Research Advice on the Proposed Shark Mitigation Strategy using drum lines for January to April 2014

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Background

In direct response to the unprecedented shark related fatalities that have occurred in WA over the past several years, the WA Government has increased funding to initiate or enhance a series of shark hazard mitigation programs. In November 2013, a surfer in the south West of the State became the seventh fatality in three years which has prompted the Government to take a more proactive approach to mitigation of shark attacks. In addition to the shark hazard mitigation strategies outlined above, the Government is now proposing an additional strategy (Strategy) for public safety purposes which includes Marine Monitored Areas (MMA) in the metropolitan and south west regions within which drum lines will be deployed at specified beaches to catch specified large sharks and a rapid response deployment where large sharks that have been identified as a threat will be targeted.

Proposed Strategy

The Strategy will involve deploying up to 36 baited drum lines in coastal waters about one kilometre off specified beaches in both of the MMAs (a total of 72). It is understood that the contractors will bait, maintain and patrol the drum lines from 0600 hours to 1800 hours, 7 days per week from a commencement date in January 2014 through to 30 April 2014. Where the baited drum lines capture white, tiger or bull sharks greater than three metres in length, the contractor is to humanely destroy the shark using a firearm. The deceased shark is to then be tagged and removed to a specified distance offshore and discarded. If the baited drum lines catch any other animals, and if they are not in a condition to survive, the contractor is to humanely destroy, tag and discard the animal.

Risk Mitigation

The use of drum lines to capture sharks is only designed to have a localised impact on the relative number of individuals of the targeted species (white sharks, tiger sharks and bull sharks) within the MMAs, not significantly affect total population size. It is recognised that the use of drum lines is likely to capture species other than the target shark species therefore to mitigate against the risks associated with the potential bycatch of, in particular, dolphins, sea lions, marine turtles, and grey nurse sharks, the following is proposed-

- Drum line contractors will be required to maintain detailed records of all catches and provide this information to relevant authorities for assessment purposes.
- Appropriate gear will be used, including significantly large hooks that limit the types and sizes of non-targeted individuals likely to be captured.

- Daily monitoring and maintenance of drum lines from 6.00am to 6.00pm to ensure any species that may be unintentionally caught are freed and released as soon as possible.

- Aerial and land patrols of beaches at which drum lines will be deployed, so that the drum line contractor can be notified of any animals that may be in distress.

- The drum line program is controlled and limited in its operation, ceasing at the end of April 2014.

- The drum line program will be assessed throughout and after its operation by relevant stakeholders, including technical experts from the Department of Fisheries and the Department of Parks and Wildlife (DPaW).

Summary of Assessments

Standard risk assessment protocols (ISO 31000, 2009) were used to complete risk analyses associated with the proposed Strategy for each of the targeted species and the expected suite of non-target species that may interact with the drum line gear. These assessments only considered the likelihoods of different levels of impact based on the current proposal starting in January 2014 and ending in April 2014. It was not an assessment of the risks that would be associated with a continuing/ongoing program- a separate assessment would have to be completed for this situation.

The use of drum lines to capture sharks is designed to have a localised impact on the relative number of individuals of the targeted species within the MMAs, the killing of a few isolated individuals of the target species over a short period of time is therefore unlikely to generate even a measurable effect on these species at a population level. Hence for these species the proposed strategy poses a negligible risk

Given the mitigation strategies outlined, the strategy poses negligible risks to most other non-targeted species and the broader ecosystem. The only non-targeted species for which there was some immediate concern was dusky whalers for which their recovery program is designed around having minimal impacts on larger individuals. Depending upon the level of capture of this species and what proportion is released alive, the broader assessment of their status may need to be revisited, the results of which may have implications for the commercial fisheries that operate on this species.

Detailed Assessments of Ecological Risks from Proposed Strategy

Methodology

The assessment of risks associated with the proposed Strategy were undertaken in the context that they will form part of the determination of whether exemptions should be granted for this to occur during the proposed period. In the context of assessing the risks of this proposed strategy, a "significant" impact would be one for which there was a reasonable likelihood that the level of impacts generated on any of these species would be such that these would

materially affect the longer term population dynamics at a whole of population level. It was also completed on the basis that the operations will be undertaken as outlined above and was therefore not an assessment of the risks associated with this same set of activities operating in perpetuity. We suggest that if this or a similar strategy is to be undertaken beyond this current proposal period, a further assessment of cumulative impacts is undertaken, and that this should incorporate relevant data collected during the current proposal period.

The calculation of risk was completed using standard risk assessment protocols as used by the Department (e.g. Jones & Fletcher, 2012) which are based on the ISO 31000 (2009) international standard protocols. We completed a risk analysis associated with the proposed strategy for each of the targeted species and the expected suite of non-target species that may interact with the drum line gear. The consequence and likelihood tables used are presented at the end of this paper.

The key information (the key references consulted are provided at the end of this paper) used to generate the risk scores included:

- the rates of capture of these species recorded in drum line programs in south east Qld and other locations
- the rates of capture using similar equipment in WA for tagging purposes
- research survey information for the lower south west region
- commercial catch and catch rate information for relevant WA fisheries
- relevant stock assessment information as presented within the annual Status Reports of the Fisheries and Aquatic Resources in Western Australia and previously in Fisheries Research Reports.
- relevant biological and behavioural information on these species
- other relevant information on these species and methods including the 2012 review by McPhee and the 2012 correlation study completed by the Department.

Assessment of Risks to Targeted Species

White Sharks

The use of drum lines to capture sharks is designed to have a localised impact on the relative number of individuals of this and other targeted species within the MMAs, it is not designed to generate a significant reduction in overall population numbers.

Based on the low rates of capture of white sharks during the targeted fishing operations that have been completed off WA in the past few years (designed to enable tagging of these sharks), plus the low catch rates of white sharks obtained in drum lines programs off Qld, the number of white sharks expected to be caught by this program by April 2014, especially those in the target size range (>3m) is likely to be less than 10. Current research on the population size of the western population of white sharks in Australia (west of Bass Strait) suggests that this is in the order of few to several thousand. It is possible it has been

increasing over the past decade or more given the rate of attacks per population through this period has been increasing. Consequently, even if the total number of white sharks killed in this program up to the end of April is in the order of 10 to 20 then this is still likely to have only a negligible impact on the total stock size of this population of white sharks. Such a level would therefore be unlikely to even be measurable against background variations. This represents a negligible risk.

Tiger Sharks

Given the geographic location of the MMAs is at the southern end of the distribution of this tropical species, the catch rates are likely to be lower than obtained off Qld. However, despite this, the catch rates for this species off WA are still expected to be higher than would be obtained for white sharks. Most of these are likely to be less than three metres and hence many may be released alive. Therefore the number of tiger sharks expected to be killed in this program may only be in the order of 10-20 which would again be considered to have an insignificant impact on this population. Given the broad northern geographic extent of this species and the lack of commercial fishing that now occurs in most areas of northern WA where they are mostly located, the number that could be caught before a measurable change in their total population would occur is likely to be in the order of 100s. Consequently, it is unlikely that this would even have a measurable impact making the proposed strategy a negligible risk to this species.

Bull sharks

This species most commonly occurs in nearshore and estuarine waters. In south west Australia it predominantly occurs in the Swan and Canning rivers. Given the offshore location of the drum line program the number expected to be caught in this program is very low. Therefore there is only a remote likelihood that this strategy will have any impact on this species making this a negligible risk.

Assessment of Risks to non- targeted species and the broader ecosystem

Other Elasmobranchs (sharks and rays)

The majority of sharks likely to be captured in this program are expected to be of non-targeted species. Some of these non-target species (dusky and sandbar sharks) are part of dedicated commercial fishery management recovery programs, especially the larger individuals of these species.

For sandbar sharks, the current acceptable catch of large individuals by the Northern Shark fishery (in addition to the catch of juveniles by the temperate fishery) was 20 t annually. This would equate to several hundred individuals. As the northern shark fishery has not operated in the past five years, the capture of sandbar sharks by the drum line program is not likely to have an unacceptable impact on this recovery program. This represents a low risk

For dusky sharks, the recovery program which has been successful in generating significant recovery over the past decade assumes minimal capture of large individuals. Therefore, if a

significant number of large dusky sharks were captured and killed this could affect the rate of their recovery and represents the highest potential risk for this drum line program. If the numbers killed through this program exceeds 30 then a reassessment of the stock assessment and potentially the management arrangements for the commercial fishery would need to be undertaken. Such an outcome within the time period of the proposal is unlikely therefore it assessed as a low- moderate risk.

Teleosts (Demersal scalefish)

The design of the gear makes it highly unlikely that any of the main demersal scalefish species will be caught in the proposed WA program. Only two teleosts have been captured in the Qld drum line program used in SE Qld. This therefore represents a negligible risk

Other Protected species

Grey Nurse

Unlike other regions, Grey Nurse Sharks have never been subjected to targeted fishing (commercial or recreational) in Western Australia (WA). The only significant source of mortality has been from incidental capture. Catch and catch rate data from the demersal gillnet fishery, prior to their listing, indicates that Grey Nurse Sharks were relatively abundant in temperate WA waters in the mid-late 1990s and that the population was stable. In addition, the expected number of captures of this species is low and their survival prior to release should be high given their biological characteristics. The risk to this stock from this proposal is therefore negligible.

Seals/Sealions

There are no records of these species having been captured on large hooks off WA. Therefore there is only remote likelihood that any individual pinniped will become captured as part of this program and therefore it is a negligible risk.

Turtles

The distribution of turtles means that they are not common in the target region of WA. This means that individuals of most turtle species are highly unlikely to even interact with the drum lines. Furthermore, as the lines are monitoring frequently, based on Qld data there is a high likelihood of successfully releasing alive any turtles that are captured. The proposal therefore represents a negligible risk.

Whales

The Strategy period occurs outside the typical migration and breeding seasons for the pygmy blue whale, Antarctic blue whale, southern right whale and humpback whale minimising likelihood of entanglement in drum line ropes. In addition the positioning of these lines will be inshore of where the majority of movements occur. Should entanglement of one of these species occur, DPaW has expertise in disentanglement procedures. Furthermore these whale

populations are no longer in threatened status hence from an ecological perspective the risks generated by any entanglement even if it occurs would be negligible.

Dolphins

Given size of the hooks used it is highly unlikely that any dolphins can be captured by this gear. They are reported as scavenging off the hooks in Qld but very few have actually been captured in 20 years of drum line operations and all were released alive. Therefore this short term program poses a negligible risk.

Ecological Effects

Given the short time period of this program, the small footprint of the operation compared to the distribution of the species, and relative numbers of individuals that may be captured compared to the total stock sizes of the affected species, this program would not have any measurable effect on broader ecosystem functioning representing a negligible risk

Advice

The potential risks to targeted and non-targeted species arising from implementation of the set of activities listed within the proposed Marine Monitored Areas strategy were assessed using standard ISO 31000 based, risk analysis procedures based on the information currently available.

The strategy as proposed, was assessed as posing only negligible risks to the three targeted species, most of the non-targeted species and the broader ecosystem. Dusky whaler was the only species identified potentially requiring additional management interventions resulting from this strategy, but this is unlikely.

A significant factor in determining these risk levels was the set of risk mitigation procedures that have been proposed, especially the short duration of the proposed activities (January – April 2014) plus the limited geographic extent of their operation compared to the broad distribution of most of the potentially affected species.

If this program, or a similar strategy was to continue beyond the current proposal period (Jan-April 2014) and/or be extended to other geographic areas, another risk assessment should be undertaken that also examines for the potential of cumulative impacts to be generated.

Dr Rick Fletcher
Executive Director Research
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RISK ASSESSMENT CATEGORIES AND LEVELS

LIKELIHOOD LEVELS

1. Remote -Never heard of but not impossible here. (<5% probability)
2. Unlikely - May occur here, but only in exceptional circumstances. (>5%)
3. Possible - Clear evidence to suggest this is possible in this situation. (>30%)
4. Likely - It is likely, but not certain, to occur here. (>50%)
5. Certain -It is almost certain to occur here (>90%)

CONSEQUENCE LEVELS

STOCKS (target and non-target)

1. Measurable but minor levels of depletion to stocks.
2. Maximum acceptable level of depletion of stock.
3. Level of depletion unacceptable but still not affecting recruitment levels of stock
4. Level of depletion of fish stocks are already (or will definitely) affect future recruitment potential/levels of stock.
5. Permanent or widespread and long term depletion of key fish stocks, close to extinction levels.

ECOSYSTEMS

1. Measurable but minor change in the environment or ecosystem structure but no measurable change to function
2. Maximum acceptable level of change in the environment/ecosytem structure with no material change in function.
3. Ecosystem function altered to an unacceptable level with some function or major components now missing &/or new species are prevalent.
4. Long term, significant impact with an extreme change to both ecosystem structure and function. Different dynamics now occur with different species/groups now the major targets of capture or surveys.
5. Permanent or widespread long term damage to the environment. Total collapse or complete shift of ecosystem processes.

RISK LEVELS

Description	Risk Score (C x L)	Risk Level
Negligible	0 - 2	1
Low	3 - 6	2
Medium	7 - 10	3
High	11- 16	4
Severe	17 -25	5

KEY REFERENCES CONSULTED

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