

Recreational Fisheries

General Overview

The Recreational Fisheries Program is responsible for the management of Western Australia's recreational fisheries and the delivery of program outcomes identified through strategic, business and operational planning.

The program's key strategic objective is to maintain or improve the quality, diversity and value of recreational fishing and ecotourism based on fish and fish habitats in Western Australia through partnerships with the community.

Other major program objectives include:

- the conservation of fish stocks and their habitats of importance to recreational users;
- improved individual responsibility and community support for sustainable recreational fishing; and
- improved quality and diversity of opportunities for recreational fishing and activities associated with fish and the aquatic environment.

Community advice on planning and operational priorities is provided through the Recreational Fishing Advisory Committee (RFAC) and a network of 12 Regional Recreational Fishing Advisory Committees.

Additional advice on specific management issues is provided through community-based working groups and public submissions collated during planning processes.

Revenue raised from licence fees is credited directly to the Recreational Fishing Fund to support recreational fisheries management, research and community education activities. Licence fees contributed approximately \$1.7 million of the total operating costs of \$10.3 million for the Recreational Fisheries Program.

Western Australia's Recreational Fisheries

Western Australia's 12,000 km coastline, 200 nautical mile fishing zone and inland regions support nine major recreational fisheries.

These are distributed between the State's four broad marine and two inland biogeographic regions (north, Gascoyne, west and south coasts, northern inland and southern inland).

From a biological perspective the boundaries of these regions are largely consistent with (or represent subsections of) the major oceanographic and climatic zones of Western Australia, and consequently the distribution of fish species and stocks.

In addition, these regions also coincide with discrete tourism regions of the State, and visitor fishing activity tends to focus within these areas during identifiable seasons.

The major recreational fisheries comprise four marine and estuarine multi-species finfish fisheries, a temperate and a tropical freshwater finfish fishery, and licensed

single-species fisheries for western rock lobster, abalone and marron.

Recreational fishing activity occurs in four main zones: creeks and estuaries, shore-based fishing, inshore marine fishing in waters generally within the inshore reef system or three nautical miles of the coast, and an offshore fishery which targets demersal fish and pelagics such as billfish and tunas.

Recreational catch and target species in each region vary significantly, as does the fishing pressure.

Threats and Opportunities

Western Australia's recreational fisheries are a major community asset, and contribute in excess of \$570 million a year to the State's economy.

Since 1987 participation in recreational fishing of all kinds has more than doubled from 284,000 people to about 640,000 people a year, or from 27% to 37% of the population over 4 years old. The most recent survey (Baharthah and Sumner 2001) showed that 213,000 (one-third) are regular fishers who go fishing on more than 10 days a year, while 427,000 (two-thirds) fish for 10 or fewer days per year. The estimated fishing effort has also risen from an estimated 3 million fishing days to 10 million fishing days, with the typical recreational fisher spending 6 days a year fishing. The most avid 30% of recreational fishers contribute 80% of fishing effort.

In the State's licensed recreational fisheries a total of 66,069 people obtained licences in 2000/2001, as follows:

Marron	22,460 licences
Rock lobster	36,820 licences
Abalone	18,713 licences
Netting	17,297 licences
South west freshwater angling	15,795 licences

Of these, 11,254 people took out all categories of licence available. (All licence figures are given as at 30 June 2001.)

Recreational fishing contributes to the quality of life of thousands of Western Australians and provides the basis for an important domestic market for the fishing tackle, bait, boating and vehicle manufacturing industries.

Major threats to the sustainability of Western Australia's recreational fisheries come from population growth, coastal development, improved fishing and fish storage technology, a low participation cost, and the opening of access to areas previously protected from significant levels of recreational exploitation by their remoteness. These factors are placing unprecedented pressure on many fish stocks at all stages in their life cycle, compounded in some instances by the eutrophication of rivers and estuaries.

Opportunities for maintaining and developing recreational fishing as an important community activity and regional tourism drawcard occur through growing community support for fishing as a quality experience, rather than focusing on taking large quantities of fish.

Other opportunities are provided by the multi-species, regional nature of recreational fishing activities, a demand by fishers to be involved in all aspects of resource management, and fishery enhancement opportunities provided through the developing aquaculture industry, particularly for inland and some estuarine habitats.

Recreational Fisheries Management

A key outcome of the strategic planning process jointly carried out by Fisheries WA's Recreational Fisheries Program and the Recreational Fishing Advisory Committee is the development of four regional marine recreational fisheries management strategies, based on the State's major biogeographic regions (Recreational Fisheries Figure 1).

These five-year strategies aim to ensure that the quality of recreational fishing available in Western Australia is maintained or enhanced in the face of growing population pressures, and will complement management already in place for the licensed recreational fisheries and commercial fisheries.

Key elements in each strategy include the clear identification of those fish species, stocks and areas of most importance for recreational fishing, and the development of a set of 'fishing quality' indicators against which each plan can be reviewed.

Each regional strategy is being developed by a community-based working group comprising fishing, conservation and tourism interests and will include recommendations for a detailed research and management program specific to that region.

This process has commenced with the Gascoyne and west coast regions and reviews of the north and south coast regions will commence in 2001/02.

A major review of charter fishing and associated ecotourism was undertaken by an industry-based working group established by the Minister for Fisheries. Their final report was released in November 1998 (Fisheries WA 1998).

A charter licensing and management framework has been developed to regulate the industry across the four biogeographic regions. At this stage 282 applications for fishing and aquatic ecotour licences have been received and are undergoing assessment against selection criteria set out in Ministerial Policy Guidelines.

Upon the issue of licences, operators will be required to submit catch returns, which will provide information on the impacts of this sector in each bioregion.



RECREATIONAL FISHERIES FIGURE 1

Map showing Western Australia's major biogeographical regions.



Recreational Fisheries

West Coast Bioregion

Regional Management Overview

The west coast, between Kalbarri and Augusta, attracts the highest level of recreational fishing activity in the State, with around 450,000 anglers fishing an estimated five million fishing days a year. Within this region the metropolitan coastal waters between Yancheep and Mandurah attract about 310,000 fishers, generating an estimated 4 million fishing days a year (Baharthah and Sumner 2000). The total effort from Kalbarri to Augusta for the boating sector alone was estimated at 453,000 angler fishing days in 1996/97 (Sumner and Williamson 1999).

Charter activity is also significant and 99 aquatic tour licence applications have been received for the west coast bioregion, with a further 82 'multi-zone' applications (operators seeking access to the west coast and one or more other regions).

Major species in the shore and inshore boat catch include Australian herring, whiting (several species including King George whiting), skipjack trevally, blue swimmer (manna) crabs, tailor, garfish and squid, while dhufish, pink snapper and baldchin groper dominate boat fishers' target list.

Estuaries including the Swan/Canning, Peel/Harvey, Leschenault and Hardy Inlet are highly popular recreational fishing areas and produce catches of black bream, cobbler, tailor, mulloway, flathead, flounder and a suite of marine species.

King and river prawns also provide a highly seasonal and variable fishery in the Swan/Canning and Peel/Harvey estuaries.

Blue swimmer crabs are the target of WA's largest recreational fishery, with over 80,000 participants. Major fishing areas include the Peel/Harvey Inlet, Leschenault Inlet, Cockburn Sound, Geographe Bay and Swan River. Catch surveys for these areas indicate that the total recreational catch is likely to be between 400 and 500 tonnes per year (two million crabs), with over half of this coming from the Peel/Harvey Estuary.

There are licensed recreational fisheries for rock lobster and abalone. The recreational rock lobster fishery is concentrated in inshore regions, in depths of less than 20 m, with most fishing activity around the Perth metropolitan area and Geraldton. Fishing controls include gear restrictions, bag and size limits and protection of breeding females. In addition, a restricted fishing season operates between 15 November and 30 June and a recreational rock lobster licence is required.

Recreational fishing for Roe's abalone (*Haliotis roei*) takes place mainly on the inshore reef platforms between Geraldton and Augusta during the early spring and summer months when tide and weather conditions allow easy access to the reefs. South of Cape Naturaliste, the larger species of greenlip and brownlip abalone (*Haliotis laevigata* and *Haliotis conicopora*) are also taken in deeper water, with most fishing activity occurring from

Hamelin Bay round to the south coast. Fishing controls include licensing, closed seasons, closed waters, possession and size limits and gear controls. The Perth metropolitan and Greenough recreational abalone season commenced on Sunday 5 November 2000 and continued each Sunday only from 7.00 a.m. to 8.30 a.m. until 10 December. A recreational abalone licence is required to take abalone.

Key issues facing Western Australia's west coast recreational fisheries revolve around the growth in recreational fishing pressure (particularly on demersal fish and the inshore reef system), coastal development and environmental degradation in estuaries and nearshore waters, and competition for the available resource with the commercial wetline and demersal gillnet fleet, the commercial crab fleet and the commercial estuarine fishery.

Additional requests have also been made in recent times for specific management controls for the proposed Jurien Bay Marine Park, Abrolhos Islands Fish Habitat Protection Area, prawn drag netting in Peel/Harvey and Leschenault Inlets, and crabs in Cockburn Sound and Geographe Bay.

A review of recreational fisheries management arrangements for the west coast is currently under way. A discussion paper (Fisheries Management Paper no. 139) prepared by a community-based working group was released in June 2000 for public comment (Fisheries WA 2000c). Over 1,200 submissions were received on the discussion paper. Following consideration of public submissions, a final report was prepared by the working group and is currently being considered by the Minister for Fisheries.

Regional Compliance and Community Education Overview

Recreational fishing compliance and education in the west coast bioregion was carried out by Fisheries Officers stationed in Geraldton, Dongara, Jurien Bay, Lancelin, Hillarys, Fremantle, Mandurah, Bunbury and Busselton, with the assistance of Volunteer Fisheries Liaison Officers (VFLOs) in major coastal centres.

A total of 26,279 hours of activity by Fisheries Officers were applied to coastal boating and land-based fishing and to overseeing netting by recreational fishers. Approximately 12,430 of these hours were applied in the greater metropolitan area between Mandurah and Lancelin, while the mid-west (Jurien–Kalbarri) accounted for 5,447 hours and the south-west (Bunbury–Augusta) 8,402 hours.

In the metropolitan and Mandurah areas the highest risks of non-compliance with the management arrangements were related to the take of under-size rock lobster and tailor, take of excessive numbers of large pink snapper and squid in Cockburn Sound, illegal recreational netting in the Swan River, under-size and over-bag-limit offences during the short abalone open season, and the take of under-size crabs in the Peel/Harvey and Leschenault Estuaries.

The six-week closure to fishing for pink snapper in Cockburn Sound appeared to be extremely well

supported by the recreational fishing community, and there were few signs of fishers targeting snapper during the closed season.

Metropolitan Fisheries Officers contacted 14,500 fishers in both a compliance and educational role throughout the year, detecting 396 offences. A significant number of these were detected in the rock lobster, abalone, crab, and marine finfish fisheries.

In the mid-west several major apprehensions occurred for possession of large numbers of rock lobster and rock lobster tails, possession of large quantities of under-size finfish, and exceeding bag limits. Reports also indicate an increased incidence of recreational fish sales and interference with fishing gear, mainly lobster pots. This increase may have resulted from the upgraded Fishwatch system, which facilitates improved regional reporting of alleged offences.

Approximately 400 Fishwatch reports on illegal activity were received during the year. Approximately 30% of reports related to marine finfish, while rock lobster, netting and crab offences accounted for 15% each, and abalone 8% of reports. The remaining reports were spread across a range of other recreational fisheries issues.

The VFLO program involves 77 volunteers in the Perth area, 37 in Mandurah, 34 in Geraldton and the mid-west and 29 in Bunbury and Busselton. VFLOs reported 13,500 contacts and 2,500 interviews during the year.

Volunteers continued beachfront education programs, focusing on correct fishing techniques, ethics, and bag and size limits; they attended major boat shows (Perth Boat, Dive & Fishing Show, Hillarys Boat Show, Mandurah Boat Show, Ascot Marina Boat Festival and others), and distributed educational material to tackle shops throughout the metropolitan area.

Fishing workshops for people with disabilities were also given priority, and the project received the 'Action On Access – Making A Difference To Everyday Life 2000' award from the Disability Services Commission.

The 'Fishers with Disabilities' program was also extended to Rottneest Island when Neville Thomas, VFLO Disabilities Development Coordinator, and other metropolitan VFLOs raised \$11,000 to purchase the 'Marine Machine'. The 'Marine Machine' is a Triton van equipped to carry 10 passengers with disabilities, including four passengers in wheelchairs. It is used around Rottneest Island to transport fishers with a disability to popular fishing locations. This could not have been achieved without partnerships from United Way, the Rottneest Island Authority, Stirling Marine and Boat Torque Cruises.

In Mandurah a locally sponsored van assisted volunteers with longer-range patrols, and a declining trend in the number of recreational crabbing infringements was noted which can largely be attributed to the presence and educational role of the VFLOs.

In Geraldton, Jurien and Dongara, three teams of VFLOs attended all major agricultural and community shows and festivals, gave school talks and conducted fishing clinics

for children, adults and pensioners. They also attended the Abrolhos Islands and conducted liaison activities for the second year in a row.

A VFLO initiative resulted in Fisheries Officers and VFLOs participating in a Coastcare-funded 'Feral Peril' survey in conjunction with school students and the Water and Rivers Commission. The aim is to determine the abundance of exotic fish in the Chapman and Greenough Rivers and the effects of their introduction.

Regional Research Overview

Scientific information to underpin recreational fisheries management in this bioregion is provided by dedicated research projects on specifically licensed high-value species (rock lobster and abalone), and research based on commercial fisheries in the finfish sector.

In addition, the estuarine and beach species have been the focus of a number of extensive studies, some undertaken by Fisheries WA researchers and others in collaboration with postgraduate students, mainly of Murdoch University. These studies have provided biological data on herring, whiting (including King George whiting), blue swimmer crabs, prawns, tailor, cobbler, black bream and other minor species. For west coast offshore boat angling species – whiting (other than King George whiting), wrasse and groper (various species), Western Australian dhufish and snapper – some biological data is also available from previous Fisheries WA studies based on the commercial fisheries, and from collaborative postgraduate research projects.

Estimates of abundance for most of these recreational species are also provided by statistical information from commercial fishing recorded in the long-run CAES database. To estimate total recreational catch and recreational/commercial catch shares in order to assess the overall status of these stocks, recreational creel survey data is required. Historically, there have been two surveys, one targeting herring in the 1970s (Lenanton and Hall 1976) and another which assessed beach angling for the lower west coast (Perth to Cape Leeuwin) (Ayvazian et al. 1997).

A 12-month survey of recreational boat-based fishing from Augusta to Kalbarri was completed in 1997 (Sumner and Williamson 1999). This survey estimated the recreational catch and fishing effort for the region. The main marine species caught by boat-based fishers are (in order of number caught) whiting species (other than King George whiting) (564,000), Australian herring (425,000), blue swimmer crabs (255,000), skipjack trevally (123,000), King George whiting (94,000), squid (88,000), southern sea garfish (79,000), various species of wrasse and groper (66,000) and Western Australian dhufish (29,000). The size of the recreational catch for many of these species was of a similar magnitude to the commercial catch. These findings have highlighted the importance of proper management for recreational fisheries.

A survey of recreational fishing in the Leschenault Estuary was completed in 1998 (Malseed et al. 2000). Similar surveys of the Swan-Canning and Peel-Harvey



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estuaries focusing mainly on the recreational catch of blue swimmer crabs were completed in 1999 (Sumner et al. 2000). Annual surveys of recreational rock lobster fishers are also undertaken, as reported by Melville-Smith and Anderton (2000). These combined surveys indicate that blue swimmer crabs and rock lobsters are the most commonly taken recreational species in this bioregion, followed by the finfish species reported by Sumner and Williamson (1999). These survey-based data, integrated with the long-run datasets from the commercial CAES database, will provide the core information necessary for management of the most important recreational fish stocks in future.

A new research project on maximising the survival of under-size west coast reef fish began in August 2000, with funding from FRDC. Short-term caging experiments are testing the effects of hook types, venting fish to release air from their swim bladders, and the 'simple' and 'shotline' methods of release, on the survival of dhufish caught from three depths (< 20 m, 25–35 m and > 40 m). This work will ultimately be used to review the regulations relating to deep-water species and to educate fishers, both recreational and commercial, on fish release methods.

Recreational Rock Lobster Fishery

RESEARCH SUMMARY

General research for managing the rock lobster stock is undertaken through the Commercial Fisheries Program and reported in that section.

For the recreational component of this fishery, an annual survey of participants is used to estimate the recreational catch and to produce the following status report.

Licensed Recreational Rock Lobster Fishery Status Report

Prepared by R. Melville-Smith and A. Thomson

FISHERY DESCRIPTION

Boundaries and access

The recreational rock lobster fishery operates on a statewide basis and encompasses the take of all rock lobster species; however, fishing is concentrated on western rock lobsters in inshore regions in depths of less than 20 m between North West Cape and Augusta. The Perth metropolitan region and Geraldton experience the greatest fishing activity. A recreational rock lobster licence is required to take lobsters, and in the 1999/2000 season 36,906 licences were sold. The 1999/2000 season operated between 15 November and 30 June inclusive, except at the Abrolhos Islands where the waters were closed to diving for rock lobsters, but open for potting, between 15 March and 30 June.

Main fishing method

Pots and diving.

RETAINED SPECIES

Recreational catch (season 1999/2000):

747 tonnes (estimate)

The recreational catch of western rock lobster for 1999/2000 was estimated at 747 tonnes, with 561 tonnes by potting and 186 tonnes by diving. Comparative catch estimates for 1998/99 were 457 tonnes by potting and 169 tonnes by diving.

Fishing effort

36,906 people purchased licences to fish for lobsters, but only an estimated 29,420 utilised their licence. The average pot and diving fishers (excluding all those who held a licence but failed to use it) used their licences on 34 and 11 days respectively during the 1999/2000 fishing season. Potters and divers fished on average 38 and 16 days respectively in the 1998/99 fishing season.

Catch rate

The average pot and diving catches were 1.7 and 2.5 lobsters per person per fishing day in the 1999/2000 fishing season. In the 1998/99 fishing season potters and divers caught 1.4 and 1.8 lobsters per person per fishing day respectively.

Commercial share:

95% (approx.)

The commercial fishery accounted for around 95% of the overall catch of western rock lobster over the past season.

Stock assessment completed:

Yes

The recreational catch is a relatively small proportion of the commercial catch (around 5%). For this reason overall stock assessments are an important focus of western rock lobster research and this information is given in the commercial fishery status report (pp. 7-13).

Exploitation status:

Fully exploited

See the commercial fishery status report.

Breeding stock levels:

Adequate

See the commercial fishery status report.

Projected catch next season (2001): 650–750 tonnes

The recreational rock lobster catch has been estimated by mail surveys since the 1986/87 season. Regional estimates suggest that licence usage has remained relatively constant in Zone B (that part of the western rock lobster grounds north of 30° S) and that the resulting catch has hovered at around 100 tonnes per year. By contrast, licence usage has more than doubled in Zone C (south of 30° S) over the period surveyed and this has had a highly significant impact on catch over time.

In addition to licence usage, the recreational catch in Zone C has also been shown to be correlated with puerulus settlement indices recorded on the Alkimos collectors three to four years earlier. The reason for this is that recruitment to the fishery is dependent on puerulus settlement with a three- to four-year time lag. As might be expected, licence sales and associated usage figures are substantially higher in years of good recruitment into the fishery, which in turn results in those years producing a higher overall

recreational rock lobster catch due to a combination of increased abundance and higher fishing effort.

Puerulus settlement indices at Alkimos, which have been shown to be a reliable predictor of future recruitment in the southern region of the commercial fishery, have been used to predict the recreational rock lobster catch in 2000/2001. Based on declining settlement indices in 1996/97 and 1997/98, it is predicted that if the number of licences used remains at a similar level to the 1999/2000 season, the recreational rock lobster catch will decrease to around 695 tonnes in 2000/2001, and will further decline in 2001/02 to about 600 tonnes before improving in 2002/03 to about 700 tonnes (Recreational Rock Lobster Figure 1).

NON-RETAINED SPECIES

See commercial fishery status report.

ECOSYSTEM EFFECTS

See commercial fishery status report.

SOCIAL EFFECTS

With approximately 30,000 people taking approximately 1.5 million individual lobsters annually, this fishery represents a major recreational activity and provides a significant social benefit to the Western Australian community.

ECONOMIC EFFECTS

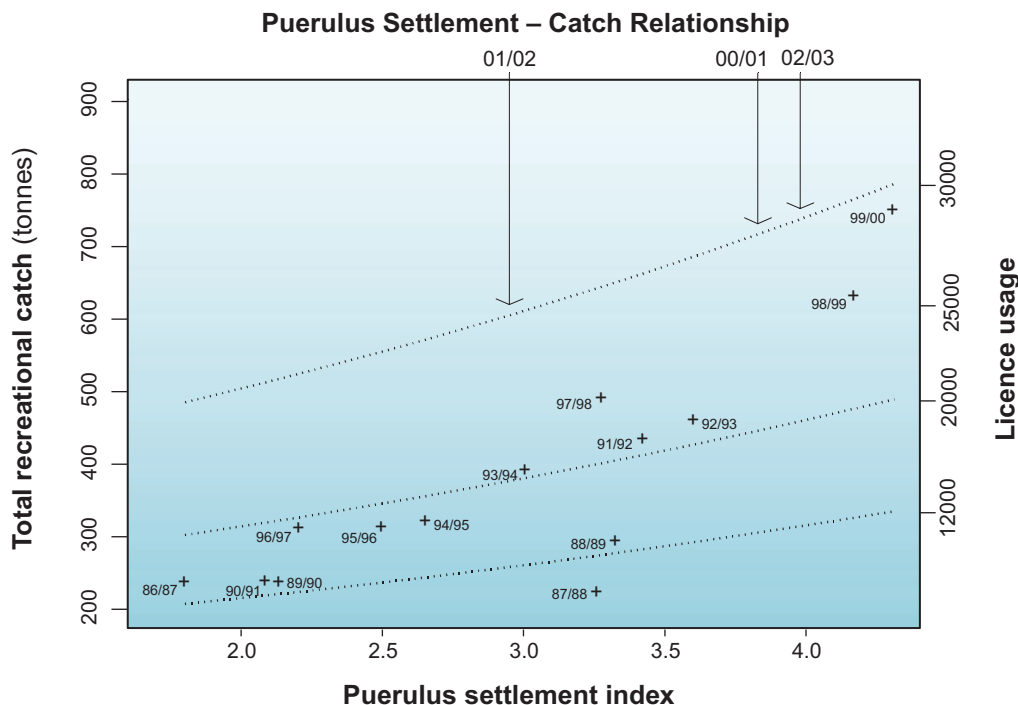
The direct value of the recreational catch in the 1999/2000 season was about \$17 million, however this represents only a minor proportion of the economic activity generated by this sector through the use of boats, fishing gear etc.

FISHERY GOVERNANCE

There are no direct controls on the annual take by the recreational sector in this fishery, other than size, bag limit, and seasonal constraints.

EXTERNAL FACTORS

The recreational catch is largely determined by the puerulus settlement in the metropolitan area, which in turn is responding to variations in the Leeuwin Current and related oceanographic factors.



RECREATIONAL ROCK LOBSTER FIGURE 1

The relationship between puerulus settlement at Alkimos and recreational catch at three different levels of recreational licence usage (see usage figures on the right side of the graph). Along the upper horizontal axis are arrows indicating the level of puerulus settlement corresponding to future seasons. The most likely catch prediction scenarios correspond to licence usage rates similar to those in the 1999/2000 season (i.e. approximately 30,000).



Recreational Fisheries

Recreational Abalone Fishery

RESEARCH SUMMARY

The recreational fishery for greenlip, brownlip and Roe's abalone can be partitioned into three main regions. These are the Perth, west coast and south coast recreational fisheries. In the latter two fisheries all three species are taken, whereas only Roe's abalone are fished in the Perth recreational fishery. Recreational fishers are required to take out either a dedicated abalone recreational fishing licence or an umbrella licence (which covers all licensed recreational fisheries). These licences are not restricted.

Catch and effort figures represented in this report are derived from two independent methods of estimation: telephone surveys covering all areas of the State, and field surveys for the Perth fishery only. In previous volumes of State of the Fisheries only preliminary catch and effort estimates for the Perth Roe's fishery were reported, and these have now been revised based on the above surveys. The telephone survey estimates the catch of all three species from the three fishery regions, based on interviews stratified by licence type (abalone or umbrella) and respondent location (postcode) from the licensing database. The field survey results are based on an analysis of head counts and interview data from recreational fishery participants during the 1997–2000 seasons.

Licensed Recreational Abalone Fishery Status Report

Prepared by B. Hancock, T. Baharthah, N. Sumner and K. Friedman

FISHERY DESCRIPTION

Boundaries and access

The Perth fishery extends from Cape Bouvard to Wedge Island. Access by recreational fishers to the Perth fishery is controlled by allowable fishing times (7.00 a.m. to 8.30 a.m.) and a limited season (six Sundays). There is also a small section of reef in the Greenough area of the west coast fishery (between the Flat Rocks car park and the mouth of the Greenough River) which operates under the same season and time restrictions as the Perth fishery. The 2000 Perth and Greenough season ran from 5 November to 10 December.

The west coast recreational fishery sector includes all other areas of the west coast down to and including Black Point (close to Cape Beaufort). This delineation reflects the bioregion boundaries of the west coast. The south coast recreational fishery sector extends east from Black Point to the SA border. Both the west and south coast sectors are open for recreational fishing throughout the year.

For all three fishery sectors a daily bag limit of 20 Roe's abalone and a combined limit of 10 greenlip and brownlip abalone is enforced throughout the State. There is a daily boat limit of twice the legal bag limit if more than one licence holder is fishing. The minimum legal size for recreational fishing of Roe's abalone is 60 mm, and for greenlip and brownlip abalone 140 mm.

Main fishing method

Roe's abalone can be fished by picking while wading or free diving, whereas greenlip and brownlip abalone are usually taken while free diving or diving on compressed air.

RETAINED SPECIES

Recreational catch: **Roe's Perth fishery 32 tonnes**
 Roe's rest of State 20 tonnes
 Greenlip 47 tonnes
 Brownlip 12 tonnes

All catches are shown in whole weight.

Estimating catch in tonnes requires the use of a mean weight figure for each species in each recreational catch region (see Recreational Abalone Tables 1 and 2). Measurements of the mean weight of recreationally caught abalone are available only for the Perth Roe's recreational fishery for the 1999 and 2000 seasons. Mean weights for the other regions and species have been assumed on the basis of commercial catch weights and recreational minimum legal sizes (Recreational Abalone Table 1 and 2).

The majority of Roe's abalone were taken in the Perth fishery. Estimates of between 33.7 tonnes and 30.2 tonnes for the Perth fishery were derived from telephone and field surveys respectively. Based on these estimates, the catch for the Perth fishery has decreased by about 33% from 1999 (30.9% and 34.1% for telephone and field surveys respectively). This has been predominantly driven by a decrease of 26% in the mean weight of abalone taken (119.5 g and 91.3 g for 1999 and 2000 respectively). Estimates of Roe's catch in the other areas of the fishery (28.8 tonnes in 1999 and 19.5 tonnes in 2000) were estimated using telephone surveys stratified by recreational abalone and umbrella licence holders (Recreational Abalone Table 2).

The recreational catch of greenlip and brownlip abalone was predominantly taken from the south coast fishery. The greenlip catch has risen on the south and west coasts by 39% and 14% respectively (Recreational Abalone Table 2). The brownlip recreational catch has increased on the south coast by 6% and decreased on the west coast by 41% (Recreational Abalone Table 2).

Incidental mortality describes the number of animals that are killed as a result of recreational fishing but are not retained and remain dead or moribund on the reef. This type of mortality was estimated at 5–20% of the retained catch from the Perth recreational fishery in surveys conducted in 1997. This information is not available from the west and south coast regions, but is assumed to be lower for greenlip and brownlip abalone fishing as these species are not taken from within the surf zone (while fishing the reef top).

Fishing effort

The total recreational fishing effort during 2000 in the Perth fishery was estimated at 21,767 fisher days from the telephone survey or 19,800 fisher days from the field survey. This represents decreases of 6.7% and 10.3% from the 1999 estimates for the telephone and field surveys respectively.

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fishery. The telephone survey estimated 6,200 of these licence holders actively fished during the 2000 season, mainly in the Perth fishery. This fishery provides a major social benefit to the sectors of the community who appreciate the abalone as a food.

ECONOMIC EFFECTS

Not applicable.

FISHERY GOVERNANCE

Recreational catch of abalone is controlled through size and bag limits, as well as season and fishing time restrictions. Under present management arrangements the Perth abalone fishery is a nine-hour fishery, operating for

1.5 hours a morning for six mornings during the season. The number of licences available is not limited and has been steadily increasing since 1995 (Recreational Abalone Figure 2).

There is no biological sustainability issue for the Perth Roe's stocks, given that the legal recreational minimum size (60 mm) is greater than the average minimum spawning size and fishers do not target significant stocks outside the aggregations. However, if preliminary data indicating a fall in average weight of abalone develop into a trend along with increasing participation rate, then changes in the operation of the recreational fishery would be advised to ensure the recreational and commercial fisheries are not negatively impacted.

RECREATIONAL ABALONE TABLE 1

Summary of effort (fisher days), catch rate (abalone per fisher day), catch (number of abalone and tonnes whole weight) and mean whole weight (kg) for the Perth recreational Roe's abalone fishery, from telephone and field surveys.

Year	Effort (days)	Telephone Survey			Field Survey				Mean weight (kg)
		Catch rate	Catch (number)	Catch (tonnes)	Effort (days)	Catch rate	Catch (number)	Catch (tonnes)	
1997					16,986	18.9	323,188		
1998					20,815	17.5	369,905		
1999	23,323	17.6	410,000	48.8	22,066	17.4	383,631	45.8	0.1195
2000	21,767	17.0	369,000	33.7	19,800	16.7	330,288	30.2	0.0913

RECREATIONAL ABALONE TABLE 2

Summary of effort (fisher days), catch rate (abalone per fisher day) and catch (number of abalone and tonnes whole weight) for the west and south coast recreational abalone fisheries, from telephone surveys.

Year	Effort ¹ (days)	Roe's abalone			Greenlip abalone			Brownlip abalone		
		Catch rate	Catch (number)	Catch ² (tonnes)	Catch rate	Catch (number)	Catch ³ (tonnes)	Catch rate	Catch (number)	Catch ⁴ (tonnes)
West Coast										
1999	10,273	12.4	128,700	11.8	1.9	20,400	13.5	1.2	11,900	8.1
2000	9,820	12.7	123,500	11.2	2.3	23,400	15.5	0.6	6,900	4.6
South Coast										
1999	16,289	11.0	186,800	17.0	3.0	48,400	22.6	0.7	10,930	7.1
2000	12,966	7.3	90,900	8.3	5.0	67,500	31.5	0.8	11,400	7.4

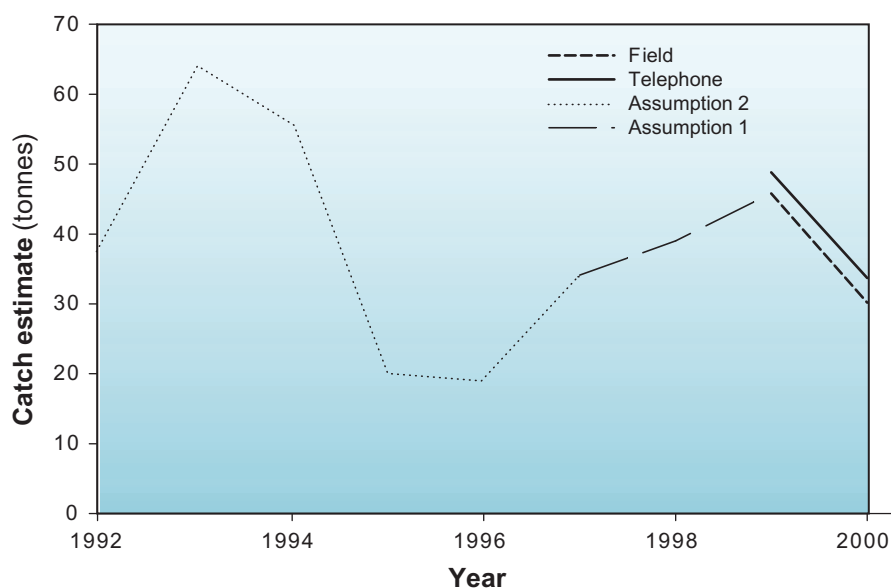
1. Effort is estimated for all species combined.
2. Mean whole weight for Roe's abalone is assumed to be 0.091 kg (mean weight measured from the Perth fishery for 2000).
3. Mean whole weight for greenlip is assumed to be 0.661 kg for the west coast and 0.467 kg for the south coast.
4. Mean whole weight for brownlip is assumed to be 0.675 kg for the west coast and 0.650 kg for the south coast.

RECREATIONAL ABALONE TABLE 3

Preliminary mean total densities of abalone greater than 5 mm and mean densities of legal-sized abalone (> 60 mm) from the six reef platform monitoring sites in the Perth fishery, measured as abalone/m². Densities are from quadrats placed at repeated positions along fixed transects oriented perpendicular to the shore across the reef platform.

Year	Bailey Street		Mettams Pool		Beaumaris		Burns Beach		Waterman's		Penguin Island	
	Total	60+	Total	60+	Total	60+	Total	60+	Total	60+	Total	60+
1999	88	25	90	35	92	45	127	45	106	36	80	26
2000	86	21	88	27	86	47	137	46	84	45	96	30
2001	87	28	90	25	88	50	155	56	95	45	97	29

Perth Recreational Abalone Catch Estimates



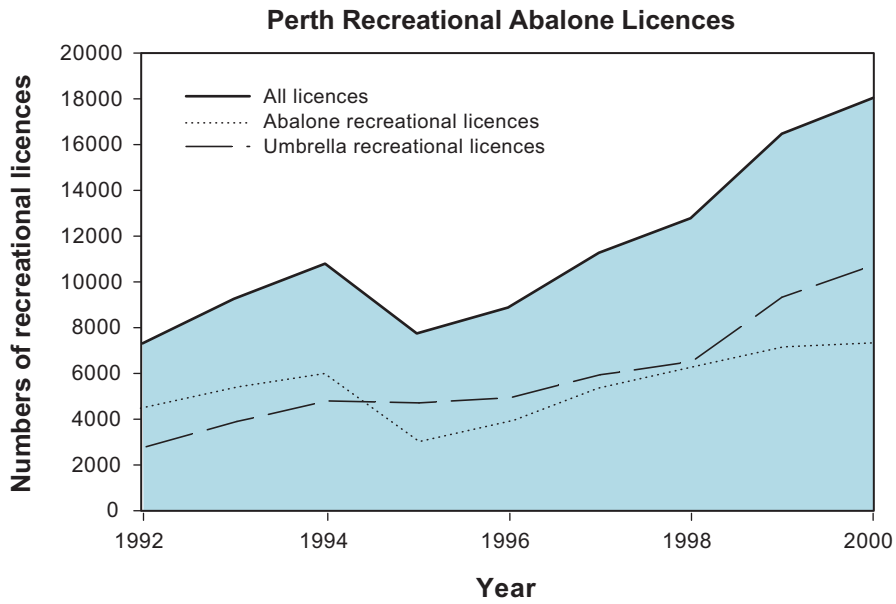
RECREATIONAL ABALONE FIGURE 1

Catch estimates for the Perth recreational abalone fishery for the period 1992 to 2000, including backwards projections through time based on two assumptions.

- Assumption 1: assumes that the mean weight of abalone taken during 1997 and 1998 is equal to the average of the two mean weight values measured for 1999 and 2000 (i.e. 105.4 g, averaged from 119.5 g in 1999 and 91.3 g in 2000). Numbers caught are estimated using the field survey technique (Recreational Abalone Table 1).
- Assumption 2: assumes that effort from 1992 to 1996 is the average percentage of the potential effort utilised for the years 1997 to 2000; that the catch rate for the years 1992 to 1996 is the average of the annual catch rates for the years 1997 to 2000; and that the mean weight of abalone taken during 1992 to 1996 is equal to the average of the two mean weight values measured for 1999 and 2000.



Recreational Fisheries



RECREATIONAL ABALONE FIGURE 2

The number of licences issued in the Perth recreational abalone fishery, by licence type, for the period 1992 to 2000.

Note that the recreational season totalled 16 days in 1993, 12 days in 1992 and 1994, 5 days in 1996 and 6 days in 1995 and 1997–2000. Since 1995 permissible fishing hours per season day have been 1.5 (7.00 to 8.30 a.m., Sundays only). In 1992–1994 fishing was permitted for two hours per season day (7.00 to 9.00 a.m., Saturdays and Sundays).