



Report and recommendations of the Environmental Protection Authority



Western Australian Shark Hazard Mitigation Drum Line Program 2014-2017

Director General, Department of the Premier and Cabinet
on behalf of the State of Western Australia

Report 1527

September 2014

Public Environmental Review Environmental Impact Assessment Process Timelines

Date	Progress stages	Time (weeks)
22/04/2014	Level of assessment set	
16/05/2014	Final ESD approved	3
09/06/2014	Public Environmental Review Document (PER) released for public review	3
07/07/2014	Public review period for PER document closed	4
13/08/2014	Final Proponent Response to Submissions Received	5
21/08/2014	EPA meeting	1
8/09/2014	Provision of EPA Report provided to the Minister for Environment	3
11/09/2014	Publication of EPA report (three days after report provided to the Minister)	3 days
25/09/2014	Close of appeals period	2 weeks

Timelines for an assessment may vary according to the complexity of the project and are usually agreed with the proponent soon after the level of assessment is determined.

In this case, the Environmental Protection Authority met its timeline objective in the completion of the assessment and provision of a report to the Minister.



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Chairman

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Summary and recommendations

This report provides the Environmental Protection Authority's (EPA's) advice and recommendations to the Minister for Environment on the Western Australian Shark Hazard Mitigation Drum Line Program 2014-2017 (the proposal).

The proposal, by the Director General, Department of the Premier and Cabinet (DPC) on behalf of the State of Western Australia, involves the deployment of temporary and static drum lines within marine monitored areas (MMAs) between 15 November and 30 April each year for a period of three years, commencing 15 November 2014 and ceasing 30 April 2017. The proposal also includes the temporary deployment of drum lines in response to an identified shark threat or incident anywhere in State waters at any time of the year until 30 April 2017.

The proposal involves the capture of target sharks with a total length of three metres (m) or greater, and aims to provide additional protection from the risk of shark interactions with water users at selected swimming beaches and surf spots in the metropolitan and south-west regions of the state.

Section 44 of the *Environmental Protection Act 1986* (EP Act) requires the EPA to report to the Minister for Environment on the outcome of its assessment of a proposal. The report must set out:

- the key environmental factors identified in the course of the assessment; and
- the EPA's recommendations as to whether or not the proposal may be implemented and, if the EPA recommends that implementation be allowed, the conditions and procedures to which implementation should be subject.

The EPA may include in the report any other advice and recommendations as it sees fit.

The EPA is also required to have regard for the principles set out in Section 4A of the EP Act.

Key environmental factors and principles

The EPA decided that the following key environmental factor relevant to the proposal required detailed evaluation in the report:

- (a) Marine Fauna.

There were a number of other factors which were relevant to the proposal, but the EPA is of the view that the information set out in Appendix 3 provides sufficient evaluation.

The following principles were considered by the EPA in relation to the proposal:

- (a) the precautionary principle;
- (b) the principle of intergenerational equity; and
- (c) the principle of the conservation of biological diversity and ecological integrity.

Conclusion

The EPA has considered the potential environmental impacts of the proposal against its environmental objective for Marine Fauna, which is *to maintain the diversity, geographic distribution and viability of fauna at the species and population levels*.

The EPA's assessment has had particular regard to the white shark, because it is listed as a migratory species and 'Vulnerable' under both the Commonwealth *Environment Protection and Biodiversity Protection Act 1999* (EPBC Act) and the State *Wildlife Conservation Act 1950* (WC Act).

The proponent has assessed the impacts of the proposal on the viability of the south-western population of white sharks. The proponent's assessment is based substantially on the considerable work undertaken by the Department of Fisheries (DoF) to obtain all available information from various sources to make best estimates of the white shark population. The proponent's assessment concludes that the proposed take limit of up to 25 white sharks over the three-year drum line program would have a minor level of consequence on population numbers and, based on its risk assessment, represents a negligible risk to the south-western white shark population, and therefore viability, of the population.

As part of the assessment the EPA engaged the CSIRO to undertake an assessment peer review of the proponent's investigations and conclusions and report directly to the EPA. Both assessment Peer Review Reports have been made available in Appendix 6 (6.6 and 6.7) to the EPA's report.

As recognised by the Peer Reviewer, the DoF's assessment is very dependent on the underlying assumptions used and most of these assumptions have yet to be supported by empirical data. The Peer Reviewer identifies that this does not necessarily mean that the conclusion of negligible risk is incorrect, but that the information provided is inadequate to judge the level of risk.

Despite the proponent's best efforts to make conservative and plausible estimates, there currently remains scientific uncertainty surrounding the available information and evidence about the south-western white shark population, population trends, and the catch of white sharks from commercial fisheries. Therefore, at this stage, and based on available information, it is the EPA's opinion that there remains a high degree of scientific uncertainty as to whether the proposal can meet the EPA's environmental objective for Marine

Fauna (i.e. to maintain the viability of fauna at the population level) and there is a risk that, if the proposal is implemented, it may compromise the viability of white sharks at the population level (for the south-western white shark population).

In view of that high degree of scientific uncertainty, the EPA considers that a cautious approach should be adopted and that the proposal should not be implemented.

The EPA's recommendation is based only on the assessment of the environmental factor of Marine Fauna, which was the only key environmental factor identified during the assessment of the proposal.

The EPA has provided other advice to the Minister for Environment in the event that the proposal proceeds. This includes a recommendation that any statement of implementation should require the proponent to have an environmental management plan in place to apply to the proposal, and set catch limits for target sharks, to minimise impacts on marine fauna.

Recommendations

That the Minister for Environment:

1. considers the report on the key environmental factor of Marine Fauna, as set out in Section 3;
2. notes that the EPA has concluded that there is a high degree of scientific uncertainty about whether the proposal can meet the EPA's environmental objective for Marine Fauna, and therefore that the proposal should not be implemented;
3. notes that the EPA has not included in this report conditions and procedures to which the proposal should be subject, if implemented, because the EPA has concluded that the proposal should not be implemented; and
4. notes the EPA's other advice presented in Section 4 about recommended requirements in the event that the State Government determines that the proposal may proceed.

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1. Introduction and background

This report provides the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for Environment on the key environmental factors and principles for the proposal by the Director General, Department of the Premier and Cabinet (DPC) on behalf of the State of Western Australia, for the Western Australian Shark Hazard Mitigation Drum Line Program 2014–2017 (the proposal).

The proposal involves the deployment of temporary and static drum lines within marine monitored areas (MMAs) (Figure 1) between 15 November and 30 April each year for a period of three years, commencing 15 November 2014 and ceasing 30 April 2017. The proposal also includes the temporary deployment of drum lines in response to an identified shark threat or incident anywhere in State waters at any time of the year until 30 April 2017. The proposal involves the capture of target sharks with a total length of three metres or greater, and aims to provide additional protection from the risk of shark interactions with water users at selected swimming beaches and surf spots in the metropolitan and south west regions of the state.

The DPC referred the proposal to the EPA on 7 April 2014. The proposal was assessed at the level of Public Environmental Review (PER). It is also being assessed under the Bilateral Agreement between the State and the Commonwealth for likely significant impacts to the white shark, which is a listed threatened and migratory species. The Environmental Scoping Document (ESD) for the proposal was approved on 16 May 2014 and the PER was released for a four-week public comment period from 9 June 2014 to 7 July 2014.

The EPA previously considered a third party referral for a similar proposal by the proponent which involved the setting of static and temporary drum lines within MMAs from January 2014 until 30 April 2014. On 12 March 2014 the EPA determined that, given the proposal's limited duration and small scale, a formal environmental impact assessment was not warranted because it was unlikely to have a significant effect on the environment. The EPA issued public advice on the proposal and recommended that, should there be a new proposal to deploy baited drum lines to catch sharks beyond 30 April 2014, it would need to be referred to the EPA for a decision on whether the proposal should be formally assessed under Part IV of the EP Act. The current proposal is the subject of this assessment.

Further details of the proposal are presented in Section 2 of this report. Section 3 discusses the key environmental factors and principles for the proposal. Section 4 provides other advice from the EPA. Section 5 provides an overview of the Matters of National Environmental Significance and Section 6 presents the EPA's recommendations. Appendix 6 contains a summary of submissions and the proponent's response to submissions (6.1) and is included as a matter of information only. It does not form part of the EPA's report and recommendations.

2. The proposal

The DPC proposes to deploy up to 60 static baited drum lines approximately one kilometre offshore of selected high-use beaches and surf breaks within designated MMAs in the metropolitan and south-west coastal regions of Western Australia (Figures 1, 2 and 3). Up to 12 additional drum lines may be temporarily deployed in response to an identified shark threat or incident within the geographical and temporal extent of the MMAs.

The static drum lines are proposed to be deployed between 15 November and 30 April for a period of three years, commencing 15 November 2014 and ceasing 30 April 2017, after which the program will be subject to review.

The proposal involves the capture of white sharks (*Carcharodon carcharias*), tiger sharks (*Galeocerdo cuvier*) and bull sharks (*Carcharhinus leucas*) with a total length of three metres or greater (target sharks) within MMAs during the drum line deployment period.

The proposal also includes the temporary deployment of drum lines, and the attempted capture of threatening sharks, in response to an identified shark threat or incident anywhere in State waters at any time of the year until 30 April 2017. This is to be implemented in accordance with the DoF *Guidelines for sharks posing an imminent threat to public safety* (the Guidelines) (Appendix 6.4).

The proponent proposes an acceptable catch level of up to 25 white sharks, 900 tiger sharks and 10 bull sharks as a result of the implementation of the proposal.

The main characteristics of the proposal are summarised in Table 1 below. A detailed description of the proposal is provided in Section 2 of the PER document (DPC, June 2014). The locations and dimensions of the MMAs are shown in Figures 2 and 3, and detailed in the Clarification of the PER Key Characteristics Table (DPC³, August 2014) (Appendix 6.3).

Table 1: Summary of the Proposal

Proposal Title	Western Australian Shark Hazard Mitigation Drum Line Program 2014–2017
Short Description	<p><u>Marine Monitored Areas (MMAs):</u> Metropolitan MMA from Ocean Reef to Port Beach and to approximately 1 km offshore. See Figure 2.</p> <p>South-west MMA from Quindalup to Prevelly and to approximately 1 km offshore. See Figure 3.</p> <p><u>Static drum lines:</u> Up to 60 static baited drum lines approximately 1 km offshore within MMAs, but not within any marine recreational or sanctuary zones or Fish Habitat Protection Areas, set between 15 November and 30 April each year for a period of three years, commencing 15 November 2014 and ceasing 30 April 2017.</p> <p><u>Temporary drum lines:</u> Up to 12 temporary drum lines deployed in response to an identified shark threat or incident within the MMAs between 15 November and 30 April each year for a period of three years, commencing 15 November 2014 and ceasing 30 April 2017.</p> <p>Outside of the geographic and temporal extent of the MMAs temporary deployment of drum lines in accordance with DoF Guidelines¹ to 30 April 2017.</p>

¹The Department of Fisheries “Guidelines for fishing for sharks posing an imminent threat to public safety”.

Table 1 incorporates modifications to the proposal made by the proponent following release of the PER document.

Since the release of the PER, the proponent has clarified that the DoF has jurisdiction for implementing the deployment of temporary drum lines in response to an identified shark threat or incident outside of the geographic and temporal extent of the MMAs in accordance with the Guidelines. The implementation of temporary and static drum lines within the spatial and temporal extent of the MMAs would occur in accordance with the draft Operational Environmental Management Plan (Appendix 6.2).

The details of these clarifications by the proponent are provided in Appendix 6.3 of this report. This includes: a revised Key Characteristics Table; clarification of the potential impacts as a result of temporary drum line deployment and, in relation to the proposed draft management plan, updated criteria for temporary drum line deployment within the geographic and temporal extent of the MMA; and clarification of trigger points.

The EPA notes that this means the DoF would continue to implement the Guidelines in accordance with the State Government's Imminent Threat Policy, which has been in place since 2012.

A draft management plan for the proposal was provided in Appendix 2 of the PER. This has been substantially further developed by the proponent, and the draft Operational Environmental Management Plan (DPC³, August 2014), provided in Appendix 6.2 of this report, now proposes acceptable catch levels for target species, anticipated catch levels for non-target species, trigger points and associated contingency measures, and further detail, in particular with regard to animal handling protocols, biological sampling, record-keeping and research to be undertaken as part of any implementation of the proposal.

The potential impacts of the proposal initially predicted by the proponent in the PER document (DPC, June 2014) and their proposed management are summarised in Table ES 3 (Executive Summary) in the proponent's PER document.

A total of 6,751 public submissions and two petitions with a combined total of approximately 25,000 signatures were received during the public review period. The key issues raised relate to:

- the justification for the proposal;
- evaluation of non-lethal methods for hazard reduction including early detection, alarm systems, tag-and-release, and community awareness/education;
- predicted impacts to target and non-target species and ecosystems;
- potential impacts to marine sanctuary zones and World Heritage Areas;
- proposed management measures;
- potential risks to public safety; and
- extent of stakeholder consultation.

In addition to the above issues, the EPA notes that a considerable number of submissions on the PER raised issues in relation to the effectiveness of the proposal from a public safety perspective. The matter of the efficacy of the proposal, that is, will it make beaches safer, is not a matter which the EPA is required or empowered to address in its assessment report. This is because the EPA's assessment report can only deal with the environmental factors relevant to the proposal, being the potential significant impacts on the environment, should the proposal proceed.

Issues raised were addressed in the Response to Submissions document received on 13 August 2014 (Appendix 6.1).

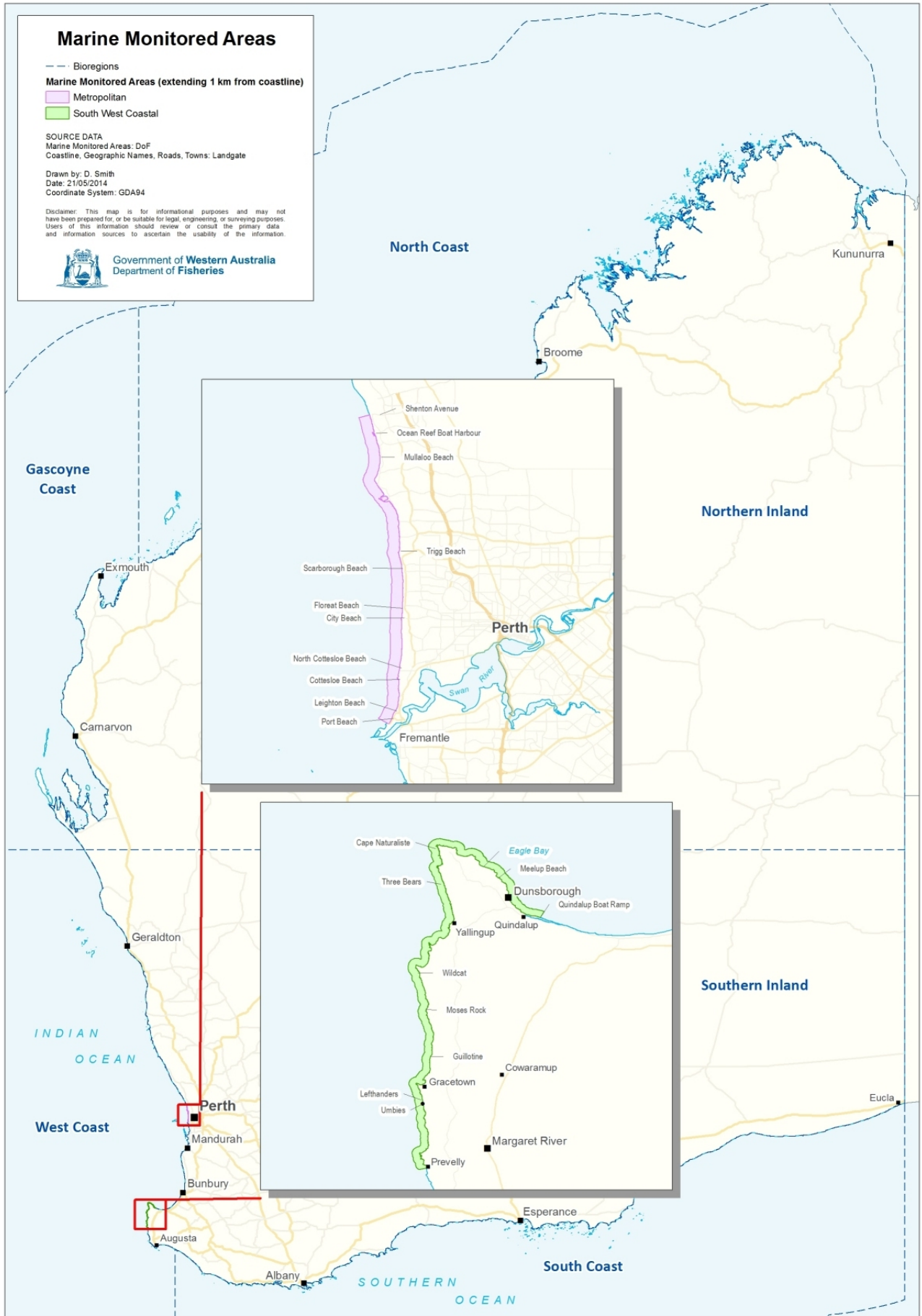


Figure 1: Location of the proposal indicating regional context

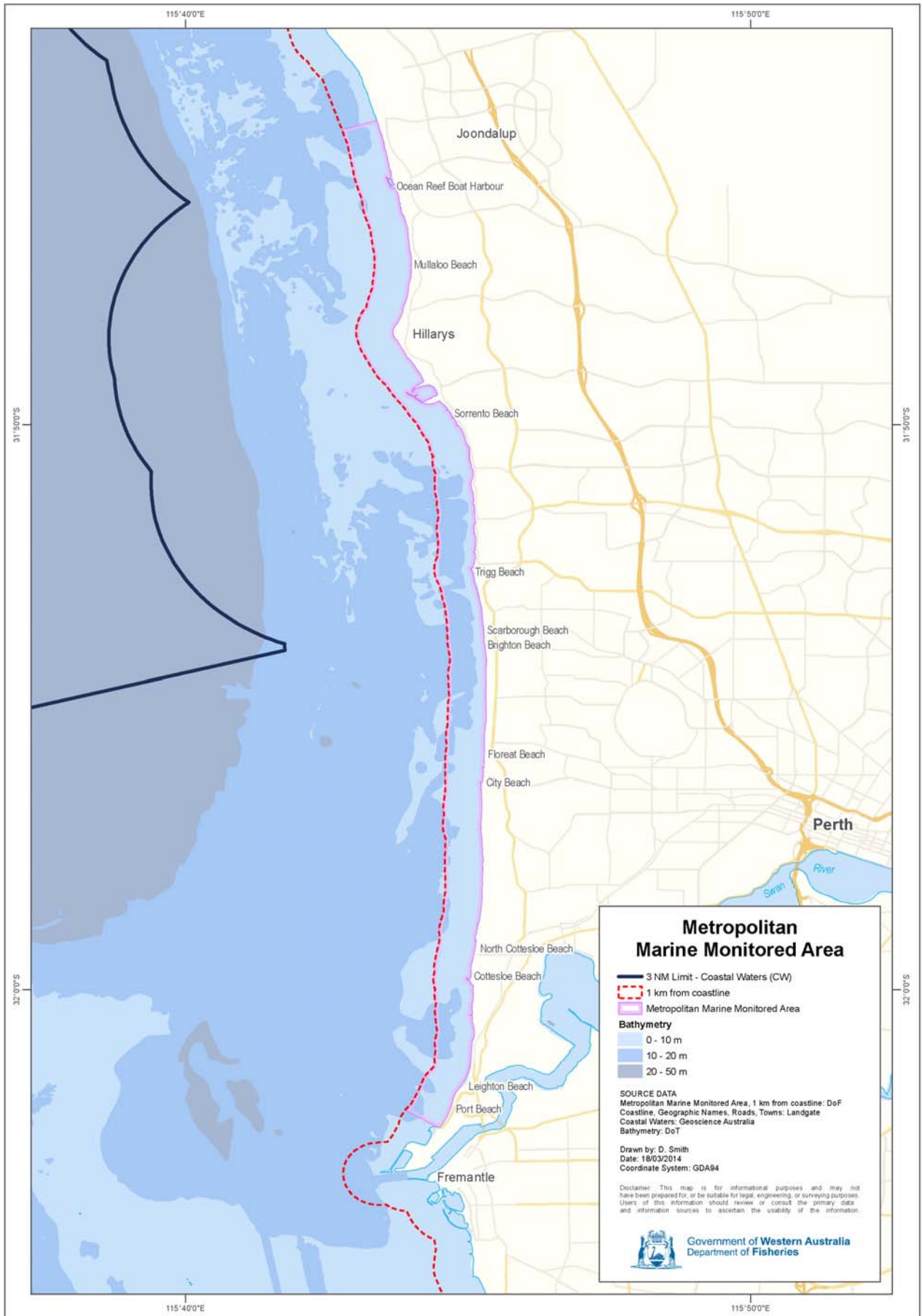


Figure 2: Metropolitan Marine Monitored Area

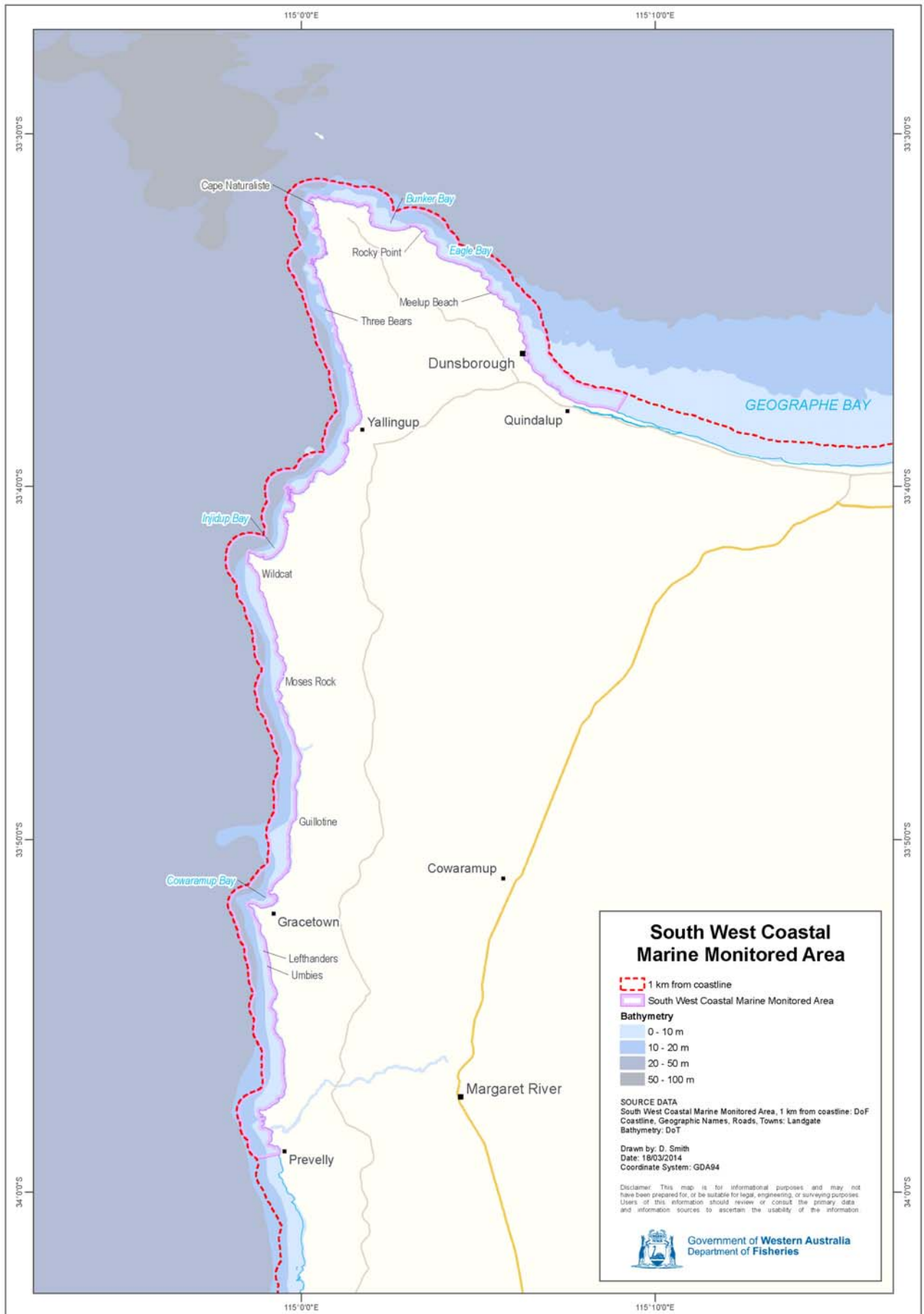


Figure 3: South West Coastal Marine Monitored Area

3. Key environmental factors and principles

Section 44 of the EP Act requires the EPA to report to the Minister for Environment on the key environmental factors relevant to the proposal and the conditions and procedures, if any, to which the proposal should be subject. In addition, the EPA may make recommendations as it sees fit.

The identification process for the key factors selected for detailed evaluation in this report is summarised in Appendix 3.

It is the EPA's opinion that the following key environmental factor for the proposal requires detailed evaluation in this report:

- (a) Marine Fauna.

The above key factor was identified from the EPA's consideration and review of all environmental factors generated from the PER document and the submissions received, in conjunction with the proposal characteristics set out in Table 1.

Details on the key environmental factor and its assessment are contained in Section 3.1. The description of the factor shows why it is relevant to the proposal and how it will be affected by the proposal, taking into consideration environmental impact management by the proponent. The assessment of the factor is where the EPA decides whether or not a proposal meets the environmental objective set for that factor.

The following principles were considered by the EPA in relation to the proposal:

- (a) the precautionary principle;
- (b) the principle of intergenerational equity; and
- (c) the principle of the conservation of biological diversity and ecological integrity.

3.1 Marine Fauna

Objective

The EPA's objective for Marine Fauna is *to maintain the diversity, geographic distribution and viability of fauna at the species and population levels.*

In deciding which components of the EPA's objective are relevant to this assessment, the EPA has had regard to the following:

- the proposal is largely limited in its extent to the two proposed MMAs, hence it is unlikely to affect the geographic distribution of the potentially affected species of marine fauna, at the species and population levels;
- the proposal is targeting three shark species (white, tiger and bull) with a total length of three metres or greater and aims to avoid and minimise impacts to other marine fauna and hence it is unlikely to affect the diversity of non-target species and populations; and
- the proposal is designed to reduce the local abundance of target sharks near selected beaches and therefore has potential to impact on the viability of target sharks at the population level.

Therefore, to meet the EPA's environmental objective, the assessment needs to demonstrate, with a high degree of confidence, that the proposal maintains the viability of marine fauna at the population level.

The evaluation of the proposal against the EPA's environmental objective in respect of maintaining the viability of species at the population level is set out below with respect to the white shark and other marine fauna.

Potential impacts of the proposal

The proposal will affect marine fauna species by the capture of target shark species (white sharks, tiger sharks and bull sharks) and the incidental capture or entanglement of other marine fauna species (non-target marine fauna).

Target sharks, which would be euthanized, are white sharks, tiger sharks and bull sharks with a total length of three metres or greater. Target sharks with a total length less than three metres that are caught would be released alive, unless they were considered not to be in a condition to survive.

Non-target marine fauna

Non-target marine fauna in the context of this assessment comprise all other marine fauna species unintentionally caught as a result of the proposal, including all non-target shark species, all non-shark fish species, marine mammals, reptiles and seabirds.

Tiger and bull sharks

With respect to the tiger and bull sharks, the EPA notes that they are not listed as a threatened species in the EPBC Act or the *Wildlife Conservation Act 1950* (WC Act).

White shark

The white shark (*Carcharodon carcharias*) is a migratory and threatened species and is listed as follows.

- Internationally it is listed on the *Convention on the Conservation of Migratory Species of Wild Animals 2002*. Australia has international obligations to protect migratory species listed in schedules to this convention. The proponent is required to address how the proposal is consistent with these obligations.

- Nationally it is listed as a 'Vulnerable' and 'Migratory' species under the Commonwealth EPBC Act. The species was listed as vulnerable because of evidence of a declining population, its life history characteristics (long lived and low levels of reproduction) and, at the time of listing, significant ongoing pressures from the commercial fishing industry (DSEWPAC, 2013). This listing occurred before it was identified that there are two distinct Australian populations of the white shark.
- Under State legislation, the species is protected and also listed as 'Vulnerable' under the WC Act. Being listed as vulnerable under the WC Act means it is considered to be facing a high risk of extinction in the wild.
- The white shark is also protected under the *Fish Resources Management Act 1994*. This means that the species is totally protected from fishing.

In 2013 the Commonwealth Government issued a National Recovery Plan for the white shark. The overarching objective of the Recovery Plan for the white shark is to assist the recovery of the white shark in the wild, throughout its range in Australian waters with a view to:

- improving the population status, leading to future removal of the white shark from the threatened species list of the EPBC Act; and
- ensuring that anthropogenic activities do not hinder recovery in the near future, or impact on the conservation status of the species in the future.

The Recovery Plan identifies the principal threats to the lack of white shark recovery in Australia as mortality resulting from accidental capture by commercial and recreational fishers, and shark control activities.

Recent research based on genetic analysis and tracking data suggests that there are two Australian populations of the white shark: the south-western white shark population, which occurs along the Western Australian coast to waters west of Bass Strait; and an east coast white shark population, from east of Bass Strait and up the Queensland coast (Blower et al., 2012).

Proponent's environmental review

Non-target marine fauna

The proponent has designed the proposal to avoid and minimise impacts to non-target marine fauna through measures such as the use of drum lines as opposed to nets or net meshing, drum line configuration, large hook size, limited temporal and spatial extent of the proposal which avoids whale migration, marine sanctuary and recreation zones, and fish habitat protection areas, monitoring and maintenance of the drum lines, and use of preferential bait.

The proponent's risk based assessment concludes that the proposal represents no or negligible risk, or negligible risk to non-target marine fauna.

Tiger and bull sharks

As the proposal does not coincide with the preferred habitat of the bull shark (which is the Swan/Canning estuary system), the proponent does not expect to catch large numbers of this shark.

Tiger sharks are a relatively abundant, tropical and subtropical shark species. In relation to tiger sharks, the proponent has predicted that if the levels of capture of tiger sharks remain within the anticipated levels (approximately 300 sharks per year), combined with high levels of release mortality rates, it would be possible for the program to generate a minor consequence risk rating. The proponent concludes that this would mean a potentially measurable but relatively small decrease in the total abundance of the tiger shark population as a result of a three-year drum line program. This is also noting the minimal levels of mortality to tiger sharks in other areas of Western Australia because their inadvertent capture is also low due to prohibition on the use of commercial shark fishing gear off large areas of the north-west since 1993 and a cessation of commercial shark fishing in northern Australia (DPC¹, 2014).

White sharks

The proponent has assessed the impacts of the proposal on the viability of the south-western white shark population. The proponent's assessment of the potential impacts of the proposal on Marine Fauna is based largely on information and expertise provided by the DoF. The DoF has undertaken considerable work to obtain all available information from various sources to make best estimates of the white shark population. This required the DoF to undertake the necessary scientific analysis and make available the relevant reports to support the conclusions in the PER document.

A fundamental component of this work is the DoF's risk assessment as set out in Appendix 9 of the PER: *A risk based, weight-of-evidence approach to determine the range of plausible estimates for the south-western Australian population of white sharks.*

As part of its assessment, the DoF developed a demographic model to calculate a range of scenarios based on potential population sizes and trajectories based on a number of conservative parameters for white shark life histories and estimated catch numbers from fishing. This was then combined with a risk-based, 'weight-of-evidence' approach where the scenarios were examined against other available data and observations to ascertain the range of most plausible scenarios.

In summary, the DoF has assessed the removal of up to 25 white sharks over a three-year period and concluded that *"...the additional removal of a relatively small number of white sharks (less than 10/year – which is less than 10 per cent of current capture rates) for public safety purposes was found to have no material effect on the population numbers and therefore the viability/status of the south-western population of white sharks."* This assessment is based principally on:

1. weight-of-evidence analysis of available information, giving an estimated current (2012) population size of 3,400-5,400;
2. an assessment that “the current population levels....are at least 70% or above their pre-exploitation levels” (pre-1940 levels);
3. an estimated current commercial by-catch of around 100 sharks per year from the population; and
4. the proposed catch limit on white sharks being limited to 25 or less for the three-year drum line program.

Key issues from public submissions

As mentioned above, a considerable number of submissions were received on the PER.

Submissions raised matters regarding non-target marine fauna, tiger and bull sharks including:

- impacts to other sharks in particular tiger sharks, bull sharks, shortfin mako and dusky sharks;
- contingency measures for other marine fauna; and
- ecosystem impacts as a result of the removal of apex predators.

A significant proportion of the matters raised were on the white sharks, particularly in relation to the:

- conservation status of the white shark;
- Australia’s international obligations regarding the protection of the white shark;
- existing threats and pressures on the white shark population;
- need to examine alternative non-lethal methods of shark control to minimise impacts;
- scientific uncertainties in the DoF’s population estimates and historical and existing catch data;
- availability of the papers and information which was used to support the estimations and conclusions in Appendix 9; and
- a published paper by Blower (et al., 2012) which estimates an ‘effective population size’ for the south-western white shark population to be 700 breeding individuals.

These matters were responded to by the proponent in the Response to Submissions on the Public Environmental Review (DPC¹, August 2014) which is attached for information in Appendix 6.

Blower et al. (2012) investigated the population genetics of Australian white sharks to estimate the ‘effective population sizes’ for the south-western white shark population and the east coast white shark population. The effective population is not a measure of total population size. While the DoF did not use

Blower's 'effective population size' in its assessment, it has responded to this issue in the response to submissions. The DoF has suggested that if the proportion of this population that would be of breeding size/age is likely to be in the order of 15-30 per cent (based on modelled population structures), then using the estimated 700 breeding individuals would generate a range of 2,500-4,600 individuals for the south-western white shark population.

Assessment Peer Review comments

As mentioned above, the EPA engaged the CSIRO to undertake an assessment peer review of the proponent's PER against the work required in the approved ESD, reporting directly to the EPA.

Tiger and bull sharks

The Peer Reviewer has advised that the proposal has the capacity to create a measurable change in the tiger shark population, with 900 anticipated to be caught over the three-year program, and that upper limits, effective monitoring, trigger points, decision rules and agreed actions in response to the trigger points, linked to management objectives, are required and may provide a mechanism to reassess the risk to the population should the catch be higher than expected.

The CSIRO² (July 2014) has advised that the proponent's assessment that the risk to community structure as a result of removing apex predators is likely to be negligible is not contested.

White sharks

In relation to the DoF's work on the risk-based, weight-of-evidence approach to estimating population size (Appendix 9, DPC, June 2014), the Peer Review has advised that (CSIRO¹, July 2014):

“Appendix 9 provides few details on how key parameters were estimated. Two of the significant parameters that dictate the predicted trajectories and current population estimates are the initial population size from which the model is run and the catch history of white sharks across the population. Modelling minimum viable population levels and population trajectories for white sharks via demographic models as used by the proponent are scientifically useful exploratory exercises but highlight the critical uncertainties and lack of information available to adequately assess current population size, population status and hence the likely impacts of any additional removals from the population. The outcomes of such modelling are heavily dependent on underlying assumptions relating to: biological parameters, initial population size (which is unknown), current/historical catches across the populations range (which are poorly documented) and either explicitly or implicitly assuming that some catches or trajectories are sustainable or more plausible compared to others (for which there are few data to adjudicate). It is important to note that such exercises are not stock assessments and they do not provide estimates of actual population size.”

The proponent has responded to this issue by recognising that some of the biological parameter values are not well known and therefore a range of different scenarios were generated. Because the proponent considered there was not sufficient quantitative data to apply to its assessment, a more qualitative approach was used that generated ranges of more plausible values which, collectively, were used to describe the confidence levels.

In relation to the proponent's estimated catch numbers from fishing, which is necessary to estimate the combined pressures from the proposal and commercial fishing at the population level, the Peer Reviewer (CSIRO², July 2014) advised as follows:

“The most significant uncertainties are the initial population size and the cumulative annual mortality [total anthropomorphic catch + natural mortality (= total mortality)] applied to the modelled population... Captures of white sharks are poorly and unreliably recorded in commercial fishery logbooks; efforts to validate catch history are fraught with difficulty and white shark bycatch/fishing effort relationships are not necessarily comparable between regions or over time due to regional differences in abundance and catchability of sharks, variations in the configuration of gear, management changes impacting fishing behaviour and variability in the motivation to report captures over time.”

Assessment against the EPA's Environmental Objective

Non-target marine fauna

In relation to the potential impacts on non-target marine fauna, the EPA notes that the proponent has designed the proposal to avoid and minimise impacts on non-target marine fauna species, as demonstrated in the draft Operational Environmental Management Plan (Appendix 6.2), which details the configuration of the drum lines and the measures to release captured animals.

Tiger and bull sharks

The EPA notes that the proposal does not coincide with the preferred habitat of the bull shark. With regard to tiger sharks the EPA notes that they are a relatively abundant tropical and subtropical shark species. The EPA notes that the draft Operational Environmental Management Plan (Appendix 6.2) provides for limits, trigger points and contingency measures which would apply in relation to tiger sharks.

The EPA is satisfied that the proponent has sufficiently demonstrated avoidance and minimisation measures through the proposal design and the Draft Operational Environmental Management Plan, and therefore considers that the proposal presents a low risk to the viability of populations for other target sharks and non-target marine fauna.

White sharks

The proponent's assessment, which is based substantially on the work undertaken by the DoF, indicates that the proposed take of white sharks by the drum line program would have a minor level of consequence on population numbers and, based on its risk assessment, represents a

negligible risk to the south-western white shark population, and therefore viability, of white sharks.

However, as recognised by the assessment peer review, the DoF's assessment is very dependent on the underlying assumptions used, and most of these assumptions have yet to be supported by empirical data. The Peer Review identifies that this does not necessarily mean that the conclusion of negligible risk is incorrect but that the information provided is inadequate to judge the level of risk.

Appendix 9 of the PER, which formed the basis of the DoF's investigations is considered a 'working draft'. The DoF advised that this paper would be subject to both internal and an external review process prior to publication as a DoF Report. This review process for the paper presented in Appendix 9 (DPC June 2014), and the other papers which were referenced but are still in preparation, may add confidence as to whether the EPA's environmental objective may be met.

The only other significant piece of information which gives an indication of the population size of the south-western white shark population is the 'effective population size' of 700 breeding individuals estimated by *Blower et al., 2012*. There is no standard relationship between 'effective population size' and 'total population size' and this will vary between species and is dependent on a number of factors. The DoF's estimate of 'total population size' of between 3,400 and 5,400 is not, however, necessarily inconsistent with the 'effective population size' estimated by *Blower et al., 2012*. The EPA notes, however, that there is also considerable scientific uncertainty regarding the estimate of *Blower et al., 2012* being based on limited data and subject to wide confidence limits.

For the EPA to find the proposal to be environmentally acceptable, the available information and evidence, particularly in relation to population size, trends, and by-catch rates from fishing (as the largest source of mortality for the south-western white shark population), should demonstrate with a high degree of confidence, that the EPA's environmental objective for Marine Fauna will be achieved (i.e. the viability of the south-western white shark population will be maintained).

At this stage, the scientific uncertainty surrounding the available information, evidence and analysis about the white shark population, population trends and by-catch of white sharks from commercial fisheries, cumulatively leads to a high degree of scientific uncertainty about whether the EPA's environmental objective for marine fauna can be met.

Summary

Having particular regard to the:

- (a) white shark being listed as 'Vulnerable' under both the WC Act and the EPBC Act;
- (b) environmental issues raised in the public submissions;

- (c) proponent's assessment of the potential impacts of the proposal using best available information and using most conservative plausible estimate of population size;
- (d) proponent's preparation of a draft Operational Environmental Management Plan which proposes a limit of up to 25 white sharks in the MMAs over three years; and
- (e) advice and conclusions in the assessment Peer Review Reports (CSIRO¹, July 2014, August 2014) and in response to questions put to the Peer Reviewer by the EPA (CSIRO², July 2014),

it is the EPA's opinion that there remains a high degree of scientific uncertainty as to whether the proposal can meet the EPA's environmental objective for Marine Fauna (i.e. to maintain the viability of fauna at the population level) and there is a risk that, if the proposal is implemented, it may compromise the viability of white sharks at the population level.

Having carefully evaluated the information available, and in view of the high degree of scientific uncertainty, the EPA considers that a cautious approach should be adopted and that the proposal should not be implemented.

3.2 Environmental principles

In preparing this report and recommendations, the EPA has had regard for the object and principles contained in s4A of the EP Act. Appendix 3 contains a summary of the EPA's consideration of the principles.

4. Other advice

The EPA notes that the Minister for Environment, in consultation with other decision-making authorities for this proposal, will decide whether this proposal may be implemented and, if so, under what conditions. In doing so, the Minister may consider broader economic, social or other matters.

The EPA provides the following advice and recommendations to the Minister in the event that the proposal proceeds. In doing so, the EPA notes that the final Peer Review Close Out Report (CSIRO, August 2014) highlights that *“Continuing to look at existing data will not improve the advice and is of less importance than how to manage the risk and impact going forward (to both the public and the white shark population).”*

The EPA recommends that any statement of implementation should require the proponent to have an environmental management plan to apply to the proposal and set catch limits for target sharks.

Environmental Management Plan

The proponent has developed a draft Operational Environmental Management Plan (Appendix 6.2), which includes the core elements recommended by the Peer Review. The EPA recommends that the draft Operational Environmental Management Plan fully incorporate the advice in the Peer Review Close Out Report (CSIRO, August 2014) (Appendix 6.7), particularly in the following areas:

- limits and triggers;
- biological sampling;
- contingency measures; and
- research on post-release mortality.

In relation to the proposed limits and triggers, the EPA recommends that these apply to all aspects of the proposal, i.e. sharks caught within both the spatial and temporal extent of the MMAs as a result of the deployment of static and temporary drum lines, and the temporary deployment of drum lines outside the temporal and geographical extent of the MMAs in response to an identified threat or incident in accordance with the DoF Guidelines (DoF, 2012) (Appendix 6).

Government should also consider the following actions to better understand the current threats and pressures on the white shark and to minimise impacts.

Cumulative threats and pressures

An increased understanding of by-catch numbers of the white shark from commercial fishing, and further efforts towards minimising by-catch, is a focus of the National Recovery Plan, and consistent with recommendations in the Peer Review Close Out Report (CSIRO, August 2014) (Appendix 6.7).

The EPA recommends that Government enhance efforts being undertaken to improve information capture on by-catch, and improve knowledge on both by-catch and population dynamics.

Investigation into alternatives

Consistent with the National Recovery Plan (DSEWPAC, 2013), the EPA supports the continuation and further research into shark behaviour and investigations and implementation of non-lethal alternatives in order to minimise the potential environmental impacts to marine fauna.

5. Matters of National Environmental Significance

The Commonwealth Minister for the Environment has determined that the proposal is a controlled action under the EPBC Act as it is likely to have a significant impact on one or more Matters of National Environmental Significance (MNES).

It has been determined that the proposed action is likely to have a significant impact on the following matters protected by the EPBC Act:

- listed threatened species and communities (sections 18 and 18A)
- listed migratory species (sections 20 and 20A).

The Commonwealth Minister further advised the proposed action is likely to have a significant impact because it targets the listed vulnerable and migratory white shark (*Carcharodon carcharias*).

This proposal is being assessed by way of an accredited process with the EPA under the bilateral agreement with the Commonwealth Government made under section 45 of the EPBC Act. The bilateral agreement allows the Commonwealth Minister for the Environment to rely on the PER process of the State of Western Australia in assessing the action under the EPBC Act.

The proposed action has been assessed by the EPA in a manner consistent with Schedule 1 of that bilateral agreement and this assessment report satisfies clause 7.3 of Schedule 1. Appendix 5 provides a table of the EPA's assessment report's achievement of the matters in clause 7.3 of Schedule 1.

As mentioned in Section 2 of the report, a considerable number of public submissions raised issues about non-lethal alternatives to the action to avoid impacts to MNES including early detection, alarm systems, underwater deterrents and repellents, tag-and-release, and community awareness/education. Some submitters made specific reference to the tag and release program undertaken in Brazil and the Shark Spotters Program in Cape Town, South Africa, and the use of shark barriers. The proponent has provided a response to all the suggested alternatives from the public submissions (Appendix 6.1).

As mentioned in Section 4 of this report, the EPA supports continued and further research into shark behaviour, and investigations and implementation of non-lethal alternatives, in order to minimise the potential environmental impacts to marine fauna, consistent with the White Shark National Recovery Plan (DSEWPAC, 2013).

The PER document contained a separate section identifying MNES and EPBC Act requirements, discussing how these matters have been addressed

consistent with the requirements of the EPA's Environmental Scoping Document.

Marine fauna listed as threatened or migratory under the EPBC Act that are likely to be present in the proposal areas and potentially impacted by the proposal through incidental capture or entanglement include:

- sharks including the Grey nurse shark, shortfin mako, porbeagle, white shark and the giant manta ray,
- marine mammals including various species of whales and dolphins, and the Australian sea lion;
- seabirds including various species of albatross and petrel; and
- various species of sea turtles.

The proponent has assessed the risk to marine fauna based on the temporal and spatial extent of the proposal, the proponent's proposed measures to avoid and minimise impacts, and the distribution, migration patterns, biology and diet of the potentially affected marine fauna. The proponent has subsequently concluded that the risk of the action impacting on the above marine fauna to be negligible.

Based on the information provided in the PER, the response to submissions and the draft Operational Environmental Management Plan, which contains measures to avoid and minimise impacts on non-target marine fauna, the EPA considers that the proponent has adequately demonstrated that the action is unlikely to significantly impact on the populations of the listed threatened and migratory species, except for the white shark.

In relation to white sharks, based on the assessment set out in Section 3.1 (Marine Fauna) of this report, it is uncertain whether the proposal is expected to result in an acceptable or sustainable impact.

Should the Commonwealth Minister for the Environment consider approving the action then the recommended requirements on the proponent are included in Section 4 of this report.

The EPA's assessment report to the Western Australian Minister for Environment on the proposed action is also forwarded to the Commonwealth Minister for the Environment, who will then make a decision as to whether or not the action should be approved under the EPBC Act. This is separate from any Western Australian Government approval that may be required.

6. Recommendations

The EPA submits the following recommendations to the Minister for Environment. That the Minister:

1. considers the report on the key environmental factor of Marine Fauna, as set out in Section 3;
2. notes that the EPA has concluded that there is a high degree of scientific uncertainty about whether the proposal can meet the EPA's environmental objective for Marine Fauna, and therefore that the proposal should not be implemented;
3. notes that the EPA has not included in this report conditions and procedures to which the proposal should be subject, if implemented, because the EPA has concluded that the proposal should not be implemented; and
4. notes the EPA's other advice presented in Section 4 about recommended requirements in the event that the State Government determines that the proposal may proceed.

Appendix 1

List of Submitters

Organisations:

Australian Marine Conservation Society Inc.
Australian Marine Science Association
Change.org
Conservation Council of South Australia
Conservation Council of Western Australia
Department of Parks and Wildlife
Department of Sport and Recreation
Dyer Island Trust
Greenpeace Australia Pacific
Humane Society International
Marine Parks and Reserves Authority
Margaret River Regional Environment Centre Inc.
Monterey Audobon Society
Rottneest Channel Swim Association
Sea Shepherd Australia Ltd
Sentient
The Global Shark Conservation Initiative
The Law Society of NSW
The Wilderness Society
Trigg Island Surf Life Saving Club Inc.
WWF Australia

Individuals:

A Connan	Ailsa Glazebrook	Alex Ross
Aaron Bement	Aimee	Alex Straschko
Aaron Cole	Aimee Samuelson	Alex Suslin
Aaron Cox	Ainhoa Quinto	Alex Tanet
Aaron Godden	Al Williams	Alex Tinson
Aaron Gove	Alan Barnsley	Alex Willis
Aaron Martin	Alan Burgess	Alex Wright
Aaron Myers	Alan Charlton	Alexander Brown
Aaron O Hare	Alan Henderson	Alexander Bueb
Abaddon	Alan Hill	Alexander Buess
Adam	Alan Johnston	Alexander Robinson
Adam Coombs	Alan Selby	Alexander Webster
Adam Finch	Alan Stewart	Alexandra
Adam Lippiatt	Alan Storen	Alexandra Gibb
Adam Miller	Alan Wilson	Alexandra Crist
Adam Nelson	Alana	Alexandra Nolan
Adam Phillips	Alanah Nicol	Alexandra Stevens
Adam S	Alastair Marsh	Alexandre Rose
Addison West	Alec Connah	Alexia Echeagaray
Adele	Alessandra Arnfield	Alexis
Adrian	Aleta Pitstock	Alexis Maxwell
Adrian Beard	Alex	Alhay Aguirre
Adrian Candey	Alex Abrahams	Ali Edmonds
Adrian Hansen	Alex Bouman	Alice Stevenson
Adrian Kavunencko	Alex Czajka	Alicia
Adrian Windibank	Alex Dawson	Alicia Brooks
Adrian Zuccon	Alex Gard	Alicia Keizer
Adriana Rose Campili	Alex Gaut	Alicia Mishinski
Adrienne deBrincat	Alex Hayes	Alicia Strous
Affie Nuzum	Alex Hyndman	Alicia Sutton
Ahmad Ghananim	Alex Jimenez	Alisa Schwartz
Aida Rodriguez- Esquire	Alex Nicholas	Alisha Mercer
Ailed Rivera	Alex Petrosino	Alison
Ailis Fraser	Alex Robinson	Alison Buckley

Alison Dorn
Alison Loxton
Alison Mulholland
Alison Sadler
Alison Spong
Alison Towner
Allan Baker
Allan Svendsen
Allegra Giagu
Allegra R.
Allison
Allison Archibald
Alwyn
Alyce
Alyssa Cass
Amanda Cafearo
Amanda Fleming
Amanda Fussell
Amanda Harris
Amanda Jarvis
Amanda Penrose
Amanda Reddell
Amanda Richman
Amar
Amba
Amber
Amber Dear
Amber Gane
Amber Lundt
Amber Marienthal
Amelia Bridges
Amelia Graham
Amulya Nakarmi
Amy
Amy Browne
Amy Buettner
Amy Burke
Amy Calhoun
Amy Cohen
Amy Dozier
Amy Gray
Amy Hollingsworth
Amy Lloyd
Amy Marsden
Amy Matthews
Amy Mulder
Amy Slender
Amy Smith
Amy Summerford
Amy White
Ana Garcia
Anah Reichenbach
Ananda Dickman
Anastasia Bulavina
Anastasia Skamarauskas
Anderson Batista de Aguiar
Andrea
Andrea Barr
Andrea Bridge
Andrea Brown

Andrea Earle
Andrea Haines
Andrea Raddatz
Andrea Smith
Andrea Sreiber
Andrea Woodhams
Andrea Yovorsky
Andreas Dalman
Andrew
Andrew Barrs
Andrew Christie
Andrew Corbe
Andrew d'Archy
Andrew Douglas
Andrew Frondorf
Andrew Fyfe
Andrew Hayes
Andrew Hill
Andrew Hutchinson
Andrew Ksander
Andrew Laird
Andrew Lindsay
Andrew Mackey
Andrew Merefield
Andrew Minehan
Andrew Nieuwenhof
Andrew Page
Andrew Peirce
Andrew Rees
Andrew Smith
Andrew Thrift
Andrew Trevor-Jones
Andrew Walker
Andy
Andy Barton
Andy Blackburn
Andy Coles
Andy Duke
Andy Lees
Andy Peter
Andy Thomson
Andy Wright
Angela
Angela Ayers
Angela Bellew
Angela Diane
Angela Knable
Angela McClelland
Angela Oldfield
Angela Wang
Angela Whyte
Angelica Hjalmarsson
Angelika Erpic
Angeline Conron
Angus McCarl
AniMaeChi drabic
Anita
Anita C Eckardt
Anita Hanekom
Anita Marchesani

Anja Gramueller-Southon
Anja Schlegel
Anjali Badloe
Ann
Ann Dib
Ann Gallacher
Ann M Owens
Anna
Anna Cameron
Anna Courtney
Anna Jurs
Anna Kalyan
Anna Pethen
Anna Prince
Anna Treloar-Tanner
Anna Wilson
Anna Wolfson
Annabel Southcombe
Annalie Prinsloo
Annamaria
Anne Dennehy
Anne Fitzpatrick
Anne Johnston
Anne Kobayashi
Anne Saw
Anne Streeter
Anne-Helen Wickizer
Annelise
Anne-Maree Newman
Anne-Marie Majcen
Annemarie Norton-Taylor
Annemiek Selter
Annette McNamara
Annette Smith
Annie
Annie Franklin
Annora Longhurst
Anoosha Ezzat Yazdi
Anthony Colliver
Anthony Frankfort
Anthony Henderson
Anthony Hicks
Anthony Juchnevicius
Anthony Limon
Anthony McColl
Antonio Carlos
Anu Taskinen
Appin Williamson
Aresha Quaass
Ari Salo
Arlee Bryant
Arlo
Arnaud Chilo
Ash Kane
Ashlee Hermsen
Ashleigh
Ashleigh Dark
Ashleigh Nelson
Ashley
Ashley Albrecht

Ashley Bates
Ashley Crookes
Ashley Densham
Ashley Dillon
Ashley Estopinal
Ashley Holbert
Ashley Washburn
Ashley Watkins
Ashly Green
Ashtyn McMaster
Asia Armstrong
Asia Rattenbury
Ati Brookes
Jo-anne McCrea
Audra Johnson
Audra Louise Walsh
Austin Charnis
Austin Monson
Axel Passeck
B
B. Lewenza
Baird Williams
Baljeet Degun
Bambi Harrison
Baratan Knaga
Barb Werner
Barbara Babula
Barbara Campos
Barbara Cattunar
Barbara Maloit
Bari Gowan
Barnaby Smith
Barri Lythe
Barry
Barry Carbon
Barry Kennedy
Barry Lang
Barton Hardie
Bauby
Bayden Thomas
Beate Bär
Beate Strube
Beatrice Lucas
Beatrice Marot
Beatriz Miranda
Bec Cross
Becky
Bekki Hull
Bel Armand
Belinda
Belinda Doust
Belinda Holdsworth
Belinda Hosking
Belinda J Clark
Bella Lipson
Bella Quinn
Ben
Ben Bastion
Ben Beverley
Ben Byrne

Ben Davis
Ben English
Ben Fitzgerald
Ben Haddock
Ben Hembrow
Ben Kevin Jones
Ben Leunig
Ben Mackney
Ben Peach
Ben Ryan
Ben Sharpe
Ben Smith
Ben Steger
Ben Wootton
Benjamin Christensen
Benjamin Dennis Rieger
Benjamin Gibb
Benjamin Reid
Benjamin Thomas
Benjamin Uddin
Benjamin Zarb
Berenice Sieber
Bernadette George
Bernadette Peirce
Bernard Jean
Bernard Macdonald
Bernard Walton
Bernice Wuttke
Beryl Gillard
Beryl Lesmond
Beth
Beth Meades
Beth Murphy
Bethany
Bethany Adomanis
Bettina Ann Jones
Betty Elwin
Beverly Oh
Bianca
Bianca Edmed
Bianca Theyer
Bianka Williams
Bidda Jones
Bill Dominguez
Bill Gannon
Bill Van Hassel
Billy Grayson
Binnie Shaw
Birgit
Birgit Senior
Blair Hardman
Blair Ranford
Blanche
Blondel
Bob
Bob MacLean
Bonnie Parker
Brad
Brad Leue
Brad O'Young

Brad Trenwith
Bradley Abrahams
Bradley Alexander
Bradley Giles
Brandi Fairbee
Brandi Heller
Brandon Ament
Brasa Suhonik
Brayden Fredericks
Breanna Holden
Breck Curtis
Bree Gardner
Bree Plater
Bree Ritchie
Brenda OSullivan
Brendan
Brendan Donohoe
Brendan Mosdell
Brendan Pitt
Brendan Rangitaawa
Brendan Yong
Brenden Robinson
Brenton Tidow
Brett Mayberry
Brett Blackwell
Brett Mulder
Brett N Brown
Brett Newmarch
Brett Restemeyer
Brian
Brian Alvisio
Brian Armer
Brian Collins
Brian Halberg
Brian Paccanaro
Brian Rubin
Brian Spinner
Brian Versey
Briana Edwards
Brianna
Bridget
Brigit Anderson
Bridgette Wilson
Brigit Jager
Briony Coleman
Brittany Barnes
Brittany Clarke
Brittany Michell
Brock Amey
Brodie Betts
Bron Kormpy
Bronte Anderson
Bronte Doneman
Bronwen Fletcher
Bronwyn
Bronwyn Cullen
Brooke Cannings
Brooke D'Alberto
Brooke Koolman
Brooke Waites

Bruce Rook
Bruno Tiaki Thomson-Baker
Bryan Field
Bryan Ramsey
Btjryan
Caitlin
Caitlin Fearnside
Caitlin Fox
Caitlin Hyde
Caitlin Race
Caleb Sigley
Calin Flora
Callan Hart
Calli Hicks
Callie Manwaring
Callum
Callum Burgess
Callum McMahon
Callum Price
Callum Thompson
Calum MacLeod
Camberley Sheffield
Cameron Clark
Cameron Gross
Cameron Halliday
Camilla Giardini
Camilla Johansson-Merrick
Campbell Chalmers
Campbell Rae
Candace Parkyn
Candice
Candy Campbell
Caoimhe Leathem
Capt. Luis Acin
Cara
Cara Griesberg
Carey
Carey Heyden
Carissa McBead
Carlee
Carlie Bronk
Carlie Lomason
Carly Crane
Carly Gladwell
Carly Taylor
Carmen Allan-Petale
Carol Goldson
Carol Holden
Carol Ingold
Carol James
Carol Leandro
Carol Moysey
Carol Neist
Carol Turner
Carole Migalka
Carole Vandal
Caroline Downes
Caroline Drogue
Caroline McGregor
Caroline Murphy

Caroline Perks
Carolyn Vinton
Carrienne Graham
Carsten Orlt
Cas Renooij
Casey
Casey Charlesworth
Cassanah Heal
Cassandra
Cassidy Reay
Cassie Ballard
Cassie Joy Polgar
Cat Silver
Cate Young
Catharine Cameron
Catherine
Catherine Chandler
Catherine Hocking
Catherine Jeffries
Catherine Little
Catherine M Bain
Catherine McPhee
Catherine O'Neill
Cathreine
Cathy Gilmore
Caz Kerbyson
Cecilia Pascelli
Celine Duquesnoy
Cerise Absolom
Channing Egeberg
Chantal Buslot
Chantelle Larkin
Charlee Shea
Charles Carter
Charles Day
Charles de Chelard
Charlie
Charlie Bicknell
Charlotte
Charlotte Davies
Charlotte Johansen
Charlotte Roberts-Clarke
Chase Rawnsley
Chasta Schneider
Chay Kyme
Chelsea Jolly-Strudwick
Chelsea McNelliey
Cherie Dodd
Cherity Kean
Cheryl Anderson
Cheryl Lee
Cheryl Valenzuela
Chey Godfrey
Chiara Contro Leao
Chloe Green
Chloe Wagenknecht-Reid
Chris
Chris Andrews
Chris Ashley
Chris Askew

Chris Brett
Chris Byrnes
Chris Chalmers
Chris Chominsky
Chris Conroy
Chris Hall
Chris Hansen
Chris Harder
Chris Hartzell
Chris Hastie
Chris Helps
Chris Lee
Chris Lindgren
Chris Macaskill-Hants
Chris Maddeford
Chris Martin
Chris Mayberry
Chris Miquel
Chris Page
Chris Parker
Chris Pine
Chris Ruffell
Chris Searle
Chris Smith
Chris Thomas
Chris Turnbull
Chris Yuill
Christa Aldridge
Christel Platt
Christian Jansen
Christian Pulham
Christian Taylor
Christian Truter
Christian Willis
Christiane Schmitz
Christie Dean
Christina Bodilly
Christina Dindinger
Christina Lauritzen
Christina Samarin
Christina Whiley
Christine
Christine Wanless
Christine Askew
Christine Bassett
Christine Bennett
Christine Farley
Christine Glennie
Christine Hanson
Christine Kershaw
Christine Litzgus
Christine Marchesi
Christine McKay
Christine PukkLocke
Christine Russo
Christine Shaw
Christine Spence
Christine Storgeoff
Christine Young
Christopher Hernandez

Christopher Lewis
Christopher Morrison
Christopher Murphy
Christopher O'Leary
Christy Marsh-Trombelli
Christy Reeves
Chula Murray
Cian Byrne
Ciara
Ciara Payne
Ciaran Hudson
Ciaran Millward
Ciaran Morris
Ciaran Tierney
Cindy Allen
Cindy Czabania
Cindy Goodwin
Cindy Lee
Cindy Rymer
Claire
Claire Black
Claire Coulson
Claire Gallagher
Claire Gold
Claire Greenwell
Claire Lund
Claire Marston
Claire McGregor
Claire Murphy
Claire Ramsey
Claire Sives
Claire Toole
Claire Tucker
Claire Vervaart
Claire Walker
Clancy Malcolm
Clare Finlay
Clare Francey
Clare Mcdonnell
Clare Moynihan
Clarissa Human
Clark
Clark Robertson
Claudette Rechterik
Claudia
Claudia Flaxman
Cle Breitinger
Clifford Morgan
Clint Williams
Clinton Rosewarne
Colette Whitton
Colin
Colin Crellin
Colin Cross
Colin Fairclough
Colin Hamilton
Colin McAnaspie
Colin Mitchell
Colin Ryan
Colleen Fagan

Collet
Colm MacGowan
Conan
Connor Acosta
Connor Barnes
Connor Butterfield
Connor Nolan
Connor Smyth
Connor Woodward
Conor Forsyth
Conrad Norton-Taylor
Constanze Hartmann
Coralie Carter
Corey Mansillas
Corina Ravenscraft
Corinne Lecormu
Corner
Cottia Meadowcroft
Courtney Crowley
Courtney Harvey
Craig
Craig Barlow
Craig Fisher
Craig Hey
Craig Mirkin
Crimson Hite
Cristina Cilla
Cynthia Sherwell
D K
Dale
Dale Parry-Iles
Damian
Damian Bishop
Damian Gleeson
Damian J. Davies
Damian Priest
Damian Ucich
Damien
Damien Kennedy
Damien Liddiard
Damon Brown
Dan Bradley
Dan Coker
Dan Fogarty
Dan Kljaic
Dana Fowler
Dana Roth
Danica Delaporte
Danie Buene Nilsen
Daniel Bertino
Daniel Boase-Jelinek
Daniel Bryer
Daniel Elder
Daniel Gallagher
Daniel Guthrie
Daniel Hall
Daniel Hawks
Daniel Hornby
Daniel Hughes
Daniel Hulström-Allen

Daniel Hurley
Daniel Kinasz
Daniel Kowald
Daniel Langridge
Daniel McKenzie
Daniel O'Brien
Daniel Panickar
Daniel Ponzini
Daniel Ramshaw
Daniel Suggate
Daniel T Lees
Daniel Tham
Daniel Thirkell
Daniel Thompson
Daniel Vandervaere
Daniel Williamson
Daniela
Daniela Honorato
Daniele Halle
Danielle
Danielle Darwent
Danielle Findlater
Danielle Hines
Danielle Mcdill
Danielle Napier
Danielle Smith
Danielle Spreitzer
Danielle Stocks
Danielle Taylor
Danni Williams
Danny
Danny Gray
Dany George
Darcy
Darran Taylor
Darren Collins
Darren Fenton
Darren Noyes-Brown
Darrin Dudgeon
Darron Richet
Darryl Leniuk
Darryn Clemens
Daryl Cummings
Dave
Dave Blackburn
Dave Kelly MLA
Dave Nicholson
Dave Sharp
Dave Thompson
Dave Williams
David
David A. Trescuri
David Andrews
David Bunyan
David Fergusson
David Ferreira
David G. Dyke
David Gobel
David Gregory
David Hallett

David Hunt
David Iskra
David Kane
David Le Cornu
David Lemberg
David Lockhart
David Perry
David Pye
David Ritz
David Ross
David Rowen
David S Farrar
David Spyby
David Szatkowski
David Turner
David Tickler
David Walsh
David Whittaker
David Woltschenko
Davis Koorey
Dawn Bailey
Dawn Kresan
Dawn Stock
Dawn Trakman
Dawn Zegledi
Dawnelle Froehler
Dayna Surlan
De Souter Emilie
Deaglan Harney
Dean
Dean Smith
Dean Thompson
Deanna Torge
Deanna Wilson
Deanne Mcgrouter
Deb Roberts
Deb Turney
Debbie
Debbie Broomfield
Debbie Burnup
Debbie Diggins
Debbie Griffiths
Debbie Monks
Debbie Williams
Deborah
Deborah Besim
Deborah Blott
Deborah Bushell
Deborah Pergolotti
Deborah Stackpole
Deborah-Rose Reivers-Gillard
Debra Moncrieff
Debra Price
Debrah Coote
Declan Mcaleenan
Declan Munoz
Dee Newell
Dee Selby
Deejah Ross
Della Grallert

Della Grunwald
Delvina Gorton
Demi
Denise Bridges
Denise Cobb
Denise Fishwick
Denise Fletcher
Denise Kuijlaars
Denise Tierney
Denise Wilson
Dennis Power
Denny Chen
Derek Barker
Derek Gibb
Desmond Prout-Jones
Devin Sewell
Dhani Riehl
Di Courtney
Di Foster
Diamond Jim Legend
Diana Escalante
Diana Nymand
Diana Pendlebury
Diana Sima
Diana Tomkins
Diana Trent
Diane Jeffrey
Diane Oliver
Diane Pennycott
Diane Tait
Diann Bates
Dianne
Dianne Drake
Dianne Maslin
Dianne Procopio
Didi Walker
Digby Hildreth
Dilys E Dicks
Dina A Ely
Dina Bacvic
Dion Bradstreet
Dirt Bryant
Dominic
Dominic Burchnall
Dominic Harper
Dominic Jeanes
Dominic Stone
Donna Carresi
Donna Chapman
Donna Lock
Donna Ogston
Donna Palravan
Donna Reed
Donna Troisi
Donna-Jo Fryers
Donya Beaton
Dorian Moro
Doris Potter
Dorothy Kaluzny
Doug Collins

Doug Landau
Douglas Egan
Douglas Stetner
Dr Alicia Lloyd
Dr Ben Diggles
Dr Bill Bailey
Dr Brian Mc Erlean
Dr Brian W Darvell
Dr Debora Brown
Dr Dianne Evans
Dr Illo Streimann
Dr Jane Newsome
Dr Karen Payne
Dr Kristy Winn
Dr Michelle Morgan
Dr Rosemary Elliott
Dr Rosemary Sandford
Dr Sharon Burden
Dr Sheree Krass
Dr Stefanie Roth
Dr Stephen Bedding
Dr Susan Quinnell
Dr Tokyra Greenwell
Dr William Robbins
Dr. Bruce Robertson
Dr. Caine Delacy
Dr. Christopher Neff
Dr Dupont
Dr. Rachel Grahamr
Dr Udo Roth
Drew Hui Tong
Drew Mcpherson
Drew Murphy
Drew Scanlan
Duncan Reilly
Dupré Simon
Dylan
Dylan Arnold
Dylan Mccallum
Dylan Perkins
Dylan Reilly-Pick
Dylan Schulz
E Ross
Earl Digby
Ebony Mcpherson
Edith Coleman
Eduardo Garza Gisholt
Edward Dorson
Edward Khoury
Edward Mortimer
Edward Wickham
Eileen Mcdonald
Eirik Ahlsen Grimstad
Ekim Toraman
Elaine Alaia
Elaine Chong
Elaine Mary
Elayne Hinsch
Eleni Jaworski
Eleni Martakis

Elisa
Elisabeth Bechmann
Elise Clark
Elise De Villiers
Elissa
Eliza
Elizabeth
Elizabeth Anne Melling
Elizabeth Duke
Elizabeth Heptinstall
Elizabeth Holland
Elizabeth Hutchinson
Elizabeth Kane
Elizabeth Lugg
Elizabeth Manson
Elizabeth Pottinger
Elizabeth Salkeld
Elizabeth Scales
Elizabeth Torres
Elizabeth Tregenza
Ella Binks
Ella Mikkonen
Ella Sweeney
Ellen
Ellen Bevan
Ellen Paynter
Ellen Sima
Ellena Marshall
Ellie Rivers
Elliott Kitson
Elly Jones
Eloise Dortch
Eloise Goudie
Eloise Rimon
Elouise Schultz
Elsbeth Stewart
Elvira
Elyse Cripps
Elyse Field
Emanuel Burgos
Emanuela
Emelia Jones
Emily
Emily Cowell
Emily Jones
Emily Lester
Emily Lyons
Emily Marks
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Appendix 2

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Appendix 3

Summary of Identification of Key Environmental Factors and Principles

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
Marine Fauna	<p>Target marine fauna: The proposal involves the capture of white sharks (<i>Carcharodon carcharias</i>), tiger sharks (<i>Galeocerdo cuvier</i>) and bull sharks (<i>Carcharhinus leucas</i>) three metres in total length or greater (target sharks) within the temporal and geographical extent of the MMAs during the drum line deployment period, and sharks considered to pose an imminent threat outside of the temporal and geographical extent of the MMAs</p> <p>Non-target marine fauna: The proposal has potential to alter community structure through the removal of apex predators, and result in the unintentional capture of non-target marine fauna.</p>	<p><u>Public and non-government organisations</u></p> <ul style="list-style-type: none"> • Noted that there is considerable uncertainty in the predicted catch rates for the white shark. • Unclear as to whether the proponent has considered demographics such as sex ratios of white sharks expected to be caught. • The cumulative impact to the south-western Australian population of white sharks has not been fully considered. • Considers that there is a high level of uncertainty regarding population estimates of the south-western Australian white shark. • Considers that the tiger shark is being unduly targeted and should not be considered a 'target shark'. • Considered that the 'low risk' rating assigned to the tiger shark is not justified. • Considers that the PER did not evaluate the survival rate of released tiger sharks (and other released animals) from the trial. • Noted that the PER contained no information to assess the likely impacts on Bull Sharks. • The posited absence of ecological impacts in the past merely reflects a lack of research on this topic and is not grounds for dismissing the issue in the present day. • Considers that the proponent has not sufficiently assessed the environmental impacts of the temporary drum line component of the program because it was reliant on the results and data collected from the trial. • Considers that the proponent is dismissing the potential impacts of the annual removal of upward of 40 tonnes of tiger sharks on World Heritage Areas. • Considers that the proponent has not adequately addressed 	<p>Considered to be a key environmental factor and is discussed in Section 3.1</p>

		<p>the requirements of Table 1, section 2 of Work and Output required, detailed in the ESD.</p> <ul style="list-style-type: none"> • The likelihood of mortality to undersized sharks, whether on the drum line or shortly after their release is likely to be greater than estimated. • The allowable catch rates should be provided based on the proponents risk assessment to ensure that the viability of the population is maintained. • Submissions note that triggers and contingency actions have not been developed for the proposal. <p><u>Department of Parks and Wildlife (DPaW)</u></p> <ul style="list-style-type: none"> • Recommends that the Department is consulted regarding those aspects of the management framework that have the potential to affect species that are specially protected under the WC Act. • Considers that opportunities for fauna research associated with the drum line program are maximised and prioritised on the basis of research needs identified in the nationally endorsed recovery plans for potentially affected species. <p><u>Marine Parks and Reserve Authority (MPRA)</u></p> <ul style="list-style-type: none"> • Noted the efforts to minimise by-catch, and small numbers involved. • Considers that the proposal may offer opportunity to increase scientific knowledge of the ecological role of sharks and their behavior in our local waters. • Support increased efforts to extend the development of other methods to deter shark attacks. • Identified that it would be preferable if the baited lines were kept outside the offshore boundaries for Ngari Capes Marine Park special purpose zones. • Identified that there is a risk that DoF resources that are currently used to assist in the achievement of MPRA and DPaW management objectives will be redirected to the 	
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		<p>metropolitan component of the shark drum line program at a cost to their wider contribution efforts in managing marine ecosystems.</p>	
<p>Human Health</p>		<p><u>Public and non-government organisations</u></p> <ul style="list-style-type: none"> • Contend that the proposal cannot be justified if the proponent cannot demonstrate that the proposal will enhance public safety. • Consider that the baited drum lines present a serious public safety hazard as they may actually draw sharks into areas where they are deployed. 	<p>The EPA notes that the issue of efficacy of the proposal, that is, will it make beaches safer, is outside of the scope of the <i>Environmental Protection Act 1986</i>, and therefore cannot be considered by the EPA. This is discussed further in Section 2. - The proposal.</p> <p>With regard to the matter of an increase in shark populations near beaches as a result of the implementation of the proposal, the EPA notes that the proposal is designed to reduce the abundance of sharks that are in the local area. The EPA also notes information provided in the proponents Response to Submissions (DPC², August 2014) in which the proponent has reviewed the information collected from shark control programs in other jurisdictions and also research about shark biology and attractants. This together with a review of the trial program in 2014 has led the proponent to advise that drum lines do not necessarily attract sharks.</p> <p>Having regard to the issues raised in submissions, the design of the proposal and the information</p>

			<p>provided by the proponent, the EPA considers that it is unlikely that the implementation of the proposal will increase the abundance of sharks in the area and therefore does not consider Human Health to be a key environmental factor.</p>
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PRINCIPLES		
Principle	Relevant Yes/No	If yes, Consideration
<p>1. The precautionary principle <i>Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.</i> <i>In application of this precautionary principle, decisions should be guided by –</i> <i>(a) careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and</i> <i>(b) an assessment of the risk-weighted consequences of various options.</i></p>	Yes	The EPA has considered this principle insofar as the proposal impacts on marine fauna and has therefore assessed the proposal against the EPA's objective for Marine Fauna which is <i>to maintain the diversity, geographic distribution and viability of fauna at the species and population levels.</i>
<p>2. The principle of intergenerational equity <i>The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.</i></p>	Yes	The EPA has considered this principle insofar as the proposal impacts on marine fauna and has therefore assessed the proposal against the EPA's objective for Marine Fauna which is <i>to maintain the diversity, geographic distribution and viability of fauna at the species and population levels.</i>
<p>3. The principle of the conservation of biological diversity and ecological integrity <i>Conservation of biological diversity and ecological integrity should be a fundamental consideration.</i></p>	Yes	The EPA has considered this principle insofar as the proposal impacts on marine fauna and has therefore assessed the proposal against the EPA's objective for Marine Fauna which is <i>to maintain the diversity, geographic distribution and viability of fauna at the species and population levels.</i>

<p>4. Principles relating to improved valuation, pricing and incentive mechanisms</p> <p>(1) <i>Environmental factors should be included in the valuation of assets and services.</i></p> <p>(2) <i>The polluter pays principles – those who generate pollution and waste should bear the cost of containment, avoidance and abatement.</i></p> <p>(3) <i>The users of goods and services should pay prices based on the full life-cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste.</i></p> <p>(4) <i>Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structure, including market mechanisms, which enable those best placed to maximize benefits and/or minimize costs to develop their own solution and responses to environmental problems.</i></p>	No	
<p>5. The principle of waste minimisation</p> <p><i>All reasonable and practicable measures should be taken to minimize the generation of waste and its discharge into the environment.</i></p>	No	

Appendix 4

Identified Decision-making Authorities

Identified Decision-making Authorities

Section 45(1) requires the Minister for Environment to consult with decision-making authorities, and if possible, agree on whether or not the proposal may be implemented.

The following decision-making authorities have been identified for this consultation:

Decision-making Authority	Approval
1. Minister for Environment	<i>Wildlife Conservation Act 1950 Conservation and Land Management Act 1984</i>
2. Minister for Fisheries	<i>Fish Resources Management Act 1994</i>
3. Department of Transport	<i>Western Australian Marine Act 1982 Navigable Waters Regulations 1958</i>

Note: In this instance, agreement is only required with DMAs 1 and 2, as these DMAs are Ministers.

Appendix 5

**Information required by clause 7.3 in schedule 1 of the Bilateral Agreement
relating to environmental impact assessment**

Table of information about relevant impacts of the action as required by clause 7.3 in schedule 1 of the Bilateral Agreement relating to environmental impact assessment between the Commonwealth of Australia and the State of Western Australia.

Clause 7.3 in schedule 1 - Information about the relevant impacts of the action	Relevant section(s) of the EPA Assessment Report
(a) A description of: (i) the action; and (ii) the places affected by the action; and (iii) any matters of national environmental significance that are likely to be affected by the action; and	Section 2 of the Assessment Report includes a description of the proposal and places affected by the proposal. Section 5 describes the Matters of National Environmental Significance that are likely to be affected.
(b) a summary of the relevant impacts of the action; and	Sections 3 and 5 of the Assessment Report include a summary of the relevant impacts.
(c) a description of feasible mitigation measures, changes to the action or procedures to prevent or minimise environmental impacts on relevant matters of national environmental significance proposed by the proponent or suggested in public submissions;	Section 3 of the Assessment Report discusses the proponent's mitigation measures to minimise environmental impacts. Appendix 6 of the EPA Assessment Report contains the summary of public submissions which contains suggested mitigation measures to prevent or minimise environmental impacts on relevant matters of national environmental significance.
(d) to the extent practicable, a description of any feasible alternatives to the action that have been identified through the assessment process, and their likely impact on matters of national environmental significance;	Included in Sections 2 and 5 of the EPA Assessment Report.
(e) a statement of recommended conditions for approval of the action that may be imposed to address identified impacts on matters of national environmental significance; and	In the event the action proceeds, Section 4 of the Assessment Report recommends requirements that should be included as conditions. This includes the implementation of the proponent's Operational Environmental Management Plan to minimise impacts to marine fauna and setting catch limits for target sharks.
(f) a statement of State or Territory approval requirements and conditions that apply, or are proposed to apply, to the action when the report is prepared, including a description of the monitoring, enforcement and review procedures that apply, or are proposed to apply, to the action.	Section 6 of the Assessment Report recommends the State Minister note that conditions and procedures have not been included because the EPA has concluded that the proposal should not be implemented.

Appendix 6

Further Proponent and Peer Review Information (CD)

- 6.1 DPC Response to Submissions**
- 6.2 DPC draft Operational Environmental Management Plan**
- 6.3 DPC Clarification of the temporary deployment aspect of the drum line program WA**
- 6.4 DoF Guidelines for fishing for sharks posing an imminent threat**
- 6.5 Peer Review Terms of Reference**
- 6.6 CSIRO Peer Review report**
- 6.7 CSIRO Peer Review Close Out Report**
- 6.8 CSIRO answers to questions from EPA/OEPA to Peer Reviewer**