

Pilbara Demersal Finfish Fisheries Status Report

P. Stephenson and J. King

Management input from K. Saville

FISHERY DESCRIPTION

The majority of the demersal finfish caught in the Pilbara region are taken by the Pilbara Fish Trawl (Interim) Managed Fishery, with a lesser quantity taken by the Pilbara Trap Managed Fishery. In addition, demersal scalefish are taken by line operators with a fishing boat licence entitling them to unrestricted access to the fishery.

The trawl fishery targets 10 main species, namely bluespot emperor (*Lethrinus hutchinsi*), threadfin bream (Nemipteridae), flagfish (*Lutjanus vitta*), crimson snapper (formerly red snapper) (*Lutjanus erythropterus*), red emperor (*Lutjanus sebae*), saddletail snapper (formerly scarlet sea perch) (*Lutjanus malabaricus*), goldband snapper (*Pristipomoides multidens*), spangled emperor (*Lethrinus nebulosus*), frypan snapper (*Argyrops spinifer*) and Rankin cod (*Epinephelus multinotatus*).

The main catch in the trap fishery comprises six of these same species (bluespot emperor, spangled emperor, red emperor, Rankin cod, crimson snapper and goldband snapper).

Governing legislation/fishing authority

Pilbara Fish Trawl Fishery (Interim) Management Plan 1997

Pilbara Trap Management Plan 1992

Fishing Boat Licence (line fishing)

Commonwealth Government *Environment Protection and Biodiversity Conservation Act 1999* (Wildlife Trade Operation)

Consultation process

Department–industry meetings for the trawl and trap fisheries

Boundaries

The boundaries of the Pilbara Fish Trawl (Interim) Managed Fishery are the waters lying north of latitude 21°35' S and between longitudes 114°9'36" E and 120° E on the landward side of a boundary approximating the 200 m isobath and seaward of a line generally following the 50 m isobath (Pilbara Figure 1). The trawl fishery consists of two zones. Zone 1, in the west of the fishery, is currently not being trawled. In Zone 2, the interim management plan introduced in 1998 set down boundaries for six management sub-areas. The exact latitudes and longitudes delineating the areas are listed in the Pilbara Fish Trawl Fishery (Interim) Management Plan 1997.

The Pilbara Trap Managed Fishery (Pilbara Figure 1) lies north of latitude 21°44' S and between longitudes 114°9'36" E and 120° E on the landward side of a boundary approximating the 200 m isobath and seaward of a line generally following the 30 m isobath. The exact latitudes and longitudes delineating the fishery are listed in the Pilbara Trap Management Plan 1992 as amended in 2000.

Management arrangements

The trawl and trap fisheries are both managed primarily by the use of input controls in the form of individual transferable effort allocations monitored with a satellite-based vessel monitoring system.

The trawl fishery came into a formal management framework in 1998 with effort levels determined (FRDC project 93/125) to achieve the best yield from the fishery while keeping exploitation rates of the key indicator species, red emperor and Rankin cod, at sustainable levels. This involved a number of areas being closed to trawling, namely Zone 1, Area 3, Area 6, and the area inshore of the 50 m depth isobath. Since then, effort has been reduced and redistributed on the basis of annual assessments of the status of the main target species and age-structured modelling of red emperor, Rankin cod, bluespot emperor and goldband snapper. There are 11 licence units with varying time allocations throughout the various areas, with the allocation being used by the equivalent of four full-time vessels.

The ITE management arrangements introduced into the trap fishery in January 2000 dealt with the issue of latent effort in the fishery and proved effective at holding the fishery within its acceptable 300 t limit. However, the ability of the fishery to target long-lived species like red emperor may require limits on the catch of specific species in the future. There are six licences in the fishery, with the allocation used by three vessels in 2005.

Plans for future management of line fishing in the Pilbara are being formulated through the statewide wetline fishing review.

A comprehensive ESD assessment of this fishery has been undertaken to identify any potential sustainability risks requiring direct management. The issues identified through this process were breeding stock levels, protected species interactions and habitat effects. Boxed text in this status report provides the annual assessment of performance for these issues.

Research summary

The monitoring of the Pilbara fishery involves the collection of spatial data on effort and catch of 10 major target species in the trawl and trap fisheries from log books, VMS pollings, and weighed catches from unload data. Otoliths are collected each year for one of the four indicator species (red emperor, Rankin cod, bluespot emperor, and goldband snapper).

The status of the Pilbara stocks is determined annually using catch and catch rates of the 10 major species. Every three to four years a formal age-structured model stock assessment is completed for the four indicator species using the age-composition data.

An FRDC-funded bycatch mitigation project completed in 2005 determined that acoustic pingers were not effective in reducing dolphin catches, but that the use of semi-flexible separation grids appeared promising in reducing the capture of dolphins, turtles, and large elasmobranchs.

RETAINED SPECIES

Commercial production (season 2005):

Trawl 2,371 tonnes
Trap 408 tonnes
Line 226 tonnes

Landings

Catches of the major species for 2005 are shown in Pilbara Table 1. The catches by different fishing methods for the years 1985 to 2005 are shown in Pilbara Table 2 and illustrated in Pilbara Figure 2. Demersal scalefish catch by trawl, trap and line was 2,371 t, 408 t and 226 t respectively.

The trawl catch decreased in 2005 due to the fishers purposely decreasing their catch of the short-lived species. It is now within the target range. The major target species landed in 2005 (2004 catch in brackets) were bluespot emperor 451 t (627 t), crimson snapper 328 t (327 t), threadfin bream 236 t (302 t), flagfish 192 t (228 t), red emperor 96 t (111 t), goldband snapper 78 t (101 t), saddletail snapper 72 t (89 t), Rankin cod 34 t (36 t) and spangled emperor 26 t (32 t). The total retained by-product was 80 t (114 t) including cuttlefish 51 t (60 t), shark 19 t (45 t), bugs 7 t (7 t) and squid 3 t (2 t). The performance indicators based on landed catch were not triggered for any species in 2005.

The trap fishery catch increased to 408 t in 2005 from 395 t in 2004. Major species taken by the trap fishery in 2005 (2004 figures in brackets) were red emperor 90 t (58 t), bluespot emperor 76 t (79 t), goldband snapper 51 t (38 t), Rankin cod 48 t (54 t) and crimson snapper 39 t (37 t). The trap catch was again outside the target catch range due to increased catches of red emperor and goldband snapper. The catch-based performance indicator was triggered in 2005 with goldband snapper, red emperor and Rankin cod exceeding their four-year averages by 216%, 50% and 44% respectively. There is no by-product in this fishery.

Demersal scalefish catches taken by line fishing increased slightly in 2005, with a total catch of 226 t compared to 217 t in 2004. The catches in 2005 (2004 figures in brackets) were mainly goldband snapper 84 t (58 t), saddletail snapper 14 t (16 t), red emperor 8 t (9 t), Rankin cod 6 t (6 t) and spangled emperor 4 t (5 t). The increase in goldband snapper is a matter for considerable concern. The Pilbara shark catch is reported in the Northern Shark Fisheries Status Report (pp. 165–169).

Fishing effort/access level

The fishing effort in the trap, line and trawl sectors of the commercial fishery is shown in Pilbara Table 3. The effort measured in days comes from monthly catch and effort returns. For the trawl fishery, however, the effort from 1991 to 2005 is also recorded as the net bottom time (hours) taken from skippers' voluntary log book data validated by VMS data.

In the trawl fleet, there are the equivalent of four full-time vessels. The number of hours allocated to the fleet in each area of the fishery, the number of hours used (verified by VMS) and the percentage of the allocation used over the period 1998–2005 are shown in Pilbara Table 4. In 2003, the

licensing year changed from a calendar year to a financial year basis (July 1 to June 30). Because the reporting of the fishery has continued on a calendar year basis, the time used can exceed the allocated time in any one season. Trawling was not allowed in either Area 3 or Area 6 during 2005.

The number of trap days allocated, the number of days used and the percentage of the allocation used for the period 2000–2005 are shown in Pilbara Table 5. In 2005, the three trap boats were allocated 5,867 trap units (days multiplied by number of traps), with the number of these units used, calculated from VMS, being 5,519 (94%). This number of units equates to 403 days fished with an average of 12.6 traps per day, a slight decrease from the average of 12.8 traps used per day in 2004.

In 2005, line fishers reported operating for 784 days, compared with 769 days in 2004. This effort does not include trolling, which is reported in the Mackerel Fishery Status Report (pp. 159–164), nor the dropline and longline effort in the Northern Shark Fisheries (pp. 165–169).

Catch rate

The trawl catch rates (based on nominal VMS effort) of the major species between 1989 and 2005 are shown in Pilbara Figures 3 and 4.

Catch rates of the major species in the trap fishery (based on reported number of days fished) from 1985 to 2004 are shown in Pilbara Figure 5.

The line catch rate in 2004 was more than double that in 2003 due to a small number of dedicated and efficient operators.

Recreational component:

< 2%

While there is a major recreational fishery in the Pilbara and the charter sector is an increasing user of the resource, the inshore closures to the commercial sector provide a high degree of separation between the user groups. These do not catch significant quantities of most species targeted by the commercial Pilbara trawl, trap and line fisheries.

STOCK ASSESSMENT

Assessment complete:

Yes

The assessment in 2005 was based on catch and catch rates. The trawl catch rates, based on nominal effort, decreased for four of the six long-lived target species. As there have been considerable efficiency increases in recent years, these decreases may be indicative of decreasing stock sizes. The catch rates should be closely monitored in the next few years with consideration given to further effort reduction in the near future.

The unrestricted access of line fishers in the Pilbara is a major concern. The line scalefish catch of 217 t is almost twice the upper limit of the acceptable catch range. The goldband snapper catch, which increased dramatically to 58 t in 2004 and 84 t in 2005, poses a considerable risk to the Pilbara stock of this species.

Breeding stock levels:

Adequate

The major performance measures for the fish stocks in the Pilbara demersal fisheries relate to breeding stock levels of the long-lived and short-lived finfish indicator species.

The target level of spawning biomass is 40% of the initial level when the catch was first recorded. The limit level is 30% of the initial spawning biomass.

The spawning biomass levels of the target species were assessed as adequate in 2002 by synthesizing the available data in an age-structured model. The age-structured model stock assessment will be updated in 2006.

NON-RETAINED SPECIES

Bycatch species impact:

Moderate

The observer program and the FRDC bycatch mitigation project confirmed the level of scalefish bycatch in the trawl fishery at about 30%, similar to that reported in Stephenson and Chidlow (2003). The trap and line fisheries have minimal bycatch.

Protected species interaction:

Moderate

The trawl fishery has an incidental capture of dolphins, turtles, sea snakes, pipefish and seahorses. Turtles and sea snakes are generally returned to the water alive but dolphins, pipefish and seahorses are generally dead when landed. The catch of these species is recorded in skippers' log books and reported every three months to the Department of Environment and Heritage. The 2005 reported catch of protected species is shown in Table 6. Given the area of distribution and expected population size of these protected species, the impact of the trawl fishery on the stocks of these protected species is probably minimal. There is a small catch of green sawfish, a species that is expected to be protected in the near future.

An FRDC-funded project to evaluate methods of reducing bycatch found that acoustic pingers were not effective in reducing the dolphin numbers in the trawl net, but that a semi-flexible separation grid appeared to reduce the capture of dolphins, turtles and elasmobranchs. A further study to quantify the catches of dolphins and turtles with grids deployed has taken place between March and July 2006.

There is no indication of interactions between the line fishery and protected species. Similarly, the trap fishery has a negligible impact on protected species.

The performance measures for the impact of the trawl fishery on protected species require skippers to record incidents of capture and minimise mortality. In 2005, the dolphin mortality recorded was about half the limit set and the turtle catch was acceptable at one-quarter of the limit set. Syngnathid, sawfish, and seasnake catches were all below their maximum levels and are therefore considered acceptable (Pilbara Table 6).

ECOSYSTEM EFFECTS

Food chain effects:

Low

The current fish trawl fishery operates with standard stern trawling gear (single net with extension sweeps) within an area previously trawled by a Taiwanese fleet. Historical research by CSIRO has suggested that the extensive Taiwanese pair trawl fishery caused a significant decrease in the biomass of finfish on the North West Shelf, and a change in species composition towards smaller species. The current Australian trawl fishery, which developed when the fish stocks had somewhat recovered, uses a much larger mesh size and much lighter ground rope, and operates at lower exploitation rates. The present levels of trawl and trap effort appear to be resulting in increased catch rates, probably due to increased stock size. Overall, the effect of the fishery on the food chain of the North West Shelf is considered to be at an acceptable level.

Habitat effects:

Moderate

Impacts to the habitat are restricted to those of the trawl fishery, which is confined to around 7% of the North West Shelf (Pilbara Figure 1). Area 3 and the waters inside 50 m are permanently closed to trawling, Zone 1 is currently closed to trawling, and Area 6 has had no trawl effort allocation since 2000.

Within the areas actually trawled, past research has indicated that approximately 10% of the sessile benthic fauna (e.g. sponges) is detached per year, with higher rates in Area 1 where the effort is concentrated. It is not known whether the detachment rate exceeds the rate of regrowth.

The performance measure for the trawl impact on the North West Shelf ecosystem was set as a maximum area of operation by the trawlers. With the current closures within the licensed area of the fishery (50 m to 200 m depth), 46% of the area is accessible to the trawl vessels. The actual area trawled is less than this as some of the area is too rough to be trawled.

SOCIAL EFFECTS

It is estimated that 22 fishers on 4 vessels were directly employed during 2005 in the Pilbara trawl fishery, and 10 fishers on 3 vessels in the trap fishery. The level of employment in line fishing is not available.

ECONOMIC EFFECTS

Estimated annual value (to fishers) for year 2005: **\$11.6 million**

This estimate is based on the landed weight and price of each species as supplied by fish processors.

There has been little overall increase in fish prices in the last two years. The trawl demersal finfish catch is dominated by lower-valued species such as bluespot emperor and threadfin bream, and its value in 2005 was \$8 million. The trap and

line catches are dominated by the valuable species such as red emperor and goldband snapper, and the demersal scalefish catch from these sectors was valued at approximately \$2.1 million (trap) and \$1.2 million (line). Important components of the line catch are shark and Spanish mackerel, which have not been included in the value of the line fishery, but are recorded in the Northern Shark Fisheries Status Report (pp. 165–169) and the Mackerel Fishery Status Report (pp. 159–164) respectively. The trawl fishery also has a retained by-product valued at \$269,000.

The catches from the Pilbara fisheries dominate the Western Australian metropolitan markets and support the local fish processing sector. There is also an increasingly important export of scalefish to Europe and Asia.

FISHERY GOVERNANCE

**Acceptable catch range: Trawl 2,000–2,800 tonnes
Trap 160–360 tonnes
Line 50–115 tonnes**

In the trawl fishery, catch in 2005 was within the target catch range. In the trap fishery, the catch is again well above the upper limit of the target range, with the major increase being for red emperor. Adjustment to the allocated effort in the trawl and trap sectors may be necessary to compensate for significant efficiency increases and, in the case of the trap fishery, to reduce the catch to within the target range.

The increased line catch of deep-water species like goldband snapper has taken the catch to almost twice the upper limit of the acceptable catch range. This is of major concern.

New management initiatives (2005/06)

The Australian Government Department of Environment and Heritage has certified the Pilbara Trap Fishery as

environmentally sustainable under the provisions of the *Environment Protection and Biodiversity Conservation Act 1999*.

In 2005 the Pilbara Trawl Fishery was declared a Wildlife Trade Operation by DEH, permitting the continued export of product until August 2006 (pending results of the research into methods to reduce turtle and dolphin catches). Bycatch reduction grids were made compulsory in the trawl fishery on 1 March 2006, and the progress made in reducing catches of these protected species through the use of these exclusion grids has resulted in an extension of the declaration until 1 December 2007.

Consultation with stakeholders for an interim management plan for the Pilbara line fishery is expected to commence in 2007. As an interim measure, it is anticipated that the Minister will prohibit commercial line fishing between Tantabiddi Well and 120° E longitude in August 2006 (with the exception of around nine wetline operators with a long history of fishing in the area). This prohibition is aimed at reducing access to the line fishery and protecting deep-water species such as goldband snapper and ruby snapper until such time as the fishery can be brought under formal management.

EXTERNAL FACTORS

The area available for fishers has decreased over recent years as a result of exclusion zones for gas pipeline and facilities. Seismic surveys also restrict the operation of fishers. However, neither of these operations is expected to significantly affect fish stocks or catches.

PILBARA TABLE 1

Commercial catches (to the nearest tonne) and the percentages (to the nearest 1%) of each major species taken by trawl, trap and line in the Pilbara in 2005.

SPECIES	FISH TRAWL CATCH		TRAP CATCH		LINE CATCH		TOTAL CATCH
	tonnes	%	tonnes	%	tonnes	%	tonnes
Blue spot emperor <i>Lethrinus hutchinsi</i>	451	86%	76	14%	–	–	527
Crimson snapper <i>Lutjanus erythropterus</i>	328	85%	39	10	17	5%	384
Threadfin bream <i>Nemipteridae</i>	236	100%	1	–	–	–	237
Flagfish <i>Lutjanus vitta</i>	192	93%	14	7%	–	–	206
Goldband snapper <i>Pristipomoides multidens</i>	78	37%	51	24%	84	39%	213
Red emperor <i>Lutjanus sebae</i>	96	50%	90	46%	8	4%	194
Saddletail snapper <i>Lutjanus malabaricus</i>	72	73%	13	13%	14	14%	99
Spangled emperor <i>Lethrinus nebulosus</i>	26	48%	24	45%	4	7%	54
Frypan snapper <i>Argyrops spinifer</i>	45	98%	–	–%	1	2%	46
Rankin cod <i>Epinephelus multinotatus</i>	34	39%	48	54%	6	7%	88
Other demersal scalefish	813	85%	52	5%	92	10%	957
All demersal scalefish	2,371	79%	408	14%	226	7%	3,005

PILBARA TABLE 2

Summary of reported commercial catches (t) of demersal scalefish by line, trap and trawl in the Pilbara fishery, as well as by-product from the fish trawl fishery.

YEAR	DEMERSAL SCALEFISH				BY-PRODUCT*
	Line	Trap	Trawl	Total	Trawl*
1985	180	168	–	348	–
1986	65	113	–	178	–
1987	67	192	3	262	–
1988	136	243	3	382	–
1989	104	457	124	685	–
1990	157	407	421	985	4
1991	107	119	754	980	14
1992	63	148	1,413	1,624	21
1993	67	178	1,724	1,969	42
1994	79	207	2,506	2,792	102
1995	95	222	2,821	3,138	77
1996	136	302	3,201	3,639	102
1997	109	234	2,630	2,973	133
1998	78	250	2,512	2,840	119
1999	50	371	2,136	2,419	69
2000	59	257	1,995	2,314	80
2001	99	266	2,221	2,592	150
2002	90	306	2,310	2,706	180
2003	81	363	2,860	3,304	154
2004	217	395	2,837	3,449	113
2005	226	408	2,371	3,005	80

* By-product consists of shark, cuttlefish, rays, bugs, and tropical lobster.

PILBARA TABLE 3

Summary of effort in the Pilbara fishery. The trap, line and trawl effort (days) is from monthly catch and effort returns. The trawl effort (hours) is nominal effort from operators' log book data.

YEAR	LINE (days)	TRAP (days)	TRAWL (days)	TRAWL (hours)
1985	809	709	–	–
1986	655	548	19	–
1987	614	507	17	–
1988	985	804	32	–
1989	863	1,198	310	–
1990	1,332	1,321	698	–
1991	740	472	1,132	8,660
1992	514	681	983	10,030
1993	876	696	832	10,725
1994	732	545	1,484	22,087
1995	852	608	1,571	21,529
1996	814	513	1,550	25,246
1997	809	483	1,389	19,810
1998	692	503	1,291	20,555
1999	453	842	1,139	15,963
2000	500	518	957	14,084
2001	401	446	1,162	15,330
2002	660	418	1,035	14,830
2003	715	412	1,014	14,663
2004	769	418	953	15,372
2005	784	431	886	14,721

PILBARA TABLE 4

The number of hours allocated, the number of hours used and the percentage of the allocation used in each area of the Pilbara trawl fishery.

		AREA 1	AREA 2	AREA 3	AREA 4	AREA 5	TOTAL
1998	time allocation	17136	3,360	0	3,360	5,712	29,568
TRAWL	time used	15,076	3,842	0	3,736	4,955	27,609
	% of time used	88%	114%	–	111%	87%	93%
	1999	time allocation	11,481	3,360	0	3,057	5,198
TRAWL	time used	10,237	3,767	0	3,213	4,973	22,190
	% of time used	89%	112%	–	105%	96%	96%
	2000	time allocation	11,481	3,360	0	3,057	5198
TRAWL	time used	9,438	3,928	0	3,358	4476	21,199
	% of time used	82%	117%	–	110%	86%	92%
	2001	time allocation	10,624	3,797	0	3,528	5141
TRAWL	time used	10,428	4,091	0	3,644	4819	23,000
	% of time used	98%	108%	–	103%	94%	100%
	2002	time allocation	10,624	3,797	0	3,528	5,141
TRAWL	time used	9,040	3,848	0	3,624	4,213	20,544
	% of time used	85%	101%	–	103%	82%	90%
	2003	time allocation	8,911	3,542	0	3,293	4,325
TRAWL	time used	9,562	4,303	0	3,299	2,995	20,159
	% of time used	107%	121%	–	100%	69%	100%
	2004	time allocation	8,911	3,542	0	3,293	4,325
TRAWL	time used	8,802	4,159	0	4,101	4,341	21,404
	% of time used	99%	117%	–	125%	100%	107%
	2005	time allocation	8,911	3,542	0	3,293	4,325
TRAWL	time used	9,328	4,367	0	3,144	3,595	20,439
	% of time used	105%	123%	–	95%	83%	102%

PILBARA TABLE 5

The number of days allocated, the number of days used and the percentage of the allocation used in the Pilbara trap fishery.

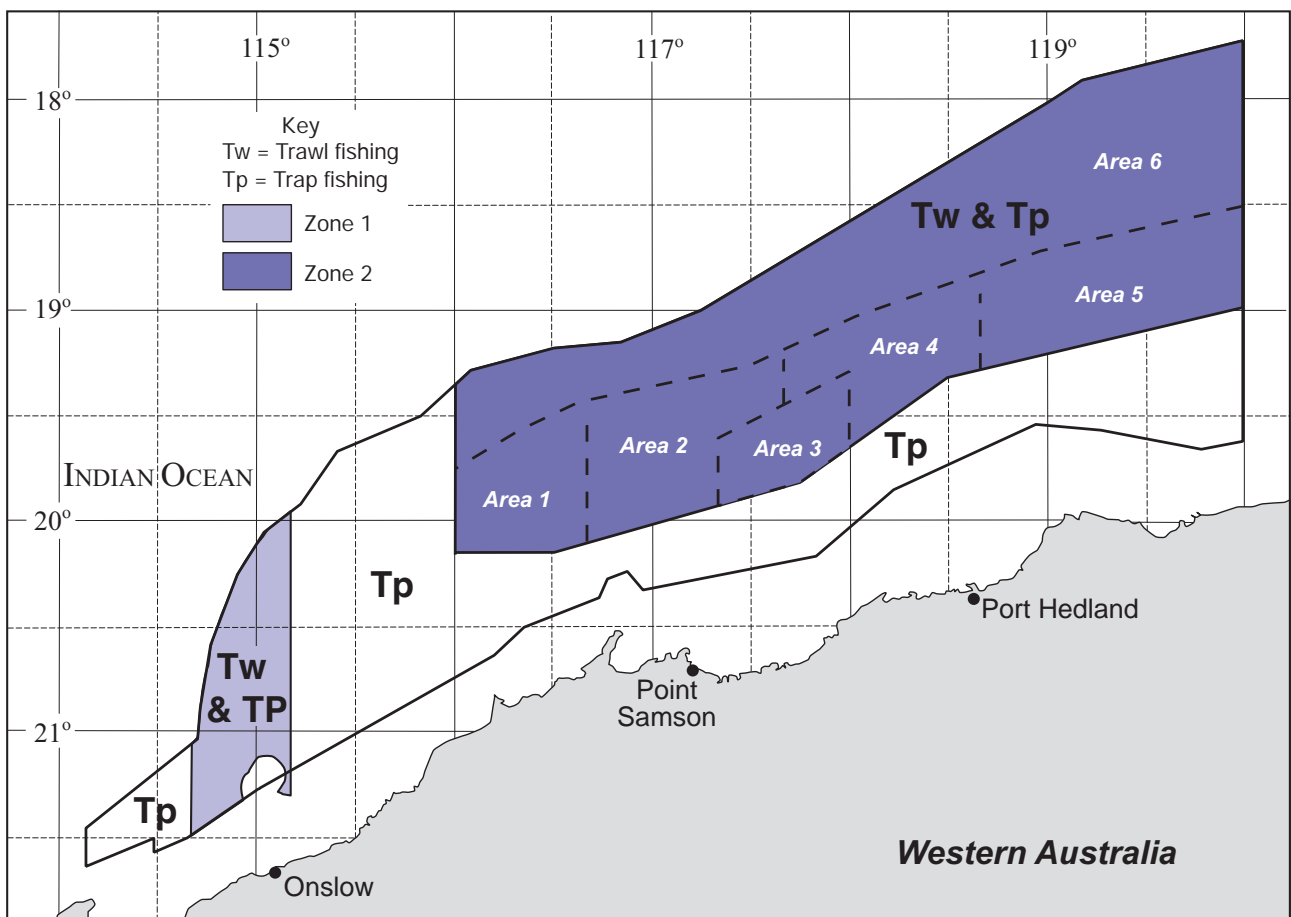
2000	time allocation	524
TRAP	time used	507
	% of time used	97%
	2001	time allocation
TRAP	time used	414
	% of time used	99%
	2002	time allocation
TRAP	time used	382
	% of time used	99%
	2003	time allocation
TRAP	time used	389
	% of time used	98%
	2004	time allocation
TRAP	time used	419
	% of time used	99%
	2005	time allocation
TRAP	time used	403
	% of time used	94%

PILBARA TABLE 6

Reported by-catch of protected species by skippers in the Pilbara trawl fishery in 2005.

SPECIES	NUMBER ALIVE	NUMBER DECEASED*	TOTAL REPORTED
Dolphins	4	52	56
Pipefish	6	105	111
Sawfish, green	8	5	13
Sawfish, narrow	1	0	1
Seahorses	0	0	0
Sea snakes	39	6	45
Turtles, green	15	4	19
Turtles, leatherback	1	1	2
Turtles, loggerhead	6	0	6
Turtles, olive ridley	3	0	3
Total protected species	83	173	256

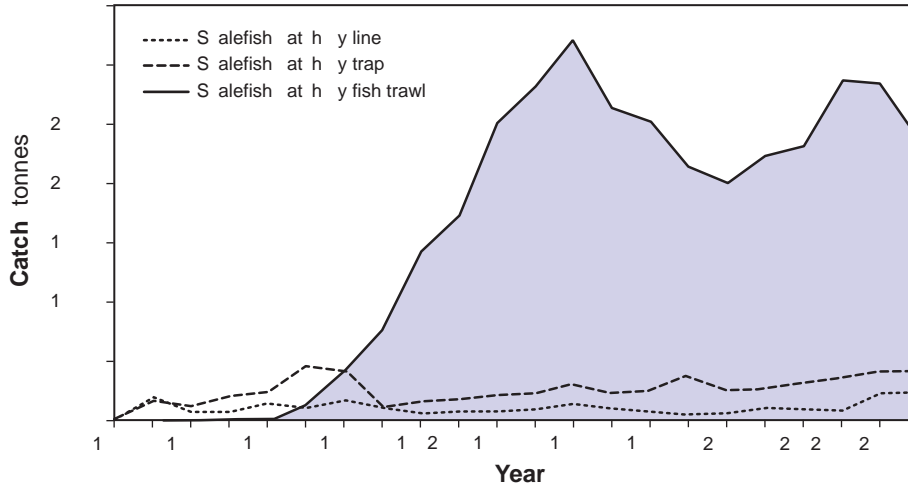
*Where the condition was not reported the animal was considered deceased.



PILBARA FIGURE 1

Demersal scalefish fisheries of the Pilbara region of Western Australia. Areas 1 to 6 refer to the management regions in Zone 2 of the trawl fishery. Zone 1 has been closed to trawling since 1998.

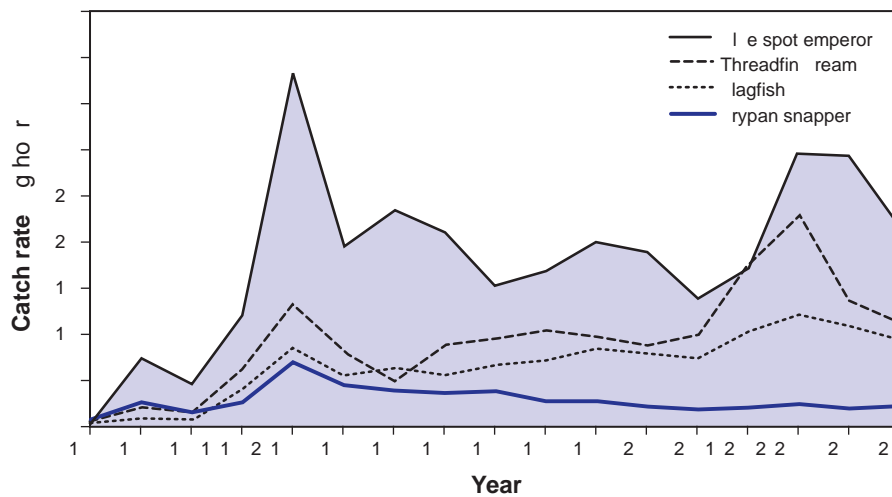
Pilbara Demersal Scalefish Catch by Gear Type



PILBARA FIGURE 2

Demersal scalefish catches by trawl, trap, and line from 1985 to 2005.

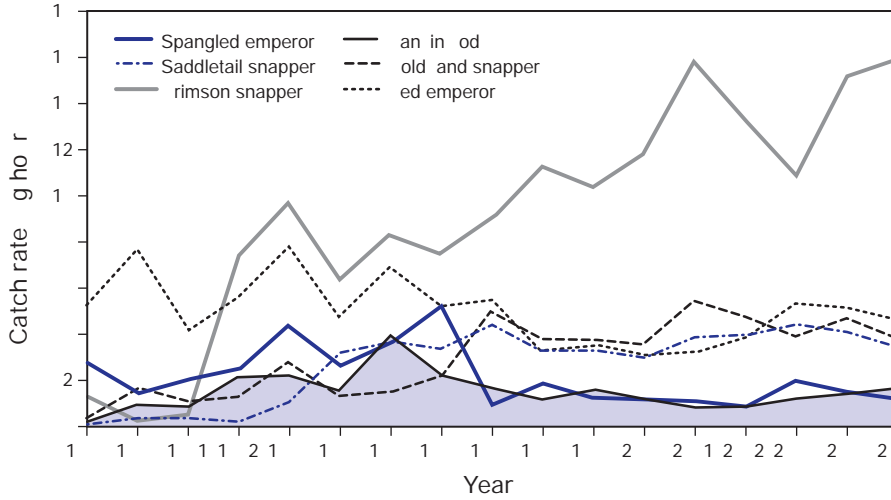
Pilbara Short-lived Scalefish Catch Rate By Fish Trawl



PILBARA FIGURE 3

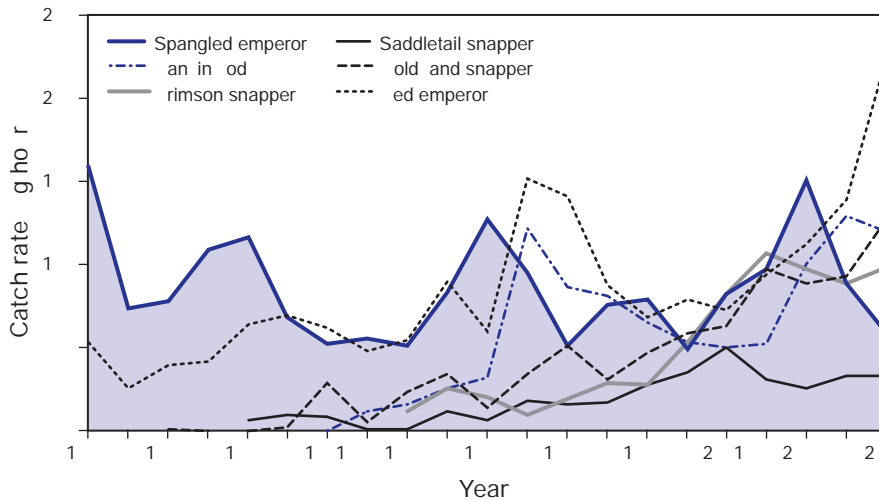
Catch rates (kg/hour) of short-lived scalefish caught by trawl from 1989 to 2005.

**Pilbara Long-lived Scalefish Catch Rate
By Fish Trawl**



PILBARA FIGURE 4
Catch rates (kg/hour) of long-lived scalefish caught by trawl from 1989 to 2005.

**Pilbara Long-lived Scalefish Catch Rate
By Trap**



PILBARA FIGURE 5
Catch rates (kg/day) of long-lived scalefish caught by trap from 1985 to 2005.