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APPENDIX I REVIEW OF BAG LIMITS

In the Capricornia Section, 76% of campers surveyed by Walker (1986) supported bag limits; 20% of those surveyed were opposed to bag limits on campers. Some campers believed bag limits would be inequitable if not also applied to commercial fishermen and to fishermen based on boats. E.S. & S. (1986) reported similar findings. Of 10 Capricornia Section user groups surveyed on this topic,¹ over 65% of respondents in each group surveyed, except charter boat operators (50%) passengers (45%) and private motor boat owners (30%), thought there should be a bag limit on recreational line fishing. A similar but higher pattern of response applied to the same question in relation to recreational spearfishing where over 70% of each group supported a bag limit. The spearfishing group was not surveyed as a distinct group.

These findings appear to suggest something of a change of attitude; in 1979-80 when the first draft zoning plan for Capricornia was published, a proposal to include a mechanism for the introduction of a bag limit met with a mixed response, but was generally not favoured by recreational anglers.

Copes (1986) has summarised the problems which can occur with individual catch quotas in commercial fishing and many of the points are also applicable to recreational fisheries:

The problems to be identified are:

- quota busting (individuals will inevitably exceed the catch limit; enforcement levels, cultural and social pressure, penalties and gain from cheating will determine the degree of non-compliance).
- data fouling (under reporting of catches and poor quality data are two effects which have been reported for fisheries with individual quotas).
- residual catch management (if for example a reproductive target is established the catch is residual, and setting a quota for the catch may be patently absurd).

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1. commercial fishermen, private motor boat users, charter boat operators, permit holders, island residents, Heron Island and Lady Elliott resort visitors, charter boat passengers, island campers and user clubs and organisations.

- . Unstable stocks (if the total catch cannot be accurately determined at the beginning of each season e.g.. in a shortlived species with high year class variability) determining individual quantities will be hazardous.
- . flash fisheries (e.g.. where the fish need to be caught in a very short period of time to catch them in a particular condition, the fish will not wait for inefficient fishermen to fill their quotas.
- . real time management (if necessary for precise timing of stock exploitation, individual quotas are unlikely to be suitable).
- . high grading (discarding fish of lesser quality, which are likely to be unreported and will affect estimates of fishing mortality.
- . multi-species fisheries (separate sets of quotas are required but this may lead to "accidental" targeting of high value species, or an overall quota may result in high grading.
- . seasonal variations (if stocks fluctuate seasonally, fishing is likely to be concentrated).
- . spatial distribution of effort (if stocks are not uniformly distributed, fishing is likely to be concentrated; intra marginal grounds are inevitably over exploited.
- . TAC setting (the TAC may not always be met because of lack of time or opportunity by fishermen to transfer unfilled quotas)
- . industry acceptance (fixed quotas diminish the opportunity for fishermen to benefit from a luck big catch).

Copes (pers comm.) suggests that bag limits may have a relatively better prospect in recreational fishing than individual quotas in commercial fishing but he points out there is no perfect system and which imperfect system is best in any instance depends on the particular circumstances for fishery.

Arguments for and against bag limits are legion. A summary is provided below:

In favour of bag limits

Reduction in catch by amateurs, not likely to occur by education alone.

Affects very small percent of recreational fishermen.

Counter Argument

Discriminatory

Will remove element of competition for club outings and will probably destroy current style of operations. ANSA removed the straight "numbers game" competition years ago.

Legislatively reinforces notion of "recreational fishing" being desirable behaviour.

Amateurs won't be able to cover cost of outings and gear.

Against bag limits

Counter Argument

Difficult to enforce (many launching points). Regulations which are impossible to enforce are questionable.

Successful prosecution may overcome initial failure to abide by bag limits.

How to distinguish the number of fish from fillets only.

Insist on landing whole fish or kilogram equivalent and/or retain.

The bag limit becomes a target in itself.

Education may counter.

Anglers take additional passengers on board to maximise catch.

Passengers will not always be available.

Fish caught initially are replaced by more desirable fish caught later in the trip.

Returned (dead?) fish still in ecosystem.

Economic incentive to cheat.

Most people are law abiding.

Will adversely affect charter boat industry.

60% of charterboat operators now do not provide fishing as primary activity. Charter boat numbers have doubled in 5 years.

Doubtful capacity of licensed Master Fishermen to fill the gap immediately.

Acceptance and effect likely to be gradual.

Existing bag limits in force

Bag limits are a relatively little used mechanism in Australia for reducing amateur catch. Table 2 indicates the extent to which bag limits are used in Australian States to regulate recreational fishing.

Table 2: Bag limits in force for recreational fishing by State (Modified from Winstanley, 1985)

Fishery	W.A.	S.A.	Vic	Tas	NSW	Qld	N.T.
Australian bass					10	20	
Australian salmon	5						
(blue, brown or red)	1				2		
King George whiting		30					
Red Morwong					5		
Abalone		5	10	10	15		
greenlip and							
brownlip	10						
Roe's	20						
Blue Crabs	36	36					
Prawns	9 litres						
Scallops			100	200			
Southern Rock							
Lobsters - by							
diving	8	5	4	5	5		
by pot or hoopnet	8	no limit	4	10	5		
Squid			10				
Reef Fishes combined							
(includes snapper)	10						
Barramundi							5
Spanner Crabs							5

As is evident, most bag limits apply to individual species. The W.A. bag limit for "reef fish" is the exception, where there is a bag limit of 10 reef fish per angler day made up of Australian jewfish, northwest snapper, blue groper, salmon fish, spanish mackerel and blue morwong.

Overseas bag limits in recreational fisheries are not unusual and they apply mainly to individual species and comprise a daily maximum limit and a maximum possession limit (equal to or almost double the daily maximum limit).

Evaluating the effectiveness of bag limits

It is difficult to evaluate the effectiveness of bag limits because of the paucity of knowledge of, for example recruitment and natural mortality, which could mask or generate results which might otherwise be ascribed to the imposition of limits (Kirkegaard, pers comm).

Estimates of compliance with fisheries regulations are difficult to obtain; and seem to be infrequently obtained. Compliance with a minimum size limit regulation on freshwater fish in Iowa streams was estimated as 86% (Paragamian n.d.).

The only known published evaluations of bag limits are those by Bargmann (1984, 1985) who investigated the "appropriateness" of existing limits for groundfish in Puget Sound, Washington. Bag limits had been in effect since 1961 and the analysis was undertaken in 1981 when the following limits were in effect:

- Pacific cod, walleye pollock, greenling, rockfish: 15 fish per day and no more than 10 rockfish
- lingcod: 2 fish per day in part of the area between 15 April and 30 November: otherwise lingcod fishery closed
- Pacific halibut: 2 fish per day from 1 March - 1 October
- no restriction on other ground fish species.

Anglers were classified into those targeting on particular species and those who were not targeting. Of those targeting on species, success rates were much higher. The majority of anglers surveyed did not appear to approach the bag limits however there were a few exceptions where limit catches were obtained e.g.. 67% of targeted lingcod trips in some areas attained the limit. For an estimated total of 311,000 angler trips, it was concluded that bag limits were effective in limiting the lingcod, walleye pollock and Pacific cod harvests in some areas and the rockfish harvest by targeting anglers. Based on the catch data for 1981 Bargmann calculated the following:

All species	Bag limit/day	% reduction in catch
	15	1
	10	8
"Aggregate" species	10	10
Rockfish	5	9
Walleye pollock	10	15
Pacific Cod	10	4
Lingcod	1	20
Greening	2	4
Flatfish	10	3
	7	12

Subsequently, in 1983, the daily rockfish bag limit was decreased to 5 fish in some areas of Puget Sound, based on an anticipated 9% reduction in total catch. Anglers were surveyed in the summer of 1983 to evaluate the impact of the bag limit changes and awareness of the regulations by anglers (Bargmann, 1984). Knowledge of the restrictions was as follows:

Year Limit imposed	No. of rockfish identified as limit	Percent of Responses in 1983	
		All anglers	Rockfish anglers
1983	5	15	25
1978	10	3	3
pre 1978	15	10	12
	Don't Know	59	40

The limit reduction had little effect on the number of angling trips made by the anglers interviewed (98% of all anglers interviewed stated that the number of bottom fish angling trips they made had not changed because of the bag limit). Ten percent of all anglers and 20% of rockfish anglers caught a rockfish limit in 1983 and 5% and 11% of each of these groups respectively, had released rockfish they otherwise would have kept because of the reduced limit. Thus the number of angling trips appeared generally unaffected but the number of rockfish retained appeared to be reduced by some small unquantified amount.

In British Columbia the bag limit in the Strait of Georgia of 2 salmon per day (so that the total recreational quota would not be exceeded under the International Salmon Treaty) is regarded as having been effective because the recreational quota has not been exceeded for the two years the limits have been in force and the total recreational catch is a reduction on pre-quota levels.

Other information obtained from North America is equivocal (Appendix 1). No evaluations of the cost-effectiveness of bag limits had been undertaken as far as could be determined. Views on their effectiveness ranged from generally ineffective in reducing total catch as less successful fishermen "picked up the slack", to being quite effective in reducing or containing catch. It appears that there has been only one study that attempts to dissect the bag limit effect from recruitment, natural mortality and other effects, even when there is reliable information that the total catch was limited.

Cost and practicability of enforcement of bag limits

There appears to be no information available on the cost of enforcement of fish bag limits. Bag limit enforcement is usually added to the range of other fisheries regulations which must be enforced. Often bag limits are imposed simultaneously with other regulations e.g. seasonal closures, so it would be difficult to distinguish the enforcement costs.

Crutchfield (pers comm.) suggests that compliance with bag limits in Washington DC has been surprisingly good; with a few tough enforcement drives at larger centres and occasional at sea checks.

In California, of the 500 to 1000 marine recreational fishing violation citations a year given by one 40' patrol boat, over half were for licence violations; few were for bag limit violations. No additional resources are applied for increased bag limit restrictions.

In British Columbia, an additional 6 enforcement officers were provided under the International Salmon Treaty to enforce sports fishery regulations which included bag limits and spot area closures; they were deployed to enforce all salmon sportfishing restrictions. Inspectors can issue on the spot tickets with penalties from \$25 to \$1000 for violations (including bag limit violations).

Management officers from California and British Columbia indicated they felt that bag limits are reasonable and effective, although they have not been formally evaluated. Researchers in British Columbia were not so optimistic.

A bag limit on GBR reef fish

If a bag limit is regarded as acceptable in principle, a number of questions would arise:

- i) to what should the limit apply: individual species, groups of species or all reef fish?
- ii) should the bag limit differ between areas of the GBR?
- iii) what should the daily and maximum possession limits be?
- iv) should bag limits only apply to particular reefs?
- v) should both spearfishing and line fishing be included?
- vi) should fishermen be required to retain whole fish?

These are considered below:

- (i) Species to which a bag limit should apply.
Reef fishing is an opportunistic activity to the extent that most fish caught are retained and it is not always possible to predict the species which will be caught. It is therefore suggested that a bag limit should apply to all reef fish and should include Serannids, Lutjanids, Lethrinids, Plectorhynchids, (Nemipterids, Scarids).
- (ii) Differences between areas of the Great Barrier Reef. Records indicate that recreational fishermen at the southern end of the Great Barrier Reef catch more small fish than those fishing off Cairns. This suggests that the bag limit for each Marine Park Section should not be the same. Additionally, surveys by Ayling and Ayling (summarised in Ayling and Ayling, 1986) indicate that coral trout numbers vary in both north-south directions and east-west directions on the Great Barrier Reef, apparently largely independent of fishing pressure. A bag limit imposed on the basis of Far Northern Section trout numbers would be inappropriate in the Swains. The most recent data available on which bag limits could be based are shown in Table 3. There are apparently differences between charter boats and speedboats in catches within each Section. Available data are old and need to be updated and collected for all areas.

Table 3: Catches by 10% groupings of recreational fishermen by Section.

Explanation: e.g. the top 10% of fishermen in Capricornia catch 25% of the total Capricornia recreational fish catch.

% of Catch by	Capricornia (1)	Capricorn N/A	Central N/A	Cairns (2)	FNS N/A
top 10%	25			38	
" 20%	43			57	
" 30%	57			69	
" 50%	78			84	
Mean no. fish/angler day					
top 10%	33			17	
" 20%	24			8	
" 30%	18			6	
" 50%	12			2	
Suggested daily limit	20			10	
Suggested maximum:	40		20		

1. Deep sea clubs (charter boat)

2. Speedboat data 1979/80

iii) Daily and maximum possession limits.

In other parts of the world where bag limits are operating there is often a daily limit and for those who go on extended trips a maximum possession limit.

Charter vessels frequently make trips of 7-10 days duration, and a maximum possession limit needs to reflect this. However, if the maximum possession limit is much greater than the daily limit, the point of the exercise may be lost. Table 3 indicates suggested daily and maximum possession limits.

iv) Application of limits to particular reefs.

If the objective is to reduce the total amateur catch, the application of bag limits to specific reefs only is unlikely to achieve its purpose as bag limits will be targeted at the restricted reefs and the balance made up at non-restricted reefs.

Only applying bag limits to specific reefs also will require that all enforcement would need to be undertaken on the waters around that reef. Even if the objective is to encourage a truly 'recreational' approach to recreational fishing an overall bag limit associated with an educational program is likely to be more effective.

v) Application of bag limits to spear and line fishing.

There can be no justification for distinguishing between the two activities if the objective is to reduce the total amateur catch.

If the objective is also to discourage or encourage one of these activities, different bag limits would be applied. However, this seems undesirably discriminatory.

vi) Retention of whole fish.

To enable the determination of whether a bag limit has been exceeded, it is essential that fishermen retain whole fish or that bag limits be established for kilogram of fillets. However, to ensure distinguishing between, for example, purchased fillets and caught fillets, confining the limit to whole fish seems simplest.

Non-biological considerations on bag limits

i) Would they be most appropriately introduced by GBRMPA or by a fisheries agency?

Imposing a limit on number of particular species taken is within the GBRMPA power to recommend. It could be viewed as a "fisheries agency" matter, if it is a question of equity, but in terms of resource protection it can be regarded as an environmental matter. i.e. a GBRMPA concern. To the extent that it would be advisable to have bag limits throughout Queensland, any such limits would be most desirably imposed throughout by the Queensland Department Of Primary Industries.

In terms of costs of management it would undoubtedly be desirable to have bag limits imposed by another agency.

ii) What is their likely cost effectiveness vis a vis other management measures?

No data have been analysed for this matter. An evaluation is essential.

iii) What is the precise attitude of fishing bodies to bag limits?

Should the question of bag limits be pursued, it is essential that comment be obtained, particularly from bodies such as Australian National Sportfishing Association, Queensland Commercial Fishermen's Organisation, Queensland Sports and Recreational Fishing Council, Queensland Fish Management Authority, etc.

Effects of bag limits

The likely calculated effect of the bag limits suggested in Table 3 is shown in Table 4. The caveats applying to the data in Table 3 apply also to this table.

Table 4: Likely effect of bag limits.

	Capricornia (1)	Capricorn	Central	Cairns (2)	FNS
Bag limit/angler/day					
Likely reduction in catch	20	N/A	N/A	10	N/A
% of total catch	12			12	

Conclusion

While the benefits of bag limits in terms of total catch reduction appear significant on the data available, there is a need for further consideration of the following issues:

- cost effectiveness of bag limits over other options
- discussion with recreational fishing operators
- discussion with fisheries agencies
- an in-principle decision as to whether GBRMPA wishes to pursue the imposition of bag limits.