

THE PROS AND CONS OF MARINE PROTECTED AREAS IN NEW SOUTH WALES: WHO'S BEEN HOODWINKED?

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Obviously I think somebody has been hoodwinked! I will return to the question of who, later. But first let me digress from the topic of today and reflect on the concluding comments of an address on trawl fisheries assessments that I gave in 1991 to a conference in Canberra.

In the foreword to his book, *The log from the Sea of Cortez*, the famous American author, John Steinbeck recounted the description his dear friend Doc, a fish biologist, gave of his father, who was also a biologist: Doc stated, 'He is always wrong. If a man makes a million decisions and judgments at random, it is perhaps mathematically tenable to suppose that he will be right half the time and wrong half the time. But you take my father- he is wrong all the time about everything. That is not a matter of luck but of selection. That requires genius.' (Steinbeck 1958). The degree to which Doc's father's powers are attributable to being a fish biologist is something we fish biologists might ponder.

The Pros and Cons of Marine Protected Areas

Worldwide there has been much debate on MPAs, with an emerging consensus that under the right conditions well designed MPAs can be effective tools for conserving biodiversity and assisting with fisheries management, particularly for relatively sedentary species and stable habitats, such as are often associated with rocky reefs. There is not such good consensus on exactly what benefits users of MPAs can actually anticipate. Benefits, have unfortunately, been more often assumed than proven, particularly for mobile species and complex ecosystems. Benefits appear to vary greatly from place to place and to be circumstance specific. Very little is said about the problems with MPAs. It would be lovely if there weren't any.

Today I will concentrate on one area and circumstance, the Batemans Marine Park, one of the most recent in Australia, and use that as an example that has relevance to the rest of New South Wales, and possibly Australia more generally. I will take advantage of today's audience that shares an interest in fish biology, to delve in some detail into the science that has been used to underpin the declaration of the Batemans Park. This is in keeping with the vision for research and monitoring by the NSW Marine Parks Authority the controlling body for the Batemans Marine Park, that the "locations and boundaries for marine parks and the zoning arrangements will have been derived from thorough scientific assessments of all available information and data" (www.mpa.nsw.gov.au).

As a starting point for consideration of the pros and cons of the Batemans Marine Park, I refer to a number of documents from the NSW Marine Parks Authority website, (www.mpa.nsw.gov.au), that relate to the assessment of the benefits of MPAs. There are many references by the Marine Parks Authority to the benefits of marine protected areas, but none to the problems.

In this age of increased political scrutiny and public accountability of government agencies most of us would expect to find some advocacy in the Marine Parks Authority's overview of its core business, such as might be evident by considering only the benefits of MPAs and not the problems. But, on a subject where sound science is so critical we would hope that subsequent decisions which impact public and environmental wellbeing would be based on objective and thorough research. This expectation is reinforced by the Marine Parks Authority's own assertion that this process will be driven by "thorough scientific assessments of all available information and data". For detail and discussion on the benefits of marine protected areas the Marine Parks Authority, not surprisingly, refers readers to another publication, the "Science Paper".

The actual title of this Science Paper is, "A review of benefits of Marine Protected Areas and related zoning considerations" (Marine Parks Authority New South Wales undated). Here the issue of balance, or lack thereof, begins to emerge; one may well question the objectivity in having "the Science Paper" on MPAs consider only the benefits.

The Science Paper is attributed as, "Prepared on behalf of the Marine Parks Authority Scientific Committee": an attribution which projects the full authorization of the Authority and the scientists therein.

In the Science Paper the objectives of NSW marine parks are stated as,

- "conserve marine biodiversity and maintain ecological processes;
- provide for ecologically-sustainable use, public appreciation, education, understanding and enjoyment of the marine environment."

Few could find exception with these objectives: but the purpose of my presentation today is not to consider asserted objectives, but rather the pros and cons of marine parks that are declared in pursuit of these objectives. More specifically, what science underpins the measures that have been taken in the Batemans Marine Park in pursuit of the stated objectives and what these measures are likely to deliver against these objectives. To do so I will go through the Science Paper section by section. The quotations included in the text below are from the Science Paper, unless otherwise referenced.

The Science Paper's introduction to the "Threats to marine environments" states, "This document highlights some of the key threats to some marine species and their habitats and examines key benefits of marine protected areas in addressing these threats." Five key activities, presumably these threats, are then listed: "coastal development, pollution, agriculture, recreational and commercial fishing, and introduced marine pests". It is noteworthy that fishing is fourth on a list of five key threats. Then, dealing specifically with New South Wales, the Science Paper states, "approximately 60% of coastal wetlands lost or degraded over the last 200 years" and "Increased nutrient levels and

turbidity from urban and industrial discharges and catchment usage are the key causes of increased turbidity and nutrient levels that often result in a decline of seagrass habitats and diversity of species in soft-sediment areas”. Here I am not trying to draw attention to the repetition, but rather to note that this pivotal listing of key and direct threats to coastal environments, which are reported to have resulted in serious damage to 60% of wetlands, does not include fishing. The Science Paper does, however, subsequently state that, “The overall pressures include some fishing activities”. The only specific fishing activity mentioned in the Science Paper is demersal trawling, which is, in this region, an offshore activity. Not a single estuarine or beach fishing activity is identified as being responsible for the identified declines, or even as being a threat.

General statements on fisheries problems around the world are then followed by the somewhat leading comment, “There are a number of species in NSW identified as being at moderate to high risk of becoming overfished; many of which are sharks species”. This key statement is neither substantiated, nor referenced. What it is actually saying is that there are no species in NSW that are currently overfished. An FOI request on information relating to the proposal for the introduction of the Batemans Marine Park revealed that NSW Department of Primary Industries, the State’s fisheries management agency, in its communication with the Marine Parks Authority on the Batemans Marine Park before it was declared, actually listed four fish species it considered as growth-overfished in NSW: snapper (*Pagrus auratus*), silver trevally (*Pseudocaranx dentex*), sea garfish (*Hyporhamphus melanochir*) and kingfish (*Seriola lalandi*). Disregarding this inconsistency between the fisheries management authority, NSW DPI, and the Marine Parks Authority on fisheries management, it is significant that neither agency provides any evidence for any current, or even anticipated problems, with predominantly estuarine or ocean beach species in NSW.

The Science Paper then continues, “The protection of species and their habitat can result in benefits to a range of species and habitats, some of which are documented below.”

“Increases in the size and numbers of marine fish and invertebrates in sanctuary zones”.

I found it hard to understand the necessity to provide a lengthy explanation of why it is remarkable that there would be more fish and invertebrates in areas that are protected from real threats. Surely if sanctuary zones do actually provide protection from the known threats then, logically, it should follow that unless the purpose of the sanctuary zone is solely to protect some clearly identified critical habitat, such as a spawning or nursery area, then the biomass of at least some of the species being protected in the zone would be higher than it is in areas that are not protected? If not, why have “protected” areas? If we are truly trying to assess benefits, the objective should surely be to assess if having closed areas leads to conservation of biodiversity that would otherwise be lost, or at least seriously threatened, and/or, the normal objectives of fisheries management, maximum or optimum sustainable yield from the total resource, are enhanced by having access to part of the resource restricted. However, as more space in the Science Paper is devoted to the benefits in the form of increased numbers and size, than to any other

benefits, obviously the Marine Parks Authority believes this is truly critical. Furthermore, as this is the first example of the Marine Parks Authority documentation providing specific examples, as opposed to unsubstantiated generalizations, these examples warrant consideration. The Science Paper continues:

“Some examples from around the world that document the benefits of sanctuary zones are:” What follow are 13 separate examples given in support of this assertion. Most are referenced to the scientific literature. The first states, “In the De Hoop sanctuary, a surf beach on the southern coast of South Africa, the numbers of 6 surf-zone fish species increased by between 30 and 500% compared to fished beaches”. I thought I should check at least some of the referencing in the Science Paper, but without the time to check it all, I was concerned with how to do so without being ‘selective’. My conclusion was that an objective place to start would be the first specific example in each section and then, if available, an example from within Australia, preferably New South Wales.

Two references are cited for the above quote on fished beaches, Bennett and Attwood (1991) and (1993). Even if I was somewhat concerned that more recent references could not have been found, I found these two papers to be quite good in a field plagued by imprecision, but I do think they have been overly optimistic in their interpretation of the relationship between angling catch per unit effort (CPUE) and abundance, relative or otherwise. But my purpose here is not to review cited papers, but rather to assess how they have been used to support the creation of the Batemans Marine Park.

The two Bennett and Attwood papers actually refer to the use of angling techniques to assess the effectiveness of closing areas where “the shore is a mixture of sandy beach and aeolianite beach-rock platforms”: not a “surf beach” as stated in the Science Paper. The 1991 paper was based on the use of angling CPUE as an indicator of abundance. The 1993 paper concentrates more on the variability in experimental catches. Bennett and Attwood actually studied ten species, not six. CPUEs for only six of these were higher in the closed areas. Of these six species the two most prominent (*Coracinus capensis* and *Diplodus sargus capensis*), which account for more than 90% of Bennett and Attwood’s samples, are described in FishBase (04/2007) as reef associated, as is another (*Diplodus cervinus*) of the remaining four. The habitats of two of the other three species (*Sparodon durbanensis* and *Rhabdosargus holubi*) are described in FishBase, respectively, as “mainly off rocky shores” and “over sand between rocks”. Only one of the six species (*Lithognathus lithognathus*) has a habitat described as “over sandy substrate”. Therefore the results from only one of these six species are truly relevant to evaluation of the effects of closures on sandy areas such as would normally be consistent with “fished beaches”.

Of even greater significance to the issue of the relevance of the two cited South African papers to assessment of possible benefits to the Batemans area from the closure of surf-zone beaches is the following quote from Bennett and Attwood (1991), “Only 2 of the 10 species examined in this study, *Argyrosomus hololepidotus* and *Pomatomus saltatrix*, are highly migratory and neither demonstrated any benefits from protection in the reserve”. The last two species names may have been familiar to many of you. *Argyrosomus hololepidotus*, actually shares the same species name as our mulloway, and *Pomatomus*

saltatrix is the same species as, or an extremely close relative of, our tailor (FishBase 04/2007). Curiously, as it is based on the same data as the 1991 paper, the 1993 Bennett and Attwood paper adds a third species, *Umbrina canariensis*, to this group and states, “The catch rates of the same three species...did not increase following the proclamation of the marine reserve, because they are migratory”. Why was this key information not mentioned in the ‘Science Paper’ presented as a basis for a marine park in the Batemans region, where migratory species dominate? The primary target species on ocean beaches in the Batemans Marine Park, Australian salmon, bream, flathead, mullet, mulloway, tailor and whiting are migratory, even if not all equally so. Incidentally, these same migratory species are dominant in the estuaries of the Batemans region.

It is also relevant to note that two thirds of the Discussion in Bennett and Attwood (1991) is about why there is need for caution in accepting that CPUE in this study actually reflects abundance. The key statement on this in the discussion is, “It is evident that angling CPUE should be interpreted with some caution”. There is continuing debate within the international fisheries community on the problems of interpreting CPUE data. Line fisheries pose particular problems, such as apparent learned behaviour, which have proven difficult to explain, let alone quantify. My conclusions from this global debate are that CPUE has its uses as a measure of relative abundance, but its relationship with total abundance is seriously questioned, particularly for recreational line fisheries. Few would argue that angling CPUE is a reliable measure of absolute abundance, such as is expressed by numbers of fish. Thus, the actual conclusions that should be drawn from the two papers cited in the Science Paper are a long way from the inference of “the numbers of 6 surf-zone species increased by between 30 and 500% compared to fished beaches”.

The relative size of the protected area in the De Hoop Nature Reserve is also noteworthy. Bennett and Attwood (1991) state, ‘The protected area of coastline is 46 km long’. Even a reserve of this size, more than six times longer than any of the beach sanctuary zones in the Batemans Marine Park, had no detectable impact on migratory species that are the same or similar as those that dominate in the Batemans region.

Therefore, the logical conclusion, relevant to the Batemans Marine Park, from these two cited papers, is that the closure of ocean beaches as included in the Batemans Marine Park will have absolutely no demonstrable benefit, even for the CPUE, let alone the numbers, of the important species on the ocean beaches in the region.

Noting the strength and unidirectional nature of the prevailing current off south eastern Australia, the East Australian Current, it is not surprising that the bulk of the species that are not tightly associated with local reefs are even more migratory than in other parts of the world. Even our most prominent rock associated species, luderick (*Girella tricuspidata*), is seasonally migratory. Therefore it could be anticipated that area closures would be of even less value as fisheries management tools for the species normally targeted in NSW, than they may be in other parts of the world, such as South Africa.

Then, as mentioned above, I looked in the Science Paper for examples closer to the Batemans region: the Solitary Islands Park being the most relevant area referred to. It should be noted here that the Solitary Islands Park is less than ten years old as a Park, but

aquatic reserves, which were in effect fishing closures, were in place since 1991. Therefore after a total of 15 years of prohibiting fishing in sanctuary zones it is reported by the Marine Park Authority's Science Paper that there is evidence that "the abundance and mean size of mud crabs (*Scylla serrata*) were consistently greater within sanctuary zones" and, "there are preliminary indications that certain demersal fish such as red morwong have greater densities in sanctuary zones, but the patterns are often inconsistent between sites".

While this faint praise could be sufficiently damning for most, I thought I should check the reference (Butcher et al 2002) given for mud crab abundance, as this is the first local example. Butcher et al actually report a difference in CPUE (the Science Paper states abundance), this time from trapping, in sanctuary and fished areas.

Perhaps more important than just noting the reported CPUE for mud crabs in sanctuary zone of two and a half times that in fished areas, is consideration of what this might mean to the well being of the species and fisheries based on it, and therefore the real benefit from the sanctuary zones. Such analysis is, unfortunately, completely lacking in the Science Paper.

There is clearly need for caution when comparing catch data from different fisheries, particularly those for different species, let alone in different countries as carried out in the Science Paper, but the assertion that relative CPUE data from crustacean trap fisheries are automatic indicators of management success can be investigated to at least some degree by the use of comparisons.

The Western Australian rock lobster fishery is a crustacean trap fishery which enjoys an international reputation for being well managed and extremely well researched. In the most recent paper on the subject of changes in CPUE in this fishery (Wright et al, 2006) raw CPUE in one of the key fished areas, Area A, is reported at the end of each season to be less than one sixth of what it is at the beginning of the season. In other words, in one of Australia's best managed fisheries the level of exploitation, as indicated by a drop in raw trap CPUE to less than one sixth, is more than twice that for mud crabs in the fished areas in the Solitary Islands Marine Park, where the difference is to less than half. Therefore, based on the data identified in the Science Paper for the Batemans Marine Park, compared with data from the Western Australian rock lobster fishery, mud crabs in the Solitary Islands Marine Park, are, either considerably underexploited, even in the fished areas of that park, or the sanctuary zones have marginal impact on the relative abundance of mud crabs in the park.

Before putting too much weight on a comparison of CPUEs in mud crab and lobster fisheries, the degrees to which the pre-fishing stock levels at the beginning of the sampling periods, and the mobilities of the two species, may impact catch rates and subsequent assessments should be further taken into account. I have not done this and it certainly has not been done in either the Science Paper or the papers it cites. However, it is pertinent to note that the higher mud crab CPUE reported in sanctuary zones in the Solitary Islands Marine Park is based on comparison only between fished and unfished

zones of the same estuary. Therefore, it provides no evidence whatsoever on the relative health of this estuary compared to other estuaries in the region. Thus it provides no indication that the estuaries in the sanctuary zones of the Solitary Islands Marine Park have received any protection at all from the real threats to them, identified elsewhere in the Science Paper as being, primarily, siltation and pollution.

My above consideration of mud crab CPUE is not intended as a fundamental criticism of the paper by Butcher et al, or that increases in CPUE in sanctuary zones are not good. It merely points out that the assertion in the Science Paper that the Solitary Islands Marine Park is providing valuable conservation and fisheries benefits, as demonstrated by the mud crab paper referenced, should not be accepted. In fact, based on the information given it can be argued that the closure of areas in the Solitary Islands Park to fishing for mud crabs is contrary to the best interests of the wise use, ecologically sustainable development, of this apparently, underexploited resource. The documentation also fails to provide any evidence at all that the declaration of sanctuary zones has provided any protection of estuaries from the real threats.

As for red morwong where the suggestions of increases are inconclusive, one can only conclude that it is lightly exploited, and/or that the Solitary Islands Marine Park sanctuary zones, after 15 years, have had little impact on its relative abundance, even though it is a sedentary fish species (described in FishBase as reef associated). Unfortunately this noting of red morwong in the Science Paper is unreferenced so I was unable to look at the data in more detail

As no other local success stories are given in the Science Paper on the benefits of marine protected areas as measured by “increases in size and numbers of marine fish and invertebrates in sanctuary zones”, it must be assumed that mud crabs and morwong are the two outstanding examples to date of the New South Wales experience of the benefits of such management measures. Neither provides the slightest reassurance.

“Spillover’ of fish from sanctuaries into areas open to fishing”

There is a great deal of literature on this subject and the degree to which ‘spillover’ actually benefits species and fisheries management is hotly debated (see, for example, Botsford et al. 2006). Therefore I felt there was little need to discuss this in detail or to review the international references given in the Science Paper.

It is, perhaps, noteworthy that the Australian references are again to mud crabs. This time in the Moreton Bay Marine Park, where the Science Paper reports, mud crabs “were twice as common in sanctuary zones than in fished areas” and “some of these crabs ‘spilled over’ into fished areas”. Similar ‘spill over’ is reported from the Solitary Islands Marine Park, where the same paper as discussed above (Butcher et al 2002) is referenced.

It should be a given that for all but the most sedentary species there will be some exchange of individuals with surrounding areas and even that it is reasonable to expect some net flow from areas of relatively high abundance. For highly mobile, or migratory,

species the reason area management struggles to be of value is because unless closed areas cover the majority of the total distribution of the species, 'spillover' tends to be so great that there is little, if any, benefit from the closure. In other words in many areas, 'spillover' is approximately equal to 'spillunder', or more correctly, 'spillinto'. The real objective should not be just to prove there is flow in one, or even both, directions, but to assess if the net shift justifies the management measures that are necessary to facilitate it. The efficiency of management against the stated biodiversity conservation and fisheries management goals is what should be important. Consideration of such issues is completely absent from the Science Paper.

“Sanctuaries lead to improvements in ecosystems and habitats”

The first example referenced here is to a sanctuary zone in New Zealand, the Leigh Marine Reserve. The major statement relevant to improvements in ecosystems quoted in the Science Paper, and attributed to the paper of Babcock et al, (1999), is, “The primary production of the marine reserve was estimated to be over 50 times greater than it was before protection from fishing”. Such an increase would make any skeptic of the benefits of marine protected areas nervous, and any interested student, or marine park manager, eager to understand it fully so similar increases might be facilitated in other marine reserves. So, as a student, I looked. The actual concluding statement from the section in Babcock et al (1999) on “Primary productivity”, is, “Overall, the total primary productivity of the rocky reef habitats we examined increased by 58%”. Thus the Science Paper presents an exaggeration by approximately one hundred fold.

No Australian examples are given.

“Improved reproductive potential of key species in sanctuary zones”

The banner statement in this section, “For most marine animals...egg and sperm production increases exponentially with size”, is leading, as we are meant to assume that fish will be bigger and more numerous in sanctuary zones, but it is at best, imprecise and inaccurate. Egg and sperm production, within a fish species, in relation to size as measured by weight, is close to linear for many species. For length, the relationship is often a power function, but is normally not strictly exponential, particularly for live-bearers. Marine mammals are “marine animals”, and the statement in the Science Paper certainly does not describe their reproductive behaviour. More specifically for the Batemans region, the key species in this area are migratory and no spawning areas have been identified, therefore the assertion that the sanctuary zones as declared in the Batemans Marine Park will provide improved reproductive potential for them is wishful, at best.

“DESIGN CONSIDERATIONS FOR MARINE PARKS”

The first paragraphs under design consideration describe the need for conservation of a “comprehensive, adequate and representative sample of marine biodiversity”. This objective appears perfectly reasonable for a series of marine parks in NSW, and without

detailed review of the actual work done, a bioregional assessment of areas with important biodiversity values would appear to have considerable merit. What is highly questionable from the information given in the Science Paper is the “ability to manage impacting activities”, such that the biodiversity identified as in need of conservation, is actually conserved (protected) and that the prescribed measures represent effective and efficient management.

The Science Paper continues: “Other important design considerations for marine parks include:”

- *“consideration of the marine park location and extent and zoning arrangements in relation to ecological processes (e.g. movement and biology of particular species), distribution of habitats, and practicality of management (e.g. enforcement, education);”*. As discussed above, ecological processes such as the movement and biology of particular species, have clearly been ignored. Key links between biology and habitats, such as identification of spawning and nursery areas, have not even been considered. The practicality of management is not discussed at all in the Science Paper.
- *“assessment of the vulnerability of the biodiversity and threatening processes;”*. Assuming that this criterion relates to the vulnerability to threatening processes it is appropriate here to note that the actual threats to the biodiversity in the differing types of habitats are not adequately identified and/or addressed. For example, for estuaries two key threats, ‘increased nutrient levels and turbidity from urban and industrial discharges and catchment usage’, and four additional direct threatening processes, ‘introduced marine pests, swing-mooring chains, propellers and retrieval of anchors’, are described under “Threats to marine environments”. Not one of these identified key threats is addressed at all in the remainder of the documentation.
- *“the ecological sustainable use of marine resources for a range of human activities;”*. This constitutes the only mention of Australia’s guiding principle of natural resource management, ESD, in the whole paper. No related goals or actions are described and no anticipated, or even desired, outputs or outcomes are even mentioned.
- *“economic, social and cultural selection criteria which are considered in the zoning process;”*. As there is a separate Socio Economic Report and an Economic Report provided by the Marine Parks Authority (www.mpa.nsw.gov.au), no discussion of these items is necessary in the Science Paper. However, as the Executive Summary of the Socio Economic Report contains key statements that are relevant to several key points in the Science Paper, some discussion here, is warranted. The Executive Summary notes there is likely to be adverse impacts on commercial fishing and “There may also be minor effects on charter boat operators and recreational fishers...However, the economic impact analysis suggests the impact is likely to be small for the region as a whole and partly offset by additional Marine Parks Authority expenditure”. The failure of the Batemans Marine Park proposal to take account of the extremely high financial and social cost to a significant number of individual recreational fishers, particularly the elderly, the very young and the financially disadvantaged (poor), who have greatly reduced means of translocating their angling efforts, totally compromises the socio-economic assessments. In cases

where life-style reasons, that include proximity to favored or traditional angling spots, have influenced house purchases and relocation of families, these financial costs could run into the hundreds of thousands of dollars for an individual angler. Replacing income from the commercial fishing sector with taxpayer funded expenditure from the Marine Parks Authority, as outlined in the Executive Summary, may balance the score-sheet for the local councils but it will do nothing for the average fish consumer (>90% of the population) or the reputation of local restaurants for using fresh, local produce.

It is also most significant that the Socio-Economic Study lists the positive economic and social impacts from the establishment of the Batemans Marine Park as including, “growth in tourism through marine park management and promotion”. Thus the primary beneficiaries of the establishment of the park are acknowledged by the Marine Parks Authority to be those who manage and promote the Park. This group constitutes the marine parks industry.

- *“buy-back of sufficient commercial fishing licences to minimize displacement of commercial fishing from sanctuaries to other areas;”*. It is inappropriate to have a buy-back of licences aimed at minimizing displacement of fishing effort without relevant assessment of what levels actually constitute optimum effort and where that effort is most efficiently employed. No such assessments have been provided. As most of the species taken by commercial fishing in this area are migratory, or at least highly mobile, it is more than possible total kill of these species will not be significantly changed by localized removal of fishing. While the need to compensate commercial fishers who may be disadvantaged is acknowledged, great care must be taken to ensure that effective effort is managed and license-splitting, and other undesirable outcomes from poorly researched and implemented effort reduction schemes, do not occur. Without access to the details of exactly what licences are being bought and what license conditions remain on fishers it is impossible to fully assess the impact of this measure. But it is difficult to imagine how a buy-back of licences in relatively small pockets of the New South Wales coastal fishing grounds could constitute the most efficient use of taxpayers’ money, or the most efficient area management in the interests of the optimum ecologically sustainable use of the resource. It appears more likely to create a culture among commercial fishers of holding out for a series of localized buy-back, or compensation, payments at the expense of the most appropriate overall management of the fishery. Fisheries data, such as yield per recruit analyses, that have been available since the early 1990s, show that a closure of all areas inside three miles of the NSW coast to all fish trawling would benefit many fisheries, particularly the fish trawling industry itself. These benefits do not necessarily come from closing small bits of this total area.

A series of “examples of the application of ecological criteria to zone planning” then follows:

- *‘One of the key aggregating species that are protected in NSW marine parks is the grey nurse shark’*. The assessment of the grey nurse shark is currently subject to legal challenge so detailed comment here is not appropriate. However, it should be

mentioned that, because of the mobility of grey nurse sharks, whatever protection of this species may be represented by the declaration of a series of sanctuary zones up and down the New South Wales coast, this will not, in itself, protect this species.

- *'Studies of some fish species inhabiting rocky reefs in NSW suggest that sanctuary zones of between 2 and 6 km long would be optimal for many temperate species. For example, the average home range of a commonly targeted reef fish (red morwong) is around 1800sq/m. This is an estimate of the minimum area of suitable habitat required in a sanctuary zone for it to provide some protection for this species'*. Again the red morwong becomes the center of attention. Why is it necessary to provide protection for this species? It is neither endangered nor assessed as over-fished. Why would you use the requirements of a minor (red morwong represented 0.02% of the angling catches in the major surveys (Steffe et al 1996) for which data are held by NSW DPI (Steffe, pers comm. 2007)), unthreatened species as the justification for determining the size of sanctuary zones that impact all the major target species? 'the average home range' of red morwong of 1800sq/m actually represents an area approximately 42 metres square, or in the words of one of the authors, Ian Suthers, of the cited paper, Lowry and Suthers 1998, "the size of a tennis court". It is also interesting that this cited reference, actually estimated the daytime home range to be 1865sq/m and the night time range to be twice that, 3639sq/m. However if the assertion, that a home range of 1800sq/m leads to the need for sanctuary zones of between 2 and 6 km long, is correct then this would again confirm that sanctuary zones of the size of those in the Batemans Marine Park have no chance what so ever of representing effective, let alone efficient, management for even one of the many prominent migratory species in this region that have distributions covering hundreds of kilometers. It must also be noted that the distributions of these species vary considerably so the chances of any closure being the primary conservation tool for all, or even the majority of them, is slight, unless such closures cover the majority of the distributions of them all. Such an area would likely have to encompass all marine waters of coastal NSW and possibly much of Victoria and southern Queensland. Fortunately none of the key species has been identified as in need of conservation and, even if they were to be so classified, it is most unlikely area management would represent the most appropriate form of management.
- *'Species with large ranges can receive protection within sanctuaries during specific life-history stages such as juveniles, or at aggregation sites for spawning and/or feeding...when aggregated species are often vulnerable to high catch rates. Such aggregation sites make ideal sanctuary zones as they can protect key locations for many species.'* It is true that sanctuaries can provide protection for critical activities of some species. Protection of gravel beds for spawning trout and salmon is a well documented example. But when the goal is efficient use and management of the species, as intended under ecological sustainable development, then the closure of areas of high catch rates of adults is extremely difficult to justify for any species that is not over-fished or endangered. Even if a species is over-fished, the goal should be to determine an holistic management response that will return stock levels and

harvest strategies to optimum. There may be justification for closing a spawning area, particularly for species that have been assessed to be recruitment-over-fished and when the stock-recruitment relationship indicates that this type of management is warranted, and the area is demonstrated to be of special significance. The implication, in the Science Paper, that an area should be closed simply because it is an aggregation site is contrary to optimum efficiency of exploitation. It matters little if the aggregation is for spawning or not, as a dead fish does not spawn: whether it was killed three months or five minutes before it would have spawned is of relatively minor consequence. The world has many well managed fisheries that are based on exploiting spawning aggregations. It is the size of the population that is allowed to spawn that matters. The inference in the Science Paper that good angling areas should be closed simply because they are good angling areas is also worrying in the extreme. Do these key statements indicate more about the real intentions of those who wrote the Science Paper and championed the Park than is otherwise stated?

- *'Placing sanctuary zone boundaries on sand adjacent to rocky reefs is recommended to maximize protection to many reef species that move over the entire reef. For instance, a movement study of six Tasmanian reef fish on a very small (1ha) isolated reef indicated that while they moved around the reef, they tended not to move off onto the adjacent sand areas'*. Why would you advocate sanctuary zones on sand adjacent to rocky reefs, and then reference, as your justification, a paper that you report as determining that reef fish “tended not to move off onto the adjacent sand areas”?

- *'Studies of beach species suggests that to effectively provide protection, whole beaches need to be included in single sanctuaries due to movement along the beach'*. This final example of the application of ecological criteria typifies the flawed logic and misrepresentation of the scientific literature that characterize the Science Paper. The two references given to support the above quote are the same two papers by Bennett and Attwood, (1991 and 1993), discussed above. Additional to the fact that neither of these papers is really about beach species, in neither of them can I find any reference what so ever to the need to close whole beaches. There is not even mention of “whole beaches” as the study site is described as a mixture of sandy beach and rock. As discussed above, the rock is of particular importance to the dominant species studied. The logical conclusion from the two papers referenced is that there is no conservation benefit at all for fish from closing sandy beaches as the species found there are likely to be migratory and not responsive to this type of area management. The above quoted statement in the Science Paper, which represents the only justification given for closing whole beaches, appears to me to be total fabrication. I hope others can demonstrate that it is not, for if there is a greater crime in science than manufacturing ‘results’ it is doing so and then attributing these ‘results’ to somebody else. Consideration of the broader aspects of the closure of ocean beaches in the Batemans Marine Park to fishing provides further evidence of the fatally flawed and biased logic underpinning this process. As discussed above the key fish species

found on the ocean beaches in the Batemans area are migratory and the closure of beaches, as detailed in the zoning plan, will offer no assessed conservation benefit to them. Furthermore, the general ecology, or even invertebrate biodiversity, of these beaches will not be protected by closing them to fishing: waves, swells, currents, tides, winds, siltation and pollution are the primary factors which impact the geomorphology and the underlying ecology of ocean beaches. Of course, alterations to these factors, and sea levels, by increasing climate variability, man induced or not, may well over-ride even current oceanic, climatic and anthropogenic influences. Claiming “protection” of ocean beaches by implementing a fishing closure as detailed in the Batemans Marine Park documentation is total misrepresentation of reality.

The final paragraph under “Design Considerations” makes the key statement that, “The benefits of protection in a marine park for a particular species are related to the extent of threats, the spatial arrangements of their habitat (and therefore the spatial arrangements of zones), and their specific life-history patterns (growth, movement, recruitment etc).” The threats to estuarine species are briefly outlined in the Science Paper, but none of these key threats is then addressed at all. No threats for any beach species have been identified in the documentation and the true threats to beaches have been conveniently neglected. Fish trawling has been identified as a threat to offshore areas but “particular species”, or habitats, have not been identified. The relatively offshore species, the grey nurse shark, has been identified as in need of protection, but the wisdom of declaring a marine park that closes to fishing one small part of the southern distribution of a migratory, or at least mobile, species, has not been demonstrated.

The “spatial arrangements” of the habitats of the target commercial and recreational species are not even listed. The “life-history patterns (growth, movement, recruitment etc)” are, all too conveniently, ignored. No growth related assessments, even such as basic yield-per-recruit analyses for different species in different areas, have been carried out: it could be expected such analyses would be a prerequisite for area management measures of the type proposed here. The highly mobile, or migratory, nature of the majority of the key species has been conveniently overlooked. No spawning, or key nursery, areas have been identified.

In combination these omissions represent a sad condemnation of a series of documents that fail to address even their own stated design requirements.

The “Conclusion” to the Science Paper again reverts to the generic benefits of marine parks that are simply not addressed in the documentation. From the international literature, there is indeed “considerable scientific information that indicates that the designation of zones in marine parks that provide protection from impacting activities is an important tool in the long-term management of marine resources”. As there is merit in the introductory statement on the Marine Parks Authority website that, “Internationally, there is support for well designed marine protected areas”. The key words here are “well designed” and “protected”.

The primary criteria for well designed protection begin with clear identification of exactly what it is that is being protected and what it is that it is being protected from. Then what should follow is logical explanation of how the proposed management measures will provide the necessary protection, and why these measures represent the most efficient way of doing so. Not one of these fundamental steps has been addressed in the Science Paper or other documents provided for the Batemans Marine Park. The issue of protection is obliquely mentioned, and it is clearly implied that declaring a zone as a sanctuary provides protection, but the fishing closures proposed, particularly in estuaries and on ocean beaches, offer no protection from the threats identified to either habitats or the key species present. No evidence is even given that fishing in any of its many forms, as carried out in the Park, constitutes a real threat to either the species or the habitats of the area.

The Batemans Marine Park, as described in the documents provided by the Marine Parks Authority does not meet the Marine Parks Authority's own vision to, "have been derived through scientific assessments of all available information and data". The Science Paper and related documents are consistent only in being biased. The majority of statements that impact the impression of the benefits of marine protected areas and their relevance to the Batemans Marine Park are either a mis-interpretation of the source material, or an exaggeration, always in the direction of overstating benefits. This consistent bias cannot happen by chance. Where was Doc's father while this was going on? I can assure you the Science Paper provided by the Marine Parks Authority on the Batemans Marine Park does not constitute a work of genius: there are actually some statements in it which are correct! Such as the potential benefits of having well designed protected areas. It does, however, provide incontrovertible evidence that the documentation presented by the Marine Parks Authority is selective. It represents unjustified advocacy for the declaration of a marine park rather than scientific assessment of the needs for, and implications of, such a park. And yet it claims science is a key component of the whole process.

The real threats, as identified in the Science Paper, for example "pollution, siltation, introduced species", are not addressed at all in the proposed actions. The management measures implemented are all nothing more than restraints on fishing. None of the key threats identified for estuaries are addressed in any way. Almost all of the other listed causes of "direct damage", "introduced marine pests, swing mooring chains, propellers, retrieval of anchors", are totally ignored, except for retrieval of anchors, which is specifically mentioned in the zoning plan as being permitted in all zones, including sanctuaries, except over seagrass beds in sanctuaries. Thus there is extremely little action against anything, even if it has been identified as a threat, except fishing of any sort. The Batemans Marine Park is nothing more than an external agency imposed fisheries management measure, and an extremely poorly conceived and designed one, at that. Why the Marine Parks Authority has been allowed to introduce and then administer measures which are solely fisheries management when New South Wales has another body, DPI, with the legislated responsibility for fisheries management, is another matter.

Because of their implications for fishing what the closures proposed in the Batemans Marine Park will do is allocate fish stocks away from those individuals who previously

fished in the areas that are now closed. The actual data in the documentation provided or cited by the Marine Parks Authority clearly show that individuals who fish in adjacent areas are most unlikely to receive any advantage from “improved fish stocks”. Individuals fishing on ocean beaches and in estuaries will certainly not receive any significant benefit. They will also have to accommodate additional fishing effort from those who pay the cost, substantial in many cases, and relocate their fishing effort to the adjacent areas. The obvious outcome is that one group of fishers will be seriously disadvantaged by having to move, at considerable cost and with grave effects on lifestyle if their current place of domicile is related to access to fishing sites, and the remaining group will have to accommodate increased fishing effort at their current sites where there will be no detectable improvement in fish stocks. These problems will be particularly acute for individual recreational anglers who do not have boats or 4WD vehicles and who go on foot to their preferred fishing sites. Children, the elderly and the poor, whose voices are seldom listened to, are prominent in this category.

In the absence of specific stock management benefits for individual species the proposed closures are a resource allocation measure for no assessed positive conservation or stock management outcome. The world has many examples of disastrous fisheries management from resource allocation being packaged and marketed, incorrectly, as resource conservation. Other forms of natural resource management in Australia, for example water management, are now suffering from the same mistake of allocation being assumed to solve conservation problems. If there are specific fish stock conservation measures that need addressing, and for which area closures are the appropriate management tool, then have them identified. Only then can the realistic benefits of the proposals be assessed, the measures necessary to test their effectiveness be designed and appropriate adaptive management begun. The most effective measures to counter identified threats may well be area management, such as MPAs, but their design will need to take into account proper scientific assessment of their possible benefits and how to achieve them. Hopefully it will also acknowledge the problems with the use of MPAs, such as the true financial and social costs, potential economic and management inefficiencies, inter and intra agency duplication and the difficulties in accommodating the problems of the differing requirements of individual species and the complex environments and high degree of connectivity of marine ecosystems. I elaborated on several of these in my submission of October 15, 2006 to the Marine Parks Authority.

The documentation relating to the creation of the Batemans Marine Park is perhaps best described as very poorly disguised advocacy marketed to the unsuspecting public as science. This is a sham. So much so that not only does it totally discredit the Batemans Marine Park but it calls into question the credibility of the Marine Parks Authority and the justification of all existing and proposed marine parks in New South Wales.

Back to the subject of this talk: who has been hoodwinked? To begin with, anybody who has read the documentation on the Batemans Marine Park provided by the Marine Parks Authority and believed that it represented an unbiased assessment. To this should be added anybody, such as myself, who made a submission to the Marine Parks Authority on the subject of the Batemans Marine Park thinking that consideration would be given to

such submissions. Assuming that Ministers Macdonald and Debus believed that the Batemans Marine Park had been established according to their own stated principles for marine parks in NSW, “scientific research programs that adhere to world’s best practice standards are required to identify the best places for new marine parks, the best arrangements of zones within them and the most appropriate management practices to be used to run them” (Macdonald and Debus 2004), and why wouldn’t they if their own agency told them that the science was sound?; then they were clearly hoodwinked. So was anybody who believed what these two ministers subsequently said indicating that the declaration of the Park was based on science and would have assessed benefits. Has the Marine Parks Authority been hoodwinked by the authors of its own reports? The bias in the documents is so consistent it is hard to believe management was not complicit. Additionally, they were told of these problems in at least some of the submissions they received, yet they did nothing about them. Even those individuals who receive benefit from managing and promoting the park may have been hoodwinked. This would depend on whether or not they actually believe the Park was justified on the basis of the information that was available.

Many citizens of the Batemans region have been hoodwinked into believing that the proposal for this park was actually based on sound science and that the park will deliver considerable benefits to biodiversity conservation and recreational fishing. The email traffic on this subject identifies many who were seduced into believing that the short-term pain will lead to long-term gain. Unfortunately this is far from the truth. Not only is it extremely unlikely there will be any demonstrable benefit to recreational fisheries, certainly not on ocean beaches or in estuaries, but the case for having future beneficial area management will be seriously weakened by the experience of these closures failing to deliver. The community will not be pleased when it is asked to accept additional management measures that will undoubtedly be necessary to appropriately address the real threats. One is reminded of the story of the little boy who cried wolf. There are almost certainly marine areas, species and habitats in the Batemans region that require protection and many that would benefit from efficient area management; examples include protection of estuaries from known threats such as siltation and pollution, area management of abalone fisheries, the closure of all inshore areas to fish trawling, and reduction in threats from introduced pests, such as aquatic weeds. It is such a pity tax payers’ money and public good-will for conservation have been so needlessly misdirected by advocacy for more parks posing as science in the asserted cause of conservation and sustainability. The goal of having effective marine parks in NSW based on sound science has been seriously set back. And to date, we fish biologists have sat back and watched it happen.

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