

**Monitoring of recreational catch and effort  
during/after the 2005 Tauwitchere fishway trial.**

Report to The Department of Water, Land and  
Biodiversity Conservation and Primary Industries and  
Resources, South Australia.

March 2006

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## **EXECUTIVE SUMMARY**

- 1 This report describes the catch and effort of recreational fishers during and after an assessment of a vertical slot fishway at Tauwitchere barrage during January-February 2005. Monitoring of catch and effort was required because redirection of recreational fishing effort to Tauwitchere could have caused fish numbers to be underestimated during the fishway trial.
- 2 Recreational fishing was the single most popular boating activity in the Coorong and accounted for 46% of all boat launches. Weekly percentages of boats launched for the primary purpose of fishing accounted for 39 and 63% of all launches in January and February, respectively.
- 3 Fishers used rod and line exclusively with an overall average of 2.2 fishers per boat who fished for 5-7 hours.
- 4 The average surveyed daily fishing effort was 17.2 and 7.3 fisher days during January (flow) and February (non-flow), respectively. This was because there was more effort in the Murray Mouth region in January.
- 5 The average surveyed daily fishing effort at Tauwitchere was 5.0 and 4.5 fisher days during January (flow) and February (non-flow), respectively.
- 6 All fishers at Tauwitchere targeted mullocky. Retained catches were irregular and small and in January and February only 12% of recreational fishers reported harvesting fish. Mullocky, yellow-eye mullet and Australian salmon dominated catches. Black bream and congolli were neither targeted nor reported as catch.
- 7 Awareness of the fishway trial and freshwater flow at Tauwitchere barrage was very low amongst recreational fishers.
- 8 This survey showed that both recreational effort and catches were low at Tauwitchere during assessment of the vertical slot fishway. There is little evidence to imply that results of the fishway assessment were compromised by a spatial shift in recreational effort.

# 1 INTRODUCTION

## 1.1 Aim

The aim of this work was to monitor recreational catch and effort in the Coorong lagoons during and after performance assessment of the vertical slot fishway at the Tauwitchere barrages (January 2005 to February 2005).

## 1.2 Background

In late December 2004, an environmental water allocation of 1.2 GL allowed the tri-state Barrage Fishways Assessment Team to evaluate the performance of a vertical-slot fishway at Tauwitchere barrage (Figure 1-1). Following a pilot study in December 2004 a sampling program commenced on 1<sup>st</sup> January 2005 to evaluate the 'downstream' and 'upstream' fish traps. A full description of the vertical slot fishway and the evaluation of the fishway may be found in Stuart et al (2005).

In order to determine the effectiveness of the fishway, data were collected on the number and sizes of fish entering and ascending the fishway. This allowed the first critical assessment of the fishway function and recommendations to be made for future fishways at the Murray barrages. Several estuarine fish species that are targeted by recreational fishers are known to use freshwater habitat, i.e. black bream (*Acanthopagrus butcheri*), congolli (*Pseudaphritis urvilli*), greenback flounder (*Rhombosolea tapirina*) and mullet (*Argyrosomus japonicus*). The release of freshwater during evaluation of the fishway may have acted as an attractant to these species causing them to aggregate downstream of the fishway. Potentially, this may have resulted in greater susceptibility of these species to fishing pressure by recreational fishers had recreational effort been redirected to Tauwitchere during the fishway trial. This may have resulted in an underestimate of fish using the vertical slot fishway. Consequently, it was necessary to monitor recreational catch and effort in the Coorong lagoons to determine if high levels of recreational fishing effort occurred in the vicinity of the Tauwitchere barrages during the fishway assessment period.

### 1.3 Fishery in the Coorong lagoons

The Coorong is the largest area of estuarine habitat in South Australia and comprises two shallow, hyper-saline lagoons that are 100 km long, 2-3 km wide, and approximately 2-3m deep (Noye 1974).

The lagoons support both recreational and commercial fisheries. Recreational fishers have open access to the fish resource using hook and line. Also, 2,258 recreational gill nets, are registered with PIRSA Fisheries for use in the Coorong (Ferguson and Ward 2003; Higham *et al.* 2005). Recreational net fishing was not surveyed in this study because it is prohibited in Area 1 from 1 November to 31 March inclusive each year (Figure 1-1).

A small commercial fishery (37 licences) also targets mullet, yellow-eye mullet and black bream, predominantly with gill nets, throughout the Coorong.

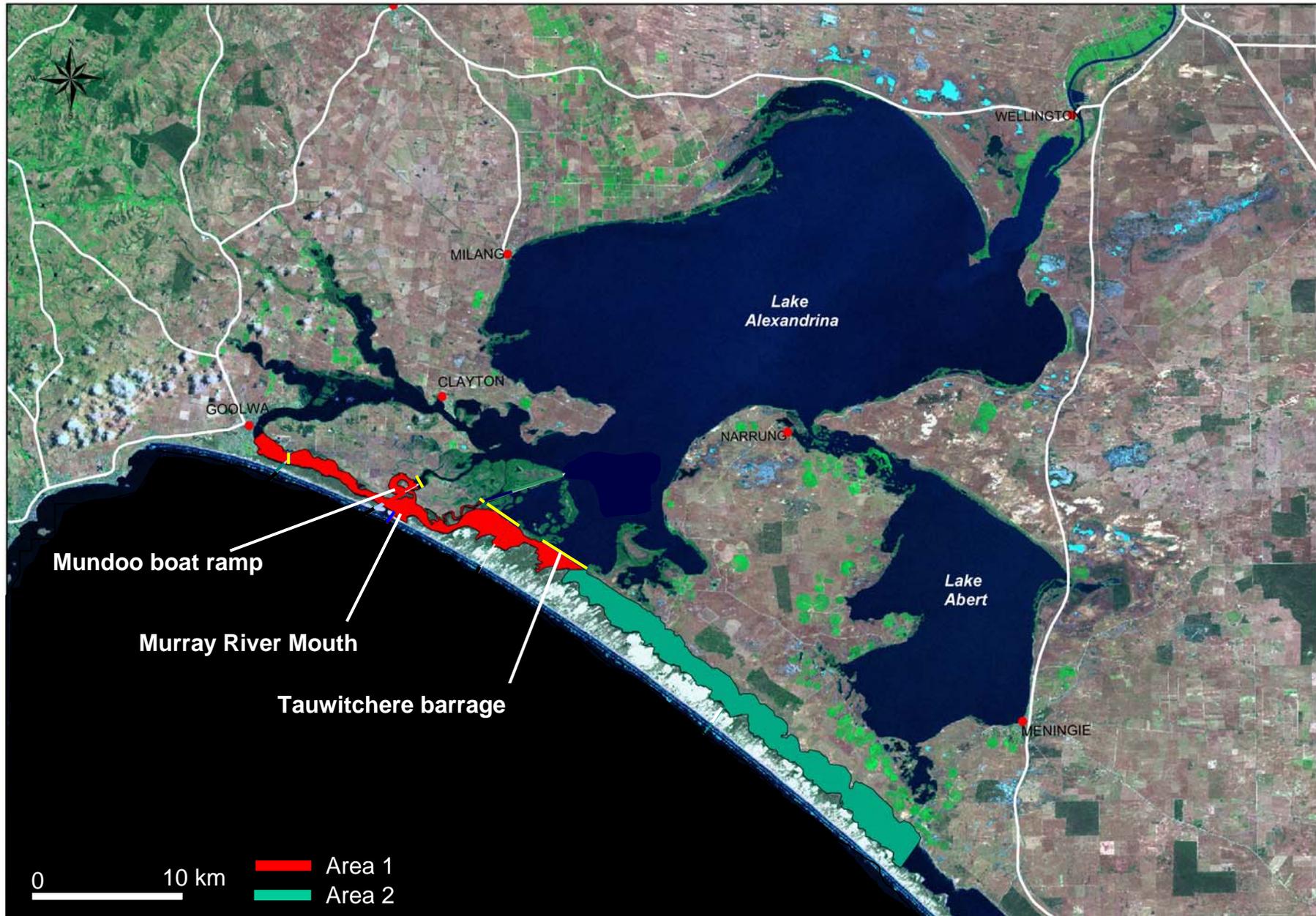


Figure 1-1. The Lakes and Coorong region showing Mundoo boat-ramp, Tauwichee barrages and Areas 1 and 2.

## 2 METHODS

Dredging operations at the Murray Mouth have been continuous since October 2002 and these operations prevented boat access to the Murray Mouth area from the boat ramp at Sugars Beach for the duration of this study. As such, the Mundoo boat ramp was the only ramp in the vicinity of Goolwa and Adelaide where boats could be launched for fishing near Tauwitchere.

Water was released over Tauwitchere barrage from December 2004 to 3 February 2005 and evaluation of the vertical slot fishway commenced on 1 January 2005 and continued until 4 February 2005 (Ivor Stuart, Arthur Rylah Institute, pers. comm.). Surveys of recreational catch and effort were conducted over 6 days in January when there was freshwater flow over the fishway (14-26 January, 17% of days) and 4 days in February (16-27 February, 14% of days) when there was no flow. During each sampling period, fishers were surveyed on one weekday and one weekend/public holiday.

On the first day of sampling, surveys were carried out from 08:30 to 17:30 hours to determine the general pattern of use of the boat-ramp at Mundoo, although only data from surveys conducted between 08:30 to 14:00 hours were used in subsequent analyses. On other days, surveys were carried out from 08:30 to 14:00 hours. Data were collected using two methods:

- 1 Boating activities (launches); For each boat launched, the primary purpose of the launch was determined either by observation, or if the purpose wasn't obvious, by questioning the owner. Activities were recorded as; fishing, pleasure, skiing, jet skiing or yachting (Appendix 1).
- 2 Recreational catch and effort (fisher interviews): For each boat that had been engaged in fishing, the owners were interviewed while retrieving their boat and the following information recorded; (i) duration of fishing trip, (ii) number of persons fishing, (iii) target species and (v) species caught. Fishers were categorised into two groups according to where they fished; (i) those fishing locally within the Mundoo channel/ Murray Mouth area; and (ii) those fishing at Tauwitchere (Appendix 2). Some fishers were asked, in general terms, if they were aware of any freshwater flows over the barrages.

By recording information from boat launches as well as via fisher interviews while retrieving boats, it was possible to: (i) maximise the number of observations available for describing the boating activities and (ii) focus on undertaking retrieval interviews with returning fishers when several vessels returned to the ramp simultaneously. Data on numbers of fishers were analysed with respect to flow conditions (flow, non-flow), location (Murray Mouth, Tauwitchenere) and day of the week (weekday, holiday/weekend) by using ANOVA ( $\alpha = 0.05$ ) (SPSS 13.0). Data that did not meet the assumption of normality and equal variances were transformed using the  $\text{Log}(x+1)$  transformation. Errors are reported as standard errors.

### 3 RESULTS

#### 3.1 Boating activities (launches).

A total of 143 boat launches were observed with 102 during the flow period (January) and 41 in the non-flow period (February) (Table 3-1).

Table 3-1 Boat launches from Mundoo boat ramp, and primary purpose of launch.

Tauwitchenere Fishway Operating	Date	Day type	Launches	Yachting camping	Skiing	Jet Skiing	Fishing	Fishing (%)
Y	14-Jan-05	Weekday	8	2			6	75.0
Y	15-Jan-05	Hol/w'end	13	6	2		5	38.5
Y	20-Jan-05	Weekday	9	5	1		3	33.3
Y	22-Jan-05	Hol/w'end	36	7	17	1	11	30.6
Y	25-Jan-05	Weekday	15	4			11	73.3
Y	26-Jan-05	Hol/w'end	21	8	8	1	4	19.0
	Sub-total		102	32	28	2	40	39.2
N	16-Feb-05	Weekday	2				2	100.0
N	19-Feb-05	Hol/w'end	12		1	2	9	75.0
N	22-Feb-05	Weekday	9	2			7	77.8
N	27-Feb-05	Hol/w'end	18	7	3		8	44.4
	Sub-total		41	9	4	2	26	63.4
	TOTAL		143	41	32	4	66	46.6

Numbers of boats launched per day were variable and ranged from 2 boat launches on Wednesday, 16 February to 36 boat launches on Saturday, 22<sup>nd</sup> January 2005. The average number of boats launched was 17 boats/day ( $\pm 4.3$ ) in the January flow period and 10.3 boats/day ( $\pm 3.3$ ) in the February non-flow period.

Fishing was the single most popular boating activity accounting for 46 per cent of all boat launches. The average number of boats launched for the primary purpose of fishing was 6.7 boats/day ( $\pm 1.4$ ) in the flow period and 6.3 boats/day ( $\pm 1.6$ ) in the non-flow period.

The percentage of boats launched for the primary purpose of fishing was greater on weekdays than on weekends (Figure 3-1). The percentage of boats launched for the primary purpose of fishing in the January flow period (39%) was lower than in the February non-flow period (63%).

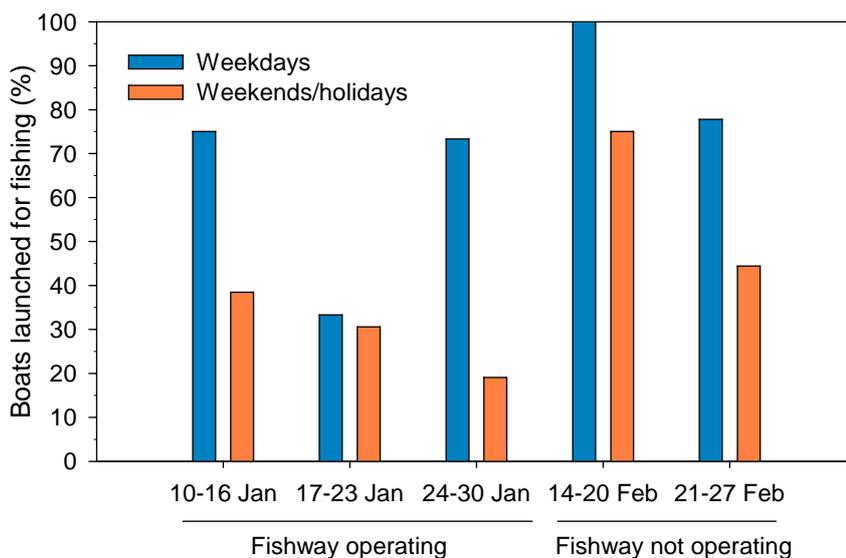


Figure 3-1. Percentages of boats launched from Mundoo boat ramp for the primary purpose of recreational fishing when: (i) there was freshwater flow across Tauwitchere barrage (January) and (ii) there was no flow across Tauwitchere barrage (February).

### 3.2 Recreational catch and effort (fisher interviews)

A total of 59 recreational fisher interviews were conducted with fishers when they returned to the Mundoo boat ramp. Between 5 and 13 interviews were conducted per day, with the highest number per day occurring in January. The numbers of fisher interviews per day were lower than the numbers of launches, although the trend in numbers per day was similar.

Rod and line was the only recreational fishing gear reported. The average number of fishers per boat for each survey period was 2.2 fishers/boat and the average trip length was 5-6 hours (Table 3-2). Due to the variable number of fishers, fishing from any one boat, fisher days provided the best estimate of fishing effort.

Table 3-2 Average numbers of fishers per boat, and hours fished per trip.

Location	Avg. no. fishers per boat	SE	Avg. no. hours fished per trip	SE
Tauwitchere	2.23	±0.29	5.00	±0.97
Murray Mouth/local	2.21	±0.32	6.22	±0.91
All	2.22	±0.11	5.96	±0.50

There was a highly significant difference in the amount of fishing effort (fisher days) between the Murray Mouth/Mundoo and Tauwitchere locations ( $F = 12.743$ ,  $p < 0.005$ ,  $df = 1, 12$ ), but only slightly significant difference for effort (fisher days) between weekend and weekdays ( $F = 6.500$ ,  $p < 0.05$ ,  $df = 1, 12$ ) and between the January (flow) and February (non-flow) periods ( $F = 4.774$ ,  $p < 0.05$ ,  $df = 1, 12$ ).

Table 3-3 shows the average daily effort (fisher days) for January and February with effort (boat days) included for comparison. The total average daily fishing effort (fisher days) in the January flow period was more than twice as high as that in the February non-flow period. This was because effort in the Murray Mouth/Mundoo area was higher in January than in February. The total average daily fishing effort (fisher days) was similar at Tauwitchere between the January flow and February non-flow periods.

Table 3-3 Recreational fishing effort for Coorong lagoons during a period of freshwater flow across the Tauwitchere fishway (January 2005) and a non-flow period (February 2005).

Flow	Effort measure	Murray Mouth		Tauwitchere		Total	
		Average Effort	SE	Average Effort	SE	Average Effort	SE
Y	Fisher days	13.8	±3.45	5.0	±0.75	17.2	±3.41
Y	Boat days	5.7	±1.16	2.2	±0.39	7.2	±1.30
N	Fisher days	5.0	±1.78	4.5	±2.48	7.2	±2.65
N	Boat days	3.2	±0.84	1.7	±0.47	4.5	±1.08

### 3.3 Target species and catch

Figure 3-2 shows the target species for fishers who fished at Mundoo/Murray Mouth or Tauwitchere. Fishers reported targeting mulloway, yellow-eye mullet or no specific target. Those who fished in the Mundoo-Murray Mouth generally fished with no specific target and those who did target a particular species targeted either mulloway or yellow-eye mullet. All fishers at Tauwitchere targeted mulloway in both the flow and non-flow periods.

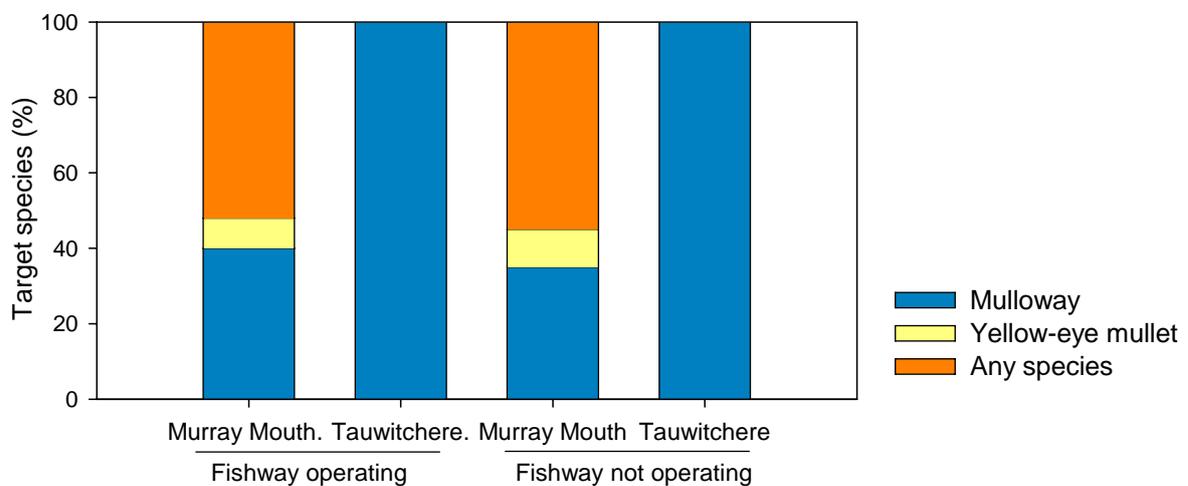


Figure 3-2. Target species for boats launched at Mundoo for the primary purpose of fishing at Tauwitchere (n=58)

Twelve per cent of fishers reported harvested catch in each of the January (flow) and February (non-flow) periods (Figure 3-3). Fifty four and thirty two per cent of fishers reported no retained catch but had returned undersized fish to the water (mulloway, Australian salmon, yellow-eye mullet) during January (flow) and February (non-flow), respectively.

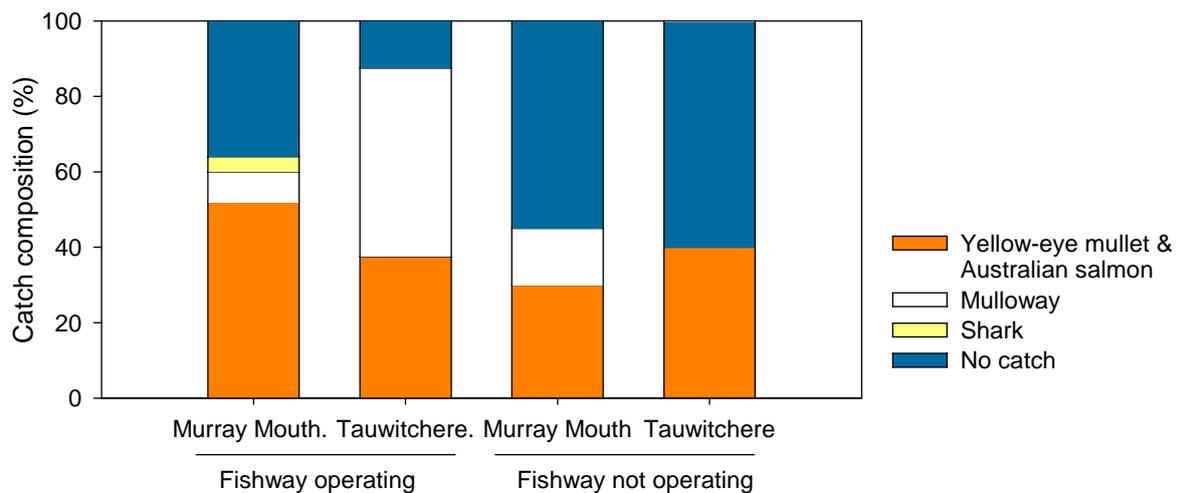


Figure 3-3. Catch by species for boats launched at Mundoo for the primary purpose of fishing (n=58).

#### 4 DISCUSSION

Large numbers of recreational fishers (>7,000 per year) are active in the Coorong Lagoons (Jones and Doonan 2005). In January 2005, freshwater was directed over the vertical slot fishway at Tauwitchere and an evaluation of the fishway performance was undertaken, by estimating numbers of fish as they moved from the Coorong lagoons via the fishway into Lake Alexandrina. Several species of fish, which provide popular targets for recreational anglers in the Coorong lagoons, are also known to aggregate in the presence of freshwater cues i.e. black bream (*Acanthopagrus butcheri*), congolli (*Pseudaphritis urvilli*) and mulloway (*Argyrosomus japonicus*). This provided a potential risk for numbers of these larger bodied fish to be underestimated due to possible increased recreational fishing effort at Tauwitchere. This concern was addressed by monitoring recreational catch and effort during January 2005 when the fishway was operating and again in February 2005 when the fishway was closed.

Recreational effort data were collected on 17% of the days (6 days) in January when the fishway was operating and on 14% of days (4 days) in February after the fishway was closed. The range of boating activities was determined from observations/interviews of persons launching boats (n=143) and recreational fishing catch and effort data were obtained from interviews with fishers when they retrieved their boats (n=59).

#### 4.1 Boating activities (launches)

While the number of boats launched varied greatly among days there was a general trend for more boats to be launched during January. The average number of boats launched per day was 65% greater during the January flow period than the non-flow period in February. Whilst this may have related to flow conditions it may also have reflected enhanced boating activity during the January holiday period.

The most common single reason for which boats were launched was for recreational fishing, however, whilst the highest overall number of boats launched per day occurred in January, the percentage of boats launched for the primary purpose of fishing was lower in January than in February. The average number of boats launched per day for the primary purpose of fishing was similar during both the January flow and February non-flow periods.

#### 4.2 Recreational catch and effort (fisher interviews)

Overall, recreational fishing effort was highest in January, however most of this effort occurred in the Murray Mouth/Mundoo area. Effort at Tauwitchere was similar in both the January flow period and February non-flow period. All recreational fishing effort at Tauwitchere was targeted at mulloway and during the January flow period only 12% of fishers reported harvesting fish. Most fishers caught and released undersize fish or took no catch. The catches comprised mulloway, yellow-eyed mullet and Australian salmon. Other large-bodied species such as black bream and congolli were neither targeted nor caught by recreational fishers.

There are few data to suggest that recreational fishing effort impacted on numbers of fish using the Tauwitchere fishway.

#### 4.3 Conclusion

The results of this survey indicate that during the evaluation of the vertical slot fishway at Tauwitchere; (i) there was limited recreational effort in the area, (ii) catches were low, (iii) species such as congolli and black bream were neither targeted nor caught by recreational fishers and (v) awareness of the fishway trial and the freshwater flow was low amongst recreational fishers. Consequently, there is little evidence from this survey to imply that counts of fish using the fishway may have been underestimated due to a spatial shift in recreational fishing effort.

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