

THE CHANGES MADE TO THE MANAGEMENT OF TASMANIA'S ABALONE, ROCK LOBSTER AND SCALEFISH FISHERIES OVER THE LAST 20 YEARS, AND THE RESOURCE, SOCIAL AND ECONOMIC RAMIFICATIONS OF THOSE CHANGES

Dennis Witt, Department of Primary Industries, Water and Environment (DPIWE),
dennis.witt@dpiwe.tas.gov.au

(Grant Pullen, DPIWE, grant.pullen@dpiwe.tas.gov.au; Hilary Revill, DPIWE,
hilary.revill@dpiwe.tas.gov.au; Sean Riley, DPIWE, sean.riley@dpiwe.tas.gov.au).

ABSTRACT

Tasmania's abalone, rock lobster and scalefish fisheries have an annual beach price value of about A\$120, A\$64 and A\$10 million respectively. Whilst small by overseas standards, Tasmania's fishing industry is an important part of this small island State's predominantly rural income, amounting to some 16% of total agricultural production. It is, therefore, natural that the legislative objectives for Tasmanian fisheries extend beyond those associated with resource sustainability, to encompass social and economic outcomes including benefit for Tasmanian fishers, Tasmanian coastal communities and Tasmania's population as a whole. The abalone, rock lobster and scalefish fisheries have a distinctly different history and significantly different management regimes. Whilst all management arrangements were designed to achieve sustainability of the resource and the ecosystem from which it is harvested, each also has had different social outcomes and economic outcomes. The introduction of quota management regimes in the abalone and rock lobster fisheries has achieved the principal management objectives. The primary objective of making the scalefish fishery sustainable using input controls has yet to be achieved, although current changes should more closely match the amount of allocated effort in the fishery with an ecologically sustainable catch.

Keywords: Fishery; Tasmania; management; sustainability; economic outcomes; social outcomes

INTRODUCTION

Tasmania's abalone, rock lobster and scalefish fisheries have an annual beach price value of about \$120, \$64 and \$10 million dollars Australian respectively. Whilst small by overseas standards, Tasmania's fishing industry is an important part of this small island State's predominantly rural income, amounting to some 16% of total agricultural production [1].

Experience world-wide has shown that where there is 'open access' to marine resources, there is little incentive for individuals harvesting the resource to conserve fish stocks. Competition amongst fishers, and the race to harvest available stocks, often leads to resource depletion and does not maximise returns to fishers or the community. Further, fishers with no secure access rights have little incentive to steward, conserve and manage fish stocks. Left unmanaged, the increase in fishing effort that results from competition is reflected in lower individual catches, over-capitalisation and reduced financial returns.

The role for the Tasmanian Government, as custodian of the resources on behalf of the general community, is to ensure that marine resources are used in an ecologically sustainable and orderly manner, while yielding an appropriate return to the Tasmanian community as a whole. This ensures that the benefits of the use of the living marine resources are maximised within the community.

Each fishery considered in this paper, abalone, rock lobster and scalefish, has a distinctly different history and a significantly different management regime. Whilst all management arrangements were designed to achieve sustainability of the resource and the eco-system from which it is harvested, each has had different social and economic outcomes.

In this paper the histories of management of Tasmania's abalone, rock lobster, and scalefish fisheries are summarised and compared, and the social and economic outcomes of the major management changes are explored.

ABALONE FISHERY

History of management

Tasmania's abalone fishery is based on the blacklip abalone (*Haliotis rubra*) and to a lesser extent the greenlip abalone (*Haliotis laevis*) [2]. Tasmania produces about 25% of the world's production of wild caught abalone [1].

Tasmania's abalone stocks were not significantly fished before 1963, but the advent of modern diving equipment and the development of attractive Asian markets for abalone precipitated rapid expansion [3,4]. The number of dive licences was limited to 120 in 1969 in an attempt to constrain fishing. A further 5 licences were issued in 1972 bringing the total to 125. The fishery underwent a series of declines and recoveries from a low annual catch of 1,450 tonnes in 1978 to a high of 4,500 tonnes in 1984 [4].

In 1985, concerns about the sustainability of the resource led the Government to introduce a total allowable commercial catch (TACC). The quota was allocated equally to the 125 divers who each received 28 abalone quota units. Each of the 3,500 quota units provided access to an equal share of the annually set TACC [4]. During the quota year, after a diver had fished 16 units worth of abalone they could temporarily transfer up to 12 units to another diver to take. This was in effect, a quota system without transferability.

The TACC was reduced in each of the years from 1986 to 1989, and then held steady at 2100 tonnes (Fig. 1).

In 1990, an abalone licence was valued at about \$A 1,000,000, a sum beyond the reach of all but a few. To facilitate easier investment in the fishery the licence was split into the entitlement to dive (abalone dive licence) and the holding of quota units [4].

In 1993, both the dive licences and the quota units were made transferable, and holders of abalone quota units no longer needed to be abalone divers. However, only a licensed abalone diver could take abalone. A diver required authorisation from the holder of an abalone quota unit in order to take the abalone represented by that unit.

For abalone, Tasmania's coastal waters are divided into some 49 major statistical blocks. The 'catch', 'effort', and 'catch per unit' effort is reviewed for each region block and sub-block each year as part of an annual stock assessment [2]. The TACC is then set to reflect the assessed 'health' of the stocks. The most recent TACC, for 2004, is 2,509.5 tonnes.

Since 2000, the Tasmanian abalone fishery has been divided into zones, each with its own component TACC. There are currently five zones, eastern, western, northern and central Bass Strait blacklip abalone zones, and a greenlip abalone zone. Some blocks that might be subject to excessive fishing pressure are given total catch limits of their own. Fishing in one of these blocks is suspended if the "trigger cap" is reached before the end of that quota year. Spatial management has been further refined by having different size limits in different areas of the fishery, depending on the size at maturity in each area. The

size limits are set to reflect the size at 50% maturity plus two years' growth, to maintain an adequate level of egg production in all parts of the fishery [2].

In 1994 the government implemented a “resource rent” or “royalty” in the abalone fishery. A ‘sliding scale’ formula, based on average beach price each quarter, is used to calculate additional fees to be paid to Government for each abalone quota unit held. This “royalty” is a payment for the privilege of a guaranteed access to a proportion of a very valuable public resource. In 2003, this payment amounted to some \$A4.2 million.

Outcomes of management changes

In 1985, the objectives of introducing quota management were firstly, to limit the overall catch of abalone, and secondly, to provide a mechanism for direct investment in the fishery [4].

The TACC reduced the total catches of abalone over the 1985 – 1989 period from an unsustainable catch level of 4,500 tonnes to 2,100 tonnes (Fig. 1). A modest increase was made in 1997, and the TACC has remained relatively stable at about 2,500 tonnes since then.

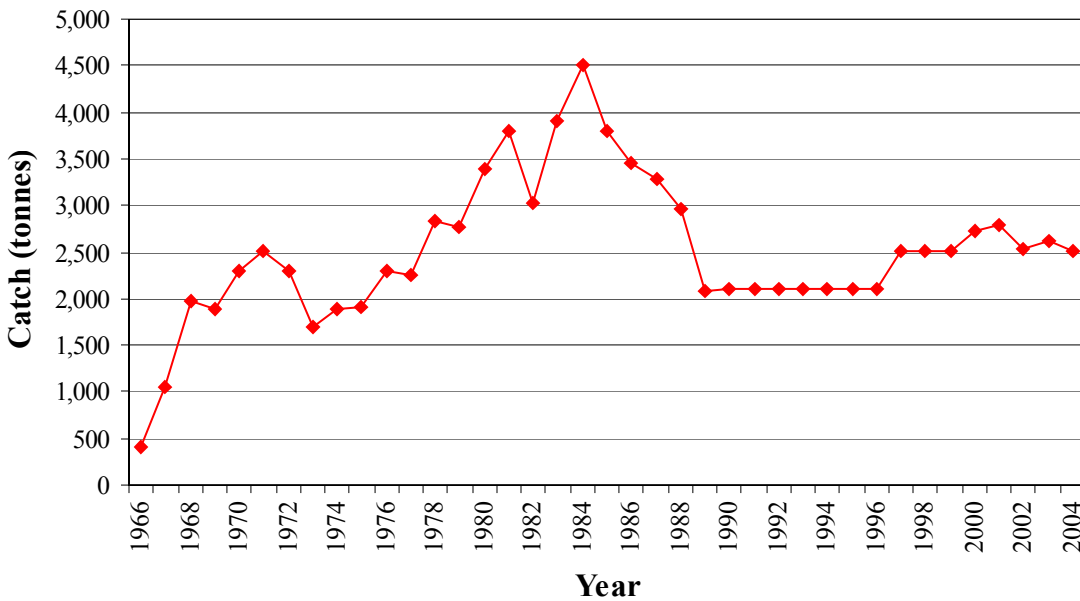


Figure 1. Annual catch of abalone in the Tasmanian abalone fishery 1966-04

The number of individuals holding abalone quota units has increased very significantly since quota management was introduced in 1985. The pattern of individual quota holdings is shown in Table 1. Table 1 indicates how many quota units were/are held by individual holders (by ownership category) for the years 1985, 1998, 2000 and 2004. The initial 125 quota holders, each holding 28 units, has evolved with holdings being diluted to the extent that 483 individuals now hold abalone quota units.

Table 1. Number of abalone quota units held by individuals 1995-04

Holdings	1985	1998	2000	2004
> 40	0	6	6	6
36 to 40	0	3	3	3
31 to 35	0	3	2	3
26 to 30	125	34	32	27
21 to 25	0	18	17	16
16 to 20	0	12	14	13
11 to 15	0	27	28	30
6 to 10	0	40	44	44
1 to 5	0	250	271	341
No. holders	125	394	417	483

The number of abalone quota units held by individuals or companies with an address in Tasmania, and those with addresses in other Australian States is shown for 1998, 2000 and 2004 in Table 2.

Table 2. Number of abalone quota units with holder having an address in that State

Year	NSW	NT	QLD	SA	TAS	VIC	WA
1998	145	2	326	6	2948	62	11
2000	148	2	302	7	2960	70	11
2004	144	4	279	9	2945	109	10

The landed value of Tasmania’s abalone catch is driven by the world demand, but is also impacted by the relative value of the Australian currency and those of customer countries. The beach price of abalone and the value of the royalty paid to Government is variable, as shown in Figure 2. Figure 2 gives the quarterly value of abalone catches and the corresponding royalty paid from October 1994 – March 2004.

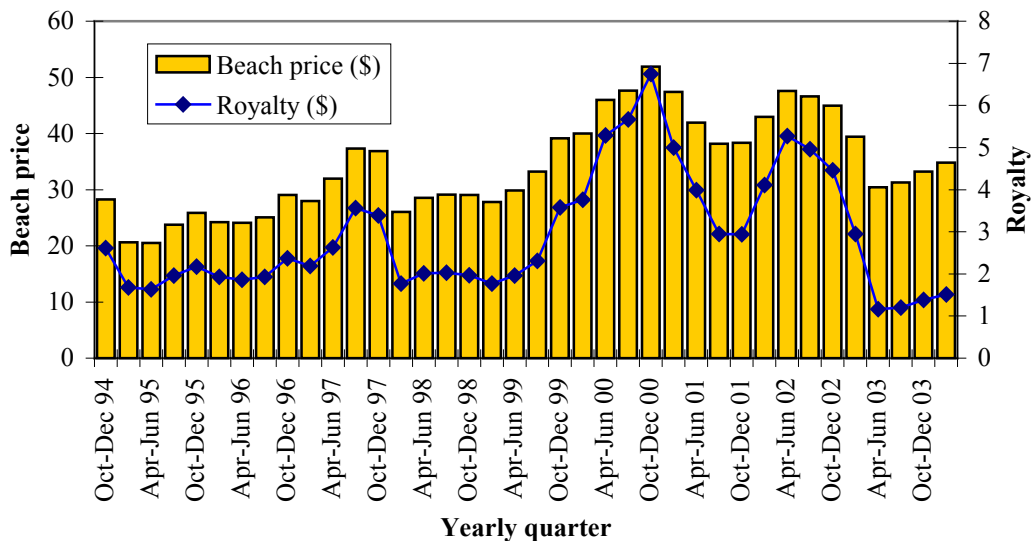


Figure 2. Quarterly beach price and corresponding royalty paid Oct-Dec 94 to Jan-Mar 04

Discussion

The basic objectives of the introduction of quota management in Tasmania's abalone fishery have been achieved.

The introduction of quota management successfully limited catch, and during the years 1990 to 1996 the TACC was held at 2,100 tonnes. Stabilising the catch at this level for 7 years enabled stocks to re-build, and in 1997 a modest rise in the TACC to 2500 tonnes was achieved and has been maintained.

The need to have a system whereby greater numbers of people could invest in the fishery was driven by the difficulty young divers experienced trying to enter the fishery; the debt loads were too high [4]. From the original 125 holdings in 1985, each with 28 quota units, to the present day, a very different picture has emerged. By 1998 there were 394 holdings and this figure has continued to increase to 483 in 2004. The ITQ system has successfully facilitated the spread of direct financial interest in the abalone fishery to many more individuals, and provided the opportunity for new divers to enter the fishery without crippling debt.

ITQ systems provide a mechanism for the concentration of ownership of quota units, and the transfer of ownership to investors in other Australian States. This was considered of sufficient concern to warrant restrictions on the ownership of rock lobster quota units when quota management was introduced in that fishery in 1998. No such restrictions were applied in Tasmania's abalone fishery when, in 1993, the abalone dive licences and abalone quota units were each made freely transferable.

In the abalone fishery, the number of holdings that consist of large numbers of quota units is relatively small and constant. The number of holdings that consist of 1 to 5 quota units is large and, if anything, continues to expand. Similarly, there is no obvious trend over recent years to indicate a transfer of ownership to investors living outside Tasmania. The proportion of abalone quota units held by individuals or companies with addresses in Tasmania has remained stable at about 84% over the period from 1998 to 2004.

The landed (beach price) value of Tasmania's abalone catch is variable, but generally increasing over time. Most of the catch is exported overseas, either canned or alive for the 'live market'. The fishery is a very significant generation of wealth for Tasmania. Whilst the majority of this economic benefit is indirect, some money is returned to the Tasmanian government, the owner of the resource, by way of a royalty or 'resource rent'. This royalty is a significant revenue stream for the government, and helps support a range of non-fishery government services.

ROCK LOBSTER FISHERY

History of management

The number of rock lobster licences was not limited before 1966, at which time the number of licences was capped at 442. Even though there were restrictions on the number of rock lobster pots that each fishing vessel could carry and use [4], the fishery continued to expand. Despite catches peaking at 2,217 tonnes in 1985, effort continued to increase to a peak of about 2.1 million pot lifts in 1992. As a consequence, catch rates almost halved over the period from 1980 to 1997 (Fig. 3).

Government, industry and scientists became increasingly alarmed and concerned about the sustainability of the rock lobster resource, which had been harvested since the early 1830's [5]. During the period from 1992 to 1997 seasonal closures were used to try and limit catch, but they were largely unsuccessful due to the quantity of spare capacity in the rock lobster fleet. By 1997 a series of effort reduction strategies reduced the number of licences to 321, and the maximum number of rock lobster pots to 10,507 [4].

Two management options were widely canvassed and debated during the early 1990's, a further reduction in effort of about 30%, or the introduction of a total allowable catch. Despite broad acceptance that the catch needed to be significantly reduced, there was no consensus within the industry on how this should be achieved. In 1996 Government decided to manage the fishery using output controls using a system of individual transferable quotas [4].

There were two over-riding objectives. Firstly, to reduce the catch to a sustainable level and rebuild the biomass of rock lobsters over time. Secondly, to provide a mechanism whereby the industry could restructure. A reduction in the catch would lead to a less viable fishery, unless fewer fishers chose to participate [5].

Each of the remaining 316 rock lobster licences was allocated one quota unit for each rock lobster pot held on each licence. Each quota unit then provided exclusive access to take a 1/10507th of the TACC [4]. Rock lobster quota units must be held on a rock lobster licence, but may be sold or leased, and transferred from one rock lobster licence to another. Because only licence holders can hold quota units, the maximum number of unit holders is limited to 316 [5]. This is a significant departure from the quota arrangements for the Tasmanian abalone fishery, and one that will be an issue for the future. Already there are a number of licence holders with investor partners who have funded the purchase of additional quota units. Allowing quota units to be held separately from licences would facilitate investment by people outside the fishery, a situation not currently supported by a majority of licence holders [6].

Prior to the allocation of quota both rock lobster licences and rock lobster pots were transferable, but fishers did not have access to any particular share of the resource. This meant that fishers could fish as hard as they chose to “maximise” their catch before another fisher caught it. This produced a “race to catch” mentality, and there was little incentive for an individual to fish sustainably. The introduction of ITQ management in 1998 gave licence holders access to a defined share of the resource, and hence the ability to move from a ‘race to catch’ system to one where fishers could choose when to fish [5].

Outcomes of management changes

The major objectives of introducing ITQs in Tasmania's rock lobster fishery were to reduce catch in order to achieve a sustainable level of harvest and to improve economic returns from the fishery by reducing fleet capacity. Both these objectives needed to be pursued whilst avoiding excessive concentration of ownership [5].

Table 3. Total annual catch of rock lobster, value of catch and number of vessels fishing per season 1995/96 – 2003/04

Season	No. vessels	Catch (t)	Value (\$m)
1995-96	325	1,643	44.41
1996-97	315	1,802	52.4
1997-98	307	1,613	49.4
1998-99	285	1,476	45.3
1999-00	253	1,480	46.3
2000-01	242	1,489	51.16
2001-02	228	1,498	60.9
2002-03	229	1,520	62
2003-04	241	1,494	46

The TACC reduced catches significantly (Table 3), and a corresponding increase in CPUE, as measured by kg/pot lift, has been achieved (Figure 3).

Since the introduction of ITQs there has been a rapid increase in the estimated biomass of legal sized rock lobster (Figure 3). Catch rates have plateaued and now trend upwards, with a corresponding decrease in the number of potlifts in the fishery, as seen in Figure 3.

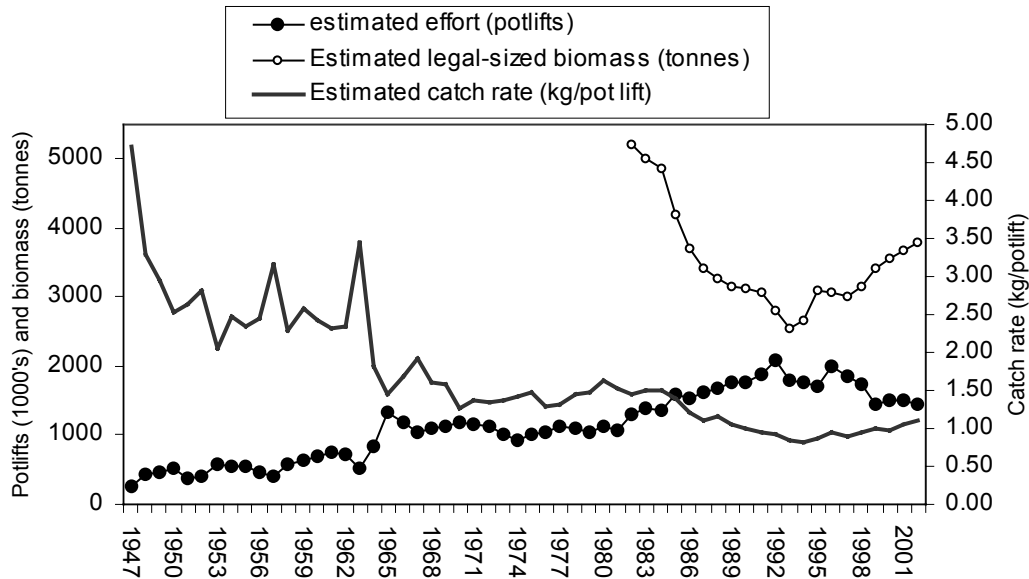


Figure 3. Rock lobster catch/effort and biomass estimates – estimated effort (pot lifts), estimated catch rate (kg/pot lift) and estimated legal sized biomass (tonnes) 1947 – 2002

At the time quota was introduced there were 316 licences that represented 305 active vessels. Since then, there has been a steady reduction in the number of active vessels in the rock lobster fishery, with 241 vessels fishing in the 2003/04 fishing season (Table 3).

There has been little change in trends in ownership of rock lobster quota units since the introduction of ITQ's (Table 4 & Table 5). Table 4 shows the number of quota units held on individual licences – no clear change since 1999 is evident. There is also no evident trend in the ownership patterns of licence holders with addresses in Tasmania, or with addresses in other Australian States (Table 5).

Table 4. Number of rock lobster quota units held per individual licence 1999 - 04

No. quota units per licence	1999	2001	2004
0-25 units	103	105	103
26-50	166	166	166
51-75	39	39	39
76-100	5	7	5

Table 5. Number of rock lobster licence holders with addresses in Tasmania and other Australian States

Licence holder cat.	1997	1999	2001	2003
Tasmania	269	260	268	264
Other Australian States	52	51	47	49

Discussion

The major objectives of introducing ITQ’s in Tasmania’s rock lobster fishery have largely been achieved. The biomass of legal sized lobsters has increased, as have catch rates. There has also been rapid restructuring of the fishing fleet, and many fishers are benefiting from being able to choose when and where to fish to best suit their own business needs. Frusher [7] investigated changes in the fleet dynamics of Tasmania's rock lobster fishery from the introduction of ITQ’s in March 1998 until November 1999. The catch was reduced to a sustainable harvest level, the number of fishing operations reduced swiftly, enhancing the viability of those remaining in the fishery [8].

One concern raised when quota management was introduced in Tasmania’s rock lobster fishery was that a few wealthy individuals could accumulate quota and dominate the fishery. For these reasons, restrictions on the ownership of rock lobster quota units were introduced. A reduction in the number of people living in Tasmania who have a direct financial interest in the fishery would dilute the fishery’s contribution to the Tasmanian economy. Ford [5,6] looked at the issue of concentration of ownership and concluded that there had been a small shift in this direction, however, this trend failed to continue and is not evident from the data post 1999. Similarly, there is little evidence of a transfer of ownership of rock lobster quota units from Tasmanian based individuals and companies to those with addresses in other Australian States.

SCALEFISH FISHERY

History of management

The Tasmanian commercial finfish fishery is a multi-species fishery involving a wide variety of fishing methods. Gear types such as gillnets, hooks and squid jigs are used to target a diverse range of finfish, shark and cephalopod species. Other gear types such as Danish seine nets, traps, dipnets and spears are used less frequently to target particular species. Many finfish species are also important to Tasmania’s recreational fishery. Key commercial and recreational species include blue warehou, striped trumpeter, jackass morwong, flathead, Australian salmon, garfish, calamari, arrow squid, banded morwong, wrasse, flounder, bastard trumpeter and school and gummy sharks. Generally, the Tasmanian inshore finfish fishery is restricted to within 3 nautical miles of the coastline [9].

Prior to 1987 there were little, if any, controls regulating commercial fishing in State waters. However, regulations have been progressively introduced to limit the level of participation in specific fisheries (shark hook and gillnet, inshore trawl, reef fisheries). Some areas have been closed to fishing all together (marine protected areas) or to specific fishing activities (no-netting waters), and some areas prohibit the taking of certain species (shark nursery areas). Commercial access to a number of sheltered and coastal waters has also been restricted by limiting the potential fishing capacity (numbers of operators) in each of these areas.

In 1998, a management plan containing a whole suite of management arrangements was introduced to extend a more formal management regime to all of the sectors within the finfish fishery. Generic gear entitlements, as well as species and gear specific licences were issued to fishers based on their demonstrated levels catch history between the years 1990 and 1994. The primary aim of this initial management response was to limit the

number of licences in the fishery and introduce specific input controls that could be applied consistently across the fishery.

These changes, for the first time, put an upper limit on the number of fishing operations and the amount of gear that could be deployed in the State’s scalefish fishery.

Outcomes of management changes

The major management changes to Tasmania’s scalefish fishery are listed chronologically in Table 6. Prior to 1998, management of the scalefish fishery tended to respond more to rapid increases in fishing activities for particular fisheries. Managers tackled the threat of uncontrolled expansion of fishing effort by either limiting entry, making licences non-transferable, or using a combination of both.

Table 6. Timing of major management changes.

Year	Fishery Sector	Management Tool
1987	All commercial fishing licences	<ul style="list-style-type: none"> ▪ Cap on total number of fishing operations
1990	Shark fishery (gillnet)	<ul style="list-style-type: none"> ▪ Limited entry, non-transferable shark gillnet licences ▪ Area closures (nursery areas) ▪ Limits on net length
1995	Shark fishery (hook) Trawl Fishery Live fish fishery	<ul style="list-style-type: none"> ▪ Limited entry, non-transferable shark hook licences ▪ Limits on hook numbers ▪ Limited entry, non-transferable trawl licences ▪ Limited entry, non-transferable live fish endorsements
1998	Remaining scalefish sectors	<ul style="list-style-type: none"> ▪ Limited entry transferable licences ▪ Maximum gear entitlements
2001	Shark gillnet and hook fishery Trawl fishery Automatic squid jig fishery General scalefish licences	<ul style="list-style-type: none"> ▪ ITQ management under Federal jurisdiction ▪ Limited bycatch of other scalefish species ▪ Demersal board trawling prohibited ▪ Limited entry transferable licences ▪ 30% made non-transferable

Before the major changes that occurred in 1998, there were steady increases in fishing effort, particularly in the use of gillnets. However, since 1998, effort for most fishing methods has declined, predominantly in the use of gillnets, as shown in Figure 5. Whilst fish availability and market factors undoubtedly influence the level of fishing activity, there is little doubt that the overall decline in fishing effort can be attributed to these changes in management arrangements.

Interestingly, whilst effort declined for methods that became increasingly regulated under the management plan, effort increased for those methods that were less regulated; notably, the fishery for calamari squid using squid jigs.

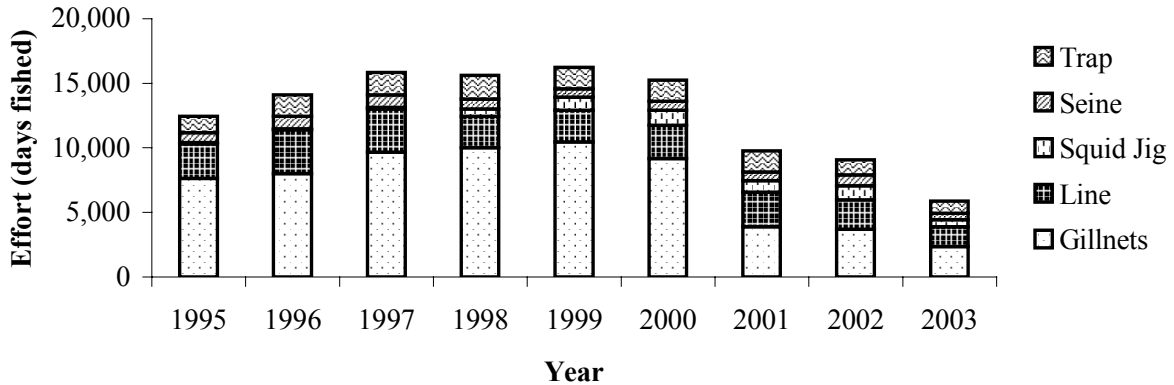


Figure 5. Effort by major fishing methods.

The annual catch of 6 categories of scalefish species is shown in Figure 6. The scalefish fishery comprises a number of migratory species (such as blue warehou, barracouta and arrow squid) whose availability to fishing in Tasmanian waters is variable. Catches of these species are also variable, and are taken “opportunistically” by fishers.

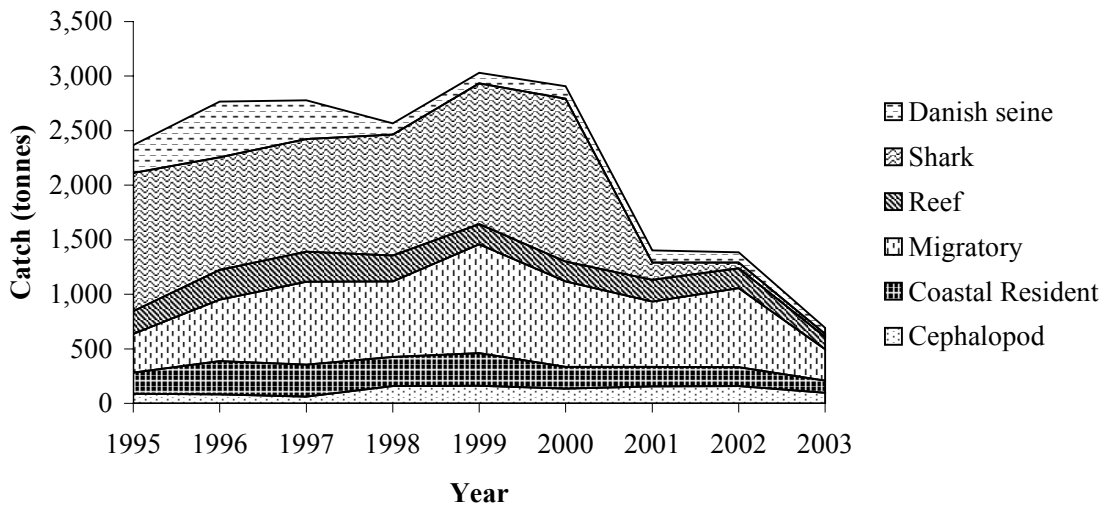


Figure 6. Catch by major species groupings.

The fishery also comprises a range of other species (inshore reef and coastal resident species) whose abundances and catches are more consistent. Catches of these species are influenced by a combination of stock size and the degree to which they are regulated. In 2001, jurisdiction of school and gummy sharks was transferred to the Federal Government.

Discussion

The objectives of management changes in Tasmania's scalefish fishery have not been as well defined as those for the abalone or rock lobster fisheries. The overarching aim of achieving an ecologically sustainable fishery is the same, but the methods of achieving this, using input rather than output controls, has resulted in a step by step progression of management measures. The earlier objective of limiting the number of fishing operations was replaced with the objective of limiting the amount of fishing gear allocated to individuals and across the whole fishery. The current objectives focus on removing latent effort.

A number of industry concerns began to emerge after only three years into the first management plan introduced in 1998. There was general consensus among industry, managers and scientists that more fishing gear was allocated than was taken up and used in the fishery. For example, between the introduction of the management plan in 1998 and May 2002 approximately fifty per cent of finfish licences had no catch recorded on them. Fishery managers considered inactive licences to constitute substantial latent effort in the fishery. Latent effort was maintained to have the potential to undermine managers' ability to respond quickly and effectively to changes in the fishery. By 2003 it became clear that although upper limits had been placed on the Tasmanian scalefish fishery in 1998, there was still a very significant amount of latent effort [10]. Stock assessments indicated that increasing catch could put the sustainability of the resource at risk.

The next phase in this process of matching effort to a sustainable and profitable level of catch is about to be implemented. Given the success of limiting the transferability of licences as a method of constraining sectors of the fishery in the past, similar techniques are being used in the current phase of removing latent effort. A substantial number of licences which provide access to gillnets, hooks and traps, that have not been used, will be cancelled. Other licences that have been inactive will be made non-transferable.

Further tightening of bycatch limits and the expansion of area restrictions are also being implemented, particularly to protect all chondrichthyes from over exploitation.

It is proposed to continue this process of removing latent effort until the input controls constrain the catch. At that point it should become possible to respond quickly to indicators of stock stresses or overfishing. Increases and decreases in catch not explained by seasonal or inter-annual variability, and decreases in catch per unit of effort can trigger a review of management arrangements. Without latent effort in the scalefish fishery, corrective changes to the suite of management controls will need to be less drastic and will have immediate outcomes.

CONCLUSIONS

The move to introduce quota management in Tasmania's abalone and rock lobster fisheries was primarily driven by the need to reduce catches to ecologically sustainable levels. However, each fishery had different secondary objectives for ITQ management. For abalone, it was to facilitate investment. In rock lobster, it was to improve economic viability by facilitating the restructure of the fishing fleet. In both fisheries, these primary and secondary objectives were achieved within a few years.

For the scalefish fishery, with its lower value, multiple species and many gear types, input controls were chosen as the management regime of choice. The primary objective, however, was the same; to achieve a sustainable fishery. Management controls progressively limited effort, but have failed to constrain the fishery. The current changes to management are aimed at removing the remaining latent effort.

Whether or not input controls will enable Tasmania to manage its scalefish fishery sustainably, in a flexible manner that can cope with inter-annual variation in fish stocks, and in a way that provides valuable economic return for fishers and Tasmanians, is yet to be seen.

We are confident that, with the continued support of fishers, Tasmania's scalefish fishery will be able to stand along side its abalone and rock lobster counterparts, as a responsibly managed, valuable, and valued fishery.

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