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Organisation de Coopération et de Développement Economiques
Organisation for Economic Co-operation and Development **26-Mar-2007**

English - Or. English

DIRECTORATE FOR FOOD, AGRICULTURE AND FISHERIES
FISHERIES COMMITTEE

AGR/FI(2006)18/REV
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DRAFT REPORT ON CAPACITY ADJUSTMENT

THE POLITICAL ECONOMY OF DECOMMISSIONING PROGRAMMES

This document is submitted for DISCUSSION and GUIDANCE to the 99th Session of the Committee for Fisheries, 18-20 April 2007, under item 9. i).

Delegates are particularly requested to provide guidance on the draft set of best practice guidelines and advise the Secretariat whether the guidelines could be adopted by the Organisation as OECD Guidelines.

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NOTE BY THE SECRETARIAT

This paper is a revision of AGR/FI(2006)18 which was discussed at the 98th Session of the Committee for Fisheries. The key revisions to the paper are:

- Expanded discussion of the economic aspects of the design and implementation of decommissioning schemes;
- The inclusion of a number of case studies of decommissioning schemes from OECD and non-OECD economies; and
- The development of a draft set of best practice guidelines for the design and implementation of decommissioning schemes based on the key lessons from the paper.

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THE POLITICAL ECONOMY OF DECOMMISSIONING PROGRAMMES

EXECUTIVE SUMMARY

Decommissioning schemes are widely promoted as providing a "win-win" outcome for fisheries with expectations of reductions in capacity, improved profitability and less pressure on stocks. Around USD 430 million was spent on such programmes in OECD countries in 2003, accounting for 7% of total GFTs (OECD 2006a). However, the available empirical evidence suggests that the majority of decommissioning schemes fail to reach their objectives from both an economic and an environmental perspective. So why do they remain so popular with policy makers?

The answer lies, at least partly, in the fact that decommissioning schemes are widely viewed as an active and highly visible policy intervention that is indispensable in the policy toolkit for dealing with the problems of excess capacity in fisheries. The political appeal to governments of such schemes is strong, while industry is also often attracted to decommissioning schemes as a means of improving the profitability of the industry and promoting industry rationalisation.

From an economic perspective, however, the use of decommissioning schemes is not without its pitfalls. Recent analysis and experience has identified a number of theoretical and practical issues arising from their use, indicating that careful planning is required in the development and implementation of such schemes. This report reviews the key economic and policy issues underlying the design, implementation and outcomes of decommissioning schemes in fisheries. Drawing on theoretical insights and practical lessons from experiences of OECD countries, the issues addressed in the analysis include: the role of management arrangements in determining the long term success of decommissioning schemes; who should pay for decommissioning schemes; price formation mechanisms; and the role of expectations of fishers in undermining the effectiveness of the schemes.

A selection of recent examples of decommissioning schemes in OECD and non-OECD economies is presented in the report. These highlight a range of innovative directions in design of decommissioning schemes as well as some continuing challenges. The case studies are:

- Industry-funded buyout in the United States Bering Sea/Aleutian Islands King and Tanner Crab Fishery;
- NGO-funded permit buyout in the United States Pacific Groundfish fishery;
- Australia's Business Exit Assistance scheme under the *Securing our Fishing Future* structural adjustment package, funded by government;

- Mandatory, government funded vessel decommissioning scheme for tuna longline vessels in Chinese Taipei; and

- Decommissioning schemes in France financed by EU and French government funds.

The success of decommissioning schemes and the outcomes for fisheries will be influenced by the degree to which the political economy aspects of policy reform influence the design and implementation of decommissioning schemes and associated policy measures. The report examines a number of dimensions of this issue including; the role of economic and environmental conditions in forming coalitions of support for the introduction of the industry adjustment assistance; the distribution of benefits both within the industry and over time; the use of decommissioning schemes as compensation strategies to gain support for or reduce opposition to wider reforms in the fishery or sector; and the importance of policy credibility in helping ensure that governments and industry reap the potential benefits from decommissioning schemes.

The main conclusion of the report is that decommissioning programmes have been demonstrated to be a useful policy tool, but only in certain circumstances. They can accelerate the transition to a rationalised fishery managed on the basis of stronger use and access rights (based on output or input parameters) and improved ecosystem health. As part of a package of transitional assistance and management changes, they can provide a window of opportunity to help transform the nature of a fishery from one characterised by non-cooperative behaviour to one in which incentives are well-aligned and cooperation is the rational outcome of interactions between fishers.

However, decommissioning schemes used on their own do not provide a long term solution to the problems of the "race-to-fish" incentive that remains in fisheries with poorly developed or enforced use and access rights. Unless complementary measures are taken to effectively manage the fishery, short term gains from the buyback are likely to be eroded as remaining fishers expand effort, previously inactive vessels and licences are activated, or as new entrants join the fishery. Moreover, the provision of continuous, on-going decommissioning funding is likely to result in rising vessel and licence prices as expected future resource rent is capitalised into asset values. This will increase the cost of future decommissioning and necessitate a continuous process of exogenous reductions in vessel capacity to offset the effects of effort creep driven by technological change and capital stuffing over the longer term.

The report develops a set of best practice guidelines, based on the analysis, that identify the key areas that policy makers need to be aware of when designing decommissioning schemes. The following guidelines are intended to assist policy makers ask the right set of questions as they develop programmes.

Box 1. Best Practice Guidelines for Decommissioning Schemes

1. Prevention is better than cure

It is usually much easier and less expensive to ensure that management systems are properly designed to prevent overcapacity and overfishing from occurring than it is to undertake capacity reduction after the fact.

2. Clear objectives are essential

Well-defined, clearly articulated and measurable objectives for decommissioning schemes will help ensure that the targets are achievable, that the mechanisms are appropriately specified, and that the full range of management policies for the fishery are coherent and mutually supportive. This also reflects key principles of good governance.

3. Ensure effective post-adjustment management is in place

It is imperative that the management regime in place following the decommissioning effectively prevents capacity and effort from re-entering the fishery. Without such a measure, the beneficial effects of decommissioning will be negated over the medium to longer term.

Improving the specification and enforcement of transferable use and access rights (based on either output or input dimensions) will help ensure that incentives are appropriately aligned and will facilitate autonomous adjustment in the fishery in the future.

4. Decommissioning schemes work well as part of a package of adjustment measures towards sustainable and responsible fisheries

Decommissioning schemes will not, on their own, address the fundamental problems of overcapacity and overfishing.

Decommissioning schemes can be successful in reducing effort (excess capacity) as part of a one-off structural adjustment program where the management regime is also changed to one that provides more security and stability and addresses the market failures leading to the overcapacity problem. The schemes can aid in the transition to a more responsible fishery in which the sustainability and profitability are improved.

5. Getting value for money

Auctions will generally provide the most cost effective means of determining prices to be paid to retire vessels and licences. Under most circumstances, they help address information asymmetries and lead to allocative efficient outcomes.

Auctions can, however, be complicated and costly, and tradeoffs may need to be made between allocative efficiency and transactions costs in choosing between auctions and other forms of pricing such as fixed rate payments.

6. Achieve effective capacity reductions

Both latent and active capacity needs to be targeted to ensure that capacity is effectively reduced and that effort does not become reactivated in the fishery. The sequencing of buyouts may be an important consideration.

7. Require beneficiaries to pay a proportion of the costs of decommissioning

Under the beneficiary pays principle, those fishers who benefit from increased resource rent resulting from capacity reductions may be required to contribute to the costs of the decommissioning schemes.

A combination of industry and public funding has worked effectively to reduce the impact on the public coffers while improving the incentives for cooperative management in the post-adjustment fishery.

8. Stakeholder involvement will improve acceptance and compliance

The involvement of stakeholders in the design and implementation of decommissioning schemes will improve the likelihood of cooperation in both the conduct of the schemes and the post-adjustment of the fishery.

9. Undertake ex-post evaluation

Ex-post evaluations of decommissioning schemes, linked to measurable performance indicators developed with the scheme's objectives, can help to ensure that lessons learned inform the design and implementation of future schemes.

1. INTRODUCTION

1. Decommissioning schemes are widely promoted as providing a "win-win" outcome for fisheries with expectations of reductions in capacity, improved profitability and less pressure on stocks. Around USD 430 million was spent on such programmes in OECD countries in 2003, accounting for 7% of total GFTs (OECD 2006a). However, the available empirical evidence suggests that the majority of decommissioning schemes fail to reach their objectives from both an economic and an environmental perspective. So why do they remain so popular with policy makers?

2. The answer lies, at least partly, in the fact that decommissioning schemes have a special resonance for both policy makers and fishers. The schemes are widely viewed as an active and highly visible policy intervention that is indispensable in the policy toolkit for dealing with the problems of excess capitalisation and capacity in fisheries. The political appeal of such schemes is strong in many countries and governments who introduce them generally expect to reap benefits from the high profile that is often attached to the introduction of the schemes. Industry is also often active in seeking the implementation of decommissioning schemes, both to improve the profitability of the fishers who remain in the industry and to provide a dignified exit from the fishery for marginal or unprofitable fishers. Lobbying for adjustment assistance is a regular feature of fishery organisations' representations to governments.

3. From an economic perspective, however, the use of decommissioning schemes is not necessarily that straightforward. Recent analysis and experience has identified a number of theoretical and practical issues arising from their use, indicating that careful planning is required in the development and implementation of such schemes. The apparent inconsistency between the appeal of the schemes and the schemes' practical outcomes is the subject of this part of the Committee's major project on fisheries policy reform. The objective of this paper is to provide a review of the development, implementation and outcomes of decommissioning schemes drawing on economic analysis and case studies of practical experience. Analysis is also undertaken from a political economy perspective as this will offer additional insight into the use of these schemes as they often take place in response to economic or environmental crises and calls for assistance from the industry. Much has been written about the economics of decommissioning schemes but there is a need to integrate this body of work into a policy-relevant context in which the demand for and supply of policy concessions is a central element. The main outcomes of the analysis will be to improve the understanding of the factors underlying the success or otherwise of decommissioning schemes and to provide policy makers with a set of practical guidelines to improve the design and implementation of the schemes.

4. The next chapter in this paper reviews the key economic issues in the design and implementation of decommissioning schemes, focusing in particular on the objectives of the schemes, price formation, the role of the management framework, financing of the schemes and the role of expectations. A number of detailed case studies of decommissioning schemes are then presented in Chapter 3 drawing on a variety of recent experiences in the United States, Australia, Chinese Taipei, France and Scotland. Chapter 4 addresses a range of political economy issues that arise in relation to decommissioning schemes that will influence the acceptability and eventual success of the schemes. In the final chapter, a set of practical guidelines for assisting policy makers in designing and implementing decommissioning schemes is presented.

2. ECONOMIC ISSUES IN DECOMMISSIONING PROGRAMMES

5. The economics of decommissioning schemes has been addressed in a number of recent studies including Campbell (1989), Holland *et al*. (1999), Banks (1999), Cunningham and Greboval (2001), Munro and Sumaila (2001), Clark *et al*. (2005), Squires *et al.* (2006) and OECD (2006a). From this literature, it is clear that the design and implementation of decommissioning schemes (which are broadly defined – see Box 2) varies significantly both between and within countries. For example, some countries require that decommissioning payments be tied to the physical scrapping of vessels while others allow vessels to be shifted to another fishery (in which case the payment is for the removal of excess capacity from a particular fishery rather than reducing the overall capacity in the country). Some schemes are intended to remove latent capacity or effort instead of capacity or effort that is currently engaged in fishing so reducing potential rather than actual pressure on particular fisheries. Auctions and flat rate payments are both widely used, each with advantages and disadvantages.

6. This chapter discusses the economics of decommissioning schemes, illustrating theoretical insights with experiences from decommissioning schemes in both OECD and non-OECD economies. The analysis draws primarily on existing literature and is intended to provide policy makers with a thorough understanding of the economic underpinnings that should inform the design of decommissioning schemes. The range of economic issues addressed include: the objectives of the schemes; the importance of existing and future management arrangements; financing of decommissioning schemes; whether vessels or licences should be purchased; mandatory or voluntary participation; the price formation process; conditions on the further use of the vessel or licence; and the role of expectations and moral hazard.

Box 2. Terminology and concepts

Decommissioning schemes

There is a range of terms for decommissioning schemes in common use across OECD countries. These include vessel buyback programs, licence retirement schemes, licence buybacks, vessel scrapping programmes, and vessel transfer programmes, just to name a few. This paper includes all these types of schemes under the generic heading of decommissioning schemes (which is used interchangeably with the term buyback programmes).

Excess capacity

Capacity is, for a given resource condition, the amount of fish or fishing effort that can be produced over a given period of time by a vessel or fleet, given the technology, fixed factors of production, no restriction on variable input usage, and customary and usual operating procedures. Excess capacity in a fishery arises whenever the capacity of the fleet is higher than required to ensure a target level of sustainable exploitation of the fish stock. Assuming that excess capacity is determined with respect to maximum sustainable yield (MSY), excess capacity indicates that the fleet size is larger than required to harvest MSY. This will result in overfishing if the fleet is operating at or near full capacity. However, this will not be the case if capacity utilization is low as the result of management measures that have been successfully introduced to prevent overfishing. That is, overfishing implies excess capacity but excess capacity does not necessarily imply overfishing.

Sources: OECD; Cunningham and Greboval (2001); Grafton *et al*. (2006).

Objectives of the schemes

7. In an early survey of decommissioning schemes, Holland *et al*. (1999) identified three main goals of decommissioning schemes:

- saving vessel owners or licence holders from losses they would otherwise incur, because of the unavoidable adjustment in a fishery in crisis;
- improving the profitability of the rest of the industry following the capacity adjustment; and
- rebuilding fish stocks.

8. The schemes they surveyed clearly have mitigated the losses of some fishers and vessel owners, although it is debatable whether the expenditures covered total losses from adjustment. Whether such programs have had a positive effect on the profits of the remainder of the industry was not always clear according to their survey. At the very least there need to be some controls on investment in the industry or incentives to prevent re-investment from taking place on too large a scale. However, in many of the programs they surveyed, the money spent on buy-backs apparently leaked back into the industry or removed capacity that was not very important in any case. In some cases, the reduction in the number of vessels was neutralized by increased effort by the remaining vessels. With respect to resource conservation objectives, the authors point out that all the programs they considered had other measures in place to deal with this problem. They concluded that decommissioning schemes therefore seem to have been motivated mainly by the desire to increase profitability and to mitigate losses from adjustment.

9. A clearly defined objective or set of objectives is, therefore, an obvious prerequisite for a successful decommissioning scheme, as this will help in ensuring that the appropriate policy tool is used to address the particular problem. For example, using a decommissioning scheme in an effort to rebuild resource stocks is unlikely to be successful as it does not address the fundamental problem of inadequate management that generally is the primary reason for pressure on resource stocks. Excess capacity in the form of too many vessels or too many licences is a symptom of the problem, rather than the cause. A focus on improving management arrangements would provide a greater return to the use of public funds than would a decommissioning program on its own.

10. Similarly, the use of a decommissioning scheme to improve the profitability of the industry would not be successful if the management arrangements following the buyout did not ensure that the benefits of the buyout accrued to the remaining fishers in the form of increasing resource rent. Any resulting increase in resource rents to be competed away by new entrants or expanded effort, nullifying the short-term benefits of the scheme.

11. These factors point to the need to view decommissioning schemes as part of a package of adjustment measures, and not as an end in themselves. A comprehensive and coherent set of objectives and matching policy measures is needed to take a holistic approach to a particular fishery's problem, identifying underlying causes of poor profitability and resource pressure and tailoring a series of appropriate policy responses. Such packages will generally, but not always, involve a combination of management change and decommissioning schemes, perhaps with additional social support. As a result, decommissioning schemes are best viewed as a time-limited transitional measure to assist fisheries towards profitable and sustainable futures. This should be reflected in the objectives of specific decommissioning schemes.

Existing and future management arrangements

12. The importance of the existing and future management arrangements for fisheries targeted for a decommissioning programme cannot be understated. It has been well established, both theoretically and from practical experience, that the economic and environmental outcome of decommissioning schemes depends critically on the management of the capacity and effort that remains in the fishery. Both the existing management regime at the time of the buyout, and the management regime that follows (assuming there is some change), will have an influence.

13. OECD (2006a) reviewed in detail the economic effects of decommissioning schemes under different types of management regimes. In the case of an ***open access fishery***, decommissioning payments will have no effect on fish stocks as new vessels will enter the fishery to replace the scrapped vessels. Indeed, the effects may be negative on stocks as decommissioned vessels would be replaced by new vessels which are typically more efficient than older ones. There may be a short term impact in terms of reduced catches, improved profitability and stock improvements, but in the medium to long term the lack of control on effort leaking back into the fishery will negate any beneficial effects from the decommissioning scheme and dissipate any resource rent that may have been generated. The Washington State Commercial Salmon Fishery in the US exemplifies the problems associated with the use of buyback programs in open access fisheries. This fishery, which was essentially open access during the 1990s, had a series of three buyback programs in the late 1990s at a cost of USD 14 million, primarily in response to overcapitalisation and the impact of unusual weather events (GAO 2000). A review of the three programs found that they were not effective at making inroads into fishing capacity due precisely to their open access nature, and that the programs could best be described as income transfer programs (Muse 1999).

14. Under a ***regulated open access regime*** where only the catch is controlled, a decommissioning program would have no effect as, in the absence of barriers to entry, the vessels being decommissioned would simply be replaced by new vessels. If there are ***effort controls*** in place (*e.g.* through limited entry), there will still be an incentive for the vessels remaining in the fishery to engage in input (or capital) stuffing in response to the initial lower level of effort, increased stocks and greater profits. However, given that most effort controls are defined with vessels (and often a small number of vessel attributes, such as power and tonnage) as one of the main control parameters, this impact may not fully offset the increase in stocks resulting from the initial decommissioning scheme and so the effects of the decommissioning scheme will be eroded. The related issue of latent effort is also problematic as the reduction in active capacity will be likely to trigger the activation of latent effort, resulting in a similar expansion of effective effort despite an apparent reduction in capacity (measured as the number of vessels or permits).

15. The problems of effort expansion in limited entry or regulated open access fisheries following a buyback of vessels or permits have been well documented. A review by the US General Accounting Office of the effectiveness of several buyback programs in the US highlighted the role of post-buyback effort expansion. It made a number of recommendations including prohibiting buyback participants from entering any fishery with excess capacity, placing restrictions on latent effort, minimising incentives to increase capacity, and developing performance measures to evaluate buyback programs with respect to capacity and conservation of fish stocks (GAO 2000).

16. The New England Groundfish fishery was one of the fisheries reviewed by the GAO. The National Marine Fisheries Service (NMFS) implemented a vessel buyout and a permit buyout in this limited access fishery. The two buyback programs were implemented at different times and for different reasons (Thunberg *et al.* 2004). The vessel buyout was introduced at a time when resource conditions were very poor and was designed to provide financial assistance to the fishing industry as well as removing active fishing capacity. However, it was feared that the entry of formerly inactive vessels would thwart the gains in resource recovery and, in turn, require further reductions in vessels that that had borne the brunt of

effort reductions in the fishery. The permit buyout was therefore designed to remove as much potential fishing capacity as possible before latent effort could be activated. The two buyout programs removed nearly 20% of the potential capacity output and helped to lay the foundations for a shift in management regime towards more market-based methods of adjusting capacity and effort (including leasing and transfers of days-at-sea among limited access vessels, and community-based quotas).

17. The impact of effort creep in offsetting the positive effects of decommissioning of capacity in input controlled fisheries is well illustrated by the experience in Australia's Northern Prawn Fishery (NPF) (see Box 3). The NPF has been controlled by input measures and has been subject to almost continuous restructuring and capacity reduction over the past two decades. However, improved harvest technology and a rise in the use of unregulated fishing inputs largely negated the effects of the dramatic capacity reductions that took place. In the case of the EU, Frost and Andersen (2006) argue that the combination of decommissioning schemes and increasingly strict entry conditions has made it more difficult to increase capacity and substitute between inputs, although such a command and control system requires regulators to stay one step ahead of fishers and can induce a race to regulation (OECD 2006a). They also note that the recent shift in the EU towards tradable days-at-sea for a number of fleet segments that exploit species under stock recovery plans has many characteristics of ITQ systems and may have much the same effects on automatic capacity adjustment in the longer term.

18. Problems of latent effort and effort creep evident in many limited entry or input controlled fisheries are likely to be exacerbated by the use of decommissioning schemes. The short term impacts of such schemes in terms of improved catches and profits can provide an incentive to spur effort expansion or activation of capacity. It has also been pointed out that decommissioning can facilitate such expansion by providing a source of funds for reinvestment (Jorgensen and Jensen 1999; Banks 1999). Measures are therefore needed to ensure that the post-buyout management regime effectively constrains capacity and effort from expanding.

Box 3. Continuous adjustment in Australia's Northern Prawn fishery

The Northern Prawn Fishery (NPF) has, for many years, been managed through a combination of input controls (limited entry, seasonal closures, permanent area closures, gear restrictions and operational controls). Poor profitability and serious declines in resource stocks led to a process of fleet restructuring and capacity reduction that has been almost continuous over the past two decades. A series of industry-funded buybacks (with limited government assistance through the provision of government backed loans) reduced the fleet from a maximum of 302 boats in the early 1980s to 137 boats in 1995 and to 83 boats in 2005. The effectiveness of the buyback schemes needs to be viewed over both the short and medium term. In the short run, the schemes were effective at removing capacity from the fishery, resulting in some stock recovery and increased net returns over what would otherwise have been the case. Over the medium term, however, effective effort increased steadily in response to continually improving harvest technology and a rise in the use of unregulated fishing inputs. This resulted in further rounds of buybacks and the cycle continued. While the key stocks of banana, tiger and brown prawns are no longer classified as over-fished, net economic returns to the fishery have fluctuated markedly over the last decade and have declined rapidly since 2001.

More recently, a buyout of fishing concessions under the *Securing our Fishing Future* structural adjustment package in 2006 (see Chapter 3 of this report). This is to help the industry move towards a management regime with a stronger set of use rights including the introduction of fully transferable Statutory Fishing Rights governing the number of trawlers that may operate in the fishery and the gear that can be used.

Source: Newby *et al.* (2004); Galeano *et al.* (2006); Australian Fisheries Management Authority

19. In the case where there are ***effective use or property rights***, the effects of vessel decommissioning would be negligible. The remaining owners of the quota or effort rights receive the benefits from capacity leaving the fishery but have no incentive to expand effort or capacity and so there is merely a transfer from taxpayers both to those leaving the industry and to those remaining behind. It is difficult to see the justification in a decommissioning scheme in this case, especially if it is an individual

quota regime. With individual transferable quotas, the quota holders have incentives to achieve optimal effort and capacity with market processes driving automatic adjustment. In a fishery with too many vessels, some vessel owners would find it attractive to sell their quotas rather than renewing their boats, while other vessel owners would find it attractive to buy quotas to improve the profitability of their own operations. In a regime like that, the industry would on its own initiative, and at its own expense, restructure itself. A decommissioning scheme would speed this process up and raise the value of the rights (quotas) in the industry, but it would have no effect on catches or stocks.

20. Decommissioning vessels within a system with property rights to effort would not make sense unless there are too many vessels. It is possible to distinguish between two situations: first, where the total effort is adequate but is spread among too many vessels, so that profits are lower than they could potentially be; or second where not only are there too many vessels, but the total effort is too large. In the first case, it would be possible to raise the profits of the fleet by getting rid of redundant vessels and transfer their effort allowance to the remaining vessels. As with individual transferable quotas, there would be an incentive for the industry itself to buy out the redundant vessels and add their effort quota on some previously underutilized vessels. Decommissioning grants could speed up this development and raise the value of the fishing rights. In the second case, it would be necessary to reduce the total effort. Effort allowances of decommissioned vessels would have to be nullified, until enough vessels have been withdrawn to make the effort rights of remaining vessels equal to the sustainable effort.

21. Despite the apparent redundant nature of decommissioning schemes within a management framework based on strong property rights, there are examples of them being used in such situations. In the 1990s in Iceland, for example, there was a buyout of vessels with licences within the ITQ system (Box 4). The decommissioning scheme was financed primarily through levies and surcharges on the vessels and firms in the fisheries sector, supplemented by a state guaranteed loan, and was intended to rationalise quota holdings and improve financial performance individual companies and the sector as a whole.

22. In another example, a structural adjustment program was instituted in the south east trawl fishery in Australia in the wake of the final round of allocation of individual transferable quotas in 1994. One of the primary reasons for the buyback was to reduce overcapacity that had carried over from the pre-ITQ era and which was proving difficult to remove through natural attrition due to the multispecies nature of the fishery (where not all species were under ITQ management) (Newby *et al.* 2004). The buyback resulted in six latent and fourteen active permits being retired and, in conjunction with the establishment of an industry-assisted quota brokerage service, resulted in a significant improvement in economic performance (Fox *et al.* 2006). However, a secondary purpose of the buyback was to remedy opposition from aggrieved fishers to the initial allocation of quotas (AMC 2000). Litigation over the quota allocation continued for some years and created uncertainty within industry and government about the security and stability of the ITQ management arrangements. The buyback was therefore also partly intended to compensate fishers who had their fishing operations affected by the move from input based units to output based ITQs.

23. In summary, it is clear that the effectiveness of decommissioning schemes in securing long-term benefits to a fishery will be determined by the management regime in the fishery. Ensuring that capacity and effort does not re-enter the fishery is crucial as failure to do so would undermine, and perhaps worsen, the resource and economic sustainability of the fishery. Decommissioning schemes are probably best viewed as a strategic tool that can facilitate the transition of a fishery to improved management arrangements based on a stronger and well-enforced set of use or property rights. This will help to restructure incentives for autonomous fleet capacity adjustment following the completion of decommissioning and avoid the need for future buybacks. The improved economic conditions that usually follow an effective buyback can provide a window of opportunity to garner support for management changes. Crucially, though, it must be recognised that decommissioning schemes do not in themselves alter the underlying incentives to over-invest in open or limited access fisheries.

Box4. Decommissioning vessels in the Icelandic ITQ system

Following a series of three publicly funded decommissioning schemes in the 1980s which were ineffective in reducing capacity, the Icelandic government established the Development Fund of the Fisheries (DFF) in 1994. The main objectives of the DFF were to: buy obsolete processing plants and equipment to reduce overcapacity in the land-based fish processing industry; subsidise the decommissioning of vessels and reduce capacity in relation to the sustainable catch of fish; and to facilitate structural and organisational changes to rationalise operations and increase profitability of the fisheries. Low profitability in the fishing sector was caused primarily by the high level of financial gearing (leverage) and low level of equity ratio in fisheries companies. By decommissioning vessel with quota shares it was anticipated that the quotas would be transferred to vessels which remained in the system. The scheme therefore addressed financial problems and rigidities in the sector rather than stock over-exploitation concerns.

The DFF was funded through levies and surcharges on the vessels and firms in the fishing sector. Vessel owners with a fishing licence paid IKR 750 per GRT, with the maximum payment being IKR 285 000 per vessel. From September 1996, all quota holders paid a levy of IKR 1 000 per tonne of quota. Owners of processing plants paid a surcharge of 0.75% of the value of the plants' assets. The decommissioning payments were calculated as a percentage of the full coverage insurance value of the vessel. In 1994, the payment was set at 45% of the full insurance value, decreasing to 40% and then 20% in following years. Special provision was made for small vessels both inside and outside the ITQ system.

During the period 1994-98, payments to the DFF was IKR 2.3 billion and subsidies for decommissioning of vessels and obsolete processing plants amounted to IKR 3.2 billion, with 87% being directed towards vessel decommissioning. The difference was covered by a state guaranteed loan. Most of the expenditure on vessel buyouts occurred early in the programme (1994) while payments to retire obsolete plants followed a few years later. A total of 459 vessels were retired, totaling 7 829 GRT with an average vessel age of 18 years.

While it is normally expected that a comprehensive ITQ system such as that in Iceland will induce automatic capacity adjustment within the sector, the DFF effectively provided an impetus for the industry to rationalise quota holdings. The relative quota per vessel increased and vessel efficiency and profitability improved. The industry funded decommissioning scheme thus served to speed up the adjustment process and reduce pressure on the management system stemming from poor profitability, enforcement difficulties and lack of compliance with regulations.

Source: Klemensson (1999)

Financing decommissioning schemes

24. From an economic perspective, a relevant public policy principle in determining how decommissioning schemes should be funded is that of "beneficiary pays". Under the beneficiary pays principle, industry participants who stand to benefit from a policy intervention should contribute to the costs of the policy intervention (Weimer and Vining 2004). This is similar in many ways to user pays and polluter pays concepts in that it seeks to better match incentives and objectives within an industry or sector. The beneficiary pays principle forms the basis of the cost recovery programmes used in a number of OECD countries, including New Zealand, Australia and Iceland (OECD 2003). The range of beneficiaries from a buyout need not be restricted to commercial fishers as other groups may also benefit following a buyout, depending on the particular circumstances. For example, recreational anglers can benefit from higher catch rates, and NGOs can gain from an increase in non-market benefits (see the case study in Chapter 3 on an NGO-funded buyout in the US).

25. In practice, decommissioning schemes have historically been funded by governments. This has reflected, at least in part, a concern that the need for decommissioning of licences or vessels is appropriate in terms of correcting past policy failures. Where governments have allowed fleet capacity to expand, or even encouraged expansion through the use of vessel construction and modernisation subsidies, there may be an obligation for government to redress the resulting excess capacity problem when the inevitable industry downturn occurs in the form of rent dissipation and pressure on stocks. For example,

decommissioning schemes in the European Union are funded by governments with funds coming from the Financial Instrument for Fisheries Guidance and, from 2007, the European Fisheries Fund, and EU Member States. EU regulations govern the amounts of money that may be spent and in what manner (see the EC Regulation governing decommissioning 2792/99 and Box 10 in Chapter 3). In many non-EU countries, decommissioning schemes are also predominantly publicly funded. For example, the shrimp vessel decommissioning scheme undertaken in Mexico in 2005 was 100% government funded (see Box 8). Similarly, Canada's and Japan's decommissioning schemes have been publicly funded.

26. Increasingly, however, mixtures of public and private funding are being used in OECD countries. In these cases, the industry contribution to the buyout is often facilitated through a government loan that is then repaid through annual levies on landings or through licence fees. A trend towards greater industry involvement in buyouts is evident in the United States where privately funded buybacks are regarded as a more effective approach to buybacks (NMFS 2004). Amendments to the Magnuson-Stevens Act in 1996 allowed buyback loans to be paid off by some combination of Federal grants and special appropriations, funds provided by States or other public or private or not-for profit organisations, or by industry fees. In recent years, three large buyback schemes have been predominantly funded by industry (Table 1). The Northern Prawn Fishery in Australia has seen a series of industry funded buybacks (with some limited government assistance) in which the government backed loan to the industry was repaid through levies on the remaining fishers (Box 3). In contrast, a buyback in the Northern Territory barramundi fishery was financed by a commercial loan on the basis of expected revenues from licences (World Bank 2004). Norway provides yet another model for facilitating public/private funding and ensuring incentives are well aligned (Box 5).

Table 1. Funding of vessel and permit buyback schemes in the United States

Buyback name	Year	No. of vessels	No. of permits	Cost of buyback (USD million)			
				States	Industry[a]	Federal	Total
NE Multispecies	1994	11	67			2.0	2.0
NE Multispecies	1995	68	475			22.5	22.5
Texas Inshore Shrimp	1995		310			1.4	1.4
Washington Salmon	1995		142			5.2	5.2
Washington Salmon	1997		391	1.2		3.5	4.7
Alaska (Bering Sea) Pollock	1999	9	17		75.0	15.0	90.0
NE Multispecies	2002		245			10.0	10.0
Pacific Coast Groundfish	2003	91	240		35.7	10.0	45.7
Alaska (Bering and Aleutian) Crab	2003	28	43		100.0		100.0
Total		**207**	**1 930**	**1.2**	**210.7**	**69.6**	**281.5**

a. Industry cost is the form of a loan from the government that is repaid by the industry following the buyback.

Source: NMFS (2004).

Box 5. An alternative model of public/private funding in Norway

An alternative model of public/private funding for decommissioning has been used in Norway. On 1 July 2003, a fund was established for the decommissioning of coastal fishing vessels up to 15 meters holding annual permits. The scheme is funded through a fee on the value of first-hand landings of every Norwegian fishing vessel (not just the vessels remaining in the coastal fleet). The government provided a capital injection to the fund of NOK 35 million in 2004, estimated to be around 50% of the contribution from the industry in that year. Further government contributions were not guaranteed and there is a five year sunset clause for the scheme. The aim of the scheme is to collect about NOK 350 million over the five years which would enable the scrapping of approximately 15% of the coastal fleet less than 15 meters.

Source: OECD (2006b)

27. In an innovative development, a privately funded buyout of fishing permits was carried out by a consortium of environmental NGOs in the United States in 2006. This buyout, which is reviewed in detail in Chapter 3, involved the joint purchase by The Nature Conservancy and Environmental Defense of a number of permits which were active in a proposed marine park, prior to the marine park being declared. This initiative is a marine extension of similar terrestrial purchases to preserve specific habitats that have been made by environmental groups in recent years in a number of countries.

28. From an economic perspective, the use of industry financed buyback programs helps to provide appropriate incentives for those fishers who remain in the industry. The remaining fishers are (usually) committed to repayment of a long-term loan (for example, up to 30 years in the case of the United States) and so have a strong incentive to maximise long-term profits within the constraints of resource sustainability. This is, of course, conditional upon the institutional arrangements being coherent with such an incentive, in particular by ensuring that effort is not able to creep back into the fishery. If this was not the case, the remaining fishers would have an incentive to maximise short term profits, with the attendant possibility that profits will decline over the longer term, resulting in possible default on the government loan or pressure for further adjustment assistance.

29. Another advantage of an industry funded decommissioning scheme is that the debt obligation becomes collective, rather than individual (Squires et al 2006). Collective borrowing also spreads the risk among the remaining fishers. Both these factors increase the prospects for cooperation both between fishers and between fishers and regulators in the future management of the fishery.

Purchasing vessels or licences?

30. There are a number of factors that will influence the decision on whether to buy back vessels, licences, or both. First, the cost may vary significantly between vessels and licences. In general, purchasing licences is often cheaper than purchasing vessels, which in turn is often cheaper than buying both vessel and licence. As a result, there is a trade-off between affordability and the objectives of the scheme. Purchasing only the licence may leave the vessel free to fish elsewhere, while purchasing the vessel could allow the licence (if transferable) to be used with another vessel. The likelihood of such capacity spillovers can be mitigated by the imposition of conditions on the transfer and subsequent use of the licence or vessel, whichever is not the subject of the buyout. However, such conditions will have an impact on the purchase cost of the licence or vessel as the constraints will be factored in, or capitalised, in the value of the asset to be purchased.

31. A second factor is the nature of the regulatory arrangements in the target fishery. In some cases, the vessel and licence are bundled together and must be transferred (or decommissioned) as a package. This is the case, for example, in most of the Norwegian fisheries. In other cases, a vessel owner may have multiple licences, allowing them to fish in several fisheries, or for several species in the same fishery, or to

use multiple types of gear. Such "stacking" of licences is common in multi-species fisheries or in fisheries where there are a high proportion of part-time or inactive fishers. The value of the licence in the latter case is equivalent to an option value.

32. Third, purchasing inactive, or latent, licences or vessels may not have a significant or lasting impact on capacity or profitability in the fishery. In many cases, decommissioning schemes will generally either buy out the currently inactive capacity, with little effect on the actual level of capacity being employed in the fishery, or encourage the latent capacity to become active (Cunningham and Greboval 2001). This latter point is particularly significant from a political economy perspective as it highlights the dynamic nature of fisheries and fisheries policy and the rational response of fishers to policy signals from governments. Unfortunately, the lowest priced licences tend to be the least active vessels, such as vessels fishing part-time or in multiple fisheries, or those which are otherwise marginally profitable. Purchasing these licences may result in a high nominal rate of licence retirement, but with little actual effect on effective effort or capacity.

33. The potential problem of latent capacity was highlighted in a 2000 report by the US General Accounting Office (GAO 2000). In its review of the New England groundfish fishery buyback scheme, the GAO found that the 79 vessels that were purchased in the buyback accounted for around 15% of the total groundfish catch in that fishery in 1996. However, because of the number of unused fishing permits in the fishery, 62 previously inactive vessels began catching groundfish in the same year as the buyout. It was estimated that the 62 vessels collectively had over two-thirds of the potential fishing capacity of the 79 vessels purchased in the buyback. The problem was compounded by vessel owners who participated in the buyback purchasing a vessel with buyback funds and re-entering the fishery.

34. A potential solution might be to provide a larger initial budget for the buyback in anticipation of purchasing both active and latent capacity or permits. Such an approach was advocated by Funk et al (2003) in their review of the licence buyback for the Texas Bay Shrimp Fishery. They demonstrated that the benefits from a combination of licence limitation and buyback would be realised sooner if additional funds were available to purchase a higher number of licences at the start of the buyout, rather than through endogenously determined licence acquisition program then in place.

35. One of the common assumptions in the debate on decommissioning schemes is that the optimal strategy is to remove the vessels with the highest catch for the lowest cost. However, this assumption may be misleading if vessel characteristics are not the most important determinant of catching power. Branch *et al.* (2006) reviews the debate on the extent to which the "skipper effect" may explain a more significant variation in catch rates relative to other determinants commonly assessed such as vessel tonnage, power or gear. The review concluded that the individual differences among skippers were indeed significant, meaning that the effect of removing vessels may be offset to some extent by skilled individuals re-entering the fishery on other vessels. It is difficult to regulate and restrict such movements in human capital.

36. In summary, careful consideration of the desired outcome of the decommissioning scheme is required during the planning stage in order to determine whether vessels or licences or both should be targeted. This may in large part be determined by the nature of the regulatory arrangements governing participation in the sector, and the extent to which vessel and licence are locked together. It may also be influenced by budget considerations. Regulators also need to be aware of the extent of latent vessels or permits in a target fishery. The order in which capacity or permits are bought out can be significant in designing decommissioning schemes for fisheries in which latent effort is a problem. There may be advantages to purchasing latent effort first in order to ensure that it is not reactivated when a buyout of active capacity improves the economic conditions improve in the fishery.

Voluntary or mandatory participation?

37. Virtually all decommissioning schemes have been implemented on a voluntary basis. This is primarily due to perceptions of fairness and equity, as well as to the likelihood of legal complications that may arise in the case of compulsory acquisition. Only two schemes have been identified as being compulsory, or having a compulsory component. In 1993, there was a compulsory, across-the-board surrender of a proportion of fishing rights in the Northern Prawn fishery in Australia as the target set for a voluntary buyback had not been met (AFMA 1999). In Chinese Taipei, there was a mandatory buyout of large scale tuna long-line vessels in 2005 and 2006 (this scheme is reviewed in Chapter 3 of this paper).

Determining the price

38. A key issue in the design of decommissioning schemes is the way in which purchase prices are determined for vessels, licences, fishing rights or gear. The experience of decommissioning schemes to date indicates that four broad types of mechanisms are used: auctions; fixed rate payments; one-on-one negotiations; and independent valuations (Holland *et al.* 1999). Each type of mechanism has advantages and disadvantages, and the relative effectiveness of each type will vary according to different situations. Table 2 provides a summary of the different types of price mechanisms and their advantages and disadvantages. The two main approaches used to date have tended to be auctions and fixed rate payments; in cases where there are many potential sellers, as is the case with most fishing vessel buyout schemes, the choice is practically constrained to auctions or fixed rate payments.

39. From an economic perspective, the fundamental objective in the choice of pricing mechanism is to achieve a cost-effective outcome which achieves allocative efficiency and provides "value for money". That is, the price mechanism should deliver either the most capacity reduction for a given budget, or achieve a given capacity reduction target at the least cost. A voluntary buyback process should therefore seek to elicit the valuations that individual fishers have of their willingness to sell their vessel or licence. These private valuations will be different for each fisher and will be influenced by a wide range of factors such as age, skill, alternative opportunities, assets, etc. Typically, the government has limited information about individual fishers' private valuations and must rely on revelation mechanisms to assist in overcoming the information asymmetry.

Auctions

40. In principle, an auction (or tender or bidding scheme) will provide the most effective means of ensuring that buyout prices for vessels or licences adequately takes account of private information held by the bidders.[1] The main advantage of an auction is its tendency, if properly designed, to attain allocative efficiency without requiring governments to have prior knowledge of resource values or costs. This outcome is achieved by promoting competition among bidders for decommissioning grants, forcing them to reveal information about their valuations through their bid. A fisher's bid will be influenced by both their own private valuation and their individual assessment of available information on other fishers' bids and private valuations. Theoretical analysis suggests that under standard auction rules, the optimal strategy is one of slightly overbidding so that the auction will not reveal bidders' true opportunity costs (Latacz-Lohmann and Schilizzi 2005). Overbidding is highest for low-cost bidders whereas high-cost bidders will bid closest to their true costs. However, low-cost bidders are usually selected early and so get paid well above their true costs. Box 6 provides a graphical analysis of the nature of the auction process.

1 . There is a well developed literature on the design of auctions under different conditions; see Klemperer 2003 for a survey of the literature.

Table 2. Price formation mechanisms in decommissioning schemes

Pricing mechanism	Type	Typical format [a]	Advantages	Disadvantages	Examples
Auction	Reverse auction	Fishers submit sealed bids. Bids ranked and accepted in order from lowest to highest.	Overcomes information asymmetry	High transactions costs. Requires large number of potential bidders	Washington State Commercial Salmon Fishery buyout
	Multiple round reverse auction	Fishers submit sealed bids in first round. Bids ranked, evaluated and offered to lowest bidders. Revised bids sought after information on previous round made publicly available. Revised bids ranked, evaluated and offered to lowest bidders, and so on.	Overcomes information asymmetry. Improved information encourages bids closer to true valuations.	High transactions costs. Requires large number of potential bidders. Costs increase over successive rounds.	British Columbia Salmon Fishery buyout (Box 3)
	Discriminative reverse auction	Fishers submit sealed bids. Agency weights bids according to specified criteria (*e.g.* volume or value of catch history of vessel) to obtain bid score or to evaluate bid. Bid scores ranked and accepted in order from lowest to highest.	Overcomes information asymmetry. Facilitates targeting of buyback.	High transactions costs. Lack of transparency wrt weighting system (if not publicly known). Requires large number of potential bidders.	United States Bering Sea/Aleutian Islands King and Tanner Crab Fishery (Chapter 3)
	Second price reverse auction	Fishers submit sealed bids. Bids ranked and accepted from lowest to highest, but each successful bid paid the amount of the next highest bid.	Overcomes information asymmetry. Reveals bidder's valuations	High transactions costs. Requires large number of potential bidders.	..
	Strike price auction	Fishers submit sealed bids. Bids ranked in order from lowest to highest and accepted up until the desired amount of capacity is reached. All bids then paid the same rate (per unit) as the final accepted bid (the strike bid)	Encourages low bidding in order to be part of the accepted group of bidders	High transactions costs. Subject to collusion. Most expensive of auction systems. Windfall gains.	2001 Northern Ireland decommissioning scheme (see Box
Fixed rate	Fixed rate	Fixed price paid per vessel or permit. Can be done on a first come, first served basis, or targeting particular vessels.	Low transactions costs Transparent	High information requirement for agency to set prices correctly. Potential for windfall gains	Mexico shrimp vessel decommissioning scheme (Box 4)
	Weighted fixed rate	Fixed rate determined according to a formula combining one or more criteria (*e.g.* vessel tonnage or power, catch history, species targeted).	Low transactions costs	High information requirement for agency to set prices correctly. Potential for windfall gains.	French and many EU decommissioning schemes (Chapter 3)

Table 2. Price formation mechanisms in decommissioning schemes (cont.)

Pricing mechanism	Type	Typical format a	Advantages	Disadvantages	Examples
Negotiation	One-on-one negotiation	Negotiations take place directly between fisher and decommissioning agency	Feasible with low number of vessels or permits	Requires symmetrical knowledge. Results in revenue and efficiency losses	NGO buyout in US Pacific Groundfish fishery (Chapter 3)
Independent evaluation		Offer based on third party assessment of value of vessel or permit (e.g. insurance company or scrap dealer). Sometimes offer is a percentage of the assessed value.	Independent and transparent	High transactions costs. Does not reveal reserve prices. Potential for windfall gains.	Iceland buyout under DFF (Box 3)

a. There is a wide variation in the detailed design of these mechanisms, particularly in relation to auctions. The description in this table is intended to be illustrative rather than comprehensive.

Source: OECD.

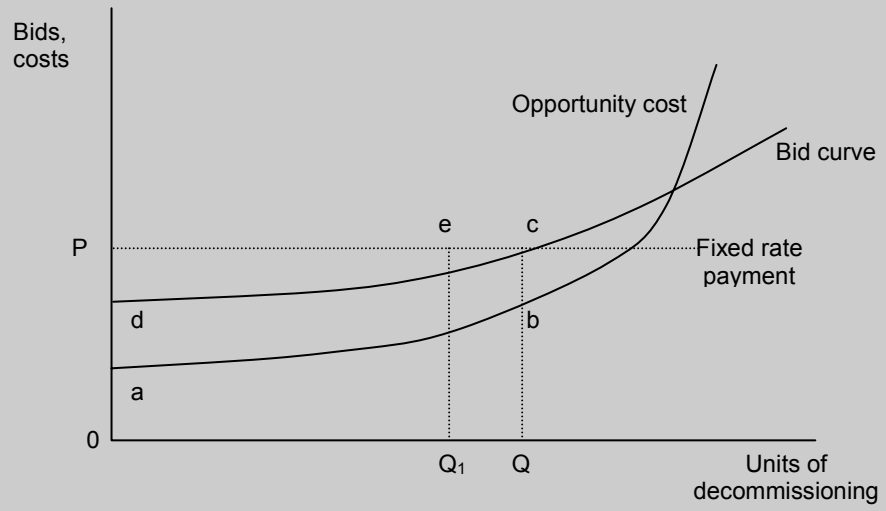
Box 6. Auctions vs fixed rate payments

A bidding model for decommissioning grants can be used to illustrate the effects of information asymmetry on the relative performance of auctions and fixed-rate payments. The model, developed in Latacz-Lohmann and Schilizzi (2005) and Schilizzi and Latacz-Lohmann (n.d.), assumes that fishers are risk neutral, hold private information about their own income from fishing, and use bidding strategies predicated on the belief that the government agency has decided on a maximum acceptable bid or payment level per unit of decommissioning service (a reserve price that is unknown to potential bidders). A fisher will tender a bid if the expected utility from participation in the auction exceeds the expected utility from not participating. It can be demonstrated that the optimal bidding strategy for a bidder will increase linearly with both the bidder's opportunity costs and their expectations about the reserve price. In this way, a bidder's bid will convey information about their opportunity costs and will reduce the information asymmetry, but not completely as the auction's cost revelation property is restricted by the fact that the bid also reflects bidder's beliefs about the reserve price of the agency. This creates room for fishers to bid above their true opportunity cost and thereby secure themselves an information rent arising from the information asymmetry.

This is demonstrated in the figure below. The optimal bid curve lies above the opportunity cost curve up to the point which represents the marginal bidder (beyond which participation in the auction is not optimal). If the agency purchases a given quantity (Q) of decommissioning units under an auction, the total expenditure will be the area under the bid curve from 0 to Q, equal to the area 0dcQ. This will include an information rent, abcd, that will accrue to the fishers due to the agency's lack of knowledge about the true opportunity costs of bidders.

The figure also shows a fixed rate payment designed to purchase Q units of decommissioning (assuming the agency has some knowledge of the bid price at that point). An auction is in principle more cost-effective than a fixed rate payment as the total rent accruing to fishers in this case is aPcb. If the objective of the decommissioning agency was to achieve the maximum buyout of decommissioning units for a given budget, auctions are again cost-effective. For a budget given by 0dcQ, an auction would result in Q units being purchased. On the other hand, a fixed rate auction will necessarily achieve a lower quantity of units (Q_1) as the bid curve will lie everywhere below the fixed rate payment. In the case of multiple round auctions, bidders would be able to learn about the implicit reservation price with each round and extract more rent (the bid curve will rotate upwards and become flatter, increasing the distance between the opportunity cost and bid curves).

Figure 1. Costs of auctions and fixed rate payments



Sources: Latacz-Lohmann and Schilizzi (2005); Schilizzi and Latacz-Lohmann (n.d.).

41. There is a rapidly growing use of auctions in decommissioning schemes in fisheries around the world. This reflects an increased policy interest in using auctions to meet environmental goals in a cost-efficient manner when there is incomplete or asymmetric information, particularly in relation to agricultural land management (Chan *et al.* 2003; Latacz-Lohmann and Schilizzi 2005).[2] In practice, there is a significant variation in the design of auctions within decommissioning schemes, and so auctions need to be carefully tailored to ensure that they provide appropriate incentives in particular situations. Table 2 covers some of the key variants but key issues include whether the auction is single price or reverse auction, uses first-price or second-price principles, has single or multiple rounds of bidding, sealed or open bids, if bids are to be weighted according to certain criteria. For example, the use of discriminative reverse auctions is increasing. Under these types of auctions, the agency running the auction accepts bids but then weights them according to a set of criteria in order to skew the resulting scores towards particular target groups. In the case of the United States Bering Sea/Aleutian Islands King and Tanner Crab Fishery, the bid prices were weighted according to the catch value history of individual vessels in order to ensure that the more active vessels received preferential rankings (see case study in Chapter 3).

42. Three broad issues in the use of auctions in decommissioning schemes are particularly pertinent. First, there is the potential problem of insufficient bidding competition. The smaller the group of potential bidders, the lower will be the level of bidding competition and the higher the likelihood of collusion and strategic behaviour. Such problems may arise in small fisheries, or when the decommissioning body invites tenders for different vessel types or species targeted, with only a small number of vessels in each category. It is exacerbated by the use of eligibility criteria, which further reduce the number of potential bidders. This may reduce the scope for targeting certain segments of the fleet.

43. Second, bidding systems involve the risk of learning on the part of the bidders. Auctions for decommissioning agreements are sometimes designed as sequential auctions where bids for vessels to exit the industry are invited over a sequence of years. For example, multiple round auctions were used in the British Columbia licence retirement scheme (Box 7). Such a system provides scope for fishermen to analyse the results of preceding bidding rounds and use this information to update their bids. In other cases, there may be a process of continuous or regular provision of decommissioning programmes. As these become anticipated by fishers, their bidding strategies are likely to be increasingly guided by what they think they can bid to be accepted rather than their true opportunity costs. The risk of this happening is quite high in 'networked' industries such as fishing, where information is spread quickly through the efficient communication networks of producer organisations or lobby groups. A review of the UK decommissioning auction system noted that fishers were becoming over familiar with the system and that there was a significant amount of learning such that vessel owners found it increasingly easy to project the likelihood of being successful at increasingly higher rates (Nautilus 1997).

44. Third, auctions tend to involve high transaction costs for both fishers and government. To the extent that these are upfront fixed costs, they may deter fishers from participating in the scheme. If a discriminative auction system is used, this will significantly increase the administrative costs for the government as much more time is required to evaluate and weight bids. It also opens up the process for challenges to the legitimacy of the weighting system or target groups that were chosen. This can tend to create a degree of uncertainty about the outcome of the bidding process and future in the industry.

2 . In the United States, for example, the Conservation Reserve Program uses an auction mechanism to award land management contracts to farmers through a competitive bidding process. The land management contracts specify conservation practices that must be adopted by successful bidders in return for payment. Such a system has also been trialled in Australia under the BushTender program in which landholders bid for payments for undertaking conservation activities on their farms (such as maintaining native vegetation and riparian corridors, etc) (Stoneham 2000; Chan *et al.* 2003).

Box 7. The use of auctions in the British Columbia salmon fishery

In 1996 and 1998-2000, two buybacks of licences took place in the British Columbia salmon fishery, following the relative failure of three previous buyback programmes between 1970 and 1993 to adequately control fishing effort and provide for a financially viable fishery. Under the Mifflin Plan, the 1996 buyback programme employed a reverse auction over two rounds to retire a total of 797 salmon licences representing 20% of the fleet, at a total cost of CAD 78.6 million. Area licensing was also introduced for the three different gear types used in the fishery (troll, gillnet and purse seine) in order to reduce congestion externalities in given regions. The 1998-2000 buyback programme was another attempt to rationalize the fishery and used a reverse auction over three rounds to remove licences. This resulted in a total of 1 409 licences being retired (43% of the fleet) at a cost of CAD 195 million.

The use of auctions in the process provided a number of insights into the way in which they hey can have an impact on behaviour. First, fishers generally supported the use of the voluntary reverse auction system in 1996 as it allowed all eligible fishers to enter bids to exit the industry. However, the buybacks had a differential effect on different gear types. This unexpected outcome caused concern amongst fishers about the "corporatisation" of the fishery as purse seiners were predominantly owned by larger fishing companies and this may future allocations of fish between the three gears. As a result, more effort was made in the later rounds of the 1998-2000 buyback to focus on the retirement of seine licences.

Second, multiple round nature of the buybacks increased administration costs, but had the benefit allowing the regulator running the auction to adjust payments to target particular groups of fishers by adjusting the criteria for what bids are accepted and allowing fishers to reformulate their bids. This reduced the strategic behaviour in terms of the offers by fishers and allowed the bids to be closer to their true private valuations. This flexibility also allowed the regulator to retire a much greater portion of the seine fleet in the latest buyback and at a lower cost than would have otherwise have been the case in a single round.

Third, the evolution of prices paid for licences between the buybacks and between the rounds within the buybacks is instructive (see table). The average price increased with over the two rounds of the first programme, but then dropped during the first round of the second programme before rising again. This most likely reflects the learning process following each round within a programme, as well as the fact that the first programme did not effectively reduce effort and so lower bids were able to be accepted a few years later in the second programme.

Table 3. Average prices paid per licence in 1996 and 1998-2000 buyback progremmes

Gear type	1996 Programme		1998-2000 Programme		
	Round 1	Round 2	Round 1	Round 2	Round 3
	CAD	CAD	CAD	CAD	CAD
Seine	405 118	443 475	420 152	432 115	435 578
Gillnet	73 719	84 702	77 880	80 830	84 231
Troll	70 881	82 136	77 532	82 150	85 872
Total licenses retired	396	401	99	645	665

Source: Grafton and Nelson (2005)

Fixed rate payments

45. Fixed-rate payments tend to be much more administratively simple than auctions, thereby reducing transactions costs and improving transparency. Compared with auctions, the fisher's decision collapses from a complex bidding strategy to a relatively straightforward take-it-or-leave-it decision. This reduces uncertainty and resulting transaction costs for both fishermen and the regulatory agency. Fixed rate payments are generally one of two types: payment of a flat rate per vessel or licence; or payment of a weighted fix rate per licence or vessel that is weighted according to specific criteria (such as vessel tonnage or power or target species). Both types of fixed rate payments are also often combined with government evaluation of the applications against specified criteria to help determine whether the bids achieve value for money or meet particular goals (a process sometimes referred to as comparative bidding or a "beauty

contest" (Pratt and Valletti 2001)). Such evaluations can be more or less transparent, depending on how well known and understood are the evaluation criteria by fishers and the extent to which subjective judgement replaces objective evaluation when selection criteria are vague or when arbitrary weights are applied to each criteria.

46. In order for fixed rate payments to be allocative efficient, the information asymmetry between government and industry must not be too great and the objects of the buyout (vessel or licence) must be fairly homogeneous across fishers. This is because the performance of fixed-rate payments is independent of the availability of information on fishers' valuations of their vessel or licence. As a result, overcompensation of "inefficient" fishers is an accepted element of this mechanism. While some attempt can be made to reflect observed market values of vessels or licenses, this will only rarely correspond to private valuations (the opportunity cost curve in Box 6). As a result, fixed rate payment schemes will less allocatively efficient and cost-effective than auctions the more severe are the informational asymmetries, and the more heterogeneous the bidders (in terms of their opportunity costs).

47. The use of flat rate payments is relatively rare. However, it was used in the Mexico shrimp fishery where over 200 vessels were decommissioned in a trial scheme in 2005 (Box 8). In this case, the relative homogeneity of the shrimp fleet made it easier to determine a fixed amount per vessel. Buyback programmes in the Italian clam fishery in 1996 and 2000 provided each voluntarily withdrawn vessel with a lump sum payment of EUR 130 000. Each crew member who left the clam dredging industry received a payment of EUR 6 500 (Spagnolo 2004).

Box 8. Mexico shrimp vessel decommissioning scheme

A recent policy development has been the introduction of a vessel retirement scheme, funded under *Alianza Contigo*. This was introduced into the shrimp fishery in both the Pacific and the Gulf of Mexico in response to a persistent excess of vessels, declining resources and poor profitability. The government initiated vessel retirement at the end of 2004 and the first vessels were retired in 2005. The scheme operated on a voluntary basis and no targeted decommissioning was undertaken. A fixed payment of MXN 100 000 was given for a vessel and its attached permit. The eligibility requirements for the scheme were that the vessel had to have a valid permit, a catch landing document for the immediate prior season (that is, it had to be an active vessel), and no outstanding fines. Staff from the Mexican fishing agency, CONAPESCA, evaluated the bids to ensure that sufficient capacity was being retired from both Mexican coasts. In 2005, 222 vessels were retired under the scheme, representing around 10% of the total shrimp fleet. This was a trial scheme and dependant on future funding to continue. There are plans to extend the decommissioning scheme within the shrimp fishery or to other fisheries.

Source: OECD (2006)

48. The use of weighted fixed rate systems tend to be more common in Europe. Throughout the EU, maximum rates for decommissioning payments are set by the EC on the basis of tonnage. Individual EU countries may then add a further weighting to adapt the buyback applications to meet their particular objectives in terms of fleet or fishery or target species. In France, for example, payments under the 2006 scheme are weighted according to the fish species targeted by the vessels (see case study in Chapter 3). In the 2006 scheme, 100% of the maximum amount of aid is available to French trawlers in the Mediterranean Sea, sole fishers in the Gulf of Biscay, and vessels targeting mostly anchovy, mackerel, horse mackerel and some deep-sea species. In contrast, 80% of the maximum amount of aid is available to vessels targeting nephrops, megrim and hake in some specific ICES area, while the rest of the fleet is eligible to 50% of the maximum of the financial aid.

49. Decommissioning schemes in Denmark have used weighted fixed rates per vessel, but a process of comparative bidding was also used to select which vessels were to be awarded decommissioning grants. This was based on a points system in which applications for decommissioning were weighted according to pre-defined categories such as age of the vessel, species composition in the catch, age of the owner and

fishing days at sea (Nautilus 1997). The relative weightings for each category were varied from year to year depending on the prevailing fisheries management priorities.

Other price mechanisms

50. Other pricing mechanisms that have been used in OECD countries include one-to-one negotiations between fishers and regulators and payments based on independent evaluations. Both these mechanisms may be useful when there are a very small number of potential applicants for decommissioning, when there are specific targets in a small fishery. Independent evaluations may also be useful when there is a perceived need for a higher degree of transparency in the price setting process. In general, though, both these forms of price formation do not solve the information asymmetry problem. Indeed, in a negotiation, the regulator is likely to be at a distinct disadvantage. The mechanisms rate very poorly in terms of cost-effectiveness as they will bear little relationship to the opportunity cost or willingness to receive compensation of fishers. Governments may be in a relatively weak bargaining position as they lack information on fishers' valuations and willingness to be compensated to exit the fishery.

Summary

51. In summary, there is clearly a tradeoff between allocative efficiency and cost-effectiveness (getting value for money) on the one hand, and the administrative and transactions costs of the various types of price mechanisms on the other. Auctions have the highest benefit as a price mechanism when there is a strong information asymmetry between fishers and the government, there is a large pool of potential bidders, and where fishers are heterogeneous in their private valuations. Fixed-rate payments tend to be much more administratively simple than auctions, thereby reducing transactions costs and improving transparency. However, they result in windfall gains for many recipients and will be less allocatively efficient and cost-effective than auctions. These factors need to be weighed in context of the objectives of the scheme, budget constraint, political climate and stakeholder attitudes in individual countries and fisheries in deciding which mechanism is most appropriate.

Conditions on further use of the vessel or licence

52. Decommissioning schemes generally place conditions on the use to which the purchased vessel, licence or gear can be put following the completion of the scheme. Vessels which are not scrapped or forced to cease fishing activity may be used in another fishery which may simply transfer overcapacity problems from one fishery to another while providing a windfall gain to the vessel owners. In OECD countries, vessel decommissioning schemes generally require that vessels be scrapped, put to non-fishing use, or sold to another country. In practice, most vessels tend to be scrapped as there is a limited demand and opportunities for conversion to non-fishing uses; this particular market is relatively small. In addition, the export of decommissioned vessels from OECD countries has declined significantly in recent years as countries have become increasingly aware of the potential for such vessels to end up in IUU fishing activities.

53. The EU regulations governing decommissioning (EC 2792/99) allows for vessels to be sold to countries outside the EU, provided that they never return to EU waters. Maximum premiums for these vessels are 50% less than those for scrapped vessels, and cannot be paid for vessels over 30 years of age. It has been noted that the specific rules governing this aspect of the EU regulation are complex, and that the control mechanisms to ensure vessels do not return to EU waters would not be cost effective (DEFRA 2006).

54. The purchase of licenses generally means that licenses are forfeited and are no longer available for use (by anyone). Situations where vessels are decommissioned but where owners retain a license can be problematic as there remains the possibility that the owners can reinvest in the fishery using their license. This has, in fact, been the case in a number of fisheries (for example, Washington State salmon fishery (Muse 1999)). Retiring both the vessel and the permit/licence is likely to be the most effective strategy.

Role of expectations and moral hazard

55. The role of expectations in undermining the effectiveness of decommissioning schemes has also been the subject of detailed analysis (Munro and Sumaila 2001; Clark *et al*. 2005). Fishers, acting rationally, will come to anticipate government policy in relation to the provision of adjustment assistance and adjust their behaviour accordingly. If the government has a past record of providing decommissioning payments when stocks are declining or there is excess effort or capacity, then the risk faced by fishers in their investment decisions is significantly reduced. As a result, under any type of management regime (even individual transferable quotas), it can be demonstrated that the expectation of future government adjustment assistance will reduce the expected costs of adjustment and result in a higher than optimal level of investment in vessels, with negative impacts on stocks.

56. Not only do decommissioning schemes alter fishers' expectations with respect to investment decisions, they also result in fishers engaging in strategic behaviour to alter the outcomes of the bidding process in their favour. That fishers, as rational economic agents, learn from their experiences is of no surprise. This was noted above in the use of auctions in the UK (Nautilus 1997; Poseidon 2005).

57. Strategic behaviour was also an issue in a voluntary buyback program in Chinese Taipei. Following a first round of buybacks over a period from 1991-95, a second round was instituted in 2000-2005. When the second round was initiated in 2000, only five vessels accepted the price offered by the government of TWD18 000 / GRT (Sun 2006). The government raised the buyback price to TWD50 000 / GRT for vessels smaller than 5 GRT, while the price for vessels over 100 GRT remained the same. There was still little response from fishers, primarily because they were holding out in the expectation of even higher payment schemes being introduced in the future. This prompted the government to change strategy by front-loading prices, particularly for smaller vessels, so that there was a penalty in terms of lower prices for delaying the decision to sell.

58. A number of moral hazard issues also arise in decommissioning schemes.[3] The purchased vessels are frequently older and less productive than the remaining vessels and the decommissioning scheme will accelerate the departure of these marginal vessels that would have departed the fishery in any case. The scheme facilitates and accelerates their exit, generally at a higher price than would have otherwise been achieved. This may encourage fishers from delaying their natural retirement or exit plans in order to benefit from anticipated decommissioning funds.

Ex-post evaluation

59. Ex-post evaluation of the effectiveness and impact of decommissioning schemes will help to understand whether the expenditures achieved their objectives. Such evaluations are consistent with best practice principles of sound governance. They would also provide useful insights and lessons for the future design and implementation of decommissioning schemes. Ex-post evaluations of decommissioning schemes appear to be conducted on an ad hoc basis with no OECD country having a regular review process in place.

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[3] Moral hazard refers to the possibility that the redistribution of risk (such as in the case of insurance which transfers risk from the insured to the insurer) changes people's behaviour.

60. Four broad types of ex-post evaluations can be identified. First, national governments occasionally undertake in-depth evaluations of decommissioning schemes. These are typically initiated by fisheries departments in response to concerns over the efficacy of current or past programmes and are intended to help inform future policy choices. Evaluations also can be requested by Treasury and Finance Departments as they have a strong interest in ensuring that public moneys are effectively spent. In 1997, the then UK Ministry of Agriculture, Food and Fisheries engaged a consultant company, Nautilus Consultants, to provide a detailed review of the UK vessel decommissioning schemes that operated from 1993 to 1996 (Nautilus 1997). The report contained a number of recommendations, some of which were taken up in later decommissioning schemes or fisheries management changes. Also in the UK, a mid-term evaluation was undertaken of the UK's use of the 2000-06 FIFG in order to analyse progress on the programme, provide a course of information for the ex-post evaluation of the FIFG (to be completed by 2009, and to prepare for the 2007-13 round of funding under the EFF (Poseidon 2005). This mid-term evaluation included a report on the uptake and impact of decommissioning schemes in the UK from 2000-03. Interestingly, one of the recommendations of the report was that there should be a review of the costs and benefits of vessel decommissioning schemes.

61. Second, national auditors have sometimes focused on specific decommissioning schemes and have conducted in-depth reviews of the effectiveness of the schemes. These usually occur in response to some problems being observed by the auditor with the effectiveness of public spending, or because the government of the day has referred the schemes to the auditor for review. A recent example is the report by the Northern Ireland Audit Office in October 2006 of the 2001 and 2003 decommissioning schemes in Northern Ireland (see Box 9). One of the points made by the Audit Office was that the Northern Ireland Department of Agriculture and Rural Development should have completed its evaluation of the 2001 scheme before introducing the successor scheme. In the United States, the General Accounting Office (the investigative arm of the US Congress) examined the outcomes of three buyout schemes (the New England groundfish, Bering Sea Pollock and Washington State salmon fisheries) (GAO 2000). The GAO recommended that future buyback schemes be designed to; restrict buyback participants from entering a fishery that has excess capacity; restrict the use of unused fishing permits in a buyback fishery with excess capacity; identify mechanisms to minimise incentives to increase capacity in a buyback fishery; and develop and evaluate performance measures for the results of future buyback programmes.

Box 9. Auditing Northern Ireland's decommissioning schemes

Three decommissioning schemes have been employed in Northern Ireland: a UK wide scheme that was run from 1994-98 by the UK ministry for Agriculture, Food and Fisheries; and two schemes in 2001 and 2003 which were run by the Northern Ireland Department of Agriculture and Rural Development. In October 2006, the Comptroller and Auditor General of Northern Ireland tabled a report examining the structure, implementation and impact of vessel modernisation and vessel decommissioning schemes operating in the Northern Ireland's fishing sector. The report had been requested by the House of Commons. One of the factors that motivated the request was the number of legal challenges to the conduct and outcome of the 2001 decommissioning scheme.

The audit report focused on the 2001 and 2003 decommissioning schemes and raised a number of concerns about the conduct and outcomes of the schemes, including:

- Errors in the application of the strike price auction mechanism in the 2001 scheme which resulted in otherwise eligible bids being excluded from the final set of accepted bids and ineligible bids being accepted. This increased the cost of the scheme and reduced the amount of capacity retired below the potential level. It also lead to a series of expensive legal challenges that eventually found against the Department
- Concerns that the strike price mechanism does not provide vaue for money as there is a high likelihood of collusive behaviour amongst fishers.
- "In keeping with best practice, the Department should have completed its evaluation of the 2001 Scheme before introducing the successor scheme" (p. 28).

- A recommendation that the Department considers using "reduction in fishing effort" as one its performance measures in assessing the impact of decommissioning.

- that found that the schemes "generally failed – sometimes quite significantly – to achieve its performance targets, in terms of the level of decommissioning secured and the relative cost" (p, 34).

While the report was highly critical, it highlights the important role that independent evaluation plays in ensuring that programmes provide a net benefit and meet objectives, while providing recommendations for improving te performance of similar schemes in the future.

Source: Northern Ireland Audit Office (2006)

62. Third, evaluations can be undertaken by supranational bodies (such as the EC) or inter-governmental organisations (such s the OECD). The European Commission regularly reviews expenditures under the FIFG on a country basis, although these tend to be reports on the uptake of funding opportunities under the various elements of the FIFG rather than on the effectiveness of particular programmes. Cross-country reviews, such as this report by the OECD, provide valuable information on lessons learned from the experiences of countries and can assist in identifying the advantages and disadvantages of alternative approaches. They do not, however, necessarily substitute for detailed evaluations of programmes at the country level.

63. Finally, the academic community undertakes research on the economic costs and benefits of decommissioning schemes. A glance through the bibliography of this report indicates that academia has been a significant contributor to the body of information evaluating decommissioning schemes. In some cases, this research is supported by governments through research grants. The key advantages of evaluations carried out by academic community are that they are independent and are likely to incorporate leading edge economic analysis and tools. The biggest challenge is to ensure that their findings get incorporated into the policy development process in governments.

3. SELECTED CASE STUDIES OF DECOMMISSIONING SCHEMES

64. This chapter presents a number of case studies of decommissioning schemes from recent experience in OECD and non-OECD economies. The types of schemes vary widely and include examples of mandatory vessel buybacks, ongoing decommissioning schemes, industry-funded buybacks and an NGO-funded permit acquisition. The objective in presenting the case studies is to highlight the lessons learned from the range of experiences in the design and implementation of the schemes. In particular, it is instructive to identify the key factors that influence the success or failure of the schemes in meeting their objectives.

65. The schemes covered in this chapter include:

- Industry-funded buyout in the United States Bering Sea/Aleutian Islands King and Tanner Crab Fishery;
- NGO-funded permit buyout in the United States Pacific Groundfish fishery;
- Australia's Business Exit Assistance scheme under the *Securing our Fishing Future* structural adjustment package;
- Mandatory vessel decommissioning scheme for tuna longline vessels in Chinese Taipei; and
- Decommissioning schemes in France.

Industry-funded buyout in the United States Bering Sea/Aleutian Islands King and Tanner Crab Fishery

66. This case study presents details of an industry-funded buyout that preceded implementation of an IFQ program in the Bering Sea/Aleutian Islands (BSAI) crab fisheries off Alaska. This fishery is managed under a Fishery Management Plan (FMP) that was developed by the North Pacific Fishery Management Council (NPFMC) under the Magnuson-Stevens Act. The Plan was implemented in 1989, and defers management of the fisheries to the State, with Federal oversight by the National Marine Fisheries Service (NMFS) and NPFMC. The fishery includes seven species of crab, three of which are overfished and under a rebuilding plan. Average annual gross ex-vessel landings over the period 2000-2005 were around USD 135 million. In addition to limited entry, management measures include catch limits, closed areas and seasons, gear restrictions (pot only), catch of males only, and bycatch measures (escape rings/tunnel size, degradable escape), and pot limits.

67. Domestic capacity in the fishery grew rapidly following the exclusion of foreign crab vessels after the declaration of the United States 200-mile EEZ. The fishery was an open access fishery up until a moratorium on the entry of new vessels was proposed by the NPFMC in 1992. Vessels were required to obtain a transferable Moratorium Vessel Qualification which would enable the vessel to later fish when the moratorium came into effect.[4] The vessel moratorium was approved and finally put in place by NMFS in

[4] The Vessel Moratorium Qualification (VMQ) was the prerequisite for obtaining a Vessel Moratorium Permit, which would enable a vessel to fish during the moratorium. The VMQ depended on a vessel's participation history and was transferable, thus acting as an access right for when the fishery came under

1995, and remained in effect until the end of 1999. Up until the introduction of the moratorium, the fishery was an open access fishery with all permits being issued by the State of Alaska. The Olympic nature of the fisheries encouraged a race to fish, with the result that many of the fisheries was subject to an extremely short fishing season (as little as 2 or 3 days in some cases) (Leal et al, 2004). The short seasons forced fishers to deliver all of their catch to processors in a very short period, resulting in a glut of crab on the market and lower dockside prices for fishers. Moreover, the high pace of fishing increased fishing costs, complicated stock assessment and management, and exacerbated dangerous conditions for fishers. The fishery was also heavily overcapitalised.

68. In June 1995, the NPFMC adopted the Licence Limitation Program (LLP) which established criteria for holding a licence, including requisite landings during a specified qualification period (see Table 4 for a history of management initiatives in the BSAI fishery). The LLP came into effect in 1999. Despite the moratorium and the LLP, however, the BSAI crab fishery remained considerably overcapitalised. The Alaska Department of Fish and game, which monitors fishing activity, reports that in 1995, some 299 vessels participated in the crab fishery (portion under LLP), while in 1996 and 1999, the first and last years of the LLP, respectively, 273 and 282 vessels participated. Under LLP and after appeals, there were 288 LLP licences. Clearly the number of permitted vessels as well as the active vessels was not significantly reduced by the LLP.

the vessel moratorium. A market for the VMQs developed during the period before the moratorium (1992-95).

Table 4. Timeline for management changes in the Bering Sea/Aleutian Islands King and Tanner Crab Fishery

Year	Event
1992	Vessel Moratorium recommended by NPFMC. In addition, the Council approved a problem statement in December 1992 describing the need for and purpose of a Comprehensive Rationalisation Plan.
1995	Vessel Moratorium approved by NMFS and Final Rule implementing Vessel Moratorium published.
	Licence Limitation Program adopted by the NPFMC
1996	First year of fishing under Vessel Moratorium
1997	LLP FMP Amendments approved by NMFS
1998	Final Rule implementing LLP published
1999	Last year of Vessel Moratorium (it was originally to intended to finish at the end of 1998, but was extended a year because the LLP was not ready)
2000	First year of fishing under LLP
2001	Final Rule published to amend the LLP required "re-implementation" of crab LLP eligibility under an FMP Amendment that added a new "recent participation period" as an additional eligibility test for a crab licence. Extant crab LLP licences without requisite history were revoked permanently.
	Consolidated Appropriations Act of 2001 required buyback program (subsequently amended twice)
2002-03	NPFMC adopted a series of Crab Rationalisation measures
2003	Final Rule to establish the buyback program published
2004	Buyback implemented
	NPFMC consolidated all Crab Rationalisation measures into a single Motion, adopted as FMP Amendment 18.
	Congress amended section 313(j) of the Magnuson-Stevens Act through the Consolidated Appropriations Act of 2004. As amended, section 313(j)(1) required the Secretary to approve and implement by regulation the Program, as approved by the North Pacific Fishery Management Council (Council) between June 2002 and April 2003, and all trailing amendments, including those reported to Congress on May 6, 2003.
2005	Last crab fisheries under LLP for rationalized crab fisheries (winter 2005, thereafter some crab fisheries remained under LLP)
	Final Rule Implementing Crab Rationalisation (including IFQ/IPQ system) published
	First rationalized crab fishing year began July 2005 (first fisheries opened August 2005).

Source: National Marine Fisheries Service, personal communication, March 2007.

Design of the decommissioning scheme

69. The industry-funded buyback program was launched in 2001 following passage of legislation (PL 106-554) which directed the Secretary of Commerce to promulgate rulemaking to implement a fishery reduction program.[5] The legislation provided USD 100 million for a loan to the vessels remaining in the fishery. The objective of the program was to increase productivity, help conserve and manage crab resources, and foster the potential for rationalising harvesting effort. The buyback preceded the implementation of an individual fishing quota (IFQ) program. The industry-funded buyout was a useful "jump start" to the IFQ program, providing a smaller universe of vessels with which to conduct the relatively burdensome and participatory process of implementing individual quotas. The buyback itself took place in 2004 with the IFQ program being implemented in 2005.

[5]. Note that the NMFS is located within the Department of Commerce.

70. Vessel owners interested in selling out were requested (by official Federal Register notice as well as more popular media processes) to send in their "bids" for exiting the fishery. By submitting a bid, vessel owners indicated the sum of money required for them to surrender all fishing permits and fishing history associated with that vessel, and to ensure that their vessel would never be used in any fishery anywhere in the world. Each bid by a particular vessel was accorded a "bid score" based on the formula which weighted the bid price by the value of catch history for each vessel (Box 10).

Box 10. An example of the bid score system

In the Bering Sea/Aleutian Islands King and Tanner Crab Fishery buyout, each bid by a vessel (say, vessel i) was given a bid score based on the following formula:

Bid score for vessel *i* = bid price by vessel *i* / sum over past five years of gross revenue from vessel *i*

The bid price was the offer made by the seller of vessel *i*. Quantities landed over the past five years by each vessel *i* were obtained from NMFS logbook/landings data, and Alaska state-wide average prices were used (rather than prices received by that particular vessel). The bid score allowed the agency to purchase the most catch history (in terms of value) for the least amount of money. The ratio reflects the fact that a low buyout bid combined with a high history of catch value is preferred over other combinations of bids and so receives preferential treatment in the ranking of bid scores. In the illustrative example given in the table below, vessel C would be preferred even though its bid is higher than that of the other vessels because of its relatively higher performance in terms of catch value. Vessel A would be the next preferred vessel even though vessel D had a higher catch value.

Vessel	Bid price	Total revenue	Bid score
A	200000	280000	0.714
B	200000	265000	0.755
C	350000	500000	0.700
D	350000	480000	0.729

Source: National Marine Fisheries Service, United States; OECD.

71. In a reverse auction fashion, bids were ranked from lowest to highest bid score. Vessels were selected starting with the lowest score, until all USD 100 million of the appropriated funds were exhausted. In the end, NMFS accepted 25 bids totalling USD 97.4 million. These 25 vessels held 62 fishing licences or permits.

72. A post-bidding referendum was held, as required by law, to determine whether all members of the fleet would approve both the buyout and the industry fee system that would be imposed on vessels remaining in the fleet, in order to repay the loan over 30 years. At least two-thirds of qualified ballots must be cast in favour of the buyout in order for the referendum to pass. The referendum did pass, and the buyout was completed. Vessels remaining in the fleet are currently paying a landings fee ranging from 1.9% to 5% (the actual rate varies by region of the fishery) to cover their cost of the buyout. These landings fees are collected by ex-vessel purchasers, and are capped at 5%. During periods when the fishery is closed (*e.g.* in case of resource failure), fees are not collected, although interest continues to accrue on the loan.

73. The interest rate charged on the loan is 2% over the United States Treasury's cost of borrowing equivalent maturity funds, averaged over the year in which the loan program was finalized (7.44% in this case). This interest rate remains fixed over the 30-year term. -The 30-year loan period is specified by law. Annual payments of approximately USD 8.1 million are required to amortize the USD 100 million loan over 30 years at this interest rate.

Outcomes

74. The decommissioning scheme was an interim step between LLP and the IFQ program. An IFQ system was implemented in the crab fishery in March 2005, and the first fisheries under this "rationalisation" program opened in August 2005. Note that this IFQ program was part of a "three-pie system" that included quotas for individual processor (IPQs), harvesters (including crew), and communities, with additional measures to protect coastal communities historically dependent on crab fisheries. The IPQs are highly controversial, allocating exclusive rights to purchase and process crab at the ex-vessel level. IPQs are legislatively prohibited in all United States fisheries other than this crab fishery. Community quotas are just that — exclusive fishing rights allocated to various small fishing communities in Alaska, including indigenous groups.

75. Active participation in the fishing fleet under rationalisation has definitely declined. In all BSAI king and Tanner crab fisheries except Eastern Aleutian Islands red king crab and Norton Sound red king crab and some other minor fisheries (which remained under State management), 101 vessels were used in the 2005/06 crab fishing year and 89 in the 2006/07 crab fishing year so far (Table 5). These reductions are market-driven as fishing activities are consolidated. Most participants in the IFQ program have joined voluntary harvesting cooperatives under the program's provisions that encourage them to do so; this allows these vessels an exclusion from certain restrictions.

76. There are no reports of any of the decommissioned fishing vessels being scrapped. There is some information regarding their use in non-fishing businesses, as well as scientific research charters. Stripped of their fishing permits as well as the right to participate in fisheries anywhere in the world, the market value of these vessels is quite low.

Table 5. Changes in vessel participation in the Bering Sea/Aleutian Islands King and Tanner Crab Fishery

Year	Event	No of vessels used
1995	Last year before Vessel Moratorium	299
1996	First year of Vessel Moratorium	273
1999	Last year of Vessel Moratorium	282
2000	First year under Licence Limitation Program (LLP) [a]	230
2001		264
2002		250
2003		256
2004	Last full calendar year under the LLP. Buyback implemented.	259
2005		169
2005-06	First year of rationalisation program and introduction of IFQ	101
2006-07	Second year of rationalisation (last fisheries close 31 May)	89

a. Under the Licence Limitation Program, there was a cap in the final number of crab licences of 288 licenced vessels.
Source: National Marine Fisheries Service, personal communication, March 2007.

Lessons learned

77. One of the most positive aspects of the decommissioning scheme was how it served as a precursor to the IFQ program. The buyout essentially set the stage for the rationalisation program by having a smaller fleet, with vessel operators/managers who were better prepared for the rationalisation implementation process, both in thought and by having their catch records at hand (the latter of which avoided some data confidentiality and disclosure problems that always arise in such implementations). By the time the buyout was completed, the NPFMC essentially had a rationalisation plan. Despite these advantages, the lack of a clear picture of the IFQ program that would follow the buyback hampered somewhat the design of the decommissioning scheme.

78. Industry involvement is an essential part of the formula to a successful transition. In the case of the BSAI crab fisheries, industry was a prime player in the push for the buyback and the shift to IFQs. While the State of Alaska supported the idea as a step towards improving fisheries management, safety at sea and profitability, the major impetus came from industry. The prospect of improved profitability in a rationalised fishery was sufficient to enable those who would wished to remain in the sector to commit to a long period (30 years) of landings fees in order to finance the buyback. The shift to stronger access rights in the form of IFQs was, therefore, an essential element in allowing the fishers to engage constructively in the design and implementation of the buyback.

79. One of the challenges was the lack of clarity in the statutory language that authorized the buyback and the associated loan. The absence of communication between regulators and legislators led to statutory language that was either unworkable, did not address critical issues, or that required substantive and time-consuming legal interpretation. For example, it was necessary to work around the problem that LLP licences were held by persons and not vessels. Delays in analyses and preparation of regulatory documents ensued.

80. Another challenge stemmed from the data confidentiality issue. Under Alaska Statute, fish ticket data (which provided the underpinning data for the buyout) are confidential except to the individual who signed the fish tickets. In many cases the government agency is unable to share underlying data with persons who are entitled to apply for and receive the benefit. This compromises the ability to address inconsistencies in the data, and affects how benefits are distributed. This issue will have to be addressed in the future via changes in statutes concerning confidentiality.

NGO-funded permit buyout in the United States Pacific Groundfish fishery

81. The United States Pacific groundfish fishery is conducted off the coast of Washington, Oregon, and California. The species complex includes 80 species (including 60 rockfish species), of which nine are overfished and under a rebuilding plan. These stocks have traditionally supplied a commercial fishery, a for-hire recreational sector (*i.e.* charter boats) and a private recreational fishery (*i.e.* individuals). All sectors of the fishery have been severely impacted by drastic reductions in fishing effort required for stock rebuilding. Overcapacity is a key issue in this fishery, particularly for stocks that will take a very long time to rebuild (up to 100 years in some cases). Revenues from Pacific groundfish trawling fell from USD 110 million in 1987 to USD 35 million in 2003.

82. Commercial fisheries off the West Coast represent an important impact on marine habitat and biodiversity. Bottom trawling and bottom-tending longline gears are widely used in the groundfish fishery and are likely to have contributed to physical alteration of benthic habitats and a loss of biodiversity. Prior to 2005, there were no systematic habitat protections in place to address these concerns.

83. In 2003, NOAA Fisheries conducted a buyout of the groundfish trawl fishery. The buyout was industry financed with a government loan that is being reimbursed through industry repayment by a tax on landings. The goal of the buyout was to reduce the number of vessels and permits for groundfish trawling and to financially stabilize the fishery and contribute to conservation and management of the fishery. A total of 240 permits were purchased in the buyout from 92 vessels, including permits for groundfish, crab and shrimp. In 2006 there were 179 trawl permits in the fishery. While the buyout did not specifically target habitat protection objectives, it did substantially reduce capacity. Although the buyout was geographically dispersed along the west coast of the United States, some unbalanced and unintended localised effects occurred. For example, in some ports a disproportionate number of permit holders opted to sell. This has since made it difficult to maintain working waterfronts (processors, harbor fees, etc.) due to reduced economic activity from the commercial fishery.

84. The Nature Conservancy (TNC), and Environmental Defense (ED), two private, environmental non-government organisations, have formed a partnership to use market-based approaches in the conservation of marine resources. TNC, founded in 1951, is expanding from its tradition in the United States of land conservation to work on marine issues in a more comprehensive and systematic manner. Their successful strategies on land include the acquisition and management of natural resources through ownership, easements and leases, and working cooperatively with communities. TNC has moved into the marine environment with the goal of using community-based approaches and transactional expertise to achieve biodiversity conservation objectives, (*e.g.* purchasing or leasing marine or submerged lands to protect habitat). With over 100 marine conservation projects in 22 countries around the world and all coastal United States states, TNC's engagement in the marine environment is increasing around the world.

85. The TNC/ED team is participating in a collaborative effort to develop a local fisheries management strategy for the central coast of California. Central to this collaborative effort has been the participation of fishing industry representatives and community leaders from ports in the central coast of California. The strategy focuses on sustainable harvest, protection of seafloor habitat, and economic stability for the communities of Morro Bay, Monterey, Moss Landing, and Half Moon Bay. The purchase of limited entry trawl permits as a means of offsetting the economic costs of habitat protection is a novel approach, the first of its kind in the United States.

86. During the analysis of essential fish habitat for the Pacific Coast groundfish fishery, the TNC/ED team engaged in a public-private partnership under which private funding was used to purchase groundfish trawl licences and vessels to offset the economic impacts of designating no-trawl zones off the central California Coast (The Nature Conservancy 2006). The no-trawl zones were identified cooperatively by

conservation NGOs and members of the affected fishing community and were established through the fishery management process, *i.e.* the Pacific Fishery Management Council (PFMC) (the constituent-based body that develops Fishery Management Plans) as well as NOAA Fisheries (see Box 11).

Box 11. Managing the United States Pacific groundfish fishery

Fishery management in the United States is conducted by both Regional Fishery Management Councils and the National Marine Fisheries Service (NOAA Fisheries) under the legislative mandate of the Magnuson-Stevens Act (MSA) and its 10 National Standards for fishery management. The Pacific Fishery Management Council (PFMC) manages fisheries off the west coast (excluding Alaska) including the Pacific groundfish fisheries. The PFMC prepares the Fishery Management Plans (FMPs) and FMP Amendments, including the groundfish FMP, which was prepared in 11982. Regulatory measures based on these FMPs are prepared by NOAA Fisheries, and these regulations apply to Federal waters and Federally permitted vessels in state waters within the EEZ. In addition to catch limits, the Pacific groundfish fishery is managed through limited entry, gear restrictions, and fishing seasons. The trawl and fixed gear fisheries (longline or fish pot) are subject to limited entry. Because of the multispecies nature of the groundfishery, the need to control harvest of the 9 overfished stocks severely limits the fishing opportunities for the fleet. Bycatch of the more vulnerable species while targeting healthy stocks is a key problem in this fishery.

Source: National Marine Fisheries Service, United States.

Design of the decommissioning scheme

87. Through the partnership, a proposal based on technical analyses was provided to the Councils and NOAA Fisheries by TNC/ED. The project area features estuaries, nearshore rocky reefs, kelp forests, soft and mixed bottom habitats, deep canyons, banks and seamounts. These habitats are characterized by high biological diversity and ecological value to groundfish and therefore protection is likely to be a key factor in rebuilding these stocks. In addition to a wide variety of marine mammals, seabirds, fish and invertebrate species, this area includes benthic biodiversity peaks in upwelling zones.

88. Through the use of logbook data and community involvement, TNC/ED identified, and began negotiating with, those permit holders who were active in the project area. Deals were negotiated with individual permit holders, although several group meetings were held to provide status reports, explain the general components of the project, design No-Trawl Zones, explain the appraisal process, etc. The purchase price for each permit was based on catch history which varied from permit to permit, rather than a flat rate per permit. This recognised the likelihood that the fishery would soon be managed under an individual fishing quota (IFQ) regime where the quotas would be allocated to each permit holder based on catch history (Squires et al 2006).

89. The effort culminated in 2006 when NOAA Fisheries implemented, through federal regulation, No-Trawl Areas initially proposed by TNC/ED, fishery participants, and community leaders. Essential to the success of this effort was an acquisition agreement contingency that the closures must be secured before TNC would complete the purchase of permits. This contingency provided the Morro Bay fishermen's support to the closure proposal made to the Council. A key strategy employed by TNC/ED has been to partner with the Council and NMFS to encourage their use of the Magnuson-Stevens Act to implement the regulatory components of the project.

Outcomes

90. The outcomes of the project addressed the goals of three distinct groups involved:

- TNC and ED engaged in this effort to address the impact of trawling on representative high-biodiversity areas of seafloor habitat in the central coast. Specifically, TNC sought to reduce by half the number of trawlers fishing in these areas and secure protection of at least 60% of the

areas identified by TNC's Ecoregional Assessment of the Central California Coast to be of high biodiversity significance[6].

- The fishing community's goal was to address increasing costs of doing business in the region and to secure the future of the fishery in what they perceive as a threatening regulatory climate.
- NOAA Fisheries and the Pacific Fishery Management Council, as mandated by the Magnuson-Stevens Act, are required to minimise to the extent practicable adverse impacts to essential fish habitat

91. The outcome of the project was to reduce effort in the groundfish fishery by removing six active permits (100% of the permits in the project area), and protecting 3.8 million acres of important habitat from bottom trawling (67% of areas of high biodiversity significance in central California). Four vessels were also purchased as the fishers had no further use for them and needed to sell the vessel in conjunction with their permit. TNC is investigating alternative uses for the vessels, such as oceanographic research, marine debris removal, or marine surveillance and enforcement (The Nature Conservancy 2006). If new owners or uses cannot be found, the vessels will be scrapped. One vessel associated with the acquired trawling permit remained with its owner who had permits in other fisheries (*e.g.* crab, salmon). However, the vessel is legally constrained from bottom trawling for groundfish in the future.

92. The permits purchased through the TNC/ED buyout were not actually retired but are now held by TNC. TNC is investigating strategies to allow fishers to utilise the permits in low impact fisheries. The cost of the buyback is not publicly available due to confidentiality constraints.

93. Another benefit has been the development of a functional collaboration between communities (fishermen, processors, etc.) of central California and the TNC/ED team. This collaboration is continuing to investigate how permit acquisition may be used to leverage additional habitat protection and encourage transformation into more sustainable fisheries. The closed areas proposed through this project were unanimously accepted by the Pacific Fishery Management Council and approved by the Secretary of Commerce to satisfy statutory requirements.

Lessons learned

94. This case study demonstrates that, if done properly, public-private partnerships can work. Key factors to success include a highly participatory, community-based approach, with local conditions driving the planning and decision-making. The Federal mandate was important, but only the NGO investment and community willingness actually led to the permit buyout and trawling closure. The private investment required a guarantee of a "return" which came in the form of the regulatory measures to protect those fishing zones. The localised focus is likely something that federal regulators could not achieve, and yet was essential to successful outcome of the project.

95. The most critical aspect of this innovative engagement of NGOs in a decommissioning scheme is the amount of time and effort invested in a collaborative process. The Pacific groundfish fishery has been subjected to considerable litigation (over a dozen cases) by primarily NGO plaintiffs (other than those engaged in the buyout). It was therefore all the more a challenge for the organisations engaged in the decommissioning scheme to acquire the trust and engagement of the fishing community.

96. Future questions include how and whether the two NGOs will use the permits they have acquired, and if the PFMC will consider alternative approaches. For example, the TNC/ED partners may pursue leasing of these permits for use with habitat-friendly fishing gear. The discussion continues, and will shed

6. As defined through The Nature Conservancy's Ecoregional Assessment for the Central California Coast.

light on how non-traditional permit ownership (including potentially IFQs in the future) might be workable in a fishery management context.

Australia's Business Exit Assistance scheme under the *Securing our Fishing Future* structural adjustment package

97. In November 2005, the Australian government announced a major package of one-off structural adjustment and improved management measures for those fisheries managed by the Commonwealth government.[7] The *Securing our Fishing Future* package addressed the profitability and sustainable future of the industry by seeking to buyout fishing concessions in those Commonwealth fisheries that are subject to overfishing or are at significant risk of over-fishing in the future. The announcement of the package was accompanied by an announcement by the Australian Fisheries Management Authority (AFMA) of significant reductions in allowable catch and effort levels for 2006 and beyond in a number of fisheries, and by the establishment of a Marine Protected Area network in the South-East Marine Region.

98. The centrepiece of the package was a AUD 150 million one-off, capped fishing concession buyout known as the Business Exit Assistance scheme. The scheme involved a voluntary tender process which would allow individual fishing businesses to exit from the industry or to rationalise their business and remain in the industry. In addition to the fishing concession buyout, the structural adjustment package provided for AUD 70 million in complementary assistance for:

- Business Advice Assistance to assist fishers in obtaining professional advice relating to their financial options under the Business Exit Assistance scheme (capped at AUD 1 500 per concession holder);

- Assistance for Skippers and Crew who lose employment as a direct result of a successful tender under the Business Exit Assistance scheme (AUD 5 000 for skippers and AUD 3 000 for crew);

- Onshore Business Assistance for those onshore businesses that are significantly affected by the structural adjustment (a total of AUD 23 million was available for either onshore business development assistance or onshore business exit assistance);

- Fishing Community Assistance to provide funds for projects aimed at generating new economic and employment opportunities in communities affected by reduced fishing activity as a result of the structural adjustment package, and the establishment of the Marine Protected Area network in the South-east Marine Region (the latter was announced at the same time as the *Securing our Fishing Future* package) (a total of AUD 20 million); and

- AFMA Levy Subsidy and Research under which the government provided AUD 15 million over three years to subsidise the AFMA management fees,[8] as well as a further AUD 6 million for science, compliance and data collection to improve the management of Commonwealth fisheries.

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7 The Commonwealth government manages those fisheries that are beyond the 3 nm State boundary and has joint management arrangements with a number of States under the Offshore Constitutional Settlement. The Commonwealth fisheries are managed by the Australian Fisheries Management Authority, a statutory authority.

8 Australia's Commonwealth fisheries operate under a cost recovery regime whereby AFMA levies fees on industry to cover a proportion of the costs of management.

Design of the scheme

99. The Business Exit Assistance scheme involved a voluntary tender process under which Commonwealth fishing concessions were surrendered. Concession holders in all Commonwealth-managed fisheries (except internationally managed and Joint Authority fisheries) were eligible for Business Exit Assistance. However, the following fisheries were particularly targeted due to high levels of current and expected over-capacity and concerns about individual fisher profitability:

- the Southern and Eastern Scalefish and Shark Fishery (excluding the Great Australian Bight Fishery, which was not subject to overfishing);
- the Eastern Tuna and Billfish Fishery;
- the Bass Strait Central Zone Scallop Fishery; and
- the Northern Prawn Fishery.

100. At the beginning of the tender process in June 2006, fishers were advised that a second round of tenders may be conducted at the Government's discretion if the first round of tenders did not meet the Government's objectives, within the allocated budget of AUD 150 million. However, fishers were told that, if they wished to submit a bid, they should not rely on the second round as it may not eventuate. The Department of Agriculture, Fisheries and Forestry (which conducted the tendering process) did not release targets and funding allocations prior to the tender process as this would have distorted the tender process and led to bid engineering. As it eventuated, a second round of tenders was required in November 2006, although only two fisheries were targeted under the second round – the Bass Strait Central Zone Scallop Fishery and the Northern Prawn Fishery.

101. Fishers were required to submit a bid based on the price that they believed reflected the amount that they would require to retire the offered fishing concessions. For example, this may have been equivalent in some cases to the amount required to exit the industry, less revenue form selling other parts of their business which could not be tendered under the structural adjustment package. However, the total price of the tender was a matter for each concession holder. Fishers were allowed to submit one or more primary tenders – in cases where they held more than one fishing concession. They were also allowed to submit an alternative tender for each of their primary tenders.

102. While the purchase of vessels was not the target of the Business Exit Assistance scheme, operators could apply for a boat scrapping incentive if they wished scarp any vessels as part of their surrender of fishing concessions. The government paid AUD 25 000 for each boat scrapped where it was part of a successful bid, and that evidence was provided of the boat actually being scrapped in an environmentally responsible manner. In the end, only two operators took advantage of this incentive.

103. In both tender rounds, the Department followed procedures laid out in the request for tender documents (DAFF 2006a, b) and evaluated the tenders based on the total price of the tender and the total number of concessions offered in the tender. Each tender was compared with other tenders that included the same types of fishing concessions and any other fishing concessions that were also included in these tenders. Nominal targets and funding allocations were set for the target fisheries in each round. In this way, value for money was assessed within and between fisheries.

104. The evaluation process was initially undertaken using only primary tenders. Where the reduction targets could not be met using primary tenders, alternative tenders were then also considered. Separate evaluation plans were developed for round 1 and round 2. In accordance with probity requirements

(overseen by the Australian Government Solicitor), these plans were finalised and approved before any tender evaluation processes commenced. A computer model was developed to implement the rules of each evaluation plan and this was used to compare the tenders.

Round 1 Evaluation

105. In accordance with the evaluation rules, the Department first tried to achieve all of the reduction targets within the total available funding. To ensure value for money was obtained, there were constraints on the maximum amount that could be spent in each fishery. This recognised the fact that the value of licences varies significantly between different fisheries. These maximum amounts were exceeded by the tenders submitted in round 1, so in accordance with the evaluation plan, the Department moved to the second method of evaluation which evaluated tenders on a fishery by fishery basis. The second evaluation method meant that results could be achieved in those fisheries that were tendered at value for money prices. In the fishery specific approach, the Department determined funding allocations and target reductions for each of the four target fisheries. The Department sought to achieve the reduction target for each target fishery within the nominal funding for that fishery.

106. The need to obtain value for money in the target fisheries was the primary factor in evaluating the tenders. For example, the evaluation process did not give any weighting to: indications by fishers that they intended to leave the fishery; the length of time a fisher had been active in the fishery; whether or not the concession was "active"; offers to scrap a vessel; or tenders that offered to submit many or all of their Commonwealth concessions. However, in the first round, the Department was required to take into account certain preferences in evaluating tenders. For example:

- in all fisheries, primary tenders were preferred over alternative tenders for each operator;
- in the Southern and Eastern Scalefish and Shark Fishery, Gillnet, Scalefish Hook, Shark Hook and Trawl Boat Statutory Fishing Rights (SFRs) were preferred over other concession, and catch landing information was considered;
- in the Eastern Tuna and Billfish Fishery, Longline Permits were preferred rather than Minor Line Permits, and the future value of the concessions in the fishery was a consideration; and
- in the Bass Strait Central Zone Scallop Fishery, the Department preferred operators to surrender all of their Eligible Fishing Concessions in the fishery rather than part of their holdings.

107. All remaining funds left over from the evaluation process in the first round were set aside for Round 2 of Business Exit Assistance.

Round 2 Evaluation

108. There were only two Target Fisheries in Round 2 – the Bass Strait Central Zone Scallop Fishery (BSCZSF) and the Northern Prawn Fishery (NPF) – as targets for these fisheries were not met in the first round. The Department determined funding allocations and target reductions for each of the Target Fisheries. 2, the Department also set indicative prices for each eligible fishing concession. The indicative prices were determined with reference to a variety of information including prices paid for fishing concessions successfully tendered in Round 1, the Gross Value of Production of the fishery and other economic information. The evaluation was then undertaken in three stages:

1. The initial step was to identify the greatest number of surrenders that could be achieved within budget for each Target Fishery without exceeding the indicative price.

2. Once the maximum number of surrenders had been achieved in each of the Target Fisheries without exceeding either the indicative price or the defined pool of funds for each fishery, the remaining funds were directed to the Non Target Fisheries. The Department then undertook the same evaluation process for the Non Target Fisheries (i.e. the greatest number of surrenders that could be achieved within the budget without exceeding the indicative price).

3. When no further concessions could be bought from any fishery without exceeding the indicative price, the best value tenders that slightly exceeded but were closest (in percentage terms) to the indicative prices were identified across all fisheries, until the remaining funds were exhausted.

109. In both rounds of tenders, the Department also considered the impacts from the proposed Marine Protected Area (MPA) network when evaluating tenders. For each impacted operator, a discount factor of up to a maximum of 10% was applied to the tender price for evaluation purposes. The discount factor was calculated by reference to the operator's gross value of production that was affected by the proposed MPAs and the discount factor was applied relative to the operator whose impact was the highest (so that the most affected operator received the maximum discount of 10%). So, for example, if the most affected operator submitted a tender for AUD 100 000, the Department would evaluate that tender as if it was submitted for AUD 90 000 (*i.e.* 10% less than AUD 100 000) and if the tender was successful, the operator would receive the full AUD 100 000. This afforded impacted operators a modest advantage in the evaluation process.

Outcome

110. Tables 6 and 7 provide details of the total number of concessions purchased under the Business Exit Assistance scheme and the total expenditures for each round of tenders, respectively. The first round of tenders achieved high levels of concession surrenders in two of the target fisheries, the Southern and Eastern Scalefish and Shark Fishery and the Eastern Tuna and Billfish Fishery. The majority of first round of tenders from the Northern Prawn Fishery and the Bass Strait Central Zone Scallop Fishery were not considered to be value for money and thus prompted the Department to focus heavily on these fisheries in the second round of tenders. In the case of the Northern Prawn Fishery, this resulted in 45% and 34% of Class B SFRs and Gear SFRs eventually being purchased, respectively. The buyout in the Bass Strait Central Zone Scallop Fishery resulted in a lower number of concession packages (14%) being surrendered.

111. Of the total budget for the Business Exit Assistance scheme of AUD 148.6 million, around AUD 89.2 million was spent on purchasing fishing concessions in the first round (Table 7). A further AUD 50 000 was spent on boast scrapping. A total of AUD 59.6 million was expended in the second round.

112. It is too early to assess the impact of the Business Exit Assistance scheme on the profitability and sustainability of the target fisheries. Much depends on the management arrangements that were in place, or were put in place, following the buyout of fishing concessions. The scheme focused on retiring fishing concessions, rather than on decommissioning vessels, so the success of the scheme will depend in large part on the ability of the management arrangements to ensure that capacity and effort remaining in the fisheries does not expand following the buyout, particularly in the target fisheries. The capacity of the various fisheries to self-adjust to changing market and environmental conditions is crucial. The target fisheries are subject to a variety of management arrangements. For example, in the East Coast Tuna and Billfish Fishery, there is a shift underway in the management regime towards individual transferable quotas, which is an improvement over the previous regime of regulated open access. The Northern Prawn Fishery is also of interest in that it has been the subject of almost continuous fleet restructuring and capacity reduction since the early 1980s (Newby *et al* 2004). Further changes in the management of the fishery away from input controls will be required to secure ongoing benefits from the buyout.

Table 6. Total number of concessions purchased in tender process in the Business Exit Assistance scheme [a]

Fishery	Type of concession	Total number of concessions in fishery prior to buyback	Quantity of concessions surrendered from Round 1	Quantity of concessions surrendered from Round 2	Total reduction	*% reduction*
Northern Prawn Fishery	Class B Statutory Fishing Right (SFR)	95	7	36	43	45
	Gear SFR	53844	4734	13631	18365	34
Southern and Eastern Scalefish and Shark Fishery	Gillnet Boat SFR	88	26	0	26	30
	Scalefish Hook Boat SFR	122	48	15	63	52
	Shark Hook Boat SFR	30	12	5	17	57
	Trawl Boat SFR	118	56	3	59	50
	Trap Permit / Auto Longline Permit	20	5	3	8	40
	East Coast Deepwater Permit	18	5	3	8	44
	SA Coastal Waters Permit	41	6	11	17	41
	Tasmanian Coastal Waters Permit	82	19	19	38	46
	Victorian Coastal Waters Permit	51	21	7	28	55
	Redfish Quota SFR	586720	112822	0	112822	19
	John Dory Quota SFR	235784	30889	0	30889	13
	Silver Trevally Quota SFR	538740	74912	0	74912	14
	Jackass Morwong Quota SFR	1480633	106064	8808	114872	8
	Royal Red Prawn Quota SFR	485394	103296	0	103296	21
Eastern Tuna and Billfish Fishery	Total Longline permits	218	98	1	99	45
	Minor Line Permits	230	103	9	112	49
Bass Strait Central Zone Scallop Fishery	Packages (Boat SFR [Round One only] + 3500 Commercial Scallop Quota SFRs + 3500 Doughboy Scallop Quota SFRs)	152	5	17	22	14
Other Fisheries	Other permits	~360	20	19	39	11
TOTAL		**~1600**	**>400**	**~150**	**>550**	

a. SFRs refers to Statutory Fishing Rights.
Source: Australian Department of Agriculture, Fisheries and Forestry.

Table 7. Final budget for Business Exit Assistance

Expenditure item	AUD
Round 1 tenders	89,219,466
Round 1 boat scrapping (2 boats)	50,000
Round 2 tenders	59,360,238
Total	**148,629,704**

Source: Australian Department of Agriculture, Fisheries and Forestry.

Lessons learned

113. Funded at AUD 220 million, the *Securing our Fishing Future* package was the largest structural adjustment program ever undertaken in Australia's fishing sector. The government chose to take a "big bang" approach to the adjustment problem, with a strong emphasis in the announcement of the package that this was to be a one-off opportunity for fishers to rationalise their operations or to exit the industry. This is in stark contrast to previous structural adjustment and decommissioning schemes in the sector which were more piecemeal, being undertaken on a fishery-by-fishery basis. While the basic philosophy underlying Australia's Commonwealth fisheries policy since the late 1980s has been on ensuring autonomous adjustment in the sector (generally through the use of economic instruments such as individual transferable quotas), there has been a series of adjustment programs for individual fisheries over the past twenty years. This may have had the effect of altering fishers' expectations regarding the future availability of government assistance in the event of financial difficulty. Whether the big bang approach is sustainable in terms of policy credibility remains to be seen. As was discussed in the previous section, much will depend on the adequacy of the future management arrangements in the sector.

114. A key feature of the structural adjustment package was the emphasis on a holistic package for the fishing sector, encompassing business advice assistance, community assistance and adjustment assistance for onshore businesses that may be adversely affected. This highlights the need to ensure that there is broad community support for the adjustment and reform package. A particular aspect that is noteworthy is the use of the buyback scheme to provide assistance for fishers from numerous fisheries simultaneously and fishers who may be adversely affected by the proposed establishment of an MPA network. This effectively rolled multiple adjustment processes into one measure, as least as far as some parts of the fishing sector were concerned and may have improved the prospects of community support for the MPA network.

115. The highly targeted approach undertaken by the government in determining which bids would be accepted used a combination of market forces and command and control regulation. By obtaining competitive bids, the Department allowed fishers to reveal their willingness to be assisted to leave the sector. However, by selecting successful bids on the basis of pre-declared preferences and considerations, as well as by using Departmental expertise in specific fisheries, the Department was able to achieve its objective of obtaining maximum value for money.

Mandatory buyout of large-scale tuna long-line vessels in Chinese Taipei

116. Large-scale tuna long-line fishing vessels have played a significant role in the development of commercial fishing in Chinese Taipei. This section of the industry developed over a period of time,

increasing rapidly during the 1990s due to improved access to markets and logistical support provided by the government. The vessels operated in three oceans and used foreign ports as bases for replenishment of supplies, repairs and transhipment of catch. Some 71 foreign ports have been approved as base ports for fishing activities which made it difficult, at least in part, for effective governance to be applied to the vessels. As a result, Chinese Taipei began to undertake measures to address the issue of vessels complying with the related rules.

117. As early as 1991, Chinese Taipei began conducting fishing fleet reduction programs, at least partly in response to the call for international conservation and management of tuna resources. Since 1991, Chinese Taipei has adopted the policy of limited fishing entry and implemented two voluntary vessel buyback programmes, one in 1991-95 and a second from 2000-05. A total of 2 319 vessels were bought back during the first programme at a total cost of TWD1 721 million (USD 52.16 million) (Sun 2006). A further 432 vessels were purchased in the 2000-05 program, making a total of 2 751 vessels of various sizes being purchased between 1991 and 2005 (a reduction of 138,698 gross tonnes in capacity). Among the vessels decommissioned were 136 large-scale tuna long-line vessels.

118. The conservation and management of major tuna and tuna-like species is the responsibility of five regional fisheries management organisations (RFMOs): the International Commission for the Conservation of Atlantic Tuna (ICCAT); the Inter-American Tropical Tuna Commission (ITTAC); the Indian Ocean Tuna Commission (IOTC); the Commission for the Conservation of Southern Bluefin Tuna (CCSBT); and the Western and Central Pacific Fisheries Commission (WCPFC).[9]

119. Recent expansion of high seas tuna fisheries in the world has placed significant pressure on some tuna stocks. In some oceans, specific tuna stocks are now at the stage of full exploitation or nearing full exploitation. In particular, global stocks of bigeye tuna show signs of over fishing. This has caused concerns among international fisheries management organizations and ecologists, urging states and RFMOs to manage bigeye tuna stock, and to restrain the harvest of the stock by means of limitation of catch levels or fishing efforts.

120. Owing to market demand, Chinese Taipei's tuna long-line fleet size was larger than necessary to catch the quotas allocated by the relevant RFMOs. The most recent challenge came in November 2005 when ICCAT requested CT to tighten the control of its tuna fishing fleets and cut Chinese Taipei's quota for bigeye tuna from 14 900 tonnes that had applied in 2005 to 4 600 tonnes in 2006, a cut of almost 70% due to non-compliance (ICCAT 2005). The ICCAT decision also called for the mandatory buyback of 160 large scale tuna long-line vessels during 2005 and 2006, as well as further measures to combat IUU fishing.

Design of the decommissioning scheme

121. In February 2005, the Fisheries Agency in Chinese Taipei launched the mandatory vessel reduction programme to purchase 160 large-scale tuna longliners in two phases (in 2005 and 2006). The first phase in 2005 resulted in 59 vessels being decommissioned and their licences cancelled. When target vessels returned to their home port pending their scrapping, they were required to berth at designated docks and their identity was checked and confirmed by the Taiwan Tuna Association and other relevant agencies. Scrapping of the vessels was made under the supervision of personnel from the Taiwan Tuna Association and other relevant agencies, in accordance with the required scrapping procedure. The scrapping process was jointly monitored by the Fisheries Agency and staff of the Taiwan Tuna Association, and, in addition,

[9] Although Chinese Taipei is not a member of the five tuna RFMOs, it has a special "cooperating status" within the organisations and is entitled to fish for tuna underthe condition of maintaining sustainability of tuna stocks.

the China Corporation Register of Shipping was requested to carry out a survey of the process and issue scrapping certificates.

122. The second phase of the program resulted in a further 101 vessels being decommissioned, predominantly focusing on those vessels fishing in the Indian and the Pacific Oceans. In the second phase of the program, to minimize pollution, hydraulic cutting has been used to break the vessels instead of using torch cutting. In view of the pressing time schedule for vessel reduction, it was decided that part of 101 vessels be sunk for use as artificial reefs. In addition, all engines and freezers of these vessels would be destroyed to ensure they could not be reused in fishery.

123. The price for the purchase of the vessels was fixed at TWD 70 000 (approximately USD 1 212) per vessel tonnage. The cost was shared between the government and the industry in the ratio of 3:4 (*i.e.* the government contributed TWD 30 000 while the industry contributed TWD 40 000). Half of the industry contribution was paid by the tuna boat owner association with whom the remaining vessels are affiliated, while the other half came from the government in the form of a low interest loan which is to be repaid by remaining vessel owners over a seven year period.

Outcomes

124. Table 8 details the results of the vessel decommissioning scheme. The estimated total cost to the government and industry is TWD 5.6 billion (USD 170 million). In 2005, 59 large-scale tuna long-line vessels were scrapped, among which were 15 vessels were from the Pacific Ocean, 24 vessels from the Indian Ocean and 20 vessels from the Atlantic Ocean. In 2006, 101 vessels were scrapped, including 10 vessels were from the Pacific Ocean, 83 vessels from the Indian Ocean and 8 vessels from the Atlantic Ocean.

125. Overall, Chinese Taipei reduced the size of its tuna longlining fleet by more than 26%. Scrapping of 110 vessels was completed in time and the remaining 50 vessels were sunk for use as artificial reefs before the end of 2006. The total numbers of large-scale tuna long-liners in CT were reduced from 614 to 444 and met the targets imposed.

126. The mandatory buyback will also help to resolve the problem of Chinese Taipei's insufficient quotas for bigeye tuna and ensure that all the remaining vessels fishing for bigeye tuna will have access to sufficient quota to enable profitable operations (Sun 2006). Prior to the buyback, the tuna quota allocations from the various RFMOs were evenly split among all longline vessels which then fished the quotas under a system of seasonal area closures. The reduced number of vessels will improve the profitability, but there may need to be further restrictions to prevent effort creep. An additional benefit is that improving vessel profitability will reduce the incentive for IUU fishing and misreporting of catches.

Lessons learned

127. Pressure from the international community was a major factor driving the mandatory buyout in Chinese Taipei's tuna fleet. It also coincided with a realisation by the Chinese Taipei government that it needed to effectively manage its large fleet operating on the high seas, by means of strict control and verification of catch in order to comply with the conservation and management measures adopted by the international fishery organizations. The buyback programme demonstrated the determination of Chinese Taipei to be regarded the international community as a responsible fishery player. By taking such radical action, Chinese Taipei has ensured a profitable tuna industry can co-exist with compliance with international regulations on the management and conservation of tuna resources.

Table 8. Reduction numbers of large-scale tuna long-line fishing vessels in Chinese Taipei

Ocean	Fishing targets	2005			2006	
		Before Reduction[a] (A)	Reduction numbers (B)	Operational vessels on 1 Jan 2006 (=A-B)	Reduction numbers in 2006 (C)	Operational vessels at start of 2007 (=A-B-C)
Atlantic	Bigeye tuna	90	18	72	8	64
	Part time	10	2	8	0	0
	Albacore	41	0	41	0	49
	Sub-total	*141*	*20*	*121*	*8*	*113*
Indian	Bigeye tuna	208	24	184	73	111
	Part time	78	0	78	10	68
	Albacore	46	0	46	0	46
	Sub-total	*332*	*24*	*308*	*83*	*225*
Pacific	Bigeye tuna	85	15	70	10	60
	Albacore	46	0	46	0	46
	Sub-total	*131*	*15*	*116*	*10*	*106*
Total		**614** [a]	**59**	**545**	**101**	**444**

a. Including 10 vessels retired before 2005.

Source: Chinese Taipei Fisheries Agency.

128. The use of a mandatory, rather than voluntary, decommissioning scheme appears to have been driven by three factors. First, the experience of the previous two voluntary buybacks was not encouraging, particularly as fishers seem to have mastered the strategic game of waiting for the government to raise purchase prices. Second, there was a sense of urgency surrounding the need to reduce the fleet's capacity, flowing from the ICCAT decision. It was abundantly clear that the long-term future of the Chinese Taipei tuna industry depended on a rapid adjustment of fleet size to available fishing opportunities: while there was certainly a high short-term cost, the longer term benefits in terms of international acceptance and possibility of increased fishing opportunities in the future were significant. Third, the demonstration effect resulting from a mandatory buyout sent clear and transparent signals to both domestic industry and the international community about the seriousness with which Chinese Taipei accepted its international responsibilities.

129. This latter point is reflected in proposals by Chinese Taipei to continue strengthening its fisheries management by implementing a six-year program spanning from 2006 to 2011 with a total budget of approximately USD 113 million. The outline of the program includes adjustment of the structure of the fishing industry, continuing to conduct port samplings, increasing observer coverage, data collection, scientific research, and taking measures to deter IUU fishing activities.

Decommissioning schemes in France

130. The French fishing fleet is one of the largest in the European Union. The vessels mainly operate in the North East Atlantic area as well as in the Mediterranean, harvesting stocks partly shared with the fleets of other EU Member States. A large proportion of the fleet consists of coastal vessels less than 12 metres in length. The French government, like other countries in the European Union (EU), launched fleet capacity management programs in the early 1990s in response to a series of four Multi-Annual Guidance Programmes (MAGPs) that imposed cuts to the allowable tonnage (GRT and later GT) and power (kW) (see Box 12 for an overview of capacity management and decommissioning policy under the EU Common Fisheries Policy). Since 2002, the maximum capacity of EU national fleets is set to a reference level within which governments are free to manage their capacity as they wish, subject to various rules regarding the use of public funds.

131. Decommissioning schemes are a major feature of the capacity management programs in France, starting in 1991 with the "Plan Mellick" which was a program to achieve the objectives for fleet reductions specified under the second MAGP (MAGP II). A succession of decommissioning schemes followed, operating more or less continuously up till the present time. These involved a series of one or two year plans responding to targets under the MAGP III, MAGP IV, the fleet reference level, as well as domestic fishing management priorities. The decommissioning schemes are funded through both the French government (at national, regional and local levels) and the EU Financial Instrument for Fisheries Guidance and, from 2007, the European Fisheries Fund. In most years, the cost of decommissioning are met almost equally by the EU and the various levels of the French government.

132. In conjunction with the decommissioning schemes, France relies on a system of limited entry based on the issue of fishery permits (*permis de mise en exploitation* or PME). These licences were allocated to vessels and regions on the basis of specified criteria, but are not necessarily tied to a vessel. A fisher can scrap their vessel and retain the PME, using it in the same or another fishery if they are able to get quota (which is allocated in a hierarchical fashion from the EC to the French government to Producer Organisations and then amongst fishers).

Design

133. The design of decommissioning schemes in France works on the basis of a fixed rate of payment rather than through an auction system. The government sets an overall target for reduction in vessel capacity (in number of vessels, power and length, as well as by target species) and determines an overall budget envelope for each scheme. The government then determines a flat rate (or *premium*) to be paid to vessel owners to permanently remove their fishing vessel from commercial fishing activity. The premium is defined by the administration and is revised for each scheme. The premium is composed of a fixed payment for each tonnage (length?) category plus a variable payment based on the tonnage of each vessel. The fixed payment increases with vessel size while the payment per GT declines as vessels get bigger. In addition, there is a premium for per kW that is equivalent for all vessel categories. The premium level is increased for vessels for which the GT/kW ratio is relatively low and under certain limits. The premium is also varies according to age criterion, consistent with EC regulations. In case of vessel scrapping in the 2006 scheme:

- Vessels between 10 and 15 years old receive the maximum amount;
- Vessels between 16 and 29 years old receive the maximum amount reduced by 1.5% per year the vessel is over 15 years old; and
- Vessels of more than 30 years old receive the maximum amount reduced by 22.5%.

Box 12. Fleet capacity targets and decommissioning schemes under the Common Fisheries Policy

From 1983 onwards, a series of programmes called "Multi-Annual Guidance Programmes" (MAGPs) for dealing with overcapacity in the European Community fishing fleet were successively adopted by the European Commission and implemented at a national level by Member States under the Common Fisheries Policy (CFP). While the third set of MAGPs (1992-97) was relatively successful in reducing fleet capacity, the fourth MAGP was not as effective due to the increasing technological of efficiency of fishing vessels outstripping efforts to scrap vessels and limit fishing activity (Cueff 2004). Attempts to tackle the overcapacity problem were also often undermined by the public aid that was granted for the modernization or renewal of the fleet (Surís-Regueiro et al 2003).

The 2002 reform of the CFP removed public aid for the construction of new vessels (from the end of 2004) and introduced a simpler system to limit the capacity of the European fleet. The new system gives Member States greater responsibility for managing their fleet capacity within effort constraints determined by the Council and within fleet capacity reference levels (expressed in terms of number and total tonnage of vessels) set according to the MAGP IV objectives for each national fleet on 31 December 2002. Under the new "Entry/Exit regime", no increase in fleet capacity is allowed and any reduction in capacity achieved with public aid is not able to be replaced. For entries of new vessels between 100 and 400 GT built with public aid prior to the end of 2004, the Member State has to withdraw 35% more capacity than it introduces (CEC 2004).

Decommissioning, or buyback, programmes have been used in most EU countries in order to achieve their target capacity levels. Up until 2006, assistance with funding of decommissioning schemes in the EU was provided through the Financial Instrument for Fisheries Guidance (FIFG) programme, with the Member States sharing the cost of the schemes. In the funding period from 1994-1999, a total of EUR 769.5 million was spent on decommissioning schemes in the EU with the FIFG contributing EUR 462 million (or 60% of the total) (Surís-Regueiro et al 2003). Decommissioned vessels were to be either scrapped or permanently reassigned for non-profitable purposes other than fishing. The FIFG also provided funds for socio-economic measures aimed at easing the transition out of fishing and thereby facilitating capacity reduction. These include providing grants to fishers to allow them to either retrain for activity outside of marine fisheries, or to diversity their activity outside marine fisheries (*i.e.* reduce fishing activity but not cease fishing). For the 2000-2006 funding period for the FIFG, around EUR 520 million of FIFG funds (of a total FIFG budget of EUR 3.7 billion) was earmarked for vessel withdrawal (final data on actual expenditures are not available at this stage).

The European Fisheries Fund (EFF) succeeds the FIFG for the period 2007-2013 and will operate on a similar basis, although there have been some modifications to simplify the management of the Fund. A total budget of EUR 3.8 billion has been allocated to the EFF and it is up to Member States to decide how they allocate their funds between the different priorities of the CFP. Funds will continue to be available for the decommissioning of capacity, as well as for temporary cessation due to emergency measures, retraining and early retirement. The ban on the use of public funding for vessel construction remains in place.

From 2003, the EC set restrictions on the level of compensation that can be paid to fishers for decommissioning their vessels (see table). However, a premium of 20% can be paid (under EC Council Regulation No 2370/2002) for fleet segments that required a reduction of fishing effort greater than 25% to achieve the target effort reductions in fisheries subject to stock recovery programmes.

Upper limits on EU contributions to decommissioning grants from 2003

Vessel category (GT)	Upper limit (EUR)
<10	11 000 per tonne + 2 000
10-25	5 000 per tonne + 62 000
25-100	4 200 per tonne + 82 000
100-300	2 700 per tonne + 232 000
300-500	2 200 per tonne + 382 000
>500	1 200 per tonne + 882 000

134. Vessel owners who wish to decommission their vessel apply for a grant and priority is determined on a first come, first served basis. Grants are made until the total amount of budgeted financial aid is distributed.

135. To qualify for financial aid, the vessels must be more than 10 years old and have been at sea for 75 days during each of two previous 12-month periods before the application for decommissioning. They also have to be operational vessels of at least 9 meters in perpendicular length or 12 meters in the case of trawlers. Financial aid for vessel decommissioning is only available to the domestic French fleet, and not to the overseas territories. Once accepted for decommissioning, a vessel must be scrapped, used for non-commercial fishing activities, or transferred to non-EU countries (note that vessels with a tonnage under 25 GRT cannot be exported to third countries).

136. The schemes target particular segments of the fleet, differing from year to year in response to priorities determined by the government and, up until the end of the MAGPs, reduction targets externally imposed for different fleet segments. For example, past schemes have targeted:

- Atlantic trawlers of less than 30 meters, dredgers, non-trawlers of more than 12 meters, and Mediterranean Sea trawlers and purse seiners (1998);

- Trawlers of less than 30 meters and Mediterranean trawlers subject to the beam trawl ban by the EC (1999);

- Non-trawlers of less than 12 meters and more than 25 meters, trawlers of more than 30 meters, and specific segments of Mediterranean purse seiners (2000).

137. For the 2006 decommissioning scheme, additional aid is given to vessels targeting threatened species. For example:

- 100% of the maximum amount of aid is available to trawlers in the Mediterranean Sea, sole fishers in the Gulf of Biscay, vessels targeting mostly anchovy, mackerel, horse mackerel, vessels targeting some deep-sea species;

- 80% of the maximum amount of aid is available to vessels targeting nephrops, megrim and hake in some specific ICES area; and

- 50% of the maximum amount of aid for the rest of the fleet.

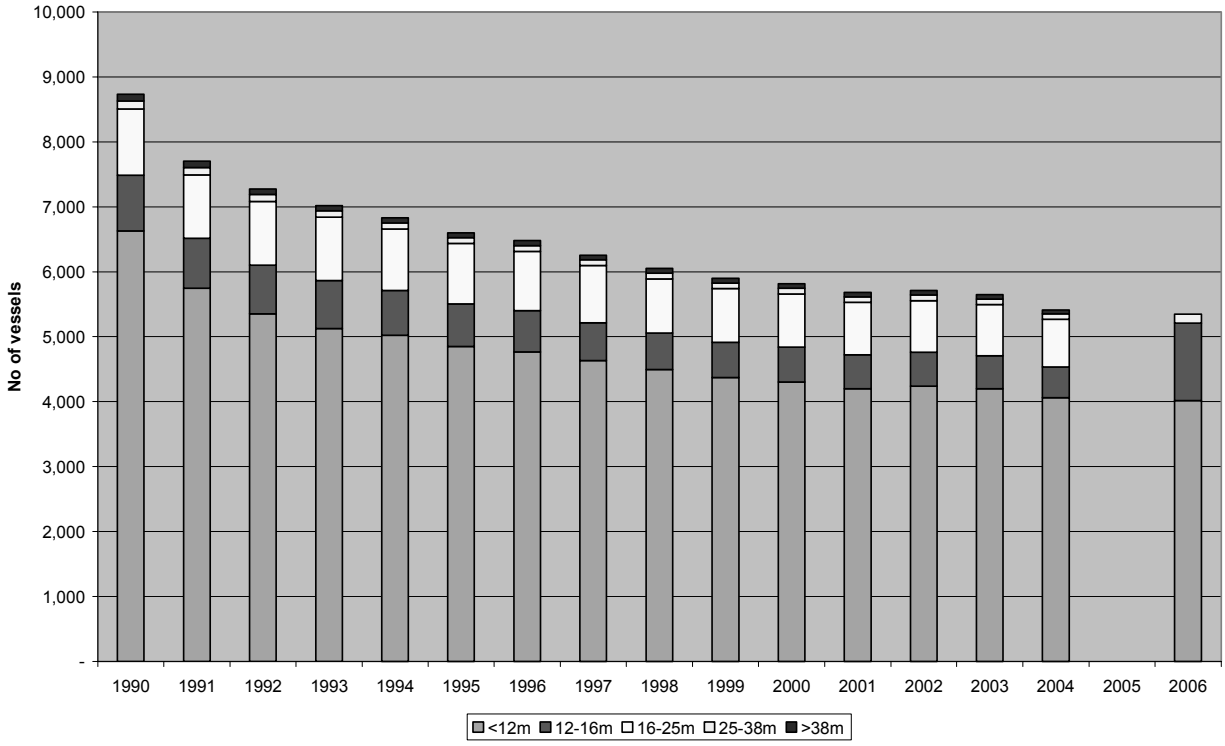
138. In addition, France has two social schemes that provide fishers with financial assistance when their vessels are decommissioned. An early retirement scheme is available for fishers that do not gather enough annual fees paid to apply for pension scheme but are 50 years old or above (213 fishers have taken advantage of this scheme since 1991). In the second scheme, a special premium is available for younger fishers that provides them with support while they are looking for another job (450 fishers have used this scheme since 1994).

Outcomes

139. The size of the French fishing fleet has declined steadily since the introduction of the decommissioning schemes in 1991, with an average annual decline in the number of vessels of 3% since 1990 (Figure 2). The total tonnage and power of the fleet has also declined (detailed data to come). The biggest decline occurred in the early 1990s as large numbers of vessels took advantage of the decommissioning payments to exit the industry. There has also been a change in the structure of the fleet

with many smaller vessels leaving the industry, particularly in the early 1990s (Giguelay 1999; Daurès and Guyader 2000). Many of these vessels were smaller and less powerful than the fleet average and so had the effect of raising the average size and power of the remaining fleet. These vessels were also relatively efficient and uncompetitive and so many vessel owners jumped at the chance to exit. Giguelay (1999) and Daurès and Guyader (2000) also point to the fact that the age distribution of the owners of decommissioned vessels was heavily skewed towards the older age groups, indicating that the decommissioning schemes also served as a *de facto* early retirement scheme for many older owners (particularly in small-scale vessels where there is a high proportion of owner-skippers).

Figure 2. Evolution of the French fishing fleet, by vessel length category [a]



a. Includes only the French domestic fleet and excludes overseas territories.

Source: INSEE and OECD.

140. Detailed data on expenditure for the decommissioning schemes are still being sought from the French authorities and will be included in a further revision of this paper. However, some data are available for recent years. Over the period 2003-2004, the expenditure on decommissioning was EUR 40 million, divided evenly between the FIFG and the French government, and achieved a reduction of 6 200 GT and 25-27 000 kW of power. In 2006, the budget for the decommissioning of vessels is EUR 26 million, of which EUR 13 million is from EU funds and EUR 13 million from the French government. The target fleet reduction is 80 vessels comprising at least 5 500 tonnes GT and 23 300 kW in power, which is around 3% of the reference level.

141. The level of the premiums that are paid to decommission vessels has increased markedly over the years across all vessel categories (Guyader *et al.* 2004). This increase is likely to be due to a combination of factors. First, the early rounds of decommissioning saw inefficient and marginal vessels exit first, leaving more efficient, and hence more valuable, vessels in the fleet. These are, of course, more expensive

to decommission and the value of the premiums has risen accordingly. Second, this is reflected in the rising prices paid for sales of vessels, particularly since 1997 when the decommissioning schemes became more targeted. However, the second-hand vessel market serves as an implicit market for PMEs and, in some cases licences, with the value of the vessel accounting for around 50% of the total value. (This is an informal transfer market as such transfers are not formally allowed in France.) In an analysis of the second-hand vessel market and the cost of resource access in Bretagne, Guyader *et al.* (2006) found that the value of the PME and licence for the right to exploit quota (issued by the Department of Maritime Affairs and managed by Producer Organisations) had increased substantially while the value of second-hand vessels had declined marginally.

142. A third factor behind the rising premiums is that the expectations of future government assistance for exiting the industry have been built into the amount that fishers are willing to be compensated for leaving the industry. Acting as rational agents, fishers have learnt to anticipate the buyouts and these expectations have become capitalized in asset values, forcing them up over time.

143. The impact of the decommissioning schemes on the profitability of the remaining fleet is difficult to isolate but, overall, the economic performance of many segments of the French fleet has been declining in recent years. According to recent economic indicators for French fishing fleet over the period 2002-2004, the economic position of eight of the twelve fleet segments for which comparable data on net profits are available has declined over the period (Table 9). The position of the remaining four fleet segments is stable or improving. In particular, the demersal trawl and seine fleet segments have experienced declining net profits and average net profits per vessel. It must be recognized that these indicators do not reflect resource rent in particular fisheries as they are fleet-based rather than fishery-based, and are an accounting, rather than an economic, concept in that they do not include the opportunity costs of labour and capital or the costs of management (Rose *et al.* 2000, Gooday and Galeano 2003). In addition, it is difficult to isolate the effects of the decommissioning schemes from the impacts of other factors that may influence economic performance (such as prices, fuel costs, stock recovery plans, etc). Nevertheless, it is noteworthy that the combination of capacity reduction, in the form of decommissioning schemes, and limited entry to the fishing fleet does not appear to be providing improving economic performance, at least in recent years.

Lessons learned

144. The provision of continuous decommissioning schemes has enabled a smooth and steady adjustment of the French fleet towards the MAGP and reference level targets. The schemes have been progressively modified from 1991 to become more efficient and targeted. The schemes are now targeting vessels fishing more threatened or overexploited species. Such a process of continuous gradual adjustment has clearly involved less short-term social disruption than can result from a "big bang" approach or major fishery-specific structural adjustment initiatives. The labour market has the capacity to adjust more gradually to the capacity reductions, provided that the markets are sufficiently flexible, and unemployment peaks are avoided. This may have been less of a concern for France as a large proportion of the vessels retired have been owned by older fishers who were rapidly approaching retirement. Such a smooth adjustment process has also helped to mitigate potential adverse impacts on social patterns in coastal regions, a key objective in French policy towards the fishing sector.

Table 9. Indicators of economic performance of the French fishing fleet, 2002-04

Fleet segment	Indicator	2002	2003	2004
Demersal trawl and seine (<12m)	Net profit[a]	9.8	3.6	2.3
	Net profit/vessel[b]	26	10	7
Demersal trawl and seine (12-24m)	Net profit[a]	12.4	4.1	-2.3
	Net profit/vessel[b]	20	7	-4
Demersal trawl and seine (24-40m)	Net profit[a]	3.4	2.4	-0.2
	Net profit/vessel[b]	23	19	-2
Demersal trawl and seine (>40m)	Net profit[a]	5	5	4.8
	Net profit/vessel[b]	217	250	300
Pelagic trawl and seine (12-24m)	Net profit[a]	6.2	8.1	6.7
	Net profit/vessel[b]	50	65	57
Pelagic trawl and seine (>40m)	Net profit[a]	25.9	22.3	23.7
	Net profit/vessel[b]	682	587	641
Dredge (<12m)	Net profit[a]	3.1	2.2	2.4
	Net profit/vessel[b]	20	13	15
Dredge (12-24m)	Net profit[a]	4.3	0.3	2.3
	Net profit/vessel[b]	31	2	19
Mobile polyvalent (<12m)	Net profit[a]	2.2	0.3	0.7
	Net profit/vessel[b]	33	5	11
Mobile polyvalent (12-24m)	Net profit[a]	0.2	-13.1	0.3
	Net profit/vessel[b]	6	-385	10
Passive gears (<12m)	Net profit[a]	12.8	23.9	22.5
	Net profit/vessel[b]	5	9	8
Drift and fixed nets (12-24m)	Net profit[a]	6.2	3.6	4.9
	Net profit/vessel[b]	32	20	29

a. EUR million.
b. EUR thousand per vessel. *Source:* Derived from Scientific, Technical and Economic Committee for Fisheries (2006, pp. 67-74).

145. However, the continuous provision of funds for decommissioning is not without its drawbacks. First, many of the owners who did scrap their vessels, and who did not retire, reinvested their aid in more

modern vessels (Guyader *et al.* 2004). The fact that the vessel was retired but the PME retained assisted fishers to do this. This was compounded by the provision of financial assistance for vessel construction up until the end of 2004 when such assistance was stopped throughout the EU. Indeed, in France and other EU countries, only marginally less public funds were invested in vessel construction and modernisation than in decommissioning, creating perverse incentives for fishers (Surís-Regueiro *et al.* 2003).

146. Second, the risk adjusted rate of return required for investment in new vessels would be lowered in the knowledge that the continuous adjustment programs that would provide them with financial support in case of economic. Jorgensen and Jensen (1999) have demonstrated that the EU funded buybacks created a stimulus for the expansion of fleet capacity, as well as influenced the behaviour of investors' bankers, who offer better credits than would normally be the case in this situation. If owners were not able to build the regular provision of decommissioning funds into their expectations, they would be reluctant to invest in another fishing vessel whose value is likely to be fluctuating.

147. Third, the continuous provision of funding serves to ratchet up the value of fishing vessels and access rights (PMEs) as expectations of future funding become embedded into asset values. This has a flow-on effect on the price at which vessels are purchased under the schemes. This is reflected in the increasing premiums that are paid under successive decommissioning schemes. Indeed, it is understood that the premiums are now close to the upper limits for decommissioning grants set by the EC (see Box 3).

148. The system of providing a flat rate payment for decommissioning vessels is transparent and administratively simple and is not open to manipulation by fishers or governments. This is especially the case when it is combined with a first come, first served system of granting assistance. This removes the need for the regulators to evaluate applicants (except for due diligence checks such as security of title, freedom from debt and financial liabilities, etc). Whether or not this system is the most suitable for the French situation in terms of providing value for money is open to debate. As discussed in Chapter 2, decommissioning payments should ideally be based on an individual fisher's willingness to receive compensation to leave the fishery. In principle, this is best elicited through an auction process. Based on an empirical analysis of adjustment n the inshore scallop fishery in the St Brieuc Bay, Daurès and Guyader (2000) demonstrate that the fishers' average willingness to receive compensation to leave the fishery was significantly less than the premium paid by the government over the period of the study (1998-2000). This implies that the government actually overspent in this particular fishery and that the exiting fishers made a windfall gain as funds were transferred from taxpayers to the fishers.

4. POLITICAL ECONOMY ASPECTS OF DECOMMISSIONING SCHEMES

149. The performance of decommissioning schemes can best be regarded as mixed. While some schemes have achieved lasting capacity reductions in a cost-efficient manner, other schemes have used less cost-effective means of reaching targets, resulting in a cost to tax-payers. Many schemes, however, did not achieve their objectives in terms of either cost or enduring capacity reductions. The analysis on the economic aspects of decommissioning schemes highlighted a range of Factors that underlie the design and implementation of successful decommissioning schemes and have identified potential pitfalls for policy makers. The selected case studies highlighted the ways in which different countries have responded to particular decommissioning challenges focusing on the motivation for the schemes, design details, outcomes and lessons learned. Taken together, the economic analysis and the case studies underscore the need for careful and considered choices to be made when designing and implementing such schemes, a process that is not always simple or straightforward.

150. However, there appears to be a disjunction between the continued appeal of decommissioning schemes to governments and their relatively poor performance. Much of this can be explained using the political economy framework developed for the fisheries policy reform project. This chapter provides a review of the key political economy factors underlying the use of decommissioning schemes. These include: the drivers for the introduction of decommissioning schemes; the distribution of benefits from the schemes; the use of decommissioning schemes as compensation strategies; and the role of policy credibility.

Drivers for decommissioning schemes

151. The push for the introduction of decommissioning schemes has generally arisen from a sense of crisis within a fishery. This is typically a depletion of fish stocks due to open access or regulated open access management regimes and the resulting excess fleet capacity and fishing effort. However, in many cases, the sense of crisis has not been related directly to environmental concerns about the status of the fish stock(s). Rather, the driving force appears to have been economic crisis within a fleet or fishery, with environmental benefits being seen largely as a positive but secondary outcome of the need for adjustment. The two are of course linked, as resource sustainability is a necessary condition for improved profitability.

152. The driving force underlying the development of a coalition amongst industry participants for the introduction of adjustment assistance is likely to be the more immediate problem of poor profitability. But poor economic performance is not necessarily enough to garner consensus amongst participants of the need for policy change: conditions often have to become really bad to encourage a coalition for reform to develop (Drazen 2000). There is a very strong tendency towards the status quo when it comes to fisheries. This is primarily a result of the common property nature of the resource and the existence of exogenous fluctuations in environmental and economic conditions. The prospect of enduring change is also an issue if fishers are to join a coalition for change. Decommissioning schemes are much more likely to gain industry acceptance if the returns from short term adjustment can be assured (if not necessarily guaranteed). This was reflected in the experiences of many countries examined in this report where the use of decommissioning schemes was a precursor to more fundamental reforms.

153. In other cases, the pressures for capacity adjustment are externally imposed. In the case of the EU, for example, resource depletion has been a major factor behind the capacity reductions imposed

through the MAGPs (although poor profitability was a more significant factor at national levels). The Chinese Taipei long-line buyback was the product of a decision by an RFMO and as taken up by Chinese Taipei at least in part to assert its international environmental credentials. And in the United States, the TNC/ED buyout of licences in the Pacific groundfish fishery is an example fo how pressure from environmental lobbies can be translated into action.

154. While industry is generally the *demandeur* for a policy concession in the form of adjustment assistance, the government is the supplier. And in this case, the government may also have a significant incentive to join an emerging coalition for such assistance. As noted earlier, one of the major political advantages of decommissioning schemes is that they are a high profile policy intervention that is action-oriented and ostensibly focussed on solving the problem of a declining publicly owned resource. There is, of course, some balancing in the government's calculus in this area as decommissioning schemes are generally very expensive and have to compete with wider government priorities for funding. Nevertheless, the prospect of a "win-win" outcome can be very appealing and support for the provision of decommissioning assistance often ensues.

Distribution of costs and benefits from decommissioning schemes

155. The distribution of benefits from decommissioning schemes is also significant in explaining the process underlying their design and implementation. In general, these schemes are narrowly targeted to a fishery or fleet. When the buybacks are publicly funded, the costs are thinly spread over society as a whole while the gains are concentrated on a small group within the fishery. There can also be significant regional benefits from the schemes. Even within fisheries in need of adjustment, the distribution of gains between those who leave the fishery and those who stay can determine the strength of the coalition for reform. In addition, there may be some uncertainty about the distribution of gains if it is not clear that the decrease in capacity is going to lead to an improvement in stock status and increased profitability. The management system in place may therefore play a role in the relative bargaining power of those who wish to leave the fishery and those who wish to stay.

156. There is also a time element to the distribution of benefits. Those who leave the fishery immediately as a result of payouts will receive immediate benefits, while those who remain may have to wait for some time for their benefits to be realised, particularly if the fishery was in an overfished condition. The potential delay in benefits for those who remain underscores the importance of effectively managing the remaining effort from expanding or new effort entering in order to sustain support for the decommissioning scheme.

Decommissioning schemes as compensation strategies

157. In many cases, decommissioning schemes have been used as compensation strategy within a larger policy reform process. Indeed, the more successful decommissioning schemes have been introduced as part of a broader package of fisheries management changes focussed on improving the economic and environmental performance of management. This has generally involved the introduction or strengthening of property rights-based management, enabling fisheries to become self-regulating with respect to capacity. They can also help to speed the process of adjustment.

158. It has been demonstrated that decommissioning schemes have the greatest chance of being successful when they are implemented in conjunction with significant management changes. Usually, this has involved the introduction of rights-based regimes which have helped to resist the tendency for remaining vessel owners to increase effort unnecessarily or for new effort to enter the fishery. The Australian experience in the northern prawn and southern fisheries bears this out. Similarly, Norway's buy-

back programs have resulted in improved profits due to the introduction of an individual quota regime under which vessels are tied to the quota.

159. From a political economy perspective, there are two key reasons why governments might provide compensation through decommissioning schemes in the pursuit of broader policy reform. First, governments may seek to overcome resistance to management reforms by providing compensation to those who lose from reform. Compensating transfers in the form of buyouts can be critical in obtaining the consent of affected individuals and groups to management change and allowing the change to take place. They can also be used to drive a wedge between sub-groups within a fishery that may be blocking the management reform. This serves to break down the homogeneity of the group's interests and can increase its coordination costs.

160. Second, compensation can be driven by distributional concerns and can be used to negate the negative effects of change. Decommissioning schemes can provide a means for individuals to exit the industry with dignity and with some return on their investment in the fishery over the years. Because of the low or non-existent value of assets in many fisheries that find themselves in crisis, it is usually not possible for fishers to sell up in order to exit the industry (Clark *et al* 1979). As a result, the government can step in to buy the assets (which may, in fact, be some form of access rights such as licences, but with low or zero value), allowing the fishers concerned to either relocate or retrain. However, providing decommissioning grants in the absence of other policy measures to assist economic diversification may not lead to sustainable social outcomes, particularly in fishery-dependant coastal regions. Similarly, if the payments become integrated into the expectations of fishers, then there is less incentive to find durable solutions to the diversification issue. The consequent impacts on community resilience can be significant and can retard the adoption of necessary adjustments that are triggered by the need for decommissioning schemes. In general, therefore, compensation payments should be temporary and directly targeted to affected groups.

Policy credibility

161. Fisheries management takes place in a dynamic policy environment where there are feedback loops between government policies and fishers' behaviour. Each is constantly adjusting to expectations about the future actions of the other, meaning that a purely static view of the policy environment will provide only a partial perspective on the issues underlying decommissioning schemes. The signalling and credibility of government policy over time is therefore central to ensuring that fishers receive the appropriate signals for ensuring sustainable and responsible fishing. This is particularly evident in three areas.

162. First, as has been discussed already, the provision of decommissioning transfers has an impact on the risk faced by fishers in their investment and production decisions if they create expectations in the industry that the government will cover losses that may arise from excess investment in vessels. This reduces the risk-adjusted discount rate used in making investment decisions with the result that vessel owners would expect to keep whatever profits result from their investment decisions while being spared the losses resulting from overfishing. This would in general promote overinvestment in the fishing industry. Therefore, the continuous provision of decommissioning payments can significantly reduce the credibility of government policy on the need to find an enduring solution to excess capacity. This can be overcome, or reduced, if a decommissioning scheme for a particular fishery or fleet is announced as being a "one-off" opportunity for adjustment or exit.

163. Second, policy incoherence can significantly undermine policy credibility when it comes to fleet adjustment. A classic example is the co-existence of decommissioning schemes and payments for vessel

construction and modernisation. For the last twenty years, the European Union has had a program[10] in place giving grants to decommissioning fishing vessels. Up until recently, the European Union also provided grants for construction of new vessels and modernisation of existing ones. There is evidence that the decommissioning grants have found their way back into the industry and stimulated investment in new vessels, in which case these grants have in effect become grants to investment (Jorgensen and Jensen 1999; Surís-Regueiro 2003). As part of its package of reforms to the Common Fisheries Policy, support for the construction of new vessels in the EU ceased at the end of 2004, although expenditures under the CFP carried over into 2005.

164. Third, policy credibility is also reduced in cases where decommissioning schemes are employed in fisheries management regimes that do not sufficiently control effort expansion through vessel entry or input stuffing. This will serve to undermine the long-term effectiveness of the decommissioning schemes and reduce the credibility of the policy. Industry observations on the state of fisheries management will be built in to their expectations on future profitability and will do little to reduce effort or increase profitability.

[10]. Or, rather, a sequence of programs where the objectives have been redefined as one program has replaced another.

5. TOWARDS BEST PRACTICE GUIDELINES FOR THE DESIGN AND IMPLEMENTATION OF DECOMMISSIONING PROGRAMMES

165. Decommissioning programmes have been demonstrated to be a useful policy tool in certain circumstances. They can accelerate the transition to a rationalised fishery managed on the basis of stronger use and access rights and improved ecosystem health. As part of a package of transitional assistance and management changes, they can provide a window of opportunity to help transform the nature of a fishery from one characterised by non-cooperative behaviour to one in which incentives are well-aligned and cooperation is the rational outcome of interactions between fishers.

166. However, decommissioning schemes used on their own do not provide a long term solution to the problems of the "race-to-fish" incentive that often arise in fisheries with poorly defined or enforced use or access rights. Unless complementary measures are taken to effectively close access to the fishery, short term gains from the buyback are likely to be eroded as remaining fishers expand effort, previously inactive vessels and licences are activated, or as new entrants join the fishery. Moreover, the provision of continuous, on-going decommissioning funding is likely to result rising vessel and licence prices as expected future resource rent is capitalised into asset values. This will increase the cost of future decommissioning and necessitate a continuous process of exogenous reductions in vessel capacity to offset the effects of effort creep driven by technological change and capital stuffing over the longer term.

167. From a political economy perspective, decommissioning schemes have a role to play in helping to garner support for reform of fisheries management policies. As both an income redistribution mechanism and a compensation tool, decommissioning schemes can assist in reducing opposition to needed policy reforms and overcoming status quo bias. However, caution is needed as the expectation of future financial assistance in times of adverse economic and resource conditions can undermine policy credibility of governments' reform efforts. In this respect, the transitional nature of decommissioning schemes needs to be emphasised.

168. The analysis in this report highlights the fact that the situation facing fisheries throughout OECD and non-OECD economies differs considerably. Such diversity will need to be reflected in the design of decommissioning schemes to ensure that the incentives for fishers and governments are appropriately aligned both during and following the implementation of the scheme. Nevertheless, it is possible to identify a set of broad policy principles that should underlie the design of decommissioning schemes, regardless of the specific fishery and country circumstances. These policy principles are distilled from the analysis and lessons learned from the case studies in this report, as well as from the insights obtained from the expanding body of experience in the use of decommissioning schemes.

Best practice guidelines

169. The policy principles are presented here as a set of best practice guidelines that identify the key areas that policy makers need to be aware of when designing decommissioning schemes. The guidelines are not intended to be normative but are intended to assist policy makers ask the right set of questions as they develop programmes.

Box 13. Best Practice Guidelines for Decommissioning Schemes

1. Prevention is better than cure

It is usually much easier and less expensive to ensure that management systems are properly designed to prevent overcapacity and overfishing from occurring than it is to undertake capacity reduction after the fact.

2. Clear objectives are essential

Well-defined, clearly articulated and measurable objectives for decommissioning schemes will help ensure that the targets are achievable, that the mechanisms are appropriately specified, and that the full range of management policies for the fishery are coherent and mutually supportive. This also reflects key principles of good governance.

3. Ensure effective post-adjustment management is in place

It is imperative that the management regime in place following the decommissioning effectively prevents capacity and effort from re-entering the fishery. Without such a measure, the beneficial effects of decommissioning will be negated over the medium to longer term.

Improving the specification and enforcement of transferable use and access rights (based on either output or input dimensions) will help ensure that incentives are appropriately aligned and will facilitate autonomous adjustment in the fishery in the future.

4. Decommissioning schemes work well as part of a package of adjustment measures towards sustainable and responsible fisheries

Decommissioning schemes will not, on their own, address the fundamental problems of overcapacity and overfishing.

Decommissioning schemes can be successful in reducing effort (excess capacity) as part of a one-off structural adjustment program where the management regime is also changed to one that provides more security and stability and addresses the market failures leading to the overcapacity problem. The schemes can aid in the transition to a more responsible fishery in which the sustainability and profitability are improved.

5. Getting value for money

Auctions will generally provide the most cost effective means of determining prices to be paid to retire vessels and licences. Under most circumstances, they help address information asymmetries and lead to allocative efficient outcomes.

Auctions can, however, be complicated and costly, and tradeoffs may need to be made between allocative efficiency and transactions costs in choosing between auctions and other forms of pricing such as fixed rate payments.

6. Achieve effective capacity reductions

Both latent and active capacity needs to be targeted to ensure that capacity is effectively reduced and that effort does not become reactivated in the fishery. The sequencing of buyouts may be an important consideration.

7. Require beneficiaries to pay a proportion of the costs of decommissioning

Under the beneficiary pays principle, those fishers who benefit from increased resource rent resulting from capacity reductions may be required to contribute to the costs of the decommissioning schemes.

A combination of industry and public funding has worked effectively to reduce the impact on the public coffers while improving the incentives for cooperative management in the post-adjustment fishery.

8. Stakeholder involvement will improve acceptance and compliance

The involvement of stakeholders in the design and implementation of decommissioning schemes will improve the likelihood of cooperation in both the conduct of the schemes and the post-adjustment of the fishery.

9. Undertake ex-post evaluation

Ex-post evaluations of decommissioning schemes, linked to measurable performance indicators developed with the scheme's objectives, can help to ensure that lessons learned inform the design and implementation of future schemes.

Discussion and feedback

170. Delegates are requested to reflect on the draft set of policy guidelines and provide feedback on whether:

- There are additional guidelines that could be inserted;
- The level of detail in the guidelines is appropriate; and
- Next steps in the development of this paper and the guidelines, including the adoption of the guidelines by the organisation as OECD Guidelines.

BIBLIOGRAPHY

AMC (Australian Maritime College) (2000), *An Economic Assessment of the South East Fisheries Adjustment Package (SEFAP)*, Launceston, Tasmania.

AFMA (Australian Fisheries Management Authority) (1999), *Factual Brief for the Independent Allocation Advisory Panel on Translation to Gear Statutory Fishing Rights*, Canberra, April.

Banks, R. (1999), "Subsidising EU fleets: capacity reduction or capital subsidisation?," in A. Hatcher and K. Robinson (eds), *Overcapacity, Overcapitalisation and Subsidies in European Fisheries*, Proceedings of the first Concerted Action workshop on Economics and the Common Fisheries Policy, UK, 28-30 October 1998, CEMARE Miscellaneous Publication No. 44, University of Portsmouth, pp. 200-211.

Branch, T.A., R. Hilborn, A.C. Haynie, G. Fay, L. Flynn, J. Griffiths, K.N. Marshall, J.K. Randall, J.M. Scheuerell, E.J. Ward and M. Young (2006), "Fleet dynamics and fishermen behaviour: lessons for fisheries managers", *Canadian Journal of Fisheries and Aquatic Sciences*, vol. 63, pp. 1647-68.

Campbell, H.F. (1989), "Fishery buy-back programmes and economic welfare", *Australian Journal of Agricultural Economics*, vol. 33, no. 1, pp. 20-31.

CEC (Commission of the European Communities) (2004), *Annual Report from the Commission to the Council and the European Parliament on Member States' Efforts During 2003 to Achieve a Sustainable Balance Between Fishing Capacity and Fishing Opportunities*, COM(2004)799 Final, 14 December, Brussels.

Chan, C., P. Laplagne and D. Appels (2003), *The Role of Auctions in Allocating Public Resources*, Productivity Commission Staff Research Paper, Productivity Commission, Melbourne.

Clark, C.C., F.H. Clarke and G.R. Munro (1979), "The optimal exploitation of renewable resource stocks: the problem of irreversible investment", *Econometrica*, vol. 47, no. 1, pp. 25-47.

Clark, C.W., G.R. Munro and U.R. Sumaila (2005), "Subsidies, buybacks and sustainable fisheries," *Journal of Environmental Economics and Management*, vol. 50, no. 1, pp. 47-58.

Cueff, J.-C. (2004), "Fishing vessel capacity management public buyout schemes: Community experience through the Multi-Annual Guidance Programmes and ways forward", Paper presented to the International Workshop on the Fishing Vessel and Licence Buy-back Programs, La Jolla, California, 22-24 March.

Cunningham, S. and D. Greboval (2001), *Managing Fishing Capacity: A Review of Policy and Technical Issues*, FAO Fisheries Technical Paper No. 409, Rome.

Daurès, F. and O. Guyader (2000), "Economic analysis of the impact of buyback programs and the role of financial incentives schemes: application to a limited entry French fishery", Paper presented to the XIIth Annual Conference of the European Association of Fisheries Economists, Esbjerg, Denmark, 13-15 April.

DEFRA (UK Department for Environment, Food and Rural Affairs) (2006), *Consultation on the Decommissioning Scheme for over 10m Beam Trawlers Affected by a Possible Area VIIe Sole Recovery Plan*, August, London, www.defra.gov.uk.

Department of Agriculture, Fisheries and Forestry, Australia (2006a), *Business Exit Assistance: Request for Tender in Relation to the Voluntary Surrender of Fishing Concessions,* Request for Tender DAFF47/06.

Department of Agriculture, Fisheries and Forestry, Australia (2006b), *Business Exit Assistance (Round 2): Second Request for Tender in Relation to the Voluntary Surrender of Fishing Concessions,* Request for Tender DAFF75/06.

Drazen, A. (2000), *Political Economy in Macroeconomics*, Princeton University Press, Princeton.

Fox, K.J., R.Q. Grafton, T. Kompas and T.N. Che (2006), "Capacity reduction, quota trading and productivity: the case of a fishery", *The Australian Journal of Agricultural and Resource Economics*, vol. 50, pp. 189-206.

Frost, H. and P. Andersen (2006), "The Common Fisheries Policy of the European Union and fisheries economics", *Marine Policy*, vol. 30, pp. 737-46.

Funk, R.D., W.L. Griffin Sr, J.W. Mjelde and J.M. Ward (2003), "A simulation model of licence buyback in the Texas bay shrimp fishery", *Marine Resource Economics*, vol. 18, no. 1, pp. 33-53.

Galeano, D., S. Vieira, W. Shafron and P. Gooday (2006), *Australian Fisheries Surveys Report 2005*, ABARE Report prepared for the Fisheries Resources Research Fund, Canberra, August.

GAO (United States General Accounting Office) (2000), *Commercial Fisheries: Entry of Fishermen Limits Benefits of Buyback Programs*, Report to House Committee on Resources, GAO/RCED-00-120, June, Washington DC.

Giguelay, T. (1999), "French decommissioning schemes: appraising their place in public assistance to the fishing industry and their impact on fishing capacity", paper presented to the XIth Annual Conference of the European Association of Fisheries Economists, 7-10 April, Dublin.

Gooday, P. and D. Galeano (2003), *Fisheries Management: A Framework for Assessing Economic Performance*, ABARE eReport03.7, Prepared for the Fisheries Resources Research Fund, Canberra, April.

Grafton, R.Q., J. Kirkley, T. Kompas and D. Squires (2006), *Economics for Fisheries Management*, Ashgate, Aldershot, UK.

Grafton, R.Q. and H.W. Nelson (2005),"The effects of buy-back programs in the British Columbia Salmon Fishery", Australian National University Economics and Environment Network Working Paper EEN0505, August, Canberra.

Greboval, D. (1999), *Managing Fishing Capacity: Selected Papers on Underlying Concepts and Issues*, FAO Fisheries Technical Paper No. 386, Rome.

Guyader, O., P. Berthou and F. Daurès (2004), "Decommissioning schemes and capacity adjustment: a preliminary analysis of the French experience", Paper presented to the International Workshop on the Fishing Vessel and Licence Buy-back Programs, La Jolla, California, 22-24 March.

Guyader, O., P. Berthou, F. Daurès, M. Jézéquel and O. Thébaud (2006), "Marché des navires d'occasion et coût d'access à la resource: application à la Bretagne", Groupe de Recherché, AMénagement des Usages des Ressources et des Ecosystèmes marins et littoraux, Série Document de Travail No. D-17-2006.

Hannesson, R. (2004), "Do buyback programs make sense?", Paper presented to the International Workshop on the Fishing Vessel and Licence Buy-back Programs, La Jolla, California, 22-24 March.

Holland, D. E. Gudmundsson and J. Gates (1999), "Do fishing vessel buyback programs work: a survey of the evidence," *Marine Policy*, vol. 23, no. 1, pp. 47-69.

ICCAT (International Commission for the Conservation of Atlantic Tunas) (2005), *Recommendation by ICCAT Regarding Control of Chinese Taipei's Atlantic Bigeye Tuna Fishery*, ICCAT Resolution 05-02.

Jorgensen, H. and C. Jensen (1999), "Overcapacity, subsidies and local stability", in A. Hatcher and K. Robinson (eds), *Overcapacity, Overcapitalisation and Subsidies in European Fisheries*, Proceedings of the first Concerted Action workshop on Economics and the Common Fisheries Policy, UK, 28-30 October 1998, CEMARE Miscellaneous Publication No. 44, University of Portsmouth, pp. 200-211.

Klemensson, O. O. (1999), "The Development Fund of the Icelandic Fisheries: objectives, activities and impacts", in A. Hatcher and K. Robinson (eds), *Overcapacity, Overcapitalisation and Subsidies in European Fisheries*, Proceedings of the first Concerted Action workshop on Economics and the Common Fisheries Policy, UK, 28-30 October 1998, CEMARE Miscellaneous Publication No. 44, University of Portsmouth, pp. 226-35.

Klemperer, P. (1999), "Auction Theory: A Guide to the Literature", *Journal of Economic Surveys*, vol. 13, no. 3, pp. 227-60.

Latacz-Lohmann, U. and S. Schilizzi (2005), *Auctions for Conservation Contracts: A Review of the Theoretical and Empirical Literature*, Report to the Scottish Executive Environment and Rural Affairs Department, October, Edinburgh.

Leal, D.R., M. DeAlessi and P. Emerson (2004), *Overcoming Three Hurdles to IFQs in U.S. Fisheries: A Guide for Federal Policy Makers*, Policy Brief No. 28, Reason Foundation, Property and Environment Research Center and Environmental Defense, March, www.reason.org/pb28.pdf.

Munro, G.R. and U.R. Sumaila (2001), "Subsidies and their potential impact on the management of the ecosystems of the North Atlantic," in T. Pitcher, U.R. Sumaila and D. Pauly (eds), *Fisheries Impacts on North Atlantic Ecosystems: Evaluations and Policy Explorations*, University of British Columbia Fisheries Centre Research Report 9(5), Vancouver, pp. 10-27.

Muse, B. (1999), *Washington State Commercial Salmon Fishery Buyback Programs, 1995-1998*, Alaska Commercial Fisheries Entry Commission, Report CFEC 99-1N, Juneau, Alaska, March.

National Marine Fisheries Service (2004), *United States National Plan of Action for the Management of Fishing Capacity*, Department of Commerce, National Oceanic and Atmospheric Administration, August, Washington DC.

Nautilus Consultants (1997), *The Economic Evaluation of the Fishing Vessels (Decommissioning) Schemes*, Report on behalf of the UK Fisheries Departments, September, Edinburgh.

Newby, J., P. Gooday and L. Elliston (2004), *Structural Adjustment in Australian Fisheries*, Report prepared for the Fisheries Resources Research Fund, ABARE eReport 04.17, November, Canberra.

Northern Ireland Audit Office (2006), *Sea Fisheries: Vessel Modernisation and Decommissioning Schemes*, Report by the Comptroller and Auditor General for Northern Ireland, October, London.

OECD (2003), *The Costs of Managing Fisheries*, OECD, Paris.

OECD (2006a), *Financial Support to Fisheries: Implications for Sustainable Development*, OECD, Paris.

OECD (2006b), *Using Market Mechanisms to Manage Fisheries: Smoothing the Path*, OECD, Paris.

Poseidon Aquatic Resource Management Ltd (2005), *Financial Instrument for Fisheries Guidance (FIFG) Programme in Non-Objective 1 Areas of the United Kingdom (2000-2006): Update of the Mid-Term Evaluation*, Final Report to Department for the Environment, Food and Rural Affairs, Scottish Executive Environment and Rural Affairs Department and the Welsh Assembly Government, December.

Read, A.G. and E.H. Buck (1997), *Commercial Fishing: Economic Aid and Capacity Reduction*, Congressional Research Service Report for Congress No. 97-441 ENR, Washington, April.

Rose, R., M. Stubbs, P. Gooday and A. Cox (2000), "Economic performance indicators for Fisheries", paper presented to the Xth Biennial Conference of the International Institute for Fisheries Economics and Trade, Corvallis, Oregon, 1-14 July.

Schilizzi, S. and U. Latacz-Lohmann (n.d.), "A comparative assessment of auctions and fixed-rate payments in fishing vessel decommissioning", mimeo.

Scientific, Technical and Economic Committee for Fisheries (2006), *Economic Performance of EU Fleets and Assessment of the Impact of ACFM Advice*, Commission of the European Communities Staff Working Paper, November, Brussels, http://stecf.jrc.cec.eu.int/meetings/sgeca/0604/stecf-aer-eiaa.pdf.

Spagnolo, M. (2004), "The decommissioning scheme for the Italian clam fishery: a case of success", Paper presented to the International Workshop on the Fishing Vessel and Licence Buy-back Programs, La Jolla, California, 22-24 March.

Squires, D., J. Joseph and T. Groves (2006), "Buybacks in Fisheries", Paper presented to the Methodological Workshop on the Management of Tuna Fishing Capacity, La Jolla, California, 8-12 May.

Stoneham, G. (2000), "Policy mechanism selection for environmental management", paper presented to the Second Environmental Economics Round Table, Environmental Economics Research paper No. 7, Canberra, 5 July.

Sun, C.-H. (2006), "Chinese Taipei's Experience in Managing Fishing Capacity", Paper presented to the APEC Seminar on Sharing Experiences in Managing Fishing Capacity, 8-9 May, Kaohsiung, Chinese Taipei, APEC Document FWG 01/2006-D008.

Surís-Regueiro, J.C., M.M. Varela-Lafuente and C. Iglesias-Malvido (2003), "Effectiveness of the structural fisheries policy in the European Union", *Marine Policy*, vol. 27, pp. 535-44.

Terrebonne, R.P (1995), "Property rights and entrepreneurial income in commercial fisheries," in *Journal of Environmental Economics and Management*, vol. 28, no. 1, pp. 68-82.

The Nature Conservancy (2006), "Conservancy purchases Federal trawling permits and vessels to protect marine areas in California", Press Release, 27 June, www.nature.org/exclude/print.php.

Weimer, D.L. and A.R. Vining (2004), *Policy Analysis: Concepts and Practice*, 4th Edition, Prentice Hall, New Jersey.

Wenninger, Q. and K.E. McConnell (2000), "Buyback programs in commercial fisheries: efficiency versus transfers," *The Canadian Journal of Economics*, vol. 33, no. 2, pp. 394-412.

Woodrow, M. (1998), "A case study of fisheries reduction programs during the Northern Cod Moratorium," *Ocean and Coastal Management*, vol. 39, pp. 105-18.

World Bank (2004), *Saving Fish and Fishers: Towards Sustainable and Equitable Governance of the Global Fishing Sector*, Report No. 29090-GLB, Agriculture and Rural Development Department, World Bank, Washington DC.