

Biological Assessment of Ecologically Important Areas for the Mollusks Taxonomic Group of the Yellow Sea Ecoregion

China Part

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Ecological sub-regions

Based on existing information, the Yellow Sea Ecoregion (YSE) cannot be further divided into subregions using mollusks as an indicator species. One possibility is that the community structure of mollusks in different parts of the YSE shows no significant differences. Lack of survey data and information may be another explanation.

Logic for Mollusk Ecologically Important Areas Selection

Twelve Mollusk Ecologically Important Areas (EIA) along the Chinese coast of the Yellow Sea were selected in the YSE biodiversity vision workshop in 2005. The selection is mainly based on: 1) the existence of data and information collected from previous surveys and research; 2) the areas' proximity to harbor and/or industrial cities, where human activities are bringing the biggest pressure to mollusk habitat. The selected mollusk EIAs are distributed more or less evenly along the Chinese coast of the Yellow Sea; this is a strategy to guarantee these mollusk EIAs can best represent the mollusk habitat diversity of the YSE.

The 12 mollusk EIAs are:

Lianyungang, Rizhao, Qingdao, Haiyang, Rushan, Weihai, Yantai, Changdao, Tanggu, Qinhuangdao, Huludao, Dalian (see Map 1).

Common Criteria for identification of Mollusk EIAs in the YSE

The Molluscan Taxonomic Group adopted the following common criteria to identify Ecologically Important Areas for mollusks in YSE (Table 1).

Table 1: List of Adopted Common Criteria for Molluscan Taxonomic Group

Selected Indicator Species/Species Groups	Definition of Indicator Species	Definition of Ecologically Important Areas
Criterion 1: representative species / habitat types		
<i>Littorina (Littorina) brevicula</i> (Philippi, 1840) (短滨螺, Duambinluo)	Dominant with a wide distribution range, inhabiting high tidal rock	Lianyungang, Rizhao, Qingdao, Haiyang, Rushan, Weihai, Yantai, Changdao, Tanggu, Qinhuangdao, Huludao, Dalian
<i>Mytilus edulis</i> (Linnaeus, 1758) (贻贝, Yibei)	Dominant with a wide distribution range	Subtidal /coarse sediment, Lianyungang, Rizhao, Qingdao, Haiyang, Rushan, Weihai, Yantai, Changdao, Tanggu, Qinhuangdao, Huludao, Dalian
<i>Ruditapes philippinarum</i> (Adams & Reeve, 1850) (菲律宾滨蛤仔, Feilvbingezhi)	Dominant with a wide distribution range, inhabiting from intertidal to a depth of about 10 m at muddy sand bottom	Lianyungang, Rizhao, Qingdao, Haiyang, Rushan, Weihai, Yantai, Changdao, Tanggu, Qinhuangdao, Huludao, Dalian
<i>Macra (Macra) chinensis</i> Philippi, 1846 (中国蛤蜊, Zhongguogeli)	Dominant with a wide distribution range, inhabiting in intertidal, (soft sand bottom)	Lianyungang, Rizhao, Qingdao, Haiyang, Rushan, Weihai, Yantai, Tanggu, Qinhuangdao, Huludao, Dalian
<i>Macra (Macra) veneriformis</i> Reeve, 1854 (四角蛤蜊, Sijiaogeli)	Dominant with a wide distribution range, inhabiting from intertidal to a depth of about 20 m	Lianyungang, Rizhao, Qingdao, Haiyang, Rushan, Weihai, Yantai, Changdao, Tanggu, Qinhuangdao, Huludao, Dalian
<i>Meretrix meretrix</i> Linnaeus, 1758 (文蛤, Wenge)	Dominant with a wide distribution range, inhabiting middle intertidal zones with fine sand bottoms	Lianyungang, Rizhao, Qingdao, Haiyang, Rushan, Weihai, Yantai, Changdao, Tanggu, Qinhuangdao, Huludao, Dalian
<i>Chlamys (Azumapeecten) farreri</i> (Jones & Preston, 1904) (精孔扇贝 Zhikongshanbei)	Dominant with a wide distribution range, inhabiting from lower intertidal line to a depth of 50 m at rocky, sandy bottom with granules or shell debris	Lianyungang, Rizhao, Qingdao, Haiyang, Rushan, Weihai, Yantai, Changdao, Tanggu, Qinhuangdao, Huludao, Dalian
<i>Scapharca subcrenata</i> (Lischke, 1869) (毛蚶, Maohan)	Dominant with a wide distribution range, from a lower intertidal line to a depth of several tens of meters. Silty mud or muddy sand bottom	Rizhao, Qingdao, Haiyang, Rushan, Weihai, Yantai, Changdao, Tanggu, Qinhuangdao, Huludao, Dalian
<i>Scapharca broughtonii</i> (Schrenck, 1867) (魁蚶, Kunhan)	Dominant with a wide distribution range, but mainly in the south of Liaoning province	Qingdao, Haiyang, Weihai, Dalian
<i>Crassostrea gigas</i> (Thunberg, 1793) (长牡蛎, Changmulu)	Characteristic species, inhabiting areas from intertidal zones to a depth of 20 m. Rocky, sandy bottom.	Qingdao, Haiyang, Rushan, Weihai, Yantai, Changdao, Tanggu, Qinhuangdao, Huludao, Dalian
<i>Sinonovacula constricta</i> (Lamarck, 1818) (缢蛏, Yicheng)	Dominant with a wide distribution range, inhabiting middle and low intertidal zones with a muddy bottom	Lianyungang, Rizhao, Qingdao, Haiyang, Rushan, Weihai, Yantai, Tanggu, Qinhuangdao, Huludao, Dalian

Selected Indicator Species/Species Groups	Definition of Indicator Species	Definition of Ecologically Important Areas
<i>Loligo japonica</i> Hoyle, 1885 (日本枪乌贼, Ribengqiangwuzi)	Dominant with a wide distribution range, but mainly in the Yellow Sea	Rizhao, Qingdao, Haiyang, Rushan, Weihai, Yantai, Changdao, Tanggu, Qinhuangdao, Huludao, Dalian
Criterion 2: endemism and unique species assemblages (endemic to Bohai Bay and the Yellow Sea)		
<i>Onoba elegantula</i> A. Adams, 1861 (文雅芋螺, Wenyahanyuluo)	Inhabiting Bohai Bay and the Yellow Sea	Qinhuangdao, Weihai, Qingdao
<i>Rissoina bureri</i> Grabau & King, 1928 (小类鹿眼螺, Xiaoleijiyuanluo)	Inhabiting Bohai Bay and the Yellow Sea	Qingdao
<i>Crassostrea gigas</i> (Thunberg, 1793) (长牡蛎, Changmulu)	Inhabiting Bohai Bay and the Yellow Sea	Qingdao, Haiyang, Rushan, Weihai, Yantai, Changdao, Tanggu, Qinhuangdao, Huludao, Dalian
<i>Macoma murrayi</i> (Grabau & King, 1928) (小白樱蛤, Xiaobaiyingge)	Inhabiting Bohai Bay and the Yellow Sea	Qingdao
<i>Cerithidea sinensis</i> (Philippi, 1848) (中华拟蟹守螺, Zhonghuaxieshouluo)	Inhabiting Bohai Bay and the Yellow Sea	Characteristic species of China, Lianyungang, Yantai, Weihai, Tanggu
Criterion 3: species richness		
Not applicable	From intertidal (soft and hard bottom) to a depth of several tens meters: 379 species in Bohai Bay and the Yellow Sea	In Jiaozhou Bay (Qingdao), 62 mollusk species were found, and the Shannon-Wiener index (H) was 3.18 in Autumn
Criterion 4-A: species of special concern (depleted stocks)		
<i>Coelomactra antiquate</i> (Spengler, 1802) (西施舌, Xishishe)	Inhabiting intertidal zone, population vulnerable and has been listed in the China Species Red List	Lianyungang, Qingdao, Yantai
<i>Chlamys (Azumapeecten) farreri</i> (Jones & Preston, 1904) (栉孔扇贝, Zhikongshanbei)	Inhabiting from the lower intertidal line to a depth of 50 m. Needs rock or sand bottoms with granules or shell debris. The total harvest has experienced a sharp decrease since 1997.	Qingdao, Haiyang, Rushan, Weihai, Yantai, Changdao, Tanggu, Qinhuangdao, Huludao, Dalian
Criterion 5-A: commercially important (Volume)		
<i>Ruditapes philippinarum</i> (Manila clam)	High level of catch (tonne) in China from 1960s to 2000s (in weight)	
<i>Mytilus edulis</i> (Blue Mussel)		
<i>Meretrix meretrix</i> (Oriental hard clam)		
<i>Chlamys (Azumapeecten) farreri</i>		

Selected Indicator Species/Species Groups	Definition of Indicator Species	Definition of Ecologically Important Areas
<i>Scapharca subcrenata</i> (Ark shell)		
<i>Crassostrea gigas</i> (Thunberg, 1793)		
Oyster		
<i>Loligo japonica</i>		
<i>Sinonovacula constricta</i> (Razor clam)		
<i>Scapharca broughtonii</i>		
Criterion 5-B: commercially important (Value)		
<i>Ruditapes philippinarum</i> (Manila clam)	High level of total value (¥) sold in China from the 1960s to the 2000s	
<i>Chlamys (Azumapecten) farreri</i>		
<i>Macra (Macra) chinensis</i>		
<i>Crassostrea gigas</i> (Thunberg, 1793)		
<i>Scapharca broughtonii</i>		
<i>Haliotis discus hannai</i>		
Abalones		
Criterion 5-C: commercially important (Unit price)		
<i>Haliotis discus hannai</i> Abalones	High level of unit price (¥/kg) in China from the 1960s to the 2000s	
<i>Fulvia mutica</i> (Japanese cockle)		
<i>Cyclina sinensis</i> (Venus clam)		
Criterion 6: intact habitat/ ecological processes		
Not adopted	Not adopted	Not adopted

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

Definition of Indicator Species under Criterion 1:

Dominant species that have a wide distribution range along the Yellow Sea.

1) [Asian Periwinkle] [*Littorina (Littorina) brevicula* (Philippi, 1840)] [短滨螺, Duanbinluo]

Reason for Selection:

As a common species, *Littorina (L.) brevicula* is often found dominant in rocky substrate near the high tide line along Bohai Bay and the Yellow Sea.

2) [Blue-mussel] [*Mytilus edulis* (Linnaeus, 1758)] [(紫贻贝, Ziyibeil)]

Reason for Selection:

Mytilus edulis is a temperate species and occurs in a depth of less than 10 meters in China and is also a representative dominant species in northern China. The production of this species has remained high since the 1970s.

3) [Short necked clam, Manila clam] [*Ruditapes philippinarum* (Adams & Reeve, 1850)] [菲律宾蛤仔, Feilvbingezi]

Reason for Selection:

Ruditapes philippinarum inhabits tidal flats with sandy and muddy bottoms in calm enclosed areas such as bays. It is abundantly distributed along the coast of Bohai Bay and other areas along the coast of the Yellow Sea. This bivalve is a very commercially important species in northern China.

4) [Hen Cokle] [*Macra (Macra) chinensis* (Philippi, 1846)] [中国蛤蜊, Zhongguogeli]

Reason for Selection:

Macra (Macra) chinensis is a species that lives in temperate waters and occurs commonly in the lower sand flats of northern China. It is also found along the coast from Hokkaido to Kyushu in Japan.

5) [*Macra (Macra) veneriformis* (Reeve, 1854)] (四角蛤蜊, Sijiaogeli)

Reason for Selection:

Macra (Macra) veneriformis is a subtropical species, inhabiting sandy bottom in lower intertidal areas to a depth of 20 m in Subtidal areas. This commercially important species has a very high landing in northern China.

6) [Oriental hard clam] [*Meretix meretrix* (Linnaeus, 1758)] [文蛤, Wenge]

Reasons for selection:

Meretix meretrix is a temperate species and occurs abundantly in Bohai Bay and Lianyungang, inhabiting the fine sandy bottoms of low tidal and shallow areas.

7) [Scallop] [*Chlamys (Azumapekten) farreri* (Jones & Preston, 1904)] [栉孔扇贝, Zhikongshanbei]

Reason for Selection:

Chlamys (Azumapekten) farreri is a temperate species distributed commonly in Bohai Bay and the Yellow Sea; its habitat also extends southward to the East China Sea. The species inhabits rocky and sandy bottoms with granules or shell debris. This commercially important species was harvested intensively during the 1970s and the 1980s. The species used to have a high aquaculture production, but its production has decreased sharply due to diseases since 1997.

8) [Cockle] [*Scapharca subcrenata* (Lischke, 1869)] [毛蚶, Maohan]

Reason for Selection:

Scapharca subcrenata is a temperate species and is distributed abundantly in Bohai Bay. The catch is high in Hebei and Liaoning Provinces as well as in Japan and North and South Korea. This species inhabits muddy bottoms from low intertidal to shallow subtidal.

9) [Ark shell] [*Scapharca broughtonii* (Schrenck, 1867)] [魁蚶, Kunhan]

Reason for Selection:

Scapharca broughtonii is a temperate species. The species is very common in the silty mud and sandy bottoms of shallow subtidal areas in northern China. This species is particularly abundant on the southern coast of Liaoning province.

10) [Oyster] [*Crassostrea gigas* (Thunberg, 1793)] [长牡蛎, Changmulì]

Reason for Selection:

Crassostrea gigas is a temperate species regarded as a characteristic species of Bohai Bay and the Yellow Sea. This commercially significant species inhabits rock and muddy sand bottom from the intertidal zones to shallow waters.

11) [Razor clam] [*Sinonovacula constricta* (Lamarck, 1818)] [缢蛏, Yìchēng]

Reason for Selection:

Sinonovacula constricta is a subtropical species distributed in Bohai Bay, the Yellow Sea, the East China Sea and the South China Sea. It is also found in Japan. *S. constricta* inhabits middle and low intertidal estuaries; it is a very important cultured species in China.

12) [Japanese squid] [*Loligo japonica* (Hoyle, 1885)] [日本枪乌贼, Ribenqiangwuzi]

Reason for Selection:

Loligo japonica is one of the most important commercial species in the Yellow Sea; it is also found in Bohai Bay, the East China Sea and the East Sea (Sea of Japan).

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

1) [*Onoba elegantula* (A. Adams, 1861)] [文雅罕愚螺, Wenyahanyuluo]

Reason for Selection:

Onoba elegantula has only been recorded on the coast of Qinhuangdao (Hebei Province), Weihai (Shandong Province), Qingdao (Shandong Province) and Yangjiaogou (Shandong Province) of China as an endemic species to Bohai Bay and the Yellow Sea. This species inhabits intertidal to shallow subtidal areas at a depth of about 20m. Its holotype, described by Adams in 1861, was collected from Bohai Bay.

2) [*Rissoina bureri* (Grabau & King, 1928)] [小类麂眼螺, Xiaoleijianluo]

Reason for Selection:

Rissoina bureri has only been recorded in the intertidal zone of Haiyangdao (Liaoning Province), Beidaihe (Hebei Province) and Qingdao (Shandong Province) in China as an endemic species to Bohai Bay and the Yellow Sea. The holotype of this species described by Grabau & King (1928) was collected from Beidaihe, Bohai Bay.

3) [*Terebra bellanodosa* (Grabau & King, 1928)] [环沟笋螺, Huangousunluo]

Reason for Selection:

Terebra bellanodosa is only found on the coast of Bohai Bay and the Yellow Sea of China. Commonly found in shallow waters, it is an endemic and unique species in Bohai Bay and the Yellow Sea. The holotype of this species described by Grabau & King (1928) was collected from Beidaihe (Hebei Province, China).

4)[*Macoma murrayi* (Grabau & King, 1928)] [小白樱蛤, Xiaobaiyingge]

Reason for Selection:

Macoma murrayi is only found in the coast of Bohai Bay and the Yellow Sea of China. This endemic species inhabits muddy sand and silty areas near low intertidal zones.

5) [Oyster] [*Crassostrea gigas* (Thunberg, 1793)] [长牡蛎, Changmulì]

Reason for Selection:

Crassostrea gigas is only found in the coast of Bohai Bay and the Yellow Sea. The species, inhabits rock and muddy sand bottom extending from the intertidal zone to a depth of about 20 m. The holotype of this species was collected from Dalian Bay.

6) [Scallop] [*Vollachlamys hirasei*] (Bavay, 1904) [平濼掌扇贝, Pinglaizhangshanbei]

Reason for Selection:

Valachlamys hirasei is an Endemic and unique species in Yellow and Bohai Bays. The species inhabits muddy bottom extending from the lower intertidal line to a depth of about 50 m, which is commonly found in Bohai Bay.

Table 2: List of Selected Indicator Species under criteria 1-5C

Selected Indicator Species	Criterion 1: Representative species/ habitat types	Criterion 2: Endemism and unique species assemblages	Criterion 4: Species of Special Concern	Criterion 5A: Commercially important (Volume)	Criterion 5B: Commercially important (Value)	Criterion 5C: Commercially important (unit Value)
<i>Littorina (Littorina) brevicula</i>	x					
<i>Mytilus edulis</i>	x			x		
<i>Ruditapes philippinarum</i>	x			x	x	
<i>Macra (Macra) chinensis</i>	x				x	
<i>Macra (Macra) veneriformis</i>	x					
<i>Meretrix meretrix</i>	x			x		
<i>Chlamys (Azumapeecten) farreri</i>	x		x	x	x	
<i>Scapharca subcrenata</i>	x			x		
<i>Scapharca broughtonii</i>	x			x	x	
<i>Crassostrea gigas</i>	x	x		x	x	
<i>Sinonovacula constricta</i>	x			x		
<i>Loligo japonica</i>	x			x		
<i>Onoba elegantula</i>		x				
<i>Rissoina bureri</i>		x				
<i>Terebra bellanodosa</i>		x				
<i>Macoma murrayi</i>		x				
<i>Cerithidea sinensis</i>		x				
<i>Coelomactra antiquate</i>			x			
<i>Haliotis discus hannai</i>					x	x
<i>Fulvia mutica</i>						x
<i>Cyclina sinensis</i>						x

Note: X indicates that the species was selected under the corresponding criterion

Selected Indicator Species under Criterion 3: Species richness

Definition of Indicator Species under Criterion 3: From intertidal (soft and hard bottom) to a depth of several tens of meters: 379 species were recorded in Bohai Bay and the Yellow Sea.

Selected Sites of High Species richness

In Jiaozhou Bay, Qingdao, 62 mollusk species were found and the Shannon-Wiener index (H) was 3.18 in autumn.

The ecosystem with high species richness is usually located in an untouched area. However, most of the entire China coast of the Yellow Sea is affected by human impact, so untouched areas are rare. Natural coasts only exist on uninhabited islands. Sampling size is critical to estimating species richness for comparative studies. The use of data and the criteria for comparison should be discussed in the future.

Selected Indicator Species under Criterion 4A: Species of Special Concern-- depleted stocks

Definition of Indicator Species under Criterion 4A: Species that have decreased significantly in stock size

Selected Indicator Species**[Antique mactra] [*Coelomactra antiquate* (Spengler, 1862)] [西施舌, Xishishe]**

Coelomactra antiquate is a very important commercial species in the intertidal zone, but due to overfishing, the stock of this species sharply declined recently and has been listed on the China Species Red List (Wang Song & Xie Yan, 2005, p. 423).

2) [Farrer's scallop] [*Chlamys (Azumapekten) farreri* (Jones & Preston, 1904)] [栉孔扇贝, Zhikongshanbei]

Reason for Selection:

Chlamys (Azumapekten) farreri was harvested intensively from the cultured one in Bohai Bay and other areas of the Yellow Sea before 1990. The production of this species then decreased sharply due to diseases and/or improper management (for example, higher culture density, over carrying capacity).

Table 3. Rank of commercially important mollusk species at intervals of 10-years using public catch statistics in China since 1960.

Scientific name	Common Name	Criterion 5-A (Volume)				Criterion 5-B (Total value)						Criterion 5-C (unit Value)				
		60's	70's	80's	90's	04's	60's	70's	80's	90's	04's	60's	70's	80's	90's	04's
Ostreidae species	Oyster	1	2	3	4	1	1	2	3	3	3	5				
<i>Ruditapes philippinarum</i>	Short necked clam (Manila clam)			4	2	2			1	2	1			5	5	4
<i>Scapharca</i> species <i>Tagillarca</i> .	Cockle															
<i>Mytilus</i> species	Mussel			1	3	5			5	5	5					
<i>Mactra chinensis</i>	Hen Cokle											4	3			
<i>Mactra veneriformis</i>	Surf clam											3	4		4	
Haliotidae species	Abalones					3					2	1	1	1	1	1
<i>Fulvia mutica</i>	Cockle shell															
<i>Coelomactra antiquate</i>														2	2	2
<i>Scapharca broughtonii</i>	Arkshell											2	2	3	3	3
Pectinidae species	Scallop			5	1	4			4	1	4		5			5
Solenidae species	Jackknife	2	1	2	5		1	1	2	4				4		

1-2-5 PROPOSED INDICATOR SPECIES UNDER CRITERION 5A: COMMERCIALY IMPORTANT (VOLUME)

Definition of Indicator Species under Criterion 5A:

The mollusk species harvested along the Chinese coast are selected inclusive of cultured species. They are based on the total weight of catches recorded in public statistics.

Proposed Indicator Species: (Table 3)

1960's: Oyster (*Ostreidae* species), Jacknife (*Solenidae* species)

1970's: Jacknife (*Solenidae* species), Oyster (*Ostreidae* species)

1980's: Sea-mussel (*Mytilus* species), Jacknife (*Solenidae* species), oyster (*Ostreidae* species), Manila clam (*Ruditapes philippinarum*), Scallop (*Pectinidae* species)

1990's: Scallop (*Pectinidae* species), Manila clam (*Ruditapes philippinarum*), Sea-mussel (*Mytilus* species), Scallop (*Pectinidae* species),

2004's: Oyster (*Ostreidae* species), Manila clam (*Ruditapes philippinarum*), Abalones (*Haliotidae* species), Scallop (*Pectinidae* species), Sea-mussel (*Mytilus* species)

[the final selection and the logic of ranking]: Scallop (*Pectinidae* species), Manila clam (*Ruditapes philippinarum*), Oyster (*Ostreidae* species), Sea-mussel (*Mytilus* species), Abalones (*Haliotidae* species), Jacknife (*Solenidae* species),

PROPOSED INDICATOR SPECIES UNDER CRITERION 5B: COMMERCIALY IMPORTANT (VALUE)

Definition of Indicator Species under Criterion 5B:

Molluscan species/taxon harvested in Chinese coastal area are selected based on the total values sold in the Chinese market.

Proposed Indicator Species:

1960's: Oyster (*Ostreidae* species), Jacknife (*Solenidae* species)

1970's: Jacknife (*Solenidae* species), Oyster (*Ostreidae* species)

1980's: Manila clam (*Ruditapes philippinarum*), Jacknife (*Solenidae* species), Oyster (*Ostreidae* species), Scallop, (*Pectinidae* species), sea-mussel (*Mytilus* species)

1990's: Scallop (*Pectinidae* species), Manila clam (*Ruditapes philippinarum*), Oyster (*Ostreidae* species), Jacknife (*Solenidae* species), sea-mussel (*Mytilus* species)

2004's: Manila clam (*Ruditapes philippinarum*), Abalones (*Haliotidae* species), Oyster (*Ostreidae* species), Scallop (*Pectinidae* species), sea-mussel (*Mytilus* species)

[the final selection and the logic of ranking]: Manila clam (*Ruditapes philippinarum*), Scallop (*Pectinidae* species), Oyster (*Ostreidae* species), Abalones (*Haliotidae* species), Jacknife (*Solenidae* species), sea-mussel (*Mytilus* species).

1-2-7 Proposed Indicator Species under Criterion 5C: commercially important (Unit price)

Definition of Indicator Species under Criterion 5C:

Unit price (value/weight) of mollusk species was also reviewed to propose indicator species

Proposed Indicator Species:

1960's: Abalone (Haliotidae species), Ark shell (*Scapharca broughtonii*), Surf clam (*Mactra veneri formis*), Cockle (*Mactra chinensis*), Oyster (Ostreidae species)

1970's: Abalone (Haliotidae species), Ark shell (*Scapharca broughtonii*), Cockle (*Mactra chinensis*), Surf clam (*Mactra veneri formis*), Scallop (Pectinidae species)

1980's: Abalone (Haliotidae species), *Coelomacra antiquate*, Ark shell (*Scapharca broughtonii*), Jacknife (Solenidae species), Manila clam (*Ruditapes philippinarum*).

1990's: Abalone (Haliotidae species), *Coelomacra antiquate*, Ark shell (*Scapharca broughtonii*), Surf clam (*Mactra veneri formis*), Manila clam (*Ruditapes philippinarum*).

2004: Abalone (Haliotidae species), *Coelomacra antiquate*, Ark shell (*Scapharca broughtonii*), Manila clam (*Ruditapes philippinarum*), Scallop (Pectinidae species)

[the final selection and the logic of ranking]: Abalone (Haliotidae species), *Coelomacra antiquate*, Ark shell (*Scapharca broughtonii*), Surf clam (*Mactra veneri formis*), Cockle (*Mactra chinensis*), Scallop (Pectinidae species), Manila clam (*Ruditapes philippinarum*), Oyster (Ostreidae species)

Table 4: List of Maps, and Area Names for Coastal Mollusks Ecologically Important Areas (CMOLLUSK EIA)

Map #	Scientific name	Common name	Lianyungang	Rizhao	Qingdao	Haiyang	Rushan	Weihai	Yantai	Changdao	Tanggu	Qinhuangdao	Huludao	Dalian
Map 1	<i>Mytilus edulis</i>	Sea-mussel	x	x	x	x	x	x	x	x	x	x	x	x
Map 1	<i>Mactra veneriformis</i>	Surf clam	x	x	x	x	x	x	x	x	x	x	x	x
Map 1	<i>Ruditapes philippinarum</i>	Short necked clam	x	x	x	x	x	x	x	x	x	x	x	x
Map 1	<i>Meretrix meretrix</i>	Hard clam	x	x	x	x	x	x	x	x	x	x	x	x
Map 1	<i>Mactra chinensis</i>	Japanese clam	x	x	x	x	x	x	x	x	x	x	x	x
Map 2	<i>Chlamys farreri</i>	Scallop		x	x	x	x	x	x	x	x	x	x	x
Map 2	<i>Scapharca subcrenata</i>			x	x	x	x	x	x	x	x	x	x	x
Map 3	<i>Scapharca broughtonii</i>	Asian clam			x	x	x	x	x	x	x	x	x	x
Map 4	<i>Crassostrea gigas</i>	Oyster			x	x	x	x	x	x	x	x	x	x
Map 5	<i>Sinonovacula constricta</i>	Razor clam		x	x	x	x	x	x	x	x	x	x	x
Map 6	Haliotidae species	Abalone	x		x				x				x	x
Map 7	<i>Atrina pectinata</i>	Fun mussel			x				x	x				x
Map 8	<i>Fulvia mutica</i>	Cockle shell			x		x		x			x		
Map 9	<i>Cyclina sinensis</i>	Venus clam	x	x	x	x	x		x	x		x		x

References

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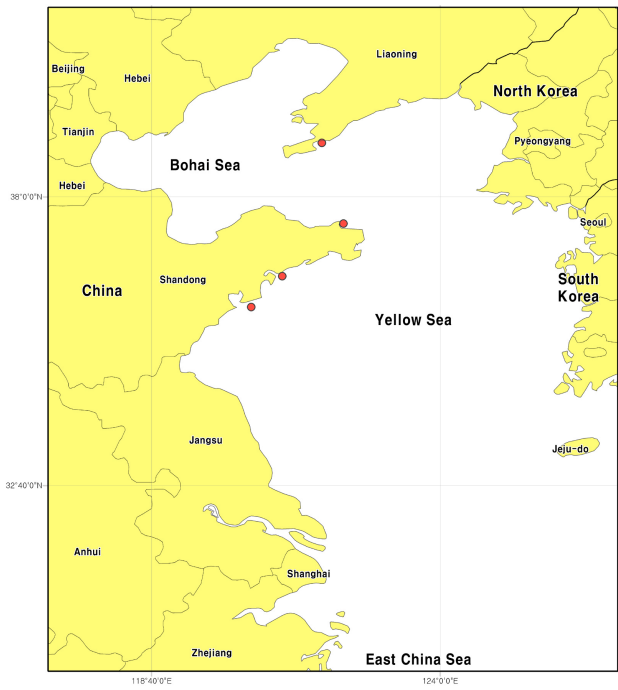
Fig 1. Locations of the 12 selected areas.



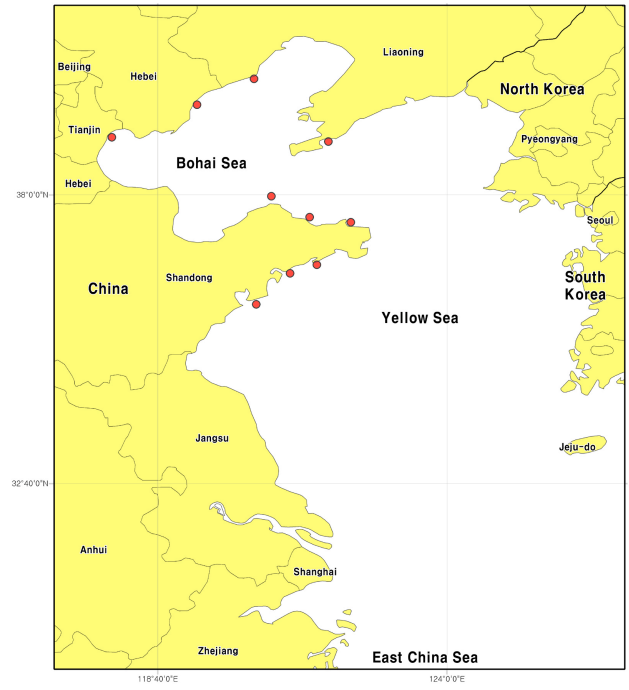
Map 1 *Mytilus edulis*, *Mactra veneriformis*, *Ruditapes*, *Meretrix meretrix*, *Mactra chinensis*



Map 2 *Chlamys farreri*, *Scapharca subcrenata*



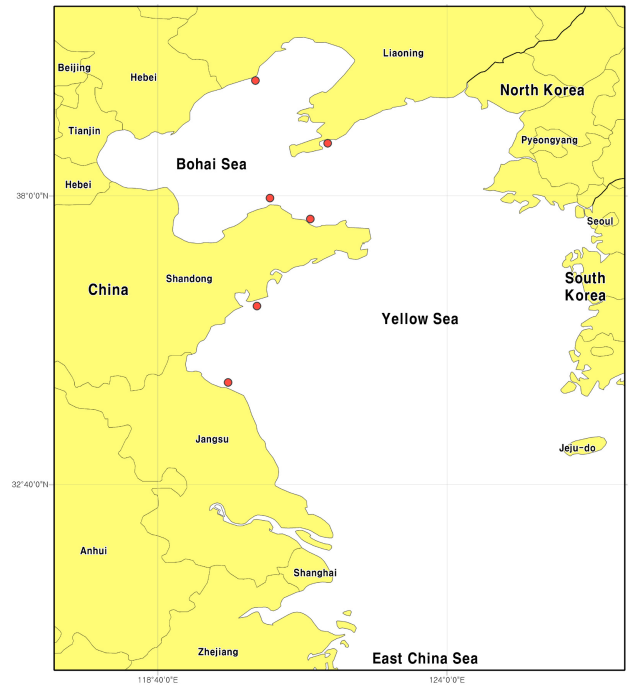
Map 3 *Scapharca broughtonii*



Map 4 *Crassostrea gigas*



Map 5 *Sinonovacula constricta*



Map 6 *Haliotidae* species



Map 7 *Atrina pectinata*



Map 8 *Fulvia mutica*



Map 9 *Cyclina sinensis*