

# **Ecosystem-based Management in Japan: Its status and challenges**

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# 1. Legal frameworks for marine-related policies and fisheries management.

# Ministries related to marine policies

- Ministry of Land, Infrastructure and Transport (shipping, landfill, coast guard, etc.)
- Ministry of Trade and Industry (ocean bottom resources, heavy industry complex development, etc.)
- Ministry of Health, Labor and Welfare (water quality control, etc.)
- Ministry of Agriculture, Forestry and Fisheries (fisheries production, resource management, etc.)
- Ministry of Environment (natural parks, endangered species protection, etc.)
- Ministry of Education, Culture, Sports, Science and Technology (basic ocean researches, national heritages, etc.)
- Ministry of Defense (marine defense, border control, etc.)
- Ministry of Foreign Affairs (territorial issues, int'l negotiations, etc.)

These 8 ministries are carrying out wide range of marine-related policies based on dozens of Int'l/domestic laws.

# Major EBM-related international laws in effect for Japan

- UNCLOS
- CBD
- Ramsar Convention
- CITES

# Laws for Fisheries Management

- Overall Policy Direction: **Fisheries Basic Act of 2001**

It's core concept: " **Stable supply of fisheries products and fisheries industry development by means of management of fisheries resources as a component of ecosystems.**"

- Other fisheries-related laws:
  - Fisheries Law of 1949, Fisheries Cooperative Association Law of 1948, Fisheries Vessels Law of 1950, Fisheries Resources Conservation Law of 1951, Marine Resources Conservation and Management Law of 1996, EEZ law of 1996, etc.

# Basic regime of fisheries management in Japan

- Coordinating organizations of fishers have the authority to decide who, where, and how to use coastal ecosystems (including fishery resources) via fishery rights/licenses and many rules.
- Government and research institutions support their activities by administrative/scientific advices.
- Government also introduces official resource management measures such as TAC or TAE (Total Allowable Efforts), as well as protection measures for endangered species.



# Fisheries Coordinating Organizations

Level	Organization	Function
National Level	<b>Fishery Policy Council</b>	The advisory body to the government for national level fishery coordination, design of national fishery policy, etc.
Multijurisdictional Level	<b>Regional Fisheries Coordinating Committees (RFCCs)</b>	Coordination of resource use and management of highly migratory species. Also addresses Resource Restoration Plans.  ( Since 2001 )
Prefectural Level	<b>Area Fishery Coordinating Committees (AFCCs)</b>	Mainly composed of democratically elected fishermen. Coordination through the Fishery Ground Plan, Prefectural Fishery Coordinating Regulations, and Committee Directions.
Local Level	<b>Local Fisheries Cooperative Associations (local FCAs)</b>	Composed of local fishermen. They establish operational regulations (FCA regulations) that stipulate gear restrictions, seasonal/area closures, etc., according to local environment.
More Specialized Purpose	<b>Fishery Management Organizations (FMOs)</b>	Autonomous body of fishermen. FMO rules are more detailed and stricter than the FCA regulations. Composed of fishermen with same gear or same target species.

Formal organizations

Informal Org.



# Basic regime of fisheries management in Japan

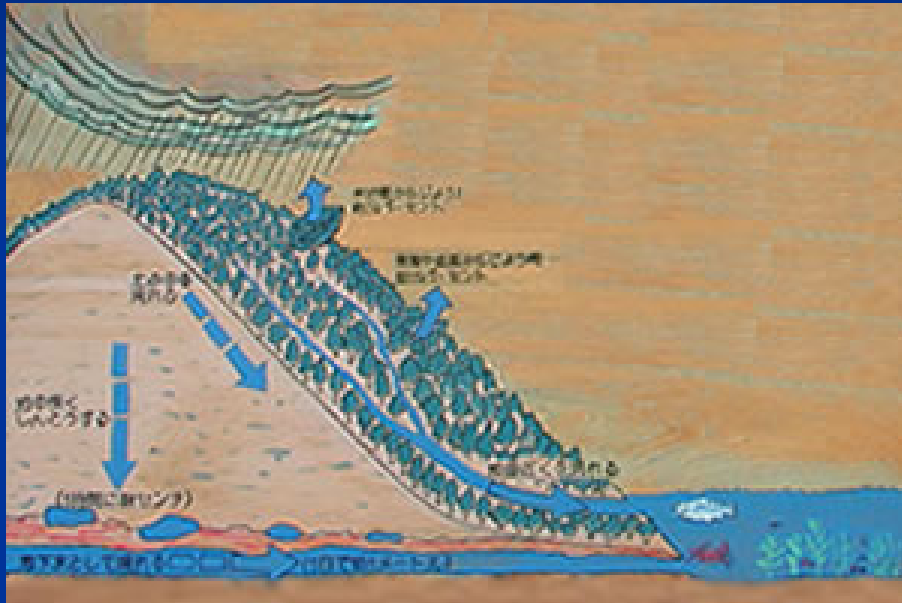
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## 2. Fisheries management and EBM activities in Japan

## 2.1) Voluntary activities on local basis

- At the local areas (esp. coastal areas), fishers and local residents have voluntarily implemented a wide range of measures to address specific local conditions.
- These measures include **not only conventional resource management measures** such as input, output, gear, or seasonal limits, **but also include EBM activities.**

# Voluntary Activities (1)



## Local legend says

# “Forests are the roots of coastal fish”

(<http://www.jf-net.ne.jp/amhiranaigyokyo/>)



## Forestation activities by local people

(<http://www.jf-net.ne.jp/hkyubetsu/sigen.htm>)

# Voluntary Activities (2)



Promotion of environmentally-friendly detergent produced by the local fishers association.

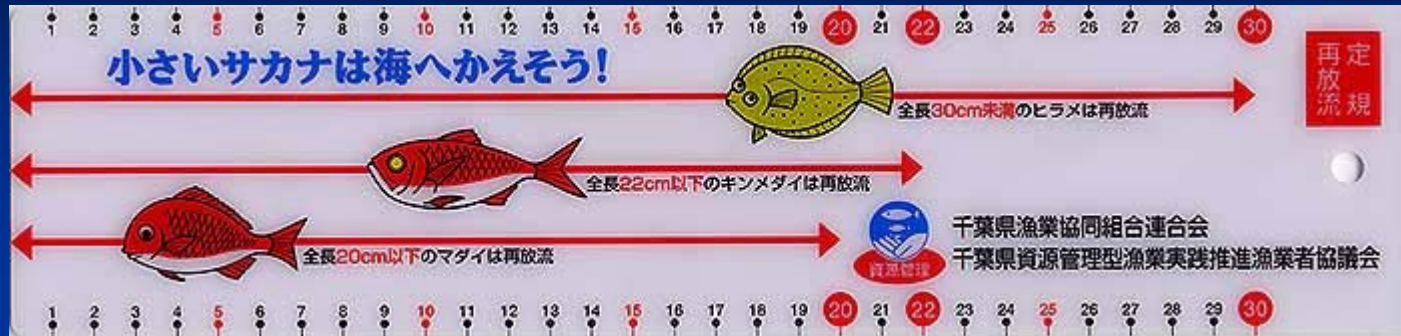
(<http://www.jf-net.ne.jp/fsgyoren/work1.html>)



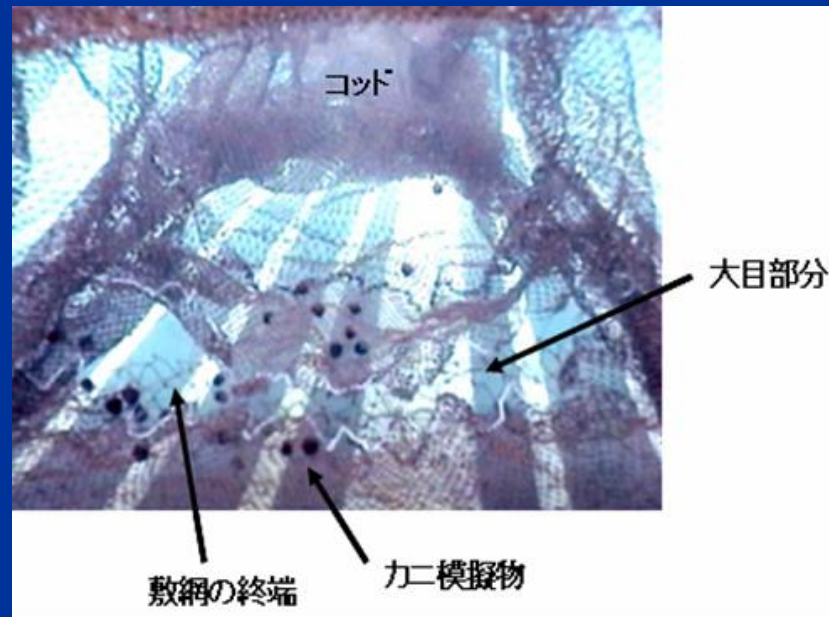
Cleanup activities by local people

(<http://www.minato-j.fks.ed.jp/seito/gyouji/shizen/shizen.htm>)

# Voluntary Activities (3)



Fish scale distributed to fishers  
(<http://www.jf-net.ne.jp/cbgyoren/sigen.html>)



Improvement in fishing gear



# Voluntary Activities (4)

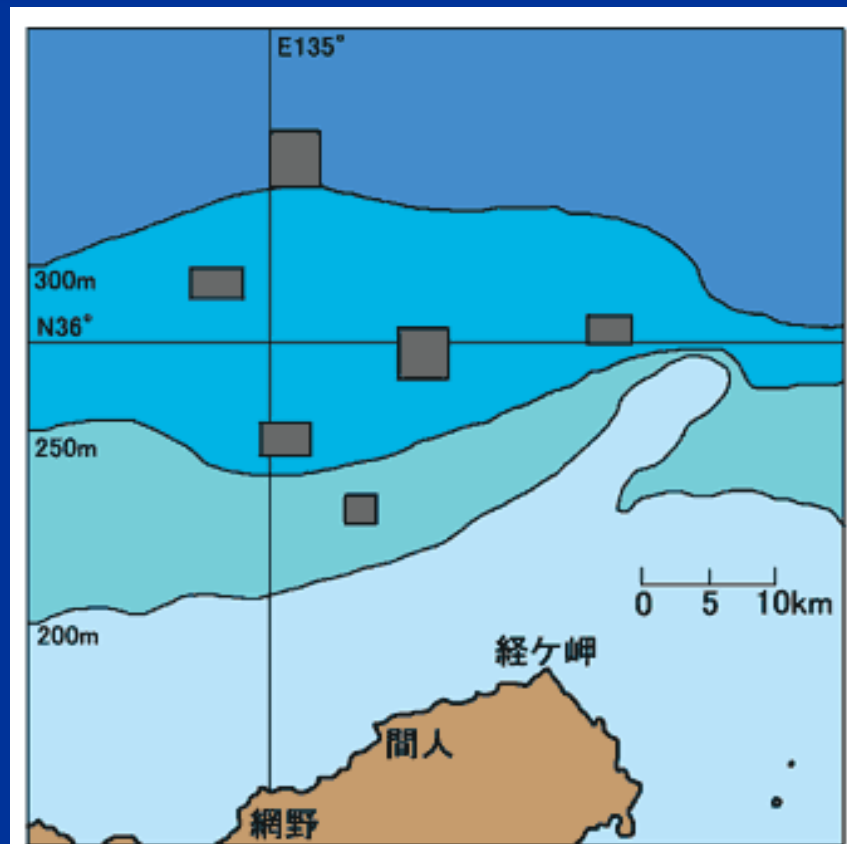


Resource Enhancement (release of seeds)

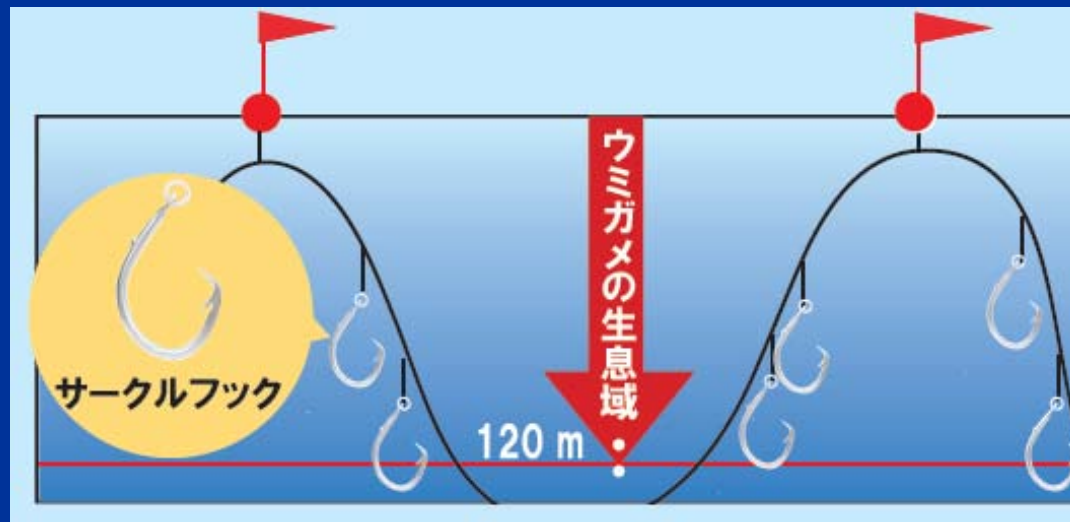
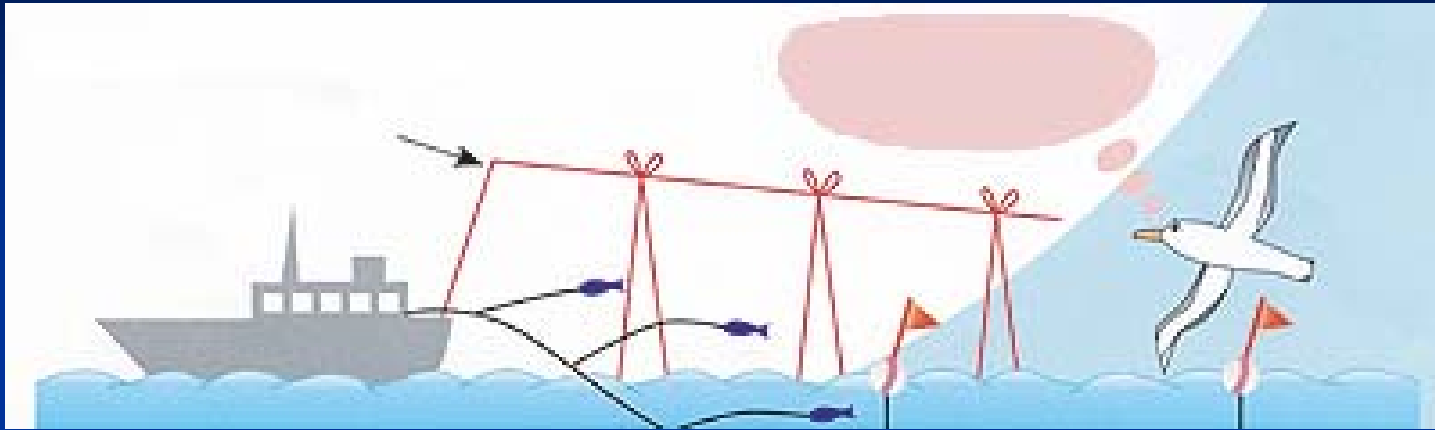


# Voluntary Activities (5)

Introduction of MPAs (no-take zones) in Kyoto  
prefecture (Makino 2007 in FAO Tech. Paper)



# Voluntary Activities (6)



Introduction of Bycatch Prevention Gears for longline

<http://www.oprt.or.jp/>

# Meetings and discussions for better management



<http://www.pref.aomori.jp>



<http://www.pref.mie.jp>



<http://www.pref.iwate.jp>

- To sum up, local fishers are engaged **not only in fishery operations, but also in resource management and a part of EBM**. They spend a lot of time for these activities.
- According to my personal experiences in field researches, core members of fishers organizations are attending about **20 meetings per month**.
- Extreme case: before the implementation of **3-years voluntary ban on sandfish fishery in Akita Pre.**, local fishers (and local research institutes) held more than 200 meetings for 6 months.

## 2.2) Official measures implemented by Government



# Governmental activities (1)



## Restored Tidelands

(<http://www.kita9.ed.jp/yoshida-j/sone.htm>)



## sewage-treatment systems

(<http://www.mizota.co.jp/gesui.html>)

# Governmental activities (2)



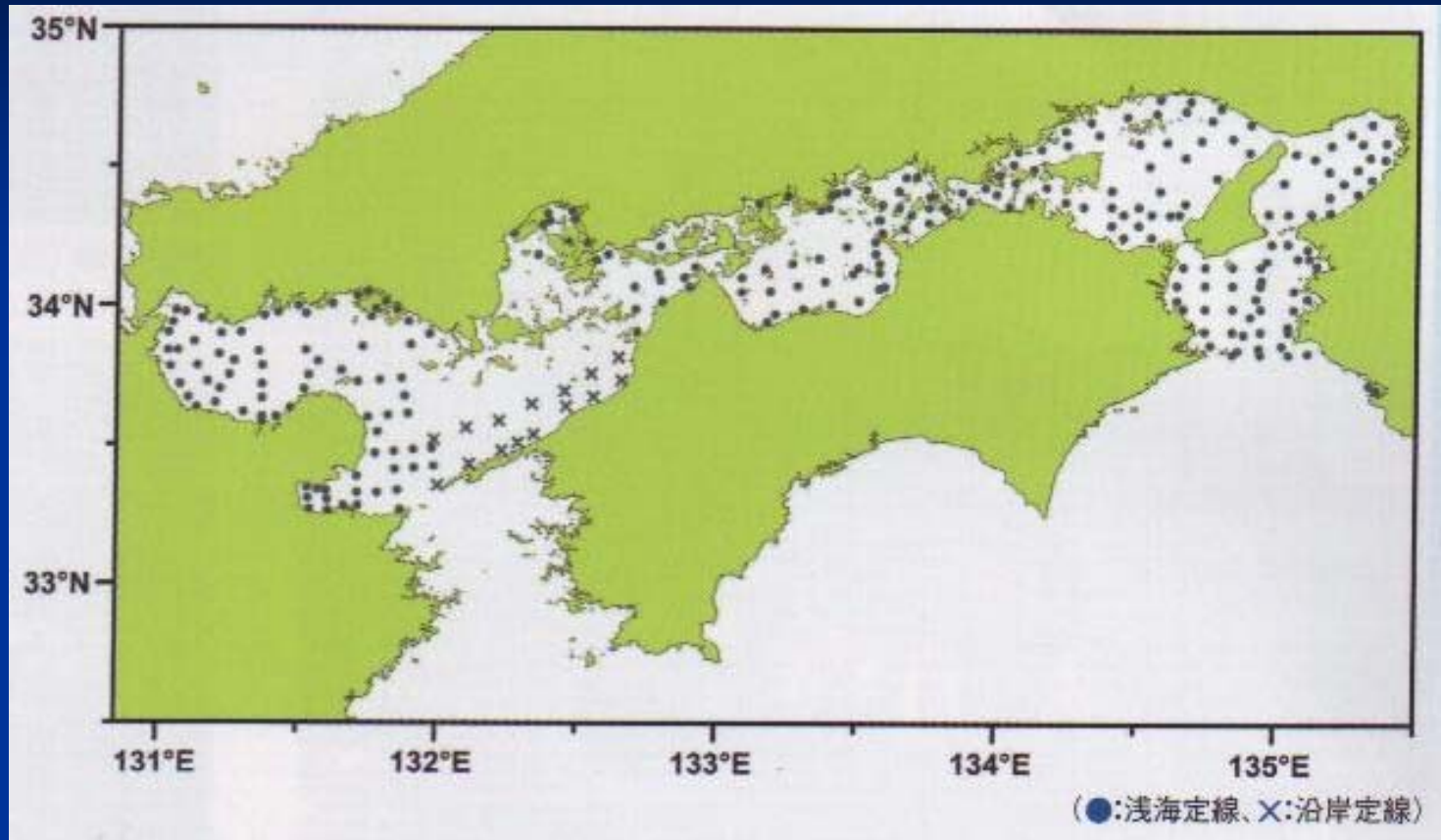
construction of seaweed beds  
(<http://www.jwrc.or.jp/profile/conservation/4.htm>)



construction of artificial reefs  
([http://www.foodkingdom-miyagi.jp/m/toukei/miyagi-suisan/suisan\\_5-3.htm](http://www.foodkingdom-miyagi.jp/m/toukei/miyagi-suisan/suisan_5-3.htm))

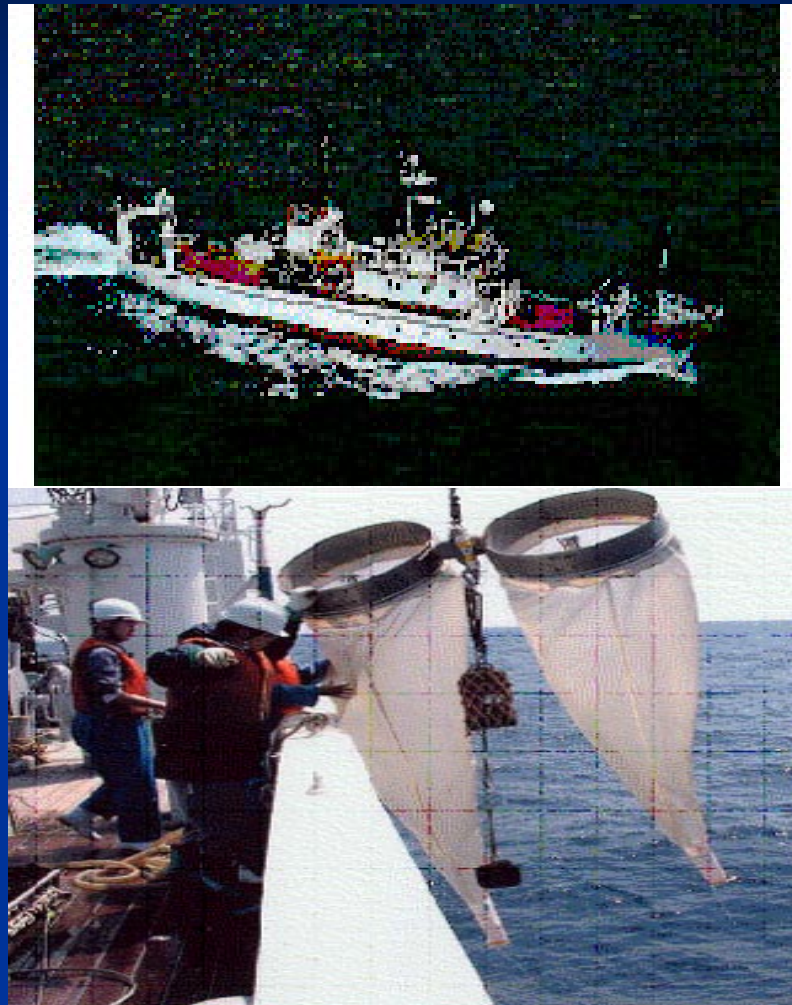
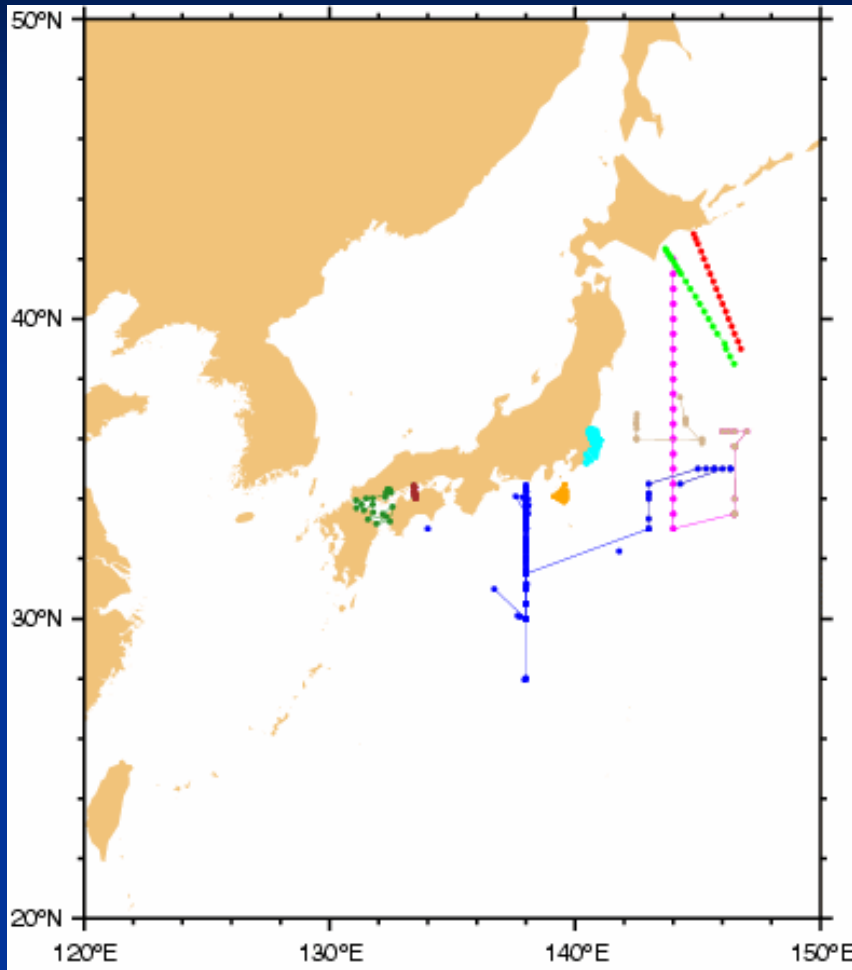


# Governmental activities (3)



- At coastal areas, local governments have conducted monthly fixed-points monitoring (temp., sal., nut., phy.p., etc).

# Governmental activities (4)



At offshore areas, Fisheries Research Agency have conducted fixed-point monitoring

(<http://www.nrifs.affrc.go.jp/eiyo/>)

**Also, catch data submitted from fishers org.s  
havs been compiled by the gov. for over 50 years**

[illegible]

**ship name**

## Fisherman's name

# Catch day

## Catch by species and category (size/type)

## Code of Fishing area

## Landing port

# Landing day

## Landings by species and category (size/type)

# Changes in catches for last 50 years

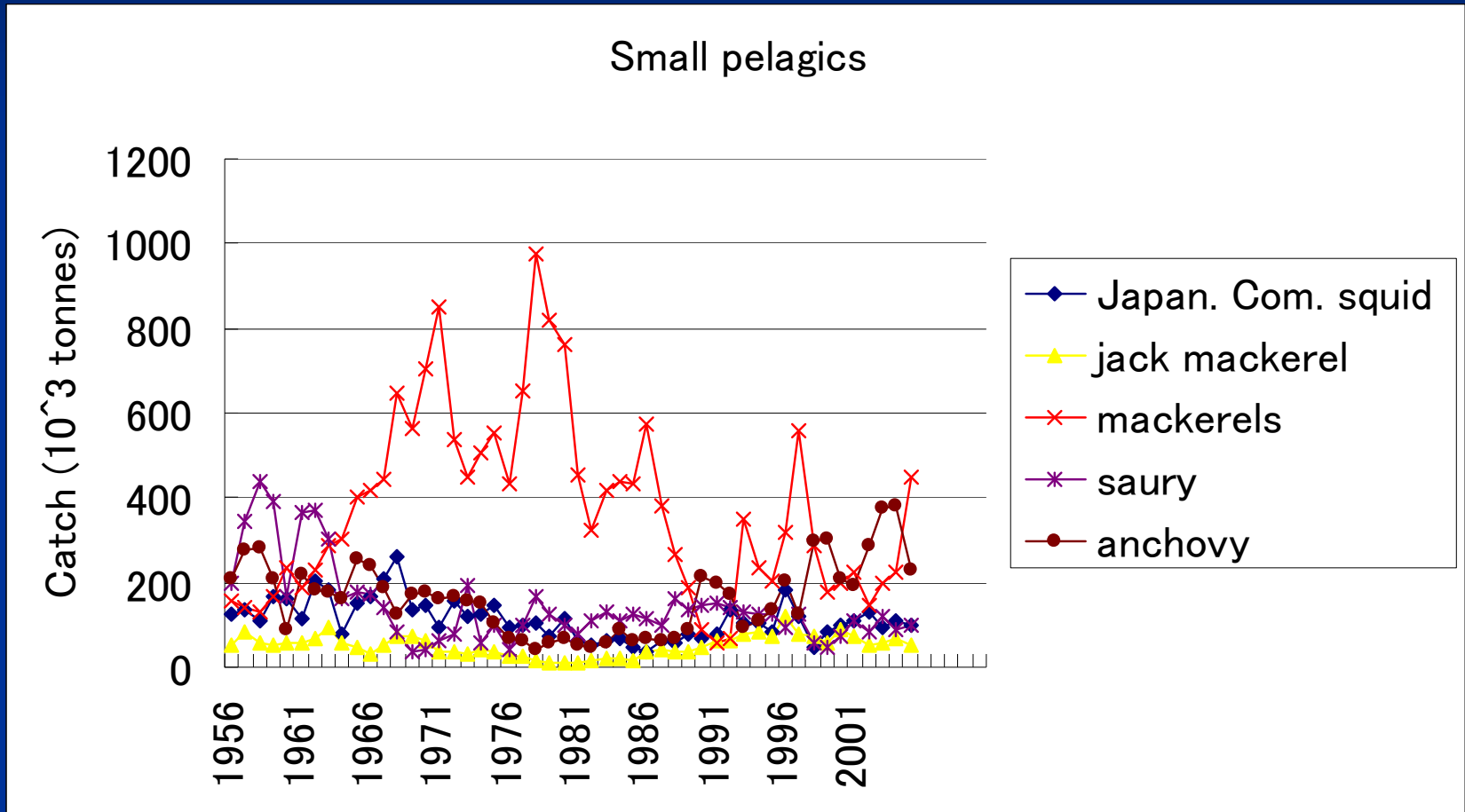
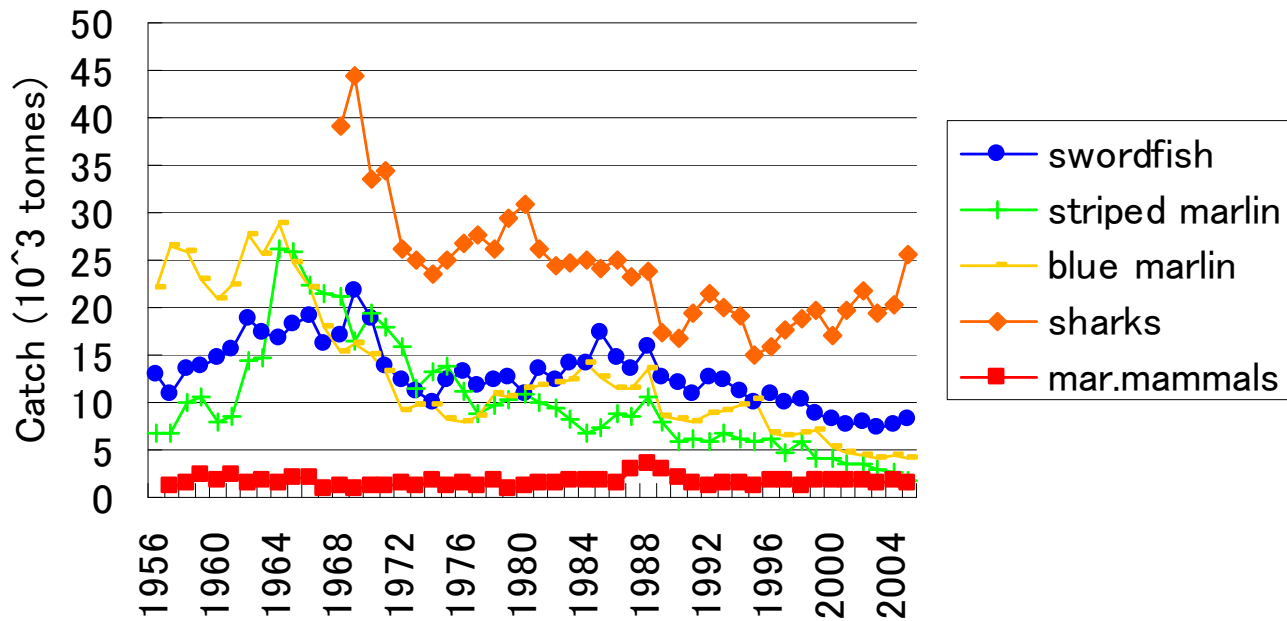
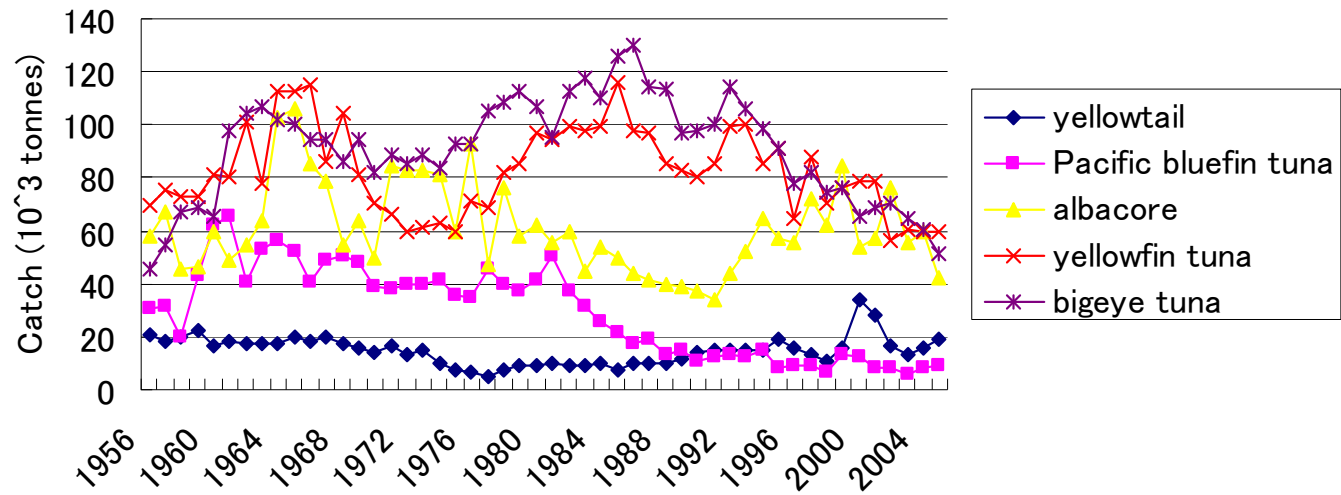


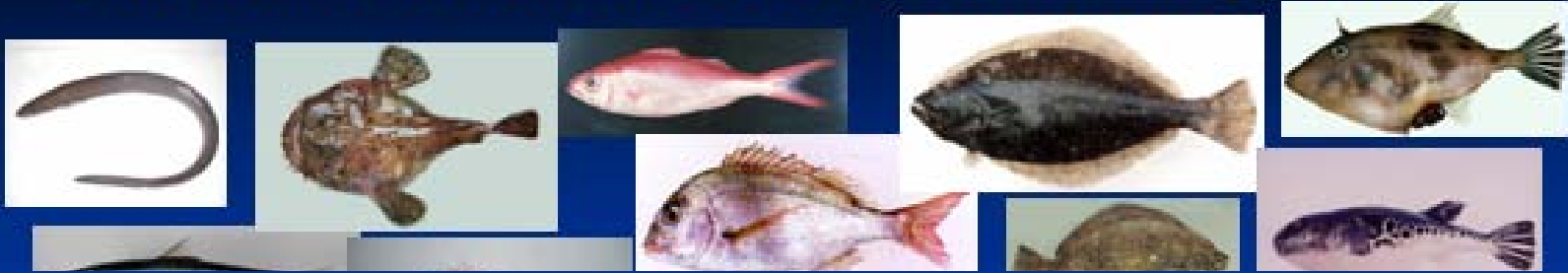
Fig.1. Catch of small pelagics.

# Piscivores





**Using catch data and monitoring results,  
Biomass estimate for more than 70 species**



**Used for official resource  
management measures  
(i.e. TAC and TAE)**



# Total Allowable Catch (TAC) Control Species

Modified from Mitani (2007)

The enforcement ordinance of the law

- (1) Pacific saury, *Cololabis saira*
- (2) Walleye pollack, *Theragra chalcogramma*
- (3) Jack mackerel, *Trachurus japonicus*
- (4) Sardine, *Sardinopes melanostictus*
- (5) Mackerels, *Scomber japonicus* & *Scomber australasicus*
- (6) Snow crab, *Chionoecetes opilio*
- (7) Japanese common squid, *Todarodes pacificus*



**Next step: incorporation of multi-species perspectives**



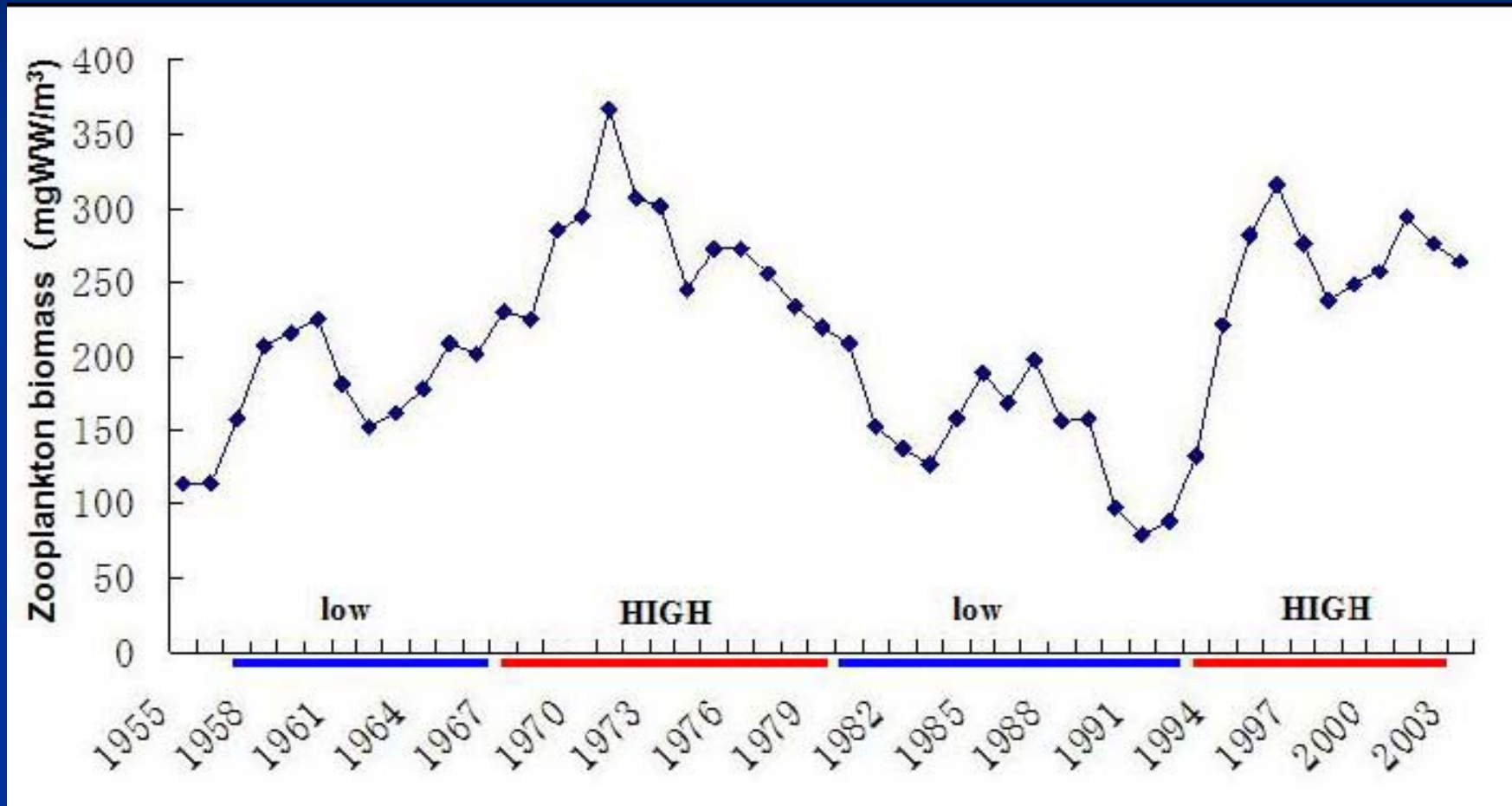
# Total Allowable Fishing Effort (TAE)

## Control Species

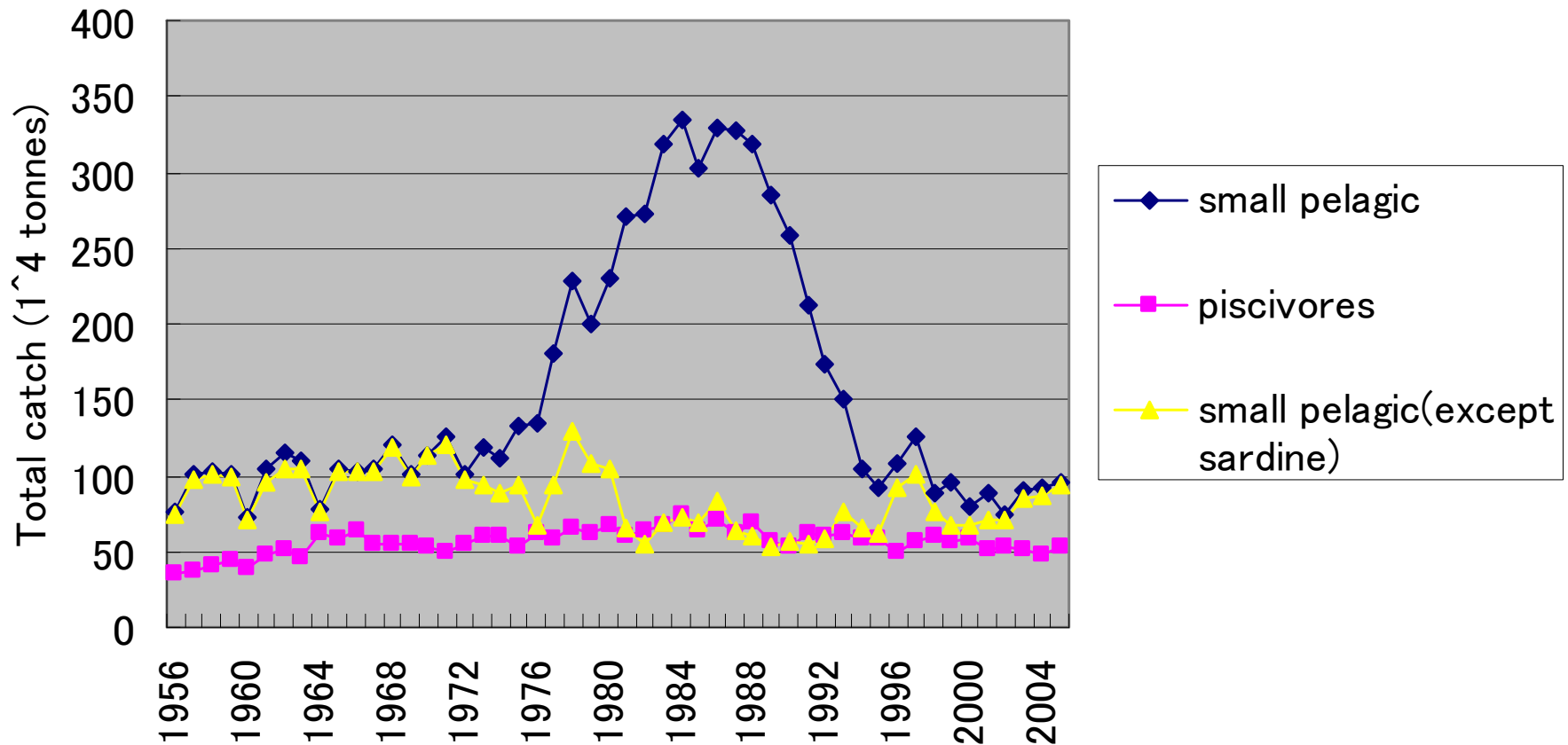
- (1) Akagarei (Flatfish),  
*Hippoglossoides dubius*
- (2) Samegarei (Flatfish),  
*Clidoderma asperrimum*
- (3) Spanish mackerel,  
*Scomberomorus  
niphonius*
- (4) Puffer, *Takifugu rubripes*
- (5) Magarei (Flatfish),  
*Pleuronectes herzensteini*
- (6) Yanagimushigarei  
(Flatafish), *Tanakius  
kitaharai*, etc.



Also, catch/monitoring data and biomass estimates can be used to derive various EBM indices

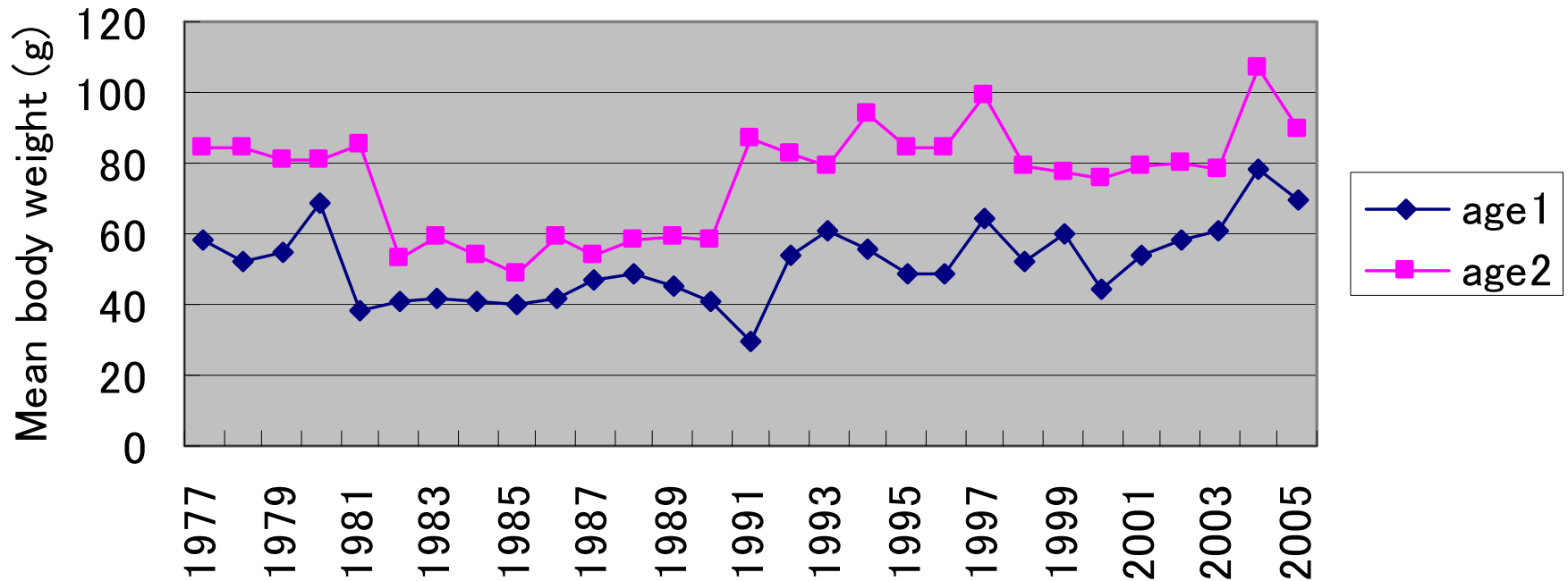


Long term fluctuation of zooplankton biomass



Relative catch of each trophic class

Body size at each age (sardine)



Body size of sardine at age 1 and 2

# Institutional Advantages of Japanese fisheries management for EBM

(Makino 2005)

- Decentralized management systems.
- Use of both local and scientific knowledge.
- Multi-scale and interlinked coordinating organizations.
- Adaptive and flexible management processes based on daily fishery operations.

# However

- The main purpose of these management and monitoring activities is the “**increase of sustainable fisheries production**”, which would not necessarily leads to EBM.

**Some supplemental measures should be implemented to fill the gap btw fisheries management and EBM.**

# Institutional Challenges and necessary policy measures for EBM (Makino 2005)

- Ecosystem perspectives (e.g. inter-species relationships) .
- Stakeholder involvement (not only fishers).
- Identification of ecologically important data, and role-sharing in data collection.
- Use of ecosystem indices.
- Use of the systems of MPAs.



### 3. A Case of EBM in Japan: Shiretoko World Natural Heritage

# Shiretoko World Natural Heritage



- One of Japan's most beautiful and unspoiled peninsula. Very popular for sightseeing.
- No roads lead to the peninsula, and the northern tip can only be viewed from boats or be reached on multi day trekking.



# Valuable Nature



- The peninsula is home to a variety of wildlife, including brown bears, deer, foxes, and sea mammals.
- In winter, the peninsula's coast is surrounded by drift ice.



# Coastal Zone Management Plan

- As a condition for the registration to W.N.H. in 2005, UNESCO requested the formulation of coastal zone management plan to achieve **multiple and sustainable use of coastal zone** (including coastal fisheries and tourism), and **ecosystem-based management** of coastal area.
- Several new measures have been implemented **to expand/modify existing fisheries management system to an EBM system.**

# 1. Inter-species relationship

## Steller's sea Lion

(Endangered Species, but destroyer of set nets. Fishers hate them)



Number of local population is controlled based on scientific information (PBR).

## Walleye Pollack

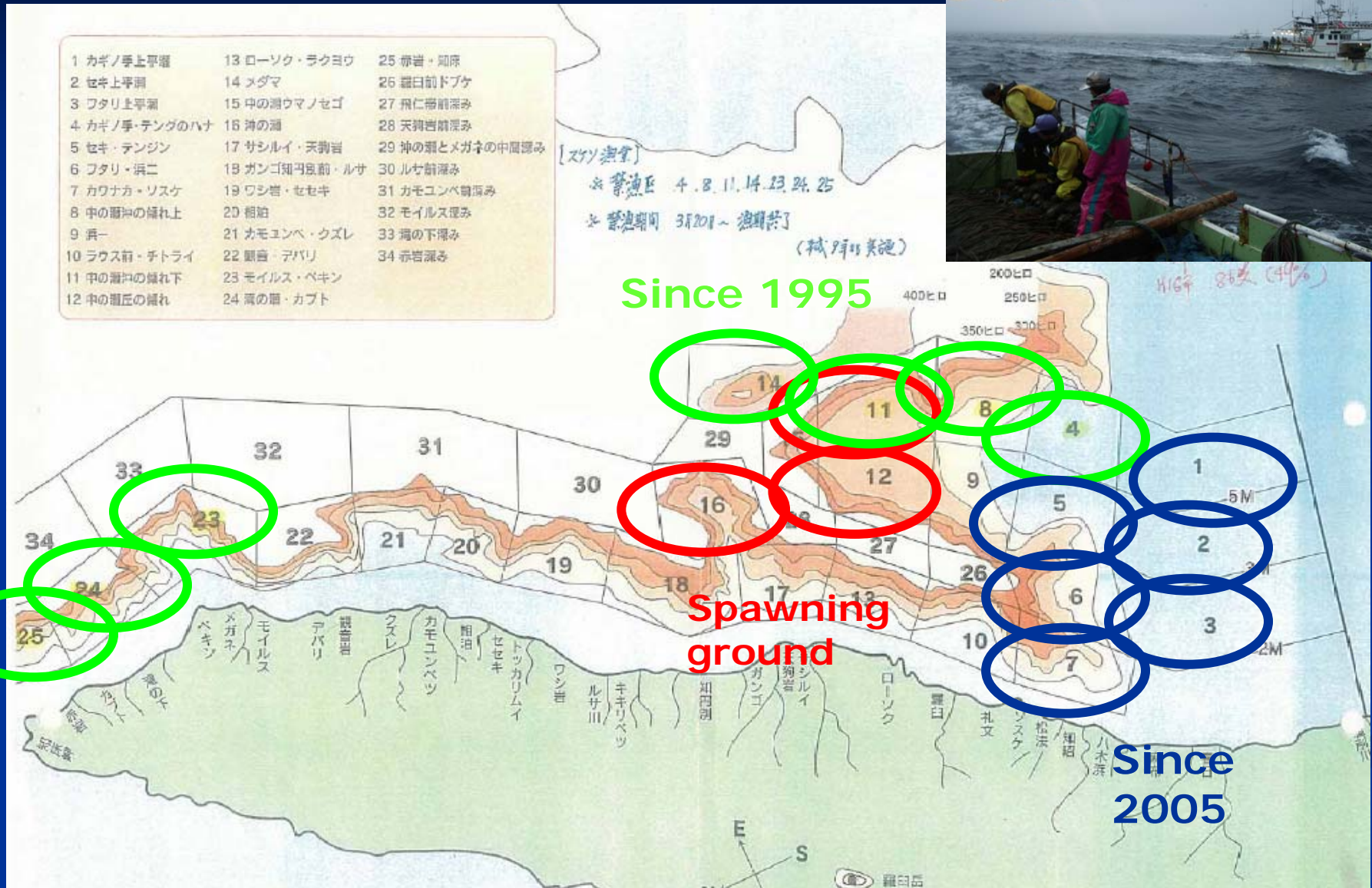
(Prey species of Sea Lion, and target species of coastal fishery)



Biomass of local population is managed and sustained by TAC and MPAs.



# MPAs to protect Walleye Pollack



Bottom trawlings are totally banned at the coastal area



## 2. Fish pass for salmon and trout to promote material circulation



# 3. Stakeholders Involvement

- Main stakeholders in this case are **not only local fishermen, but other citizens and tourism sector** are also important for decision-makings in EBM objectives/measures.

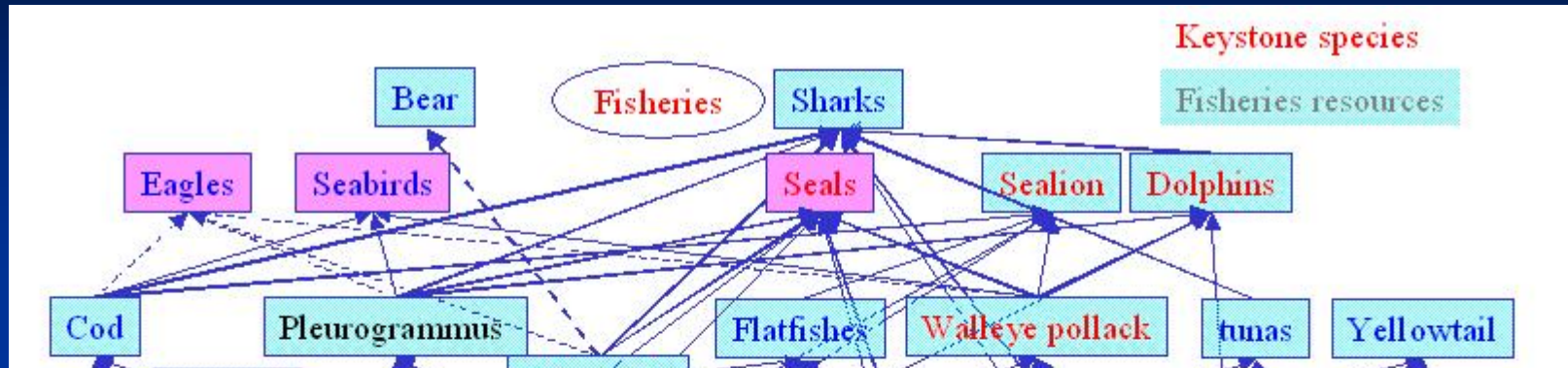
## → **Establishment of new coordinating org.s**

- **Scientific Committee** (academics, fishers, central ministries and local gov.s)
- **World Heritage Liaison Conference** (central ministries, local gov.s, NGOs and fishers)
- **Committee for Adequate Use** (local gov.s and tourism)

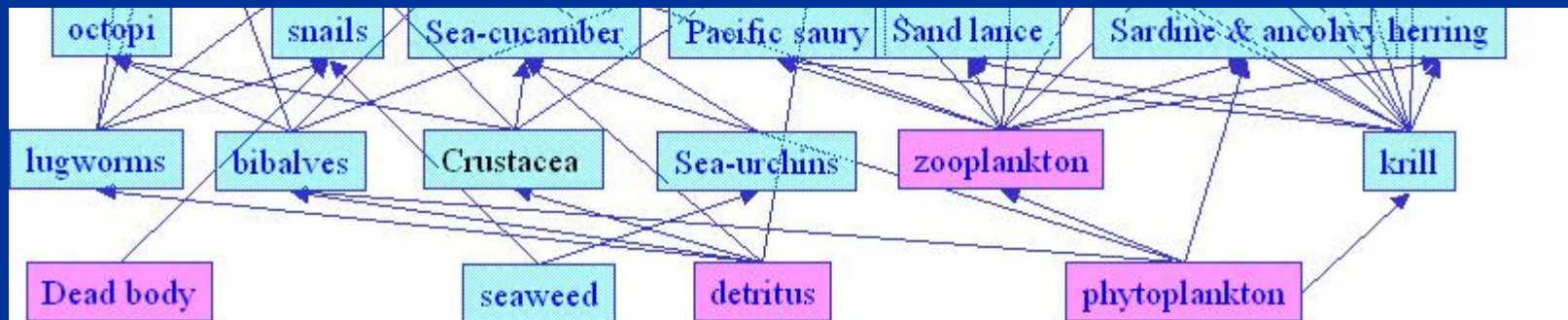
## 4. Data collection and Monitoring

- The Science Committee firstly depicted the foodweb structure of the WNH area.
- Now, the Scientific Committee is identifying the other necessary data for ecosystem conservation, such as weather, water quality, ice drift, planktons, key stone species, etc.

# Coastal Foodweb at Shiretoko WNH

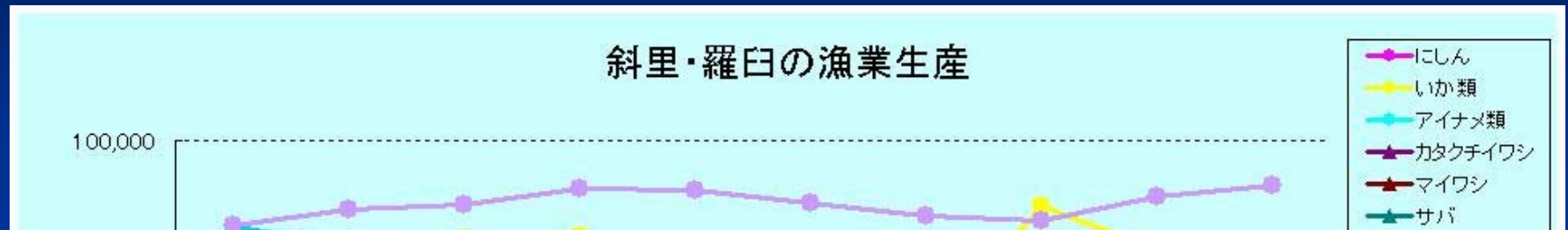


**Most of keystone species are caught and recorded by local fishers org.s!**

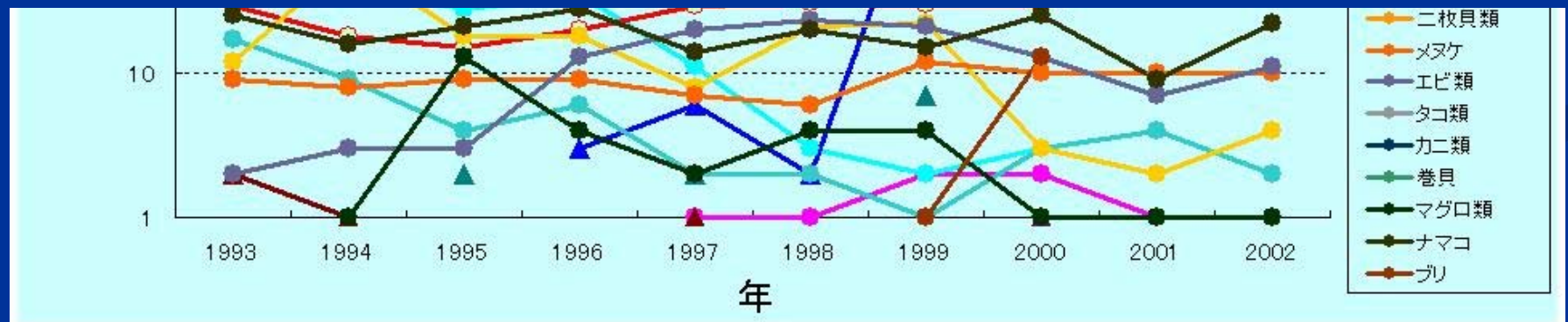




# Fisheries production statistics (tons) at Shiretoko WNH



Very informative time-series data for  
monitoring the changes in ecosystem  
structure/functions



# Data collection and Monitoring

- The Science Committee firstly depicted the foodweb structure of the WNH area.
- Now, the Scientific Committee is identifying the other necessary data for ecosystem monitoring, such as weather, water quality, ice drift, planktons, key stone species, etc. and summarizing them on GIS system.



# The features of EBM activities in *Shiretoko* WNH

- Sustainable fishery as an important and indispensable part of the EBM.  
(esp. role of fisheries statistics in ecosystem monitoring)
- Endangered species population is scientifically sustained to co-exist with fisheries.
- Wide-ranging Stakeholder involvement via newly founded coordinating organizations.

This *Shiretoko* approach would be one of the model case for future EBM in Japan

# Future Challenges in *Shiretoko* WNH

- Fisheries data is not enough for EBM, so **supplemental monitoring items** should be identified and their monitoring system should be established in a sustainable and cost-effective manner.
- Then, science/experience-based theory to connect changes in **ecosystem indices** (e.g. keystone species) **and policy reactions** (incl. fisheries mngmt) should be established.

# New movement in Japan:

## Ocean Basic Act of 2007

- Legislated in April, in effect in July, in order to sweep away the obstacles caused by vertically-segmented administrative system amongst 8 ministries.
- Integrated Marine Policy Headquarter (IMPH) was founded, and headed by the prime minister.
- It covers all the ministries related to marine activities, policy, and researches.
- Now IMPH is drafting the Basic Plan of Integrated Marine Policy.

It is expected to move towards  
integrated/coordinated EBM policies by 8 ministries

Thank you very much



# Research Needs

- 漁業の存在の意義: 日本には50年以上の歴史データがある。これからも漁業があればデータは来る。おそらくモニタリングのB/Cは非常によい→漁業振興と生態系管理の接点。
- データ: 現場レベルでは、漁獲物に対するもっと詳しいデータ(サイズ、熟度、銘柄など)が記録されている→でも、カテゴリーの分け方が流通由来であり、地域や魚種によりばらばら→科学に基づいて、キャリブレートできるようになれば、生態系モニタリングにさらに有用となる。また、漁業データでは足りないけど必要なデータは何か特定し、そのモニタリング体制を作る。
- 社会科学の重要性: ただし漁業は経済活動→選択行動や多魚種漁業の面を考慮して、漁獲データを生態系データにキャリブレートする手法が重要→特に経済分析との統合
- 漁業による生態系モニタリング: 食物網の図を作ること、そして、物質循環や生態系モデルより漁業操業と生態系の構造・機能の関係性に関する科学的考察に基づき、何がどうなったらどうするべきか、を明らかにすることが最終的に必要。
- 利害関係者の参画の必要性: 漁業制度は自治的でローカルで柔軟であり、生態系管理に大いに貢献している。また漁民は一年を通じて海をみており地元環境に習熟しており、それが合理的だろう。ただし、漁業制度だけでは足りない部分がある。どうしても漁業の価値の高い種に施策が集中しがち→幅広い生態系サービス利用者の意見を反映している意思決定制度が大切。
- 海洋基本法: 経済規模からいえば、海運や埋め立てがずっと大きい。よって、海洋基本法下の海洋政策全般がそちら側に引っ張られる恐れ→まず、生態系サービスには貨幣で評価されていない価値があり、それはとても大きい(Costanza)。漁業が食料生産のみならず、その大きな価値の保全に貢献できることを科学的に立証すれば、発言力は保てるはず。



## ■ Forest Management

- Natural Park Law of 1957, Forestry Basic Act of 1964, Environment Basic Act of 1993, Fisheries Basic Act of 2001, etc.

## ■ Water Pollution control

- River Law of 1964, Water Pollution Control Law of 1970, Marine Pollution and Disaster Control Law of 1970, Natural Environment Protection Law of 1972, etc.

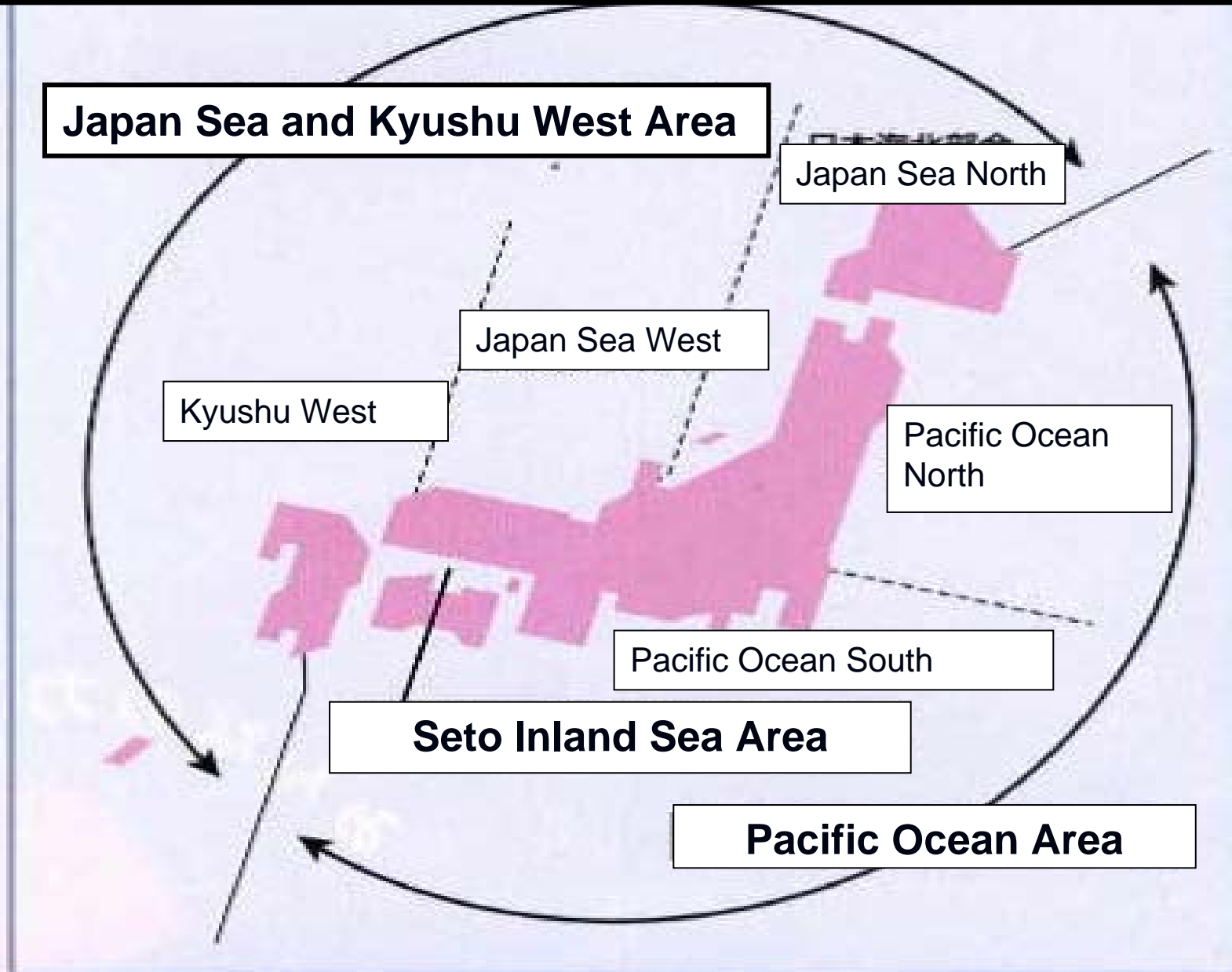
## ■ Coastal zone use

- Landfill Law of 1921, Shipping Law of 1949, Port and Harbor Law of 1950, Natural Park Law of 1957, etc.

## ■ Endangered species Protection

- Beasts and Birds Protection and Hunting Law of 1918, Endangered Species Protection Law of 1992, Environmental Assessment Law of 1997, etc.

# The Wide Area Fisheries Coordinating Committees Since 2001



# Fisheries Co-management in Japan

(Makino and Matsuda 2005)

## Official management measures by gov.

- **Entrance control:** Rights, licenses, etc.
- **Effort control:** Gear/season/ground limits, Total allowable effort (TAE) settings.
- **Output control:** Size limits, Total allowable catch (TAC) settings.
- **Environmental conservation:** Water quality control, upstream forestations, alien invasive species controls, marine protected areas (MPAs) constructions.
- **Resource Recovery:** Resource Recovery Plans, fish seeds releases.

## Voluntary management measures by local fishers

- **Entrance control:** Reductions of fishing vessels, eliminations IUU vessels, promotion of the positive list scheme.
- **Effort control:** Additional gear/seasonal/ground limits.
- **Output control:** Additional size/catch limits.
- **Environmental conservation:** Promotion eco-friendly detergents, sea grass bet / tidal land conservations, upstream forestations, coastal cleanups, implementation of bycatch prevention gears, marine protected areas (MPAs) constructions.
- **Resource Recovery:** Fish seeds releases.

# Methods for Integrated mgmt for Coastal Fisheries

(examples from activities at Japanese coastal area)

## 1. Land & coasts

### 1-a) Conservation/improvement of material circulation and influx quality

- mgmt of upper stream forests (incl. forestation), - Improvement of sewage-treatment systems, - Promotion of environmentally-friendly detergent, - improvement of river environment, etc.

### 1-b) Conservation/restoration of environmental functioning at coastal area

- Conservation/restoration of seashore or tidal lands, - Cleanup activities at coastal area, - measures for ship bottom paint, - crisis-management system for accidental oil spills, etc.

## 2. Under the sea

### 2-a) Conservation/restoration of fish habitat for reproduction, growth, and stock enhancement

- construction of seaweed beds or artificial reefs, -establishment of marine protected areas, restrictions in fishing gears, -sea bed digging up, -promotion of low load aquaculture, etc.

### 2-c) To leave matured stock to avoid the recruitment overfishing

- Setting catch limit (e.g. TAC), - Protection of egg-holding fish by gear/area restriction.

### 2-b) Use of inter-species or food web relationships

- Extermination/capture of predator species, - conservation/release of prey species

### 2-d) Protection of small fish to avoid the growth overfishing (economic overfishing)

- Lower size limit, -Selective gears and areas

### 2-e) Direct stock enhancement

- Seed release, - intermediate culture.

## 3. Catch, and sell

### 3-a) Efficient use of resource, e.g., high value-added or costs reduction

- Acoustic conditioning to control fish dispersal, - improvement of the fish treatment on board (icing, size selection, well preservation, etc), - Coordination for fishing ground use, - Prevention of over competition or over capitalization, - Strategy for fish processing and marketing, - introduction of sanitation standards, etc.

### 3-b) Improvement of social welfare through fishery industry

- Setting the labor standards, the lowest wages, or fishery insurance systems, - Promotion of seafood related industries (e.g. processing, marketing, catering), - Promotion of exports, etc.

## 4. Social Capitals

### 4 Social capital development and accumulation

- Education and empowerment, -institutional development, -formation of local fishermen's org, -improvement of fisheries infrastructures (e.g. ports), -improvement of statistical systems, -Promotion of research activities, etc.



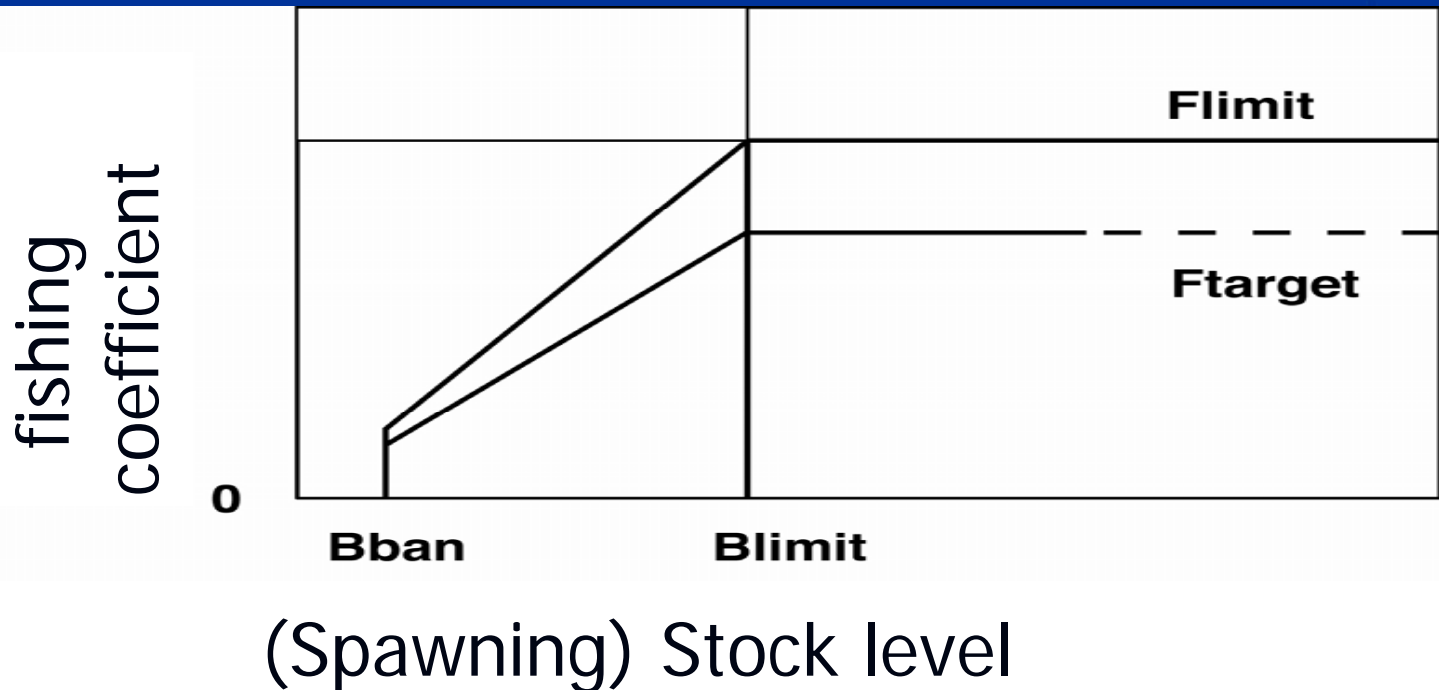


Total planning of fishery grounds  
(<http://www.miegyoren.or.jp/gyoren/umisyokai/su-isansigen/image1.html>)

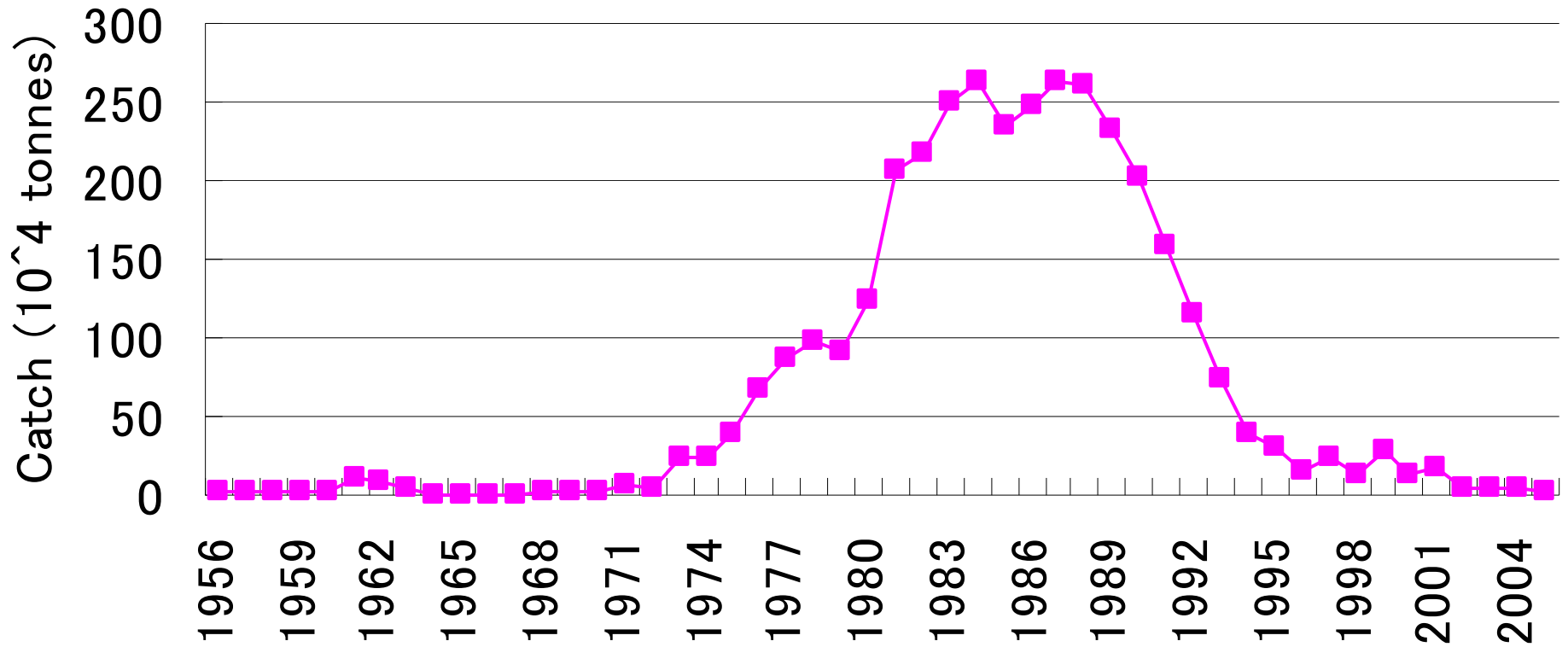
Lecture of processing techniques  
(<http://www.fishexp.pref.hokkaido.jp>)

# Basic Idea of ABC :

1. Recommend appropriate  $F$  (a kind of Coefficient of Fishing Pressure)
2. When Stock level is lower than standard level ( $B_{limit}$ ),  $F$  should be decreased.



## Sardine



Catch of sardine

## Skipjack

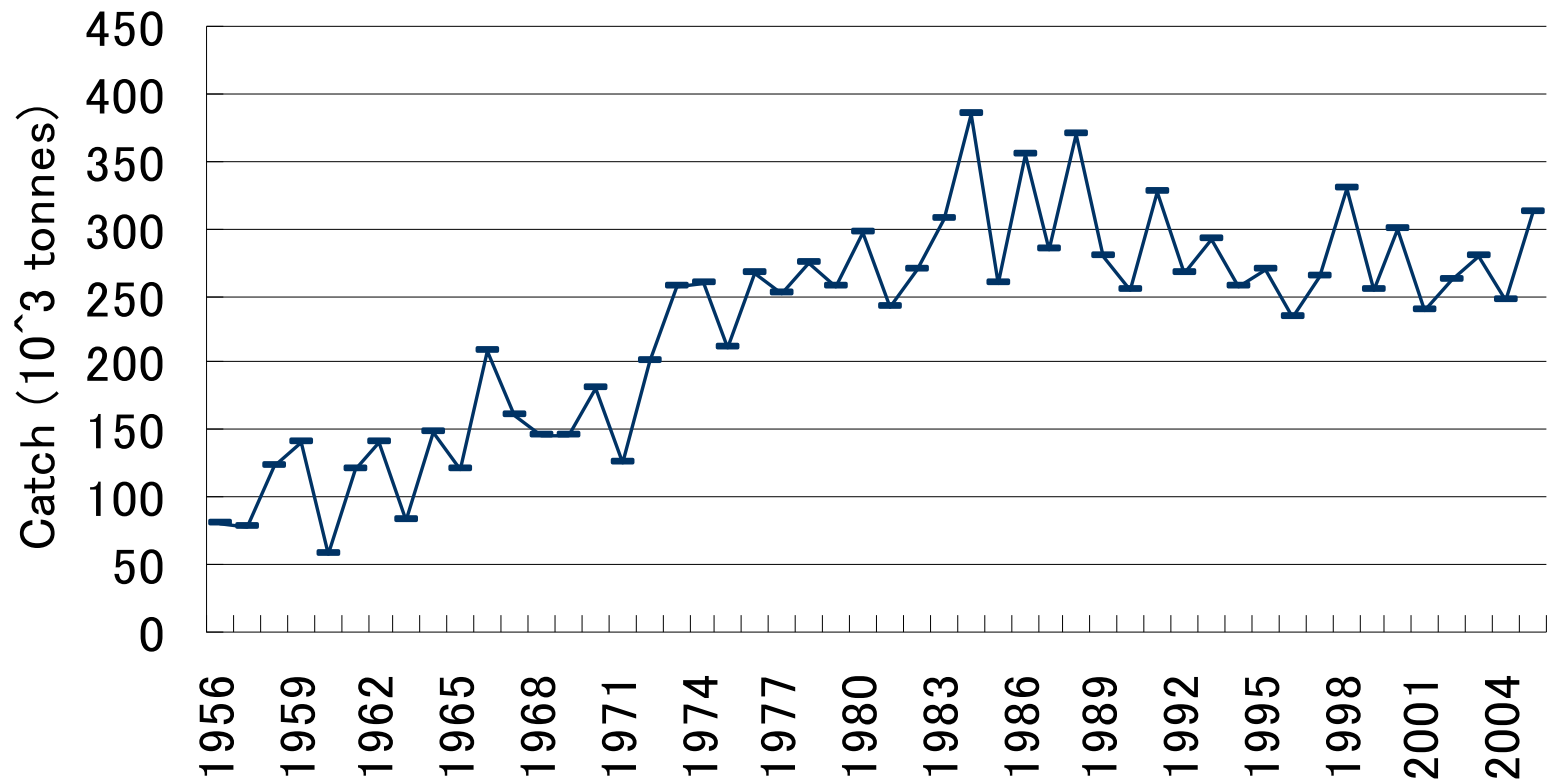


Fig.4. Catch of skipjack

# 12 Principles of Ecosystem Approach of CBD

- Principle 1. The objectives of management of land, water and living resources are a matter of societal choice.
- Principle 2. Management should be decentralized to the lowest appropriate level.
- Principle 3. Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems.

**The Ecosystem Approach is a social strategy that links biological, social and economic information, and aims to achieve a socially acceptable balance between nature conservation and the use and sharing of benefits from ecosystems.**

Principle 4. Decision-making should be based on the best available scientific and indigenous and local knowledge, innovations and practices.

Principle 12. The ecosystem approach should involve all relevant sectors of society and scientific disciplines.

# MEL-Japan

- Council
- Technical Committee
- Public Relation Committee

Advice on  
operation/management

**Board of Trustees**

Audit

**Audit Committee**

Report

Audit

**Independent Reviewing Bodies**

Fisheries research  
institutes

Distribution  
of Labels

Review

Application

Representative's Service

Advice/support

**Fishers/processors  
Organizations**

Advice/support

**Applicants**

**Consumers**

\*Types of certificate

for **production** processes (**5years**)

for **processing/marketing** process (**3 years**)