

7 November 2016

The Hon Josh Frydenberg
Minister for the Environment and Energy
Parliament House
Canberra ACT 2600
Dear Minister

Expansion of shark gillnetting (bather protection) in Australian waters

I am writing in regards to the operation of those shark netting operations in Australian waters which are aimed at bather protection. I am concerned about the implications of the existing and proposed netting operations and the lack of a formal commitment by government agencies to maintaining shark populations above a level which would prevent reproductive impairment or, better, at a level which would support MSY.

As I will demonstrate below, for the bather protection programs the aims are vague with regards to protecting shark populations. More than likely, they are focused on depleting sharks to an unknown low level to ensure a minimal risk of shark attack. However, whether such low levels are consistent with fisheries law remains to be demonstrated.

1. The fishing strategy is aimed at reducing shark numbers to an undisclosed level on a regional basis and is not designed to keep sharks away from individual beaches

NSW Fisheries has claimed that the nets prevent the formation of territories by sharks and/or disrupt migrations but there is no scientific evidence for this. Indeed, all the tagging data show that sharks of concern (notably great whites and bull sharks) are highly mobile over large distances. Most recently the Department has claimed that the nets stop sharks 'aggregating' on beaches but there is no evidence of any link between aggregations of sharks and attacks on humans (see quote by Dr Barry Bruce - <http://www.abc.net.au/am/content/2015/s4402057.htm?site=sydney>). The Department has also claimed that the nets 'disrupt migration' patterns but, again, there is no evidence for this.

The DPI admits that 'There is no scientific evidence that sharks aggressively defend small, localised territories.....' (Answer to question 253 – Budget Estimates General Purpose Standing Committee No. 5) but then claims that "The word 'territory' means different things to different people, and this is the case for sharks as well as many other animals " and argues that a territory includes any sort of aggregation of animals be it for feeding or nursery purposes. However, this broad approach is at variance to the commonly accepted definitions in animal ecology (see references at [https://en.wikipedia.org/wiki/Territory_\(animal\)](https://en.wikipedia.org/wiki/Territory_(animal))) where the concept of an area being defended is a key factor separating sites where animals may congregate for some reason as opposed to an area which, in the minds of most members of the community, an animal would defend from interference by others.

The meshing program is termed "*a pulse fishing strategy*" in a review of the Queensland program which has gear in the water all year (Anon 2006). In New South Wales it is described as "*an*

intermittent 'fish-down' tactic" (D.D. Reid, NSW Fisheries, pers. comm. quoted in Cliff and Gribble, 1999). According to Paxton and West (2006) 'The aim of shark meshing is simply to reduce the populations of dangerous sharks by killing them'. In South Africa it is openly acknowledged that the shark meshing program is designed to achieve localised depletion (Cliff and Dudley 1992), as quoted below:

How Do the Nets Work?

Although incidents have continued to occur at unprotected beaches and at certain netted beaches, the number of incidents in Natal has been substantially reduced by the widespread installation of nets (Wallett 1983; Cliff 1991). The nets have reduced the number of sharks along the entire Natal coast (Davies 1963; Wallett 1983), thereby lowering the probability of a shark encountering a bather at netted or unprotected beaches. This reduction in shark numbers is shown by the rapid decline in the catch rate immediately after the installation of nets in Durban in 1952 (Davies 1964; Holden 1977) and the remainder of the Natal coast from 1966 (Wallett 1983; Cliff et al. 1988b) (Fig. 3). Since 1970, catch rates have remained relatively constant, and catches are now thought to be sustained by the influx of sharks from adjacent waters.

Cliff and Dudley (2011) show how catches increased as more nets were added to the coast and this caused a depletion as catches exceeded the ability of the shark population to replenish itself either via local breeding or inward migration from other areas (See Figure 6).

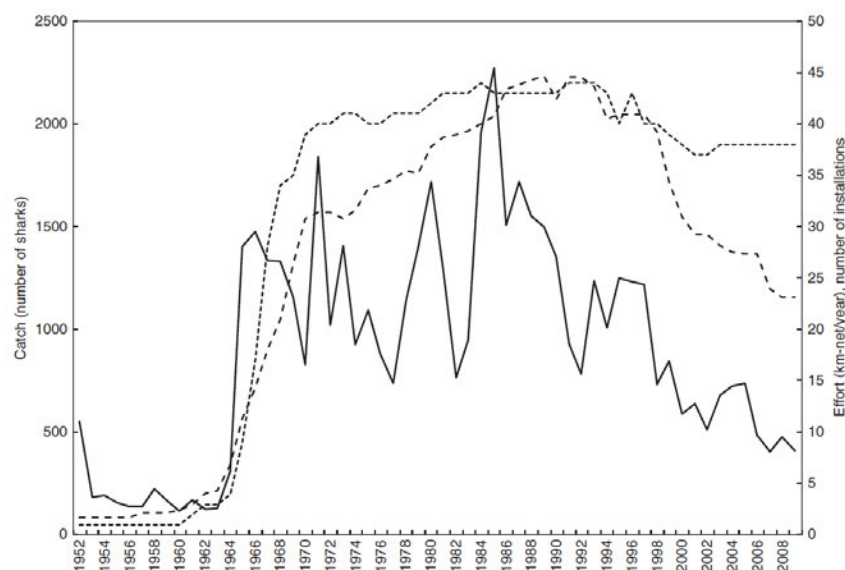


Figure 1 - Reproduced from Figure 2 (Cliff and Dudley 2011) showing total annual catch (solid line) and effort (number of installations, dotted line, kilometres of net per year) in the KwaZulu-Natal shark control program

This graph bears a remarkable similarity to the decline in the NSW shark meshing area (Figure 7.

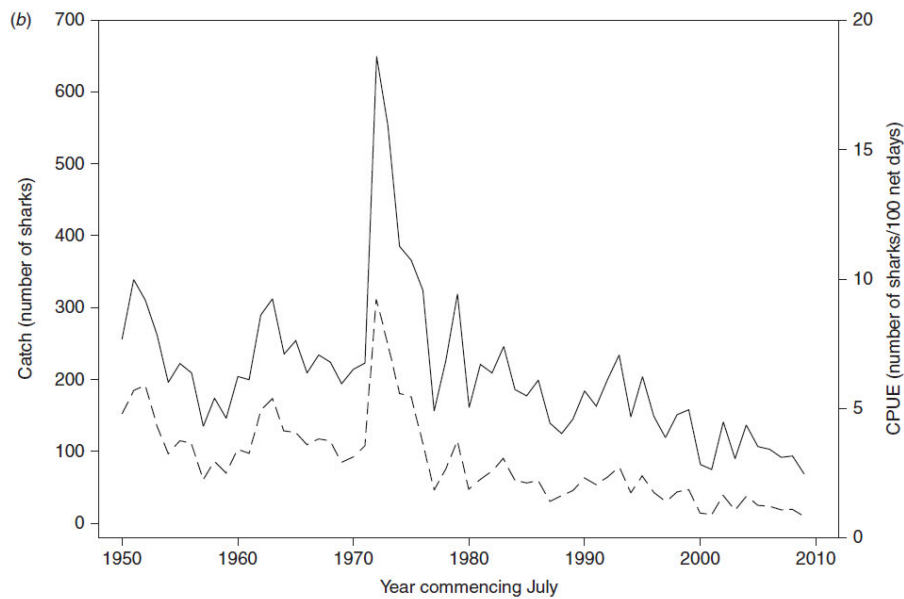


Figure 2 - reproduced from Reid et al (2011) – (a) total effort (number of net days) separated by region for a period from 1950-1951 to 2009-2010. (b) Total catches (number of sharks) by year (solid lines) and catch per effort (number of sharks per 100 net days) 1950-1951 to 2009-2010 (dashed lines).

This depletion effect is similar to many unregulated and unsustainable fisheries. A classic and relevant example from a shark fishery in Australia relates to the fisheries for school and gummy sharks where catches plummeted after an unregulated expansion of fishing, including the use of gillnets (Walker 1998).

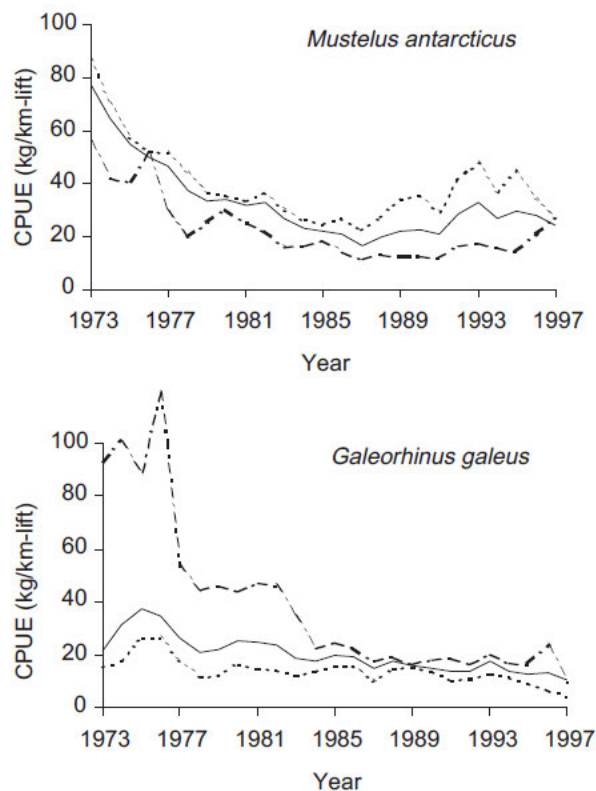


Figure 3 - reproduced from Walker (1998) – *Mustelus antarcticus* and *Galeorhinus galeus* CPUE trend during 1971-1997 for gill-nets of 6 inch mesh in Bass Strait (----), of 7 inch mesh off South Australia (-.-.-) and of all mesh sizes and Bass Strait and South Australia combined (unbroken line)

The pattern displayed by the meshing program in New South Wales is much more consistent with a depletion model than a migration/aggregation/territory disruption model. It is clear that the department is implementing a cull and this term has been used in the past:

- “The Department seeks to selectively cull local populations of large, potentially dangerous sharks adjacent to popular swimming beaches, while maintaining their numbers elsewhere”. (Cliff and Gribble, 1999);
- “The SMP began in Sydney in 1937 and since then has had varying objectives, including but not limited to reducing the risk of shark attack for surfers and swimmers; culling populations of large aggressive sharks; and deterring large sharks from establishing territories adjacent to metropolitan swimming beaches”. Green et al (2009)

This depletion effect appears designed to operate on a regional scale, thus the un-netted beaches are protected by the regional scale decline in shark numbers which is driven by netting at 51 beaches. As mentioned by Cliff and Dudley (1992) the low catch rates are maintained by migration of sharks into the meshing zone. Without this catch rates would be close to zero. Krogh’s (1994) observations that catch rates are higher at the northern and southern end of the NSW meshing zone would be better explained by sharks migrating into the meshing area than sharks being dissuaded by the nets in some way and migrating out from the centre.

In the absence of any evidence supporting the existence of ‘local populations’ of sharks occurring adjacent to swimming beaches it is clear that the culling is aimed to be effective on regional scales (several hundred kilometres) and growth in the number of culling regions needs to be closely examined in the absence of any stock assessments and reference points (see below).

2. Lack of target and limit reference points

If depletion is indeed occurring the DPI (and its Queensland counterpart given the shared nature of some sharks stocks) needs to explain what is the lower limit of the shark population that is being pursued. If the sharks were the subject of a managed commercial fishery most fishery managers would be seriously concerned at the marked drop in catch rates, especially when the catch involves animals which are well known for their susceptibility to fishing pressure. A well-managed commercial fishery would have a target reference point which, for a modern shark fishery would be set at about 50% of the original biomass so as to maintain a viable yield and protect the stock. There would also be a limit reference point, below which the population would not be allowed to drop. For the gummy and school shark fisheries mentioned above there are reference points in place and, for school sharks, a clear and quantitative rebuilding target.

The CPUE in the meshing program has dropped by far more than 50% and this would indicate that the population has declined precipitously. If this is a deliberate strategy by the DPI then the objectives of the program should be openly stated.

Target and limit reference points are a key part of the tool box available to fisheries agencies to not only protect fish stocks but implement the precautionary principle and meet obligations to protect ecosystem structure and function.

At present it would appear that the objective of protecting human life is not only dominant over maintaining stocks at or above MSY but it even dominates any requirement to prevent reproductive impairment (see below). This is a dangerous precedent that could be applied to any human/wildlife interaction whereby the targeted elimination of populations (or even their supporting habitats) could be justified to prevent a very small number of human deaths or injuries each year.

3. Compliance with international obligations

Australia is a signatory to the United Nations Convention on the Law of the Sea which has requirements for the sustainable management of fisheries. Relevant articles include:

Article 61 – requires that fish populations not be endangered by overexploitation and be managed at or restored to a level that supports maximum sustainable yield. The requirements for associated or dependent species (e.g. bycatch) are for populations to be maintained at a level above that “at which their reproduction may become seriously threatened”.

There is no provision for even the low bar of preventing serious impairment of reproductive capacity in the bather protection programs. The Joint Management Plan for the NSW bather protection program provides for little more than monitoring and education, which is also the same as the White Shark Recovery Plan. There are no specific management arrangements for bull sharks or tiger sharks which are clear targets of the meshing programs.

The requirements of UNCLOS are elaborated in the UN Fish Stocks Agreement where Article 6, which can be applied within nation State waters, sets out how the precautionary principle can be applied to the management of fish stocks via the adoption of target and limit reference points.

The bather protection programs are considered to be fisheries and are managed under Australian fisheries laws. Whilst many fisheries have been subject to depletion, arguably more by neglect than any deliberate attempt at extermination, the aims of the bather protection programs point more towards population depletion to as low a level as required to meet human risk minimisation (zero in the eyes of some beach goers). The lack of any formally adopted reference points, especially population targets is a source of concern. This is more so the case given that recovery plan for Great White Sharks is administered under the EPBC Act but is also a concern for those species such as bull and tiger sharks which should be subject to management provisions under fisheries law that give effect to Australia’s commitments to international law.

Australian fisheries agencies pride themselves on their success in the sustainable management of Australia’s fish stocks. Where species drop below a clear and explicit management target there are plans put in place to restore stocks to MSY or above. The bather protection programs, which do not undertake or contribute to stock assessments, inflame public tensions due to the lack of rigorous science. Indeed, shark tagging and aerial wildlife surveillance is often promoted to the public as bather protection when the objectives are driven by scientific inquiry. Lack of rigour has been a regular criticism of the NSW Beach Meshing Program by the Scientific Committee that advises the Threatened Species provisions of the NSW Fisheries Management Act.

I would be grateful if your department could answer the following questions to help me understand how the bather protection programs, especially that in NSW (including the proposed expansion) seeks to implement fisheries best practice:

- Does the government consider the bather protection programs to be 'fisheries' and, if so, how is it that they are they managed inconsistent with the obligations set out in the requirements of UNCLOS as elaborated in the UN Fish Stocks Agreement?
- Does the EPBC Act provide a level of protection for sharks that is greater than the MSY threshold set out in UNCLOS and, if so, how is this achieved by current management arrangements?
- What are the implications of the gillnet programs that are aimed at depleting some sharks now being expand to a significant proportion of the east coast of Australia where the population estimate for great white sharks is 800-1200 individuals and there are no population estimates for bull and tiger sharks?
- Does your department have a threshold that limits the depletion of sharks caused by cumulative impacts?

I have been involved in fisheries management both here and overseas for over 30 years and have both a professional and personal (as surfer/diver) interest in how this issue is managed and what this means for Australia's international claims about being amongst the world's best managers fisheries. Whilst I understand the fear that many bathers have I am concerned that some sharks are potentially being affected on a regional scale and the issue is being mismanaged by fisheries agencies which have underinvested in alternatives (notwithstanding the very recent injection of funds) and conducted a series of research projects with no real, tangible, management focus.

I look forward to your reply

Yours Faithfully

Duncan Leadbitter

References

Anon 2006) – A Report on the Queensland Shark Safety Program, The State of Queensland, Department of Primary Industries and Fisheries, March 2006.

Cliff, G., and Dudley, S. F. J. (1992). Protection against shark attack in South Africa, 1952 to 1990. *Australian Journal of Marine and Freshwater Research* 43, 263–272.

Dudley S.F.J. and Gribble N.A. (1999). MANAGEMENT OF SHARK CONTROL PROGRAMMES. In Shotton, R. (ed.) Case studies of the management of elasmobranch fisheries. *FAO Fisheries Technical Paper*. No. 378, part 2. Rome, FAO. 1999. pp. 480–920.

Green M, Ganassin C, Reid DD (2009) Report into the NSW shark meshing (bather protection) program. NSW Department of Primary Industries. 134 p.

Paxton, J and West, J. (2006). NSW Shark Attack Records: Monthly analyses from shark meshing areas (Greater Sydney, Newcastle, Central Coast, Wollongong). Scientific Shark Protection Summit.

Medina Grand Harbourside Hotel, Aquarium Pier, Darling Harbour, NSW Department of Primary Industries and Sydney Aquarium.

Reid, D.D., Robbins, W.D. and Peddemors, V.M. (2011). Decadal trends in shark catches and effort from the New South Wales, Australia, Shark Meshing Program 1950 - 2010. *Marine and Freshwater Research*, 2011, **62**, 676–693.

Walker T. (1998). Can shark resources be harvested sustainably? A question revisited with a review of shark fisheries. *Mar. Freshwater Res.*, 1998, 49, 553.72