Republic of Korea

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INTRODUCTION

This review constitutes part of the FAO's project on the state of the world marine capture fisheries management relating to marine capture fisheries management of the Republic of Korea (ROK). Overall goal of the review is to provide information useful to decision makers, fishery managers and stakeholders who may involve in the management of marine capture fisheries of the country.

The ROK is located in the southern half of the Korean Peninsula and borders the East Sea (Sea of Japan) on the east and the Yellow Sea on the west. It has a land area of approximately 98 480 square kilometres with a highly indented coastline of 2 413 kilometres (CIA, 2003). The country has a border line of 238 kilometres with North Korea on the north and there are around 3 579 islands lying mostly along its south and west coasts. Korea has made a number of maritime claims and the most significant of them include:

- Contiguous zone: 24 nautical miles;
- Exclusive economic zone: 200 nautical miles; and
- Territorial sea: 12 nautical miles; between 3 nautical miles and 12 nautical miles in the Korea Strait.

In July 2002, ROK had an estimated population of 48.324 million with a population density of 490 persons per square kilometre (CIA, 2003). Gross National income per capita was around US$8 910 in 2000 (OECD, 2002; World Bank, 2003). The ROK is also one of the world's major fishing countries in both production and trade, the tenth largest harvester as well as exporter in 1999. The fishery sector in Korea has had and would continue to have a dominant role and impact on the national supply of animal protein food in the years to come.

POLICY FRAMEWORK

The Ministry of Maritime Affairs and Fisheries (MOMAF) is an executive agency in charge of planning and implementing the fisheries policy of the country at the national level. The central government, local governments, fisheries cooperatives, and research institutes also share the responsibilities of protecting the ocean and fisheries with MOMAF. Two committees have been established to facilitate coordination among all responsible organizations. These are the Commission on Protection of the Quality and Supply of Fresh Water Resources, which sits under the office of the Prime Minister, and the Committee of Maritime Pollution Response of MOMAF (MOMAF, 2003).

The policy of marine capture fisheries management in the ROK can be categorized into two parts, namely the fisheries regulation policy and the fisheries resource protection policy:

- *Fisheries Regulation Policy*: The policy deals with restrictions on catch size, fishing gears, fishing activities and efforts, etc. These regulations are for fisheries resource protection and conservation. Fisheries resource protection policy comprises of installing artificial reefs, assisting in production of seedlings in hatcheries, etc. as well as to implementing a quota system for offshore fisheries (OECD, 2002). The

most significant programs and acts currently being implemented under this policy include:

- "*Fishery Structural Adjustment Program*": Under this program the displaced fishers are entitled to compensation from the Government for the closure of fishing grounds, and the withdrawal of their fishing vessels; so far, the fishery structural adjustment policy has given priority to the management of small-scale coastal fisheries mainly because of the negative impacts of these fisheries on the breeding of juvenile and young fish in coastal waters (Lee, 2000).
- "*General Buy-Back Program" and Buyback Program by the International Agreements*": Since 1994 the chronic over-exploitation of marine fishery resources by over-capacity in coastal and offshore waters has been addressed by imposing a fleet reduction program, the "General Buy-back Program". About 113 fishing vessels were scrapped under this program in 2001. Moreover, another buy-back scheme, the "Buyback Program by the International Agreements," has also been implemented after the "Special Act for Supporting Fishermen Affected by the International Fishery Agreements" entered into force on 7 December 1999; this Special Act of agreements aimed at compensating fishermen for losses resulting from the international fishery agreements, including fishing cooperation agreements with Japan and China. The Korean government had scrapped 551 vessels in accordance with this Special Act in 2001.
- "*Total Allowable Catch (TAC) Program*": This TAC program is an alternative to the current fishing license system and it has been implemented for seven commercial species such as the common mackerel, Pacific sardine, Jack mackerel, red snow crab, purple Washington clam, pen shell and spiny top shell (Table 1) in 2001 after the program has been successfully tested in 1999-2000 (OECD, 2002).
- "*Farming Ground Management Act*": The Act was enacted as of 29 January 2000 to support the building of a sustainable cultured-based fishery and to improve the productivity of the farm sites.
- "*Cultured-based Fishery Promotion Act*": The Act was enacted as of 14 January 2002 to further enhance the development of aquaculture industry in the country.
- "*Fishery Resource Protected Area (FRPA) Act* and *Wetland Conservation Act*": Currently there are ten FRPAs designated across the coastal areas under the Fishery Resources Protected Area (FRPA) Act to protect fish habitats and spawning grounds. The Wetland Conservation Act enforced as of 9 August 1999 makes it possible for the government to designate a wetland sanctuary which restricts human activities such as fishing, building, dredging, etc to protecting the wildlife (MOMAF, 2003).
- "*Fishery Products Quality Control Act*": The Act, enacted as of 29 January 2001, aims at securing food safety and harmonizing the products with international standards of food quality. It integrated the acts on control of fishery products quality and was effectuated as of 1 September 2001; the Act introduces and enforces the HACCP (Hazard Analysis Critical Control Point) system.
- "*Act on Distribution and Price Stabilization of Agricultural and Fishery Products*": The Act was enacted as of June 1, 2000 for stabilizing the distribution and pricing of fishery products in the country. A "market brokerage system" was introduced under the Act which sets the basic framework on fishery products distribution and pricing.

• *Fisheries Resource Protection Policy*: The policy is meant to preserve and appropriately manage the fisheries resources. Under the policy and based on the concept of natural resources as "public property", it is generally prohibited to exploit the fisheries resources without license, authorisation, or report from or to

TABLE 1
Total allowable catch (TAC) by fishing methods and species - 2001

Fishing Method	Species	TAC (metric ton)	Actual Catch (metric tons)	Actual Catch to TAC (%)
Large purse seine	Common mackerel	165 000	156 081	94.6
	Pacific sardine	19 000	125	0.7
	Jack mackerel	10 600	9 335	90.3
Offshore trap	Red snow crab	28 000	19 319	69.0
Diving	Purple Washington clam	9 500	6 051	63.7
	Pen shell	4 500	1 479	32.9
Village fishery	Spiny top shell	2 150	1 938	90.2

Source: PRFP, 2003

the government. The Government uses the right based instrument such as license limitation for the fishing activities in order to directly control the catch effort by certain types of fishing vessels (MOMAF, 2000).

LEGAL AND INSTITUTIONAL FRAMEWORK

The main legal documents regulating Korean fisheries are the Fishery Act (amended in December, 1995), the Fisheries Promotion Act and the Resources Protection Decree. Article 6 of the Fisheries Promotion Act stipulates the following:

> *"The Government shall continuously promote resource development by establishing a fisheries protection zone, ensuring appropriate utilisation and development of fisheries resources, propagation of marine fisheries, prevention of contamination, and effective utilisation of fishing grounds in order to protect the fisheries resources."*
>
> **(MOMAF, 2003).**

According to the Fishery Act, the Ministry of Marine Affairs and Fisheries (MOAF) is largely responsible for fishing vessels in offshore and distant waters and foreign-flagged vessels fishing within the Korean EEZ while the local governments at provincial, city and district levels are responsible for fishing licenses of vessels in the coastal areas. The main functions of MOMAF are to develop and restructure the fishing industry, to ensure safe navigation of fishing vessels, to construct and manage the port facilities, and to assist conservation/exploration of the marine resources. The MOMAF has five branches concerned with the management of fisheries resources (research, management and monitoring/enforcement services).

- The NFRDI (National Fisheries Research and Development Institute) providing research services.
- Fisheries Administration Bureau and Fisheries Resource Bureau providing the management services.
- Fisheries Resource Bureau, Fishing Vessels Management Office and NMPA (National Marine Police Agency) providing monitoring and enforcement services.

Among these branches, it is the Fisheries Resource Bureau that is committed to the general affairs of fisheries resources management. The Fisheries Resource Bureau serves all of main duties involving the management and enforcement of fisheries policies except for the research and development affairs (OECD, 2003a).

After the 1992 establishment of diplomatic ties, the Korea-China Fishery Agreement was signed as of 3 August 2000 and entered into force on 30 June 2001. As a result, Korea has bilateral fishery management regimes under the UNCLOS and the EEZ system with neighboring countries, China and Japan, but not North Korea. According to these bilateral agreements, only Chinese and Japanese vessels can gain access to the Korean EEZ on a reciprocal basis.

The entire Korean fishing fleet is subject to a permit and license system. Permits are applied to all fishing vessels while a license scheme is applied to mariculture. Permits

specify boat names, GRT, fishing gears and fishing areas. Licenses specify the place to farm, the species/acreage to be cultured and the period of farming. Korea Maritime Police Agency, which was established upon the birth of the Ministry of Maritime Affairs and Fisheries (MOMAF) in 1996, is responsible for monitoring and surveillance of all fishing vessels and controls their traffic activities in and out of the ports. The central and provincial fishery extension boats complement surveillance of the fishing activities.

The Korean government also started a fishermen-oriented co-management system for more effective implementation of responsible fisheries. Under this system, an organization of fishermen such as a fishery corporation or a group of fishermen in fishing villages set up self-regulation according to the fishery-related laws and regulations with endorsement of local government; thereby a fishery is controlled. The fishermen-oriented co-management system is designed to enhance the sense of responsibility of the fishermen and to prevent illegal fishing.

The introduction of EEZs by coastal countries, the rise in oil prices and the drop in the market price of tuna, created the need for fleet adjustment and more active foreign policy. By 1995, the number of vessels dropped to 640. In recent years, the Korean Government has been very active in negotiating fisheries agreements with coastal countries that have abundant resources in their economic zones. It leads to the conclusion of 14 bilateral fisheries agreements. Korea also joined ten international fisheries organizations as of the end of February 1996 (OECD, 2002).

STATUS OF THE FISHERIES

Korea is blessed with rich fisheries resources in its coastal and offshore waters. There are more than 150 commercial-value species that could be caught, including 60 species of fish, 10 crustaceans, 17 shellfish, 7 molluscs, and 56 other marine animals excluding seaweeds. Major fish species include Alaska Pollack, hair-tail, red-lip croaker, mackerels, anchovy, sardine, flounders, file fish, squid, and cuttlefish. Although Korean fishing operations take place throughout the world's oceans, the capture fisheries in the coastal and offshore waters still dominates, contributing to about 46.9 percent of the nation's total fishery production (Table 2). Some 75 000 vessels are engaged in a variety of fishing activities. Small-scale fishing households, operating engine-free boats less than 10 tonnes, makes up 88 percent of the nation's fishing units. During the last few decades, over-capacity, marine environmental degradation and international fishery regulations have severely constrained the entire Korean fisheries (Lee, 2000).

TABLE 2
Fishery Production in 2000-2001

Fisheries sub-sectors			2000*		2001*	
			Metric tons	Million KRW	Metric tons	Million KRW
Capture Fisheries	Marine Capture Fisheries	Coastal & offshore	1 189 000	2 329 483	1 252 089	2 468 309
		Distant waters	651 267	1 321 681	739 057	1 223 078
	Sub-total		1 840 267	3 651 164	1 991 155	3 691 387
	Inland Capture Fisheries		7 142	33 765	5 971	29 469
	Sub-total		1 847 409	3 684 929	1 997 126	3 720 856
Aquaculture	Marine aquaculture		653 373	683 856	655 827	717 163
	Inland aquaculture		13 443	89 676	12 170	73 831
Sub-total			666 816	773 532	667 997	790 994
TOTAL			**2 514 225**	**4 458 461**	**2 665 123**	**4 511 850**

Note: * KRW = Korean won; Official exchange rate for 2000 is USD 1 = KRW 1 130.6398 and for 2001 is USD 1 = KRW 1 290.4096
Source: OECD, 2003c

TABLE 3
1995 – 2001 catches by major species in coastal and offshore fisheries (In thousand metric tons)*

Species	1995	1996	1997	1998	1999	2000	2001
Alaska Pollock	6.9	4.4	6.4	6.2	1.4	0.8	0.2
Amberjack/Yellowtail						4.8	6.5
Anchovies	**230.7**	**237.1**	**230.9**	**249.5**	**241.3**	**201.2**	**273.9**
Cod						1.8	2.5
Conger eel							7.7
Croakers	70.4	65.5	56.7	42.5	41.5	60.3	36.9
File fish	1.8	1.8	16.3	10.0	2.6	2.9	1.6
Flounders	13.7	18.1	18.1	20.1	19.6	15.4	14.5
Hair tail/Ribbon fish	94.6	74.5	67.2	74.9	64.5	81.1	79.9
Herring						13.5	8.5
Horse mackerel	12.3	14.5	22.8	22.1	13.6	19.5	17.5
Mackerels	**200.5**	**415.0**	**160.4**	**172.9**	**177.6**	**145.9**	**203.7**
Mullets						8.7	5.8
Butterfish (silvery pomfret)						7.8	6.8
Marbled rockfish						0.1	9.8
Hokory shad (gizzard shad)	13.5	18.6	9.0	7.6	17.0	6.4	9.1
Saury	6.5	9.7	18.6	4.6	11.4	19.9	5.3
Squid	**200.9**	**252.6**	**225.0**	**163.0**	**238.7**	**226.3**	**225.6**

* The bolded letters and figures indicate the three major groups of species caught over the period of 1995-2001;
Source: PRFP, 2003

The ROK produced 2 665 123 metric tons (MTs) of fish with a value of 4 511 billion Korean won (KRW) in 2001, showing an increase of around 6 percent (equivalent to 150 898 MTs) over that in 2000 (Table 2). The increase was due to increased catches of mackerel and anchovy from the coastal and offshore waters (Table 3) and of Alaska Pollack from distant waters (OECD, 2002) as well as attributed to the implementation of production-oriented fishery policies (Lee, 2000). In 2001, about 47 percent of the total fishery production came from offshore and coastal waters; only 0.2 percent came from inland waters. Landings from distant water fishing operations have also steadily expanded, and accounted to more than one-quarter (27.7 percent) of the total fishery production in 2001 (Table 2). The main species of fish caught from the Korean coastal and offshore waters are anchovy, mackerel, hair-tail, yellow corvina, squid, and blue crab (Table 3). Most fishery products are used for human consumption.

TABLE 4
Catches of the distant water fisheries by major commercial species in 2001

Species	Catch (metric tons)
Alaska Pollack	200 012
Skipjack tuna	137 569
Yellow-fin tuna	58 957
Big-eye tuna	31 335
Brown croaker	22 030
Saury	21 309
Corvina	11 037
Cod	10 731
Other species	78 244
Total Catch of Distant Water Fisheries (all species)	**571 224**

Source: PRFP, 2003

The distant-water fishing fleet has expanded rapidly in the last 25 years reaching the peak of 878 vessels in 1976. The majority of the fleet is tuna longliners and trawlers operating from overseas fishing bases, particularly in the Atlantic, the Caribbean, the South Pacific, and the Indian Ocean. Catches comprise mainly tuna, squid, anchovy and shrimp and are generally consumed in Korea (Table 4).

The fishing efforts have been found to reach their peak in 1991 and, thereafter, have been declining in both the number of vessels and weight (e.g., a drop of exceeding 34 percent in 1995). The number of fishing vessels in 2001 was 94 935 (884 853 gross tonnes [GT]). Powered vessels comprised 94.1 percent in number and 99.5 percent in GT. Large-sized vessels (over 50 GT) comprised only about 2.9 percent of the total powered fishing boats (Table 5). While the off-shore and coastal fisheries sector remained the largest, its share in the nation's total fishery production has fallen from

TABLE 5
Total number, size and power of Korean fishing vessels in 2000-2001

Ranges of Vessel Tonnage (Gross tones)	2000			2001		
	Total Number	Total Gross Tonnes	Total Horse Power	Total Number	Total Gross Tonnes	Total Horse Power
Powered Vessels						
0-24.9	85 046	212 287	10 532 766	85 336	214 912	11 353 877
25-49.9	1 491	51 589	595 716	1 424	49 204	1 042 800
50-99.9	1 584	120 489	818 129	1 463	110 345	777 338
100-149.9	362	46 006	369 398	342	43 499	354 606
150-249.9	218	41 516	210 272	212	40 669	215 990
250-499.9	446	173 696	615 622	431	168 937	594 321
500-999.9	62	45 844	137 950	61	45 892	139 348
1 000-1 999.9	45	62 148	146 226	43	59 369	141 126
2 000+	40	164 388	171 100	35	147 640	146 339
Sub-total	89 294	917 963	13 597 179	89 347	880 467	14 765 745
Non-powered Vessels	65 96	5136	n/a	5588	4386	n/a
Total	**95 890**	**923 099**	**13 597 179**	**94 935**	**884 853**	**14 765 745**

Note: n/a = not applicable
Source: OECD, 2002

TABLE 6
CPUE in coastal and offshore fisheries

Year	Catches (thousand metric tons) (A)	Vessel Tonnage (B)	CPUE (A/B)
1995	1 425	445	3.20
1996	1 400	439	3.70
1997	1 367	439	3.11
1998	1 308	438	2.99
1999	1 336	434	3.06
2000	1 189	398	2.99

Source: PRFP, 2003

TABLE 7
Catches by distant water fisheries in 1992-1999 (metric tons)

Water/Year	1992	1993	1994	1995	1996	1997	1998	1999
Pacific Ocean	714 246	532 940	729 084	702 730	496 601	537 896	568 349	446 584
Atlantic Ocean	278 758	178 198	132 714	171 411	186 486	253 011	128 287	319 899
Indian Ocean	30 922	29 879	25 400	23 086	32 291	38 488	25 961	24 926
Total	**1 023 926**	**741 017**	**887 198**	**897 227**	**715 378**	**829 395**	**722 597**	**791 409**

Source: KODEFA, 2003

some 52 percent in 1984 to 47 percent in 2001. Fishing is carried out by private fishermen grouped in fisheries cooperatives. The fleet consists of purse seiners, seiners, trawlers, gillnetters, boats for lift and set-nets, pole and line vessels, long-liners ranging from 10 to 200 GT. Catches comprise hair-tail, mackerel, shark, anchovy, corvenia, and mixed demersal species.

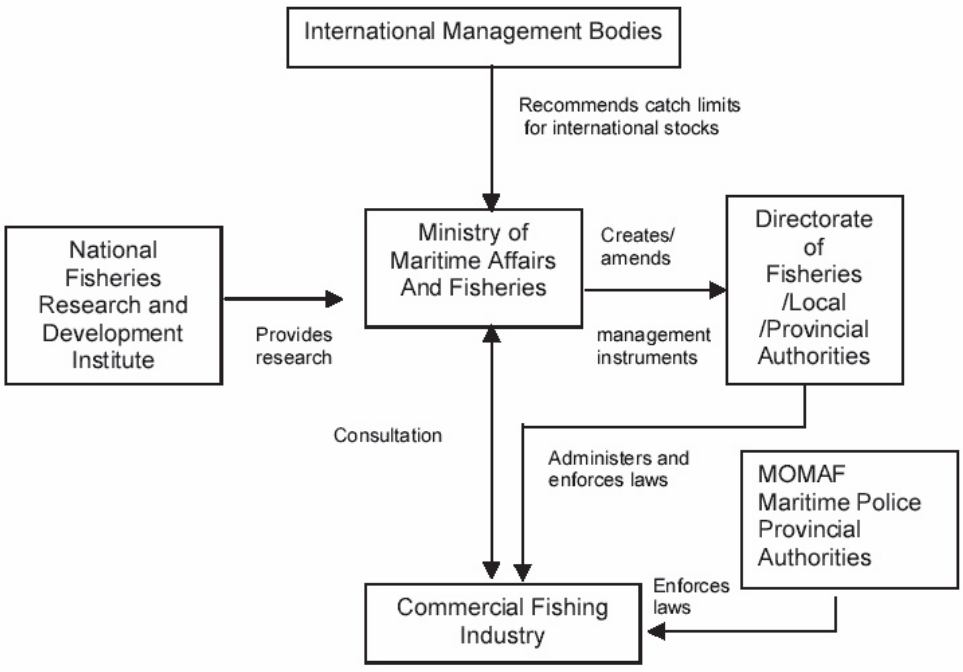
The capacity reduction programs such as TAC and Buyback programs as implemented by the ROK government appeared to yield results in stabilizing the CPUE (catch per unit effort) values (2.99-3.70) over the past six years (1995-2000) for coastal and offshore fisheries (Table 6). Pelagic species such as anchovies, mackerels, and squids still dominate the catches from the coastal and offshore waters (Table 3). The major species caught by the distant water fisheries are the Alaska Pollack and tunas (skipjack, yellow-fin and big-eye; Table 4). Total catches by the distant water fisheries decreased from 1 023 926 MTs in 1992 to 791 409 MTs in 1999 (Table 7).

MANAGEMENT ACTIVITY

The system of marine capture fisheries management in Korea is shown in Figure 1.

The fishery management system involves largely the input control and technical measures. Input control includes Limited Licenses (which restrict the number of

FIGURE 1
The system of fishery management in Korea



Source: OECD, 2003a

fishing units), and Gear and Vessels Restrictions (which restrict the size and other dimensions of each fishing unit). Technical measures include Size and Sex Selectivity measures and Time and Area Closures.

Management of Commercial Fisheries

The coastal and offshore fisheries in Korea are managed through regulations on the maximum number of fishing vessels to be licensed, minimum mesh size of fishing nets, engine power by fisheries, fishing grounds, fishing seasons and size of fish. Maximum permissible number of fishing licenses issued to fisheries is restricted for those with intensive fishing capacity in order to protect the fishery resources such as those shown in Table 8.

A number of fishing capacity programs has been implemented to address the chronic problem of over-exploitation of marine fishery resources. The most notable ones are the "General Buy-back Program" and the "Total Allowable Catch (TAC) Program". Korea is also initiating the international observer training program to dispatch observers in the distant waters managed by the regional fisheries bodies for implementing the TAC program.

The Republic of Korea has entered into bilateral agreements with several foreign countries to gain access to their waters for its distant water fisheries. The countries which have such bilateral agreements with Korea as well as the quota, catch, fishing fees and species allowable under the bilateral programs are shown in Table 9. Access to Korean waters by foreign-flagged vessels was allowed only for Japan and China on a reciprocal basis according to the bilateral agreements (OECD, 2002).

Management of Post-harvest Fisheries and Marketing of Fishery Products

The Fishery Products Quality Control Act, enacted as of 29 January 2001 (a Ministerial decree to implement the Act was effectuated as of 14 March 2002) forms the basis for

TABLE 8
License distribution by gear type

Fishery type	Number of licenses issued	Major target species
Danish seine	80	Hair-tail, flounder, file fish.
Pair trawl	180	As above
Middle-sized Eastern Sea Danish trawl	42	Alaska Pollack, cod, shrimps.
Middle-sized Western & Southern Danish seine	65	File fish, flounder, hair-tail, blue crab
Off-shore Eastern Sea trawl	43	Alaska Pollack, herring.
Large otter trawl	60	Shrimps, mackerels, hair-tail.
Anchovy drag nets	150	Anchovy.
Diving	249	Oyster, hen cockle, pens-hell.
Offshore stow net	850	Hair-tail, croaker, pomfret.
Offshore drift gill-net	2 200	Croaker, anchovy, saury.
Offshore dredges	540	Hen cockle.
Offshore powered purse seine	35	Hair-tail, sardine, mackerels.
Offshore eel trap	300	Sea eel.
Offshore traps (newly-set in 1999)	10 581	Sea eel, blue crab.
Total	**15 375**	

Source: OECD, 2002

TABLE 9
Korea's bilateral fishery agreements and access to foreign waters

Country	Date of Effectuation of Agreement	In 2001			
		Quota (metric tons)	Catch (metric tons)	Fishing fee (US$)	Species covered/scope
Japan	22 January 1999	109 773	23 389	-	Mackerels, squids, etc
China	30 June 2001	90 000*	99	-	Hair-tail, croaker, etc
Iran	1 April 1978	-	-	-	Access to the country's waters
Tuvalu	18 June 1980	-	2 950	650 000	Tuna
Cook Island	25 August 1980	-	-	-	Access to the country's waters
France	19 December 1980	-	-	-	Access to the country's waters
Solomon Islands	12 December 1980	-	7 238	394 285	Tuna
Kiribati	18 December 1980	-	75 016	5 943 251	Tuna
Australia	24 November 1983	-	-	-	Access to the country's waters
Mauritania	8 January 1984	-	-	-	Access to the country's waters
Ecuador	19 September 1984	-	-	-	Access to the country's waters
Russia	22 October 1991	236 150	228 150	29 142 275	Alaska Pollack, saury, cod, squid
Papua New Guinea	15 April 1992	-	18 320	2 308 500	Tuna
Peru	None	-	11 517	1 393 836	Squid
Argentina	None	-	6 035	800 000	Squid, ray
Falkland (UK)	None	-	132 449	11 179 314	Tuna
FMS	None	-	29 695	2 376 000	Tuna
Nauru	None	-	12 575	675 000	Tuna
Total		**435 923**	**574 372**	**54 862 461**	

* This quota was allocated for the period from July 2001 to December 2002.
Source: OECD, 2002)

managing the post-harvest fisheries to secure the safety of the fishery products as well as their compliance with the international standards of food quality. for the fishery products. The Act introduces and enforces the HACCP (Hazard Analysis Critical Control Point) system for fishery products and commodities intended for export.

The Act on Distribution and Price Stabilization of Agriculture and Fishery Products was enacted as of June 1, 2000 for stabilizing the distribution and pricing of fishery products in the country. A "market brokerage system" was introduced under the Act which sets the basic framework on fishery products distribution and pricing. Under this brokerage system, a judicial person qualified on aspects of business management can directly collect and sell fishery products so that it provides producers with more opportunities in selecting buyers and reduces distribution stages of fishery products.

Management of Recreational Fisheries

Recreational fisheries sub-sector is managed through the enactment of the Fisheries Act of 1908 (replaced by the Chosum Fishery Act of 1929) and the Recreational Fishing Boats Operation Act (RFBOA). The Chosum Fishery Act regulates the seasonal and area enclosures, minimum size limits, etc of the fishery while the RFBOA controls the operational aspects of the recreational fishing boats such as regulating the recreational fishers' safety, prevention of discarding of wastes by anglers, inspection of recreational boats for safety and waste-treating equipment on boats, etc. (OECD, 2002). Accordingly, recreational boats must be inspected for safety every five years and waste-treating equipment on boats is required.

Monitoring and Enforcement of Fishery Management

The MOMAF, Maritime Police and local governments are mandated to jointly carry out the monitoring and enforcement of the fisheries regulations and programs. To carrying out the tasks, the agencies have mobilized 84 patrol vessels, 220 guard-ships, 10 helicopters, and 3 950 staff in 2001 and they found 1 532 national vessels and 95 foreign-flagged vessels violated Korean laws and regulations in 2001(OECD, 2003c).

The Korean government has also enacted the "Ordinance on Complying with the Conservation and Management Measures of International Fisheries Organizations" to comply with the conservation and management measures adopted by the regional fisheries bodies such as the Asia Pacific Fishery Commission (APFIC), Pacific International Commission for the Exploration of the Sea (PICES), and Indian Ocean Fishery Commission (IOFC), etc.

The Korean Government is adopting the "International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing" by the 24th FAO/ COFI on March 2001 to cope with the illegal fishing activities through preparing a stronger national action plan.

COSTS AND REVENUES OF FISHERIES MANAGEMENT

Management of marine capture fisheries in Korea primarily involves costs for the following (OECD, 2001b; Flaaten and Wallis, 2001; OECD, 2003a):

- Research and education;
- Fisheries infrastructure and environment enhancement;
- Fisheries resources enhancement;
- Aquaculture development;
- Renewal and modernization of vessels;
- Support for crew insurance;
- Payment for fishing fleet reduction; and
- Other cost reducing transfers.

The government financial transfers to cover the costs to carry out the above fishery management activities in 1999-2001 are provided in Table 10.

Total transfers in 2001 amounted to KRW 550 billion, an increase of KRW 192.7 billion from KRW 357.3 billion in 2000; about seven times expansion of the payments for fishing fleet reduction contributed to the increase. Most of the transfers in 2001 were used for fishing fleet reduction (KRW 260.2 billion, 47.3 percent), infrastructure & environment enhancement (KRW 177.2 billion, 32 percent), and resource enhancement (KRW 31.0 billion, 5.6 percent).

The revenues from the fisheries totaled to KRW 4 458.5 billion in 2000 and KRW 4 511.9 billion in 2001 (Table 2). The total government financial transfer constitutes around 8.0 percent of the total revenue from fisheries landings in 2000, increasing to12.2 percent in 2001.

TABLE 10
Government financial transfers

Items	Cost (Billion KRW) 1999	2000	2001
(A) Direct Payments	241.3	38	260.2
Payments for fishing fleet reduction	236.9	33.3	254.5
Support for crew insurance	4.4	4.7	5.7
(B) Cost Reducing Transfers	67.9	76.8	72.8
Renewal and modernization of vessels	3	8.7	2.4
Aquaculture development	5.7	4.8	18.2
Other cost reducing transfers	59.2	63.3	52.2
(C) General Services	233.9	242.5	217
Fisheries resources enhancement	56	54.9	31
Fisheries infrastructure and environment enhancement	172.5	182	177.2
Research and education	5.4	5.6	8.8
Total	**543.1**	**357.3**	**550**

Source: OECD, 2003a

TABLE 11
Supply and demand for fresh fish products (in thousand metric tons)

	1 000 metric tons	1997	1998	1999	2000	2001
Supply	Production	3 244	2 834	2 911	2 454	2 880
	Import	1 189	753	1 332	1 420	1 880
	Total Supply	4 433	3 587	4 243	3 874	4 760
	Carryover from previous year	427	480	319	582	510
Demand	Consumption	3 187	2 394	2 746	2 699	3 280
	Export	1 193	1 354	1 232	1 338	1 080
	Total Demand	4 380	3 748	3 978	4 037	4 360
	Carryover to next year	480	319	582	510	641

Sources: PRFP, 2003; NSOK, 2003; OECD, 2003c

MARKETS AND TRADE

Both the total supplies and demands of fresh fish products in ROK showed trends of increasing in 1997 – 2001 (Table 11). The low consumption in 2000 is due to the relatively low production of the year (OECD, 2003c).

In 2001, the ROK registered for the first time a trade deficit of US$374 million in fishery products due to declining export exports to Japan following economic depression and increasing imports from China. Total export value of fishery products was US$1 273 million at 435 691 metric tons in 2001 showing a decrease of US$231 million (15 percent) from US$1 504 million (533 824 metric tons) in 2000 (OECD, 2003c). The main species exported were tuna, oyster, sea eel, squid and fish meat. The main countries exported to were Japan (72.6 percent), USA (6.4 percent) and China (4.4 percent). Imports of fishery products in 2001 rose 17 percent in value to US$1 648 million (1 056 252 metric tons) from US$1 410 million (749 191 metric tons) in 2000. The main import items included yellow croaker, fish egg, shrimp, hairtail and Alaska Pollack and the leading countries imported from were China (38.59 percent), USA (9.6 percent) and Russia (9.3 percent) (OECD, 2003c).

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

Under the new maritime order created by UNCLOS, Korea, Japan and China have proclaimed their Exclusive Economic Zones (EEZs). These States have overlapping EEZ claims to the East China Sea, the East Sea and the Yellow Sea. Due to the complexity of these overlapping claims to the sea area, the Korean Government concluded a fisheries agreement with Japan in January 1999 and one with China in

August 2000. These fisheries agreements, both of which have now entered into force made it possible for Korea to protect its interests in fisheries and secure grounds for its EEZ claim to the sea area in future EEZ talks with the relevant States. As of December 2001, Korea has had four rounds of maritime boundary delimitation talks with Japan and six with China. Korea will endeavour to settle these matters in accordance with the international law and relevant practice (MOMAF, 2003).

The East Sea, Yellow Sea and East China Sea, all traditional fishing grounds of Korea, China and Japan, are known to be very productive areas. However, management of resources in these areas has been complicated due to territorial claims made by all three countries. In 1997, China and Japan signed a new fishing agreement, revising the fishing agreements signed in August 1975.

Korea and Japan signed the existing fishery treaty in June 1965. In view of changing fishing conditions in the Northeast Asian seas that resulted from the implementation of the UNCLOS in November 1994, the two countries began negotiations to revise the existing treaty. Fishery negotiations between Korea and Japan have been difficult and complicated due to territorial claims to the island of Tokdo. During the course of these negotiations in 1997, Japan unilaterally declared establishment of the straight base lines in the East Sea, disregarding the provisional clause of Article 1 of the Korea-Japan Fishery Treaty (which states that the establishment of a fishing zone using the straight base line shall be determined in consultation with all participating signatories of the treaty). As a result, negotiations between the two countries are underway. Presently, Korea is engaged in fishery negotiations with Japan and China. However, fundamental disagreements about fishing boundaries (and/or potential ocean areas) still remain. In addition, Korea is in the process of negotiating bilateral fishery agreements with Peru, Guinea and the Seychelles (Asianinfo, 2003).

PARTICIPATION IN REGIONAL FISHERY BODIES

Korea became a member of CCSBT (Convention for the Conservation of Southern Bluefin Tuna) as of 17 October 2001. Also, Korea is planning to be a party of the following conventions or agreement in 2002:

- Convention on the Conservation and Management of Fishery Resources in the South East Atlantic Ocean;
- Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean; and
- Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas.

In addition, Korea has hosted the first APEC Ocean-related Ministerial Meeting from 22 to 26 April 2002 in Seoul. The meeting has adopted the "Seoul Ocean Declaration" which signifies a major milestone in cooperation among APEC member economies, including Korea, to work towards a sustainable management of marine and coastal resources (OECD, 2003c).

The ROK has participated in the following regional fishery bodies as a member and contributed its role in the global management of the fishery stocks (Lugten, 1999; Swan, 2000):

- Asia-Pacific Fishery Commission;
- Indian Ocean Tuna Commission;
- Western Central Atlantic Fishery Commission;
- Fishery Committee for the Eastern Central Atlantic;
- Indian Ocean Fishery Commission;
- Commission for the Conservation of Antarctic Marine Living Resources;
- International Commission for the Conservation of Atlantic Tunas;
- Northwest Atlantic Fisheries Organization;
- North Pacific Marine Science Organization; and

- International Whaling Commission.

The ROK is also a Party to the following oceans-related international agreements (Swan, 2000):

- IMO, International Maritime Organization
- IHO, International Hydrographic Organization
- IOPC FUND, International Oil Pollution Fund
- UN Convention on the Law of the Sea
- IOC, International Oceanographic Commission
- ISA, International Seabed Authority
- AT, Antarctic Treaty
- CITES, Convention on International Trade in Endangered Species of Wild Fauna and Flora
- CBD, Convention on Biological Diversity
- PICES, Pacific International Commission for the Exploration of the Sea
- NOWPAP, Northwest Pacific Action Plan
- EAS, United Nations Environment Programme For East Asian Seas
- UNEP, UN Environment Programme

In addition, the ROK Government is a Member of the OECD (Fisheries Committee) Resources Conservation Working Group and is a Party to the following Fishery Conventions (Organizations):

- NAFO, Northwest Atlantic Fisheries Organization
- CECAF, Committee for the Eastern Central Atlantic
- COPCBS, Convention on the Conservation and Management of - Pollock Resources in the Central Bering Sea
- APEC/F & MRC WG, Asia Pacific Economic Cooperation/Fisheries & Marine

OUTLOOK

The main objective of ROK marine capture fishery management policies is to improve both the fishermen's and consumers' welfare through restructuring the management of the fishery resources in the coastal and offshore waters (OECD, 2003c).

To improve the livelihood of the fishermen, the ROK Government focuses on the following measures: (a) promotion of fishing fleet buyback program; (b) promotion of cultured based fisheries and fishery resources fostering efforts; (c) expansion of applicable species for TAC program; (d) prevention of marine pollution; and (e) strengthening law enforcement activities to eliminate illegal fishing activities. To protect the interests of consumer, the ROK Government has put her emphasis on ensure/improving the quality of fishery products, reinforcing rules and regulations relating to seafood sanitation with the application of HACCP system, and devising a better system to eliminate redundant phases in fishery markets.

The ROK Government is continuing to make efforts to observe international regulations and to share in international efforts for ensuring optimum management and sustainable use of marine resources (OECD, 2003c).

SUMMARY AND CONCLUSIONS

The Republic of Korea has a land area of 98 480 square kilometres with a highly indented coastline of 2 413 kilometres and a border line of 238 kilometres with North Korea on the north. In July 2002, Korea had an estimated population of 48.324 million with a population density of 490 persons per square kilometre with a Gross National Income per capita of US$8 910 in 2000. The Republic of Korea is also one of the world's major fishing countries in both production and trade, the tenth largest harvester as well as exporter in 1999. The fishery sector in Korea has had and would continue to have a dominant role and impact on the national supply of animal protein food in the years to come.

The Ministry of Maritime Affairs and Fisheries (MOMAF) is the executive agency being in charge of planning and implementing the fisheries policy and overall fishery management. The fisheries management policy in the Republic of Korea can be categorized into two parts, namely the fisheries regulation policy and the fisheries resource protection policy. Fisheries regulation policy deals with restrictions on catch size, fishing gears, fishing activities and efforts, etc., for fisheries resource protection and conservation. Fisheries resource protection policy comprises of installing artificial reefs, assisting in production of seedlings in hatcheries, etc. as well as to implementing a quota system for offshore fisheries to enhance the fisheries resources.

The Republic of Korea produced 2 665 123 metric tons (MTs) of fish with a value of 4 511 billion Korean won (KRW) in 2001, showing an increase of around 6 percent (equivalent to 150 898 MTs) over that in 2000. About 47 percent of the total fishery production came from offshore and coastal waters, 27.7 percent from the distant water fisheries and only 0.2 percent came from inland waters in 2001. The main species of fish caught in Korean waters are anchovy, mackerel, hair-tail, yellow corvina, squid, and blue crab. Most fishery products are used for human consumption.

The fishing efforts have been found to reach their peak in 1991 and, thereafter, have been declining in both the number of vessels and weight. While the offshore and coastal fisheries sector remained the largest, its share in the nation's total fishery production has fallen from some 52 percent in 1984 to 47 percent in 2001. Fishing is carried out by private fishermen grouped in fisheries cooperatives. The total export value of fishery products was US$ 1 273 million (435 691 MTs) in 2001, a decrease of US$ 231 million (15 percent) from US$ 1 504 million (533 824 MTs) in 2000. The imports of fishery products rose 17 percent in value to US$ 1 648 million (1 056 252 MTs) in 2001 from US$ 1 410 million (749 191MTs) in 2000.

Since 1994 the chronic overexploitation of marine fishery resources by over-capacity in coastal and offshore waters has been addressed by imposing a fleet reduction program, the “General Buyback Program”. About 113 fishing vessels were scrapped under this program and another 551 vessels under the “Buyback Program by the International Agreements” in 2001. Financial transfers by the Korean Government for implementing these buyback programs totalled to KRW 550 billion in 2001, showing an increase of KRW 192.7 billion (54 percent) from KRW 367.3 billion in 2000.

In addition to the buyback programs, the Korean Government also worked towards implementing the “Total Allowable Catch” (TAC) system for seven commercial species such as the common mackerel, Pacific sardine, Jack mackerel, red snow crab, purple Washington clam, pen shell and spiny top shell in 2001 after the system has been successfully tested in 1999-2000.

With the development of new technologies, aquaculture production has increased to account for one quarter of the total fishery production in 2001 of which the marine aquaculture dominates 98 percent of the total aquaculture production (667 997 MTs) with the rest 2 percent contributed by the inland aquaculture . In 1995, some 107 000 hectares were used to produce about 996 000 tonnes of fish. Approximately 50 fish species, 15 shellfish species, ten species of seaweed as well as other aquatic animals and plants were produced.

According to the Fishery Act, the Ministry of Maritime Affairs and Fisheries (MOMAF) is largely responsible for licensing of fishing vessels in offshore and distant waters and foreign-flagged vessels fishing within the Korean EEZ, while local governments at province, city and district levels are mainly responsible for vessels in the coastal areas. The major fishery management measures in Korea are the input control and technical measures. Input control includes Limited Licenses (which restrict the number of fishing units), and Gear and Vessels Restrictions (which restrict the size and other dimensions of each fishing unit). Technical measures include Size and Sex Selectivity measures and Time and Area Closures. The Korean government also

started a fishermen-oriented co-management system for more effective implementation of responsible fisheries. Management activities for commercial fisheries, aquaculture, post-harvest fisheries, marketing of fishery products, recreational fisheries, monitoring and enforcement in fishery management as well as multilateral agreements and arrangements in support of the fishery management were described.

Costs for fisheries management in Korea primarily involve costs for: (a) research and education; (b) fisheries infrastructure and environment enhancement; (c) fisheries resources enhancement; (d) aquaculture development; (e) renewal and modernization of vessels; (f) support for crew insurance; (g) payment for fishing fleet reduction; and (h) other cost reducing transfers. Total government financial transfers in 2001 amounted to KRW 550 billion; most of the transfers were used for fishing fleet reduction (KRW 260.2 billion, 47.3 percent), infrastructure & environment enhancement (KRW 177.2 billion, 32 percent), and resource enhancement (KRW 31.0 billion, 5.6 percent). The government financial transfers constitute around 12.2 percent the total revenue from fisheries landings (KRW 4 511.9 billion) in 2001.

Bilateral and multi-lateral treaties between Korea and Japan, Korea and China, Korea-Japan-China were signed for managing the fisheries resources in the East Sea (Sea of Japan), East China Sea and Yellow Sea in view of changing fishing conditions in the Northeast Asian seas that resulted from the implementation of the UNCLOS in November 1994. The Republic of Korea has participated as a member for ten regional fishery bodies and contributed its role in the global management of the fishery stocks. Area of competence and terms of reference for these fishery bodies were provided. Korea is also a member of the Organization for Economic Co-operation and Development (OECD) and a party to 4 fishery conventions (organizations) as well as a party to 13 oceans-related agreements.

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APPENDIX TABLES

Current Management of Marine Capture Fisheries in South Korea

Level of Management	% Fisheries Managed	% with Fisheries Management Plan	% with Published Regulations	Trends in the number of Managed Fisheries over ten yrs. (increasing/decreasing/unchanged)
National	50	50	45	Increased
Regional	20	20	20	Unchanged
Local	30	30	35	Increased

Summary information for three largest fisheries (by volume) in South Korea (Year 2001)

Category of Fishery	Fishery	Volume mil tons	Value* mil US$	% of Total Volume Caught**	% of Total Value Caught**	Covered by a Management Plan?	# of Participants	# of Vessels
Industrial	1 Anchovy	273 900	n.a.	21.8	n.a.	Yes	n.a.	n.a.
	2 Mackerels	203 700	n.a.	16.3	n.a.	Yes	n.a.	n.a.
	3 Squids	225 600	n.a.	18.0	n.a.	Yes	n.a.	n.a.
Artisanal***	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Recreational***	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Notes: n.a. = not available; n/a = not applicable
* Value in 2002 U.S. Dollars.
** % values are based on totals for each category of fishery.
*** The fisheries are insignificant and data very scanty.

Use of Fishery Management Tools within the three largest fisheries in South Korea

Category of Fishery	Fishery	Restrictions				License/ Limited Entry	Catch Restrictions	Rights-based Regulations	Taxes/ Royalties	Performance Standards
		Spatial	Temporal	Gear	Size					
Industrial	1 Anchovy	No	No	Yes	Yes	Yes	Yes	No	Yes	No
	2 Mackerels	No	No	Yes	Yes	Yes	Yes	No	Yes	No
	3 Squids	No	No	Yes	Yes	Yes	Yes	No	Yes	No
Artisanal*	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Recreational*	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Notes: n.a. = not available; n/a = not applicable
* The fisheries are insignificant and data very scanty.

Costs and Funding Sources of Fisheries Management within the three largest fisheries in South Korea

Category of Fishery	Fishery	Do Management Funding Outlays Cover			Are Management Funding Sources From		
		R&D	Monitoring & Enforcement	Daily Management	License fees in fishery	License fees from other fisheries	Resource rents
Industrial	1 Anchovy	Yes	Yes	No	Yes	No	No
	2 Mackerels	Yes	Yes	No	Yes	No	No
	3 Squids	Yes	Yes	No	Yes	No	No
Artisanal*	1	n/a	n/a	n/a	n/a	n/a	n/a
Recreational*	1	n/a	n/a	n/a	n/a	n/a	n/a

Notes: n.a. = not available; n/a = not applicable
* The fisheries are insignificant and data very scanty.

Compliance and Enforcement within the three largest fisheries in South Korea

Category of Fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other (please specify)
Industrial	1 Anchovy	Yes	Yes	Yes	Yes	No	No
	2 Mackerels	Yes	Yes	Yes	Yes	No	No
	3 Squids	Yes	Yes	Yes	Yes	No	No
Artisanal*	1	n/a	n/a	n/a	n/a	n/a	n/a
Recreational*	1	n/a	n/a	n/a	n/a	n/a	n/a

Notes: n.a. = not available; n/a = not applicable
* The fisheries are insignificant and data very scanty.

Capacity Management within the three largest fisheries

Category of Fishery	Fishery	Does overfishing exist?	Is fleet capacity measured?	Is CPUE increasing, constant or decreasing?	Have capacity reduction programmes been used?	If used, please specify objectives of capacity reduction programme
Industrial	1 Anchovy	No	Yes	Constant	No	No
	2 Mackerels	No	Yes	Constant	Yes	total allowable catch (TAC)
	3 Squids	No	Yes	Constant	No	No
Artisanal*	1	n/a	n/a	n/a	n/a	n/a
Recreational*	1	n/a	n/a	n/a	n/a	n/a

Notes: n.a. = not available; n/a = not applicable
* The fisheries are insignificant and data very scanty.

Russian Federation

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October 2003

POLICY FRAMEWORK

Both in the late Soviet and the post-Soviet periods, the general policy attitude in fisheries was the so-called "rational use" (*rationalnoe ispolzovanie*) of fishing resources, a term which in the Russian language may have different meanings: one close to the meaning of the English word "sustainable" and another implying the maximizing of economic benefits.

Until September 2003, several strategic documents for national fisheries development were in preparation by the governmental agencies. Both the State Committee for Fisheries and the Ministry for Economic Development and Trade submitted their draft concepts of fisheries development but there have been no special documents adopted at the national (federal) level which would set objectives of fisheries management policy in the country. The attempt of the federal government to introduce an auction system of quota allocation in 2001–2002 met active resistance from the stakeholders and extensive public discussion regarding the ways of reforming the Russian fishery. The government was heavily criticized for the absence of consistent fishing policy.

In September 2003, the new policy document "The Concept for Development of the Fishery Industry of the Russian Federation until the year 2020" was approved by the government. This document sets the following general aim for the fishery development in the Russian Federation:

> *"The aim of the development of the fishery sector of economy in the Russian Federation is sustainable functioning of the fishery industry on the basis of conservation, replenishment, and rational use of the aquatic biological resources, the development of aqua- and mariculture which altogether should meet the domestic demand for fish products, the social and economic development in the regions which economy depend on the fishery. Alongside, the conditions should be developed to provide the effectiveness of fish and seafood export, its competitiveness and the optimization of the fishery sector management"*
>
> **(State Committee for Fisheries, 2003a).**

LEGAL FRAMEWORK

Responsibility for fisheries management

According to the Law of the Russian Federation "On the Animal World", fishing, including harvesting of benthic invertebrates and hunting marine mammals, falls into the definition of use of the Animal World. Animal organisms inhabiting in the territorial seas, the internal marine waters, the continental shelf, and the exclusive economic zone (EEZ) of the Russian Federation (all notions in the juridical sense), or migrating between two or more administrative regions, and those which are subject to international agreements are considered federal property. Thus, it is the responsibility of the federal institutions to manage, monitor, and enforce marine fisheries.

The Ministry for Natural Resources is the general governmental institution for protection, control, and regulation of the use of any organisms belonging to the Animal Kingdom (Government of RF Bill 726 of 25 September 2000). However, management of fisheries (including governance, interagency coordination of "rational use", monitoring and research, protection of stocks and their environment, and stocks replenishment) is

the specific responsibility of another federal agency, the State Committee for Fisheries. The basic regulatory documents are the so-called fishing rules (in the latest version called "*Pravila promysla vodnykh bioresoursov*" – Rules for conducting fishery for aquatic resources) and the federal rules for the protection and harvesting of marine mammals which have been put in force by governmental bills.

There are, for example, regulatory documents (rules) for fisheries in the EEZ, the territorial seas, and the internal marine waters of the Pacific and the North Polar Oceans, in the Barents Sea, in the Baltic, in the Azov – Black Sea Basin, and in the Caspian Basin. The internal marine waters are additionally covered by other regulatory documents. They are largely inherited from the Soviet time but contain a number of amendments introduced by the orders of the State Fisheries Committee issued from time to time (see, for example, *Pravila*, 2003). These documents set regulation for Russian companies and citizens while the fishing by foreigners is largely regulated by special documents based on bilateral and multilateral fishery agreements of the Russian Federation. In addition, there are several other documents and instructions, most of which were issued by the then Ministry of the Fishery Industry of USSR but are still in force.

Responsibility for fisheries enforcement

Specifically, coordination of enforcement of marine biological resources is the task of another federal body, the Federal Border Service, FPS (Federal Law "On the Border Service of the Russian Federation" of 4 May 2000 – to be changed in the nearest future). Recently (2003), this service was subordinated to the Federal Security Service (FSB). However, other agencies also have responsibilities to enforce fisheries. In particular, the State Committee for Fisheries and its regional bodies enforce the inland waters but the demarcation becomes unclear in the case of estuaries, lagoons, and other kinds of the internal marine waters. The Special Marine Inspection of the Ministry for Natural Resources has an official task to perform protection of the marine environment and marine living and non-living resources and biodiversity. Its ability to enforce fisheries was somehow reduced by the New Code of Administrative Violations but, in fact, this agency continues to play a rather important role in the enforcement, in particular with regard to environmental regulations.

Management and enforcement at different jurisdictional levels

The same federal agencies (as above) but their regional and basin divisions act at different jurisdictional levels of the country. At the regional level, the State Committee for Fisheries is represented by its basin directorates for aquatic bioresources protection and replenishment (or reproduction in some translations) called in Russian *rybvods*. The area of each directorate's responsibility covers the area of one or several administrative regions – parts of the Russian Federation and the adjacent marine waters. The *rybvods* draft updates of regional fishing rules, issue fishing permits, control daily reporting of vessels, collect fishery statistics for all kinds of fisheries including recreational, perform the operative management of important fisheries and the marine mammal populations management, and directly manage or coordinate salmon or sturgeon hatcheries and other (if any else) replenishment facilities.

In total there are 26 such directorates (for descriptions see National administration, 1995), 14 being most important in the management of marine fisheries.[1] The zones of

[1] Murmanrybvod (Kola Peninsula, the western and the central Barents Sea, Karelrybvod and Sevrybvod (White Sea and the south-eastern Barents Sea along with river basins), Sevvostrybvod (waters of Chukotka, Bering Sea and the waters off West and East Kamchatka), Okhotskrybvod (northern and north-western Sea of Okhotsk), Amurrybvod (south-western Sea of Okhotsk, Amur Liman and western Tatar Strait), Sakhalinrybvod (waters off Sakhalin, Kuril Islands and the south-eastern Sea of Okhotsk), and Primorrybvod (Sea of Japan), Sevzaprybvod and Zapbaltrybvod (Baltic Sea), Azovrybvod and Kubanrybvod (Sea of Azov and the Black Sea), Sevkasprybvod and Zapkasprybvod (Caspian Sea).

responsibilities of *rybvods* or fishing zones and subzones may be considered as the first order regional management units. In the Pacific they generally correspond to the FAO statistical areas and subareas. Stock assessments in these basins are performed by regional research institutes for marine fisheries and oceanography, subordinate to the State Committee for Fisheries.

The Federal Border Service (*FPS*) oversees the regional directorates. Each regional directorate is further subdivided in accordance to the administrative divisions. The Special Marine Inspection is the main body responsible for the enforcement; which involves all forces protecting the marine borders. The Special Marine Inspection has regional branches corresponding to the administrative regions.

Coordination of management and enforcement

Coordination between the different agencies in the management and enforcement of particular fisheries and stocks is limited even though such coordination is required by the legislation. In some seasonal fisheries with considerable impacts by poaching, regional coordination committees are organized during so called *putina*, the high fishing season. However, in most cases coordination refers to the enforcement *per se* and even in this case it is most often relegated to joint patrolling and involvement of other governmental agencies responsible for the enforcement of fisheries-related activities, such as trade in fish and seafood by the Ministry for Interior and the State Customs Committee.

The role of regional administrations

Even though the regional administrations and municipal authorities are formally alienated from the process of management (in particular, stock assessments, the total allowable catch (TAC) setting, introducing regulatory procedures, and enforcement), they are an important factor influencing fisheries management. In most administrations of the maritime regions there are fisheries departments often headed or supervised by a vice-governor. These departments are developing and implementing fisheries policy at the regional level and play an active role in the allocation of quotas to local fishing enterprises (via the regional fisheries councils).

Along with the *rybvods*, the departments collect information on fisheries development in the region. In some fisheries regulated by the bilateral or international agreements (i.e. most of the Barents Sea distant fisheries), the regional representatives work in transboundary management bodies, for example the Russian-Norwegian Commission on Fisheries.

Regional administrations may also introduce regulation for endangered coastal species and protected areas. These regional reserves may restrict shore-based marine and estuarine fisheries (e.g. salmon, whitefish, char, smelt, navaga, and also seaweed and sessile organisms harvesting).

The current Concept for Development of the Fishery Industry calls for a greater role of the regional administration in the management of the coastal fishery, which is defined as the fishery in the internal marine waters and within the 12-mile territorial sea. However, the regulatory framework for this involvement is still under discussion.

Non-fisheries specific legislation and its influence on fisheries management

Russia does not have a special federal law regulating fisheries. At the federal level, marine fisheries are regulated by the Law on the Animal World, the Law on Ecological Expert Review (*Ob Ecologicheskoy Expertize*), the Law on the Continental Shelf, the Law on the Territorial Sea and the Internal Marine Waters, the Law on the Exclusive Economic Zone, and the Water Code.

The Law on the Animal World and the Law on Ecological Expert Review require a state ecological expert panel review for the TAC for all stocks fished. The absence of

a particular stock in the TAC list implies no commercial fishery for it. Basically this means that the TAC proposal not only should contain a justification of the catch figures but also an environmental impact assessment (EIA) of the specific methods harvesting this allowable catch. In practice, an EIA is either extremely rare or is implemented in an extremely formal way (Mokievsky & Spiridonov, 2000).

Endangered species listed in the Red Data Book of the Russian Federation[2] (RDBRF, 2001) and the regional Red Data Books are excluded from the commercial harvesting. Theoretically, this means that if there are any data regarding by-catch or incidental mortality of such species in particular fisheries, these fisheries may be considerably restricted or even closed upon the recommendation of the State Ecological Expert Panel of TAC or through the legal intervention of environmental authorities. However, few data on by-catches of endangered species have been collected and nearly nothing has been published. In total, there is one species of marine polychaets, three species of loricates, five species of gastropods, three species of marine bivalves, three species of marine crustaceans, and 24 species of marine and anadromous cyclostomates and fish included in the Red Data Book of the Russian Federation. The endangered fish species list consists of mainly anadromous fishes, sturgeons and salmonids.

Listing a fish or a marine invertebrate species in the Red Data Books makes the resumption of its harvesting very difficult as down-listing requires detailed data on species status. Since censuses of fish and aquatic invertebrates not related to fishing activities are methodologically difficult and expensive and obtaining catching permits for endangered species is a very complicated procedure, there is little chance that satisfactory data will be ever collected. Most of the listings in the Red Data Book of the Russian Federation were completed in the Soviet and early post-Soviet time. New listings are constrained by the difficulties in obtaining the data and by the consideration of the consequences related to such listings.

Federal marine protected areas cover ca. 1.8 percent of the continental shelf under Russia's jurisdiction (Spiridonov & Mokievsky, 2003). In most cases, these are the offshore parts of the terrestrial strictly protected reserves (the IUCN category I). Fishing is prohibited in such areas; while in others (i.e. buffer zones and federal reserves), there is an environmental authority approving any fishery programmes.

STATUS OF FISHERIES IN THE COUNTRY

Reported catch of marine capture fisheries (1995 – 2002) ranged between 2.9-3.9 million metric tons. More than 70 percent of this catch was taken in Russia's EEZ, the territorial sea, and the internal marine waters. The distribution of the domestic catch according to different groups of seas is highly uneven. Approximately 85 percent of the total catch is provided by the Far Eastern seas, the Bering Sea, the Sea of Okhotsk, the Sea of Japan, and the Pacific waters west off south-western Kamchatka and Kuril Islands. The Barents Sea and the internal marine waters each support around five to seven percent of the total catch.

From the legal standpoint, marine capture fisheries in Russia are broadly divided into industrial or commercial (*promyshlennoe rybolovstvo* in Russian) fisheries and into a second the group, which may be tentatively called "non-industrial" or "non-commercial". The second group includes the recreational (*lubitelskoe rybolovstvo* in Russian) and subsistence fishing (the latter term is not officially coined). The main difference between these two groups is that all target stocks for the industrial fisheries are subject to TAC and quota setting and permits to fish are issued to organizations

[2] The Red Data Book of the Russian Federation (RDBRF) is a basic state document established for listing rare and endangered species of wild animals, plants, and fungi, as well as some subspecies and separate populations.

BOX 1

Historical traditions of fisheries managemnent: Pomors fishery in the White Sea

Fisheries and other modes of natural resources use had been formed in the coastal villages of the old Russian settlers, the Pomors, along the White Sea several centuries ago. Fish and sea mammal hunting played the main role in providing proteins and goods for trade. Fisheries were divided into two main types: 1) far going fisheries and mammal hunting in the area of Spitzbergen and Novaya Zemlya and on the coast of Kola peninsula and 2) local fisheries in the vicinities of the villages (rural communes). The Kola coast cod fishing was an example of the first type of fishery; while the White Sea cod fished mostly by women in the season the male villagers were away fishing is an example of the second type.

Fishing grounds (*tonyas*) located along the of coastline, were marked and named centuries ago. There are summer and winter *tonyas*, herring *tonyas*, salmon *tonyas*, seals *tonyas*, etc. The *tonyas* were considered as common resources, belonging to a village, to be distributed each year between members of the commune. The order of partitioning of the resources was different in every village, dependent on the types of fisheries resources (under the ice fishery, summer fishery, herring, salmons, etc.) and the traditions of the village.

For example, in the Kovda, Kandalaksha, and Kolvitsa communes (Kandalaksha Bay), only winter herring *tonyas* (i.e. places, where nets could be productively deployed underneath ice) should be shared equally between the members of communes. Summer fishery of herring in these communes was free for all inhabitants and there was no restriction concerning the areas of fishing and fishing effort. Within the next commune along the Karel'sky Bereg to the South-East – Chernaya Reka (Black River), winter herring *tonyas* are regulated and the summer herring fishery are generally unregulated, except for two of the most productive summer *tonyas* – these two should be shared and regulated. And, finally, another commune situated a bit more to the South –east along the coast – Keret', is characterized by all year-round regulation of the herring fishery: if the summer herring fishery contributes a significant part of total catch, it should be regulated; if not, it is free for all members of commune (and probably for peoples from other communes).

Traditional types of fisheries still exist in the routine practice of villagers even though these practices were seriously hampered during the Soviet time when the State took the resources under the strict control. Fishing was officially allowed only in the frame of kolkhose. However, in the course of time, the licensed subsistence fishing became a common practice. Now, the same people working in a kolkhose may be considered as the industrial fishermen when they use a quota for navaga or the recreational fishermen (but in fact subsistence fishermen) when they go for licensed fishing of herring or for practically open access fishing for cod (the White Sea cod is not included in the Total Allowable Catch list and is not considered as a stock for the industrial fishery even though its total catch is comparable to the catch of navaga and may be even greater). The local fisheries inspectors often just issue permits for commercial fishing and licenses for the subsistence fishing but the allocation of the fishing grounds, *tonyas* to particular fishermen and their groups is still performed in a traditional way.

Source: Tzetlin, 2000

while in case of non-industrial fisheries there is no TAC and quota setting (but usually catch limits are set) and permits are either not required or are issued to individuals.

There is no officially adopted Russian term for the artisanal fishery. In fact what is usually called "artisanal fishery" (i.e. fisheries conducted with largely traditional

gears used for subsistence but also delivered to the market) in Russia covers also several kinds of fisheries classified as industrial, for example salmon, whitefish, chars, navaga, flounders and greenling fisheries in the Baltic, the Arctic and the Far Eastern Seas. Often the same fishermen conduct fisheries in which some activities are formally regarded as non-industrial, while others are considered as industrial (see Box 1). The production of both subsistence and small-scale industrial fisheries may be delivered to the local (and sometimes not only local) market.

The Pacific salmon fishery, which is of great importance for Russia, is largely industrial because part of the catch comes from marine fishing with kiddle the fish, which are delivered to processing factories and often to processing trawlers coming to the shore. However, another part of the catch comes from small fishermen teams using gillnets in the estuaries and the rivers. They may deliver their catch to the processing factories or to the local market, but separate catch figures for these small-scale fisheries conducted in a more or less traditional way usually are not available in the fisheries statistics. Therefore, Pacific salmon fisheries are regarded here as largely industrial.

Furthermore, there is a unclear transition from the subsistence to the marine recreational fisheries. Formally, they may be distinguished by using different types of gears as nets and similar gears are not permitted in the recreational fishery. However, people angling for greenling in East Kamchatka may land hundreds kilograms of catch per day; while remaining within the formal framework of recreational fisheries (S.A. Safronov, Kamchatka Administration, personal communication).

The formal number of the stocks allowed for industrial fisheries in Russia's internal marine waters, territorial seas, and EEZ is provided by the annual TAC proposal. Many of these "stocks" have little biological meaning and furthermore several of them are in practice not fished. In a total there are currently 133 formally defined commercial stocks of fish and 71 stocks of marine invertebrates (State Committee for Fisheries, 2000-2002). Some fishing stocks are not harvested on a regular basis, being either subject to experimental fishing or as by-catch. Extraction of such stocks, for which estimated numbers are given in Table I, results in a more conservative estimate of the stocks providing a basis for the industrial fisheries, i.e 116 stocks of fish and 59 stocks of invertebrates. Some of these stocks are multi-species assemblages. In particular, Pacific halibuts include three species of flounders and plaice may include up to three species in the Barents Sea and up to 20 species in the Pacific, while the number of redfish species in the Pacific seas amounts to six. Some invertebrates are also harvested as multi-species stocks, in particular whelks (Buccinidae) in the Sea of Okhotsk (ca. 20 species) or estuarine clams (*Corbicula*) in the Sea of Japan.

The largest fisheries by volume and value are those for Alaska Pollock and, among those, in the Western Bering Sea and the Eastern Sea of Okhotsk. The second in importance by volume may be the Pacific salmon fishery in Kamchatka or the Pacific herring fishery in the Northern Sea of Okhotsk. However, the salmon fishery apparently exceeds the herring fishery by value. Being both highly seasonal and based on spawning stocks, these fisheries have much in common with regard to management. The third most important fishery is the crab fishery in the West Kamchatka shelf, which is not outstanding in terms of the volume but remarkable in terms of the value (see Appendix Tables).

In the small-scale industrial and the non-industrial fisheries, which roughly correspond to the category of the artisanal fishery, one of the most important is the winter fishing of navaga in East Sakhalin. In addition, the small-scale Atlantic salmon fishery is very important in terms of value. The lower Ob' Basin, which includes Obskaya Guba (Ob' Bay) provides approximately 40 percent of the total catch of whitefish (NAFE, 1995). Even though part of this catch is taken in the estuary, it is traditionally accounted for in the inland fishery. Other important artisanal fisheries, which are conducted using nets and similar gears under licenses of the recreational

TABLE 1
Number of marine fish stocks formally or actually managed

Area	Total stocks	No regular fishery, experimental catch or by-catch	Considerable unreported catch	Multi-species stocks	Managed on single species basis
Barents	18	4			16
White	3				3
Baltic	13				13
Black, Azov	14		2		10
Caspian	13		3		7
Bering Sea	18	2	3	3	10
Kuril Islands	20	6	1	3	10
Okhotsk Sea	20	4	4	3	9
Japan Sea	15	1	3	2	9
Total	**134**	**17**	**16**	**11**	**87**

Source: State Committee for Fisheries, TAC list

TABLE 2
Number of marine invertebrate stocks formally or actually managed

Area	Total stocks	No regular fishery, experimental catch or by-catch	Considerable unreported catch	Multi-species stocks	Managed on single species basis
Barents	4	1	1		2
White					
Baltic					
Black, Azov	1				1
Caspian	1				1
Bering Sea	10	4			7
Kuril Islands	15	4	6		5
Okhotsk Sea	18	3	4	1	10
Japan Sea	23	1	4	5	13
Total	**72**	**13**	**15**	**6**	**39**

Source: State Committee for Fisheries, TAC list

fishery (but are in fact the subsistence fisheries and/or deliver their production to the local market), include the cod and the herring fisheries in the White Sea and the char and whitefish fisheries in the estuaries of the Siberian and the Far Eastern rivers. Their catch statistics are collected by the *rybvods* and may be, in principle, available upon request but the analysis of these data has not been published.

Little is published about the marine recreational fishery in terms of the volume, value, and the catch structure. An organized recreational fishery for Atlantic salmon on the Kola Peninsula and in Karelia appears to be rather profitable (ca. several million US$ value of the tourist product); while the economic values of other recreational fisheries are difficult to assess. There are some seasonal recreational fisheries with mass involvement of local urban population, in particular those for smelt in the Bay of Finland, the Magadan Coast of the Sea of Okhotsk, and Sakhalin, greenling in East Kamchatka, and hokkai shrimp in South Sakhalin.

Due to the aforementioned problems in the assessment of these fisheries it appears to be difficult to compare them to the industrial fisheries and they are for the time being not included in the Appendix Tables.

MANAGEMENT ACTIVITY

How are management measures developed and implemented?

Both the Ministry for Natural Resources and the State Committee for Fisheries are involved in the management process; while the principal responsibility is due to the

latter institution, its regional and central fisheries research institutes, and directorates for fish stock protection and replenishment (*rybvods*).

Stakeholders are in most cases alienated from the management process, since there is no legal basis for stakeholder involvement (except in the case of quota allocation), and, therefore, influence the fisheries management only indirectly. The municipalities may collect data on the artisanal and recreational fisheries and apply to the local fish stock protection inspections (branches of *rybvods*) or to *rybvods* to introduce special measures. They tend to influence the process of establishing the property rights system for the salmon fishery grounds (see Box 2).

How many fisheries and exploited stocks in the country are managed

Formally all fisheries for stocks listed in the TAC list may be considered as the managed ones. At least, their inclusion in the list means that the stock assessment is somehow conducted, the allowable catch is somehow determined and when issuing catch permits, the *rybvods* determine the fishing season, the gear and whether a particular species is a target species or a by-catch.

From the less formal standpoint, real management at the stock level is not always the case. Nearly all exploited fish stocks in the Barents Sea along with king crabs and Northern shrimp are under management and most of them, in fact besides of Polar cod, the herring of the Cheshskaya Bay and some other less important species are managed on the bilateral (Russian – Norwegian) basis.

In the North-western Pacific a special management effort is focused on Alaska Pollock (see Box 3), Pacific salmon, Pacific herring, Pacific cod, halibuts, saury, redfish, crabs and shrimps. By excluding the experimentally fished and by-catches, dominated by unreported catch and multi-species stocks, an attempt was made to estimate the percent of fish stocks in the TAC list which may be considered as managed on a single species stock basis (Table 1 and Appendix Tables).

Generally this is approximately 75 percent of the finfish and 66 percent of the invertebrate stocks in the TAC list.

The stocks which are not listed in the TAC and are targeted by the subsistence fishing are managed by setting certain rules and restrictions in the frame of the regional fishing rules for the subsistence and the sport fisheries (so called *Pravila sportivnogo I lubitelskogo rybolovstva*). Usually, the catch limits are set and limitations are imposed by the *rybvods*; while the allocation of fishing grounds often follows the traditional practice (see Boxes 1 and 2). However, the compliance of fishermen and the enforcement effort of inspectors vary greatly. A special excepting is recreational fishing for Atlantic salmon, which is rather strictly controlled.

Changes in the number of managed fisheries

Formally, the number of managed fisheries has somewhat increased from year to year as new stocks have been introduced to the TAC list, providing an assessment of these stocks and the development of management measures. In particular, this formal increase of the fished stocks (by nearly 30 percent since 1991) occurred for the most part in invertebrates harvesting in the Russian Far East. The reason for this increase was a high demand for seafood in the Asian Pacific market and the breaking apart of the state monopoly for the seafood export. In addition, since 1991 (in a quasi-decade period), harvesting of sea urchins in Primorye, Sakhalin, South Kurils and Kamchatka, hairy crabs off South Sakhalin, Kuril Islands and the mainland coast, deep water stony king crabs (*Lithodes aequispina*) in the Sea of Okhotsk, and clams in the Sea of Japan developed practically from zero. All of these fisheries are formally managed but this management is generally poor (see Box 4). According to a conservative estimate based on the results of the TAC review, the effective (and not just "paper") management activity exists in five of these stocks (i.e. Hairy crabs and sea urchins in Kamchatka,

BOX 2

In search of the co-management: the experience of a Kamchatkan municipality

Ust'-Bolsheretsk is a small town in the mouth of the Bolshaya River, the second biggest river of Kamchatka Peninsula. As many areas in the Russian Far East the administrative district of Ust'Bolsheretsk underwent rapid development of salmon fishery: from 1996 to 2000 the number of small to medium fishing enterprises showed 2.5 times increase. The administration of the district made an analysis of the performance of these enterprises and elaborated a programme for the coastal fishery development in the Bolshaya River area and the proximate coast.

The administration initiated the development of the property right system for fishing grounds and developed requirement to the enterprises willing to have a long-term lease of particular grounds.

Besides of this the administrations analysed the current fishing regime for particular species and advocated limitations for the spring fishing of smelt in order to protect the winter recreational and subsistence fishing of this species which attracts not only the locals but also the inhabitants of neighbour districts and Pepropavlovsk, the administrative centre of Kamchatka. The administration also applied for the restriction of fishing of the most overharvested salmon species, spring sockeye salmon, coho and king salmons. During the high fishing season, the *putina*, the municipal authorities organized the control of landing and allocated special funds for the local police involved in the enforcement activity. The measures undertaken had a positive impact on the regional development. In three years the number of enterprises practicing deep processing of fish and supplying several kinds of products showed 3.6 times increase, there was a corresponding growth of the working places number.

The administration also revealed a negative effect of additional kiddle of non-local companies deploying in the marine waters upon the pressure of the regional government. It was estimated that ca. 80 percent of salmon catch from kiddles were delivered to the processing trawlers and only the remaining 20 percent went to local processing facilities. This caused a sort of conflict between the municipal administration and the regional authorities rather typical for Kamchatka and some other areas of the Russian Far East.

Source: Beker, 2000

deep water king crabs in Kurils, and probably two species of clam in the Sea of Japan); constituting around 30 percent of the new fished invertebrate stocks. At the same time, only one new managed stock was added to finfish fisheries, namely the introduced Pacific mullet in the Sea of Azov.

In the last five years, several invertebrate taxa were proposed for fishing in the Sea of Japan, for example medusae, mysids, and tunicates. Proposals for their harvesting were inspired by growing demand for these products in the Asia Pacific market. In fact, their inclusion in the TAC proposal did not mean the development of sound management schemes; so the Ecological Expert Panel for TAC criticized and rejected some of these proposals or reduced the allowable catch until a proper management scheme be presented.

What factors drove changes in the management actions, measures and/or mechanisms adopted?

The driving force in changes in the management actions and/or mechanisms is usually the transboundary nature of particular exploited stocks. Currently in the Barents Sea, the stock and environmental assessments are presented to the ICES to be discussed

BOX 3

Assessing the management practices in the most economically important fishery

Walleye (Alaska) Pollock is the most commercially important species in the Russian fisheries. Fisheries institutes undertake annual assessments of its stocks using various methods, at least three to four, for annual stock assessment independent from the catch and effort data. In the 1990s, most of populations of walleye (Alaska) Pollock abundance levels decreased. The spawning stock of the eastern Sea of Okhotsk, one of the most economically important, showed a four-fold decrease in 2000 compared with 1996. The Russian fishery science often related these stock dynamics to global climatic changes; however, it appears that such a drastic decrease was caused by the impact of fishing practices.

The results of the researchers from the Kamchatkan Institute for Fishery and Oceanography (Petropavlovsk) showed that there were considerable discards of Pollock and, therefore, the real catch in the 1990s was much higher than reported. According to the authors, the discards mainly comprised smaller (even though adult) fishes, which did not fit to the filleting lines of the modern processing trawlers. Besides this, around 30 percent of the catch was underestimated due to the incorrect coefficients of the production outcome. Especially striking is the fact that the modern filleting trawlers operate with 47 percent of the catch being processed and the rest being discarded; a level that may not be considered efficient or sustainable when contrasted with the middle-size trawlers who processed more than 80 percent of the catch. The overall, average excess of the reported catch due to such discard was estimated to be approximately 17 percent. To mitigate these loses, two options were proposed: some changes in trawler constructions aimed at decreasing the catch of smaller fish or the decrease of the Total Allowable Catch for this fishery.

Source: Varkentin *et al.*, 2001

and considered by this and some other advisory bodies while the Russian-Norwegian Commission on Fisheries set TAC and quotas to both Russia and Norway and adopt management measures for most of the stocks except those which spend their entire life history in the waters under Russia's jurisdiction. The Alaska Pollock fishery in the Bering Sea, covered now by a special convention on stock protection (Vylegzhanin and Zilanov, 2000), is another example of the development of management driven by a transboundary regime.

Strengthening the governmental control over catch and export stems from introducing new general measures such as the control of daily reporting and the satellite monitoring of vessels positions which became mandatory since 1999 (Bliznetsov *et al.*, 2000).

The economic role and dependence of the domestic economy on particular fisheries is another factor driving changes in the management approach at the regional level. This is particularly seen in the development of the Pacific salmon fisheries management, in particular those in Sakhalin, which include rather regular assessments of smolts, setting a definite number of the fishing sites at sea and in the estuaries, assessments of the number of fish having accessed spawning grounds, flexible systems of regulatory measures during the fishing season, and the enforcement practices.

Regularity of stock assessments

The practice and regularity of stock assessments varies widely across the different seas and the institutions undertaking the assessments. The most economically important

stocks are assessed using surveys. These are rather regular and include, in many cases, annual embryo and larvae surveys to assess the breeding stock of such species as Arcto-Norwegian cod and haddock. Adult populations along with other demersal fish species in the Barents Sea are assessed by trawl and acoustics surveys often done jointly with Norwegian fisheries institutes. Similar special surveys are done quasi-regularly for the king crab and the northern shrimp in the Barents Sea. In addition to this, catch and effort data are regularly collected and one or several models of stock dynamics are run by the regional fisheries institute (PINRO). Currently, an ecosystem model incorporating fisheries and top predators has been also developed for the Barents Sea (Filin, 2000).

Alaska Pollock stocks in the Bering Sea and the Sea of Okhotsk are assessed using a similar approach on the regular basis (see Box 3). Other important fish stocks in the Sea of Okhotsk, the Bering Sea, and the Sea of Japan are also assessed quasi-regularly on the basis of trawl surveys. In the years preceding the 1990s, the regularity of surveys in many areas was higher than now because there was special funding from the federal budget; while the regular federal funding is quite scarce and, therefore, the planning of surveys requires extra-budgetary funding.

Red king crab stocks in the principal fishing areas are assessed annually. Every year a trawl survey is undertaken on the West Kamchatka shelf by the TINRO-Centre and usually a pot survey is conducted in the Tatar Strait by the Amur Branch of TINRO. The data collected are incorporated into stock models, albeit usually rather simplified when compared to fish stocks models. In other fishing grounds, king, snow and hairy crabs, and shrimps are usually surveyed on a quasi-regular basis, using pot surveys in the case of crabs or trawl surveys in the case of most shrimp stocks. However, catch and effort data are more regularly collected and used in management. It is important to note that regularity and quality of stock assessment largely depends on the "scientific" quotas, their allocation, and quota holders (see Boxes 4 and 5).

The TINRO-Centre carries out large-scale surveys in the Sea of Okhotsk, the western part of the Bering Sea, with a quasi-regular grid (with a distance of approximately 60 nautical miles between stations). Ideally, these surveys are planned for every year but gaps happen due to funding and logistic reasons. At these stations, standard trawl hauls, along with oceanographic measurements and plankton sampling, are performed. The assessment is done for most of the exploited and non-exploited populations and the data are fed into a macro-ecosystem model. This model is used in complement to stock assessments following routine methods (Shuntov *et al.*, 1993; Shuntov, 1998).

Assessments of Pacific salmon stocks are characterized by considerable specificity: every spring, the regional fisheries institutes conduct assessments of smolts on their downstream migration in the most important rivers; forming the basis for the return rate forecasting. To forecast such return rates, spawning stocks are assessed throughout the course of the fishing season. However, these forecasts are not particularly reliable and special research at sea (driftnet and trawl surveys) is practiced to refine the original forecasts. When salmon species enter the rivers, the inspectors of the Ichtyological service of the *rybvods* assess the number of having passed to the spawning grounds using various indicators (e.g. visual assessment, oxygen regime).

Surveys in the coastal waters are rather irregular. Demersal fishes and invertebrate stocks such as sea urchins, sea cucumbers, clams, and crabs are usually assessed in the process of harvesting based on the "scientific" quotas. One should note that this approach was strongly criticized by the experts of the TAC panel (see Boxes 4 and 5).

The number of overfished, depleted and fully utilized stocks

Several fish stocks, mostly demersal species and herring stocks, were severely depleted in the early years of industrial fishing in the Russian seas (Suvorov, 1948) or during the high years of the Soviet fishing in the Barents Sea (Borovkov *et al.*, 2001). Some

BOX 4
Notes on "scientific" quotas

In some cases, the practice of using the so-called scientifically-based quotas has given rather good results, in particular the Amur Branch of TINRO (based in Khabarovsk) has been conducting data collection and analysis in a robust way to assess the king crab stocks in the Tatar Strait. This fishery may be considered as rather satisfactorily managed since it has not experienced the same declines as the red king crab fishery off West Kamchatka. In other cases, the quality of assessments based on scientific quotas has been severely criticized by the TAC Ecological Expert Panels since 1999. The main reason for the low quality of the scientific research on board fishing vessels is the lack of motivation of captains and crews to properly undertake the necessary assessments. In turn, scientific observers paid by the companies are not motivated to maintain scientific data requirements. After several corruption scandals (especially those related to the murder of Valentin Tsvetkov, the Governor of the Magadan Oblast') in October 2002, the practice of scientific quotas was strongly compromised. In 2003 the approval of programmes based on the "scientific" quotas by the government was delayed and the phasing out of "scientific" quotas became possible. Even though the new Concept for Fisheries Development accepted by the Government in July 2003 retains "scientific" quotas as part of the management process, the regulation for them and stakeholders participation in the stock assessment process may be changed in the nearest future.

In some still exceptional cases (most examples from the Murmansk Oblast' and Sakhalin) the fishing companies initiate the stock and environmental assessments in particular areas in order to increase the scope of assessed stocks and to develop a plan for their management. Apparently, they are motivated by a hope that they can become quota holders for the newly opened fisheries. With the development of new regulations for the long-term use of the coastal grounds declared by the new Concept for Fisheries Development, this practice may become more common.

important red king populations faced serious crises in the mid-twentieth century but, by late 1980s, they were in relatively healthy conditions as a result of management efforts and enforcement (Levin, 2001). An attempt to characterize the recent situation is presented in Tables 3 and 4, comprising estimates of overfished, depleted, and fully utilized stocks on the basis of the discussions with the experts participating in the TAC panels (Mokievsky and Spiridonov, 2000). Expert opinion estimates that 31 percent of fish stocks and 30 percent of invertebrate stocks have been negatively impacted by the recent history of fisheries. Caution is noted in that these estimates take into account only more or less apparent cases of direct effects; while a number of cases of synergies (ecosystemic) of fishing impacts and natural population fluctuations (in particular characteristic for Atlantic and Pacific herring, sardine, anchovy, and pilchard stocks) largely fall outside of the analysis.

TABLE 3
Estimates for marine fishes stocks recently overfished, depleted or totally utilized

Area	Total	Overfished	Depleted	Fully utilized
Barents	18	7	1	
White	3		1	
Baltic	13	3	1	
Black, Azov	16	3	4	2
Caspian	15	3	2	2
Bering Sea	18	6		
Kuril Islands	20	1		
Okhotsk Sea	19	4	1	
Japan Sea	15		1	1
In percent	137 (100%)	19.7%	8.0%	3.6%

In the Barents Sea, overfishing has affected in one or another way all major commercial stocks. Pronounced depletion is seen in the Atlantic salmon, however not only affected by fishing pressure but also by other anthropogenic

BOX 5
What can save sturgeon fishery?

Historically, the Caspian sea basin has been and remains the source of the greatest volume of sturgeons in the world. During the first half of the century the harvest started to decline and the reduction in recorded annual catches had become especially serious during the last decade of the twentieth century, with a reported drop from 8 500 metric tons in 1992 to about 1 200 metric tons in 1987 and even less in early 2000s. According to some estimates, poaching may be up to ten times higher than the legal catch. In June 1997, 23 species of *Acipenseridae* (sturgeons and paddlefish) were listed in CITES Apendix II, joining those already covered by the Convention, and thereby including all sturgeon species under CITES. Despite some evidence that such a listing has relieved pressure on stocks, illegal harvesting and trade of sturgeons for caviar continued unabated and the population continued to decline at a precipitous rate. Partial moratorium on the commercial catch of sturgeons in the Caspian Sea in 2001 would unlikely ease the pressure on sturgeons stocks since the majority of the Russian sturgeon catch appears to be destined for domestic markets; thereby making monitoring more difficult.

Source: Vaisman and Raymakers, 2001.

activities (i.e. damp construction on the spawning rivers and timber rafting in the 1960-80s apparently causing population decline). Invertebrate stocks in the Barents Sea have not been strongly affected besides the over-harvesting of Iceland scallop on particular banks.

In the Baltic and Black Seas, the Sea of Azov, and the Caspian Sea, overfishing mostly affected anadromous and semi-anadromous fish species. Of particular importance are sturgeons, which especially suffered in the 1990s due to increasing poaching and the lack of coordination in management efforts of the countries of the Black/Azov Seas and the Caspian Basins (see Box 6).

In the Far East, the major resource of fisheries, Alaska Pollock is also considered as overfished (Box 2). Regarding other fish stocks, it is mostly salmon species that were, to various extents, affected by fishing: sockeye salmon in the Bering Sea, king and coho salmon off West Kamchatka, chum salmon in the Amur River Basin, and cherry salmon in the Tatar Strait area (Sea of Japan). Nearly fully utilized are kaluga sturgeons in the Amur River, the Amur Liman and the Bay of Sakhalin, and Sakhalin taimen along the mainland coast of the Sea of Japan, where it is not listed as an endangered species.

The invertebrate stocks, even more so than the finfish stocks, were recently affected by overfishing. King crabs are under strong pressure of illegal, unregulated, and unreported (IUU) catch and the analysis of Japanese import data shows that actual catch of the red king crab may be three times greater than the official figures (Levin, 2001). The red king crab population off South Kurils appears to be fully utilized (Box 4). Strongly depleted populations include the sea cucumber (*Apostichopus japonicus*) in South Sakhalin (Sea of Okhotsk) and Peter the Great Bay (Sea of Japan).

TABLE 4
Estimates for marine invertebrate stocks recently overfished, depleted or totally utilized

Area	Total	Overfished	Depleted	Fully utilized
Barents	4	1		
White				
Baltic				
Black, Azov	1			
Caspian	1			
Bering Sea	11	2	1	
Kuril Islands	15	3	1	1
Okhotsk Sea	18	5	1	
Japan Sea	23	6	1	
In percent	73 (100%)	23.3%	5.5%	1.4%

BOX 6

Management undermined by illegal fishing (a WWF Russia case study)

The Krill Islands are a region of high biological diversity and are considered to be a natural phenomenon with no parallel. Since the late 1980s, fishing activities for saury, Alaska Pollack and sardines have reduced in the open waters off the Kurils, whilst the fishing pressure in the coastal zone of the Kurils islands has increased. Problems with the control of the quota realization and catch size in Russian waters, the imperfection of the legislative base, and difficult economic situations are key factors behind such increased fishing activities. Additionally, the demand for seafood in the Asiatic-Pacific market has resulted in high poaching pressure on king crab and hairy crab populations, shrimps, sea urchins and some other benthic invertebrates.

The king crab fishery off the South Kuril Islands started in 1905. Catch in this area reached several thousand tons before 1990 but then sharply decreased. Official catches in the area of the South Kuril Islands was below 100 metric tons in the early 1990s and then declined to several metric tons in the late 1990s. Presently, resources are considered depleted and commercial fishing is prohibited. However, since 1991 illegal fishing activities have continued and production sent mainly to the ports of the Nemuro Peninsula (Hanasaki and Kusiro) in Japan. Thus, an estimate of the illegal catch in the area may be calculated using import statistics of fresh and live crabs (frozen crabs may have another origin, either the South-West Kamchatka or the South Sakhalin regions): the illegal catch in the late 1990s amounted to several thousand metric tons. The value of crabs illegally exported from the Kuril Islands area and adjacent waters amounted to approximately US$10 million in 1998 and US$15 million in 1999 and 2000.

Sea urchin fishing began in the area of South Kuril Islands at the beginning of 1990s, again as an export fishery. This opening up followed a weakening of border controls, and many groups (often credited as being Yakudza (Japanese mafia)), began harvesting these invertebrates using divers. The official figures of catch were low while the illegal catch, which was assessed according to landing in the ports of Nemuro Peninsula, exceeded them by an order of magnitude. From 1990 to 2000, the illegal export of sea urchins nearly doubled, and the value of smuggled product reached US$15 million. Starting with the second half of the 2001, several attempts to manage the situation have resulted in an increase of the Total Allowable Catch (TAC) for sea urchins. These proposals were accepted by the State Ecological Expert Panel of TAC in 2001–2002. The TAC Panel also recommended reducing the number of fishing boats and illegal catch by setting a quota for the harvest of sea urchins of not less than 50 tons for each boat. However, these recommendations were undermined by the over issuing of licenses. Hence, landings of sea urchin at ports of Nemuro exceeded 8.5 thousand metric tons whilst the TAC was less than 1 thousand metric tons. The value of sea urchin imports from the area of the South Kuril Islands was around US$41 million in 2002.

Are fishery managers legally required to adopt measures to address overfishing and rebuild depleted stocks?

There is no juridical notion of overfishing in the national regulatory documents, which provide the legal background for the governmental organizations managing fisheries (i.e. *rybvods* and other institutions of the State Fisheries Committee and the Ministry for Natural Resources). However, the Fishing Rules amended by the fishing authorities ban catching of particular species until the stock has been rebuilt. The *rybvods* are required to protect and replenish aquatic biological resources. Replenishment in this sense refers to all exploited stocks not necessarily depleted. Replenishment is traditionally targeted at two groups of anadromous fishes, sturgeons and salmons,

considered the most valuable but also those for which, historically in Russia and Soviet Union, the development of hatcheries technologies has been progressing for decades. Due to these traditions and attitudes, nearly all rebuilding and replenishment measures resulting in revenues from selling quotas (for example for Japanese salmon driftnet fisheries in Russia's Pacific EEZ) and compensation from industrial projects (for example, harbour construction or offshore oil and gas development) are channeled to the development of hatcheries.

What management tools are used

Most of the management tools used are based on provisions in the Fishing Rules. For most demersal/midwater fish stocks, like Alaska Pollock, cod, halibuts, these mechanisms include size restrictions, spatial restrictions, temporal restrictions, and gear restrictions. Furthermore, in crab fishing only adult males may be taken; females and undersized crabs should be released back to the sea. Most fish species are susceptible to retention when they reach a particular size (*promyslovaya mera* in Russian); generally determined by the size at maturity. However, there are no such restrictions if fishing activity focuses on spawning migrations species (i.e salmon) as these are, by definition, based on mature specimens exclusively. As a complement measure, spatial restrictions are set for the spawning areas of particular species or in areas where a large fraction of undersized fish is recorded.

There are some areas closed for fishing particular or all species. In particular, there are fishing free areas established by the Fishing Rules and the Rules for Marine Mammal Protection.

Temporal restrictions at sea are introduced for the most important species (i.e. Alaska Pollock, herring, and king crabs) for periods when most of the spawning females are in ripe condition. For example, temporal restrictions are imposed in the herring fisheries for spawning periods in general. Salmon fishing again has considerable specificity because in this case temporal restrictions are flexible and depend on the number of fish which have entered spawning rivers. These statistics are estimated individually for particular rivers by the inspectors of the Ichtyological Service of the *rybvods*. In addition, fishing for crabs is prohibited for the period of moulting (See Appendix Tables).

Industrial fishing is allowed only for those enterprises having a special permission issued by a regional *rybvod* on the basis of a quota allocated to this enterprise. In this sense limited entry is used universally. However, there is no practice of licensing particular fisheries and, hence, there are no specific limitations on the number of participants in any particular fisheries.

The property rights approach in fisheries management is rather a historical practice than a clearly written regulation. The Pacific salmon fishing provides the most remarkable example: the number of sites is limited and each site is allocated to a particular enterprise. The same refers to the fishing grounds in the mouths of the rivers. Historically, the property right system in coastal fisheries has a clear connection to the fishing cooperatives (*kolkhozes*) of the Soviet time. Even those having been disintegrated or split into descendant enterprises or kolkhozes often retain their fishing grounds where not only salmon but also other species are fished (see Box 7).

No special management plans have been developed for particular fisheries, and generally this targeted approach remains poorly understood within the agencies responsible for the assessment, management, and enforcement.

Capacity management has been broadly discussed recently and is one of the targets of the current policy. The State Committee for Fisheries now issues annually updated orders setting minimum daily catch limits for various types of vessels. This measure is aimed at prevention of splitting the quota held by a particular enterprise over a larger number of vessels. However, these minimum catch limits are currently calculated

BOX 7

Sakhalin lagoons: the rise, the fall, and the property right of its fisheries

The village of Morskoi Piltun on the north-eastern Sakhalin coast existed for many years and was most probably located on the place of the ancient Nivkh (the indigenous people of the lower Amur and North Sakhalin) settlement on the coast of the Piltun Lagoon. In the 1950s –1960s, there was a fishing kolkhoz specializing in industrial herring fishing using 300 meter *zakidnye nevoda*. Herring was salted in a big processing factory and the production transported to the nearest railway station. In the late 1960s, the herring catches decreased, coinciding with the general policy of the Soviet administration to decrease the number of villages in remote areas and combining their inhabitants in a fewer number of larger settlements. Thus, in 1968, Morskoi Piltun was abandoned and the *kolkhoz* united to two other kolkhozes located in the shores of other lagoons of North-eastern Sakhalin. The new kolkhoz had been based in the town of Nogliki, ca. 150 km to the south of Morskoi Piltun. This kolkhoz retained the fishing ground in the Piltun Lagoon and used the facilities remaining in Morskoi Piltun. In the post-Soviet time, a small enterprise separated itself from the kolkhoz and continued fishing in the area. However, the specialization of this fishing has changed dramatically. Now the enterprise regularly receives a quota for winter fishing for navaga for this particular area. The production (frozen navaga) goes to the local and the regional market. Navaga fishing is conducted by a team of 10-12 fishermen; while in summer, a single person from this team watches the base and conducts subsistence fishing with seine nets. The right to fish in this particular area is based on the combination of the legal documents (ownership of the fishing base, rights to perform economic activity on this particular segment of the shore, and allocation of the quotas) and traditions.

only for most of the economically important stocks, i.e. Alaska Pollock and red king crab (*Pravila* …, 2003). In several other fisheries, the current practice of quota splitting contradicts the principle of capacity management. There are many examples of allocating small quotas to a greater number of vessels approved by the rybvods (see Box 4).

Prohibited gears

Absolutely prohibited gears include dynamite fishing, using of poisons and drugs for fishing, pneumatic and normal guns, electricity, and all new methods of fishing not approved by the fishing authorities.

Other prohibited gears and methods are specified for particular species/stocks and areas. For example, bottom trawling is prohibited, *inter allia*, for Alaska Pollock everywhere, for catching flounders, cod, and navaga in three fishing subzones around Kamchatka, for catching any fish and seafood at depths less than 20 meters everywhere in the Far East and less than 30 meters along the mainland coast of the Sea of Japan, for catching any fish on part of the West Kamchatka shelf and in the Shelikhov Bay (*Pravila* …, 2003), and for fishing in the territorial waters off the Murmansk Coast and in some other areas of the Barents Sea. Bottom gillnets are prohibited in some areas of the northern Sea of Okhotsk and in some areas on the West Kamchatka shelf.

For crab fishing, all gears besides pots are prohibited and pots must be provided with a "window" made of natural material. This requirement implies that, due to the degradation of the "window" material, any lost pots will be out of operation after some time and will not affect crab stocks (*Pravila* …, 2003).

Finally, hooks are prohibited for salmon fishing and certain types of dredges are not allowed for clam and holothurians harvesting.

Changes of management tools over the past ten years

The current Fishing Rules were introduced in 1989. They were based on the earlier version of the rules and retain most of the tools developed in the 1950-80s. The essential novelty is the introduction of the obligatory reporting of the position and catch data to the centralized information system and mandatory installation of the technical devices required for the satellite based monitoring of the vessel's position (i.e. vehicle monitoring system (VMS)). The present system of fishery monitoring has been in force since 1999 and implies daily reporting (according to the standards adopted in 1996) and transmitting of vessels position data to the regional centres of monitoring and rybvods (Bliznetsov *et al*., 2000). The resulting databases are intended for use by fishery management and enforcement.

Has the introduction of management measures adopted in the past 10 years improved the status of the fisheries/stocks?

In the past, the Soviet system of fisheries management resulted in several successful stories, in particular the recovery of the West Kamchatka population of the red king crab after banning net gears, a complete switching to pots, and the introduction of protected areas (Levin, 2001). Similarly, a positive effect from management efforts brought upon the improvement of the Pacific herring stock condition in the Korf-Karaginsk area (Naumenko and Bonk, 1999). However, in the last decade, there is little indication that the status of particular fisheries/stocks has been improved as a result of the introduction of specific management measures. One of the reasons for this is the high pressure from illegal fishing and corruption, undermining management efforts. One should note that there are some examples showing that at least worsening of the situation has been slowed down or that some stocks have stabilized after several years of decline (e.g. several stocks in the Barents Sea, the salmon fishery in Sakhalin, and the king crab fishery in the Tatar Strait).

What are the principal impediments to more effective management?

The system of fishery management in Russia is essentially non-integrative. One of the basic problems is the lack of effective cooperation between science, management bodies *per se* (*rybvods* and affiliated organizations), and the enforcement bodies. There are departmental barriers to the effective information exchange between these groups of organizations. In addition, illegal, unreported, and unregulated (IUU) fishing undermines the management efforts. Furthermore, alienation of stakeholders from the management process negatively affects their motivation to use resources in a sustainable way and their compliance to the rules and good practices. One of the ways to improve the management of the most critical stocks, which are under pressure of the IUU fishing, could be the development of targeted management plans which extensively use the benefits of the fishery monitoring system, coordinate between the assessment, reviewing, management and enforcement units, effectively allocate existing funds, and involve stakeholders in the management process.

Currently management of the fishing effort is nearly completely focused at the single stock basis. Environmental impacts of fisheries (and ideally their synergetic effect in particular ecosystems) should be properly assessed and included (along with mitigation measures) in the annual TAC proposals.

Furthermore, the information on the status of stocks and fisheries and catch statistics is scarcely published and is hardly available for the experts outside the fisheries institutions, to the general public, and the non-governmental organizations. This limitation on information exchange complicates public control of the fishery management and development. To improve the feedback between the management authorities, fishing dependent communities, and the general public, much more information must be made publicly available. This particularly refers to the information

on the subsistence and the recreational fisheries, their social roles and environmental impacts.

The current quota allocation system remains one of the most important impediments to more effective management. The voluntary approach and the quota auctions led to the increases in unreported catch (Zilanov, 2001; Pacific Regional Directorate, 2002) and the misuse of "scientific" quotas. The new Concept for Fishery Industry Development (State Committee for Fisheries, 2003) calls for the development of transparent mechanisms of quota allocation, which mostly takes into account the economic and social roles of the companies. The environmental performance should be fully taken into account as well. A methodology has been developed by Zgurovsky and Spiridonov (2003) that provides a feasible mechanism of incorporating the environmental policy and environmental performance of the companies into the quota allocation process.

Furthermore it is necessary to develop a more effective bilateral and multilateral cooperation in the fishery management issues. Of particular importance are the international mechanisms to protect sturgeon stocks in the Sea of Azov and the Caspian Sea, progress in cooperation with Japan and South Korea to prevent export of illegally caught seafood, and the inclusion of the management and environmental aspects in the Russia/European Union fishery agreement. Other recommendations on the improvement of marine fisheries management and enforcement have been compiled by Vaisman (2001).

COSTS AND REVENUES OF FISHERIES MANAGEMENT

The current budget for the fishery management comprises the stock assessments undertaken by the fisheries institutes, the functioning of the relevant services of *rybvods* (inspections and the Ichtyological Service), enforcement at sea conducted by the Federal Border Service, and the functioning of the relevant services of the Ministry for Natural Resources involved in the process of fisheries management.

Until now the costs related to the stock assessments were paid directly via the basic funding of the research institutes from the federal budget and indirectly by allocating the so-called "scientific quotas" (see Box 5). In 2003, when this system has been seriously questioned, very few assessments were carried out because the funds from the federal budget covered only the immediate needs of the institutes and the basic salaries of the specialists. The full cost of the marine stock assessments was recently estimated to be approximately 8 billion roubles (VNIRO estimate), or around US$260 million (at the rate of Spring 2003). This may be considered as the maximum estimate. Probably the total cost of assessment was close to this value in the early to mid-1990s when the "scientific quotas" were greater and the process of their allocation was under less public control. Since that time the annual funds channeled toward stock assessments apparently decreased.

The funds for the management in the strict sense performed by the *rybvods* also come from various sources. Basic salaries and supplies are provided via the federal budget. Other sources of funding include fees for issuing fishing permits and part of the fines imposed for violations of the fishing rules in the inland (including estuaries and lagoons) waters. The *rybvods* also receive part of the revenues from selling quotas according to the international agreements and the fines for the estimated loss of fisheries resources resulted from industrial activities (offshore and harbour construction, accidental pollution, seismoacoustic surveys, etc.). These funds, however, are mostly allocated to the development and modernization of salmon and sturgeon hatcheries. The exact partition of these compensation fees between the central and the regional directorates is difficult to estimate.

Until the end of 1997, the inspections of the *rybvods* maintained the enforcement at sea and used also part of the fines imposed for violations of the fishing rules and the estimated loss of fisheries resources – but via a complicated formal procedure. The

rybvods lost these two sources of funding in 1998 when, according to the bill signed by President Eltzin, the function of the fisheries enforcement at sea was transferred to the Federal Border Service. Until 1998, the body of the on-board observers on foreign vessels and in most important fisheries was also formed by the rybvods and the costs of the onboard observation/inspection were born by the fishing companies. In 1998, after Eltzin's bill, this function was also transferred to the Federal Border Service but *rybvods* retained on board observers for the daily management purposes.

The Federal Border Service has a budget approved at the federal level and strictly controlled by the central directorate. Which part of the service's budget is allocated to the enforcement at sea is unclear since this information was never accessible publicly. There has been a general increase of the Federal Border Service budget since 1997; however, the mechanisms of using fines for the development of the enforcement system are essentially lacking (Pacific Regional directorate, 2002). The cost of the on-board observers, recruited now mainly from the employees of the Federal Border Service, is still covered by the fishing companies.

Within the Ministry for Natural Resources a rather limited cost of the panel review of TAC proposals is covered by the fees paid to the Ministry by the State Committee for Fisheries. The Special Marine Inspection of the Ministry for Natural Resources has similar basic funding from the federal budget; however, these funds may not be sufficient to cover the costs of the work in the field. Several regional branches practice the development of special enforcement operations with an operative planning to ensure success. For this purpose, they charter fishing boats and, in the case of success interventions, part of the revenues from fines covers the costs of the charters. Several federal specially protected natural areas have inspection teams skilled for working in the offshore zones of these protected areas. However, the federal spending for this activity is very low and it is mostly maintained on the basis of imposed fines and special grants from environmental organizations.

Until 2000, the Special Marine Inspection and the federal protected areas were subordinated to the State Committee for Environmental Protection (abolished in May 2000 according to the bill signed by President Putin). There was the Federal Ecological Fund affiliated to this agency, which had regional marine branches. These institutions accumulated funds from fees imposed for the violation of marine environmental regulation. These funds were partly used for the management and enforcement of fisheries including some assessment work, the designing of coastal protected areas, the planning of enforcement operations by the Special Marine Inspection, and the publication of identification manuals for commercial species. This funding ceased in the year 2000 and was never fully replaced by any other sources.

In summary, the funding for fisheries management and enforcement comes from various sources and its complete assessment requires a special investigation out of the scope of this review. The general tendency over the last ten years has been a decrease in the funds allocated to stock assessments and probably some increase in the funds allocated to monitoring and enforcement activities.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

In Russia, the UN Convention on the Law of the Sea (UNCLOS) was ratified by the special federal law, #30-F-3 of 26.02.1997; while the UN Fish Stock Agreement (UNFSA) was ratified by the special federal law, # 69 FZ of 26.04.1997. According to the Constitution of the Russian Federation (Article 15, paragraph 4), these agreements are part of the legal system of Russia (Vylegzhanin & Zilanov, 2000). The signing and ratification of UNCLOS has had considerable impacts on the fisheries management procedure and led, for example, to the development of the TAC setting procedure in its present form and also to the development of bi-lateral cooperation, in particular such effective examples as the Russian – Norwegian cooperation in the Barents Sea.

PARTICIPATION IN REGIONAL FISHERY BODIES (RFBS)

Russia participates in nine Regional Fishery Bodies and four other international fishery organizations. Annual membership fees paid by the country to these organizations amounted to approximately US$600 000 (State Committee for Fisheries, 2003b). The international marine fisheries strategy of Russia follows the below targets (State Committee for Fisheries, 2003a):

- Restoring and strengthening Russia's position in the World Oceans;
- Attaining national economic goals in the frame of the international fisheries cooperation on the basis of restoring Russia's position in the World Oceans;
- Using the possibility to apply national scientific results in the framework of aquatic resources development programmes; and
- Providing access of the Russian fishing fleet to the productive conventional areas of the World Oceans.

SUMMARY AND CONCLUSIONS

Russia does not have a special federal law regulating its fisheries. Several federal laws that treat issues related to the EEZ, the territorial sea, the internal marine waters, the continental shelf, and the water resources along with the country's environmental laws are used as a background; while the management regimes are set by the State Committee on Fisheries, which issues special documents called, in the everyday language, fishing rules.

Reported catch of marine capture fisheries (1995 – 2002) ranged between 2.9-3.9 million metric tons. More than 70 percent of this catch was taken in Russia's EEZ and territorial seas and, within these, more than 80 percent of the catch originated from the West Pacific. There are currently 133 commercial stocks of marine fish and 71 stocks of marine invertebrates formally defined in the Total Allowable Catch list supporting the industrial marine capture fishery. The artisanal fishery in Russia does not exist as a separate category and overlaps with the small-scale industrial and the subsistence/ recreational fisheries.

In terms of volume and value, the most important fisheries include the Alaska Pollock fishery in the Sea of Okhotsk and the Bering sea, the Pacific salmon fisheries in Kamchatka, and the red king crab fishery on the West Kamchatka shelf. Due to the lack of published data, it is difficult to rank the artisanal and the recreational marine fisheries.

Some Russian stocks/fisheries experienced overfising in the past; while more than 30 percent became classified as overfished, depleted, or fully utilized in the recent history of fishery development.

IUU fishing undermines management efforts; while the management system (in a broad sense) fails to tackle this issue due to a lack of legal integration of the assessment, management (in the strict sense), enforcement, and stakeholder involvement in co-management.

At the same time, the management of Russia's fisheries has been impacted by such international agreement as UNCLOS and UNFSA and the country's membership in nine Regional Fishery Bodies.

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APPENDIX TABLES

Current Management of Marine Capture Fisheries in Russia

Level of Management	% Fisheries Managed	% with Fisheries Management Plan	% with Published Regulations	Trends in the number of Managed Fisheries over ten yrs. (increasing/decreasing/unchanged)
National	61	0	100	increasing
Regional	n.a.	n.a.	n.a.	n.a.
Local	n.a.	n.a.	n.a.	n.a.

Summary information for three largest fisheries (by volume) (Year 1999) in Russia

Category of Fishery	Fishery	Volume mil tons	Value* mil US$	% of Total Volume Caught**	% of Total Value Caught**	Covered by a Management Plan?	# of Participants	# of Vessels
Industrial	Alaska Pollack in Sea of Okhotsk and Bering Sea	1.2	864***	41.5	Data not obtained at the moment	No	Data not obtained at the moment	Data not obtained at the moment
	Herring in Northern Sea of Okhotsk	0.2	76***	7.0	Data not obtained at the moment	No	Data not obtained at the moment	Data not obtained at the moment
	Pacific salmon in Kamchatka	0.08	69***	3.0			Data not obtained at the moment	Data not obtained at the moment
	Red king crab in West Kamchatka	0.03	213***	1.0	Data not obtained at the moment	No	Data not obtained at the moment	Data not obtained at the moment
Artisanal	NO DATA							
Recreational	NO DATA							

* Value in 2002 U.S. Dollars.
** % values are based on totals for each category of fishery.
*** calculated on the basis of export prices reported by the State Customs Committee (Kamchatka Branch) and published by Vaisman (2001).

Use of Fishery Management Tools within the three largest fisheries in Russia

Category of Fishery	Fishery	Restrictions				License/ Limited Entry	Catch Restrictions	Rights-based Regulations	Taxes/ Royalties	Performance Standards
		Spatial	Temporal	Gear	Size					
Industrial	Alaska Pollack in Sea of Okhotsk and Bering Sea	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
	Herring in Northern Sea of Okhotsk	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
	Pacific salmon in Kamchatka	Yes	Yes	Yes	No	Yes	No	Yes	No	No
	Red king crab in West Kamchatka	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
Artisanal	NO DATA									
Recreational	NO DATA									

Costs and Funding Sources of Fisheries Management within the three largest fisheries in Russia

Category of Fishery	Fishery	Do Management Funding Outlays Cover				Are Management Funding Sources From		
		R&D	Monitoring	Enforcement	Daily Management	License fees in fishery	License fees from other fisheries	Resource rents
Industrial	Alaska Pollack in Sea of Okhotsk and Bering Sea	Yes	Yes	No	Yes	Yes	Yes	No
	Herring in Northern Sea of Okhotsk	Yes	Yes	No		Yes	Yes	No
	Pacific salmon in Kamchatka	Yes	Yes	No	Yes	Yes	Yes	No
	Red king crab in West Kamchatka shelf	Yes	Yes	No	Yes	Yes	Yes	No
Artisanal	NO DATA							
Recreational	NO DATA							

Compliance and Enforcement within the three largest fisheries in Russia

Category of Fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other (please specify)
Industrial	Alaska Pollack in Sea of Okhotsk and Bering Sea	Yes	Yes	No	No	Yes	
	Herring in Northern Sea of Okhotsk	Yes	No	No	No	Yes	
	Pacific salmon in Kamchatk	No	No	No	Yes	No	
	Red king crab in West Kamchatka shelf	Yes	Yes	No	No	Yes	
Artisanal	NO DATA						
Recreational	NO DATA						

Capacity Management within the three largest fisheries in Russia

Category of Fishery	Fishery	Does overfishing exist?	Is fleet capacity measured?	Is CPUE increasing, constant or decreasing?	Have capacity reduction programmes been used?	If used, please specify objectives of capacity reduction programme
Industrial	Alaska Pollack in Sea of Okhotsk and Bering Sea	Yes	Yes	Somewhat decreasing	No	n.a.
	Herring in Northern Sea of Okhotsk	Yes	No	Fluctuating	No	n.a.
	Pacific salmon in Kamchatka	Yes	No	Fluctuating	No	n.a.
	Red king crab in West Kamchatka shelf	Yes	Yes	Decreasing	No	n.a.
Artisanal	NO DATA					
Recreational	NO DATA					

n.a. = not applicable

Taiwan Province of China

Seng-Keh Teng
Coastal Management Center, Philippines
April 2004

INTRODUCTION

This review provides a brief description of the status of marine capture fisheries management in Taiwan and it forms part of the UN Food and Agriculture Organization's (FAO) project on the "Review of the State of the World's Marine Capture Fisheries Management". The purpose of the review is to provide useful information that could be used by the decision makers, fishery managers, scientists, and other stakeholders who may be involved in the marine fisheries management of Taiwan.

Taiwan, a province of China, is an island located off the southeastern coast of China. The island is bounded on the west by the Taiwan Strait (linking the South China Sea and the East China Sea), on the south by the Luzon Strait (linking the South China Sea and the Philippine Sea), and on the east by the Philippine Sea and it has a total land area (main island and its small offshore islands of Pescadores, Matsu and Quemaoy) of 35 980 km^2 (CIA, 2004).

Taiwan has made a number of maritime claims and the most significant of them include:

- Exclusive economic zone: 200 nautical miles; and
- Territorial sea: 12 nautical miles.

In July 2003, Taiwan had an estimated population of 22.6 million with a population density of 628 persons per square kilometer and its gross national income per capita was around US$18 000 in 2002 (CIA, 2004).

The coastline of Taiwan is 1 566 kilometers; from which its extensive domestic fishing fleet sets sail almost every day of the year. The Taiwanese fishing industry employs approximately 300 000 people and accounts for 37 percent of Taiwan's overall agricultural output. Taiwan's thousands of fishing vessels are common in the South Pacific, where they ply the waters in search of the vast variety of pelagic (open sea) species, valued by Taiwanese and others around the world.

POLICY FRAMEWORK

In recent years, there have been growing international concerns on environmental protection and resources conservation. In order to overcome any negative impacts and challenges faced by the fisheries sector, the directions of fisheries policy formulation and research in Taiwan have been focused on the harmonization with the overall policy of the Government, in coherence with the changes in the international environment.

Thus, the policy framework of the Taiwan marine capture fisheries management includes the policies for managing the following fisheries sub-sectors:

- Distant Water or Deep-sea Fisheries;
- Offshore and Coastal Fisheries; and
- Marketing and Distribution of Fisheries Products.

Distant Water or Deep-sea Fisheries

The development of modern distant water fishing fleet in coherence with the international regulations and taking into account fostering fisheries cooperation with foreign countries forms the basic policy for managing the distant water fisheries. In

compliance with the policy, the fishing fleet shall be actively operating in the major fishing grounds of the world and the catch shall be mainly for export but also catering to the needs of domestic consumption. Apart from seeking reasonable profit, the fishing activities of the fleet shall be conducted in the manner consistent with the norms and rules of the FAO Code of Conduct for Responsible Fisheries and other international conventions and agreements. At the same time, cooperation with various coastal countries will be strengthened. This fleet will thus be playing an important role in the international arena of fisheries.

The main strategies to strengthen the implementation of the policies are as follows:

- Fisheries cooperation with coastal countries will be strengthened, through fishing access and joint exploitation of the fisheries resources in the exclusive economic zones of coastal countries, in order to secure the fishing grounds for the far seas fishing fleet. In addition, localization of fisheries operation with suitable coastal countries will be promoted.
- Active participation in various international fisheries organizations will be promoted, to protect the interests of fisheries in the international waters. To accommodate with the fisheries management regulations as set forth in FAO Code of Conduct for Responsible Fisheries, Vessel Monitoring System will be implemented in broad scale, in order to achieve the goal of transparency in fishing operations.
- The operation scale and the fishing capacity of far seas fisheries will be adjusted in response to the international action plan adopted. Appropriate vessel registration plan will be implemented to allow those flag-of-convenience tuna longliners built in Taiwan, to acquire proper registration back home. Boat owners will be encouraged to make investment in those coastal countries which are willing to undertake their international obligations as flag States, in such a way that the operation of tuna fishery will be under proper regime, so as to maintain a stable development in far seas fisheries.

Offshore and coastal fisheries

The policy for managing the offshore and coastal fisheries is focused on implementing measures that could achieve rational and sustainable utilization of offshore and coastal fisheries resources. In compliance with the policy, plans shall be formulated to diversify the functions of fishing ports and the use of fisheries resources, providing the public with suitable locations to perform recreational activities at sea or to enjoy the delicacy of fresh seafood; while upgrading the living environment in fishing villages by injecting new dynamics into the local economy, thus giving a new development feature to the fishing villages.

The main strategies supporting the implementation of the policies are as follows:

- Plans on orderly fisheries productions in the 12-mile territorial waters will be re-assessed and proper management mechanism will be established to extend the activities of coastal fisheries and to intensify the management of sea areas. Diversification of fisheries will be promoted to achieve effective utilization of fisheries resources within the territorial sea of Taiwan.
- There will be plans to promote multiple functions of fishing ports. The infrastructures at various ports will be improved by installation of proper environmental protection facilities, whereby upgrading their overall features.
- In line with the growing fondness of the public in recreational activities as well as the trend of development in recreational fishery, infrastructures at various ports will be improved while maintaining their scenic features. Fishermen will be encouraged to change their original operation to recreational fishery, in order to relieve the pressure on fisheries resources and to ensure their sustainable utilization.

Distribution and Marketing of Sea Products

The policy for managing the distribution and marketing of fisheries products is focused on establishing brands for quality seafood highlighting characteristics of freshness, sanitation, safety, wholesomeness and variety in the domestic seafood; making it a product of "convenient handling and easy cooking" in meeting the need for development of the fishing industry. E-commerce for seafood shall be promoted to ensure superiority in market competition.

The main strategies in support implementation of the policies are as follows:

- Criteria for verification of seafood brands will be formulated, and the brand for domestic seafood will be established.
- The procedure of production of domestic seafood with brand will be monitored and extensively promoted.
- Guidance will be provided to producers organizations to seek closer cooperation with traders and distributors.
- Direct sales centers for domestic seafood will be established.
- The system of direct door-to-door delivery and electronic commerce for high quality seafood will be established.

LEGAL AND INSTITUTIONAL FRAMEWORK

The *Fisheries Law* of Taiwan is comprehensive and consists of 71 Articles (Anonymous, 2003). It forms the basic legal framework for managing the marine capture fisheries in Taiwan. To supplement the *Fisheries Law*, the following regulations/rules were also enacted to regulate the management of deep-sea fisheries, coastal and offshore fisheries, and recreational fisheries (FA, 2003):

- "Guidelines of fisheries categories and renovation for sampan and fishing raft of Taiwan Province";
- "Fishing Period Limits and Minimum Crew Quota for Fishing Boats Ranging from 20 to 100 Tons of Taiwan Province";
- "Criteria Chart with Maximum Restrictions of marine Diesel Engines for Fishing Boats Ranging from 20 to 100 Tons of Taiwan Province";
- "Guidelines in Maximum Quota, Quota Application & Registration and Building of Pleasure-Oriented Fishing Boats in Taiwan Province";
- "Regulations Governing Fishing Boat Crew";
- "Regulation Governing Employment and Foreign Crew"; and
- "Provisional Measures for Taiwan-based Fishing Boat Owners in Hiring Mainland Chinese Crew serving in waters beyond 12 N.M. from Taiwan Coasts".

The Council of Agriculture is the highest fisheries policy making body and under which the Fisheries Administration, the highest fisheries administrative agency, was established. The Fisheries Administration was established on 1st August 1998, by upgrading the Department of Fisheries in the Council of Agriculture. This Administration is responsible for issuing licenses to fishing boats ranging from 20 to above 100 metric tons, as well as the management of their operations. The Administration also carries out enforcement of penalties upon irregularities and oversees county/city governments in licensing and management of fishing boats below 20 metric tons.

A unique feature of fisheries management in Taiwan is the formation of the Provincial Fishermen's Association (PFA) in 39 districts. The associations are formed by fishermen in the districts under the *Fishermen's Association Act*. The PFA is a multipurpose, non-profit organization for fishermen, which carries in its capacity four major functions – educational, economical, social, and political functions. The contribution of PFA to rural community and fisheries development has been substantial. Fishermen could make deposits and loans from the PFA through its credit departments, and fishery products may join the market through the PFA. The government also uses the PFA as the media

for promoting new governmental fisheries policy, with some governmental support such as collecting service charges for conducting government entrusted businesses such as fishermen health insurance programs (Huang & Lin, 2002; FA, 2003).

There are nine research and academic institutes involved in the fisheries research, which also contributed substantially to managing the marine fisheries in Taiwan. They include, for example, the Academia Sinica, the Fisheries Research Institute of the Council of Agriculture, the Development Center for Biotechnology and the National Taiwan Ocean University, the Institute of Oceanography and the National Taiwan University. In addition, there are a number of fisheries vocational schools in the Suao, Tainan, Keelung, Tungkang, and Penghu Counties that provide courses for training the fishermen or students to be the fisheries technicians.

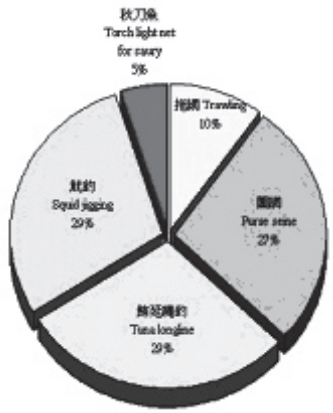
STATUS OF FISHERIES IN THE COUNTRY

Taiwan is an island surrounded by seas and oceans and its fishery industry is highly developed. Taiwan's fishing grounds extend to three oceans, including areas for fish farming that cover an area of more than 60 000 hectares. Currently, deep-sea fishing accounts for over half of Taiwan's total fishery production volume. Major fishery industries include tuna longline, squid-jigging, purse seine, and trawl fishing. The proportions of fisheries production by fishing methods in the deep-sea fisheries are shown in Figure 1. Taiwan has now become one of the world's six major high-seas fishing nations.

Overall fishery production in the year 2000 was around 1.3 million metric tons, with a value of nearly NT$ 100 billion (Figure 2). Over 130 000 households, with approximately 340 000 people are involved in the work of fisheries production. The fishery sector has contributed greatly to the stability of society and as a source of food supply.

In recent years, under the prevalence of exercising of 200-mile exclusive economic zones (EEZ) by coastal countries as well as the adoption of the cooperative management of high seas resources, the deep-sea fisheries have been encountering tremendous impacts; while the production of the offshore and coastal fisheries has reduced, due to overfishing and pollution of the nearby seas. To adapt to these adverse impacts, the Taiwanese Government has exerted great efforts in promoting international fisheries cooperation and active participation in international fisheries organizations to enable sustainable development of the far seas fisheries.

FIGURE 1
Proportions of fisheries productions by fishing methods in the deep-sea fisheries



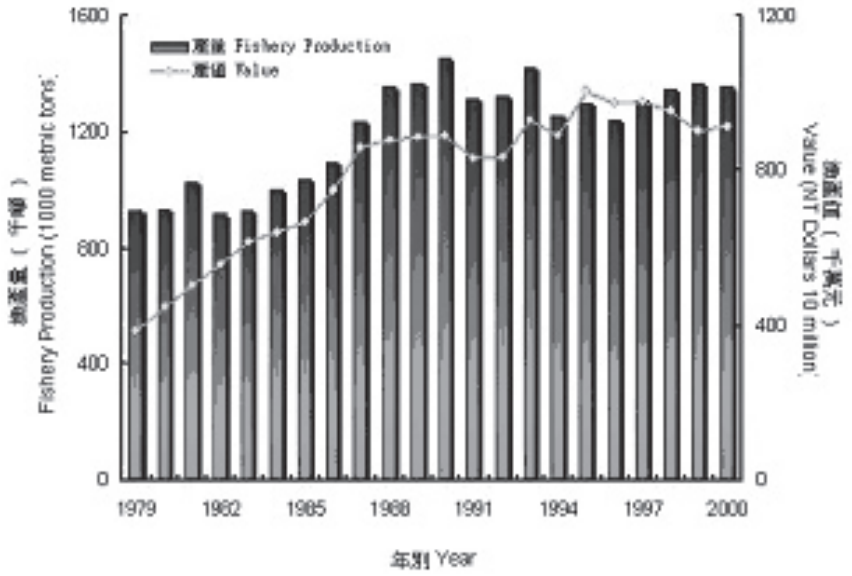
Source: FA, 2003

Regarding coastal and offshore fisheries, efforts have been focused on proper management of resources in the coastal and offshore seas, to enable sustainable utilization of resources. In addition, aquaculture has been directed to the rational utilization of land and water resources to ensure a harmony between fish farming and the environment. At the same time, fishermen are encouraged to engage in recreational fisheries for income diversification and more effort will be placed on the construction of picturesque fishing villages and augmentation of fishermen's welfare, with the hope of laying a sound foundation for Taiwan's fisheries in the next century.

Deep-sea Fisheries

Deep-sea fisheries refer to those fishing activities performed beyond 200-mile EEZ of Taiwan. The main fishing methods used include tuna longline fishing, tuna purse seine fishing, trawling, squid jigging, and

FIGURE 2
Volumes and values of fishery production in Taiwan 1979-2000



Source: FA, 2003

torch light saury fishing. In recent years, their production was over 880 thousand metric tons per year, accounting for over 65 percent of the total fisheries production. The tuna longline fishery, which comprises deep frozen longliners and the traditional longliners, is performed throughout the high seas areas of the three oceans.

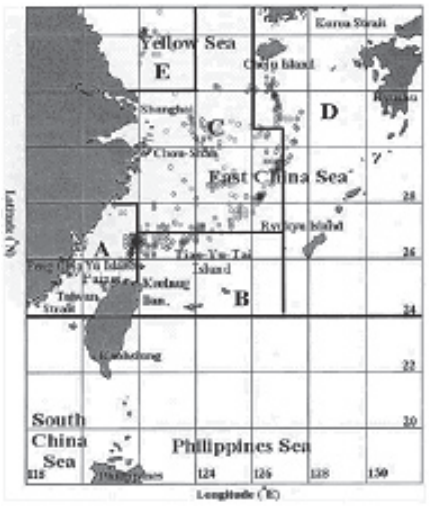
As for tuna purse seine fishery, the major fishing grounds are areas around the western and central Pacific Ocean. Squid jiggers operate mainly in the southwest Atlantic Ocean, North Pacific Ocean, and the waters around New Zealand. The fishing grounds for the trawl fishery have been greatly limited since the implementation of the 200-mile EEZ by coastal countries and, therefore, vessels have had to seek for joint ventures with such coastal countries as India, Indonesia, Oman, and Yemen for securing fishing grounds. Some squid jiggers engage in saury fishing on a part-time basis in the North Pacific Ocean after the squid fishing season is over. Most of the tuna longliners and purse seiners use foreign ports as bases for replenishment of supplies, repair, and transshipment of catch. Presently, more than 67 foreign ports have been approved by the Taiwanese Government as fishery base ports (FA, 2003).

Trawl Fishery

Taiwan's trawl fishery operates primarily in two major fishing grounds: one to the northeast and the other to the southwest of Taiwan (Figure 3). The offshore trawl fishing ground to the northeast of Taiwan, which covers most of the East China Sea, is the most traditional fishing ground and accounts for about half of the total offshore trawl harvest in Taiwan. According to the Taiwanese Fisheries Yearbook, the 1997 offshore trawl fisheries harvest measured 74 542 metric tons and was valued at NT$6 252 609. The trawl fishery thus accounts for 30 percent of total offshore fisheries production and 37 percent of offshore fisheries production value, respectively.

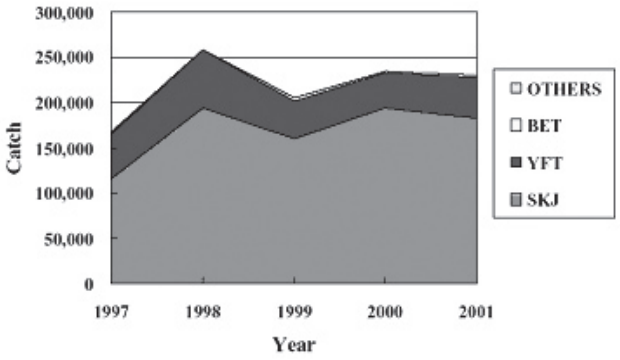
Trawl fishing vessels operating in the northeastern fishing ground are mostly below 200 metric tons in size and almost all are registered in three major northeastern districts of Keelung, Ilan Hsien, and Taipei Hsien. Chiang and Sun (1999) indicate that trawl vessels in the 50-100 and 100-200 metric tons categories have made up almost 95 percent of the fishing fleet since 1983. In addition, the age distribution of the northeastern trawl

FIGURE 3
Offshore fishing grounds of Taiwanese trawl fishing boats



Source: Sun & Chiang, 1999

FIGURE 4
Composition of catches from the purse seine fishery



Notes: SKJ = skipjack; YFT= yellow-fin tuna; BET= big-eye tuna; Others include billfish and ground-fish etc.
Values are in metric tons.
Source: Wu, 2002

fleet shows that in 1995 more than 60 percent of the trawl vessels were over 11 years old. A typical trawl fish harvest is a combination of many species. Shrimp is still the major target species for Taiwan's northeastern trawl fisheries, not only because of a deterioration of groundfish stock in the East China Sea, but also because the price for shrimp is higher (Sun and Chiange, 1999).

Purse Seine Fishery

Purse seine fishing was introduced into Taiwan in 1982 and developed rapidly in the late 1980s. Since the early 1990's, Taiwan has become one of the most important purse seine fishing countries in the Western and Central Pacific Ocean, in terms of the amount of catch and the number of fishing fleets in operation. The number of Taiwanese purse seiners reached a historical peak of 45 in 1992, maintained at 42 from 1995 to 2000, and reduced to 41 in August 2001 after one vessel was sold to a foreign company. The average annual production from this fishery during 1997-2001 was about 210 000 metric tons. In 1998, the production reached a historical high of about 260 000 metric tons; since then the production has been kept at a level of between 200 000 and 230 000 metric tons. The major fishing grounds are located in the EEZ of FFA member countries including Papua New Guinea, Federated States of Micronesia, Solomon Islands, Kiribati, and nearby high sea areas (WU, 2002; Wang *et al.*, 2002).

After 1998, the annual production of Taiwan deep-sea purse seine fishery remained around over 200 000 metric tons; however, production levels in 2000 and 2001 were over 230 000 metric tons (Figure 4). In terms of catch composition, skipjack and yellow-fin tuna accounted for about 98 percent of the total catch during 1997-2001 (Table 1) and big-eye tuna just accounted for a small portion. Because of price difference

TABLE 1
Proportions of the species of tuna caught from purse seine fishery during 1997-2001

Year	SKJ	YFT	BET	Others
1999	78.6%	20.5%	1.7%	0.0%
2000	82.7%	16.4%	0.8%	0.1%
2001	79.1%	19.9%	1.0%	0.1%

Notes: SKJ = skipjack; YFT= yellow-fin tuna; BET= big-eye tuna.
Source: Wu, 2002

between skipjack and big-eye tuna, with the price of big-eye tuna higher than the price of skipjack by about 30 to 50 US$ per metric ton, buyers prefer to separate out the different species from the catch when trans-shipping.

Shark Fishery

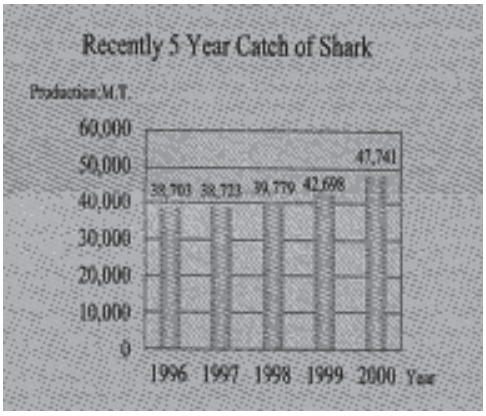
The development of the shark fishery in Taiwan has a long history. In the past five years, the annual catch of shark in Taiwan from the coastal, offshore, and deep-sea fisheries ranged between 30 to 50 thousand metric tons (Figure 5), accounting for about 7 percent of the global catch, and ranking as the fifth largest producer in the world following Indonesia, India, Pakistan, and Spain.

Most sharks are caught by fishing vessels under the membership of Kaohsiung, Tungkang, Suao, Shinkang and Keelung Fishermen Associations, and among which sharks caught by fishing vessels of Kaohsiung, Tungkang and Keelung Fishermen's Associations are from far seas operations, and the remaining are from the coastal and offshore areas of Taiwan. Sharks from the deep-sea fisheries, which constitute almost 80 percent of the total catches (Figure 6), are mainly caught by tuna longliners and trawlers, with Blue Shark, Silky Shark, Scalloped Hammerhead Shark, Shortfin Mako Shark and Thresher Shark as the main species. While in the coastal and offshore fisheries, sharks are mainly caught by longline, trawl, harpoon and set net fisheries and the main species are Blue Shark, Scalloped Hammerhead Shark, Shortfin Mako Shark, Thresher Shark, Sandbar Shark, Silky Shark, Whale Shark and others.

Offshore Fisheries

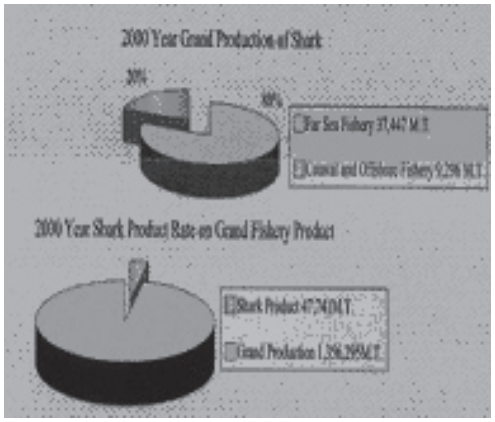
Offshore fisheries refer to those fishing activities performed within the exclusive economic zone extending from 12 to 200 miles from the baseline. Their production has been maintained at 150-250 thousand metric tons per annum in recent years. The major fishing methods include trawling, ring net fishing, mackerel purse seine fishing, gillnet fishing, longline fishing, light inductive fishing, etc. Their main fishing areas extend to the East China Sea, Taiwan Strait, South China Sea, Bashi Channel and the waters off the east coast of Taiwan. Due to the depletion of fisheries resources in the offshore waters in recent years, and coupling with the employment of larger vessels as well as the improvement of both fishing skill and fishing/navigation equipments, offshore tuna longliners tend to move to more distant fishing grounds.

FIGURE 5
Catches of sharks by Taiwanese fishing boats (1996-2000)



Source: FA, 2003

FIGURE 6
Total catches of sharks coastal, offshore, and far-sea fisheries in 2000



Source: FA, 2003

Coastal Fisheries

Coastal fisheries refer to those fishing activities operated within the 12-mile territorial seas of Taiwan. The production of these fisheries in recent years has been maintained at about 40 thousand metric tons per annum. The major fishing methods include the gillnet fishing, set-net fishing, beach seine fishing, fish fries catching, and other hook gear.

Coastal waters in Taiwan are generally overfished due to a great number of fishing crafts competing for the same resources in the same area. In addition, following the intensive industrialization along the coastal areas, pollution in the coastal seas further deteriorated the living resources. In order to promote sustainable development of coastal fisheries, the Taiwanese Government has in recent years established a number of fisheries resources conservation areas, artificial fish reef areas, and fisheries protection areas along the coastal seas (FA, 2003). Extensive releases of seeds of fish, crustacean and mollusc had been carried out to protect fishing grounds and to enhance the fish stocks. At the same time, the Government has also encouraged fishermen to diversify their fisheries operations by engaging in recreational fisheries, such as angling and whale watching tours.

Fishing Harbours

Fishing harbours are located along the coastal areas of almost all the counties (except the Hwalien County) and cities in Taiwan (Figure 7). The numbers of fishing harbours (figures in brackets) in the counties and cities are listed in the following (FA, 2003): Keelung City (6); Taipei County (35); Taoyuan County (2); Hsinchu County (1); Hsinchu City (2); Miaoli County (12); Taichung County (6); Changhwa County (2); Yulin County (6); Penghu County (68); Chiayi County (9); Tainan County (6); Tainan City (2); Kaohsiung County (7); Kaohsiung City (11); Pintung County (26); and Ilan County (10).

Recreational Fisheries

In Taiwan, recreational fisheries offer a wide range of recreations, including pond angling, touring of the sea bottom, and various types of sport fishing such as trolling and angling. In addition, such activities as tourist fishing trips involving operations of set-net and beach seine are becoming more popular. Spectacle programs on fisheries include those in exhibition halls and aquariums. A number of programs have been initiated by the Government and have resulted not only in increasing fishermen's income from direct sales of fish products, but also providing the public with an ideal place for leisure and relaxation.

MANAGEMENT ACTIVITIES

In Taiwan, the fisheries are managed in three-level systems. At the central government level, the Fisheries Administration (renamed the "Fisheries Agency" on April 14, 2003 under a fisheries act), the Council of Agriculture, and the Executive Yuan operate through four departments: Planning and Programming, Fisheries Regulation, Deep-sea Fisheries, and Aquaculture and Coastal Fisheries in working out policies of deep-sea fisheries and various fishery development programs. Secondly, the Fishermen's Association oversees, promotes, and educates fishermen. Thirdly, the Counseling Department under the Council of Agriculture is responsible for sales, financial affairs, and welfare of the fishery sector.

At the provincial and municipal level, the Fisheries Agency under Taiwan Provincial Department of Agriculture and Forestry initiates policies for fishery development and improves fishermen's life through six divisions to manage the operations of fisheries administration, fishing boats and fishermen, protection of fishery resources, fishery cooperation, improvement and promotion of fishing technologies, fishing harbor

constructions, public facilities, fishing production and marketing, planning, survey and statistics, assistance to fishermen associations and fish market supervision. Currently the government is further drawing up fishing port management organizations to regulate the Categories I and II Fishing ports.

At the county and city levels, the Fisheries Section under the Bureau of Agriculture or the Bureau of Construction is in charge of fisheries administrative and management affairs with duties primarily including administration of fisheries, the supervision of ports, fish production, and fisheries facilities, the counseling of the Fishermen's Association, and the support to fisheries and fishermen's welfare.

FIGURE 7
Counties and cities in Taiwan where fishing harbours are located

Source: FA, 2003

To meet the urgent needs in marine resources protection, the Taiwanese Government has since 1976 set up fisheries resources protection zones in various counties and cities, with a total of 25 Fisheries Resources Conservation Areas established as of 1995, covering 4 795 hectares of protected waters with marine resources, mainly small abalones, hard clams, lobsters, purple lever, agar agar, trochus, bamboo-blind clams, and sea urchins. Small abalone reefs, lobster reefs, and cross reefs were laid along with fish, shell, and shrimp fries. During the 1977-1995 period, more than NT$1.3 billion was invested to build 66 artificial fish reefs to create more than 1.4 square million meters of artificial fishing grounds. Since 1983, copies of publicity brochures, signboards and publicity walls were produced to keep fishermen informed of the importance in fishery resource protection. To prevent netting fishing boats from fishing within three nautical miles off coasts, cross-shaped cement reefs have been laid into waters selected by the counties and cities since 1990. As of 1995, a total of 58 protection districts had been established.

To ease up heavy offshore fishing pressure, the government has helped retired obsolete fishing boats through purchases. As of 1994, the government had retired 2 226 outdated boats totaling 109 200 metric tons, including 313 FRP boats which were laid into artificial fishing reefs to culture new marine resources.

To safeguard coastal fishery resources and fishing order, the Fisheries Administration has built Fishery Construction No. 2 fishery patrol boats with the task to crackdown against illegal fishing. With the support of the Fisheries Administration, the "Joint Crackdown Task Forces Against Illegal Fishing" were set up in various counties and cities, with members including county/city governments, police authorities, fishermen' associations, and village governments. They take the fishery patrol boats of counties and cities for crackdowns in the seas on irregular basis. To encourage denouncements against illegal fishing, the Fisheries Administration began budgeting funds in 1988 as sources for crackdown incentive awards. During 1979-1995 periods, a total of 1 405 cases of illegal fishing were undertaken.

On the grounds of Article 17 of the Fishery Law (updated on February 1, 1991), the planning of fishery rights of public waters began, including sound management, reasonable utilization, and cultivation of fishery resources. The Taiwan Fisheries Bureau (now amalgamated into the Fisheries Administration) has teamed up with the relevant county and city governments to commission academic organizations to conduct fishery rights planning for all waters around Taiwan, using the subsidy provided by the Council of Agriculture in 1992. Planning of fishing rights in public

waters was completed and promulgated in 1993 for application. As of June 30, 1996, the Fisheries Administration had issued a total of 40 licenses to safeguard fishermen's interests.

COSTS AND REVENUES OF FISHERIES MANAGEMENT

No information on the costs and revenues of fisheries management is available.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

Taiwan has ratified both the Law of the Sea Convention (UNCLOS) and the UN Fish Stocks Agreement (UNFSA), but is not a party to the Compliance Agreement.

Taiwan has also implemented some of the UNCLOS requirements through provisions in the law (FA, 2003):

- The coastal State shall determine the allowable catch of the living resources in its exclusive economic zone;
- Available scientific information, catch and fishing effort statistics, and other data relevant to the conservation of fish stocks shall be contributed and exchanged on a regular basis through competent international organizations;
- Where the coastal State does not have the capacity to harvest the entire allowable catch, it shall give other States access to the surplus of the allowable catch; and
- Where the same stock or stocks of associated species occur within the exclusive economic zones of two or more coastal States, these States shall seek, either directly or through appropriate sub-regional or regional organizations, to agree upon the measures necessary to co-ordinate and ensure the conservation and development of such stocks.

Taiwan has recently taken specific steps to implement the recently adopted International Plans of Action relating to capacity management, IUU fishing, shark management, and seabird by-catch in longline fisheries (FA, 2003).

PARTICIPATION IN REGIONAL FISHERY BODIES

Taiwan has participated as a member to the following international and regional fishery bodies:

- ICCAT (International Commission for the Conservation of Atlantic Tunas);
- IOTC (Indian Ocean Tuna Commission);
- IATTC (Inter-American Tropical Tuna Commission);
- ISC (Interim Scientific Committee for Tunas and Tunas-like Species in the North Pacific Ocean);
- CCSBT (Commission for the Conservation of Southern Bluefin Tuna); and
- APEC (Asia Pacific Economic Cooperation).

SUMMARY AND CONCLUSIONS

Taiwan is an island surrounded by seas and oceans with a highly developed fishery industry. Taiwan's fishing grounds extend to three oceans, including areas for fish farming that cover an area of more than 60 000 hectares. Currently, deep-sea fishing accounts for over half of Taiwan's total fishery production volume. Major fishery industries include tuna longline, squid-jigging, purse-seine, and trawl fishing.

The development of the shark fishery in Taiwan has a long history. In the past five years, the annual catch of shark in Taiwan from the coastal, offshore, and deep-sea fisheries ranged between 30 to 50 thousand metric tons, accounting for about 7 percent of the global catch and ranking as the fifth largest producer in the world following Indonesia, India, Pakistan, and Spain.

In Taiwan, the fisheries are managed in three-level systems. At the central government level, the Fisheries Administration (renamed the "Fisheries Agency" on April 14, 2003 under a fisheries act), the Council of Agriculture, and the Executive Yuan operate

through four departments: Planning and Programming, Fisheries Regulation, Deep-sea Fisheries, and Aquaculture and Coastal Fisheries in working out policies of deep-sea fisheries and various fishery development programs. Secondly, the Fishermen's Association oversees, promotes, and educates fishermen. Thirdly, the Counseling Department under the Council of Agriculture is responsible for sales, financial affairs, and welfare of the fishery sector.

At the provincial and municipal level, the Fisheries Agency under Taiwan Provincial Department of Agriculture and Forestry initiates policies for fishery development and improves fishermen's life through six divisions to manage the operations of fisheries administration, fishing boats and fishermen, protection of fishery resources, fishery cooperation, improvement and promotion of fishing technologies, fishing harbor constructions, public facilities, fishing production and marketing, planning, survey and statistics, assistance to fishermen associations and fish market supervision. Currently the government is further drawing up fishing port management organizations to regulate the Categories I and II Fishing ports.

At the county and city levels, the Fisheries Section under the Bureau of Agriculture or the Bureau of Construction is in charge of fisheries administrative and management affairs with duties primarily including administration of fisheries, the supervision of ports, fish production, and fisheries facilities, the counseling of the Fishermen's Association, and the support to fisheries and fishermen's welfare.

To safeguard coastal fishery resources and fishing order, Fisheries Administration has built Fishery Construction No.2 fishery patrols boat with the task to crackdown against illegal fishing. Under the support by the Fisheries Administration the "Joint Crackdown Task Forces against Illegal Fishing" were set up in various counties and cities, with members including county/city governments, police authorities, fishermen's associations, and village governments.

To ease up the heavy offshore fishing pressure, the government has helped retire obsolete fishing boats through purchases. As of 1994, the government had retired 2 226 outdated boats, totaling 109 200 metric tons and including 313 FRP boats, which were laid into artificial fishing reefs to culture new marine resources.

On the grounds of Article 17 of the Fishery Law (updated on February 1, 1991), the planning of fishery rights of public waters began, including sound management, reasonable utilization, and cultivation of fishery resources.

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APPENDIX TABLES

Current Management of Marine Capture Fisheries

Level of Management	% Fisheries Managed	% with Fisheries Management Plan	% with Published Regulations	Trends in the number of Managed Fisheries over ten yrs. (increasing/decreasing/unchanged)
National	50	100	50	Unchanged
Regional	20	0	50	Unchanged
Local	30	0	0	Unchanged

Summary information for three largest fisheries (by volume)

Category of Fishery	Fishery	Volume Metric tons	Value** US$	% of Total Volume Caught***	% of Total Value Caught***	Covered by a Management Plan?	# of Participants	# of Vessels
Industrial*	1: Tuna Longline	258 263	154.8 million	37.6	11.7	Yes	Unknown	Unknown
	2: Purse Seine for Tuna	317 205	1 106 million	46.2	83.7	Yes	Unknown	Unknown
	3: Squid Jigging	110 887	60.6 million	16.2	4.6	Yes	Unknown	Unknown
Artisanal	1	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
	2	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
	3	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Recreational	1	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
	2	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
	3	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown

* 1 = Purse seine fishery; 2= Tuna longline fishery; 3= Squid jigging fishery (TFY, 2002).
** Value in 2002 U.S. Dollars (NT$ 32 = 1 U. S. Dollar)
*** % to total in 2000 (686,355 metric tons; US$ 1,321.4 million) of the three fishery categories (TFY, 2002).

Use of Fishery Management Tools within the three largest fisheries

Category of Fishery	Fishery	Restrictions				License/ Limited Entry	Catch Restrictions	Rights-based Regulations	Taxes/ Royalties	Performance Standards
		Spatial	Temporal	Gear	Size					
Industrial	1: Tuna Longline	Yes	unknown	unknown	unknown	Yes	unknown	unknown	Yes	unknown
	2: Purse Seine for Tuna	Yes	unknown	unknown	unknown	Yes	unknown	unknown	Yes	unknown
	3: Squid Jigging	Yes	unknown	unknown	unknown	Yes	unknown	unknown	Yes	unknown
Artisanal	1	unknown	unknown	unknown	unknown	unknown	unknown	unknown	Yes	unknown
	2	unknown	unknown	unknown	unknown	unknown	unknown	unknown	unknown	unknown
	3	unknown	unknown	unknown	unknown	unknown	unknown	unknown	unknown	unknown
Recreational	1	unknown	unknown	unknown	unknown	unknown	unknown	unknown	unknown	unknown
	2	unknown	unknown	unknown	unknown	unknown	unknown	unknown	unknown	unknown
	3	unknown	unknown	unknown	unknown	unknown	unknown	unknown	unknown	unknown

Costs and Funding Sources of Fisheries Management within the three largest fisheries

Category of Fishery	Fishery	Do Management Funding Outlays Cover			Are Management Funding Sources From		
		R&D	Monitoring & Enforcement	Daily Management	License fees in fishery	License fees from other fisheries	Resource rents
Industrial	1: Tuna Longline	Yes	Yes	Yes	Yes	No	No
	2: Purse Seine for Tuna	Yes	Yes	Yes	Yes	No	No
	3: Squid Jigging	Yes	Yes	Yes	Yes	No	No
Artisanal	1	unknown	unknown	unknown	unknown	unknown	unknown
	2	unknown	unknown	unknown	unknown	unknown	unknown
	3	unknown	unknown	unknown	unknown	unknown	unknown
Recreational	1	unknown	unknown	unknown	unknown	unknown	unknown
	2	unknown	unknown	unknown	unknown	unknown	unknown
	3	unknown	unknown	unknown	unknown	unknown	unknown

Compliance and Enforcement within the three largest fisheries

Category of Fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other (please specify)
Industrial	1: Tuna Longline	Yes	Yes	Yes		Yes	Aerial
	2: Purse Seine for Tuna	Yes	Yes	Yes		Yes	Aerial
	3: Squid Jigging	Yes	Yes	Yes		Yes	Aerial
Artisanal	1	unknown	unknown	unknown	unknown	unknown	unknown
	2	unknown	unknown	unknown	unknown	unknown	unknown
	3	unknown	unknown	unknown	unknown	unknown	unknown
Recreational	1	unknown	unknown	unknown	unknown	unknown	unknown
	2	unknown	unknown	unknown	unknown	unknown	unknown
	3	unknown	unknown	unknown	unknown	unknown	unknown

Capacity Management within the three largest fisheries

Category of Fishery	Fishery	Does overfishing exist?	Is fleet capacity measured?	Is CPUE increasing, constant or decreasing?	Have capacity reduction programmes been used?	If used, please specify objectives of capacity reduction programme
Industrial	1: Tuna Longliine	No	No	unknown	Yes	__
	2: Purse Seine for Tuna	No	No	unknown	Yes	---
	3: Squid Jigging	No	No	unknown	Yes	---
Artisanal	1	Yes	No	unknown	No	---
	2	Yes	No	unknown	No	---
	3	Yes	No	unknown	No	---
Recreational	1	No	No	unknown	No	---
	2	No	No	unknown	No	---
	3	No	No	unknown	No-	---