of human activities on demersal fish populations by comparing the current status with their status in the 1960s.

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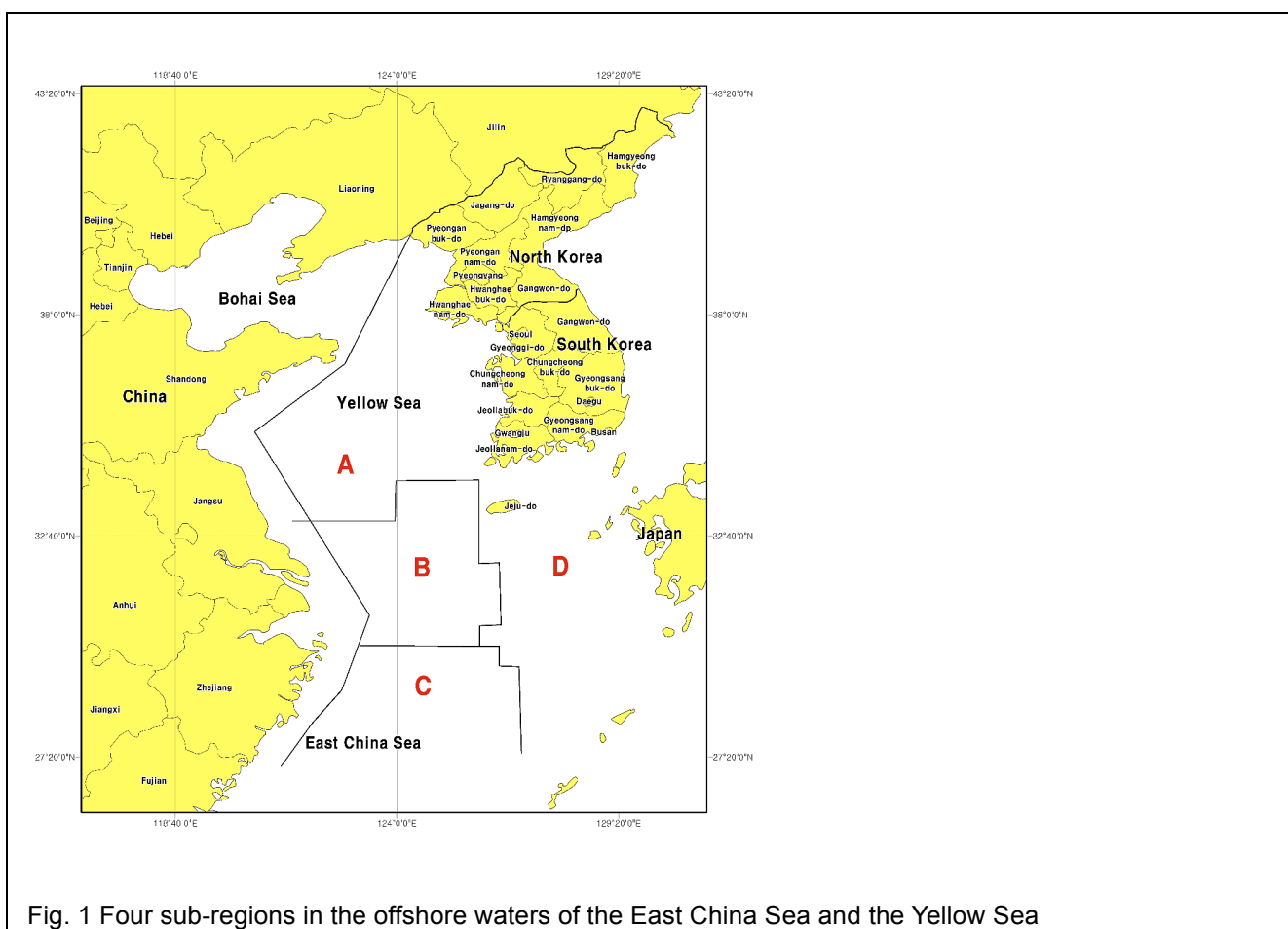


Fig. 1 Four sub-regions in the offshore waters of the East China Sea and the Yellow Sea



Map 2 Pointhead funder (*Cleisthenes pinetorum*)



Map 4 Small yellow croaker (*Larimichthys polyactis*)



Map 6 Pacific cod (*Gadus macrocephalus*)



Map 7 Chinese shrimp (*Penaeus chinensis*)



Map 10 Blackmouth croaker (*Atroubucca nibe*)



Map 16 Daggertooth pike conger (*Muraenesox cinereus*)



Map 17 Largehead hairtail (*Trichiurus lepturus*)