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Statistical analysis of Gascoyne region recreational fishing study July 1996

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Contents

Statistical analysis of Gascoyne region recreational fishing study July 1996

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Abstract

*A survey of recreational fishers in the Gascoyne region of Western Australia was conducted in July 1996 to provide information required by fisheries managers. Catch rates, attitudinal, demographic and economic information from boat-based and shore-based fishers was collected by Fisheries Officers. Pink snapper (*Pagrus auratus*) was the primary species caught by boat-based recreational fishers in the region. Various species of whiting were the predominant catch from shore-based anglers. Most fishers interviewed (80%) supported the introduction of an upper limit on the amount of fish and fillets that a person could take away from the Gascoyne region for personal or family use. The majority of fishers (93%) indicated that they would support the introduction of additional fishing regulations if these were needed to maintain the quality of fishing in the Gascoyne region.*

1.0 Executive summary

- Pink snapper was the primary species caught by boat fishers in the Gascoyne region.
- The bag limit of eight for pink snapper at the time was effective in reducing large catches on occasions. However, the survey indicated that very few fishers (5%) achieve the daily bag limits specified under present statewide recreational fishing regulations.
- The minimum size limit for pink snapper of 410 mm at the time of the study, had a major impact on the number kept, with 52% of pink snapper caught subsequently being released primarily due to the size limit.
- The mean catch rate of pink snapper for different locations varied from two fish per line per hour at Baba Head to nil at Gnaraloo and Exmouth. Almost all pink snapper were caught by boat-based anglers.
- Most fishers interviewed (80%) supported the introduction of an upper limit on the amount of fish and fillets that a person could take away from the Gascoyne region for personal or family use. Most fishers (77%) believed that 19 kilograms or less was a reasonable upper limit per person to take away from the region.
- The majority of fishers (93%) indicated that they would support the introduction of additional fishing regulations if these were needed to maintain the quality of fishing in the Gascoyne region. Most fishers (67%) believed the same fishing rules should apply for the whole of the Gascoyne region. Fishers interviewed believed that they were aware of the regulations and the results indicated they were staying within the bag and size limits for all species.
- Since this pilot survey was a secondary objective of the regional staff who undertook the survey work, the methodology was compromised. The results were far less useful than a properly designed creel survey.

2.0 Introduction

The Gascoyne region, particularly Shark Bay (Figure 1), is a popular tourist destination and important for both recreational and commercial fishers. Concern has been expressed about the increasing level of recreational fishing effort in the area and the increasing size of the recreational finfish catch. The primary concern is the recreational catch of pink snapper (*Pagrus auratus*) in the eastern and western gulfs of Shark Bay which has been at a high level for a number of years.

This pilot survey, conducted in the Gascoyne region during July 1996, was designed to investigate the activities of recreational fishers. Catch rates, attitudinal, demographic and economic information from boat-based and shore-based fishers was collected. The information is required by managers responsible for the conservation and sustainability of fisheries resources in the region.

Previous studies (Johnson *et al*. 1986, Moran 1987, Edmonds *et al*. 1989) have shown that there are three distinct stocks of pink snapper in the Shark Bay region: a western stock in the Freycinet Reach and Freycinet Estuary, an eastern stock in Hopeless Reach to the east of Peron Peninsula, and an oceanic stock west of the embayment from Cape Cuvier to Steep Point. Salinoclines (Figure 2) may provide some insight into the distribution of the distinct pink snapper stocks, since it is likely that their segregation is related to the higher salinities in the inner gulfs.

The commercial trap and line fishery generally targets the oceanic stock of pink snapper, while the recreational fishers generally target the inner gulf stocks in the Freycinet Estuary and east of the Peron Peninsula. Since each of the three stocks is genetically and geographically distinct, if either isolated stock in the inner gulfs was to be seriously depleted, it is unlikely that it would be replenished from other areas through migration of adults or juveniles or by dispersal of larvae (Moran, pers. comm.). This is not, however, likely to be the case for the larger and widely distributed oceanic stock, which extends into the northern waters of Denham Sound. In this area, localised depletion of spawning-sized pink snapper may occur, but recruitment of larvae and juveniles is likely to be maintained from less intensively fished regions adjacent to Shark Bay.

Pink snapper in the inner gulfs of Shark Bay are thought to grow to a larger size than oceanic pink snapper. The size at maturity for inner gulf pink snapper is also larger than that for oceanic pink snapper. At the minimum legal length of 410 mm only 14% of inner gulf pink snapper are mature compared with 66% for oceanic pink snapper in Shark Bay (Moran, pers. comm.).

Shark Bay inner gulf pink snapper form spawning aggregations between May and September (Moran, pers. comm.). The locations where the pink snapper aggregate and the time of the day that the aggregations occur is known to many recreational fishers, particularly near Monkey Mia. These aggregations are targeted by the recreational fishers, making this species particularly vulnerable to heavy fishing during these months. Recreational catch and effort information is required to assess the sustainability of fish stocks under current fishing practices.

3.0 Methods

The survey was conducted by Fisheries WA Fisheries Officers during patrols in the Gascoyne region in July 1996. They collected catch, effort, attitudinal, demographic and economic information from 399 recreational fishers at boat ramps and shore-based fishing locations. Most

of the data were collected from the Shark Bay region, a 748,725 ha marine park (see Figure 1), where the recreational fishing effort is concentrated. A two-part questionnaire was used to survey all fishers. The first part recorded catch, effort and demographic information (Appendix A). The second part recorded attitudinal and economic information (Appendix B).

In most cases, the catch for boat-based fishers was recorded at the completion of the day's fishing and represents the entire catch for the duration of the trip. Shore-based fishers were interviewed whilst fishing. Fishers were interviewed either during the day or evening. The locations and times of interviews could not be randomised since the survey was conducted by the Fisheries Officers between their enforcement commitments. All percentages given are based on the number of valid responses to a question and do not include fishers that did not respond.

4.0 Fishing activities

In total, 399 fishers were interviewed. Of the fishers interviewed 304 (77%) had access to a freezer to preserve their catch.

Amount of fish taken home by fishers
Eighty-six per cent of fishers had visited the region previously. Of these, most (66%) reported taking 14 kilograms or less of fish or fillets home from previous trips (Figure 3). Eighty per cent of fishers reported taking 19 kilograms or less.

Frequency of fishing
Most fishers staying in the region for two weeks or less intended to fish every day. Fishers staying for between two weeks and a month intended to fish about every second day. Those staying for longer indicated that they intended to fish less frequently. Most fishers fished for less than 15 days (Figure 4) although this was related to the length of the trip.

Size of fishing parties
The most common number of fishers per party was two (Figure 5), although some fishing parties had over ten fishers. Since only fishers were interviewed, the proportion of parties visiting the region that did not participate in fishing activities is not known.

Equipment used by boat fishers
Most boats (68%) had either a black and white (B&W) echo-sounder or colour echo-sounder (Table 1). One-third of the boats surveyed had a global positioning system (GPS).

5.0 Recreational catch and effort

Of the 399 fishers interviewed, catch and effort information was collected for 186 recreational boats and 148 shore-based fishers in the Gascoyne region. No catch and effort information was recorded for 65 fishers.

As a consequence of enforcement commitments, it cannot be assumed that the data are random or even representative of the region due to biases introduced by the collection methods. The Fisheries Officers did not visit all fishing spots in the region and focussed on the more popular locations. The assumptions of random sampling for the type of analysis normally used for surveys are not satisfied. Hence, it is not possible to estimate total catch or total effort over the

period of the survey, only estimates of catch rates for some of the locations visited could be obtained. A well designed creel survey with a randomised sampling strategy is required to estimate total catch and total effort.

The mean time spent fishing for boat-based fishers was 3.9 hours and 4.4 hours for shore-based fishers. The mean number of fishing lines used in recreational fishing boats was 3.4 and 1.3 lines by shore fishers.

5.1 Catch rates for pink snapper

Pink snapper was the primary species caught by boat fishers in the region and comprised fifty-nine per cent of the catch (Appendix C). Almost all (98%) pink snapper were caught by boat-based rather than shore-based anglers (Appendices C and D).

Catch rates for pink snapper were calculated for the locations frequented by boat fishers (Table 2). The catch rate is calculated as the number of pink snapper kept per line per hour of fishing time. The total number of pink snapper kept by the fishers interviewed for each location is also given.

Half (50%) of the boat-based fishers interviewed had caught one or more pink snapper per fisher. It is not known whether they were fishing for pink snapper or for other species. Few boat-based fishers (5%) caught the bag limit of eight pink snapper (Figure 6). Undersize pink snapper were caught and released by anglers in many locations, particularly Denham Sound, Monkey Mia, Nanga, Tamala and White Island.

The only shore-based catches of pink snapper recorded, occurred at False Entrance (30 km south of Steep Point), where six fishers interviewed caught a total of 24 pink snapper with a catch rate of 1.26 legal-sized fish per line per hour.

Catches of up to 80 pink snapper per boat were reported from Denham Sound, particularly near Dirk Hartog Island (Table 3). A large catch of 60 oceanic pink snapper per boat was reported from the Levillain Shoal on the north east tip of Dirk Hartog Island. Large catches in the Freycinet Estuary also occurred at Baba Head (24), Cosy Corner (35) and White Island (19). The largest recorded catch reported from the eastern gulf was 26 pink snapper landed at Monkey Mia.

5.2 Length information for pink snapper

Of the 2,183 pink snapper reported, 1,042 legal-size fish were kept, 1,140 released and one under-size fish kept. Since few fishers achieved the bag limit, it is likely that most fish released were below the legal-size limit of 410 mm in place at the time. This is consistent with observations made by Fisheries Officers working in the region at the time.

Since only the smallest and largest fish per boat were measured, rather than all fish on a boat or a random sample from the catch, it is not possible to undertake a length–frequency analysis for pink snapper or any other species. Furthermore, the number of fish measured was insufficient for this purpose. The proportion of mature adult fish in the catch cannot be obtained from the available data.

5.3 Catch of other species

Most boat fishers (67%) and about half of the shore-based fishers (48%) had not caught fish species other than pink snapper when interviewed (Figure 7). All fishers on recreational boats were counted, hence the number of boat fishers exceeds the number of boats interviewed. Other

species caught by anglers include spangled emperor, whiting, mackerel, skipjack trevally, cods, blue lined emperor, tailor, sharks and baldchin groper. Mullet were caught using set nets and blue swimmer crabs by drop nets.

The recorded catch by species is shown as Appendix E. The boat-based and shore-based catch by species is shown as Appendices C and D respectively.

Most boat fishers (58%) and shore-based fishers (62%) had kept at least one fish when interviewed (Figure 8).

6.0 Attitudinal responses

Attitudes to fishing regulations
The majority of fishers (88%) believed that they knew the fishing regulations and that the information was readily available. Two hundred and sixty-one (67%) fishers believed the same regulations for recreational fishing should apply for the whole of the Gascoyne region. Three hundred and sixty-seven (93%) fishers indicated that they would support the introduction of additional fishing regulations if these were needed to maintain the quality of fishing in the region.

Attitudes to implementation of an upper limit of fish to take home from region
Three hundred and fifteen (80%) fishers interviewed believed that there should be an upper limit on the quantity of fish people were allowed to take away from the region for personal or family use. Most of the fishers (77%) believed that 19 kilograms or less was a reasonable upper limit per person to take away from the region for personal or family use (Figure 9). Eight per cent believed the limit should be 30 kg or more.

Reasons for visiting Gascoyne region
The main reasons given for visiting the Gascoyne region by fishers interviewed were to enjoy the pleasant environment and climate, for a camping holiday and to go fishing (Table 4). Visiting the region for sightseeing and tourism or for a new experience was considered important by most fishers, although not as important as the other reasons given. Most fishers had visited the region previously (see 7.0 Demographics).

The environment and climate, being with family and friends, and being in a pristine area were the most important ingredients for a high quality fishing trip (Table 5). The size of fish, the abundance of fish, and variety of fish were also considered to be important. In contrast, the quantity of fish to take home and the value of fish taken home was considered not to be very important by most fishers. This suggests that most fishers were fishing to eat while on their holiday rather than fishing to take fish home.

Attitudes to size and quantity of catch
Most fishers enjoyed their trip whether they caught enough fish to justify the cost or not (Table 6). The responses to the statement “Once I’ve caught enough for a couple of meals I usually stop fishing” (Appendix B, question 11, fourth statement), have a bimodal distribution (Table 6). This suggests the existence of two distinct groups of fishers: one group (agree or strongly agree) was only fishing to catch enough for a couple of meals and the other group (disagree or strongly disagree) preferred to keep fishing to stock up on fish or because they wanted to spend more time fishing.

The responses to the statement "I usually try to catch as many as the bag limit allows" (Appendix B, question 11, fifth statement) also have a bimodal distribution (Table 6). This also suggests the existence of two distinct groups of fishers (as identified above): one group (disagree or strongly disagree) was fishing to catch enough for a couple of meals and the other group (agree or strongly agree) preferred to keep fishing to try to catch the bag limit. Fishers who generally agreed with the above statement generally disagreed with the previous statement and vice versa.

There was a significant difference at the 0.01 level using a chi-squared test, in the response to the two statements between fishers from the Perth metropolitan area and fishers from other parts of WA. Fishers from other parts of WA were less inclined to stop fishing after catching a couple of meals and more inclined to try to catch the bag limit than fishers from the Perth metropolitan area (Table 7). This result should be interpreted with caution as only 88 records could be linked to the demographic information and placed in one of these two groups due to most attitudinal forms not being completed correctly.

Most fishers enjoyed fishing even if they did not catch anything (Table 6). Most fishers released fish once the bag limit had been reached. Most fishers did not believe that there were so many fish in the ocean that they could catch as many as they liked and believed that the recreational catch does affect fish stocks. Most fishers agreed that they can help protect fish stocks by keeping within bag and size limits.

7.0 Demographics

Most fishers interviewed in the Gascoyne region were with their family (206), a group of friends (77) or both (103). Eleven fishers were on their own.

Most fishers interviewed (61%) were from the Perth metropolitan area, 3% lived in the Gascoyne region and 1% were from the eastern states. Those remaining (35%) were from other parts of the state (Figure 10).

Most fishers were in the 40-59 year age group (Figure 11). There were also a large number in the 60+ years age group, suggesting that a large proportion of fishers had retired from the work force. There were few fishers in the 0-19 year age group, despite the survey being conducted during the shool holidays. Of the fishers interviewed, 87% were males and 13% females. The most common number of persons in a party was two (Figure 12).

Six of the fishers interviewed lived in the region and 393 were visiting. Only 54 (14%) fishers were visiting the region for the first time (Figure 13), despite many considering their visit an important new experience (see Table 4). Seventy-eight (20%) of the fishers interviewed visited the Gascoyne region every year (10 visits in the last 10 years).

Most fishers stayed in the region for two weeks or less (Figure 14), although eighteen per cent of fishers spend 50 days or more in the region; these are likely to be retirees.

8.0 Economic impact on the Gascoyne region

Recreational fishing is important for the local economy in the area. Many fishers purchase accommodation, petrol, food, bait and other supplies (Table 8). While it is not possible to estimate the total amount spent in the region by recreational fishers, most individual fishers (62%) reported spending more than $750 in the region, and 25% spent more than $2,000 per trip (Figure 15). Surprisingly, the estimated expenditure for a party (group of people) is not noticeably greater than that for individual fishers interviewed (Figure 16). It is likely that many parties comprised a family group where one person pays all the expenses for the trip.

9.0 Discussion and conclusions

Despite survey limitations and the small sample size, a number of findings can be surmised.

The survey data indicate that pink snapper was the principal species caught in the survey area. Shore fishers, on average, were able to catch fish on 62% of occasions and boat-based fishers were able to catch fish on 58% of occasions. Catch rates indicated that the bag limit regulations rarely impacted on the quantities of fish taken. For pink snapper the bag limit per angler was only effective on 5% of occasions. However, some vessels with large numbers of anglers succeeded in taking significant catches of pink snapper in excess of 20 fish per trip in the inner bays and 50 fish per trip in the oceanic areas.

The minimum size limit for pink snapper of 410 mm at the time of the study had a major impact on the number kept, with 52% of pink snapper caught being subsequently released primarily due to the size limit.

Almost all fishers interviewed believed that they were aware of the regulations and were staying within the bag and size limits for all species. Less than 1% of fishers exceeded the bag limit for a species and few under-size fish were kept.

Most pink snapper from the western and eastern gulfs are not mature at a length of 410 mm. For this reason, a minimum size limit of 410 mm does not provide adequate protection for the breeding stock under conditions of high fishing mortality. It is not possible to predict the effect of imposing limits on the number of fish kept over 70 cm, as has been done for the Perth metropolitan area. The proportion of the catch that was above 70 cm is not known since length–frequency data are inadequate.

There was support for a possession limit, with most fishers (80%) supporting the introduction of an upper limit on the amount of fish and fillets that a person can take away from the region for personal or family use. Most fishers (77%) believed that 19 kilograms or less was a reasonable upper limit per person to take away from the region. Ninety three per cent of fishers indicated that they would support the introduction of additional fishing regulations if these were needed to maintain the quality of fishing in the region, and 67% of fishers believed the same fishing rules should apply for the whole of the Gascoyne region.

The pilot survey was a secondary objective of the regional staff who undertook the survey work. Since statistical survey design techniques involving randomised sampling were not used here, it is not possible to estimate total catch or total effort for the region over the period of the survey.

Some estimates of catch rates were obtained from the data. The methodology was compromised and thus the results were far less useful than a creel survey. A properly designed creel survey approach should be used for future work.

It was not possible to investigate the length–frequency of the pink snapper caught because only the smallest and largest fish per boat were measured, rather than measuring all fish on a boat or taking a random sample from the catch. This is a major deficiency since this biological information is important for assessing the breeding stock and for considering the introduction of new management measures for the region. For this reason, it is not possible to assess the effect of changing the minimum size limit or the introduction of a slot limit (legal size range bounded by upper and lower size limits).

This pilot study has provided limited catch rates, attitudinal, demographic and economic information for boat-based and shore-based anglers in the Gascoyne region during July 1996. If estimates of the total recreational catch and effort are required, it will need to be followed up with a properly designed creel survey of boat- based and shore-based fishing in the region for a full twelve-month period.

10.0 Acknowledgements

Andrew Bartleet, Manager Gascoyne Region (Fisheries WA), coordinated the data collection. Most of the Fisheries Officers working in the region at the time contributed to the data collection, resulting in the successful completion of the field survey. Norm Hall, Nick Caputi, Jim Penn, Gary Jackson and Rod Lenanton reviewed the draft manuscript and provided many useful comments.

11.0 References

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12.0 Tables

Table 1 Fish finding equipment on recreational fishing boats.

Equipment on boat	No. of boats with equipment	No. of boats without equipment	No response
B&W echo-sounder	113	153	13
Colour echo-sounder	68	197	14
GPS	90	180	9

Table 2 Catch rates of pink snapper (number of fish kept per line per hour) for boat-based fishing.

Location	No. of interviews	Catch rate (legal-size kept)	Number kept
Denham Sound			
Denham	43	0.54	348
Eagle Bluff	2	0.04	1
Dirk Hartog Island	5	0.98	46
Sunters Coral (Dirk Hartog Is.)	2	0.51	18
Freycinet Estuary			
Nanga	21	0.28	82
White Island	10	0.37	67
Baba Head	4	1.90	57
Tamala	11	0.47	38
Carrarang	2	0.33	16
Eastern Gulf			
Monkey Mia	32	0.28	115
Gladstone	4	0.76	17
Oceanic			
Levillain Shoal	2	0.93	42
South Passage	3	0.27	8
Steep Point	4	0.13	9
Other Locations			
Three Mile Camp	5	0.06	6
Gnaraloo	6	0	0
Coral Bay/Warroora	13	0.02	2
Exmouth	6	0	0

Table 3 Number of pink snapper kept per boat.

Number of pink snapper kept	Number of boats			
	Denham Sound	Freycinet Estuary	Eastern Gulf	Oceanic
0	32	21	26	19
1	6	7	3	1
2	-	3	-	2
3	4	2	3	1
4	3	-	1	-
5	2	4	-	1
6	3	3	2	1
7	1	2	-	1
8	2	3	-	2
9	-	2	-	-
10	2	1	1	-
11	-	1	-	-
12	4	1	-	1
13	1	1	-	-
14	1	2	-	-
15	1	-	-	-
16	1	1	3	-
17	-	-	-	-
18	1	-	-	-
19	-	1	-	-
20	1	-	1	-
21	-	-	-	-
22	-	-	-	-
23	2	-	-	-
24	1	2	-	-
25	2	-	-	-
26	1	-	1	-
27	-	-	-	-
28	-	-	-	-
29	-	-	-	-
30	-	-	-	1
35	-	1	-	-
60	-	-	-	1
80	1	-	-	-

Table 4 Reasons for visit to the Gascoyne area.

Reason for visit	Not very important	Reasonably important	Important	Very important	Extremely important	Not recorded
Camping holiday	55	34	60	145	102	3
Environment and climate	3	11	45	206	132	2
Fishing	24	29	92	128	125	1
New experience	91	45	104	101	37	21
Sightseeing & tourism	86	63	100	117	31	2

Table 5 Items important for high quality fishing trip.

Item	Not very important	Reasonably important	Important	Very important	Extremely important	Not recorded
Size of fish	66	38	107	116	71	1
Environment & climate	2	13	47	230	104	3
Abundance of fish	55	76	102	122	43	1
Variety of fish	71	62	126	118	21	1
Fish to take home	213	68	67	42	8	1
Friends & family	10	11	61	195	117	5
Value of fish	261	54	45	32	5	2
Pristine area	10	21	73	185	109	1
Low cost	77	53	94	97	76	2

Table 6 Extent to which fishers agreed or disagreed with the following statements.

Question	Strongly disagree	Disagree	Not sure	Agree	Strongly agree	Not recorded
Know the rules	3	7	38	253	97	1
Information hard to get	101	243	21	27	5	2
Don’t catch enough fish	178	180	12	21	6	2
Stop fishing when caught enough	13	127	41	167	50	1
Catch bag limit	46	129	17	181	23	3
Enjoy fishing even if don’t catch fish	178	180	12	21	6	2
Release fish after bag limit reached	25	30	32	201	110	1
Catch as many as we like	137	201	25	28	4	4
Won’t affect fish stocks	65	156	80	85	11	2
Bag & size limits	1	0	13	231	153	1

Table 7 Extent to which fishers from the Perth metropolitan area and other WA areas agreed or disagreed with the following statements.

	Stop fishing when caught enough		
Try to catch bag limit	**Disagree**	**Agree**	**Total**
Perth Metropolitan			
Disagree	2	21	23
Agree	18	5	23
Other WA areas			
Disagree	6	11	17
Agree	21	4	25
Total	47	41	88

Table 8 Number of fishers purchasing goods and services in the Gascoyne region.

Goods or service	**Number of fishers**	**Percentage**
Petrol	392	98%
Bait	275	69%
Camping fees	328	82%
Alcohol	271	68%
Food	363	91%
Other	296	74%

13.0 Figures

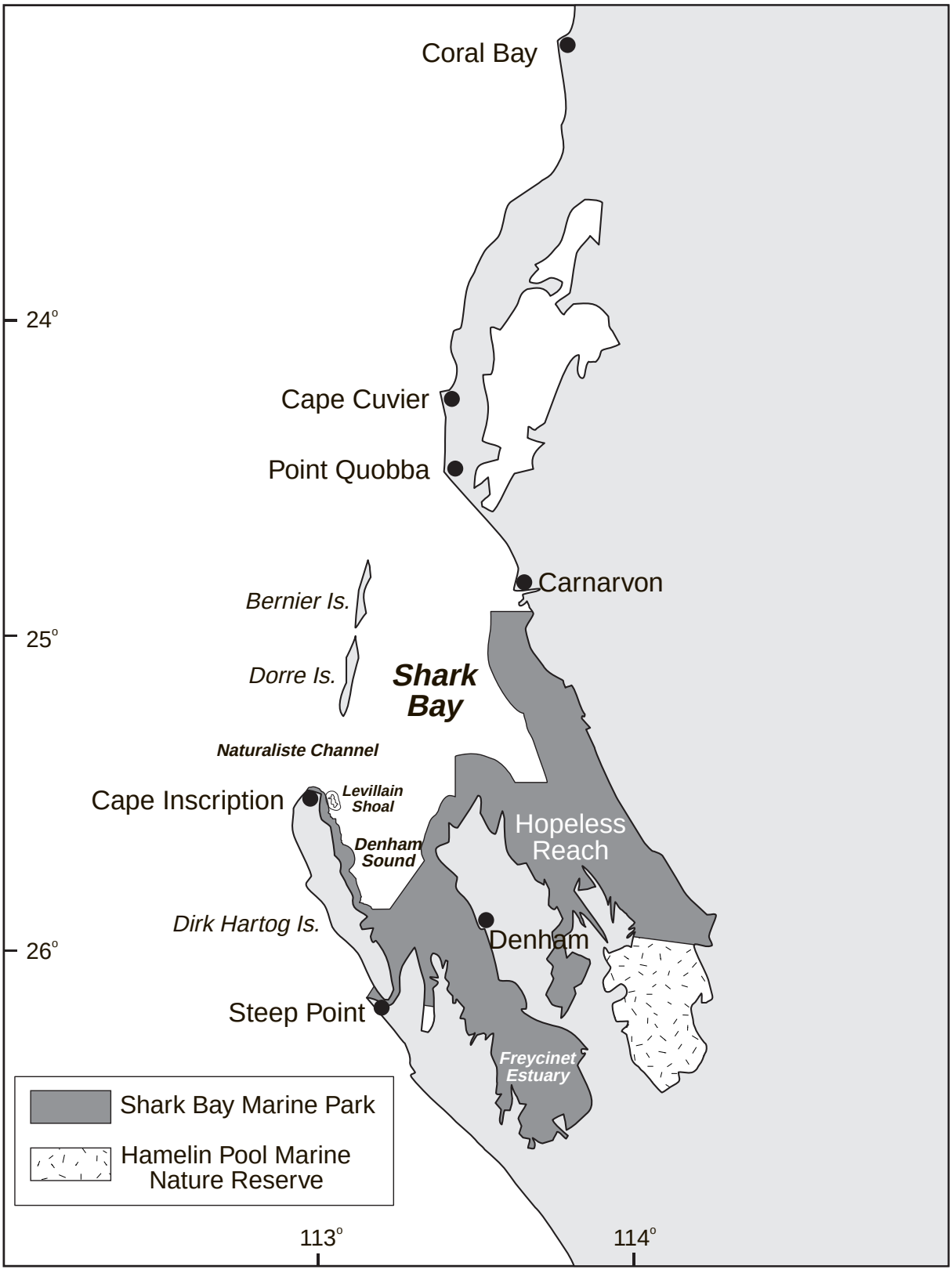


Figure 1 Shark Bay, Western Australia.

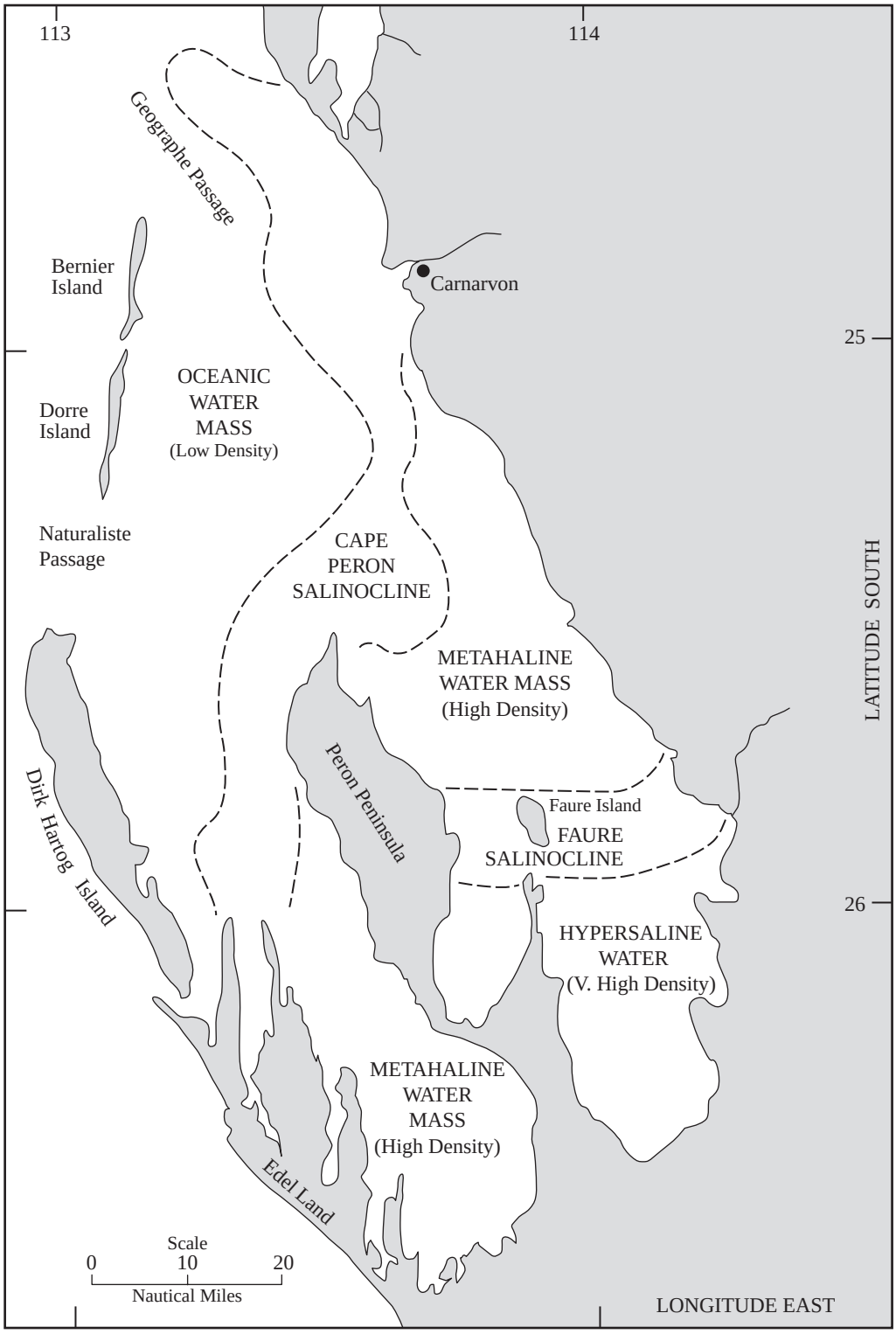


Figure 2 Distribution of major salinoclines in Shark Bay waters; salinoclines are viewed as interfaces which partition the embayment waters into three major types: oceanic, metahaline and hypersaline. (Adapted from Logan, 1971).

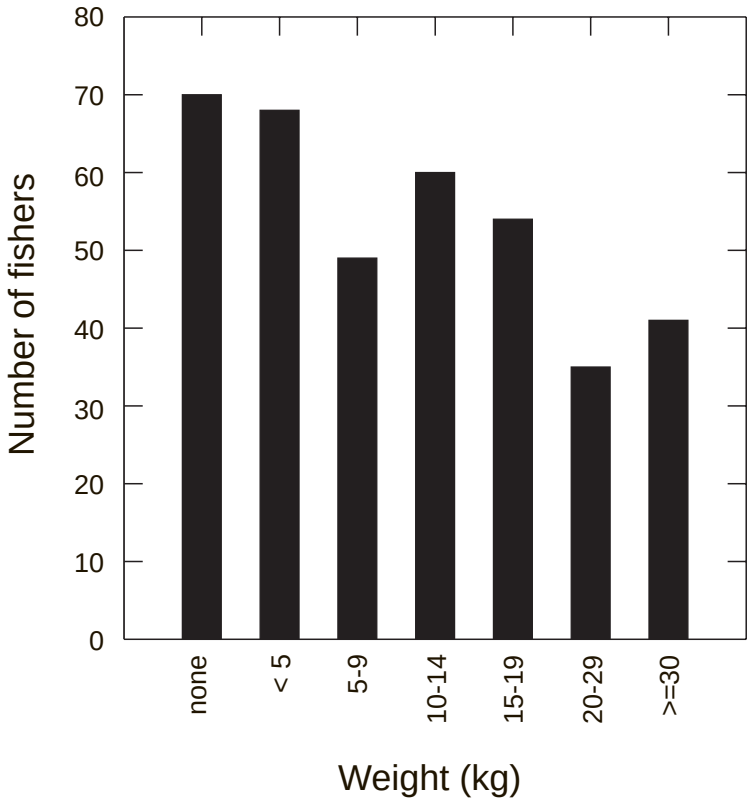


Figure 3 Number of fishers taking home fish/fillets from Gascoyne region in previous trips by weight category (n = 377).

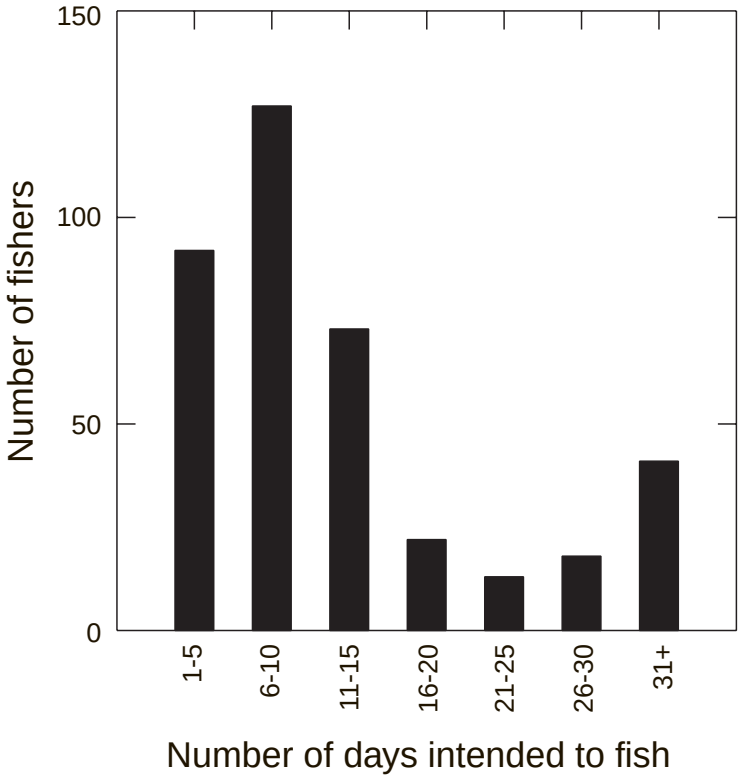


Figure 4 Number of days fishers intended to fish in the Gascoyne region.

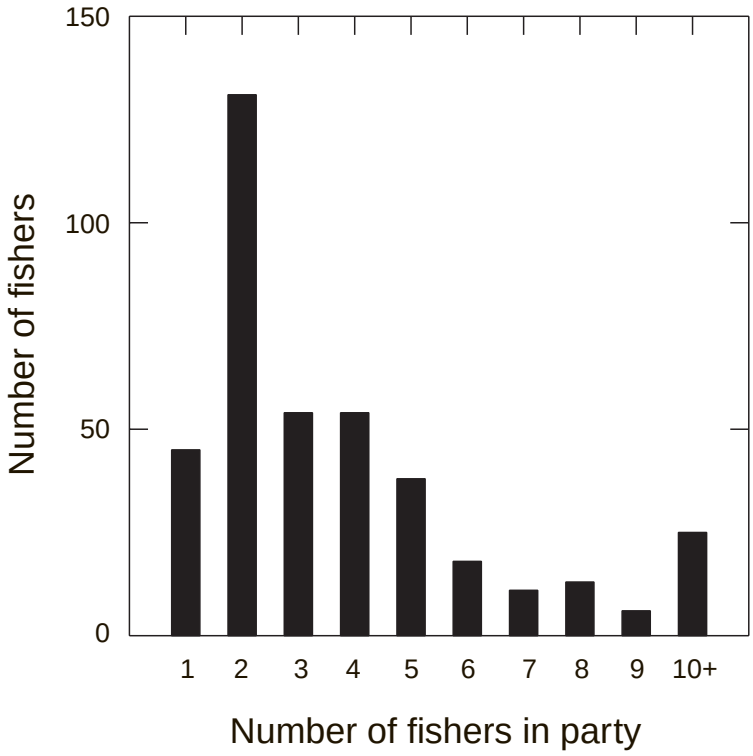


Figure 5 Number of fishers in party.

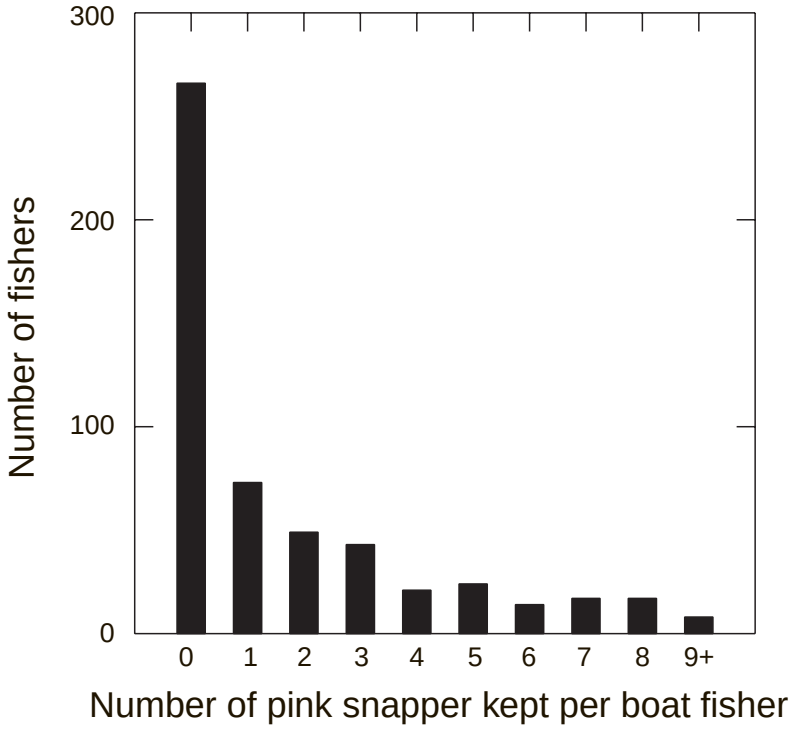


Figure 6 Number of pink snapper kept by boat fishers.

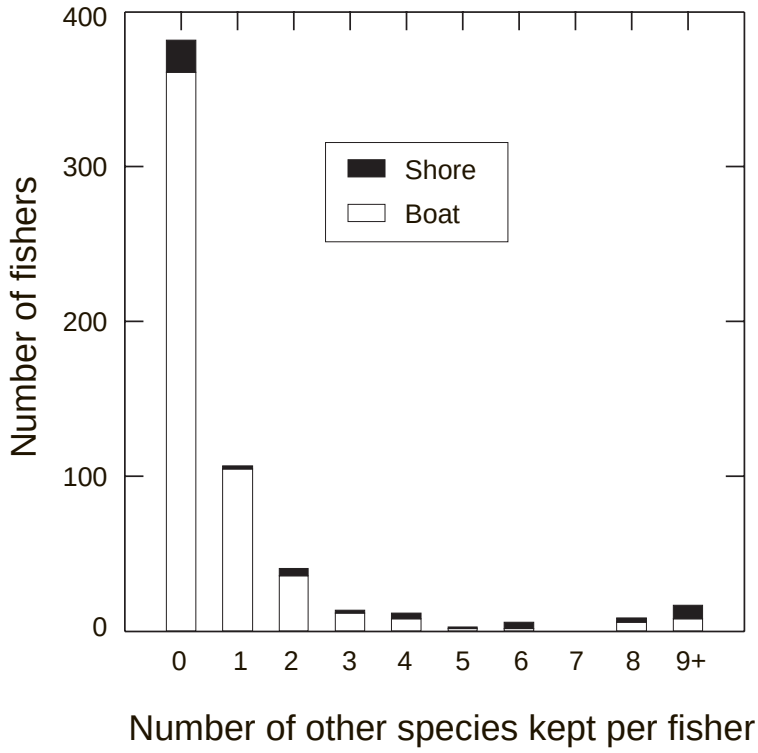


Figure 7 Number of fish of other species kept by fishes.

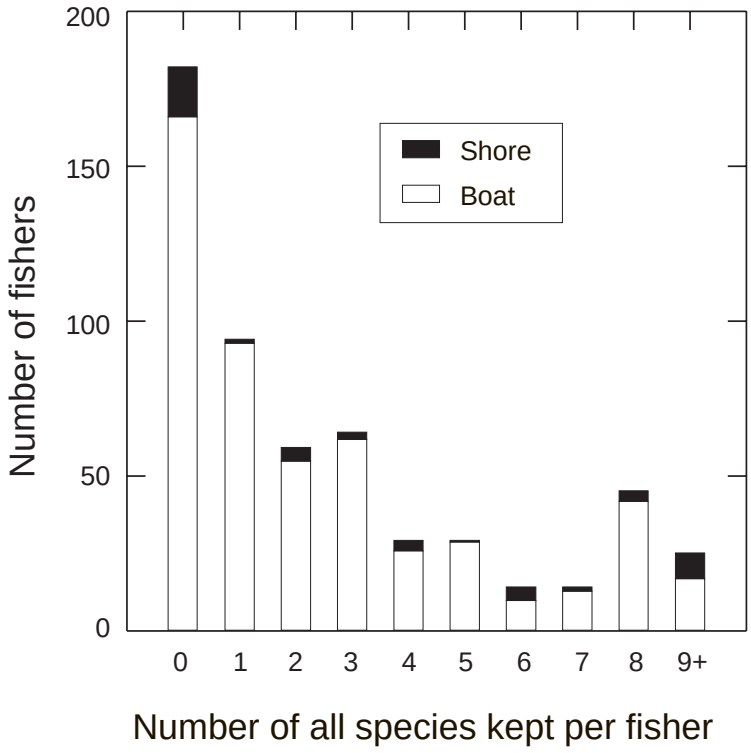


Figure 8 Number of fish (all species) kept by fishers.

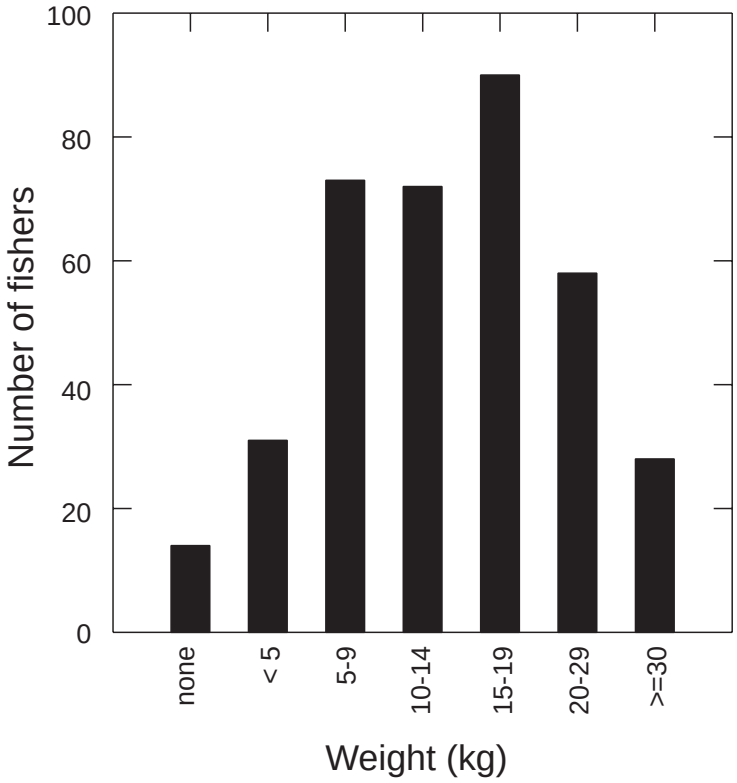


Figure 9 Fishers' impressions of what was a reasonable upper limit of fish/fillets for a person to take away from the Gascoyne region for personal of family use (n = 366).

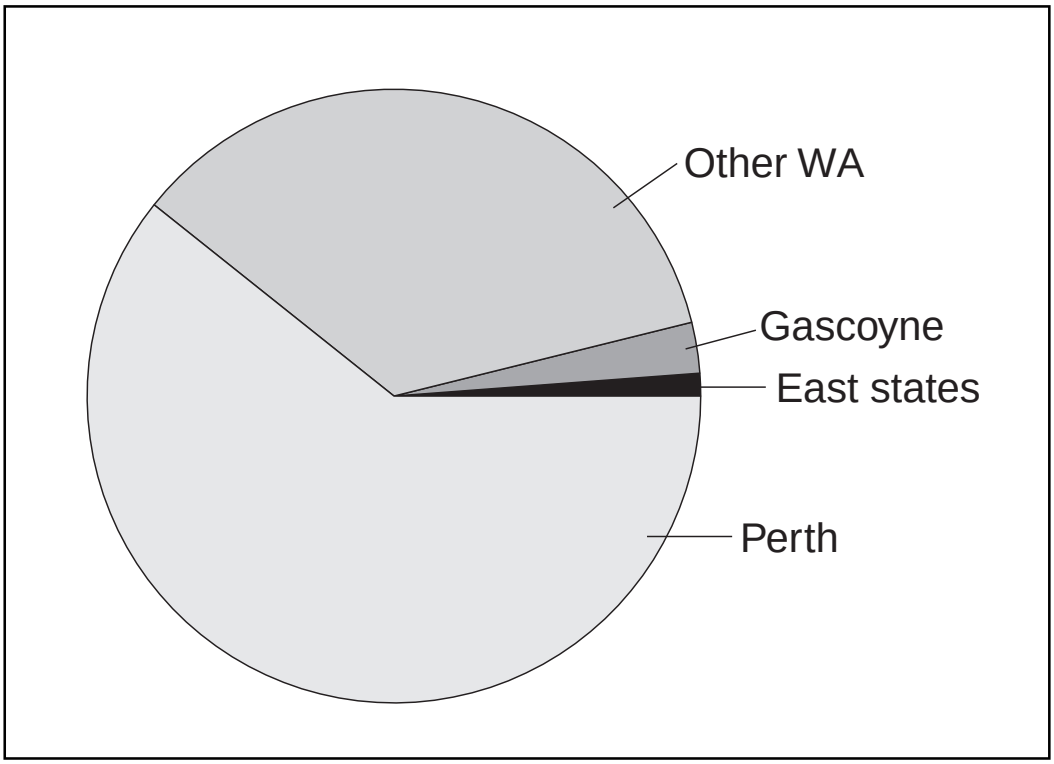


Figure 10 Place of residence for fishers interviewed.

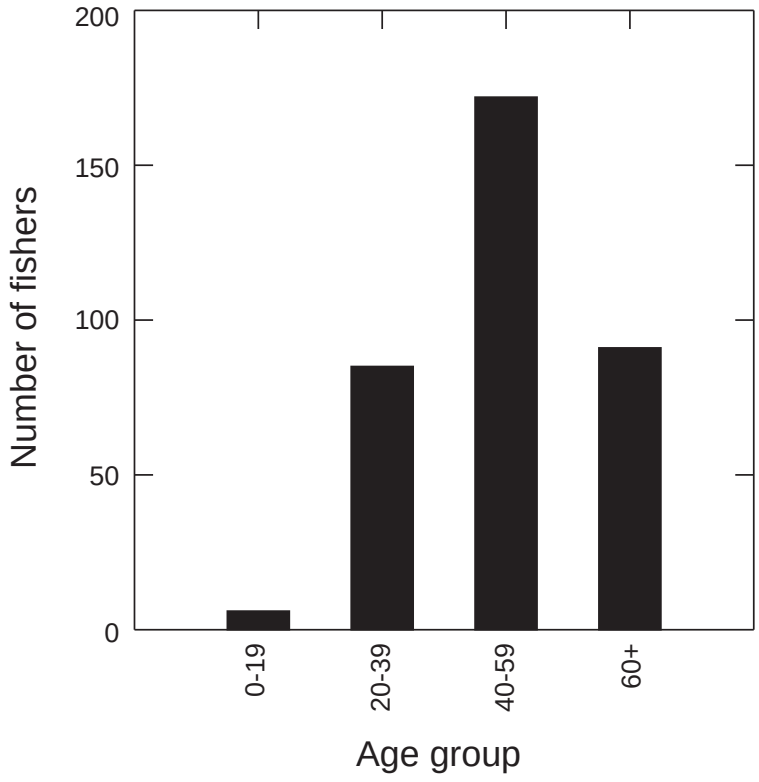


Figure 11 Number of fishers interviewed by age group.

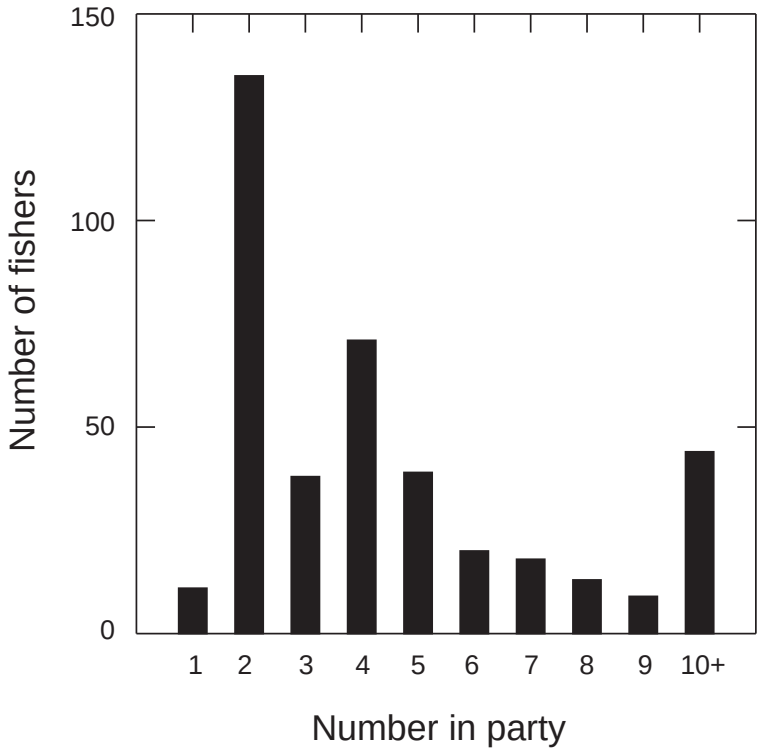


Figure 12 Number of persons in party.

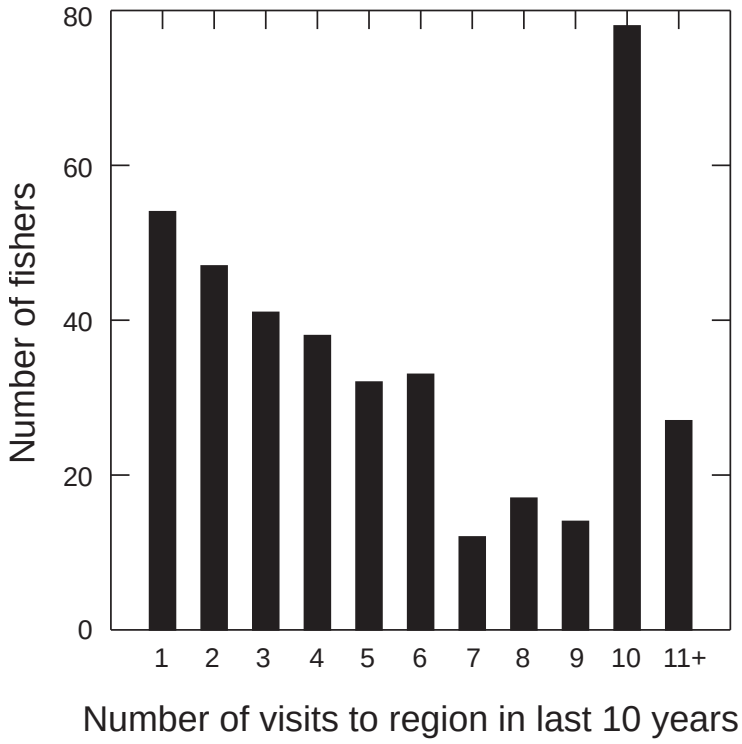


Figure 13 Number of visits to the Gascoyne region in the last ten years.

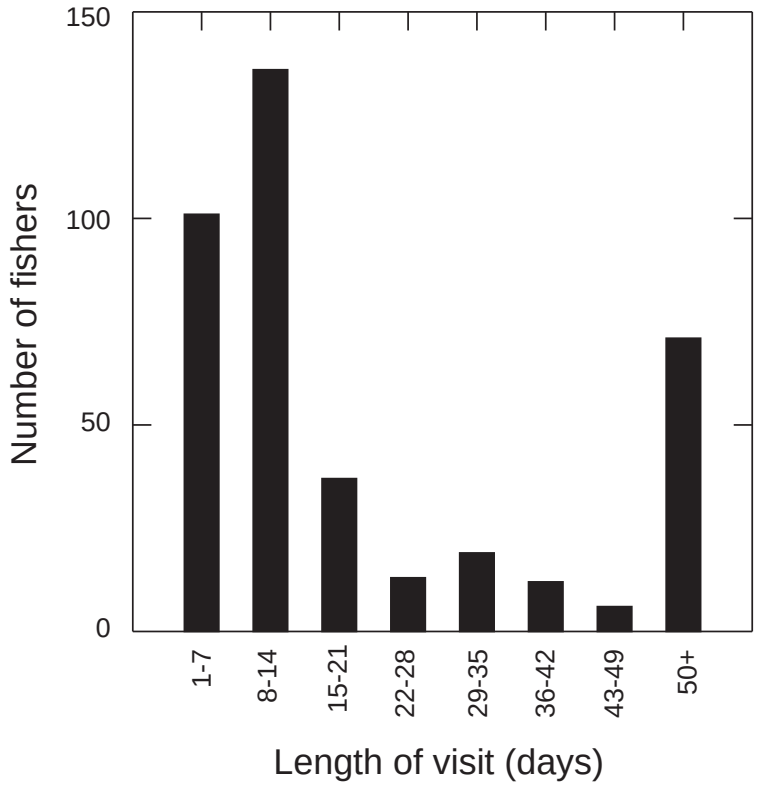


Figure 14 Length of visit to the Gascoyne region.

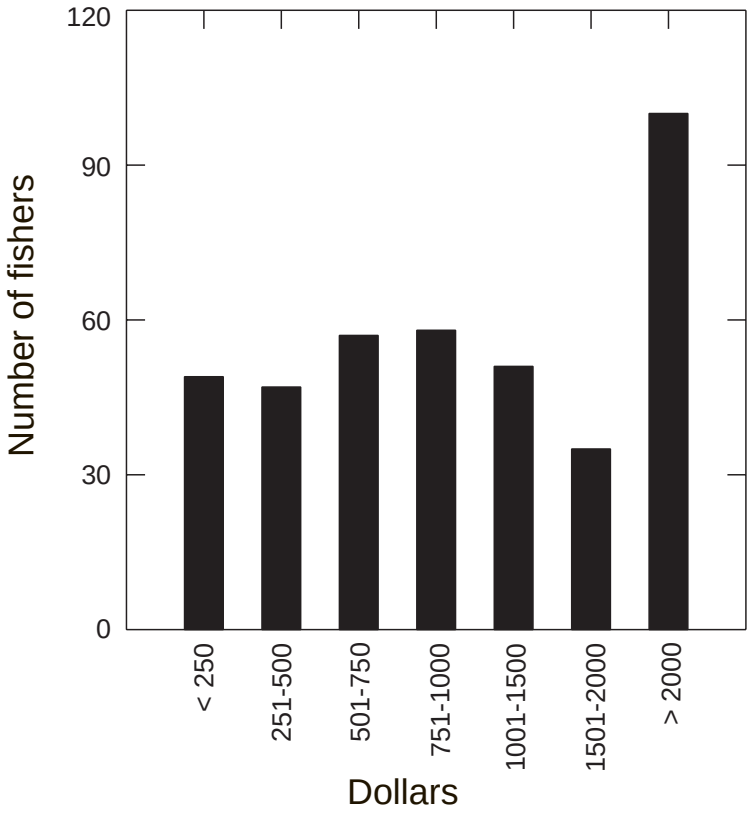


Figure 15 Amount spent in the Gascoyne region by an individual.

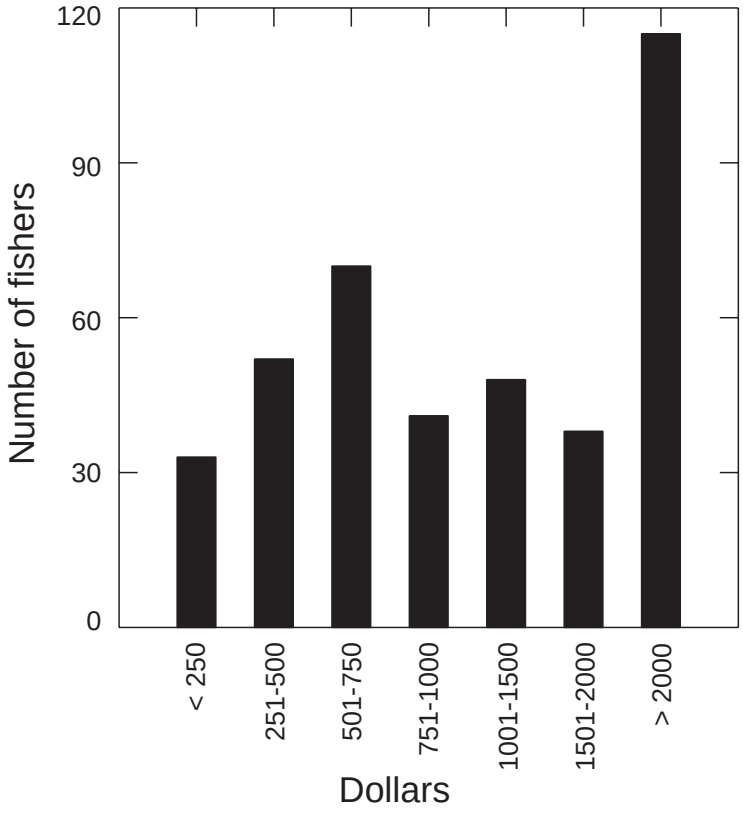


Figure 16 Amount spent in the Gascoyne region by a party.

14.0 Appendices

14.1 Appendix A: Catch and effort questionnaire

RECREATIONAL FISHING SURVEY

Name _____

DATE ____/____/____ LOCATION _____ START TIME _____ am/pm FINISH TIME _____ am/pm

Total number of shore-based fishers

Total number of boats

Total number of trailer

On arrival	On departure

INTERVIEWS

WIND						SEAS					CLOUD COVER AND RAINFALL				
Calm 1	Light 2	Mod 3	Strong 4	Gale 5	DIRECT	Calm 1	Slight 2	Mod 3	Rough 4	V.Rough 5	Cloud %	Nil 1	Light 2	Moderate 3	Heavy 4

Fisher number	Time of interview	Sex	Age Group	Postcode (HOME)	Angling Clubs	Time spent fishing	Boat/Shore/Dive	Boats fishers only: Boat departure time	Boats fishers only: Block No.	Boats fishers only: Boat arrival time	Boats fishers only: Number in BOAT	Number of lines useds	Nets (Crab,Set,Haul)	Kept/released	Kept/released	Kept/released	Kept/released	Kept/released	Kept/released	Undersize Kept	Undersize Kept	Interviewed before	Size of pink snapper

14.2 Appendix B: Attitudinal questionnaire

ATTITUDINAL QUESTIONNAIRE
GASCOYNE REGION

Fisher no _____

Date of interview: _____

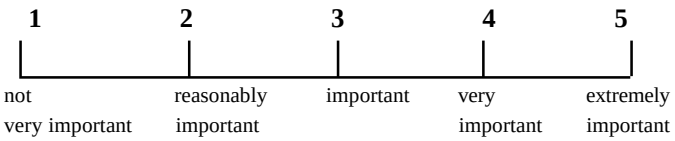
Location of interview: _____

Introduction: My name is ..... from the Fisheries Department of WA. We are conducting a survey about recreational fishing in the area.

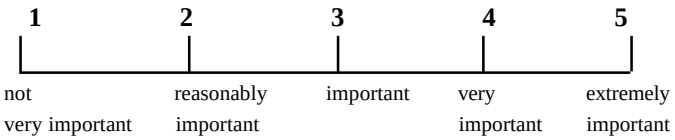
_____

1. How often have you visited the Gascoyne Region in the last 10 years: _____ visits
2. How long will you stay in the Gascoyne Region this trip?: _____ days
3. Do you think that the same fishing rules apply throughout the Gascoyne Region? (prompt: the Gascoyne Region extends from the bottom of Shark Bay to the North West Cape) _____ (Y/N)
4. Are you here with:
   a) Family?
   b) A group of friends?
   c) Both?
   d) On your own?
5. How many days do you intend to fish? _____ days
6. How many in your party? _____
7. How many in your party go fishing while here? _____
8. How many fishing trips to regions other than where you live do you make per year? _____
9. Please circle the following reasons for your visit to the area as not important, important, or very important:

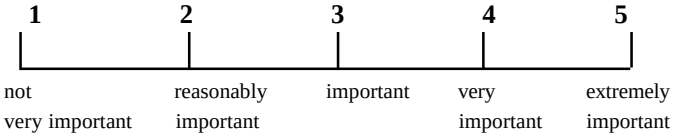
For a camping holiday



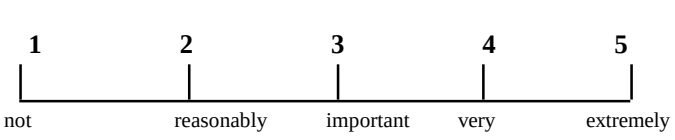
Enjoy pleasant environment and climate



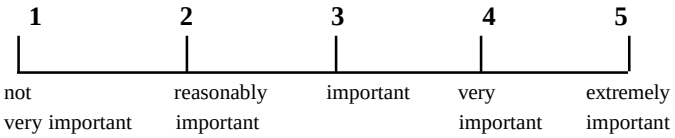
Go fishing



First time in area - offers a new experience

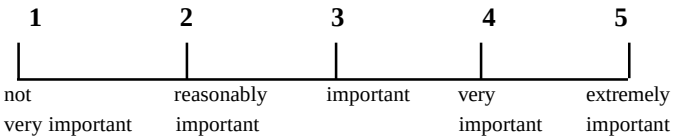


Sight-seeing/tourism

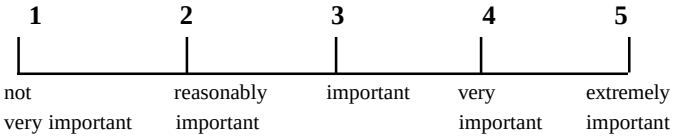


10. Please circle the following items as very important, important, or not important for a high quality fishing trip:

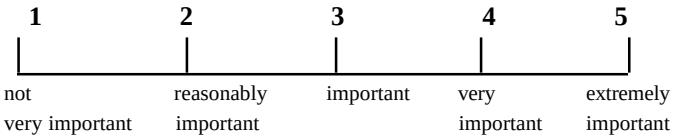
Size of fish caught



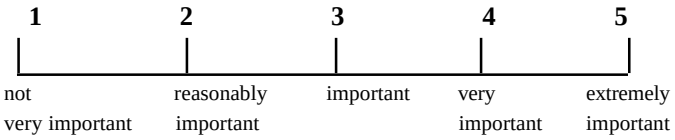
Enjoyment of pristine environment and a pleasant climate



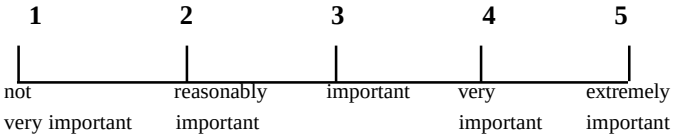
Abundance of fish



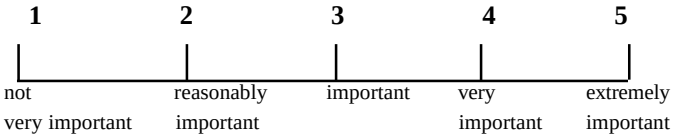
Variety of fish species available



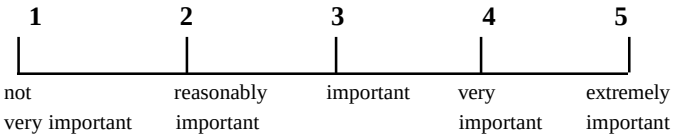
Large quantiity of fish to take home



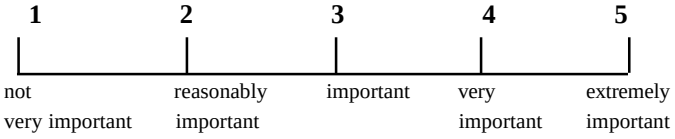
Opportunity to share experience with friends or family



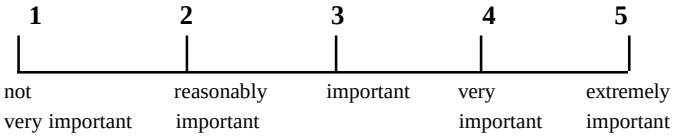
Value of fish taken home



Experience of fishing in a pristine and uncrowded area

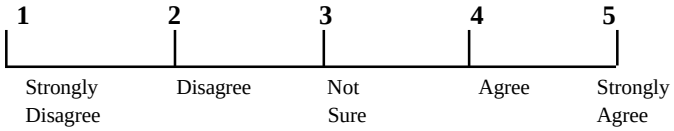


Low cost holiday

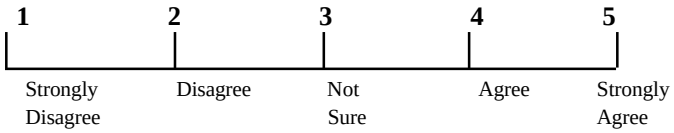


11. To what extent do you agree or disagree with the following statements about fishing in Gascoyne?

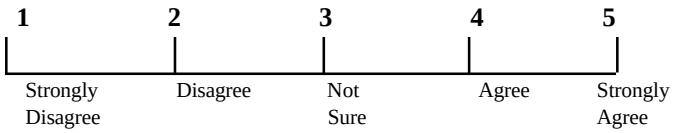
I know the current fishing rules for the fish I catch, and try to keep up to date



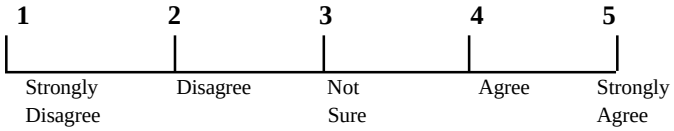
Information on fishing rules is hard to get



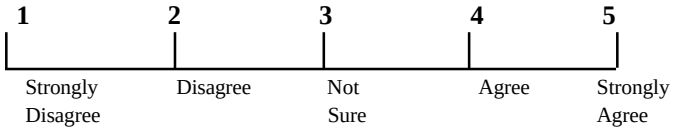
If I don't catch enough fish to justify the costs, I don't really enjoy the trip



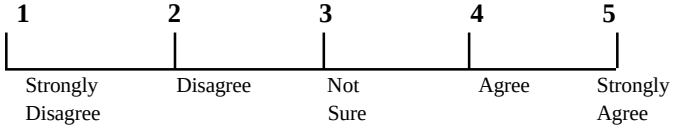
Once I've caught enough for a couple of meals I usually stop fishing



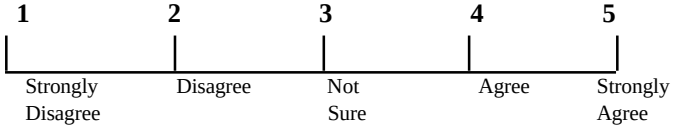
I usually try to catch as many fish as the bag limit allows



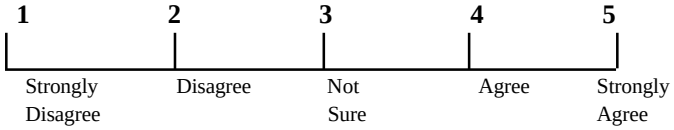
I enjoy fishing even if I don't catch anything



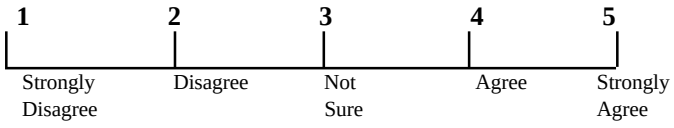
Once I have caught the bag limit for a species I usually release the rest



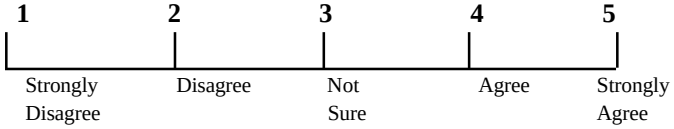
There are so many fish in the area we can catch as many as we like



The recreational fishing catch is too small to affect fish stocks



Individual fishers can help protect fish stocks by keeping within bag size limits



13. Do you believe there should be an upper limit on the quantity of fish people are allowed to take away from this area when they leave? (Y/N) _____

14. Would you support additional fishing regulations in this area if these were needed to maintain the quality of fishing here? (Y/N) _____

15 Do you have access to a freezer on this trip (Y/N) _____

16. How much fish or fillets do you usually take home with you in your freezer or esky from fishing trips to this area?

    a) None
    b) Less than 5 kilos
    c) 5 - 9 kg
    d) 10 - 14 kg
    e) 15 - 19 kg
    f) 20 - 29 kg
    g) 30 kg or more
    h) Don't know

17. Given that frozen fish has a freezer life of approximately 3 - 4 months, what quantity, do you believe is a reasonable upper limit per person to take away from the area for personal or family use?
    (Prompt - approximately 5 large serves of filleted fish to the kilo)

    a) none
    b) Less than 5 kilos
    c) 5 - 9 kg
    d) 10 - 14 kg
    e) 15 - 19 kg
    f) 20 - 29 kg
    g) 30 kilos or more
    h) Don't know

18. How many times have you seen a Fisheries Officer or Fisheries Patrol in this region in the last 10 years? _____

19. Approximately how much will you spend on this fishing trip

    a) less than $250
    b) $251 - $500
    c) $501 - $750
    d) $751 - $1,000
    e) $1,001 - $1,500
    f) $1,500 - $2,000
    g) more than $2,000

20. Approximately how much will your party spend in the Gascoyne region while here? (Circle letter)

    a) less than $250
    b) $250 - $499
    c) $500 - $749
    d) $750 - $999
    e) $1,000 - $1,499
    f) $1,500 - $1,999
    g) more than $2,000

21. What goods or services did you buy in the Gascoyne Region?

- Petrol
- Bait
- Camping fees
- Alcohol
- Food
- Other

Section for boats

22. Equipment on boat:
    a) Black & white echo sounder (Y/N) _____
    b) Colour echo sounder (Y/N) _____
    c) Global Positioning System (GPS) (Y/N) _____

Thank you for your time and assistance. Your answers will help us to manage this special environment better.

14.3 Appendix C: Boat-based catch by species

Common name	Total kept	Total released	Total catch	Undersize kept	Catch rate (per line hour)
Snapper, Pink	1018	1129	2147	1	0.417
Emperor, Spangled	231	190	421	-	0.095
Emperor, Blue-lined	27	69	96	-	0.011
Mullets - General	93	0	93	-	-
Snappers/Bream	42	45	87	-	0.017
Tunas/Mackerels	46	19	65	-	0.019
Crab, Blue manna	23	40	63	-	-
Trevally, Skipjack	24	34	58	-	0.010
Emperor, Sweetlip	15	28	43	-	0.006
Groper, Baldchin	22	15	37	-	0.009
Tuskfish, Blackspot	3	32	35	-	0.001
Sharks (not identified)	23	8	31	-	0.009
Blowfish, Northwest	4	25	29	-	0.002
Cods - General	24	2	26	-	0.010
Butterfish, Western	5	20	25	-	0.002
Whiting	21	4	25	-	0.009
Tailor	14	9	23	-	0.006
Emperor, Red	15	2	17	-	0.006
Cod, Chinaman	7	10	17	-	0.003
Mulloway	6	9	15	-	0.002
Longtom	3	12	15	-	0.001
Lizardfishes - General	4	11	15	-	0.002
Flatheads	9	6	15	-	0.004
Snook	12	0	12	-	0.005
Sweetlips - General	9	0	9	-	0.004
Rockcod, Rankin's	6	0	6	-	0.002
Mackerel, Shark	5	0	5	-	0.002
Trevally, Golden	0	4	4	-	0.000
Buffalo Bream, Western	0	4	4	-	0.000
Toadfishes	2	2	4	-	0.001
Mackerel, Narrow Barred Spanish	1	2	3	-	0.000
Cobia	2	1	3	-	0.001
Wrasse/Gropers	3	0	3	-	0.001
Unknown species	1	1	2	-	0.000
Samsonfish	1	1	2	-	0.000
Western Australian Jewfish	1	1	2	-	0.000
Seaperch, Stripey	2	0	2	-	0.001
Rockcod, Tomato	1	0	1	-	0.000
Squids (unidentified)	1	0	1	-	0.000
Queenfish, Talang	1	0	1	-	0.000
Trout, Coral	1	0	1	-	0.000
Morwongs	1	0	1	-	0.000

14.4 Appendix D: Shore-based catch by species

Common name	Total kept	Total released	Total catch	Undersize kept	Catch rate (per line hour)
Whiting	212	73	285	-	0.353
Snapper, Pink	24	11	35	-	0.029
Mullets - General	32	0	32	-	0.038
Trevally, Skipjack	17	14	31	-	0.020
Queenfish, Talang	21	4	25	-	0.025
Bream, Yellowfin	13	12	25	2	0.016
Dart, Common	20	2	22	-	0.024
Hardyheads/Silversides	20	1	21	-	0.024
Crab, Blue manna	8	10	18	-	-
Tailor	8	2	10	-	0.010
Flatheads	9	0	9	-	0.011
Snappers/Bream	7	1	8	-	0.008
Lizardfishes - General	8	0	8	-	0.010
Emperor, Spangled	4	3	7	-	0.005
Cod, Chinaman	7	0	7	-	0.008
Butterfish, Western	5	0	5	-	0.006
Unknown Species	1	4	5	-	0.001
Cods - General	5	0	5	-	0.006
Tunas/Mackerels	3	1	4	-	0.004
Sharks (not identified)	3	0	3	-	0.004
Longtom	3	0	3	-	0.004

14.5 Appendix E: Recorded catch by species

Common name	Total kept	Total released	Total catch	Undersize kept
Snapper, Pink	1042	1140	2182	1
Emperor, Spangled	234	193	427	-
Whiting	254	81	335	-
Mullets - General	125	0	125	-
Emperor, Blue-lined	27	69	96	-
Snappers/Bream	49	46	95	-
Trevally, Skipjack	41	48	89	-
Crab, Blue manna	31	50	81	-
Tunas/Mackerels	49	20	69	-
Emperor, Sweetlip	15	28	43	-
Groper, Baldchin	22	15	37	-
Tailor	22	11	33	-
Tuskfish, Blackspot	3	32	35	-
Sharks (not identified)	26	8	34	-
Cods - General	29	2	31	-
Butterfish, Western	10	20	30	-
Blowfish, Northwest	4	25	29	-
Queenfish, Talang	22	4	26	-
Flatheads	18	6	24	-
Bream, Yellowfin	13	12	25	2
Cod, Chinaman	14	10	24	-
Lizardfishes - General	12	11	23	-
Dart, Common	20	2	22	-
Hardyheads/Silversides	20	1	21	-
Longtom	6	12	18	-
Emperor, Red	15	2	17	-
Mulloway	6	9	15	-
Snook	12	0	12	-
Sweetlips - General	9	0	9	-
Unknown species	2	5	7	-
Rockcod, Rankin's	6	0	6	-
Mackerel, Shark	5	0	5	-
Buffalo Bream, Western	0	4	4	-
Trevally, Golden	0	4	4	-
Toadfishes	2	2	4	-
Mackerel, Narrow Barred Spanish	1	2	3	-
Cobia	2	1	3	-
Wrasse/Gropers	3	0	3	-
Seaperch, Stripey	2	0	2	-
Samsonfish	1	1	2	-
Western Australian Jewfish	1	1	2	-
Morwongs	1	0	1	-
Rockcod, Tomato	1	0	1	-
Trout, Coral	1	0	1	-
Squids (unidentified)	1	0	1	-