

INITIAL ALLOCATION OF HARVESTING RIGHTS IN THE ROCK LOBSTER FISHERY OF WESTERN AUSTRALIA

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1. INTRODUCTION

The commercial fishery for *Panulirus cygnus*, the western rock lobster, is one of the largest and most valuable fisheries in Australia and a major contributor to the global supply of rock lobsters. The fishery began in the latter years of the Second World War when a small fishery was established at the Abrolhos Islands (see Figure 1) to supply canned rock lobster tails to the armed forces. The rock lobsters were captured using pots, similar in design to those in use today, which were pulled by hand from a small number of sailing craft. The

Figure 1
Coast of the southern part of Western Australia showing the major fishing areas for the Western Rock Lobster and the three zones (A, B and C) into which the fishery is divided for management purposes



fishery was restricted to shallow water areas because of the comparatively inefficient method of fishing. This is perhaps the main reason why the Abrolhos Islands (with its vast expanse of shallow reefs) was the preferred fishing area rather than the deeper limestone reefs of the coastal areas.

After the Second World War, the industry shared in the advantages of post-war reconstruction with marine engines and power winches for pulling pots becoming available. This enabled the fishery to expand into deeper waters as well as leading to more intensive fishing of the shallow water areas. Markets for frozen rock lobster tails were quickly established in the United States and in those earliest days of the fishery, 90-95% of the catch was exported to the USA (Sheard 1962). These export markets were supplied by processing and freezing establishments situated at Geraldton, Lancelin and Fremantle (Figure 1) and also by a number of small vessels equipped with facilities to process and freeze the tails at sea. The fishery today remains an export-orientated fishery.

With increasing prices being paid for rock lobster tails, the fishery rapidly expanded until by the late 1950s, it supported over 1000 fishermen who yearly took approximately 8600t of rock lobsters from coastal areas as well as the Abrolhos Islands. As the number of boats and fishermen continued to increase and the fleet became more efficient, it became apparent that restrictions would have to be placed on the unbridled expansion of the industry if the stocks of rock lobsters were to be managed for long term sustainability. This philosophy of restricting the industry so as to manage the resource for long term sustainability was, at the time, a relatively new concept and was one which was generating considerable discussion in Australia and elsewhere. It probably helped the discussion that the then Directors of Fisheries in the states (including Western Australia) were mostly science or biology graduates. They therefore were able to provide significant intellectual leadership

to move Australia's major fisheries towards a long term biological and resource management philosophy which still underpins most fisheries management discussions in Australia today.

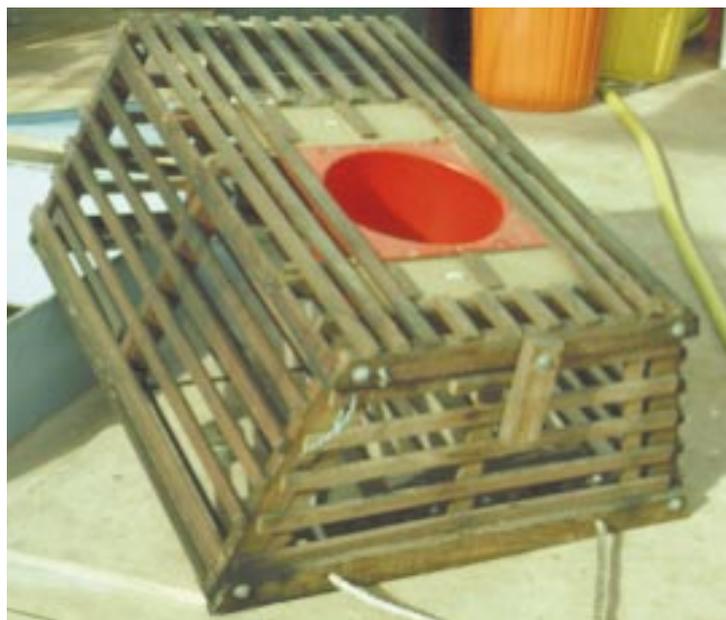
On 1 March 1963, the first restrictions were put into place in the Western Australian rock lobster fishery, with the number of rock lobster vessels in the industry being limited to those already engaged in the industry and, to the present time, no new additional licences have been issued.

The number of pots permitted to be fished per boat was also restricted at the same time to three per foot of boat length. The combination of these two measures effectively restricted (at least for a short time) the total number of pots licensed in the industry.

Management of the fishery continued to evolve with a boat- replacement policy being introduced in 1964 (which effectively capped the number of pots in the fishery at 76 623). Escape gaps in the pots were introduced in 1966 and recruitment-monitoring began in 1968. At the present time, there are 69 288 licensed pots in the industry, with the 9.6% reduction over the past 40 years occurring slowly for various reasons such as pot confiscation for illegal activities, voluntary surrender, pot amalgamation, etc.

These simple measures however, while effective at the time, did not prevent fishing effort increasing in the fishery. Larger vessels could be built, thereby attracting additional pot entitlements, while increases in efficiency through improved technology and an increasing number of days fished have resulted in a constant upward pressure in fishing effort. Management efforts in recent years (detailed below) have largely been directed towards containing and reducing fishing effort, and particularly to increasing spawning stock biomass. This latter goal has been spectacularly successful with an approximate doubling of the spawning biomass between 1992 and 1998. This has led to increased recruitment and subsequent significant improvements in catch rates.

The fishery today is a vigorous, wealthy and stable fishery with the catch in 1999/2000 of approximately 14 450t valued at some \$A380 million. The fishery is therefore the largest single rock lobster fishery in the world, accounting for approximately 24% of global production. A summary of recent catches and fishing effort is shown in Table 1, which shows the variation in catches between management zones in recent years. This variation is due to spatial differences in recruitment.



An example of a Western Australian lobster pot

Licences for such an individual pot have ranged from \$A25000 to \$50000

Photo credit: C. Chubb Western Australia

Table 1
WA rock lobster catch and fishing effort, 1990/91 - 1999/00

Year	Abrolhos Islands, Zone A		North Coastal, Zone B		South Coastal, Zone C		Total *	
	Catch (t)	Potlifts	Catch (t)	Potlifts	Catch (t)	Potlifts	Catch (t)	Potlifts
1990/91	1 616	1 505 227	3 925	4 414 916	3 664	6 064 635	9 220	12 032 188
1991/92	1 650	1 475 885	4 408	4 638 038	6 073	6 582 266	12 164	12 772 846
1992/93	1 669	1 487 821	4 000	3 902 680	6 601	6 234 675	12 303	11 733 687
1993/94	1 628	1 188 009	3 849	3 821 972	5 539	5 252 921	11 040	10 373 825
1994/95	1 704	1 141 737	3 936	3 951 079	5 153	5 215 705	10 802	10 373 121
1995/96	1 902	1 224 505	3 486	3 899 617	4 410	5 327 442	9 800	10 462 324
1996/97	1 824	1 201 112	3 628	3 937 642	4 456	5 477 565	9 902	10 620 697
1997/98	1 792	1 250 320	3 573	3 840 969	5 098	5 641 984	10 463	10 733 982
1998/99	1 970	1 214 767	4 164	3 811 091	6 873	5 721 477	13 009	10 750 205
1999/00	1 714	1 118 693	4 516	3 874 582	8 203	5 627 368	14 437	10 634 789

* The total catch and total potlifts are not always the exact sum of Zones A, B and C because very small quantities (less than 0.03%) are captured in extreme northern and southern areas, outside any of the 3 management zones.

There are currently 594 licence holders in all zones of the rock lobster fishery. The number of licences has declined slowly over recent years as amalgamation of pot entitlements and structural adjustment of the industry has taken place. This aspect is discussed below. Table 2 shows the number of licencees and the average number of pots per licence holder for the period 1990/91-1999/00.

Table 2
Licence numbers and average pot holdings in the WA Rock Lobster Fishery

Year	Abrolhos Islands, Zone A		North Coastal, Zone B		South Coastal, Zone C		Total	
	Licences	Pots/ licence*	Licences	Pots/ licence*	Licences	Pots/ licence*	Licences	Pots/ licence*
1990/91	180	100.4	166	96.8	343	106.7	689	102.7
1991/92	175	99.1	166	97.2	335	107.0	676	102.5
1992/93	168	100.4	167	99.4	330	108.6	665	104.2
1993/94	153	106.2	164	105.0	322	111.3	639	108.5
1994/95	149	108.8	158	109.7	314	113.9	621	111.6
1995/96	149	110.6	155	110.1	311	114.9	615	112.7
1996/97	149	111.4	154	110.1	308	116.1	611	113.4
1997/98	149	113.3	151	110.4	303	118.0	603	114.9
1998/99	148	114.3	150	110.8	298	119.9	596	116.3
1999/00	148	113.5	150	111.7	296	120.7	594	116.6

* Under temporary management arrangements introduced in 1993/94, only 82% of these pots can be utilized at any one time.

2. THE NATURE OF THE HARVESTING RIGHTS

The western rock lobster fishery is managed through a system of input controls designed to restrict (and in recent years, to reduce) fishing effort and manipulate the spawning biomass. A joint industry/Government management advisory body makes recommendations to the Government on the various management issues related to the fishery.

The fishery has been a limited-entry fishery for some 40 years although licences are freely transferable. The value of the access right to participate in the fishery has increased substantially as a result of this limited-entry, the profitability of the fishery and the certainty of the management structure.

The current management arrangements include:

- i. limited entry
- ii. minimum legal size of 76mm carapace length, except for the period 15 November - 31 January each season when a minimum legal size of 77mm carapace length applies
- iii. closed season from 1 July to 15 November each year
- iv. escape gap of 54mm in all pots to allow escape of sub-legal animals
- v. prohibition on taking spawning female rock lobsters and those in a pre-spawning condition (*i.e.* with setose pleopods)
- vi. maximum size for female rock lobsters of 115mm carapace length south of 30°S latitude and 105mm north of 30°S. There is no maximum size limit for males
- vii. a temporary 18% reduction in pot entitlement, instituted in 1993/94, whereby only 82% of a vessel's pot entitlement can be used
- viii. a restriction on the number of pots/vessel to three per foot of boat length (or 9.84 per metre) up to and including the year 1996. This restriction no longer applies.
- ix. minimum pot holding of 63 pots per vessel and a maximum holding of 150; these limits are subject to the temporary 18% pot reduction so that, for example, the maximum holding of 150 results in only 123 (*i.e.* 82% of 150) pots able to be utilized at the present time and
- x. restrictions on boat replacement whereby if a vessel less than 6 years old is replaced, the pot entitlement of the new, replacement vessel is reduced by 5%.

Again, the limited-entry nature of the fishery and its profitability has resulted in the access right to participate in the fishery acquiring considerable value on transfer. Despite these high values, the return to capital (including the access right value) has been around 6% in recent years.

Both the access right to the fishery (formalized by a commercial fishing license) and the pot entitlement are freely tradable and, because of the highly profitable nature of the fishery, these currently command significant prices on the open market. Pots (*i.e.* the right to operate a single pot) currently change hands for

approximately \$A27 000 each. Therefore, the free market price for an access right with the average pot holding of 116 pots would be approximately \$A3.13 million. This does not include the cost of the vessel and other equipment.

The tradable entity is therefore the pot, and transfers occur freely in an open market. The market, however, is restricted to those who have a rock lobster license to fish in this limited-entry fishery and hence it is not possible for persons external to the fishery to operate pots, although it is possible for non-licence holders to own pots. Because of the minimum pot holding of 63 pots (and a maximum of 150), a licence to operate in the fishery is only available to those persons who own, or have leased, this minimum of 63 pots. Once the minimum pot holding is achieved, there are no barriers to the issuing of a licence to fish and to operate those pots. The current average pot holding, for all areas combined, is 116 pots per vessel.

The Rock Lobster Industry, like other major commercial fisheries in Western Australia, operates on a cost-recovery basis whereby the Government's costs of management, research and enforcement are recovered through substantial licence fees. These licence fees were \$A83 per licensed pot in 1998/99.

3. THE METHOD OF ALLOCATION

3.1 Policy objectives

When restrictions on the number of vessels and pots and other input controls were implemented in the 1960s, the primary policy objective addressed was one of resource sustainability. There was a concern that catch rates were declining while the number of vessels operating in the fishery was increasing rapidly. Simple analyses of catch and fishing effort data at the time (Bowen and Chittleborough 1966) indicated that increasing fishing effort was no longer leading to increasing catches, with the result that catch rates were declining. Economic issues received little attention as a defined policy objective in the initial allocation although monitoring of economic performance is now undertaken for the fishery through the joint Government/Industry Management Advisory Committee.

Brown, Caputi and Barker (1993) estimated that fishing power within this input-controlled management environment had increased by 36% between 1971/72 and 1992/93, with the greatest increases being in deeper water areas where the increase in fishing power over the same period was estimated at 53%. The increase in deeper water areas was significant because this is the area where the majority of the spawning stock occurs. As improved technology of vessels and gear resulted in these continuing increases in effective fishing effort within the input-controlled management system, additional restrictions were implemented to counteract these increases. Again, the policy objective was clearly, and solely, one of resource sustainability.

Some of the additional measures introduced were:

- i. 1965 – boat replacement policy introduced, restricting the size of vessels and the number of pots they could operate
- ii. 1966 – escape gaps in pots made mandatory to facilitate the escape of undersize animals
- iii. 1971 – restrictions on the operations of vessels which were processing at sea because of evidence that such vessels were processing undersized animals
- iv. 1972 – the size of the escape gap was increased to 54 mm
- v. 1978 – fishing season shortened by 6 weeks
- vi. 1984 – the size of pots was regulated
- vii. 1986 – a temporary 10% reduction in the number of pots allowed to be used
- viii. 1987-1991 – a permanent 10% reduction in the number of pots in the industry was implemented
- ix. 1992 – legal maximum sizes introduced and
- x. 1993 – a 'temporary' 18% pot reduction was implemented, which is still in force.

In 1992, additional concerns began to be expressed at the rapid decline in the abundance of mature, spawning female rock lobsters, and the forecast (based on puerulus settlement) of poor recruitment for the years at least to 1994/95. In Zone A of the fishery the decline in spawning stock was estimated to be more than a 50% reduction over the previous decade, with only slightly lesser reductions in other areas. In addition, analyses at the time (reported in Bowen 1994) ruled out environmental variability as the sole cause of this reduction.

As a consequence, a management package was adopted in 1993/94 with the aim of rebuilding spawning stock levels to at least those of the late 1970s. This was to be achieved by:

- i. an 18% reduction in the number of pots
- ii. a total ban on the taking of female rock lobsters in spawning condition (previously, the ban only included those actually carrying eggs)
- iii. an increase in the minimum size to 77mm carapace length for part of the year and
- iv. the introduction of latitudinal differences in maximum size for female lobsters to reflect differences in growth rate and size at maturation.

Again, the policy objective was solely related to resource sustainability issues.

During the extensive discussion on the most appropriate long-term management strategy to address the declining abundance of the spawning stock, detailed consideration was given to the merits of moving to an ITQ system of management. However, this move was not adopted, primarily because of the apparent high compliance costs which would result (see Bowen 1994).

Following the outstanding success of the 1993/94 stock-rebuilding programme, recruitment to the fishery increased markedly and, in the late 1990s, the fishery began to experience a series of high-catch years. For example the catch for 1999/2000 was a record 14 437t (Table 1) with catch rates, expressed as catch/pot-lift, some 30% higher than those of 1992/93 when the rebuilding strategy commenced. These high catch-volumes began to have a significant affect on the marketing and prices received for the product, with wholesale prices in the period 1998-2000 being some 25% less than those received in the period 1995-97. The fishery was an economic victim of its biological success.

As a consequence, in 1998, the Management Advisory Committee, for the first time, explicitly considered policies related to optimizing the economic performance of the fishery. A number of options have been explored which aim at achieving the dual objectives of:

- i. maintaining steady supplies of live rock lobsters (primarily for the export market) throughout the year and
- ii. reducing year-to-year variability in supply as a means of reducing large year-to-year price fluctuations.

The mechanisms for achieving these objectives are still under consideration.

3.2 Process used in determining the allocation

When boat numbers were initially restricted in 1963, great reliance was placed on formal scientific assessments of the stocks and this scientific underpinning of management remains a feature of the industry today. As a consequence, continuing expenditure on research related to management of the fishery is considerable and averages around 2-3% of the annual Gross Value of Product (GVP). Much of this cost is recovered from the industry through licence fees, under an explicit 'cost-recovery' arrangement. Industry perceptions are that this expenditure on research has provided a good return in terms of long-term sustainability and there is a generally close and harmonious working relationship between the research staff and industry.

The initial allocation decision in 1963 was to restrict access to the fishery to those vessels licensed on 1 March 1963. However, the announcement of the change was made some 6 months prior to the implementation and this allowed a brief opportunity for anyone who wanted to be part of the limited-entry fishery to obtain a licence. However, because of the novelty of limited-entry fisheries at the time and the fact that the fishery was then not particularly attractive financially, there was no significant rush to enter the fishery prior to the imposition of limited entry (Bowen and Chittleborough 1966).

All subsequent management changes have occurred within this context of limited entry and negotiations between Government and industry on management changes have taken place with the original licence-holders or their successors.

3.3 Allocation method chosen

The chosen allocation-method for access rights was simply an access restriction to those vessels licensed as of 1 March 1963. It appears that no other allocation method was considered at the time. Allocation between zones (Figure 1) was also based on historic areas of operations and a formal process was established whereby changes of zones required an application to the Minister for Fisheries who may or may not approve such application. This formal process has significantly slowed and managed short-term re-location between zones. This has resulted in *relative* vessel numbers in each zone remaining virtually unchanged over the recent history of the fishery, although all zones have seen a reduction in vessel numbers as a result of concentration of ownership.

4. DATA REQUIREMENTS AND COMPUTATIONAL PROCESS

The primary data used in the initial allocation process were biological and stock assessment data. These data were used in the simple analysis of catch and effort to support the move to control fishing effort through restriction of access. It is interesting however that, in 1963, no specific catch or fishing effort target appears to have been determined. Later management measures, however, have included specific targets, most notably in the move to restore spawning stock levels to 25% of the virgin spawning biomass, which was the level of the late 1970s. Extensive data-collection processes have been in place in the fishery since the 1960s and these include comprehensive data on catches, fishing effort, areas of operation, size frequency of the catch and the retained catch, and various measures of spawning biomass, including annual fishery-independent surveys. These data have been, and continue to be, used in ongoing assessments of the stock.

Economic data has only recently been collected (*e.g.* Marec 1997) although informal economic and market assessments have been part of the Management Advisory Committee's deliberations since the late 1980s. Financial data on individual operations have been sporadically collected since the 1970s although, again, the financial aspects of existing and proposed management decisions have been considered by the Management Advisory Committee through the inclusion of industry members on that Committee.

5. APPEALS PROCESS

No formal appeals process was established during the initial allocation of access rights although, in common with other fisheries management decisions, appeals directly to the Minister for Fisheries were possible. However, care was taken during the allocation process to involve the relevant industry sector at an early stage in consultation. Such close industry/Government dialogue is a well established feature of the management of fisheries in Western Australia and was, and continues to be, critical to the success of both the allocation procedure and the ongoing management of the fishery.

6. ADMINISTRATION OF THE ALLOCATION PROCESS

6.1 Staff requirements

The entire process of allocation of access rights was handled by existing staff within the Western Australian Government. Subsequent scientific analyses of management options have used consultants to a very limited extent, and all such work continues to be resourced primarily from within existing Government and industry budget allocations.

6.2 Additional programme funding requirements

There were no additional funds made available for the allocation process.

7. EVALUATION OF THE INITIAL ALLOCATION PROCESS

7.1 Success in achieving initial policy objectives

In the 40 years since the initial allocation of access rights, the fishery has been maintained as a productive and highly profitable fishery, and annual assessments of stock status have indicated that the primary policy objective of ensuring long term biological sustainability has been met. Within this time, however, there has been an ongoing process of preventing the escalation of fishing effort in the face of technology improvements and increased value of the product. As Lindner (1994) has noted, it is only in fisheries where the technology of production is sufficiently inflexible that licence-limitation and other input-controls can be expected to control the expansion of total fishing capacity. Such conditions are met in the western rock lobster fishery where the limitation on the number of pots has been an effective policy instrument because the feasibility of lifting pots more than once in a 24 hour period is subject to severe diminishing catch returns.

The constant attention that has needed to be given to the ongoing process of controlling fishing effort and capacity has seen relatively large expenditure (partially industry funded) in the areas of administration, compliance and research. Morgan (1997) showed that, for example, surveillance and compliance costs in the fishery had increased at a rate greater than the rate of inflation during the period 1985-1996, in response to ever more stringent and complicated regulations.

7.2 Satisfaction of rights-holders with the process

The initial allocation process was done at a time when the concept of limited entry was novel and because the fishery was not particularly lucrative from a financial viewpoint, there was little dissatisfaction with the process. This general satisfaction was enhanced by the opportunity that was provided for anyone to participate in the allocation of licences by establishing a presence in the fishery prior to 1 March 1963. However, as the fishery has become extremely profitable, with the asset value of the access right increasing at a compound rate of around 15% per annum over a 20-30 year period, there have been occasions where further restrictions on the access right has met considerable industry resistance. These further restrictions have been needed, as noted above, to continue to keep fishing capacity under control in this input-controlled fishery.

In essence, there exists a tension between the long-term need to further restrict the rights of those who have access to the fishery and the short-term financial incentives and imperatives to prevent erosion of those access rights. This debate has ebbed and flowed over the past 20-30 years and, in the author's opinion, has only been managed by the close working relationship between Government and industry. At the present time, there is a general feeling of satisfaction by rights-holders because of the success of the programme, begun in 1993/94, of rebuilding the spawning stock biomass and hence leading to vastly improved catches and catch rates in recent

years. Most rights-holders consider the costs of such success (in terms of an 18% 'temporary' pot reduction) a reasonable one given the demonstrated benefits that have resulted.

An important issue in facilitating rational debate on all management issues has been the increasing financial sophistication of the industry and the longer-term view that is taken by rights-holders. Restriction of access rights and the subsequent sustainability of the fishery has resulted in large asset values (commonly greater than \$A2 million) accruing to the access right. This, in turn, has resulted in the need to better manage these significant assets, a process that has been supported by lending institutions and accountants. This increased financial sophistication, and the tradition of industry/Government co-operation in fisheries management in Western Australia, has led to an increasingly harmonious management environment within which a joint vision of long-term sustainability remains at the core.

Recent reductions in prices as a result of large catches has, however, focussed industry's attention on the economic performance of the industry and on the economic and financial consequences of good resource-management practices. Whether the most appropriate structure for optimizing economic performance of the industry continues to be a Government/industry partnership remains to be seen.

7.3 Views of other community groups

There was little debate or consultation with other community groups in the initial allocation procedure. While not initially an issue of great concern, this is becoming an increasing point of debate. Another emerging aspect of the allocation debate revolves around the escalating values of the access right. Community groups are questioning the wisdom of past Government decisions that have provided a very large windfall gain (in terms of asset values of access rights) to a small number of fishermen. These groups lobby for a more equitable distribution of the resource and the participation of a greater number and diversity of user groups in the exploitation of the resource. Such debates are likely to become more significant in future years.

Conservation and ecosystem-management issues have been addressed within the context of the resource management arrangements over a number of years and the recent accreditation of the fishery by the Marine Stewardship Council has enhanced the reputation of the fishery in the area of environmental and ecosystem sustainability.

7.4 Hind-sight assessment

Several major issues could have been addressed better in the initial allocation process. First, there were no economic or social considerations in the initial allocation debate although, at the time, these were considerations that a fisheries agency was not expected to address. This resulted in a number of unexpected consequences, the most significant of which is the impact on coastal communities that depend on the rock lobster industry for their survival. Reductions in fishing vessel numbers due to a concentration of ownership, and the ability of faster and more seaworthy vessels to operate from ports with the best facilities have resulted in changes in many of these smaller coastal communities. However, in no area has it become catastrophic since alternative industries (particularly the burgeoning tourist industry) have replaced the business revenues of rock lobster fishermen.

Secondly, and as mentioned above, the allocation process has had the effect of producing large asset values for the access rights created. This is becoming a major social debate as the Government defends having created a group of wealthy, elite fishermen. During the initial allocation process, this effect was unforeseen and the process for re-allocation of access rights was not addressed. In hind-sight, such a process would have been best considered as part of the initial allocation package rather than trying to address the issue in later years after asset values have increased

8. ACKNOWLEDGEMENTS

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