SOUTHERN FISHERMEN'S ASSOC. INC.

Wild Fisheries with a Future *Est. 1854*

Recommendations for

SUSTAINABLE MULLOWAY MANAGEMENT

September 2004

Proud of our Environmental Performance

Finalist, Australian Seafood Industry Environment Award 2003
Winner, South Australian Fishing and Seafood Industry "Fishing for the Future" Environment Award 2003
Winner, SA Great Regional Science & Environment Award 2002
Winner, South Australian Fishing and Seafood Industry "Fishing for the Future" Environment Award 2001
Finalist, Australian Seafood Industry (Inaugural) Environment Award 2001
Winner, South Australian Fishing and Seafood Industry Environment Award 1999
Winner, South Australian Fishing and Seafood Industry Environment Award 1997

Executive Summary

The members of the Southern Fishermen's Association are unanimously committed to an independently certified, sustainable mulloway fishery throughout Australia.

The Southern Fishermen's Association (SFA) has deliberately not undertaken a media campaign to correct glaring vulnerabilities in mulloway fishery management; preferring to work within the government's system to improve the sustainable harvest of this important resource. However, recent SARFAC (2003) attempts to further disadvantage the already severely limited commercial access/allocation for this species based on unfounded, irrational and inaccurate contentions threaten this process, and SFA commitment to it.

The SARFAC mythology conveniently overlooks or deprecates important facts:

A. The Lakes and Coorong commercial fishery has access to less than 1% of the total fishable area inhabited by (just) the southern genetic stock of mulloway; recreational fishers have access to approximately 100% of this area (inclusive of interstate and Commonwealth waters).

B. There is no evidence that the mulloway spawn in the Coorong, nor in the adjacent surf zone fished commercially. Mulloway enter the Coorong in search of food when conditions are favourable; just as kangaroos move onto feed following summer thunderstorms. The fraction of the total stock that may access the Coorong now find over 92% of historic habitat blocked by barrages, and remaining habitat is shallower and can sustain only smaller mulloway … where are recreational efforts to reclaim access to this critical habitat for mulloway (together with the massive productivity gains for all sectors, which the SFA has championed for decades)?

C. Lakes and Coorong commercial fishers possess heavily constrained effort limitations and gear restrictions as well as mandatory catch reporting in aid of sustainability objectives; recreational fishers have unlimited effort, and immediate access to improvements in much gear technology as well as absolutely no reporting accountability.

At present, mulloway management in Victoria, Commonwealth and SA Coorong and non-Coorong waters is poorly integrated in aid of sustainability. The Southern Fishermen's Association calls on the South Australian government to back the following demonstrably equitable, logical and biologically based sustainability recommendations as being in their own interests, and the interests of the South Australian community:

Across the southern mulloway stock range:

1. That both recreational and commercial mulloway fisheries across the entire stock range be subjected to independent (eg, Marine Stewardship Council) triennial sustainability certification to demonstrate care of this important resource (exactly as the SFA is already pursuing, at its own cost, in the Lakes and Coorong component).

2. That a multi-jurisdiction recreational catch tag system be introduced for mulloway, allowing collection of data on both harvest and effort (equivalent to the current commercial status quo). Importantly, full cost recovery will allow recreational fishers to pay their way in managing this resource (without a licence introduction). Current contributions of recreational management costs from general revenues (in SA) amount to a government subsidy which allows far greater recreational effort on this, and other aquatic resources, than would otherwise occur.

3. That the SA Minister of Fisheries call on his interstate counterparts to integrate recreational mulloway (and other shared stock) harvest regulations based upon a clear, testable, and science-based management plan.

4. That the SA Minister of Fisheries call upon his Commonwealth counterpart to implement, at minimum, random observer coverage (and independent dockside catch assessment) for Commonwealth licensed fishing vessels to quantify bycatch of mulloway and other key management species.

5. SARFAC has, once again, pretended that the reduced minimum size limit for Coorong mulloway is a threat to sustainability (despite the fact that this is a reflection of habitat destruction over a tiny fraction of the fish' range); despite decades of use with no demonstrable negative impacts. Placing minimum size limits at the size of first reproduction "sounds good" but has little demonstrated merit in either biology or population dynamics (Sigler and Sigler 1990). Recent critical research (Heino 2003) indicates that exactly this size selectivity for adult individuals has resulted in genetic selection for earlier/far smaller maturation in northern cod stocks … which may have effectively destroyed harvest viability (likely for 100's of generations) of what is generally considered the most important fishery on earth.

   Dr Keith Jones has already documented similar earlier maturation in King George whiting, where minimum size limits continue to fail management and stakeholders. The Southern Fishermen's Associations calls upon this government (and its interstate and Commonwealth partners) to urgently review the impacts of size restrictions on the genetic biodiversity (and especially, the fishing down of size at maturity) of major fish stocks such as King George whiting and snapper in the first instance. In the interim, any considerations to change mulloway size limits (at all) be held in abeyance. The SFA notes that such harvest of intermediate size fish (46-75cm) from the Coorong acts to reduce the overall size selectivity on the mulloway stock, and represents a positive contribution to mulloway sustainability, just as a-selective fishing by Aboriginal fishers has for millennia before.

For the Coorong and associated beaches:

1. SARFAC believes that mulloway stocks display reduction, based on commercial harvest data from an environment with an almost closed mouth, and greatly lowered desirability for mulloway to enter (SARFAC 2003). Given this concern, SARFAC should endorse SFA's recommendation that the permanent Murray Mouth (commercial) closure area be extended to include <u>all</u> fishers, in order to aid mulloway in transiting this critical pathway into and out of the Coorong unmolested (NB: this is in exact equity with commercial restriction, which SFA continues to endorse).

2. That several current net specifications which place unsustainable fishing impositions on Lakes and Coorong fishers be amended. In particular, net sizes for larger species be specified as greater than or equal to 4 ½ inch (115mm). Small mesh nets size range to remain exactly as at present for targeting mullet (ie. 2 inch to 2 ½ inch inclusive). Further, haul net mesh sizes for the Lakes and Coorong commercial fishery be specified as either 2 inch (effectively 50mm) or equal to, or greater than, 4 ¼ inch 108mm).

3. With respect to currently non-transferable recreational gillnet licences for the Coorong (and Lake George), there is no evidence to indicate that this fishery is un-sustainable. It is therefore appropriate to re-issue a conservative number of personal/community use net licences, from within the current "recreational" licence number, to Ngarrindjeri persons, and subject to existing sustainable management and regulatory provisions. Further, after investigation, a sustainable number of "recreational" mesh net licences be allowed to be transferred. This would be subject to a cost-recovery fee (ie, one fee level for one location to be fished, being Lake George or the Coorong, and a second level fee to be charged for access to both). Management of this fishery to remain otherwise as currently regulated.

4. While SARFAC is meant to be representing all recreational participants, recommendations within their (2003) submission would disenfranchise over 2000 fee-paying licence holders. It seems timely and appropriate for this government to immediately review SARFAC and the nine Recreational Fishing Committees relative to:
   - Evidence of full and equitable representation of recreational fishers
   - Quantification and cost-effectiveness of benefits from each element of the process
   - Potential for self-funding of recreational fisheries representative bodies.

5. The SFA believes that to even consider stocking of aquacultured fish into the RAMSAR and community-beloved Coorong is wrong. The SFA calls upon this government to (wisely) make known its public policy prohibiting either aquaculture or stocking of aquacultured fish into the Coorong ecosystem, and its immediate environs.

6. That apparent lack of stable government policy regarding Lakes and Coorong commercial access to mulloway is greatly impeding value adding of existing sustainable harvest, and associated benefits to the regional economy and community of South Australia. If recreational interests are as financially well endowed as exaggerated expenditure reports suggest, this government should adopt a policy requiring recreational interests to buy out commercial (Lakes and Coorong) licenses to achieve allocation changes transparently and fairly, rather than employing public funds (a subsidy) or sustainability mis-representations.

   Any such buy-outs must be reversible to be equitable, rather than extinguish a commercial licence. Subject to this free market opportunity and equitable implementation of independently reviewed sustainability variations, it is recommended that allocation in the Coorong mulloway fishery be accepted as public policy for a period of one decade to allow investment in value-adding of existing harvest opportunities across both recreational and commercial sectors.

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Purpose

Who is the SFA?

The Southern Fishermen's Association (Inc) represents the members of the Lakes and Coorong commercial fishery of South Australia. A brief history of the fishery, together with recent key economic, production and environmental performance information is provided in Appendix A for those unfamiliar with this unique team. For well over a century, this fishery has continuously improved its stewardship of Lakes and Coorong aquatic resources, to ensure our own viability and future. This world-leading performance is well known locally, within South Australia, nationally and internationally … it is documented in our Environmental Management Plan, in the published scientific literature (eg, Pierce 2004, Jones and Pierce 2002, Pierce and Hera-Singh 2001a,b) and in diverse competitive awards. While environmental awards (as listed on the cover page) are positive benchmarks, the ongoing and innovative successful accomplishments of the fishery on the water are what make a difference to the health and future of the Lakes and Coorong ecosystem (summarised, in brief, in Appendix B, for those unfamiliar with these efforts and achievements).

Current Issues

For decades, the SFA has worked within the fisheries management system, donating major amounts of time and expertise, and backing rational management, consultation, and equity. The South Australian Recreational Fisheries Advisory Council (SARFAC) and elements of this sector have consistently chosen to work outside this structure (as well as within it) in efforts to secure increased allocation and access to fish species such as mulloway, at the expense of the commercial sector and consumers. The SFA and its members have not attempted to reduce or disadvantage recreational access or allocation to our advantage. The recent SARFAC call to effectively cripple commercial (Lakes and Coorong fishery) access to mulloway (SARFAC 2003; attached for information in Appendix F) represents yet another such attack under a pretence of sustainability concerns.

The Southern Fishermen's Association understands that such actions are within the democratic rights of individuals and groups. However, our Association is no longer willing to work silently within the "system" while mis-information and inequitable demands threaten our families, our businesses, regional economies and the very sustainability of the resources we have helped protect and conserve.

The South Australian government expects the Southern Fishermen's Association, with other commercial fishers, to increase their important contribution to the state's economy through greater value-adding of our quality seafood production (ie, by at least 8% per annum, State Food Plan 2004-2007). Our members have backed this initiative and have already increased production value in real terms over the past decade (1.1% per year, EconSearch 2004) despite unfavourable climatic conditions. How can our members risk further capital investment and increased operating costs necessary to value adding (eg, live holding and transport facilities) when this government fails to publicly commit to stable access/allocation arrangements for mulloway and others species? This is particularly close to home when our fishers have watched members of the (late) SA Commercial River Fishery who invested in value-adding equipment such as export grade cool rooms and live holding facilities receive absolutely no compensation for these investments made in support of this and previous government's value-adding initiatives. It also strongly conflicts with the State Food Plan's stated priority in underpinning Industry's Vision for:

- ***Investor certainty to encourage high levels of new investment***

In South Australia, commercial fishing licences are transferable; hence, SARFAC or independent recreational fishers can, at any time, in a free-market system, purchase any or all licences that they wish to remove from accessing the Lakes and Coorong or any other fishery. Such purchases would obviously be fair and reasonable to both sides (ie, mutually acceptable), yet SARFAC has never chosen to use this means of re-allocating aquatic resources, not once. Instead, it has sought the use of public money to buy out commercial entitlements, or has sought to relatively disadvantage commercial allocation/access.

We continually hear about how "valuable" recreational fishing is with quotations of the amount of money invested in boats, etc. Since recreational fishing has such a large economic base, it seems inappropriate to waste public money supporting its management costs or objectives … such as exterminating sustainable and productive commercial fishing businesses.

Objectives

Our purpose in developing this document is to provide all South Australians, and its government, with an accurate basis for understanding and improving mulloway management throughout its range. Specifically, we will:

1. Provide evidence dispelling relevant biological and management myths about Mulloway;
2. Place Coorong mulloway management into its correct national, state and local perspective;
3. Provide reasoned and concrete recommendations in the interests of this government and the community to further improve the sustainability of mulloway, and its economic and social benefits.

4.

Mulloway Myths Dispelled

Unfortunately, as with many large fish species, many myths and mistaken beliefs surround them. The SFA does not seek to fully document its extensive knowledge of this species here, but merely wishes to clarify several key myths … myths which are regularly "cited" in support of attacks on the Lakes and Coorong commercial fishery. These myths are:

1. Lakes and Coorong commercial fishing is, by far, the most important harvest fishery and determinant of mulloway abundance.
2. Mulloway spawn (only) in/near the Coorong, which is by far the most important nursery habitat for the species in Australia.

Many groups harvest mulloway over a huge area.

Mulloway (*Argyrosomus japonicus*) are found in South Africa, China, South Korea and Japan, Madagascar and Australia. In Australian waters, this species displays an extensive range, from North West Cape in Western Australia around to the Burnett River in Queensland (Kailola et al. 1993).

Within this distribution, much is made of an affinity for "estuaries" by mulloway, especially smaller fish (eg, Hall 1986, Ferguson and Ward 2003, and many associated references to these citations). However, shark fishers and other offshore fisheries regularly catch this species in significant numbers across the continental shelf zone, particularly on offshore reefs. At times, these fish are found in, or just outside, the surf zone. While we are not aware that the data have been published, our members have had conversations with (SADF) scientists/technical officers associated with 1970's Russian exploratory sampling at the edge of the continental shelf (the shelf break, being the drop to the abyssal depths). In appropriate size gillnets adult mulloway were the dominant species caught, with reports that when the nets were lifted, the expanding swim bladders of the many fish meshed actually ballooned the nets to the surface unaided.

Figure 1 demonstrates the trivial area fished by Lakes and Coorong commercial fishers (within severe gear restrictions) relative to the range of this species in Australia … and the area available for harvest by other commercial and recreational fishers. Note that the original figure truncates the distribution in seaward extent for no known or documented reasons. Our evidence is that the actual range extends seaward across the full continental shelf and inclusive of the shelf break. We interpret the relatively greater abundance of mulloway in SA waters as being associated with greater shelf development (ie, pasture) in this region, rather than some critical contribution by an estuary which is now a sliver of its historic size.

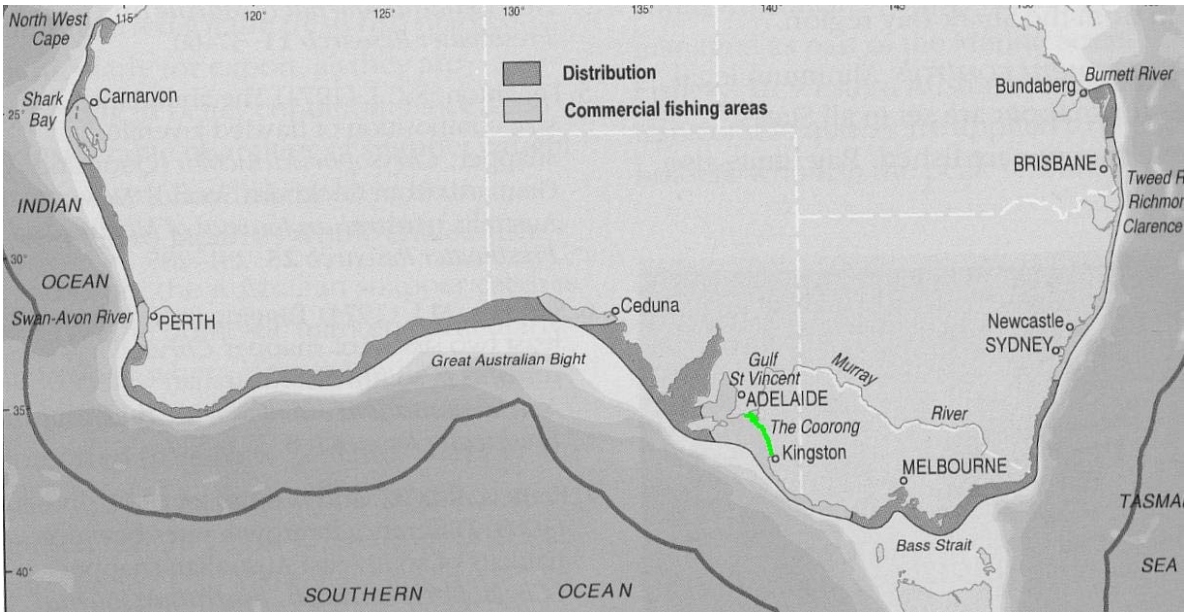

Figure 1. Mulloway distribution in Australia (after Kailola et al. 1993). *The fished area of the Lakes and Coorong commercial fishery is highlighted, but note that the width is not proportional to actual fishable area or the highlighting would not be apparent. This area represents much less than 1% of the total distribution of the species.*

Preliminary genetic work to determine the stock structure of mulloway in Australia (Dixon 1988) lacked sufficient sample sizes and locations to offer much insight, but appeared to support the existence of a distinct west coast stock. These fish look somewhat different from fish found in more southeasterly waters. More recent and extensive work (Black and Dixon 1992) still remains inconclusive in separating distinct stocks. If we are really going to use the best available science, evidence to date supports the existence of significant genetic exchange within this species across the southern extent of its range. Lakes and Coorong fishermen find this less than surprising, given the rapid and extended movements which these fish can make.

It is a geographic reality that the Lakes and Coorong commercial fishery has access to less than 1% of the total fishable area inhabited by (just) the southern genetic stock of mulloway; recreational fishers have access to approximately 100% of this area (inclusive of interstate and Commonwealth waters), and that other commercial fisheries have both more extensive access and greater gear allocations capable of harvesting/targeting this species.

It is bleeding obvious that this species (and even a southern stock substructure) has an extensive range, and must be managed as an integrated resource across ALL jurisdictions. This is not happening at present (to our available evidence). The Minister of Fisheries (SA) and all South Australians have a common incentive to improve and integrate mulloway management across all jurisdictions. This principle forms the basis for SFA recommendations (given within the later management section) regarding practical actions in this regard. It also necessitates a common, independent sustainability certification process to benchmark management success involving diverse sectors and jurisdictions. The SFA does not believe it should be immune from management. Our evidence is that we are already the most tightly managed mulloway harvest sector (by far), throughout the range of the species, and that it is critically important to broaden management attention and action across the full range of harvesting agents.

The importance of the Coorong to mulloway

"Where are they found?
…They are most abundant in the Coorong Lagoon, which is by far the most important nursery area for this species."

"Lifecycle
Mulloway generally spawn in marine waters just outside of the surf zone and the egg larval development occurs at sea, with juveniles settling in estuarine nursery areas until a length of 46cm is reached, in about three to four years."

PIRSA Aquaculture and Fisheries - More Information - Mulloway (16KB)
http://www.pir.sa.gov.au/pages/fisheries/rec_fishing/mf_mulloway.htm

There is absolutely no evidence that mulloway spawn in the Coorong, or its immediate vicinity. No mulloway eggs or larvae have ever been found despite numerous attempts to locate them in this area (by several scientists, as well as fishermen). Mulloway have floating eggs and larvae (Fishbase 2004 references), whereas most fish of this family that spawn in estuaries have sinking eggs and larvae (to retain their position in the estuary against tidal and other flows) (Dando 1984). Imagine a fish with pelagic eggs and larvae spawning in or near the surf zone … hardly a great (or productive) place to ensure the survival of your offspring!

The smallest mulloway found within the Coorong proper have consistently been around 150mm TL, and likely about one year old (consistent with Hall 1986). These fish could have been (and most likely were) spawned 100's of kilometers (or more) away from the Coorong. While smaller mulloway have been found in NSW and Western Australian estuary sampling, these are still fish of 30+mm TL which reveal little about the actual spawning site for the species. Our most recent information is that no eggs of mulloway have yet been sampled in an Australian estuary. On the face of this data (and employing the irrational concept of only one or two spawning locations as put forward by some) it would be rational to conclude that mulloway spawn closer to NSW and WA estuaries than to the Coorong.

Our interpretation of available evidence (eg, Hall 1984, 1986, Ferguson and Ward 2003, Fishbase 2004, etc.) is that mulloway spawn at numerous sites around Australia. Their early development is consistent with fish which spawn well offshore, where pelagic eggs rise to the surface and larvae are blown and carried inshore to recruit across the widest possible range of available habitat. This pattern is also seen in Sciaenid fishes, and does not preclude spawning aggregation even at the Continental Shelf break.

Reference is regularly made to the presence of "mature" and "spent" mulloway caught in the vicinity of the Murray mouth, as evidence of some sort of local spawning aggregation which recruits to the Coorong. When recent references are tracked back (eg, Ferguson and Ward 2003, Kailola et al. 1993) they all refer to a single statement made in Hall 1986, being:

> *"It is believed that they (mulloway) spawn in marine waters in the summer months (Nov.-Feb.) as spent and spawning fish are most evident in summer. Exact spawning areas are unknown, but the far west coast and Murray mouth regions appear to be important spawning areas as aggregations of spent and spawning fish are commonly reported by fishermen in these areas" (Hall 1986, p 2).*

Adult mulloway are most available to capture in the Lakes and Coorong during November to April, with the latter two months less reliable. It is axiomatic that spent fish will only be able to be observed at a time when the fish are available to sample/capture. It is unclear what is meant by "spawning fish" here, as we are unaware of commercial fishermen (or any other fishers) observing mulloway in the act of spawning. Mature fish (but not ripe and running which would be indicative of spawning within 24 hours) are regularly encountered, but in many fish species, a mature condition may be held for several months in anticipation of optimal spawning triggers. The presence of such fish does not, in itself, evidence local spawning. Similarly, spent fish may remain in an unrecovered state for more than a month; again providing no definitive evidence for an immediate local spawning site.

The SFA is aware of tagging work conducted in support of Hall (1986) where Dave Evans (ex-Lakes and Coorong commercial fisher) assisted in tagging three adult mulloway netted adjacent to the Murray mouth during summer. One of these fish was recaptured the following day some 25km further along the ocean beach. Such extensive movement in a short time, and despite the shock effects of capture, indicate that mature and spent adult mulloway may spawn/have spawned over 750km away (a conservative estimate) from the Murray mouth and vicinity (ie, in Victoria or WA, or off the shelf break).

Fishbase (2004) reports mulloway elsewhere within the international range of the species to spawn over much of the year. The limited locations of commercial fishing for mulloway in SA (per Figure 1, Kailola et al. 1993, Ferguson and Ward 2003) and the limited seasonal availability to capture would be able to provide little evidence to reveal such a trend here. Recent fishery independent sampling (Ferguson and Ward 2003) still relies on commercial netting technology, and samples within the same area as the commercial fishery; hence it would need to expand its methods and area sampled to be able to fully reveal trends in stock maturation.

The clear "model" in the minds of most scientists, managers, the PIRSA "fact" sheet, and recreational fishermen is that mulloway spawn near the Coorong, where young fish must immediately move and grow, and from whence all adult stock originate. This model is grossly inconsistent with available facts. For example, barrage completion in 1940 essentially reduced available mulloway habitat by over 90%; hence it is not surprising that peak mulloway harvest cycles for this fishery, after this date, are reduced by a similar proportion (see Appendix D). If the Coorong were indeed the primary contributor to mulloway abundance overall, it is axiomatic that a similar reduction in catch (and available stock) would be seen in the catch signatures of interstate and other mulloway fisheries. Victorian catch statistics (limited) and conversations with Bays and Inlets commercial fishers with experience over this period fail to indicate any such decline. Similarly, we are unaware of any decline in NSW catches reported after this period (relative to pre-1940). An ongoing 90+% decline in catch of such an important and visible fish would surely have attracted some comment or documentation.

For over a decade, the SFA has stated an alternative model consistent with available evidence. We state that mulloway spawn offshore, at sufficient locations to fully reseed available habitat within their range, and over a reasonable period consistent with the high temporal variability of annual production cycles in this range. Floating eggs, larvae and, eventually, juvenile fish are carried onshore where they occupy all available habitat, including surf zone, eelgrass and hard substrate, as well as all bays and estuaries. Mulloway density in these areas is largely determined by available food (ie, productivity) and acceptable abiotic conditions. As these factors change, so does the presence and density of mulloway. As fish grow, they range further afield, inclusive of the available shelf and shelf break habitat.

Consistent with this model, it is well known (among fishermen, and in the scientific and popular literature) that small mulloway are well known from all the significant bays and estuaries in South Australia, eg:

- Glenelg River
- Foot of Yorke Peninsula
- Far West coast
- Guichen Bay, Robe
- Onkaparinga River
- Port River
- The entire coast from Kingston to Victor Harbor

In addition, small mulloway were a feature of the West Lakes estuarine complex prior to its "development," just as 200mm fish regularly show up in the catch of (un-enlightened) recreational anglers in the Port River each year. Groups of schoolie-size mulloway (ie, sub-adult) are also well known from nearshore waters distant from estuaries (eg, Wallaroo jetty). Thus, a pre-occupation with assessment of mulloway stocks in the Coorong means we have little understanding of the total stock, nor the contribution of other habitats or locations to the total stock.

Finally, again referencing Appendix D, an approximately decadal cycle in Lakes and Coorong mulloway catch appears evident, as was first brought to the attention of scientists and others by the SFA (circa 1990). Such a cycle would be precisely in keeping with SOI (Southern Oscillation Index) climatic drivers of terrestrial drought/flood cycles, as well as oceanic productivity regimes (and marine fisheries abundance). Such cycles would be consistent with linkage to recruitment success of pelagic eggs/larvae, as well as with increased habitat productivity in estuaries such as the Coorong. There is an apparent exception to this cycle circa 1980. As SARDI catch and effort data for this timeframe clearly shows, Lakes and Coorong fishing effort shifted from mulloway and other species onto carp and bony bream in order to meet a high demand for bait supply to the rock lobster industry (which at that time was not operating under a quota system).

Clearly, Murray floods move huge quantities of freshwater fish (eg, bony bream) into the Coorong and/or Encounter Bay. This effectively creates a giant burley trial, and as the flow subsides, large fish come closer to the mouth and become (excessively) available to recreational capture (in our evidence, promoting resource waste at times). Minor inflows (a few gates open, plus leakage through the barrages) to the Coorong have the same scaled down effect on small mulloway. When there are no inflows and, especially, when Coorong waters cool in winter, most small mulloway will rapidly move out of this estuary. Mulloway movement out of the Coorong over the cooler months is well documented in the daily and monthly resolution commercial catch and effort data. Thus, the lack of movement out of the Coorong observed over the limited tagging study of Hall (1986) coincided with a period of inflow, warmer water, and conditions which provided an incentive for these fish to remain in this habitat. To extrapolate that mulloway must always remain in the Coorong or are always abundant in the Coorong based on this period of study would be foolish.

This evidence places the Coorong in a more accurate context, as being one of many mulloway production habitats (and fisheries) which must be managed wisely. It also reveals the Lakes and Coorong commercial fishers as an important ongoing data source as to the health of the mulloway resource overall, and one of many harvesting sites and sectors, rather than some "great Satan" poised to annialate the last fish at any time.

Mulloway Management

As with any farm, our evidence indicates that mulloway abundance is primarily determined by habitat availability and quality (ie, the pasture) and climatic cycles. Lakes and Coorong commercial fishery catch data demonstrate both these issues well (as discussed above). Therefore, the SFA has consistently backed and promoted initiatives to improve mulloway fish passage back into the huge area alienated by barrage construction, as the most effective means of increasing mulloway abundance applicable to our region, together with improved Murray flow management. These recommendations are well known and will not be repeated here (relative to the SARFAC matter at hand).

Control over other environmental drivers is largely out of the hands of government/humanity. Control over fishing (all sectors) therefore is about getting sustainable benefits from what nature provides. The SFA does not seek to repeat or critique the current mulloway fishery management measures as these are well stated in the Fisheries Act (1982) and Regulations, with some relevant discussion in Ferguson and Ward (2003)(A brief history of commercial regulation and access is provided in Appendix G). Instead, consistent with our sustainability certification work, we choose to provide recommendations which (based on evidence provided) will represent opportunities to significantly improve mulloway management in terms of the benefits provided to this government, and the South Australian community. These opportunities will be addressed:

1. Across the full range of mulloway (including interstate jurisdictions)
2. Specific to the Lakes and Coorong regional fishery

Management opportunities for all mulloway

At present, mulloway management in Queensland, NSW, Western Australia, Victoria, Commonwealth and SA Coorong and non-Coorong waters is poorly integrated in aid of sustainability. The same can be said for most shared stocks around Australia.

Mulloway and other key species possess major long-term value for all of Australia if demonstrably managed sustainably. These benefits are conservation, as well as recreational and commercial. For example, if mulloway were managed to an independent "green tick" level, it would provide far greater marketability of these fish in the high value international recreational "trophy" fishery market. The same certification would enhance export value of commercially harvested fish (especially as live and fresh product). Conservation interests would have a basis, and model, for ensuring ongoing sustainability of shared stocks, as well as a transparent reporting system with clear integrity.

The SFA has already initiated MSC (Marine Stewardship Council) certification of our fishery, inclusive of mulloway. However, it is clear that the lack of integrated management for this species outside our "patch" will hinder our efforts (and South Australian benefits). There is merit in bringing shared jurisdictions, and recreational fishing, into the certification system in order to harness all of these benefits. We therefore recommend, in the interests of this government and all Australians:

That both recreational and commercial mulloway fisheries across the entire stock range be subjected to independent (eg, Marine Stewardship Council) triennial sustainability certification to demonstrate care of this important resource (exactly as the SFA is already pursuing, at its own cost, in the Lakes and Coorong component).

Recreational fishing effort is effectively open access/unlimited, across the full stock range of this species. Little comparable data is available concerning recreational harvest, since recreational fisheries lack reporting requirements, and "surveys" (eg, Henry and Lyle 2003) occur at irregular intervals using non-comparable methods. Internationally, catch tag systems have proven valuable in collecting highly specific data on recreational catch of key species on an ongoing basis (eg, North American icon species such as salmon). Importantly, fees for such tags can recover full cost recovery of that sector's management costs for such special species, rather than requiring subsidisation from public moneys. While each jurisdiction could sell such tags, the resulting specific data can then be used to fine tune management of this fishery, as well as provide evidence of sustainable management. In view of these major benefits, the SFA therefore recommends:

That a multi-jurisdiction recreational tag system be introduced for mulloway, allowing collection of data on both harvest and effort (equivalent to the current commercial status quo). Importantly, full cost recovery will allow recreational fishers to pay their way in managing this resource (without a licence introduction). Current contributions of recreational management costs from general revenues (in SA) amount to a government subsidy which allows far greater recreational effort on this, and other aquatic resources, than would otherwise occur.

Commercial fishery harvest regulation in Australia has undergone extensive refinement over many years, and is now generally highly specific to particular locations, species, conditions and community issues. Recreational fishing, by its nature, has tended to be managed more generally, and at a state jurisdictional level. The lack of integration of recreational management planning is apparent when mulloway size limit and bag limits are considered for this species.

STATE	Min. Legal Size (cm)	Bag Limit	Other Rules	Reference
SA Coorong	46	10	Only 2 over 75cm	http://www.pir.sa.gov.au/pages/fisheries/rec_fishing/mf_bbl.htm
SA (outside Coorong)	75	2	Boat Limit 6	http://www.pir.sa.gov.au/pages/fisheries/rec_fishing/mf_bbl.htm
Victoria	50	10	nil	http://www.dpi.vic.gov.au/dpi/nrenfaq.nsf/LinkView/1652C66B4F996F43CA256F0200267B4CB7195D3E8D C5086DCA256F01001CBFA2
NSW	45	5	(only 2 fish longer than 70cm)	http://www.fisheries.nsw.gov.au/rec/sw/bag_and_size.htm
Qld	45	10	nil	http://www.dpi.qld.gov.au/fishweb/11416.html
WA	50	2	West Coast region	http://www.fish.wa.gov.au/rec/broc/westcoast/westcoast_rules2004_10.pdf

While SA would appear out of step with other states regarding minimum size limits for this species, this matter requires separate consideration on important biological ground. However, the disparity of sizes and bag limits fails to convince us that any have been selected based on evidence of a clear, quantitative contribution to the sustainability of the species. As an innovative state, which needs to maximize the sustainable benefits it can achieve from all its natural resources, the SFA recommends:

> **That the SA Minister of Fisheries call on his interstate counterparts to integrate recreational mulloway (and other shared stock) harvest regulations based upon a clear, testable, and science-based management plan.**

SFA members are well aware that, at times, major bycatch of mulloway is taken in Commonwealth waters by Commonwealth licensed fishing vessels. While specific bycatch limitations have been regulated, we lack evidence that they are actually enforced. Further, little if any independent evidence of mulloway (and other) bycatch discarding (or retention) is available for these fisheries, despite the importance of this species to inshore fisheries. Random or regular independent observer coverage would provide evidence in support of regulation and effective management. It would also assist these fisheries in meeting their bycatch management planning requirements (relative to sustainability and export issues). It is mutually beneficial to all parties:

> **That the SA Minister of Fisheries call upon his Commonwealth counterpart to implement, at minimum, random observer coverage (and independent dockside catch assessment) for Commonwealth licensed fishing vessels to quantify bycatch of mulloway and other key management species.**

The SFA believes that the issue of minimum size limits, and size selective fishing, represents a sustainability bombshell waiting to discredit fisheries management agencies, and potentially impact entire governments. We provide the following discussion and advice to assist this government dealing successfully with these matters.

While SARFAC has raised the minimum size limit issue with respect (only) to net fishing for mulloway in the Coorong, we must consider it from the perspective of the full species range, and its longer-term impacts. The SARFAC (2003) submission would have us believe that there is evidence that mulloway are heavily overfished such that recruitment is being impacted (ie, recruitment overfishing) which King (1995, p286) clearly states is the problem which minimum size limits are meant to address.

There is no evidence of such overfishing in the mulloway fishery, either in the Coorong or elsewhere (per Ferguson and Ward 2003, or any other literature) nor any evidence of recruitment overfishing overall in this highly fecund species. King (1995) states very clearly

> *"However, minimum legal lengths applied to species with high fecundity may not result in an increased recruitment unless stock sizes are very low (Figure 6.7, curve A)."*

The analysis of different state minimum size limits for mulloway reveals that SA is the only state which feels the need for a 75cm limit; with all other states having limits between 45 and 50cm (comparable to the Coorong limit for recreational and commercial fishers).

SARFAC seems to consider it fair that netting in the Coorong be urgently restricted to meet some perceived stock issue while choosing to ignore essentially identical (size limit) harvest regimes in all other states, as well as identical restrictions on hook and line anglers in the Coorong itself. If there really is some problem, this appears a highly irrational and biased means of resolving it (noting that no evidence is provided by SARFAC that such a measure will indeed solve the problem, which should itself be defined and quantified).

While there is no biological or conservation basis for the inequitable SARFAC recommendation, we have recently become aware of more insidious problems with the application of such size limits. Minimum size limits have an effect through the modification of the size structure of a target fish population (Sigler and Sigler 1990). When we use selective breeding in domestic animals, we rapidly change their characteristics. Minimum size limits, and selective gear in aid of achieving such restrictions, are highly selective on target fish populations, and must be expected to have a genetic impact. Many fish stocks worldwide now show evidence of earlier maturation of individuals (ie, smaller, often younger fish becoming reproductive) and, indeed, Dr Keith Jones (SARDI) has published on this observation with respect to King George Whiting.

Once fish become reproductive, their growth rate typically reduces dramatically, as energy is put into reproductive effort. Heino (2003) has examined stocks of northern cod which have been subject to such size selective harvest for many years. Following overharvest (and associated reduced environmental productivity regimes), few of these stocks are recovering despite, in some cases, complete prohibition of fishing. Heino and others have found that these cod populations have responded by maturing below the age of size selectivity … resulting in a small and uneconomic population which is no longer filling its natural place in the ecosystem. Genetic selection changes the characteristics of a population such that hundred's of generations of zero harvest may be necessary to achieve partial recovery (ie, hundreds of years). We cannot afford such impacts on mulloway, or any other fish in our waters.

The currently available advice from geneticists appears to prescribe a-selective fishing (ie, not size selective) as the preferred harvest strategy. Size limits (mostly for minimum size at harvest) are used extensively to manage SA recreational and commercial species. While the SFA does not pretend to have adequate expertise in this area, we believe it is in the interests of this government and the community to take this problem very seriously.

(The SFA notes that such harvest of intermediate size fish (46-75cm) from the Coorong acts to reduce the overall size selectivity on the mulloway stock, and represents a positive contribution to mulloway sustainability, just as a-selective fishing by Aboriginal fishers has for millennia before.)

We therefore recommend the following strategy as a means to ensure the continued value of all our SA fisheries:

> **That this government (and its interstate and Commonwealth partners) urgently review the impacts of size restrictions on the genetic biodiversity (and especially, the fishing down of size at maturity) of major fish stocks such as King George whiting and snapper in the first instance. In the interim, any considerations to change mulloway size limits (at all) be held in abeyance.**

Management opportunities for Coorong mulloway

The SFA believes that most of the opportunities for improved management of mulloway harvest now exist in less intensively managed parts of the range of this species. Lakes and Coorong commercial fishers possess heavily constrained effort limitations and gear restrictions as well as mandatory catch reporting in aid of sustainability objectives; recreational fishers have unlimited effort, and immediate access to improvements in gear technology as well as absolutely no reporting accountability. In addition to the overall opportunities addressed above, the SFA believes the following tailored initiatives have sustainability and other benefits to this government and the broader South Australian community.

SARFAC believes that mulloway stocks display reduction, based on commercial harvest data from an environment with an almost closed mouth, and greatly lowered desirability for mulloway to enter (SARFAC 2003). In the 1970's, commercial access to fish the Murray mouth was restricted. This was not based on impacts on stock, but on a desire to ensure that mulloway had full access/egress to/from (remaining) Coorong habitat. Since that time, recreational effort in the vicinity of the Murray mouth, when mulloway are present, has increased dramatically with the increased popularity of four-wheel-drive vehicles. At times, hundreds of fishers converge on this tiny area, with noise, light, boats and other activity all through the night. Now that the Murray mouth has become so constricted, with little likelihood of dramatic improvements over time, physical access to the Coorong for mulloway is itself restricted. Recreational fishing activity is now as big a threat to mulloway access to the Coorong as commercial fishing was seen to be earlier. By ensuring full access to Coorong waters (and out of Coorong waters) all the time, fish can be equitably accessed elsewhere by all sectors, to the benefit of the stock and the ecosystem. The SFA therefore:

> **Calls on this government and SARFAC to endorse SFA's recommendation that the permanent Murray Mouth closure area be extended to include all fishers, in order to aid mulloway in transiting this critical pathway into and out of the Coorong unimpeded (NB: this is in exact equity with commercial restriction, which SFA continues to endorse and support).**

Lakes and Coorong commercial fishery net restrictions currently currently specify 2" – 2 ½" mesh nets for mullet fishing, and 4½" to 6" for other species.

The Lakes and Coorong fishers themselves initiated a legislated mesh size restriction between 2½" to 4½" mesh specifically to protect undersized mulloway, bream and flounder. This was to address by-catch of those species, reducing it to the very low level of discards we have today [this will be verified by the upcoming SARDI/FRDC funded by-catch study].

For unknown reasons, the upper limit of 6" mesh was introduced as a regulation without consultation or evidence of benefit, and remains one of a number of mistakes in the that need to be fixed. Three reasons for this are:

- Firstly - Industry was not consulted about, or even made aware that, the maximum mesh size of 6 inches being put into legislation until well after it's introduction [Lakes and Coorong Fishery Scheme of Management 1983].

- Secondly - Fishers are fully legally entitled to catch fish above 60cm, however they cannot use gear which can catch these larger fish (eg. 65cm Mulloway are meshed in 6 ½ inch nets, 70cm fish are meshed in 7 inch nets etc.).

- Thirdly - As the majority of data collected to understand the stocks are provided by commercial fishers, there is currently a gap in the data as the sizes of fish caught are directly related to the size of mesh used (ie, the community is missing out on valuable data which it could obtain for free).

Larger mesh nets will give a wider range of scientific data to make management decisions as well as redress current mistakes in regulation. SARDI Aquatic Sciences would get more accurate length/age data. Studies on length and age composition have been driven by the commercial catch data and are skewed because the data snapshot is of 3 – 5 year old fish of a species that potentially lives to 30 years plus.

Finally, removal of the upper limit mesh size will improve the economic efficiency of this sector and increase length/age data information at no extra cost to the government and the community, nor to the sustainability of the resource, which will benefit all stakeholders. It is therefore recommended that

Net sizes for larger species be specified as greater than or equal to 4 ½ inch (115mm). Small mesh nets size range to remain exactly as at present for targeting mullet (ie. 2 inch to 2 ½ inch inclusive).

Haul nets are shot around a school of fish and taken to the bank, where the bunt of the net remains in the water and fish are removed with a brailing net. Non-target fish are released unharmed as it is rare for fish to gill in such small mesh.

The 2 inch mesh haul device was removed in the 1988 and replaced with the 3 ¾ inch minimum mesh specification - which has proven to be a bad decision forcing fishers to use gear which actually increases impacts on undersize and non-target fish.

The 3 ¾ inch haul was recommended to the Dept. of Fisheries at the time to be a better net for reduction of by-catch by allowing fish to escape through the mesh. In practice, this device gills many undersize fish, defeating it's perceived objective (which was already being met by simply removing fish live from the bunt in the water).

From 1st November to 31st March no small mesh nets can be set in Area 1 [refer to map] of the Coorong. Therefore over the summer months when mullet tend to congregate in this area, fishers are unable to target them. This affects continuity of supply and causes unnecessary economic hardship, for a species that has been an integral part of the fishery. Mullet is one of only two recognized under utilized species in South Australia by SARDI Aquatic Sciences [the other is Tommy Ruff].

By returning the 2 inch haul net it will provide a more consistent supply of Coorong mullet to the general public. This also provides a fishing method to target mullet during a period of time when undersized mulloway are prolific, and can be avoided.

For larger fish and deeper situations, 4 ¼ inch mesh size is desirable. Due to the influence of current and manual hauling on the diamond configuration of haul net mesh, it has different catchability than static mesh nets. This size mesh targets the same sized fish as a 4 ½ inch static mesh net which catches legal and biologically acceptable harvest as already specified. In effect, SFA is recommending increased restrictions (in specifying a large mesh haul net size) on its members in aid of meeting its bycatch minimisation efforts towards sustainability certification.

The recommendation to allow 2 inch haul nets for mullet allows harvest of an underutilised species for which there is unmet market demand, without adverse impacts on other species. Seddons (2000) has already clearly demonstrated that haul nets fished as above have minimal impacts on seagrass and habitat, while similar work in Victoria (Morison 2002) has demonstrated that haul nets can achieve almost zero bycatch mortality when the bunt is left in the water (as above). It is clearly in this government's interests to regulate that:

> **Haul net mesh sizes for the Lakes and Coorong commercial fishery be specified as either 2 inch (effectively 50mm) or equal to, or greater than, 4 ¼ inch 108mm).**

Mulloway is an important species to the Ngarrindjeri as is the Murray Mouth/ Area one and the indigenous community are being conveniently overlooked by the recreational lobbyists (eg, SARFAC 2003) when making claims for species and areas.

The original 3,000-5,000 aboriginal residents of the Coorong region traditionally fished the rich marine, estuarine and freshwater resources of this highly productive ecosystem. This population is believed to have been the largest historical population of aboriginals in Australia. Hauling nets, mesh nets, fyke (type) nets and fish traps were common fishing gear of the Ngarrindjeri people, as were spears and specialist boomerangs. Mulloway were the most common target species followed by Bream and Yellow-eye Mullet. Goolwa cockles were also important to the regular diet in their culture.

The local indigenous community are also concerned at the large number of recreational boat users and anglers returning day after day to the Coorong to take these excessive bag limits and especially with no boat limit. (Personal Communications, D. Gollan, Ngarrindjeri Elder, 2004).

There is currently a Native Title Claim over the Murray Mouth and Coorong Area which is expected to be dealt with under an Indigenous Land Use Agreement (ILUA). The Southern Fishermen's Association has a member on the Native Title Reference Group (NTRG) for the SA Fishing Industry and also sits on the Fishing and Aquaculture Side Table (FAST). To date the outcomes from that process appear to be positive. And it is expected that if this process continues to be supported there will be benefits to all involved.

The SFA welcomes the indigenous community to become part of the commercial fishery where fish are to be taken for sale, and has indicated our willingness to provide training and mentorship when this happens. At present, there is no formal provision for Ngarrindjeri people to take fish for personal use, outside of non-traditional recreational methods. As discussed below, the SFA supports "recreational" gillnet use (as currently regulated) as a sustainable harvest mechanism. As part of our proposed re-allocation of a limited number of these licences, we believe that it is just and reasonable that a number of such licences be (re-)issued to individuals within the Ngarrindjeri community for provision of personal/community use. The SFA proudly supports this government in endorsing:

> **The re-issue of an appropriate number of personal/community use net licences, from within the current "recreational" licence number, to Ngarrindjeri persons, and subject to existing sustainable management and regulatory provisions. These are also to be subject to conditions agreed to through the ILUA process.**

Recreational netting focuses on mullet in the Coorong and Lake George which is recognised by SARDI Aquatic Sciences as one of two under-utilized species in South Australia. In the freshwater lakes, carp are targeted as bait for recreational rock lobster pots. The number of active netters is unknown as many of the license holders renew their registrations without using the net, due to the small fee involved. Their impact on the juvenile mulloway is not measured and is therefore not documented. Industry observations on the water have noted minimal impact by this sector. A recreational net is a 1 metre floating net with an operator in attendance which is also consistent with Lakes and Coorong commercial fishery best practice.

A nominal administration fee is currently charged for the annual reissue of licenses and these licenses are surrendered either voluntarily or when the permit holder passes away. No recreational nets are reissued under this moratorium. The last data available showed that there were 2238 recreational nets registered in South Australia and the only legal location for their use is in the Coorong and Lakes region, given that Lake George is currently closed to fishing.

There has been no conflict between this user group and commercial fishers. With a bag limit of 60 fish/day and 180 fish/boat, this has been a cost effective manner to harvest a plentiful resource. We have seen no evidence of sustainability issues with this recreational fishery, as currently managed and regulated. As this method is often the primary way to catch mullet along most of the length of the Coorong, and has been a tradition for many decades, the commercial industry sees no reason as to why it cannot continue. However, current restrictions mean that young people have no access to this fishery/resource except with largely ineffective angling methods.

The SFA supports renewed transferability of these licences, subject to a cap on numbers available for issue, and cost-recovery implementation for access benefits. Given that current licences are not heavily fished, investigation may be required to estimate a sustainable number of on-going licences. By allowing the licenses to be transferable, it will continue a tradition especially in those families who currently enjoy the activity as a recreation. The registration fee can offset management costs. Additional funds can finally be collected to pay for compliance and contribute towards research costs, currently borne by the commercial industry and general taxpayers (non-fishers).

It is therefore recommended, as being sustainable and in the interests of the community, that:

> **After investigation, a sustainable number of "recreational" and "indigenous community" mesh net licences be allowed to be transferred. This would be subject to a cost-recovery fee (ie, one fee level for one location to be fished, being Lake George or the Coorong, and a second level fee to be charged for access to both). Management of this fishery to remain otherwise as currently regulated.**

It is surprising that SARFAC (2003) recommends the abolition of recreational netting opportunities in the Coorong, when SARFAC is supposed to be representing the several thousand stakeholders who pay annually for this access and fishing opportunity. This position is particularly surprising, when there is no evidence of sustainability problems with this sector over many year, and which the SFA is happy to acknowledge. SARFAC has been operating under a revised structure, incorporating nine publicly funded Recreational Fishing Committees since 1997. Evidence such as the plight of recreational netters seems to indicate that SARFAC may not be adequately or fully representing its constituency, despite the injection of major funding. The SFA, which has had members contribute to regional RFC's, believes that it is time to review the SARFAC/RFC structure relative to the benefits it actually provides, the representativeness of its advice, and whether this industry should fund its own respresentative groups (in equity with commercial representation). The SFA therefore recommends that the Minister of Fisheries:

Immediately review SARFAC and the nine Recreational Fishing Committees relative to:

- **Evidence of full and equitable representation of recreational fishers**
- **Quantification and cost-effectiveness of benefits from each element of the process**
- **Potential for self-funding of recreational fisheries representative bodies.**

SARFAC (2003) presents the Coorong mulloway as a very important recreational issue. According to Henry and Lyle (2003, the National Recreational and Indigenous Fishing Survey 2000/1), mulloway was well down the list of recreational species targeted. The Coroong area is also well down the list of recreational preferred spots.

The SFA notes that there are very few closures for recreational anglers and they have approximately 100% access to the mulloway resource. In fact, the huge increase in recreational anglers over the past two decades is having an enormous impact on the resources. Coupled with the fact that they contribute nothing in dollar terms toward the cost of management and research, the true value of this recreational activity to the state is highly questionable. In the National Recreational and Indigenous Fishing Survey 2000/01, mulloway numbers caught were ranked numerically 27th out of 42 recreational species caught in South Australia.

The commitment by SARFAC to responsible management must be questioned. After making recommendations for the Lakes and Coorong commercial fishery, they conveniently ignored implementing a boat limit for Mulloway. All other important species in the state have boat limits. Bag and boat limits for the ever increasing sector are being brought into question in many forums especially the conservation sector. Non-fishers believe many of the bag/boat limits are excessive and should be reviewed. Community expectation is that a bag/boat limit should reflect "a feed of fish," and not commercial quantities.

The SFA notes that the NRIFS found a mean bycatch level of 67% for this sector, with mortality unknown. Perhaps this is why an EPA report (on sustainability of fish resources within SA) in Nov 2003 stated that more effort is needed by government to manage the recreational sector sustainably.

The SFA has made its recommendations regarding improving the contribution of the recreational sector to the overall sustainability of the mulloway resource above, since it reasonably must include all jurisdictions. The SFA believes that there is a need to further refine recreational angling management with respect to mulloway and the Coorong, but reserves the right to present these in future, as more evidence becomes available (eg, with respect to genetic impacts of size limits, potential bycatch mortality reduction through the use of circle-hooks, etc.).

The marketplace has already given its own negative verdict regarding the profitability of mulloway aquaculture, as advised by the SFA before the venture began (based on known market value and best case production costs). Recently, agency representatives sought industry advice regarding possible stocking of the 350,000 aquacultured mulloway fingerlings into the Coorong.

Not only was this deemed unworkable in an open system such as the Coorong but the trophic balance and effect on all animals, particularly the more vulnerable species (eg. congolli, galaxiids and gobies) would likely be pushed to the point of "no return". Equally, given our imperfect understanding of the stock structure of this species, genetic swamping of wild fish could result.

SFA believes that to even consider stocking of aquacultured fish into the RAMSAR and community-beloved Coorong is wrong. The SFA calls upon this government to (wisely) make known its public policy:

> **Prohibiting either aquaculture or stocking of aquacultured fish into the Coorong ecosystem, and its immediate environs.**

In the introductory remarks to this document, the SFA provided strong evidence of the conflicting expectations being made of the Lakes and Coorong fishery to "add value which requires major investment" while facing a lack of government commitment to a stable access future. This issue remains at the heart of the families that make up this fishery. It is clear that this apparent lack of stable government policy regarding Lakes and Coorong commercial access to mulloway is greatly impeding value adding of existing sustainable harvest, and associated benefits to the economy and community of South Australia. If recreational interests are as financially well endowed as exaggerated expenditure reports suggest, this government should adopt a policy requiring recreational interests to buy out commercial (Lakes and Coorong) licenses to achieve allocation changes transparently and fairly, rather than employing public funds (a subsidy) or sustainability mis-representations. Any such buy-outs must be reversible to be equitable, rather than extinguish a commercial licence. In view of this free market opportunity, the government's clear economic expectations, and the fishery's exceptional sustainability record, it is recommended that:

> **allocation in the Coorong mulloway fishery be accepted as public policy for a period of one decade to allow investment in value-adding of existing harvest opportunities across both recreational and commercial sectors.**

Investment and security will allow the next generation of Coorong Fishermen to benefit their region and communities.

Conclusions

In the past the Southern Fishermen's Association has chosen not to become involved in recreational management issues. SARFAC representatives can make recommendations to government on management issues and through the FMC on sustainability issues. Disturbingly more and more of these recommendations are aimed squarely at reducing the commercial sector and demanding more and more of the resource for no financial contribution to managing the stocks and the fishers themselves.

However in light of the continued adversarial approach by recreational sector and results of the National Recreational Indigenous Fishing Survey 2002, the time has come to address some of the issues, myths and mistakes that have arisen over time.

This is a dangerous trend amongst Managers and scientists who are surmising and supposing more and more instead of using data to support their hypotheses (eg, recent stock assessments).

The recommendations put forward in this paper are long overdue, and listed above, as well as within the Executive Summary. There is the opportunity to bring some reason and responsibility to the management of mulloway, and correct some of the anomalies in the regulations.

These anomalies have occurred due to lapses in the chain of command when regulations have been written up. Changes to existing regulations or new regulations were either imposed on industry or agreements were reached between industry and previous PIRSA Fisheries Managers/Directors, but when it reached the regulation writers there have been mis-interpretation of the original agreements. As the regulation writers are not fishers it is often difficult for them to have a clear picture of how the regulation was intended to work in practice. In addition, the regulations were not sent back to industry to peruse prior to them being implemented. This type of practice needs to be addressed.

There also needs to be a firmer hand by PIRSA Fisheries in regard to the issue of commercial/recreational conflict. The only conflict that arises is where the recreational sector keeps seeking a larger slice of the resource pie, in complete disregard for the needs of the public or the truth, and completely outside the readily available market system established by government.

The more educated recreational fishers acknowledge that 90% of the recreational catch is caught by 10% of the fishers. It is that minority who perpetuate the myths about commercial fishing, and completely ignore the rights of those who cannot or choose not to go fishing for themselves. This massive, but forgotten group rely on the commercial sector for their "feed of fish".

The SFA executive would expect that given that the recreational sector pays nothing toward the management of the resource and that the commercial industry pays for a large component of the manager's time that the main priority to focus on is lack of information about the recreational impact on fish stocks and recreational by-catch.

It is time for the recreational representatives (SARFAC) to demonstrate their actual commitment and practical action in support of sustainable mulloway resources, and all other shared stocks. It is time for government to commit to a stable allocation base which allows both sectors to get on with the business of contributing even more to the state's economy and enjoyment.

Acknowledgements

The members of the Southern Fishermen's Association acknowledge the contributions of their members and associates whose individual insights into the behaviour and management of mulloway often represent "trade secrets" but have been shared in aid of the sustainability of the resource.

The SFA acknowledges the input of two anonymous fisheries scientists in the development of these recommendations, together with the input of WWF and MSC stakeholders over many years with respect to continuously improving the demonstrable sustainability of the Lakes and Coorong commercial fishery.

The SFA acknowledges the work of a number of SARDI (and other) scientists in improving our understanding of mulloway. PIRSA fisheries managers are acknowledged for their willingness to openly discuss sustainability and allocation issues with industry; again, with a view to enhanced sustainability. Finally, the ongoing work of CCSA (Conservation Council of South Australia) and MCCN (Marine and Coastal Community Network – South Australia) is acknowledged for their efforts on behalf of the future of the Lakes and Coorong ecosystem.

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Appendix A

The Lakes and Coorong Commercial Fishery is an inland and inshore waters community fishery, harvesting estuarine, saltwater and freshwater species. It has been commercially fished since 1846, with a number of generational fishing families (some going back 5 generations), still conducting their activities in the area. This gives fishers an intimate knowledge of the environment and an understanding of the history that has shaped the development of the fishery.

The area fished by the license holders stretches from Wellington on the River Murray, Lakes Alexandrina and Albert, the waters of the Coorong estuary, and the coastal waters from the Murray Mouth to Kingston SE.

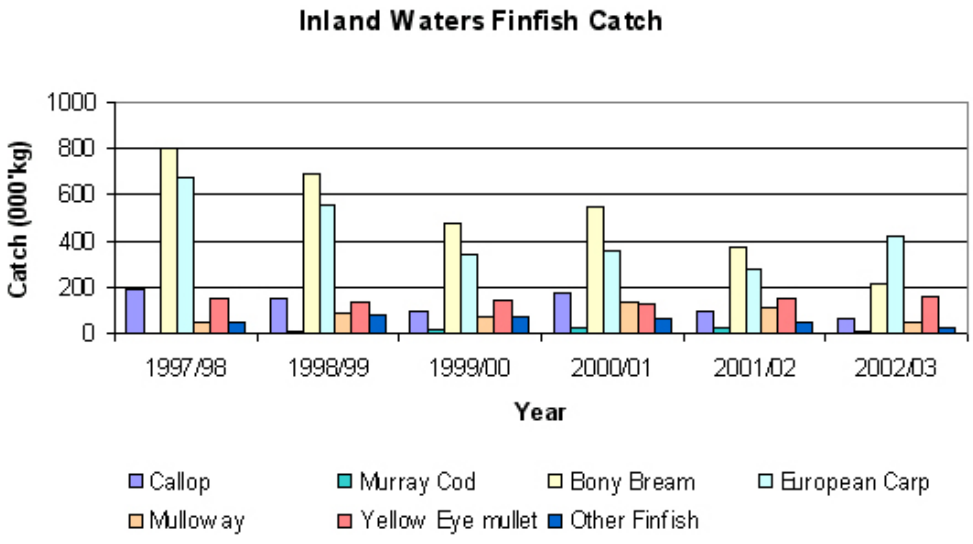
It has become a highly modified system, following the construction of barrage network from 1935 to 1940, when 89% of estuary turned into fresh water. The impacts of man's interference in the natural regime include reverse/summer flooding, riparian zone modification, introduced species, massive upstream water extraction and flow modification and pollution. Yet despite this 90% of value comes from 10% of the original estuary with the value of the fishery approx. $5.0 million GVP in 2002/03[1].

The main species fished are mulloway, flounder, yellow-eye mullet, cockles, black bream, bony bream, redfin perch, callop, and European carp. Many of the gear types used are modified versions of traditional aboriginal gear types.

Fishing methods utilise low mechanisation coupled with highly energy efficient netting and manual harvest types. This results in low by-catch, highly specific methods operated by well-trained operators with decades of experience with the ecosystem and it's fish.

The modification of the ecosystem means there is a diverse range of habitats (freshwater, estuarine, marine and hyper saline areas.) The advantages of being a multi-species, multi-gear fishery is that there can be a rotational harvest system, which shifts effort from one species to another when one becomes financially non-viable to target, or spreads effort across several species when conditions are optimal.

Having these options available guarantees there is no possibility of a major fish down of any single species.



[1] GVP is the landed wharf value and processing/value adding of the total catch.
The catch of finfish species and hence gross value of production of the fishery in 2002/03 were significantly influenced by drought conditions in the Lower Murray lakes and Coorong. (EconSearch Pty Ltd 2004)

Appendix B

Since1988 there has been major rationalisation of the commercial fishery to ensure sustainability both to the industry and key fish stocks. In addition industry has initiated further management strategies to further enhance these aims and continues to do so.

Through several innovative projects, the Lakes and Coorong Commercial Fishery through the Southern Fishermen's Association (SFA) has become recognised nationally and internationally for its proactive approach, for example:

- 1st Fishery in Australia to implement an Environmental Management Strategy
- 1st Fin Fishery in Australia to pursue Marine Stewardship Certification (MSC) as a sustainable fishery. We are currently undergoing full assessment.
- 1st Fishery in Australia to have a Partnership Agreement with the World Wide Fund for Nature (WWF)
  [see separate attachment "The Southern Fishermen's Association and World Wide Fund for Nature – Partnership"]

The Association has continued active involvement in a number of projects to address degradation issues in the Lakes and Coorong, Lower Murray region:

- Restoration of environmental flows in the River Murray
- Implementation of fish passage strategies
- Improved management of barrage operations for enhancement of the downstream ecology
- Integration of the Upper South East Drainage Scheme with a major outlet at Salt Creek into the southern lagoon.

During the last 10 years the SFA committee and fishers, with minimal financial resources, have produced several documents supporting our continuous improvement approach to fishery management and stock enhancement, such as:

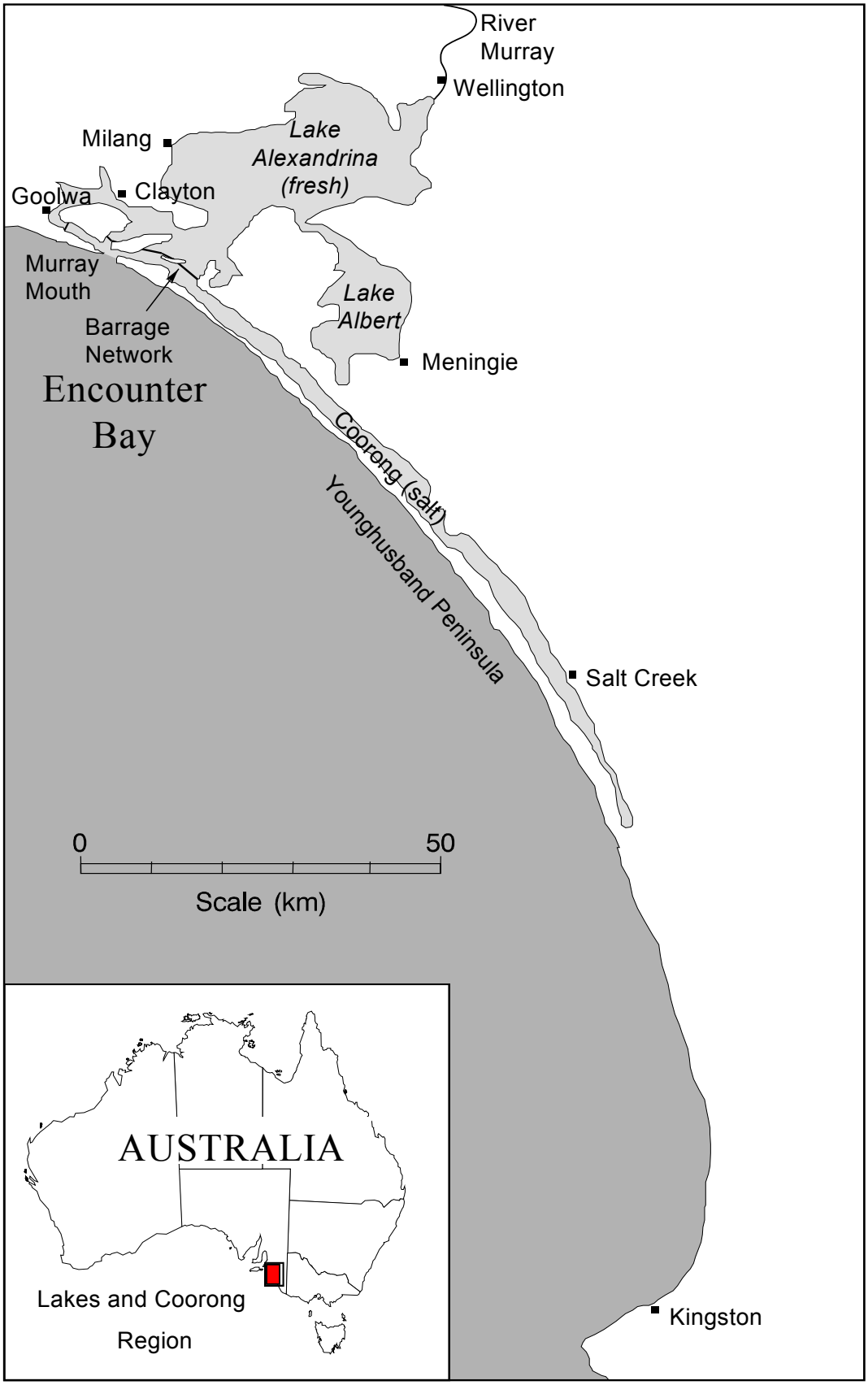
- Environmental Management Plan (to be revised following MSC certification advice)
- Best Practices To Minimise Interaction Of Juvenile Mulloway, Crabs And Birds With Fishing Gear
- Strategic Plan 2003
- "Wild Fisheries with a Future" Current Economic Value and Value-Adding Opportunities – project report
- Industry photographic displays at Signal Point, Goolwa and Tourist Information Office, Meningie
- The Southern Fishermen's Association and World Wide Fund for Nature - Partnership

'The Southern Fishermen's Association believes that MSC certification, coupled with independent science, aggressive environmental partnerships with local conservation groups and active communication of our role as environmental watchdogs to our local community will guarantee our future. If like most fishermen, we just keep fishing and don't work for the future, we won't have a future.'

Excerpt from 'SFA and WWF—Partnership' Brochure

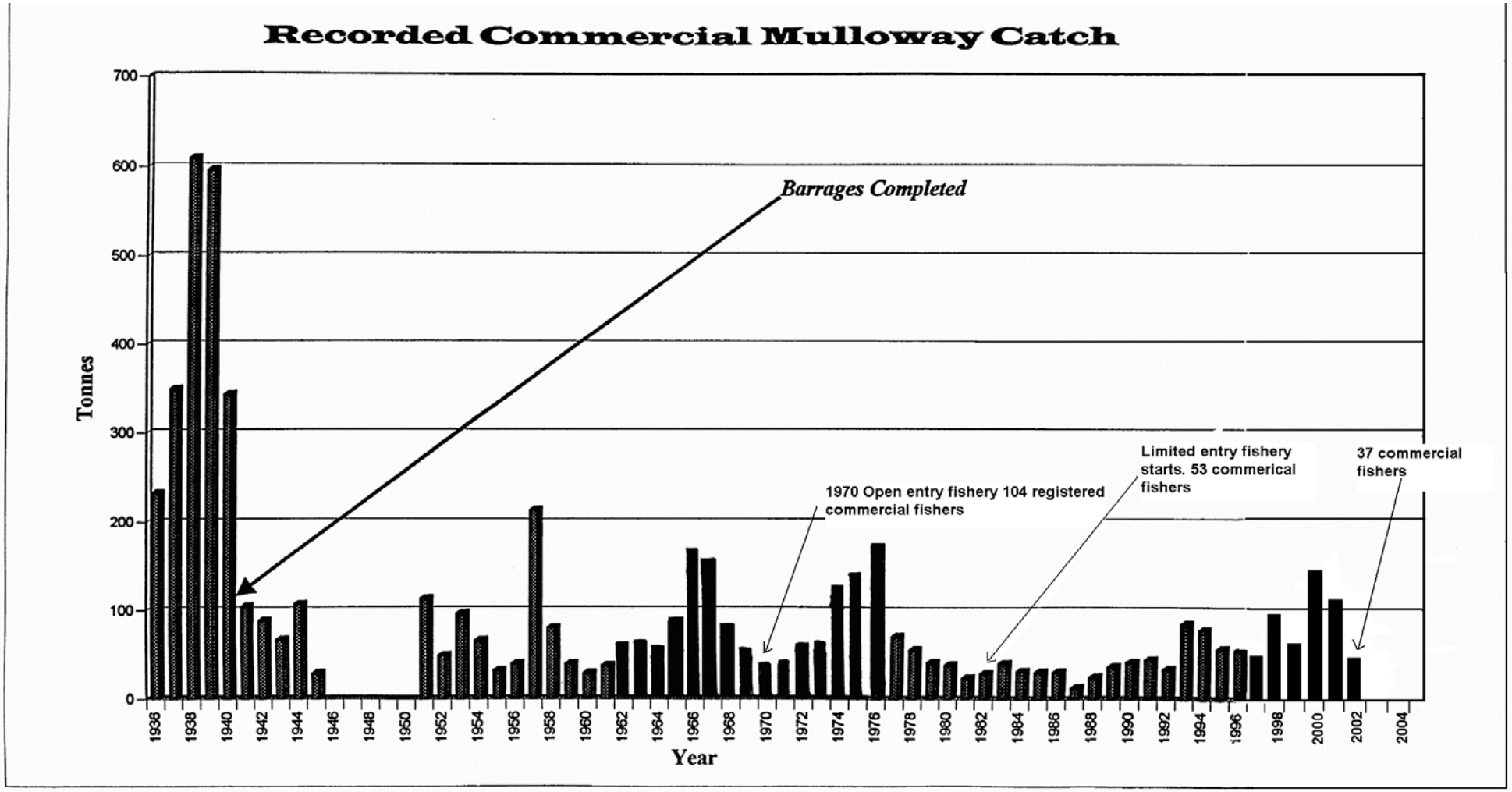
Appendix C

Location map of the Lakes and Coorong fishery.



Appendix D

Reported commercial Mulloway harvest from the Lakes and Coorong fishery demonstrating the importance of our data.



Source: Fisheries Research paper No.22 (S.Aust) with additional data from SARDI Aquatic Sciences - Inland Waters Statistics

Note: Data Unavailable for period 1946-50

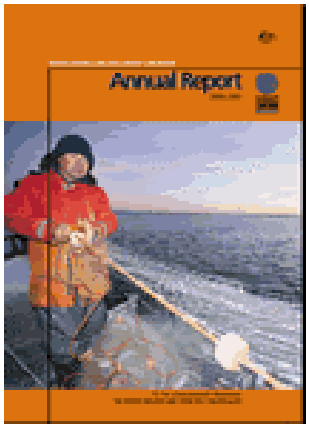
Appendix E
Evidence of the esteem in which the SFA is held at a national level.

From 'FRDC Annual Report 2000 – 2001'

Cover theme: a small fishery leads the way in ecologically sustainable development

A fourth-generation fisher, Garry Hera-Singh, hauls in part of the day's catch from the Lakes and Coorong Fishery in South Australia.

Garry and his colleagues in the Southern Fishermen's Association were the first fishers in Australia to develop an environmental management plan for a fishery – initially as a reaction to threats to their livelihood. Since then, they have been at the forefront of development of new environmental management systems. This effort is no longer reactive; now it stems from understanding that the economic and social dimensions of the industry will benefit from managing the environmental dimension for the long term. The conviction that "ecologically sustainable development is the only way to go" is growing fast throughout the industry.



The FRDC works with industry organisations such as the Southern Fishermen's Association to develop practical environmental management systems. In doing so it pursues its planned outcome for industry development, which is: "the commercial sector of the Australian fishing industry is profitable and internationally competitive; the commercial, recreational and traditional sectors are socially resilient".

Appendix F

SARFAC (2003) recommendations regarding mulloway which really only focus on the Coorong and commercial/netting (reformatted from Word Perfect).

RECOMMENDATION FOR MANAGEMENT ACTION ON THE MULLOWAY FISHERY IN THE COORONG LAGOON (AREA 1)

Prepared by
South Australian Recreational Fishing Advisory Council Inc.

October 2003

SUMMARY

In view of the general decline in catch rates over the past several decades, together with the more recent serious decline in the River Murray fresh water flows and the direct relationship with mulloway recruitment, SARFAC believes urgent management actions and future direction is required to provide protection for juveniles in the Lakes and Coorong fishery.

Mulloway may be vulnerable to high levels of juvenile mortality (Ferguson & Ward 2003).

Increases in minimum legal length in some heavily exploited fish stocks have been shown to result in significant benefits (King 1995).

1. INTRODUCTION

The Murray Lakes and Coorong (Goolwa to Gnurlung Point, Area 1; see figure 1.), are of material and international conservation status and listed as a Ramsar Wetland in accordance with the Ramsar Convention on wetlands (1971), and operates within the boundaries of the Coorong National Park. Since European settlement the area has been subjected to declining fish fauna, extensive algal blooms, reduced freshwater flows at the Murray mouth, and declining habitat diversity.

The Coorong Lagoon is also South Australia's most important nursery area for mulloway.

Mulloway is an important and icon recreational specie in South Australia and concern has been expressed on the susceptibility of the biomass to the fluctuations of fresh water flows into the Coorong lagoon.

In the Discussion Paper by D A Hall in 1986, "An Assessment Of The Mulloway Fishery In South Australia With Particular Reference To The Coorong Lagoon", Commercial catches between the years 1951 to 1996 for the whole State show up to 700% variation (30t to 215t). A ten year recurrence at regular intervals of peak catches is apparent around 1956, 1966,1976, 1986 and 1996. In 2001 / 02 the Coorong comprised 41% of the total marine scalefish sector catch.

Catch appears to be influenced by freshets 2 - 3 years prior and as the age of recruitment of mulloway is around 2 - 3 years and the bulk of the catch consists of new recruits from the Coorong, it is apparent that good freshwater flows enhance recruitment of mulloway.

A positive correlation is found between catch and river flows by using catch data from the Coorong (Hall 1986). It was also found that barrage flows are the prime influence on recruitment and could provide a reliable indicator of catch rates. The current reduction in frequency and volume of river Murray outflows is of major concern having regard to the Hall Discussion Paper.

More recently the SARDI 2003 Stock Assessment Report on mulloway supported the Hall paper and commented that the primary periodicity of both peak catches and peak freshwater inflow to the Coorong Lagoons was approximately 12 months. For large mesh nets, value of the correlation coefficient increased sequentially for lags of 41, 53 and 63 months (see figures 3 and 4).

2. STOCK MANAGEMENT

Apart from the minimum legal length restriction of 46cm, there are no specific management policies for mulloway. Other schemes of management exist for both the Coorong Fishery and the Marine Scalefish Fishery. These schemes of management encompass regulations that control the taking of all species through restrictions on gear types, commercial / recreational effort, minimum legal lengths, closed seasons and area closures.

2.1 MINIMUM LENGTH RESTRICTION The present minimum length restriction of 46cm does not provide optimum yield per recruit under conditions of fishing mortality (Hall 1986). It is also well below the length and age correlation of first maturity for females believed to be 85cm (L_{50}) TL or /5 years (see SARFAC Policy Appendix B).

Preliminary samples taken from the commercial swinger net fishery during October 2001 to March 2002 indicated that the smallest female to exhibit stage V ovaries was 889 mm TL (Ferguson & Ward 2003).

2.2 CLOSED SEASONS Seasonal Closures are applied to protect and or improve the yield of fish stocks. Protection is achieved either by general effort reduction or by prevention of exploitation of spawning fish which are more vulnerable to capture due to their schooling behaviour.

2.3 BAG LIMITS Bag limits are placed on mulloway to control the recreational catch. The Hall report also recommended that tight restrictions be placed on commercial fishing effort through a quota of 3 000 kg per annum per licence holder.

2.4 GEAR RESTRICTIONS There are a number of gear types that could be modified, restricted or banned, to improve the yield and management of mulloway in South Australia.

2.5 EFFORT REDUCTION A reduction in effort could also be achieved by taking deliberate management steps to reduce the impact of recreational and commercial fishers.

2.6 ENVIRONMENTAL MANAGEMENT There are serious concerns for the mulloway breeding population being influenced by reduction of River Murray outflows. Although the distribution of River Murray water is a complex environmental and political problem, the maintenance of aquatic flora and fauna, and minimum stream flow requirements are a major issue world wide.

3. RECOMMENDATIONS

Future water resource management proposals for the River Murray that reduce the outflows need to identify likely losses to the Coorong fishery and ecology and a water management policy be developed to maximise the benefit of fresh water outflows for mulloway and other fish stocks.

The prognosis for the South Australian mulloway population and other fisheries may not be positive unless improved procedures for ensuring adequate environmental flows are implemented (Ferguson & Ward 2003).

3.1 NET POLICY **We strongly recommend that the use of recreational nets in the Coorong be suspended with the long term policy of phasing out recreational nets completely.**

This has been a SARFAC policy since June 1978, whereby SARFAC does not accept that recreational anglers need to take catches which exceed their immediate requirements. Adoption of this policy will reduce effort and ensure increased escapement from the Coorong increasing yield generally.

3.2 SEXUAL MATURITY **Removal (or suspension), of the use of gill nets in the Coorong which will enable the minimum legal length to be lifted from 46cm TL to 75cm TL, which is consistent with all other waters.**

Experience in other fisheries has shown that gill nets are highly efficient and indiscriminate, and therefore can inflict high fishing mortality on juveniles when used in nursery areas.

Mulloway do not become sexually mature until about age six, or about 75cm TL (correlation between sexual maturity and length). Little is known of mulloway spawning areas, however the Murray mouth appears to be an important spawning area as aggregations of spent and spawning fish are commonly reported by fishers in the area. This suggests that during the warmer months fresh water flows act as an attractant (Hall1984; Gray 1990; et alii).

The majority of mulloway in the Coorong Lagoon (see figure 2.), are below the age of first maturity (75cm TL); gonad development has never been reported in fish taken from the Coorong (Hall 1986, Ferguson & Ward 2003).

Despite that gill net design can be selective, three year old classes of immature mulloway tend to be caught, and because female mulloway grow faster than males, use of large mesh gill nets may result in differing mortalities for males and females. If females were removed from the population at a younger age or at a greater rate than males, this then has implications for generational changes affecting the male / female ratio over time (Ferguson & Ward 2003).

3.3 REMOVAL OF NETTING EFFORT **All netting effort in the Coorong should be phased out as this is South Australia's most significant estuary and nursery area for estuarine species.**

This can be achieved by declaring that commercial licences to fish the Lakes and Coorong waters (Area 1), be non - transferable. SARFAC also recommends that licence numbers in the Lakes and Coorong fishery be reduced through a buy - back scheme with a goal towards abolition of commercial fishing effort in the Lakes and Area 1 and 2 by the year 2010 (see SARFAC Policy Appendix A).

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Appendix G

Commercial fishing regulation and access history

The Lakes and Coorong fishers have been fishing the resource under the precautionary approach for over 100 years.

Commercial harvesting is considered by industry to be extremely conservative due to the measures introduced for commercial fishing under both the implementation of the scheme of management in 1983 and further changes in 1988/89. This included a dramatic reduction in the number of nets and fishers allowed in the fishery. License amalgamations were instigated, with transferability of licenses brought in to allow them to be traded as compensation. These measures removed a large component of latent effort from the fishery. This was verified in a letter from Principal Fisheries Manager, Dr. D Gartside, 1980 to Mr D. Gallary, CEO SAFIC.

The capacity to catch mulloway has also been limited by regulations, controlling spatial and temporal closures. A recreational only zone was created at the Murray Mouth in the early 1970's.

In 1989 industry initiated further protection mechanisms for juvenile mulloway [e.g. changes in mesh sizes and ply ratings] to a point where any further reductions in effort or gear restrictions will clearly make this fishery inefficient and our businesses economically unviable.

Area 1 encompasses what is considered the estuarine component of the fishery from Goolwa barrage to the southern end of Tauwitchere barrage. When this area concept was introduced in 1989, the commercial fishing effort in this region was reduced by a minimum of 66%, from 25 nets to 10 nets per fisher.

Area 1 supports a third of the Lakes and Coorong fishery licenses and closing this area to commercial fishing will displace fishing effort into other areas of the fishery inducing spatial depletion and jeopardising economic returns.

As one of the major primary industries in the region[2], it is imperative that the commercial fishery is encouraged to develop and prosper, creating jobs, a regional identity and a showcase fishery which will be a jewel in the crown for PIRSA Fisheries and South Australia.

[2] Copy of council letter