

研究ノート

FISHERIES MANAGEMENT SYSTEMS IN AUSTRALIA: QUEENSLAND STANCE[†]

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1 INTRODUCTION

Fisheries resources have the same nature as common pool resources; which are easily overexploited. Some social regimes are needed to conserve fisheries resources so that people can enjoy the fruits of nature eternally. Governments play an important role in fisheries management in most countries. The purpose of this note is to improve our understanding of the fisheries management systems in the state of Queensland, Australia.

It would be very helpful for Japan to refer to the experiences of Australia when considering a new fisheries management system. The Japanese systems have so far been based on entry-based controls which intend to maintain the opportunity for existing fishers to fish; whose family has been engaged in the fisheries for many generations. Especially prevalent in the coastal fisheries, most of the rule setting and decision makings in regards to fisheries are made at the local community level with fixed members. However this closed system is faced with the problem of a lack in successors; which will cause the industry to decline in the near future. Thus it is a matter of up most urgency to construct a new system which will be open to potential efficient fishers, making the new system compatible with resource conservation and conflict resolution between fishers. From this viewpoint, we shall consider the fisheries management systems in Australia and specifically in the state of Queensland; where access to fisheries resources are supposed to be fair to all.

Overfishing occurs when the fishing capacity, based on the number of fishermen and fishing boats as well as fishing equipments, exceeds the optimum catch. There are two classes of management techniques to deal with this problem, they are: input control and output control. Both concepts aim to limit fishing mortality and reduce the

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risk of overexploitation; however input control limits the various aspects of fishing effort whereas output control puts limits on the fisheries catch. Input controls include: limiting the number of participants in a fishery (licensing); limiting the amount and efficiency of fishing gear such as specifying the type of boats, nets, hooks and traps, as well as their maximum number and sizes; and limiting the times or places where people can fish (fishing days restriction, temporal closures and spatial closures etc.). Sometimes total allowable effort (TAE) systems for some of these restrictions are explicitly introduced. Output controls include: limiting the sizes and weight of fish retained; limiting the gender/reproductive status of fish catches such as retaining (egg-bearing) females; and limiting the amount of fish catches through systems such as total allowable catches (TACs), individual transferable quotas (ITQs), and bag limits.

In Australian fisheries, these controls are the major management instruments that managers adopt in order to put management theory into practice. Especially, systems such as individual ‘transferable’ quotas and ‘transferable’ boat licensing are being actively introduced which expect market-based adjustment to allocate the quotas and licenses efficiently. This stance is very different from the closed systems of Japanese fisheries management.

This paper is organized as follows. We first overview the fisheries management systems of the Commonwealth for reference in order to understand the Queensland management systems. Then, we consider the Queensland systems, focusing on aspects of the legislation system, licence and quota systems, monitoring and enforcement program, and stakeholder involvements. In the last section, concluding remarks are provided, which offer some important suggestions to be considered by the Japanese fisheries management.

2 OVERVIEW OF FISHERIES MANAGEMENT SYSTEMS IN AUSTRALIA

Before we consider the fisheries management systems of the state of Queensland, we shall briefly overview the systems of the Commonwealth based on the OECD [6].

The jurisdiction of the Commonwealth

The jurisdiction of the Commonwealth extends from the 3 nautical mile (nm) limit to the 200nm limit of the Australian Fishing Zone (AFZ, or EEZ (Exclusive Economic Zone)) and States’ jurisdiction extends from the coastline to the 3 nm limit, with some exceptions. To cope with cases where stock in some fisheries spread over the boundaries of States and the Commonwealth, agreements about the entity responsible for the management can be settled between State and Australian Government, through the system of the Offshore Constitutional Settlement (OECD [6], p.1).

The Commonwealth legislation for fisheries

The central pillars of the Commonwealth legislation for fisheries are the *Fisheries Management Act 1991* (Fisheries Act) and the *Fisheries Administration Act 1991*¹. The former Act deals with management of fisheries plans, and fishing concessions including: statutory fishing rights, fishing permits, science permits, and foreign fishing boat licenses. It also prescribes offences for the taking of certain marine species such as blue marlin and black marlin, and bans drift net fishing activities in the AFZ. The latter Act sets up the Australian Fisheries Management Authority (AFMA) which specializes in implementing efficient and cost effective fisheries management under the *Fisheries Management Act* (OECD [6], p.4).

1 The predecessor to these acts was the *Fisheries Act 1952* (Cth).

The Australian Fisheries Management Authority

According to the Fisheries Act, the following objectives must be pursued by the Minister and the AFMA (Section 3 (1)) :

- (a) implement efficient and cost-effective fisheries management on behalf of the Commonwealth;
- (b) ensure that the exploitation of fisheries resources and any related activities are conducted in a manner consistent with the principles of ecologically sustainable development as well as the exercise of the precautionary principle, in particular the need to have regard for the impact of fishing activities on non-target species and the long term sustainability of the marine environment;
- (c) maximise economic efficiency in the exploitation of fisheries resources;
- (d) ensure accountability to the fishing industry and to the Australian community in the AFMA's management of fisheries resources; and
- (e) achieve government targets in relation to the recovery of the costs associated with the AFMA.

Thus the AFMA is supposed to attain compatibility between ecological sustainability, economic efficiency, accountability and cost recovery.

The fishing concessions in the Commonwealth fisheries

The Fisheries Act prescribes four separate types of fishing concessions that the AFMA is supposed to allocate adequately (OECD [6], pp.5-6) :

- 1) Statutory fishing rights including fish quota and boat and/or gear units; such as a right to a specified quantity or proportion of fish, a right to use a boat in a managed fishery, and a right entitling a person to use specified type or quantity of fishing boat or equipment. In general, they are freely transferable and permanently valid.
- 2) Fishing permits, for the fisheries where no plan of management exists.
- 3) Scientific permits, for scientific research to be carried out.
- 4) Foreign fishing boat licences, for the master of a foreign fishing boat.

The management plans

The AFMA has determined management plans for several fisheries. Some prominent examples are: *Northern Prawn Fishery Management Plan 1995*, *Southern Bluefin Tuna Fishery Management Plan 1995*, *South East Trawl Management Plan 1998*², *Southern and Eastern Scalefish and Shark Fishery Management Plan 2003* (SESSF Plan: The Plan also covers the Gillnet, Hook and Trap Fishery) .

For example, in the Northern Prawn Fishery, restrictions are imposed upon operators through management arrangements such as limited entry, seasonal closures, permanent area closures, gear restrictions and operational controls. In the Southern Bluefin Tuna Fishery, management arrangements such as limited entry, ITQs and TACs, and area restrictions have been introduced. Thus varying combinations of management techniques are applied depending on the nature of each fishery.

The management advisory committees

According to the *Fisheries Administration Act 1991*, the AFMA has a responsibility to consult with all stakeholders on fisheries resources when making management decisions, and to set up management advisory committees (MACs) for each major fishery; which is expected to provide the necessary forum in regards to issues related to a fishery, and to assist the AFMA in determining management arrangements. Each MAC is comprised of stakeholders who come from the commercial industry, government agencies, environmental

² The *Fisheries Management (South East Trawl Fishery) Regulations 1998* complement the Plan.

organizations, and research scientists (OECD [6], pp.4-5) .

Problems in Australian fisheries managements

The basic problem in Australian fisheries management is the over-fishing caused by excess fishing capacity and the increase of effective effort-inputs by fishers. Since limiting fishing effort arrangements, which had been originally applied as an input control policy had little effect in controlling over-fishing, the government is attempting to find a more sophisticated input and control mechanism. According to the OECD report (OECD[6], p.11) the government views management arrangements based on ITQ management, but complemented by other measures, as best suited towards achieving the broader range of objectives in contemporary fisheries management (including environment protection).

Another major problem is conflict resolution, that is, how to resolve disputes between different fisheries user group, such as commercial fishing operators, recreational fishers and indigenous fishers, in the decision making process of fisheries management. It is apparent that determining a criterion for the fair allocation of shares of marine resources among different sectors is very difficult.

In addition to these fundamental problems, Australian managers have to grapple with several issues to attain the objectives of fisheries management which include: identifying fisheries where output based management can be used; allocating access rights (the rights to exploit the resource)³; setting of TACs even with a lack of information; by-catch discarding and high-grading; cost and priority in research; and physical surveillance, monitoring and auditing activities for illegal, unreported and unregulated (IUU) fishing (OECD [6], pp.10-16) .

In this section, we have constructed a survey of the various features and problems in the Commonwealth fisheries management. It is natural to anticipate that the state of Queensland experiences the same sort of problems in relation to managing the fisheries in its jurisdiction. In the following sections, we shall describe the policy framework and positions of the state of Queensland which are used to tackle the problems of fisheries managements.

3 THE QUEENSLAND MANAGEMENT: LEGISLATION SYSTEMS

The objective of fisheries managements in Queensland

Queensland fisheries are managed under the *Fisheries Act 1994* (Qld) (the Act)⁴. It appears to have been enacted to keep up with the current times of ecologically sustainable development, following the Fisheries Act of the Commonwealth. The particular purposes of the Act provided in Section 3 include;

- (1) The main purpose of this Act is to provide for the use, conservation and enhancement of the community's fisheries resources and fish habitats in a way that seeks to --
 - (a) apply and balance the principles of ecologically sustainable development; and
 - (b) promote ecologically sustainable development.
- (2) In balancing the principles, each principle is to be given the relative emphasis appropriate in the relevant circumstances.

Then the notion of the 'principles of ecologically sustainable development' as explained in Section 3 (5) are the following principles:

- (a) enhance individual and community wellbeing through economic development that safeguards the wellbeing

3 Such as auction (allocation to the highest bidder), tender (allocation through making an offer giving a stated fixed price) and ballot (allocation through a lottery) approaches or through other methods such as selection criteria. It is interesting to note that there is a tendency for auction, tender, and ballot approaches to be used in the case of new fisheries, and selection criteria such as finders' right system, as well as historical use or investment base in established fisheries.

4 The predecessor to this act was the *Fisheries Act 1976* (Qld).

- of future generations;
- (b) provide fairness within and between generations;
- (c) protect biological diversity, ecological processes and life-support systems;
- (d) in making decisions, effectively integrate fairness within short and long-term economic, environmental and social considerations;
- (e) consider the global dimension of environmental impacts due to actions and policies;
- (f) consider the need to maintain and enhance competition, in an environmentally sound way;
- (g) consider the need to develop a strong, growing and diversified economy that can enhance the capacity for environmental protection;
- (h) that decisions and actions should provide broad community involvement on issues affecting them;
- (i) the precautionary principle⁵.

Thus people must initiate activities which pursue the optimum benefit for society as well as being compatible with the ecology of fisheries resources and the fairness to allocate the access rights to the resources.

The Functions of the Chief Executive of the Department of Primary Industries & Fisheries

The Act prescribes the role of the Chief Executive of the Department of Primary Industries and Fisheries (DPI&F), who is given appropriate powers to achieve the objectives of the Act. The chief executive is responsible for the management, use, development and protection of fisheries resources generally, as well as the management, control and, if possible, elimination of diseased fisheries resources; and fish ways (Section 20 (1)).

Based on the original version of the Act, the Queensland Fisheries Management Authority (QFMA) had been established to manage the fisheries and protect resources. However, in 2000, the QFMA was taken over by the DPI&F.

Management plans and regulations

The Act provides for the development of fisheries subordinate legislation. The day-to-day management rules are provided for under fisheries management plans and regulations (Section 32-42).

A management plan is considered subordinate legislation and the chief executive of the DPI&F can make a management plan for the following: (a) a fishery; (b) a fish habitat or declared fish habitat area; (c) a fish way; (d) fisheries resources; (e) aquaculture (Section 32). For example, a management plan may deal with the way a fishery is to be managed, including: (a) fishing methods; (b) taking of a specific species, type or quantity of fisheries resources; (c) the use of a specific type, size or quantity of fishing apparatus; (d) use of a type or number of boats; (e) a period of fishing (Section 36). Explicitly, a plan may declare a certain time period to be a closed season, the waters to be closed waters, fish to be regulated fish, and prescribe a quota (Section 37, 38).

A regulation may be developed to make provisions about all other issues which provision may be made by means of a management plan. Anything that may be declared by a management plan may also be declared by regulation. If there is an inconsistency between a regulation and a management plan, the regulation prevails throughout the whole extent of the inconsistency (Section 42).

Following is the complete list of current subordinate legislations which underpins the management of Queensland's fisheries (DPI&F [3]):

- Regulation: *Fisheries Regulation 1995*,
- Management Plans: *Fisheries (East Coast Trawl) Management Plan 1999*,
Fisheries (Coral Reef Fin Fish Fishery) Management Plan 2003,

⁵ This means that lack of scientific certainty should not be reason enough to postpone measures that prevent environment degradation (See Section 3 (5)).

Fisheries (Freshwater) Management Plan 1999,
Fisheries (Gulf of Carpentaria Inshore Fin Fish) Management Plan 1999,
Fisheries (Spanner Crab) Management Plan 1999.

In the following, we shall describe the licence and quota system, monitoring and enforcement program for rules and stakeholder involvements in fisheries managements; so that we can see how Queensland copes with the fundamental problems of fisheries in its jurisdiction.

4 LICENCE AND QUOTA SYSTEMS

Licence Systems

It is prescribed in the *Fisheries Regulation 1995* (Section 30, 34, 49-57) that the chief executive can issue the following types of licence, permit and authority including:

- (a) buyer licences for buying, selling, and processing fisheries resources lawfully;
- (b) carrier boat licences for carrying fish taken for trade or commerce;
- (c) charter fishing licences for charter fishing trips in offshore waters;
- (d) commercial fisher licences for buying and using commercial fishing apparatus, taking and selling fish for trade or commerce; and authorizing assistant fishers to carry out tasks;
- (e) commercial fishing boat licences in order for the boat identified on the licence to fish commercially;
- (f) commercial harvest fishery licences related to “hand-harvest” or “collection” fisheries;
- (g) general fisheries permits for special activities such as research;
- (h) developmental fishing permits for carrying out assessments;
- (i) indigenous fishing permits for assessment of the commercial fisheries by an indigenous person or a community of indigenous persons; and
- (j) resource allocation authorities for prescribed development activities such as fish habitat area development, aquaculture development and developments mentioned in the Planning Act.

Thus to operate any kind of commercial fishing business in Queensland, it is authorised to hold licences and/or permits which corresponding to the fishery.

Commercial Fishing Boat Licences and Commercial Harvest Fishery Licences are marked with fishery symbols which endorse the licence holder and the boat identified on the licence to operate in that fishery (for example, C1: Crab Fishery (Other than Spanner Crab); C3: Crab Fishery (Spanner Crab Managed Area B), K8: Net Fishery (Ocean Beach - Area 8); L8: Line Fishery (Multiple Hook - East Coast)). Thus the fisheries in which a fisher who holds a commercial fishing boat licence can operate in are subject to the fishery symbols present on the licence. All of these fishery symbols are transferable with the licence, except for the adult eel fishery (E) (DPI&F [3]).

Although the Commercial Fisher Licence allows the holder to be in charge of a commercial fishing activity, obtaining this licence type requires qualifications. Applicants applying for the first time are required to gain 12 months of fishing experience as an assistant fisher in Queensland or interstate, in addition to completing the Commercial Fisher New Entry Examinations for all six subjects. If applicants are returning commercial fishers, completion of the examinations and documented commercial fishing experiences with details of which state and in what capacity they were operating, are necessary. The six subjects in the examinations are: net and gear technology, seafood handling, business practices, fisheries legislation, the fishing industry environment and endangered and threatened species awareness.

Unlike Commercial Fisher Licences, Commercial Fishing Boat Licences are transferable. Under the limited entry arrangements, new fishers are able to enter fishing industries only when they purchase an existing boat licence from boat licence holders. This is due to the introduction of a policy of limited entry in 1984, which

resulted in boat licences to be no longer issued⁶.

Quota Systems

According to the *Fisheries Act 1994* (Qld), a management plan may prescribe, or authorize the issue of, a quota (Section 38), and the chief executive may declare a quota for a fishery (Section 44). Quota includes a restriction specified by reference to any of the following: (a) a quantity of fish; (b) a percentage of a quantity of fish; (c) a period of time; (d) an area; (e) the length or another reference to the size of a boat; (f) a quantity or type of fishing apparatus or aquaculture furniture; (g) an activity affecting a fish habitat, whether or not the activity involves fishing; (h) anything else prescribed under a regulation (Section 9).

At present quotas apply for the Spanish Mackerel, Coral Reef, Spanner Crab, Bêche-de-Mer, and Trochus fisheries, which are maximum catches for each fisher (set annually) (DPI&F [3]). Effort units, which are the number of “fishing days” allocated per year, also applies to each East Coast Trawl fisher. Quota and effort units are transferable⁷, that is, they are tradable between the holders of licences with the appropriate fishery symbols (DPI&F [3]). This system in which quotas are assigned to each fisher and are transferable is called an Individual Transferable Quota (ITQ) system, which is a typical means of output control in fisheries management.

In the past, input control has been used as the major management tool for fisheries as these controls are easier to establish and monitor. Today, economists, managers and large-scale fishery participants see benefits in fishery management which is based primarily on ITQs; and therefore ITQs have been strongly promoted for years (Charles [1]). This is because ITQs are considered to be able to overcome drawbacks caused by input controls in management. ITQs are designed to protect fish stocks from over-exploitation by the restriction of the amount of an individual species caught to within limits where ecological sustainability can be maintained (Waitt & Hartig [8]). ITQs are also considered to be capable of preventing over-fishing by limiting entry to fishers with economically viable quotas (Waitt & Hartig [8]). Besides that, another advantage of ITQs is that they give fishers property rights in the fishery and allow them to trade those rights with others (Jennings *et al.* [5]).

In Queensland, ITQs are allocated to fishers based on the logbook returns and their licence history for over three years (Williams [9]). The introduction of an ITQ system was largely political and partly environmental due to green movements. An ITQ system was introduced for the first time in 1997 in the Spanner Crab fishery, as a response to imperfect management arrangements that had no total catch limit for the amount taken by an individual crabber over the course of the year.

There is a general concern that the quotas will tend to be concentrated in fewer hands in fisheries with ITQ systems. This is the case in the Spanner Crab fishery. There are currently a few major players in the fishery who hold the majority of quotas (approximately 75%) (Williams [9]). These quotas are leased to licence holders who then catch the amount of crabs allowed by the quota and sell their catches back to these major quota holders (Williams [9]). When they are unable to fill the overseas export product amount, crabs are purchased from the rest of the 25% quota holders.

Despite its beneficial outcomes, ITQ systems may no longer be introduced presently as a fishery management tool because of the high operation costs. The system can not work well without regular and accurate monitoring and stock assessment to set and adjust an appropriate level for the TAC. In addition to the cost of implementing the system, declining fish value, increasing fuel price and competition with other countries have also contributed to preventing the implementation of ITQ systems in fisheries (Williams [9]). Williams [9] believes that the ITQ system is a great idea when managing fisheries, however it is probably better off restricting the number of boats as expensive monitoring is not required and therefore it is more cost effective.

6 Limited entry arrangements for the commercial fishery commenced in 1979 for the trawl fleet; in 1980 for barramundi-fishing boats; and in 1984 for all other commercial fishing activities (DPI [2], p.1).

7 Transfers of quota or effort units can be either temporary or permanent.

5 MONITORING AND ENFORCEMENT PROGRAM

Commercial fishers in state managed fisheries are required to complete daily catch and effort logbooks. To comply with this requirement, fishers are to report everyday in regards to where, when and how fishing took place, and what was caught. The Commercial Fisheries Information System (CFISH) is a database designed to store the fishing information from all licensed operators and dates back to 1988 when the logbook system was introduced (DPI&F [3]) .

Thus the logbook program was started in 1988, and submitting logbooks monthly is compulsory for all fishers. Prior to the introduction of logbooks, information was only gained through fisheries independent surveys (Williams [9]). Since the logbook introduction, stock assessment data used for long-term monitoring programs, have been based on both logbooks (fishery dependent data) and fishery independent surveys. Extensive logbook system also estimates the gross income of every fisher since 1988.

According to a conjecture of Williams [9], most fishers (80%) follow the rule to return logbooks; 15% put effort on recording for their logbooks (more than they are asked for) ; and the rest (5%) lie and cheat.

As for enforcement, most commercial fishers are honest and operate lawfully under the *Fisheries Act 1994* (Qld) . Nevertheless, Queensland Boating Fisheries Patrol is in charge of policing the fisheries. In more detail, their role is to enforce fisheries and boating safety laws, as well as implementing surveillance and related education.

Despite the efforts put into enforcement and management, illegal activities still exist in Queensland. Fish are still caught and sold by recreational fishers for some pocket money, although it is against the current Act (Williams [9]). Spanish mackerel and female crabs are illegally sold. However this issue is not a serious one at present.

6 THE QUEENSLAND MANAGEMENT: STAKEHOLDER INVOLVEMENTS

Co-management

Co-management is a management system that is referred to as an incentive instrument for the sustainable use of fisheries resources where responsibility for resource management is shared between the government and user groups (Sen & Nielsen [7]; Greiner *et al.* [4]) . In contrast to regulatory instruments which are designed to achieve compliance, co-management ensures the involvement of industry and stakeholder groups in policy design and administration which leads to intrinsic motivation (Greiner *et al.*[4]). Most fisheries managements in Australia use consultative co-management system; in which the government consults with stakeholders through mechanisms, but all the decisions are still made by the government.

Management advisory committees (MACs)

As we have seen above in Section 3, the main purpose of the *Fisheries Act 1994* (Qld); ‘principles of ecologically sustainable development’, includes the principle that ‘decisions and actions should provide broad community involvement on issues affecting them’. Therefore it is mandatory to involve processes such as holding public consultation through meetings and other forms for public input; constituting Management advisory committees (MACs) and releasing regulatory impact statements (RISs). The MACs are supposed to provide advice to the DPI&F on the development of appropriate management arrangements for fisheries including things such as restrictions on the amount of fish that can be taken, and gear restrictions (DPI&F [3]).

At present, there are seven MACs: Trawl MAC, Reef MAC, Crab MAC, Gulf of Carpentaria MAC, Inshore finfish MAC, Harvest fisheries MAC, and Freshwater MAC. Membership for MACs vary, depending on the relevant fishery, but generally includes the representatives of the main users of fishery resources such as commercial fishers, recreational fishers, and charter operators as well as conservationists, scientists,

enforcement officers, fisheries managers and representatives from key government agencies (DPI&F [3]).

We believe that the role of co-management and community involvement in the decision making process are of special significance, especially in a management system where access rights are supposed to be fair to all. These mechanisms are expected to promote sharing information, encourage partnership, and reduce conflict between stakeholders.

7 CONCLUDING REMARKS

In order to gain an understanding of the development and effectiveness of fisheries management systems present in Australia; we have overviewed the Queensland fisheries management in the perspective of Australia's overall management, with a special focus on the principles and management arrangements in place. In doing so, we have examined licensing, quota systems, monitoring, and enforcement programs, as well as stakeholder involvements in fisheries management. We would like to conclude by discussing three main remarks, which are considered highly important and valuable lessons (suggestions) for the future of Japanese fisheries management.

The first remark is in relation to the business environment surrounding the commercial fisheries in Queensland. Commercial fishers in Queensland are currently facing financial challenges due to competition with overseas aquaculture and the negative public perception being placed upon them. Relatively cheap and efficient aquaculture products from overseas are targeting the bottom protein market. Bulk markets, such as Coles and Woolworths, import aquaculture fish; including Nile perch, mullet, and prawns (Williams [9]). Aquaculture products also tend to target restaurants. As a result, commercial fishers have to compete with overseas aquaculture exporters. Public perceptions also have significant affects on fishers. The public tend to see commercial fishers as the exploiters of marine resources due to their fishing operation. In fact, some consumers prefer aquaculture products for these reasons, as they believe aquaculture ensures the sustainability of natural resources. No such argument is currently present in Japan; however it is crucial to recognise that as the interest in environmental issues of the public grows; it may reflect the public perceptions and consequently greatly influence how fisheries management systems should be performing within this context.

Secondly, sharing resources among different user groups should also be noted; particularly commercial, recreational and tourism-based fishing. Recreational and tourism-based fishing sectors are regarded to be just as important as the commercial fisheries in Queensland. The presence of Management Advisory Committees who deal with conflicts among different users and development of holistic frameworks to fairly allocate access rights to these fisheries, is therefore vital, in order to minimise adverse socio-economical impacts on these user groups; as well as to ensure ecological sustainability of marine resources.

In Japan, commercial fisheries have been given priority access to resources in coastal areas based on historical facts, in order to effectively operate the community based fishery management. Nevertheless, it is important to take the concept of fair resource allocations into consideration in the Japanese fisheries context in order to overcome issues that the current fisheries system is facing.

The final remark to address in this report is the ITQ system in Australia. According to the OECD report (OECD [6], p.11) , ITQ as a form of output-based control has been regarded as an effective way of delivering long-term sustainability in the Australian fisheries arena. It is likely that this system has the potential to be the most efficient way to keep the stocks of targeted individual species sustainable. Nonetheless, there is growing recognition for the role of fisheries to be considered in marine ecosystems as a whole; as fisheries management is unlikely to deal with one stock at a time. This recognition was especially relevant in management after the introduction of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth), and international agreements; which required the consideration of the ecosystem impacts of fisheries. This brings to light the crucial issue of how the ITQ system needs to be adjusted to gain a broader ecosystem perspective. Consequently,

multi-species management models might be an option worth consideration to deal with this issue.

Additionally, as discussed in Section 4, the ITQ system also has a fundamental flaw; namely the concentration of quotas in fewer hands, and the considerable cost of operation. Consequently, when introducing new systems, it is essential to carefully consider the potential resulting social and economic effects and the optimal way of introducing the new system; such as ITQs, in the currently closed, community-based Japanese fisheries management systems.

It has been commonly said that fisheries management is about managing the fishers, rather than managing the fish. To conclude, we strongly believe that global experience and their approaches provide us with meaningful lessons in relation to the Japanese fisheries system. Therefore, the evolution of fisheries management systems in various countries should be further studied in the future as well as more specific aspects of Australian fisheries.

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