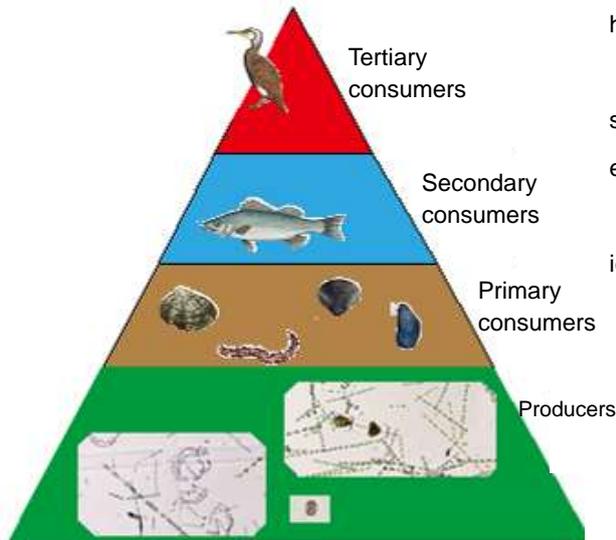


## Aquatic Organism Inhabitation in Tokyo Inner Bay (Fiscal 2015)



Tokyo Inner Bay hosts a variety of organisms in its various habitats.

Since 1986, the Bureau of Environment has been conducting surveys on aquatic organism in a part of its efforts to study the environment of Tokyo.

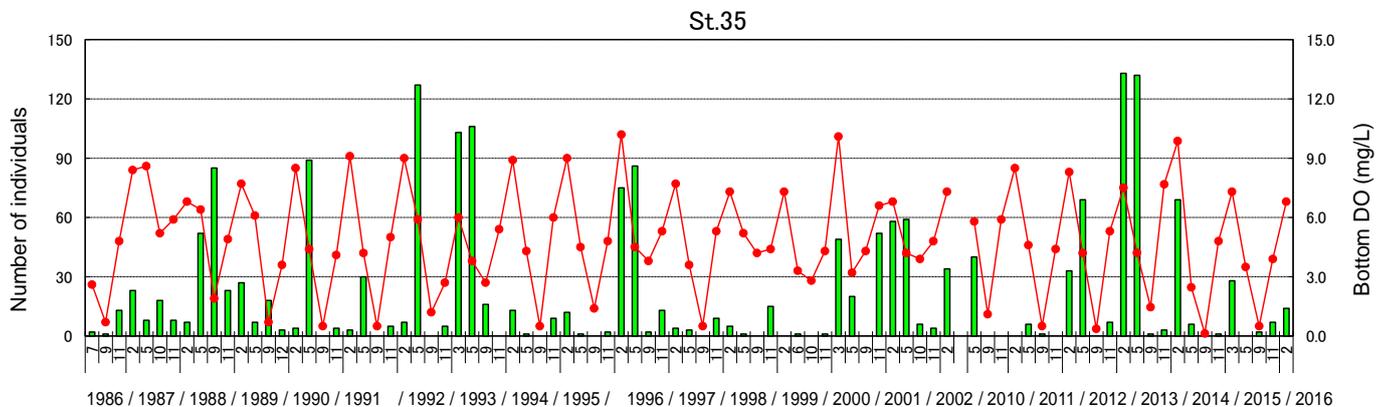
In the survey of fiscal 2015, the following organisms were identified.

- Birds: Great Cormorant, ducks, etc.: 53 species
- Adult fish\*: Whipfin Dragonet, etc.: 11 species
- Juvenile fish: Big-eyed Herring, Goby family, etc.: 38 species
- Sessile animals: Mediterranean Mussel, etc.: 63 species
- Benthic organisms: Japanese Littleneck Clam, etc.: 50 species
- Planktons: Skeletonema, etc.: 72 species

\* For adult fish, benthic fish species were surveyed using small trawl nets.

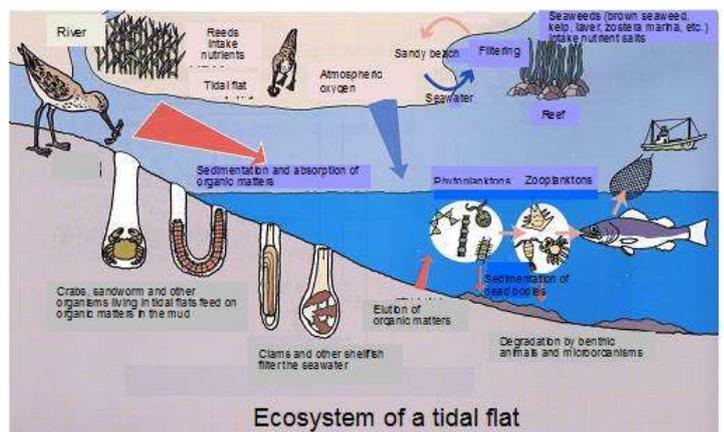
The graph below shows the changes in the number of adult fish individuals observed (bar chart) and the changes in dissolved oxygen (DO) levels at the lower layer (line chart).

In the survey conducted in September, the DO levels (1 m above the sea bottom) often reached below 2 mg/L. The number of individuals observed extremely decreased under those circumstances, indicating the large impact of poor oxygen conditions on the organisms.

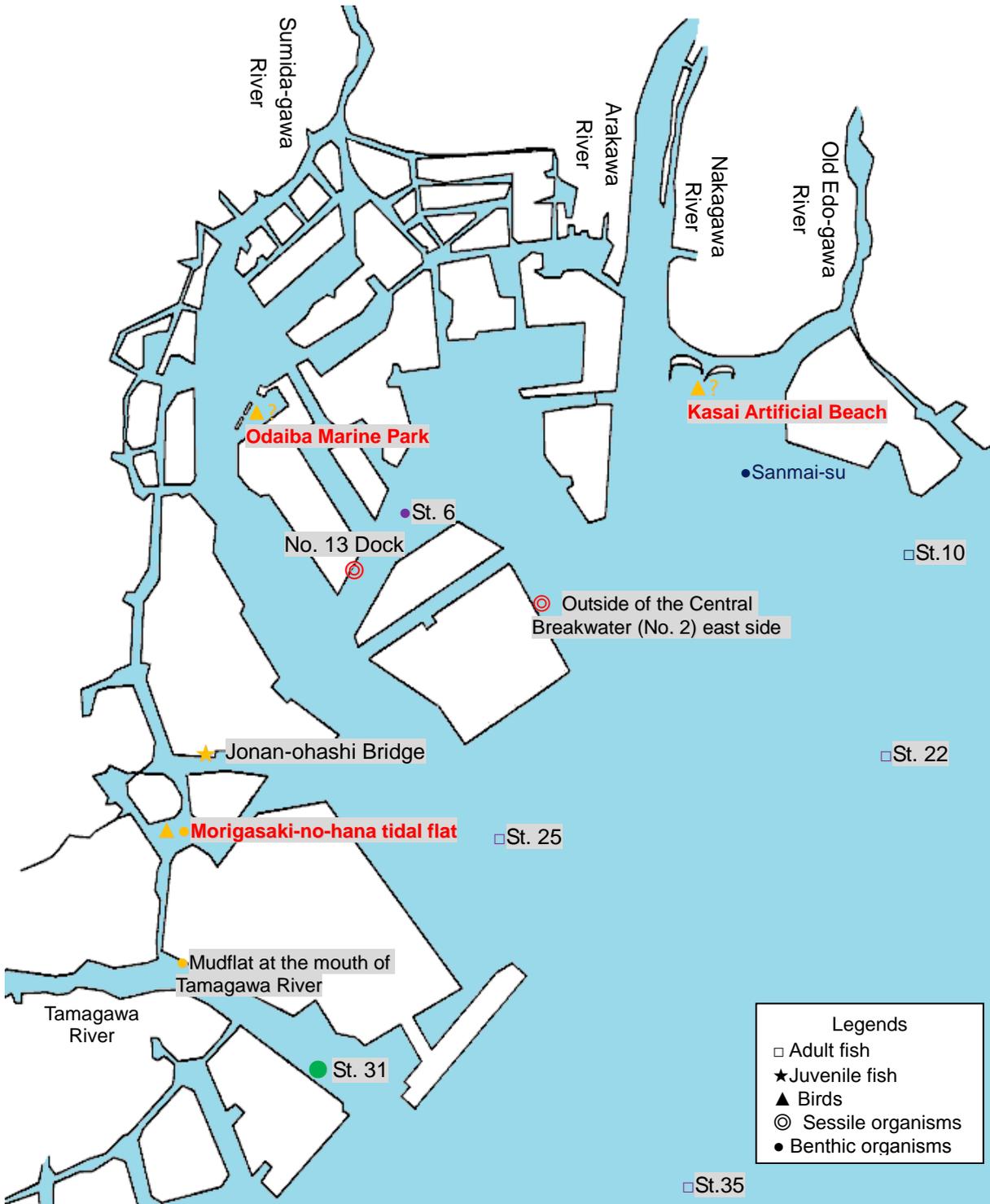


Living organisms play roles to clean the ocean through the aquatic food chain.

The wastes (organic matters) resulting from human activity are consumed by shellfish, crabs, lugworms and other organisms as their foods. Birds and fish prey on these organisms and then defecate the waste (organic matters) from the Tokyo Bay. This flow easily becomes functional at tidal flats, which are home for various organisms at each level of the food chain.



Survey stations (**stations in red** are described in pages 3 to 5 of the preface.)



**Inner bay: 4 stations**  
(St.6, St.22, St.25, St.35)

**Shallow sea area: 2 stations**  
(St.10: Sanmai-su)

**River mouth area: 1 station (St.31)**

**Tidal flat: 5 stations**

(Kasai Artificial Beach, Odaiba Marine Park, Jonan-ohashi Bridge, Morigasaki-no-hana and Mudflat at the mouth of Tamagawa River)

**Seawall area: 2 stations**

(Outside of the Central Seawall (No. 2) east side, No. 13 Dock)

Note: See pages 2 and 3 of the main part for details on survey stations.

# Odaiba Marine Park: popular spot for aquatic organisms

Survey subjects: Birds and juvenile fish

Odaiba will be the venue for triathlon and marathon swimming (10 km) games in the 2020 Summer Olympics. In the past, it was the site where cannons were placed when the black ships of Commodore Perry arrived in 1853; we can still see cannon batteries. The site had been then used as a timber storage before it was finally developed into a marine park. The site now is neighbored by commercial complexes and a headquarters of a broadcasting company. Many floating houseboats at nights also add a feature as a major tourist destination in Tokyo. A manmade beach was created so that everyone can go close to the water.

Survey sites:



(4) Reefs are used as feeding and resting sites for Grey-tailed Tattler and Ruddy Turnstone.



## Bird

(1) Great Cormorants and egrets are nested on the trees in No. 6 Daiba and (2) Torinoshima. (January to June).



(1) Black-tailed Gulls resting on a reef near the No. 6 Daiba.



(3) Greater Scaup and other ducks and Black-headed Gulls are resting on the shallow water and sand beach (January and February).



## Juvenile fish survey



We conduct surveys for juvenile fish 6 times a year. Among them, the largest number of fish is observed in the one in April. This is the time of the year when large numbers of Yellowfin Goby and Chestnut Goby (*Gymnogobius breunigii*) are found, and juvenile Ayu Sweetfish can be found before they go up to the river.

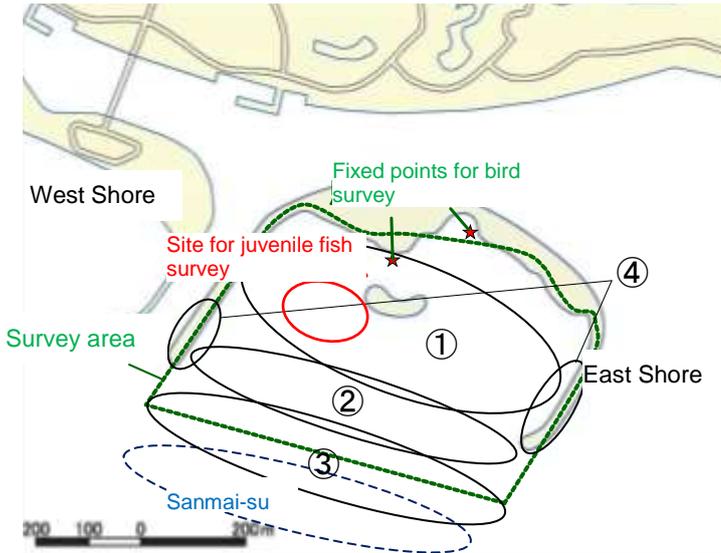
# Kasai Artificial Beach (East Shore): Paradise for aquatic organisms

Survey subjects: Birds and juvenile fish



Kasai Artificial Beach is a manmade tideland constructed in Kasai Marine Park. Of the two tidal flats (East Shore and West Shore), the West Shore is open for people and accessible to a bridge. It has been popular for events to experience ocean bathing. The East Shore is a nature reserve and closed for people. It is a "paradise" for aquatic organisms.

Survey sites:



(4) Great Cormorants, egrets and ducks rest on the seawall, while Eurasian Spoonbill and Black-faced Spoonbill rest on the western seawall (January to February).



## Bird

(1) Egrets and shorebirds feed and rest on tidal flats.



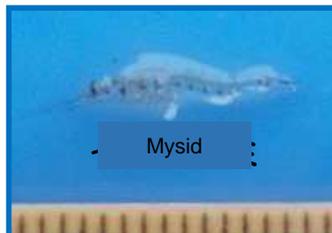
(2) Great Cormorants, egrets, gulls and oystercatchers rest near the water on tidal flats.



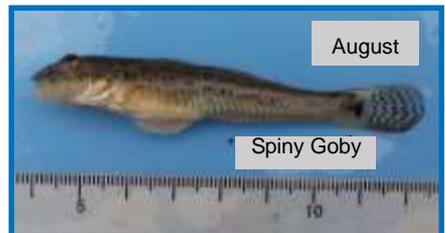
(3) Greater Scaups and Great Crested Grebes are in rest in the winter.



## Juvenile fish survey



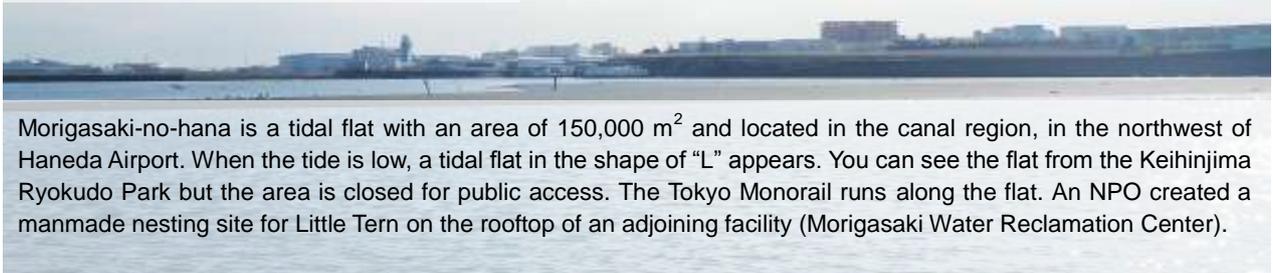
A large volume of mysid (*Neomysis japonica*), a prey of fish, was caught throughout the year.



Spiny Gobies feed on Mysids. A juvenile in a relatively large size was collected in this survey.

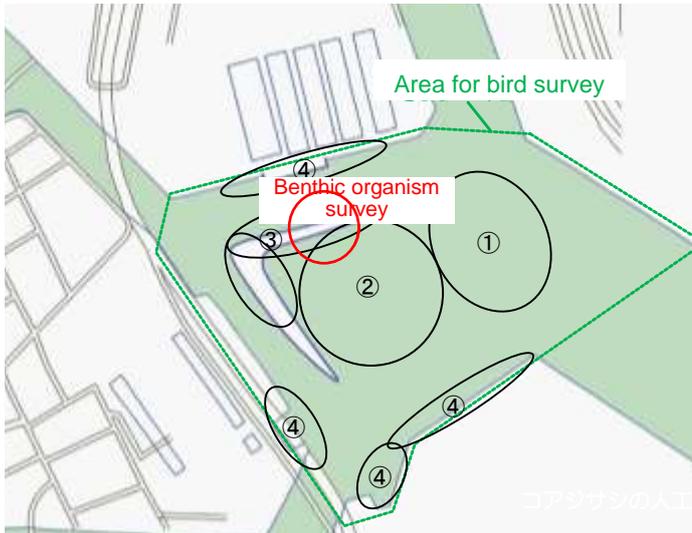
# Morigasaki-no-hana: A tidal flat surrounded by reclaimed land

Survey subjects: Birds and benthic animals



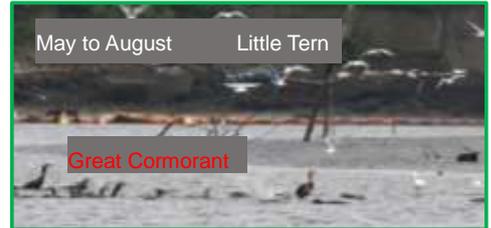
Morigasaki-no-hana is a tidal flat with an area of 150,000 m<sup>2</sup> and located in the canal region, in the northwest of Haneda Airport. When the tide is low, a tidal flat in the shape of "L" appears. You can see the flat from the Keihinjima Ryokudo Park but the area is closed for public access. The Tokyo Monorail runs along the flat. An NPO created a manmade nesting site for Little Tern on the rooftop of an adjoining facility (Morigasaki Water Reclamation Center).

Survey sites:

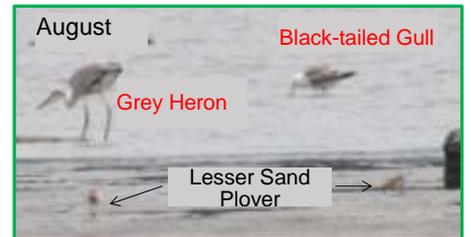


## Bird survey

(1) Little Terns feed from the sky, while Great Cormorants dive from the water surface to feed.



(2) When the tidal flat appears, egrets and shorebirds feed and rest.



(3) The highest area in the tidal flat is a site for Great Cormorant, gulls and egrets to rest.



(4) Sandpipers, egrets and ducks feed and rest on the seawall.



Act on Conservation of Endangered Species of Wild Fauna and Flora: Internationally Endangered Species of Wild Fauna and Flora Red List of Threatened Species of Japan (2015): Threatened II (VU)  
Red List of Threatened Species of Tokyo Metropolitan Government (2010) (23 Wards): Threatened IB (EN)

Staying in Australia and New Zealand in winter, Little Terns breed around Japan from April to August. Natural nesting sites are getting scarce in recent years. An artificial nesting site is created on the rooftop of the Morigasaki Water Reclamation Center, which is adjacently located to Morigasaki-no-hana (NPO and government).

## Benthic organism survey



Species in Polychaeta family were most abundantly collected through spring and summer at this site. Japanese Basket Clam and Japanese Littleneck were also observed.

## Juvenile fish survey (Page 13 of the main part)

Tidal flats and shallow waters are often called “cradles for fish” as they are sites for many juvenile fish to grow. Fish (mainly juveniles) were surveyed at tidal flats in Kasai Artificial Beach (East shore), in Odaiba Marine Park and near Jonan-ohashi Bridge (near the Ota Market) using small-sized drawl nets. The survey was conducted in every even month.



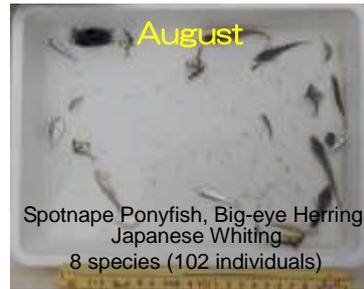
### Kasai Artificial Beach (East shore)



### Odaiba Marine Park



### Jonan-ohashi Bridge



### Representative species collected in the juvenile fish survey (small-sized drawl net)

Species	Ecological information	Figure/photo
Spotnape Ponyfish	Found in sea bottoms with sandy mud in river mouths or inner bay. Commonly seen in tidal flats, sandy beaches or fishing ports throughout the Bay. From June to August, large numbers of fries (6 to 7 mm in size) occur in tidal flats and artificial beaches. They feed on zooplanktons to grow.	 <p>Adult fish in size of 10 cm can be caught from the reclaimed land and artificial seawalls. Through the surveys, this species was observed each time except in 2011.</p>

Species	Ecological information	Figure/photo
Chestnut Goby	Lives in mud bottom and sandy mud bottom, especially in areas of well-developed mud bottom near a river mouth. Nest in a hole under the mud bottom near the shore, which were dug by themselves or other organisms, such as Japanese Mud Shrimp and lugworm. The females lay eggs on the wall to protect till hatching. Hatched fries go down to the ocean and then come back to the river after a while.	 Although the life span is from 2 to 3 years, many individuals die after maturing in 1 year and egg-laying. The overall length is about 6 cm. The photo above was taken in Odaiba Marine Park in December.
Flathead Gray Mullet	In Japan, it is called by different names as it grows: Haku, Oboko, Ina, Bora and Todo. Karasumi, dried mullet roe, is regarded as a delicacy. Widely seen from the downstream of rivers and in Tokyo Inner Bay. Main feed is organic matters in the mud bottom.	 Flathead Gray Mullet Kasai Artificial Beach (April) なぎさ、4月 Jump on the sea surface. When jumping fish is observed in Odaiba Marine Park, it is most likely Flathead Gray Mullet. The whole length of the adult fish is about 60 cm.
Japanese Sea Bass	The most popular fish in Tokyo Bay. In early spring, many juvenile fish in the size of a few centimeters appear in the tidal flats in the river mouths. In Japan, it is called by different names as it grows: Koppa, Seigo, Fukko, and Suzuki. Widely migrates in Tokyo Bay and seen even in the canals near the city center. Found widely from the river mouths to inner bay. Feeds on lugworms, crustaceans, and small fish.	 Small-sized Japanese Sea Bass has blackish spots on its body.  Odaiba Marine Park (April) The whole length of adult fish is 50–90 cm.
Spiny Goby	This is the largest goby in Tokyo. In early spring, juvenile fish appear tidal flats near river mouths and then disperse to different places as they grow. In river mouths and inner bay, they dig a deep hole in the shape of “U” to lay eggs.	 This is one of representative benthic fish in Tokyo Inner Bay. While those found in the juvenile fish surveys are 10 cm in the majority, the whole size of adult fish can reach 30 cm. From autumn to winter, this is a most popular fish for anglers.

### Representative non-fish organisms identified in the fish surveys

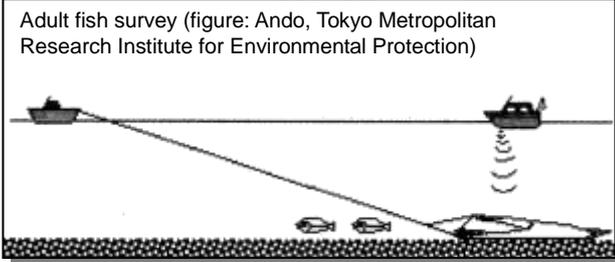
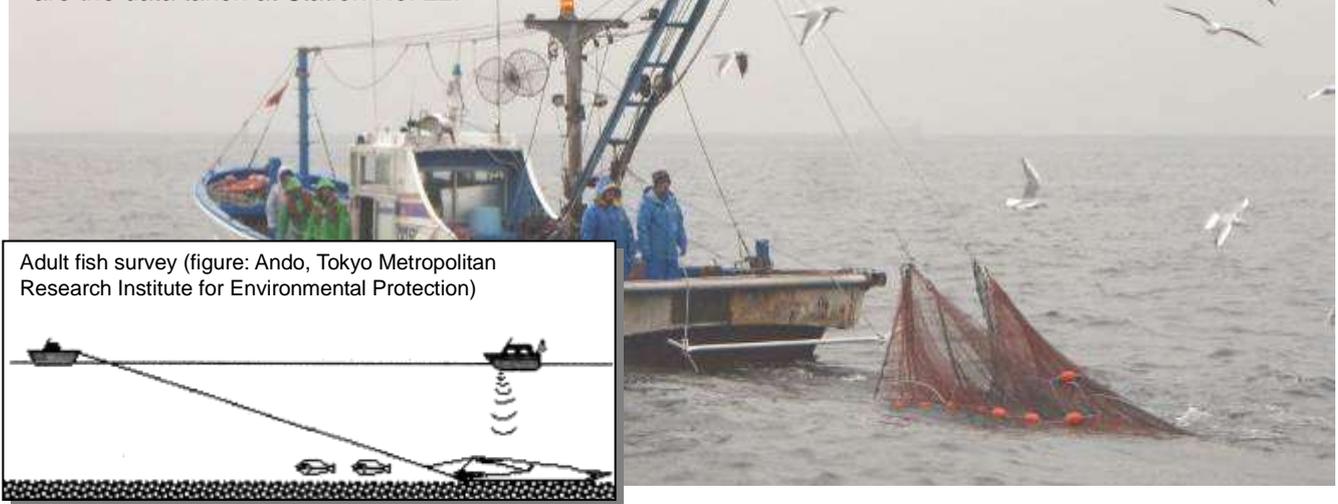
Non-fish organisms caught in the surveys conducted in tidal flats with a draft net include mysid and bivalves, which serve an important role as feed for juvenile fish, etc.

Species	Ecological information	Figure/photo
Japanese Littleneck Clam	Occurs in sandy mud bottom in the intertidal zones of bays in Japan, which are affected by fresh water. The matured size of a shell is about 4 cm in length and 3 cm in height. This is a representative species in the tidal flats in Tokyo Bay, which is caught by many people who enjoy shellfish catching. As a large number of floating larva is identified in Tokyo Bay, the clams are able to live in the bay if sites for settlement are secured.	 It is often said that the Littlenecks in Tokyo Bay have showy patterns on the shells,
<i>Crangon sp.</i>	Distributed from the Kamchatka and Sakhalin to the southern Kyushu Island. Found from the low tide line to 200 m under the sea.	 The whole length is up to 45 mm.

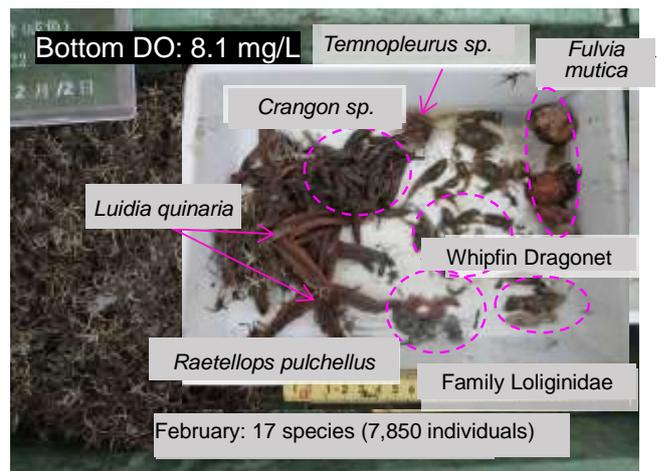
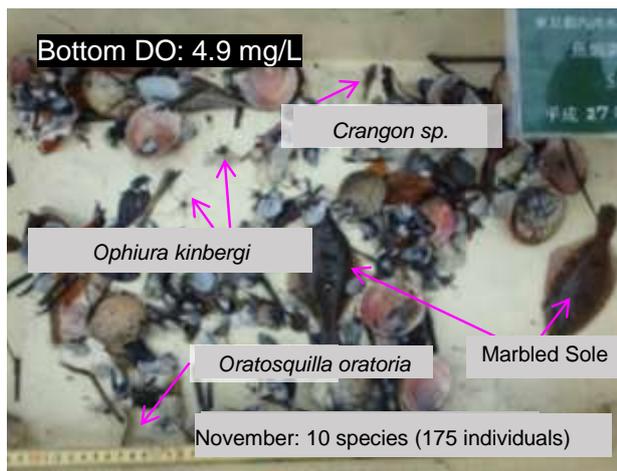
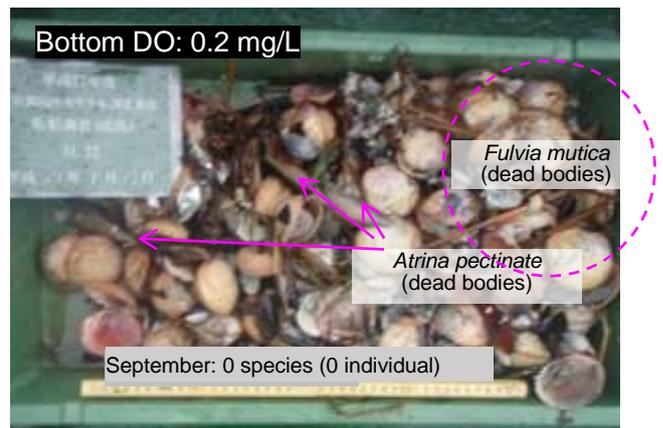
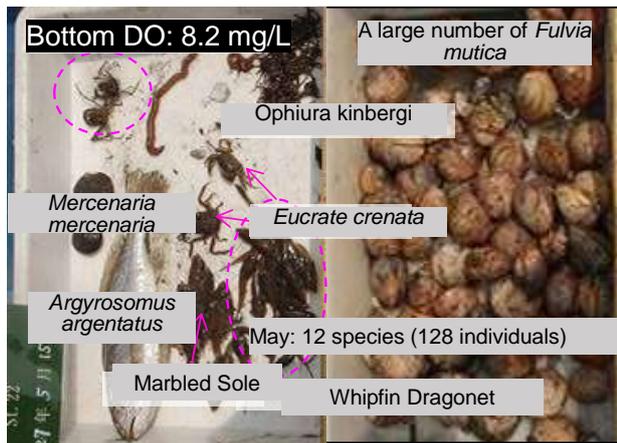
Adult fish survey (page 40 of the main part)

In the adult fish survey, we sampled benthic fish using a draft net. The population size significantly decreases during summer, when the oxygen level at the sea bottom lowers (see Page 1 of the preface).

The survey was conducted at 4 stations in Tokyo Inner Bay (St. 35: farthest offshore, St. 25: center, St. 22: Chiba side and St. 10: shallow water of Urayasu) in May, September, November and February. The below are the data taken at Station No. 22.



St.22



Absolutely no organism is observed during the summer, when the bottom DO (dissolved oxygen) level goes down. Although organisms come back when the DO level starts to recover at the beginning of the fall, the environment will become unsuitable for them to inhabit again in the next summer. This has been a big issue for the current Tokyo Bay.

**Representative species observed in the adult fish survey by beam trawling (including non-fish species)**

Species	Ecological information	Figure
Cardinal Fish	<p>Found in sandy mud bottom from the inner bay to the water with the depth of 100 m.</p> <p>Nocturnal. Lays eggs from July and August. Males protect the mass of laid eggs in their mouth.</p> <p>Feed on small animals on the sea bottom.</p>	<p>Big eyes</p>   <p>Whole length is about 9 cm</p>
Whipfin Dragonet	<p>Found in sandy mud bottom in the inner bay. Different body patterns between male and female: males have a long tail fin like a thread.</p> <p>Slippery body due to mucus excretion. Feed on lugworm and bivalves.</p>	<p>Male has a particularly long fin.</p>   <p>Whole length is about 10 cm.</p>
Marbled Sole	<p>Found in the water with up to 100 m in depth. Unlike Stone flounder, the adult fish cannot be found in shallow water. Lays eggs during winter. Individuals with the size larger than 40 cm are observed in Tokyo Bay.</p>	
Mantis Shrimp	<p>In Tokyo Bay this species is found in the water with 15–30 m in depth. This carnivorous shrimp catches Crustacean and Polychaeta organisms, etc. to feed on. A popular ingredient for Tokyo-style sushi. The volume of fish catches has been low in recent years.</p>	

**Bird survey (page 53 of the main part)**

Survey was conducted 6 times (May, June, August, September, January and February) in Kasai Artificial Beach, Odaiba Marine Park and Morigasaki-no-hana.



**Survey methods:**

Bird species, its numbers and behaviors (resting, feeding, etc.) were observed from boats and higher grounds using spotting scopes, etc.

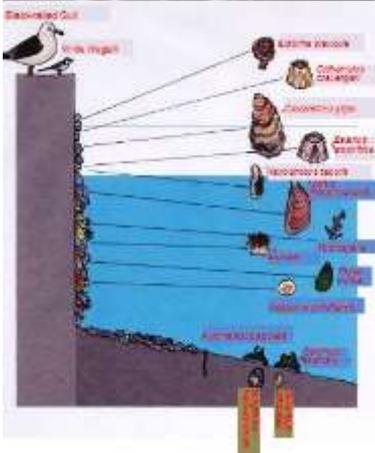
**Examples of representative and critical species found in bird surveys**

Species	Ecological information	Photo
Great Cormorant	<p>Resident bird. Most common bird seen in Tokyo Inner Bay, including fresh waters, rivers and ponds in inland region. Skillfully dive to catch and feed on fishes and crustaceans.</p> <p>Breed in group almost throughout the year in the woods near the water. In the Tokyo Bay area, the No. 6 Daiba and Gyotoku Bird Sanctuary are used as colonies or nests.</p>	 <p>September 2015</p> <p>Shallow waters of Tokyo Bay are important feeding sites. A large number of Great Cormorants gather to feed.</p>
Greater Scaup	<p>Winter bird in Tokyo Bay. Many seen in the coastal, inner bay and river mouth areas. In Tokyo, Greater Scaup are seen at sea near Kasai Artificial Beach and Odaiba Marine Park, where their feeds, fishes and bivalves (Japanese Littleneck Clam, Trough Shell, etc.), are abundant. Large numbers of Greater Scaup are observed during the winter, sometimes a big flock of thousands to dozens of thousands.</p> <p>Listed as concern species in the Red List of Threatened Species of Tokyo (2010) .</p>	  <p>Greater Scaup</p> <p>This species has the largest population among the ducks in Tokyo Bay. A few non-breeding individuals are sometimes seen in the summer</p>
Common Teal	<p>A fresh water duck widely breeding in the north parts of the northern hemisphere. Has a distinctive yellow triangle under the tail. Winter visitor. Males have a brown head with green lines extending backward. Females have brownish plumage with dark spots. Recently, more teals have been observed in winter at Morigasaki-no-hana.</p>	 <p>January 2016 (Morigasaki-no-hana)</p>

Species	Ecological information	Photo
Black-headed Gull	<p>Very common, small-sized gull. Arrive at the coastal fishing ports, river mouths, tidal flats, rivers, etc. in the winter. Mainly feed on insects, invertebrates, dead meat, etc. Living in flocks—sometimes in a huge size.</p> <p>Although it is a winter bird, a few may stay in summer. A black “hood” on the head is distinctive in the summer plumage. Designated as the Bird of Tokyo.</p>	 <p>January 2016 (Odaiba)</p> <p>Most dominant winter duck in Tokyo Bay. Flocks in thousands are seen in the migration periods of spring and fall.</p>
Grey Heron	<p>A largest member of the heron and egret family. Catch fish near the water. Form colonies with other members of the heron/egret family in a thick bunch of trees. Often chased away by local residents because of their loud calls and feces. The No. 6 Daiba and Torinoshima Island are some of the very few breeding sites in Tokyo, where they form colonies with Great Cormorants, Little Egrets and Great Egrets.</p>	 <p>January 2016 (Odaiba)</p>
Little Tern	<p>Critical species designated as internationally Endangered Species of Wild Fauna and Flora in the species conservation act.</p> <p>Visit ponds and lakes, rivers, sandy beaches, etc. as a summer bird and feed on small fish with the size of 10 cm or less. Breed from May to July in groups on sandy or gravel areas in the coastal areas, sand bars in the rivers and reclaimed lands. An artificial nesting site is created on the rooftop of the Morigasaki Water Reclamation Center.</p>	 <p>May 2015 (Morigasaki-no-hana)</p>
Great Crested Grebe	<p>Visit coasts, ponds and lakes near the coast, large rivers, etc. as mainly a winter bird. Feed on fishes, crustaceans, insects, etc.</p> <p>In Tokyo, the grebes gather at sea near Kasai Artificial Beach during the winter. The population size, which used to be small, drastically increased after fiscal 1993. Sometimes repeatedly dive to catch fish. Listed as concern species in the Red List of Threatened Species of Tokyo (2010)</p>	 <p>February 2016 (Odaiba)</p> <p>Distinctively white bird on the ocean surface due to the white part from face to chest in the winter plumage as well as large body with long neck.</p>
Eurasian Coot	<p>Resident bird seen in wetlands like the ponds and lakes or rivers and in rice paddy fields. Feed on insects, shellfish and crustaceans, as well as leaves, stems and seeds of aquatic plants. In the breeding period from April to August, they nest in the reed fields. In Tokyo, Odaiba Marine Park and Morigasaki-no-hana are the major sites to see the coots in the winter. Dive to feed on seaweeds. Designated as Vulnerable (VU) species in the Red List of Tokyo.</p>	 <p>February 2016 (Morigasaki-no-hana)</p>

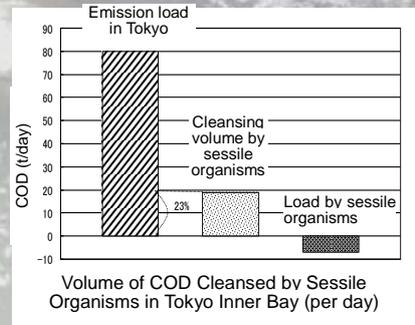
**Sessile organism survey (page 101 of the main part)**

Sessile organisms are those adhering to the seawalls. In the survey, vertical distribution from the seawall to the sea bottom is observed by divers. As sessile organisms stay in one place, long-term influences of the environment are reflected on them. Annual survey for sessile organisms was conducted in May at the site located outside (east side) of the Central Breakwater (No. 2) and at the No. 13 Dock. As sessile organisms often consist of alien species, such as Mediterranean Mussel, concerns have arisen from their influence on the aquatic environment and ecosystems, in relation to ballast water.



Dead bodies of sessile organism adhered to vertical seawalls are considered as a cause for formation of a mass of water with poor oxygen levels. On the other hand, they contribute to water purification. In a trial estimation, the total cleansing volume for the total length of seawalls in Tokyo Bay was equivalent to 23% of the contamination load emitted to Tokyo Bay\*.

\* Kimura, et. al. (1998). Tokyo Metropolitan Research Institute for Environmental Protection



**Conditions at survey sites**

	Outside (east side) of the Central Breakwater (No. 2)	No. 13 Dock
Survey site		
Notes	Designated the seaside quay at the reclaimed land located outside of the Central Breakwater as a survey site.	Designated a dock located at the No. 2 Route Undersea Tunnel between Odaiba Marine Park and the Central Breakwater Reclaimed Land as a survey site.

**Representative species, etc. identified at the sessile organism survey**

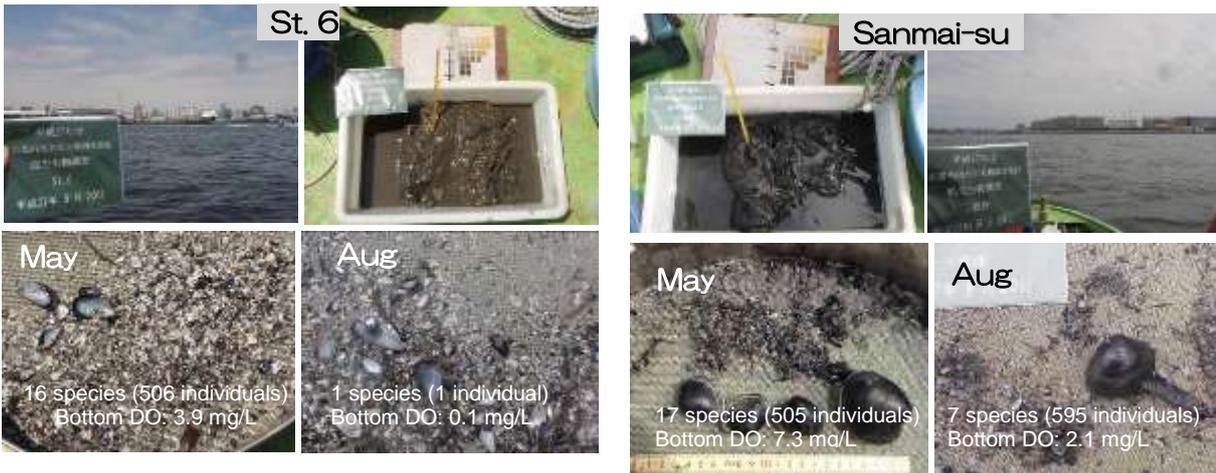
Species	Ecological information	Observed conditions in this fiscal year
<i>Chthamalus challenger</i>	[Representative species] Small-sized barnacles inhabiting in groups on top of the rocks in intertidal zones. The shell opening is large. When living alone, the shell is conical in shape, but changed into a tube when a group is formed. Have high tolerance for prolonged dry conditions. Distributed the south of the southwestern part of Hokkaido and can be found rather deep in the inner bay. The diameter of the shell is about 8 mm.	 Dominated at the upper part of the intertidal zone for both sites.
Mediterranean Mussel	[Representative species, alien species] Being native to Europe, Mediterranean Mussel ( <i>Mytilus galloprovincialis</i> ) first arrived to a port in Japan in early 1900 by adhering to the ships and spread to the whole country. Densely adhere to buoys and fishing nets in the ports and sea walls. The shell looks similar to <i>Mytilus coruscus</i> (pelagic species) but is thin and shiny. The shell size is 7 cm (length) and 4 cm (height). Designated as an invasive alien species.	 Dominated at the middle part of the intertidal zone for both sites.

**Benthic organism survey (page 117 of the main part)**

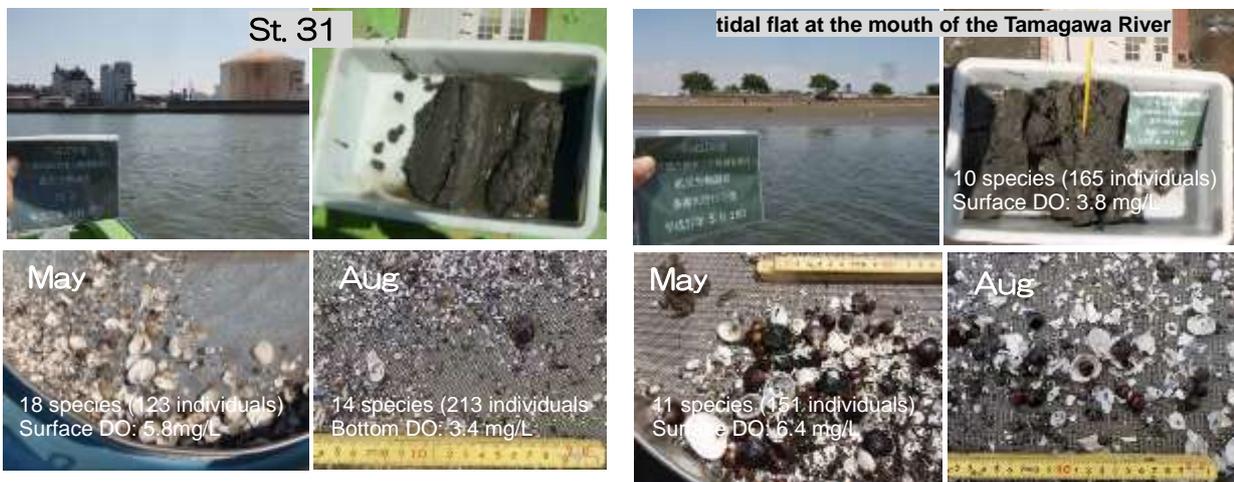
Benthic organism survey was conducted twice a year (May and August) at a total of 5 sites (inner bay, shallow water and river mouth: 1 site each; tidal flats: 2 sites).



Inner bay (St. 6) and shallow water (Sanmai-su)



River mouth (St. 31) and tidal flat (tidal flat at the mouth of the Tamagawa River)



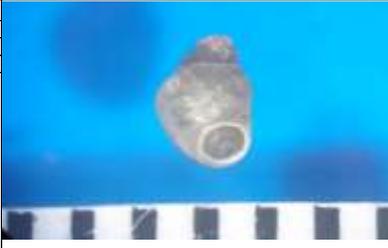
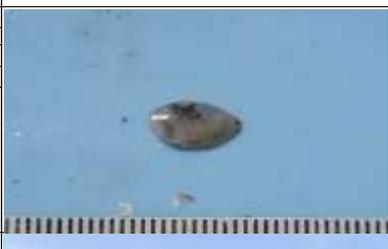
**Bottom DO and surface DO**

DO levels at the depth where surveyed benthic organisms inhabit are also shown. In the tidal flats and shallow waters, the levels of dissolved oxygen are high enough for organisms to survive even during the summer.

Bottom DO (1 m above the sea bottom): inner bay, shallow water and river mouth (For May at St. 31, surface DO level is shown as the sea depth was less than 1 m.)

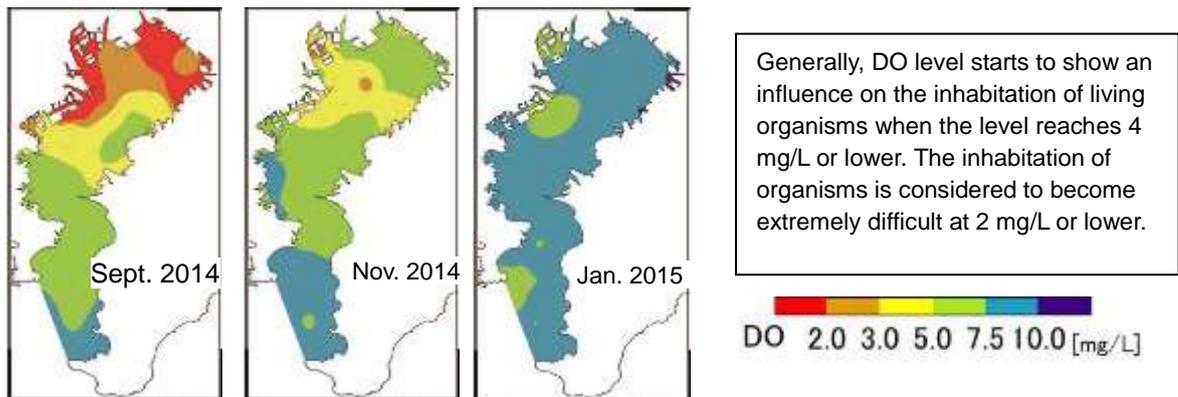
Surface DO: Tidal flats (no bottom DO was measured).

Note: For the photos for species observed at the sea wall, species that were visually confirmed at the sites are also included in addition to the actual individuals sampled in the survey.  
Major benthic organism observed in the survey

<p>May/August 2016</p> <p>Mollusca</p> <p>Gastropoda</p> <p><i>Stenothyra edogawensis</i></p> <p>Shell size: 2 mm (height) x 1 mm (diameter). Found in sandy mud in inner bays from Honshu Island to Kyushu Island. Designated as a near threatened species in the Guidebook to threatened animals at tidal flats issued by the Japanese Association of Benthology.</p>		<p>May/August 2016</p> <p>Mollusca</p> <p>Bivalvia</p> <p><i>Ruditapes philippinarum</i></p> <p>Shell size can reach 4 cm (length) and 3 cm (height). Found in sandy mud areas in the inner bay affected by fresh water. Commercially distributed as a common food item. A popular item for recreational clam digging. Was dominant at St. 31 in spring and summer.</p>	
<p>May/August 2016</p> <p>Mollusca</p> <p>Bivalvia</p> <p><i>Musculista senhousia</i></p> <p>Shell size: 2 cm (length) x 1 cm (height). Found in sandy mud in inner bays. Form groups by tangling their byssus. Predominant at St. 31 in the summer.</p>		<p>August 2016</p> <p>Annelida</p> <p>Polychaeta</p> <p><i>Neanthes succinea</i></p> <p>About 5 cm in length. Often found from the intertidal zone to subtidal zone in the inner bay. Although considered as an alien species, its origin is unknown. The bases of palpus are large and barbs on the parapodia of latter half of the segments are long. Commonly observed in the inner bays, but closer to the ocean than Hediste spp., or among the sessile organisms. Was dominant in Morigasaki-no-hana during the summer. (Source: Website of Tokyo Bay Ecosystem Research Center, Toho University)</p>	
<p>May 2016</p> <p>Mollusca</p> <p>Bivalvia</p> <p><i>Raetellops pulchellus</i></p> <p>Considered as an index species for organic contamination. The length of shells are 2 cm for matured individuals. Shells are thin and semitransparent. This bivalve species was dominant in Sanmai-su during the spring.</p>		<p>May/August 2016</p> <p>Annelida</p> <p>Polychaeta</p> <p><i>Paraprionospio patiens</i></p> <p>Length: 8 cm. Inhabit occasionally very densely in muddy bottom of the inner bay up to 20 m in depth. The back of the latter half of body looks puffy and covered with a thin membrane. Used to be classified as <i>P. pinnata</i>, but the Japanese native species were divided into 4 species. An index species for organic contamination. (Source: Website of Tokyo Bay Ecosystem Research Center, Toho University)</p>	
<p>May 2016</p> <p>Mollusca</p> <p>Bivalvia</p> <p><i>Theora fragilis</i></p> <p>Small sized bivalve with thin, semitransparent shells. Similar to <i>Raetellops pulchellus</i>, <i>Theora fragilis</i> is considered as an index species for organic contamination. Dominant in Sanmai-su during the spring.</p>		<p>May/August 2016</p> <p>Annelida</p> <p>Polychaeta</p> <p><i>Pseudopolydora kempii</i></p> <p>Body length is 1–4 cm. Inhabits in sandy mud areas in the inner bay forming tubes. Was dominant in Morigasaki-no-hana in the summer.</p>	
<p>May/August 2016</p> <p>Mollusca</p> <p>Bivalvia</p> <p><i>Corbicula japonica</i></p> <p>The shell size can get to 4 cm (length) and 3 cm (height) (the one in photo is 3.5 cm in length). Found in sandy mud at the river mouth that receives influence of sea water. This is a representative species in the <i>Corbicula</i> spp. and distributed widely in Japan, and thus important species as a marine resource. Designated as a near threatened species in the Guidebook to threatened animals at tidal flats issued by the Japanese Association of Benthology. Dominant in the tidal flat at the river mouth of Tamagawa River.</p>		<p>May/August 2016</p> <p>Annelida</p> <p>Polychaeta</p> <p><i>Streblospio benedicti japonica</i></p> <p>Small-sized and thread-like Nereididae organism (length: 7 mm; width: 0.3 mm). Densely distributed in the areas of Tokyo Bay where freshwater flows in. Was dominant in Morigasaki-no-hana in spring.</p>	
<p>May/August 2016</p> <p>Mollusca</p> <p>Bivalvia</p> <p><i>Mercenaria mercenaria</i></p> <p>The shell size can get to 15 cm in length (the one in photo is 5 cm in length). Alien species native to North America. Found in tidal flats in the inner bay. Edible and sold in markets in some regions. Observed at St. 31 in Sanmai-su in spring and summer.</p>		<p>May 2016</p> <p>Annelida</p> <p>Polychaeta</p> <p><i>Heteromastus</i> sp.</p> <p>About 5 cm in length. Mainly found in sandy mud bottom in inner bay. Extremely long. Living organisms have a pale red body with dark red spots. Relatively common at foreshore tidal flats in the deeper part of Tokyo Bay. Was dominant at St. 31, Morigasaki-no-hana, and mud flats at the mouth of Tamagawa River (source: Website of Tokyo Bay Ecosystem Research Center, Toho University).</p>	

**Oxygen-deficient water mass: a threat to living organisms**

In each summer, an “oxygen-deficient water mass” (water mass with low dissolved oxygen (DO) level) is formed for a long period and in wide areas at lower layers in Tokyo Bay, especially in Tokyo Inner Bay. This mass is a cause of inhibition of development and inhabitation of aquatic organisms, raising a serious concern for the aquatic environment of Tokyo Bay.



Planar distribution of bottom DO (dissolved oxygen) in Tokyo Bay (fiscal 2014)

Left: Oxygen-deficient water masses spread in September.

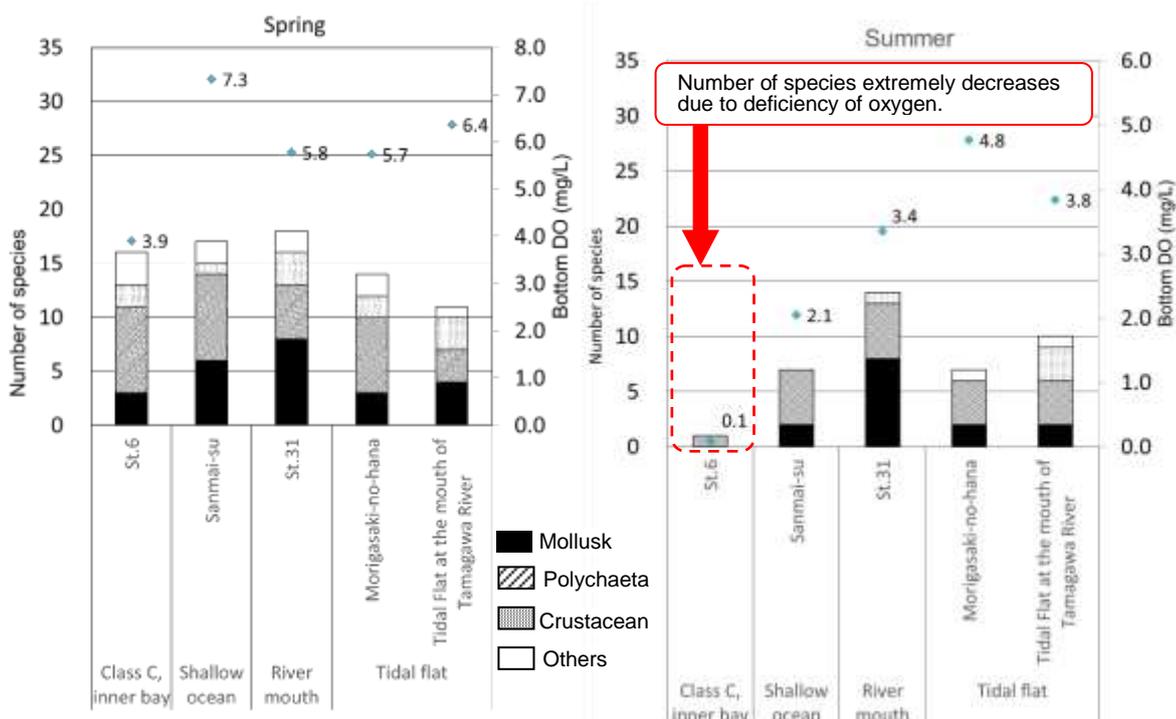
Center: Recovering in November.

Right: Water quality become stable and the DO level recovered in January.

(Source: Website of the Environmental Conservation Council of Governments along Tokyo Bay)

**Influence of oxygen-deficient water mass: from the benthic organism survey**

In the areas used as routes for ships and the areas farther offshore (inner bay), nearly no oxygen was detected at lower layer and no living organism was observed in August (summer) 2015. In the tidal flats and shallow waters, which are unlikely to be affected by oxygen-deficient water mass, organisms were observed in large numbers in summer as well as in spring.



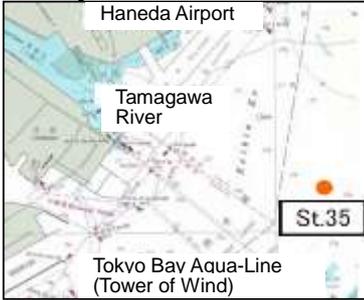
Number of species observed for each survey site (fiscal 2015). Left: May (spring), Right: August (summer) (page 119 of the main part)

# Example Breaking Story (excerption)

## Adult Fish Survey (February 2016)

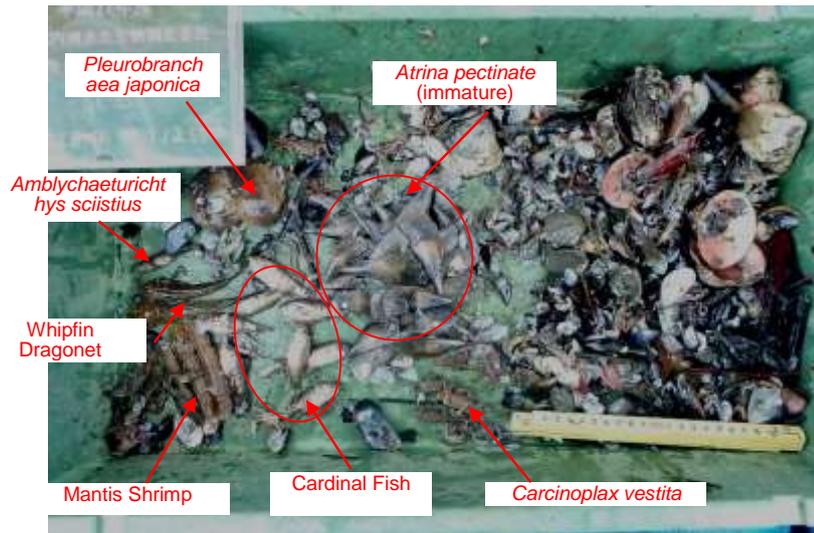
### St. 35

#### Survey sites

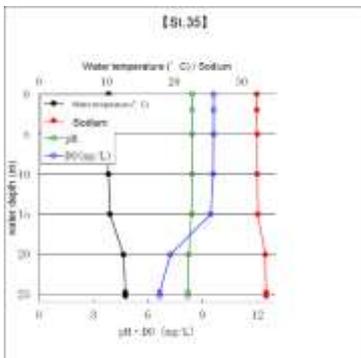


Located in the northeast of the Kawasaki Artificial Island (Tower of Wind) on the Tokyo Bay Aqua-Line. For fish, Cardinal Fish, Whipfin Dragonet and *Amblychaeturichthys sciiustus* have been identified. In other types of organisms, more than 5 species of organism including *Atrina pectinate* (immature), Mantis Shrimp and *Carcinoplax vestita* were observed. The DO level at the bottom layer was normal (6.7 mg/L).

#### Collected samples



#### Water quality



**Cardinal Fish**

Commonly found in sandy mud bottom of Tokyo Bay, but uncommon in the deeper part of inner bay. A small fish (grow no larger than 8 cm). Parent fish protect eggs in their mouths till hatching.



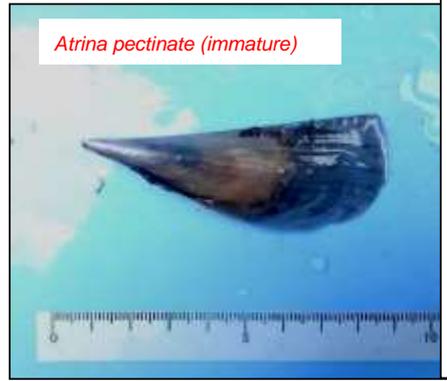
**Amblychaeturichthys sciiustus**

A goby found in sandy mud bottom with slightly deep areas in Tokyo Bay. No record to observe it in adult fish surveys after FY 2001. This is the first observation in 14 years, following *Amblychaeturichthys hexanema* in November.



**Mantis Shrimp**

In Tokyo Bay, found in sandy mud bottom with the depth of 15-30 m. Carnivorous. Feed on crustaceans and Polychaeta. Although small in size, observed continuously in recent years except in summer



**Atrina pectinate (immature)**

As in the case for the last survey, the number of immature *Atrina pectinate* (more than 20 individuals) was highest among the organisms identified at this survey site. The shell size increased (about 8 cm). The fastest recovery from the oxygen-deficient conditions at the bottom resulted in such improvement.