Review of the South African National Plan of Action for the Conservation and Management of Sharks

Compiled by the Shark Expert Panel as appointed by the Honourable Minister, Ms Barbara Creecy, Department of Environment, Forestry and Fisheries

October 2020

Executive summary

In May 2020, following public concern about shark populations along the South African coast, the Minister of Environment, Forestry and Fisheries, Ms Barbara Creecy, appointed an Expert Panel to formally review South Africa's National Plan of Action for the Conservation and Management of Sharks (NPOA-Sharks). The Panel scrutinised 60 documents over three months and held eight virtual meetings to review the NPOA-Sharks. The Panel reviewed the 62 actions of the current NPOA-Sharks and provided scores and comments for each action. The systematic review focussed on alignment with the International Plan of Action for the Conservation and Management of Sharks (IPOA-Sharks) of the Food and Agricultural Organisation (FAO), recommendations on the overall structure, completeness of the plan and identification of gaps, achievability of the plan, clarity of the actions and indicators and areas of general progress or lack of progress. The Panel also noted stakeholder concerns around the disappearance of white sharks from several aggregation sites, declines in abundance of demersal sharks, a perceived lack of habitat protection and spatial management for sharks, conflicts among shark tourism and fishing industries, and concerns related to the shark fisheries. The Panel deliberated on and drafted responses to written stakeholder input.

The Panel commended the external review process of the NPOA-Sharks as a unique example of accountability and transparency, and emphasised the Department's commitment to conserve shark species and properly manage their long-term sustainable use. The Panel agreed that the South African NPOA-Sharks was in line with international standards and covered all goals of the IPOA-Sharks as set out by the (FAO). The external experts agreed that the NPOA-Sharks is comprehensive, albeit too ambitious in both extent and timeframes. The external experts commended the progress that has been made and that is underway to implement the plan, given existing human capacity, funding and infrastructure constraints.

The Panel scores for the individual actions associated with issue clusters revealed good progress in the cluster with the foundational areas around *taxonomy* and *assessment*, and that in this context, South Africa's plans and achievements were rated by the international experts as being of the standard of developed countries such as the USA or Australia. Moderate progress was made around *optimal utilisation, capacity and infrastructure development* and *compliance*, and limited progress in *data and reporting, sustainable management* and *development of regulatory tools*. The Panel highlighted that better communication and coordination is needed within the Department, and between the Department and external stakeholders, to improve and report on some of the actions. The actions of the NPOA-Sharks should be further prioritised and their completion tracked through measurable indicators and timelines.

The Panel identified five improvement priorities:

1. Ensure effective communication and coordination from science to policy to achieve the actions of the NPOA-Sharks.
2. Develop and implement measurable indicators to track the progress and completion of actions.
3. Incorporate ecosystem effects of fishing and spatial management measures in future plans.
4. Strengthen the focus on addressing illegal, unregulated and unreported fishing and improved monitoring, surveillance and enforcement of compliance.
5. Integrate and modernise data collection and storage to improve access for future assessments.

The Panel drafted a new action table for the NPOA-Sharks in line with the analyses and recommendations emerging from the review and this table provides the nucleus for an updated NPOA-Sharks with further prioritised actions. The Panel recommended that the results of this report be presented and widely communicated to internal and external stakeholders for their input, such that the updated NPOA-Sharks becomes an inclusive roadmap for effective science, management and compliance for shark fisheries in South Africa.

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1. Background and terms of reference (ToR)

In May 2020, following concerns from the public on the status of some of South African shark populations, the disappearance of white sharks from some established aggregation areas and associated conflicts between fishers and tourism operators, the Honourable Minister of Environment, Forestry and Fisheries, Ms Barbara Creecy, appointed an Expert Panel to formally review the management and conservation plan of sharks, rays and chimaeras for South Africa. As such, the Panel was tasked with providing an independent and critical appraisal of the South African National Plan of Action for the Conservation and Management of Sharks (NPOA-Sharks). The NPOA-Sharks was developed in line with the International Plan of Action for the Conservation and Management of Sharks (IPOA), developed by the FAO Committee on Fisheries (1998), and within the framework of the Code of Conduct for Responsible Fisheries to which South Africa is a signatory. The NPOA-Sharks was implemented in 2013 and internally reviewed in 2018.

The aims of the IPOA-Sharks (www.fao.org) are to:

1. Ensure that shark catches from directed and non-directed fisheries are sustainable
2. Assess threats to shark populations, determine and protect critical habitats and implement harvesting strategies consistent with the principles of biological sustainability and rational long-term economic use
3. Identify and provide special attention, in particular to vulnerable or threatened shark stocks
4. Improve and develop frameworks for establishing and coordinating effective consultation involving all stakeholders in research, management and educational initiatives within and between States
5. Minimise unutilized incidental catches of sharks
6. Contribute to the protection of biodiversity and ecosystem structure and function
7. Minimize waste and discards from shark catches following article 7.2.2. (g) of the Code of Conduct for Responsible Fisheries
8. Encourage full use of dead sharks
9. Facilitate improved species-specific catch and landings data and monitoring of shark catches
10. Facilitate the identification and reporting of species-specific biological and trade data.

The Panel consisted of a diverse range of experts representing national and international institutions, science and management knowledge, and fisheries, conservation and biodiversity expertise. The Panel members were:

1. Prof. Dr. Sven Kerwath, Specialist Scientist: Finfish (Linefish, Tuna and Sharks), Branch: Fisheries Management, DEFF (Chair)
   https://www.researchgate.net/profile/Sven_Kerwath
2. Dr. Charlene da Silva, Scientist: Shark Resources Research, Branch: Fisheries Management, DEFF (Convenor)
   https://www.researchgate.net/profile/Charlene_Da_Silva2
3. Mr Saasa Pheeha, Chief Director (Acting) Marine Resource Management, Branch: Fisheries Management, DEFF
4. Ms Sarika Singh, Scientist: Marine Biodiversity Research, Branch: Oceans and Coasts, DEFF
5. Ms Zintle Langa, Control Environmental Officer, Ocean Conservation Strategies, Branch: Oceans and Coasts, DEFF
6. Prof. Kerry Sink, Marine Programme Manager and Principal Scientist, SANBI
   https://www.researchgate.net/profile/Kerry_Sink

7. Dr. Alison Kock, Marine Biologist and shark scientist, SANPARKS https://www.researchgate.net/profile/Alison_Kock
8. Dr. Andres Domingo, Director: Large Pelagic Fisheries, National Department of Aquatic Resources, Uruguay. Co-chair of the Subcommittee for Ecosystems and By-Catch Mitigation at International Commission for the Conservation of Atlantic Tunas (ICCAT)https://www.researchgate.net/profile/Andres_Domingo2
9. Dr. Rishi Sharma, Fisheries Scientist, FAO. Mathematical statistician and stock assessment expert. Former head of stock assessment at Indian Ocean Tuna Commission (IOTC) https://www.researchgate.net/profile/Rishi_Sharma16

The outcome of this process will form the basis of an updated NPOA-Sharks by providing a roadmap for the implementation of priority actions related to the conservation and management of sharks and their long-term sustainable use in South Africa.

2. Workflow and methodology

The review process comprised three initial steps, with an additional two steps added during the review period.

1. The Panel undertook individual reviews of each research and management action in the NPOA-Sharks action table, made suggestions for further actions and commented on the NPOA-Sharks in its entirety. The Panel noted clarity, progress and challenges for each action.
2. The Panel re-evaluated the internal review process concluded by the Department in 2018 and scored the individual actions in terms of completeness.
3. The Panel discussed and prioritised all individual actions and comments. Suggestions were collated into a new action table draft as the basis for the revised NPOA-Sharks.
4. The Panel reviewed and responded to written input received from external stakeholders.
5. The Panel provided detailed recommendations and a roadmap to take this process forward.

The Panel briefly discussed whether the Shark Biodiversity Management Plan (No. 38607, gazetted in March 2015), which is separate from the NPOA-Sharks, should also be reviewed. However, based on the Terms of Reference and that the public concern was primarily around shark fisheries and their perceived direct and indirect impact, the Panel focussed on the NPOA-Sharks for this review. The first two steps of the review were completed simultaneously. The experts provided individual comments and recommendations on all 62 actions, in line with their expertise. Additional actions were recommended, and redundant or duplicated actions were identified. The Panel also commented individually on the overall format, alignment with the IPOA-Sharks, and content of the NPOA-Sharks, and made specific suggestions for improvement on the overall performance, structure and flow. Input and comments were reviewed, debated and discussed during regular virtual meetings with specific focus on the following elements:

- Alignment with the IPOA-Sharks (FAO)
- Overall structure of the document
- Completeness of the plan, highlighting any critical gaps
- Achievability of the plan considering timelines, funding and existing capacity
- Clarity of the actions and indicators
- Areas of general progress or lack of progress

Background documents, including permit conditions, Scientific Working Group documents and recommendations and published and unpublished information was provided to the Panel to evaluate and review the NPOA-Sharks. All individual and group input was captured in an Excel table that contained the original actions of the NPOA-Sharks. To quantify the progress made in each action cluster, and within each issue, actions were independently scored either 1 (significant progress), 0.5 (partial progress) or 0 (no progress). The individual Panel expert scores for each action were averaged and then aggregated for each of the issue clusters, namely, *data and reporting*, *classification and assessment of shark species*, *sustainable management*, *optimum use*, *capacity and infrastructure*, *capacity and infrastructure*, *compliance* and *regulatory tools.* Scores (expressed as a percentage completed) were compared to those made during the internal review process in 2018. Individual scores were discussed, and the Panel reached an agreement in 60 of 62 actions. Disagreement on the remaining two scores was related to the lack of clarity of the description and scoring criteria and resulting views on prioritization.

The Panel conducted 8 virtual meetings up to 3.5 hours long and reviewed 60 background documents. Additionally, the Panel reviewed and provided responses to six documents from four stakeholder groups. The review was also informed by three presentations by Panel experts on key issues around the reasons for the disappearance of white sharks from some aggregation areas, the decline of soupfin and smoothhound sharks in relation to the demersal shark longline and other fisheries, and the conflict between shark fishers and ecotourism operators.

3. Findings

The overall view of the Panel on the NPOA-Sharks was positive, acknowledging that the plan and implementation of some of the actions represents a substantial amount of work. The Panel agreed that the plan aligned with the IPOA-Sharks and covered all 10 aims therein in some way. The external experts commended the Department for the progress made in the implementation of the plan, especially with the limited resources, funding and human capacity available for implementation. The Panel acknowledged good progress has been achieved in foundational areas of the plan such as, taxonomic work and species assessments, and that South Africa's plans and achievements are of a high global standard that is more typical of developed countries such as the USA and Australia.

While the external experts were impressed by the completeness of the listing of issues and actions, there was consensus that the plan was overly ambitious considering the limited human and financial resources available for implementation, the plan needed more clarity on actions, prioritisation and measurable indicators. The external experts recommended that the plan needed prioritisation of actions and more measurable indicators in order to be achievable and to track progress more effectively.

In terms of the clustering of issues, the Panel recommended a more consistent level of detail per cluster. Furthermore, some actions were noted to be better suited under different clusters, and actions that overlapped with others should be consolidated or removed. The Panel identified areas of improvement and provided specific recommendations pertaining to the structure of the plan, clarity of issues and actions, prioritisation of actions to effectively manage all shark species occurring in South Africa's oceans, and to guide their long-term sustainable use.

Panel scoring

Table 1. Expert Panel combined scores on the NPOA-Sharks action table (2020). Green shading indicates good progress with a score of 67-100%, orange indicates moderate progress with a score of 34-66% and red indicates limited progress with a score of 0 – 33%. The complete table with individual scores and comments can be found in Appendix 2. *Capacity was increased during period, but recently lost.

Issue cluster	Panel score	Major achievements	Main challenge	Comments
Data and reporting Processes relating to the improvement of data from fisheries-dependent & independent sources	31%	• Identification guide of 100 chondrichthyes completed & provided to fishers from several targeted shark fisheries • Four shark specific management recommendations made through scientific working groups & permit conditions amended • Observer specifications drafted for all land-based & sea-based observer programmes which includes monitoring of discards & catch • Active participation in RFMOs & shark related issues • Conversion factors completed for soupfin, smoothhound and blue sharks • Catch composition and overlaps in catch between fisheries identified in da Silva et al. 2015 • Satellite tagging studies underway for shortfin mako and blue sharks	Lack of formal monitoring & observer programmes across all fisheries	Improved identification of sharks from fishers' logbooks & training of fishers, collection of fisheries independent data by observers, improved understanding of total catch & discards across fisheries Prioritisation of species & fisheries is required. The use of modern electronic systems would enhance & streamline actions Collaborate more widely with external institutions The lack of progress is mostly due to the absence of a formal observer program Missing detail e.g. the number of training sessions per quarter, in the description of the action also resulted in low scores
Classification & assessment of shark species	73%	• Species assessments completed for 21 species at a high global standard	No assessment of ecosystem effects of	Most notable achievements in this issue cluster includes stock assessments for demersal shark

Information needed for formal species assessments i.e. clarification of taxonomic uncertainty investigation into stock delineation, gaps in knowledge of life history, uncertainties related to unknown movement across RFMO & national boundaries, ecosystem changes induced by fishing		• Stock assessments completed for soupfin & smoothhound sharks • Six peer-reviewed papers on stock delineation and DNA barcoding • Updated life-history information for 100 chondrichthyans targeted or caught as by-catch • Two peer-reviewed papers on pelagic shark nursery areas and on a Red List assessment tool	fishing & little progress in habitat protection for sharks & the use of spatial management	species, inputs into stock assessments of global species and implementation of an IUCN Red List support tool applied to 21 species of chondrichthyans A priority species list is needed There needs to be improved integration and co-ordination of the NPOA-Sharks & the Shark Biodiversity Management Plan, especially to address ecosystem effects of fishing
Sustainable management Management protocols across all fisheries & coordination between fisheries &management	27%	• Scientific review on status and management of shark fisheries published in 2015	No management protocols exist for any fisheries	Little progress was made on these actions. The lack of co-ordination between separate management units within DEFF remains a barrier to effective implementation
Optimum use Research on the health risks associated with the consumption of shark meat, mitigation measures for unwanted by-catch, full utilization of shark catches and traceability of shark products from catch to sale	56%	• Three peer-reviewed publications examining trace metals in consumed sharks & subsequent de-commercialisation of vulnerable species e.g. broadnose sevengill sharks • New permit conditions requiring fins attached for the large pelagic fisheries • South African Seafood naming standard Gazetted (prevent seafood fraud) • Genetic identification method tested on confiscated shark fins • Several shark identification training sessions in collaboration with PEW, TRAFFIC & WWF	Little coordination among implementing agencies	Increased accessibility of information & wider stakeholder engagement on work done & in progress is required to maximise outputs & build relationships. Increased communication of scientific findings to managers, compliance & the public will help with implementing the findings Improved linkages between DEFF & customs officials is required
*Capacity & infrastructure**	39%	• Increase of scientific capacity (but recently lost again)	Little capacity & expertise to enforce shark related regulations	Increased collaboration with organisations already creating awareness around sharks is needed

Awareness, capacity to complete frequent assessments, funding & staff capacity		• Increased representation of DEFF researchers at international scientific working groups (IOTC, ICCAT & CCSBT)		Scientific capacity needs to be increased again as a priority action
Compliance Lacked sufficient detail on this objective.	50%	Improved compliance related to finning regulations & the aquarium trade	No transparency on compliance achievements & no regular training of compliance officers	The score might not be a true reflection of the compliance efforts as there was too little information for the Panel experts to gauge the accomplishments. The experts advised on more transparency in enforcement of compliance results e.g. in the form of an annual compliance report
Regulatory tools Lacked sufficient detail on this objective	20%	Continuous improvements in shark related permit conditions in Large Pelagic Longline Fishery • Shark has been designated as bycatch • Wire traces have been banned • Fins have to be attached during landing • Observer coverage of local fleet increased	No overarching framework for shark regulations. No regulation of shark catch in trawl and linefisheries No regulation of recreational fishing competitions & charter fishing	There is no overarching framework for shark management & no improvement on shark management in recreational fisheries

4. Stakeholder concerns and Panel responses

The Panel received six documents (SEP_2020_08_28#1, SEP_2020_08_28#2, SEP_2020_08_28#3, SEP_2020_08_28#4, SEP_2020_08_28#5, and SEP_2020_08_28 #6) from four stakeholder groups detailing several issues of concern. The Panel deliberated on the issues and responded to each one. Written responses were drafted in the form of letters to the respective stakeholders and are attached as Appendix (1). The Panel recommends that upon the Minister's approval, these response letters be sent to each stakeholder group. A short summary of the main issues and responses are provided below.

The disappearance of white sharks from some aggregation areas

The Panel noted with concern the disappearance of the white sharks from eco-tourism hotspots, but concluded that these were more likely a shift in distribution from west to east as a result of recent *Orca* occurrence and predation, rather than being related to the fishing activity of the demersal shark longline fishery. The Panel found no convincing connection between the disappearance of white sharks from False Bay and Gansbaai and the demersal shark longline fishery (Appendix 1.2 & 1.3).

The decline of demersal sharks and management concerns regarding of the demersal shark longline fishery

The Panel was concerned about the decline of soupfin and smooth hound sharks, but noted progress made towards halting this decline with scientific recommendations implemented to reduce catches and progress on assessment methodology. Permit conditions have already been changed in the demersal shark longline fishery to accommodate the reduction in catches. However, changes to permit conditions have yet to be implemented in the commercial linefishery and trawl fisheries (Appendix 1.1, 1.2, 1.3 & 1.4).

The perceived lack of habitat protection and spatial management for sharks

The Panel noted that the NPOA-Sharks lacked direct actions for habitat protection and spatial management for sharks but reflected on recent progress in Marine Protected Area (MPA) expansion. The Panel advised including specific actions to improve the understanding and management of the ecosystem effects of fishing and the identification of further priority areas for habitat protection and spatial management of sharks in the updated plan. It furthers recommended alignment with the Shark Biodiversity Management Plan. The Panel also provided recommendations to improve compliance and transparency around compliance issues if fishers transgress regulations or permit conditions (Appendix 1.1 & 1.2).

Conflict between fishers and tourism industries

Commercial shark fisheries and shark ecotourism are both important economic industries. However, these two sectors are for the most part incompatible. Therefore, user conflict mitigation measures are needed to identify and resolve potential user conflict in a timeous manner. The Panel recommended the urgent review of the TOPS and MLRA regulations, and the use of modern spatial management including MPAs to prevent and reduce conflict (Appendix 1.1, 1.2 & 1.3).

Fishing industry concerns

The Panel noted the concern from the fishing industry that socio-economic considerations might not be considered in the review (Appendix 1.5). The Panel noted that aim 2 of the IPOA explicitly mentions the implementation of "harvesting strategies consistent with the principles of biological sustainability and rational long-term economic use". The Panel noted that more effective dialogue is needed between the fishing industry and DEFF to communicate scientific findings, assessments and recommendations. It also noted the lack of species-specific reporting in the trawl fishery as a concern, and made recommendations for improvement. The catch has to be reduced by an order of magnitude across all fleets to achieve a turnaround in the trajectory of soupfin sharks, which is estimated to lead to commercial extinction by 2055 (Appendix 1.4).

The Panel was guided by the specific aims of the IPOA-Sharks. The aims of the IPOA-Sharks and the mission statement of the NPOA-Sharks make sustainability of target and bycatch species the primary considerations that inform decisions on rational long-term use. However, the Panel acknowledged the importance of socio-economic considerations in the management of sharks, and recommend an increase in the collection and use of socio-economic data to support decision-making (Appendix 1.5).

The above issues raised by stakeholders provided examples which highlight the need for improved communication within the Department, and between the Department and external stakeholders. The need for more effective and responsive science to policy mechanisms; the development and implementation of modern spatial management measures and enhanced compliance were also recognised.

5. Specific recommendations for immediate implementation

1. The experts identified that effective communication and coordination from science to policy is vital to achieve the actions of the NPOA-Sharks. This was especially applicable to compliance and implementation of management actions. It was applicable within different sections of the Department, and between the Department and external stakeholders (different branches of government, conservation agencies, NGOs, fishing industry, academics, and neighbouring countries). Timeous feedback amongst units within the Department, a significant shortening of the lag time between scientific advice and management action, and the transparent and rapid communication with stakeholders was considered to be extremely important.

2. The Panel emphasized the need for measurable indicators to track the progress and completion of actions. These should include timelines and quantities (e.g. the number of species assessments completed, percentage of observer coverage, etc.). The Panel recommended an adequate prioritisation of actions within the individual clusters to ensure that the species, gaps and pressures with the greatest need are prioritised. The Panel advised that actions should be clearly prioritized to maximise the available human and financial resources to implement the NPOA-Sharks.

3. The Panel noted that the ecosystem effects of fishing and spatial conservation and management measures need to be adequately covered in the plan. Emerging science demonstrates that area-based management can have positive impacts for shark and ray populations, and can reduce conflict between user groups. The IPOA-Sharks also specifically directs that critical habitats of sharks need to be conserved. Direct and indirect impacts of shark fishing on ecosystems, in particular interactions between consumptive and non-consumptive user groups need special consideration as there is considerable potential for conflict. The need for better coordination, communication and a framework for identifying and reducing conflict was emphasised by the Panel.

4. The Panel recommended a stronger focus on illegal, unregulated and unreported fishing and improved monitoring, surveillance and enforcement of compliance. The increased use of illegal gillnets along the coast are an emerging threat. Further, it was suggested that cancellation or suspension of fishing rights should be made public. Monitoring, reducing and optimising shark and ray bycatch in commercial fisheries, especially trawl fisheries, is a high priority. Increased effort is needed to better monitor and manage recreational fisheries, which are currently not monitored and inadequately regulated.

5. The Panel recommended modernising and integrating data collection and storage to improve access to data for improved assessments. The use of technology should be embraced to improve monitoring and evaluation of management actions and compliance with permit conditions. For example electronic monitoring programs such as camera-based scientific observer schemes, state of the art electronic vessel monitoring systems, utilization of drones for surveillance and compliance and online submission and storage of catch and effort data within modern cloud based data systems.

Additional improvements included sourcing socio-economic data, in addition to biological and ecological data, for holistic and informed decision making, and the development of adequate funding models to support the actions and implementation of the NPOA-Sharks.

6. Road map on the way forward

There were diverse ideas amongst the Panel on the most appropriate way forward. The experts agreed that there should be a public launch of the review and, when completed, the revised NPOA-Sharks in the form of an event, possibly with a presentation and question and answer session. This would demonstrate accountability and transparency and showcase the good work that the Department has achieved to date. The Panel also recommended that the revised NPOA-Sharks needs to be widely communicated and that buy-in is required from stakeholders, which includes various levels of stakeholder engagement from the public to policy makers. However, the Panel agreed that formally gazetting the new document may not be the fastest and most effective method of moving forward, especially since the original plan was gazetted for formal comment.

Proposed Road Map

A seven step roadmap was developed that, if implemented, can enable more effective science, management and compliance for shark fisheries in South Africa. The roadmap comprised the following proposed steps:

After endorsement by the Minister the findings of the Panel should be shared through an event and presentation on findings and actions by the Department, including a timeline for the actions, and a question and answer session. This could coincide with World Fisheries Day on November 21st

Initiate an internal process to assign responsibilities and time lines to the NPOA-Sharks new action table to maximise the Department's capacity and resources and identify gaps

Initiate an internal process to ensure harmonization between the Shark Biodiversity Management Plan and NPOA-Sharks to maximise use of the Department's capacity and resources and streamline mutually applicable actions or identify overlap

Develop a stakeholder engagement plan to:

Ensure that key relevant stakeholders are included in the updating of the plan e.g. use the Scientific Working Groups to select representatives from all stakeholder groups, in addition, lists of organizations and stakeholder groups that commented on the original NPOA-Sharks can be contacted

Circulate the draft new action table and plan to stakeholders for their input

Revise and update the NPOA-Sharks, including updating it with new catch and permit condition information

Develop a funding strategy and research plan as Annexures to the NPOA-Sharks

Formally launch the updated NPOA-Sharks with a dedicated event within a stipulated time-frame, ideally this should be completed within a year.

7. Conclusion

The Panel found that the South African NPOA-Sharks is in line with international standards and contributes to all ten goals of the IPOA-Sharks. The overall progress made is good and exceeds that of most other countries that have engaged in similar processes despite the ambitious plan and multiple constraints. The external experts' commended the hard work that South Africa has undertaken so far and the external review process of the NPOA-Sharks as a unique example of accountability and transparency.

The Panel scores of the individual issue clusters revealed good progress in the foundational areas of *taxonomy and assessment,* an area where the external experts felt that the work was on the same level as that of developed countries like the United States or Australia, moderate progress in *optimal utilisation, capacity and infrastructure development and compliance,* and limited progress in *data and reporting, sustainable management* and *development of regulatory tools*. The Panel agreed that better communication and coordination are needed to improve planning and implementation of actions and maximise use of existing human capacity and resources. The actions themselves should be further prioritised and their completion tracked through measurable indicators allowing for impartial review.

The Panel recommended an increased focus on the ecosystem effects of fishing and the use of spatial management to conserve critical habitats and reduce user conflict. Illegal, unreported and unregulated fisheries remain a problem that requires renewed focus, shark catches need improved monitoring, reduction and optimisation. Modernisation of reporting, monitoring and compliance systems will help South Africa to be more effective in accomplishing these shark management and conservation actions for the benefit of all South Africans. Other desirable improvements included sourcing socio-economic data, in addition to improved biological and ecological data, for informed and holistic decision making, and the development of adequate funding models to support the implementation of the NPOA-Sharks The Panel also drafted a new action table with further prioritised actions for the NPOA-Sharks, in line with the analysis and recommendations emerging from the review and this provides the core for an updated NPOA-Sharks.

The Panel recommended that the results of this report be widely shared with internal and external stakeholders for their input and provided a roadmap for the updated NPOA-Sharks to become an inclusive plan to implement the recommended actions for effective science, management and compliance for shark fisheries in South Africa.

APPENDIX 1: Panel Responses to Stakeholder input

1.1. Shark tourism operators and University of Miami

The Panel received a report produced by a group of shark tourism operators affiliated to the University Of Miami on the De Hoop Marine Protected Area document number: SEP_2020_08_28#1. The report was authored by Albano, P., Fallows, C., Fallows, M., Williams, L., Shuitema, O., Sedwick, O., and N. Hammerschlag (2020) titled: "Evaluating the Efficacy of a Marine Reserve (The De Hoop MPA) for Threatened and Endemic Sharks off South Africa". The stakeholders requested that the Panel consider the following 1) establishment of spatial protections for sharks beyond the Eastern Boundary of the De Hoop MPA across the Breede River mouth to include the Northern section of St. Sebastian's Bay, 2) increased monitoring of the entire MPA by qualified personnel.

The increased use of spatial management for the management and conservation of sharks and rays is recognized by the Panel as an important action for inclusion in the next iteration of the NPOA-Sharks. Several improvements have been suggested by the Panel including increased priority to ecosystem effects of fishing, habitat protection and spatial management. The previous iteration of the NPOA had no specific action linked to spatial conservation to mitigate against fishing impact. However, there has been significant progress in this area since the NPOA had been published. South Africa's Marine Protected Area (MPA) network was increased from 0.4% to 5.4% of the ocean area around mainland South Africa with the declaration of 20 new MPAs in 2019. Fisheries data, including data from shark fisheries, were used for the spatial planning decisions specifically for the new offshore MPAs. The Panel also recognised the need for strengthened compliance.

The Panel found it difficult to evaluate the report as the underlying data were not provided and there was limited detail in terms of data and methods. The report consisted of an abstract, a summary of the main findings and a list of recommendations.

From what was provided, the Panel found several inconsistencies: The authors argue that on the one hand, the current MPA seems effective in protecting the majority of focal species, indicated as higher encounter rates on BRUVs. On the other hand, the authors argued that the MPA is not sufficient and needs to be expanded. The authors have not provided information on sample numbers, nor sampling period. There is no mention of the effects of habitat on shark abundance (reef versus unconsolidated habitat), nor possible seasonal changes in abundance due to behavioural or environmental factors. From what was provided, it is not clear how the particular increase in area was derived. It would be useful to have information regarding the algorithm or mechanism that was used to determine those particular boundaries. There is little indication that the majority of the focal species are affected by fishing. Further spatial protection of a species needs to be considered in the context of the spatial distribution of the species and potential changes thereof. Spatial protection is effective in instances where ecologically and biologically sensitive areas and biodiversity hotspots are protected. In cases where a single species needs protection, mitigation against the primary threat (i.e. fishing with a particular gear) might be a more suitable alternative, especially when the area is utilised by multiple, competing stakeholders.

In summary, the Panel acknowledged that spatial protection including MPAs and Other Effective Conservation Measures (OECMs) can be used to support the conservation and management of sharks and needs to be better integrated into the revised NPOA. The specific application of these management options need to be carefully considered and weighed against possible unintended adverse effects, which can be socio-economic or ecological. Modern marine spatial planning, as used in the design of South Africa's offshore marine protected area network, taking multiple uses and pressures into account and an inclusive stakeholder engagement process ought to be used to inform future

spatial protection. To Panel concluded that in order evaluate the specific recommendations made in the received letter, the underlying data and analyses should be provided as this information could be included in future spatial planning. This includes emerging Marine Spatial Planning Measures, work to support the refinement of Ecologically or Biological Significant Marine Areas and potential management measures within these area and MPA expansion efforts. South Africa recently increased its MPA coverage and is soon to initiate consultation and planning for further MPA expansion.

1.2. Save Our Sharks group

The public group 'Save Our Sharks', a group consisting of members of the public and the Nelson Mandela Bay Tourism Association provided three documents, a petition outlining their concerns SEP_2020_08_28#2, background information SEP_2020_08_28#3 and a letter to the Panel SEP_2020_08_28#4. The group is also concerned that South Africa does not follow the FAO code of practice for responsible fisheries.

The **petition** specifies the following concerns:

1. Unsustainable shark fishing
2. Illegal fishing in MPAs and lack of enforcement
3. Sudden decrease in white shark numbers
4. Inadequate legislation to protect marine resources
5. User group conflicts: shark resources
6. Access to Information
7. Habitat Protection

The **letter** requested the immediate implementation of the following:

1. species-specific TAC (lower than identified in the stock assessments);
2. species-specific slot limits;
3. independent observers on board;
4. buffer areas for MPA's, protected species aggregation- and shark-nursery areas;
5. liaison and transparent communication with all stakeholder groups involved with shark natural resources;
6. ministerial approval to effectively implement the recommendations of the Panel and the allocation of adequate funding;
7. self-assessments and independent compliance audits on fisheries with respect to monitoring and enforcement of permit conditions; and the
8. evaluation of the DEFF mandatory compliance status with existing legislation and international agreements

The group provided summarized information largely based on DEFF literature, specifically the stock assessments of soupfin and smoothhound sharks. Using recent catch data they highlighted that the scientific recommendation on the level of catch of has been consistently exceeded since 2016. The group also draws on assessments from the South African Sustainable Seafood Initiative (SASSI) and several studies published and in preparation as well as anecdotal information.

The panels' deliberations on the petition:

The expert Panel noted that its primary role is to provide an appraisal of the South African National Plan of Action for sharks (NPOA-Sharks), highlighting its strengths and possible challenges. South Africa is a signatory to the International Plan of Action for the Conservation and Management of Sharks (IPOA-Sharks) developed in 1998, and the previous NPOA for Sharks (2013) was developed with the specific aims as outlined in the IPOA – Sharks. The development and implementation of which was consistent with our role as a signatory of the FAO Code of Practice for Responsible Fisheries as developed in 1995. The FAO Code of Practice for Responsible Fisheries (including article 6 and 7 as mentioned by the Save Our Sharks letter) was used to develop the IPOA-Sharks) in

1998.The Panel was in agreement that South Africa's NPOA is a substantial body of work and broadly covers all the aims as outlined by the IPOA-Sharks. Requests to immediately change management of fisheries in South Africa, amendment to spatial marine managements are not within the TOR of the panel. The Panel highlighted shortcomings in the current NPOA and its implementation and provided detailed input on how to improve an update of the NPOA were provided. The Panel had access to all relevant information, including the information contained in the save our sharks request and took this information into account.

1. Unsustainable shark fishing

The Panel noted that the stock assessments and risk assessments informing sustainable management are on par with international best practice. Several permit conditions were amended in response to the pessimistic outlook of the soupfin and smoothhound assessments. The permit conditions amended in May 2020 for the demersal shark longline fishery (DSL) now include:

1) The slot limit for soupfin, smoothhounds and requiem sharks of 70 to 130 cm TL

2) All sharks must be landed with heads and fins attached

3) All sharks below or above the slot limit have to be released with release condition recorded on logbook. Prohibited sharks must be released unless mortally wounded, in the latter case they must be declared in logbook, landed and handed over to Fisheries Control Officers during offload in an unprocessed state

4) Best practice for release

5) Rights Holders must carry one or more Observer on board per quarter at their own cost

6) Alternative to physical observers, rights holders are encouraged to use an electronic Monitoring system in consultation with the Department

In line with meeting catch limits for soupfin and smoothhound sharks as determined by the stock assessments, the introduction of the slot limit was recommended by the Scientific Working Group for the commercial linefishery. In addition, a precautionary Upper Catch Limit (PUCL) was recommended for soupfin sharks in the trawl fishery. *All* of these recommendations must be implemented for catch to decrease to desired levels. It must be noted that the demersal shark is one of three fisheries responsible for catching the majority of soupfin and smoothhound sharks in South Africa. This sector accounts for 13% of the total catch of soupfin shark and 70% of the total catch of smoothhound sharks in South Africa. The decline in soupfin shark stock precedes the development of the demersal shark long fishery by seven decades.

2. Illegal fishing in MPAs and lack of enforcement

During the review process, the Panel provided recommendations to improve compliance in the future. The Panel were made aware of criminal cases and Section 28 procedures within the DSL fishery relating to MPA transgressions. The Panel has requested information regarding existing criminal procedures for vessels in this fisheries.

3. Disappearance of white sharks from aggregation sites

The sudden decrease in white shark numbers has been noted as a major concern and the investigation of possible reasons, including the impact of fisheries was discussed in detail by the panel. The Panel found no conclusive information for a general decline of the white shark population in South Africa, but rather the evidence supports localized changes in abundance, probably due to a change in distribution from west to east. The Panel found some evidence for a causative link between the appearances of a pod of orcas that had specialised on preying on white sharks. The Panel found no causative link between the fishing activities of the DSL and abundance of white sharks. Further, the Panel noted that white sharks are generalist predators with a diet of over 40 prey species from four functional groups. The Panel further noted the lack of evidence that target species of the DSL represent a significant proportion of white shark diet. The Panel noted that further work is needed to understand ecosystem effects of fishing on shark populations and highlighted this as a recommendation for the improvement of the NPOA. Detailed deliberations are provided in document in Appendix 1.3.

4. Inadequate legislation to protect marine resource

The Panel was in agreement that South Africa's NPOA is a substantial body of work and broadly covers all the aims as outlined by the IPOA-Sharks, therefore adhering the FAO Code of Practice for Responsible Fisheries. The Panel acknowledged that legislation to protect marine resources in South Africa is fragmented and provided recommendations on how to improve management inefficiencies. Recommendations include shark specific permit conditions, fisheries management plans and harmonisation across sectors.

5. User group conflicts related to shark resources

Due to the diversification of commercial uses of sharks, and a growing shift from extractive/consumptive use to non-consumptive use, tension has been growing between user groups that have opposing business models. Commercial shark fisheries and shark ecotourism are two sectors which are incompatible. In general resource conflict has been dealt with by spatial separation through zoning, however when it becomes an issue of ecosystem integrity of areas where tourism is sited and/or the targeted removal of tourism significant species, traditional management tools need review. At present the dept. is reviewing the implementation of user-conflict mitigation measures that combine both species protection from fisheries (TOPS and MLRA review and revision) but also the spatial partitioning of user groups through MPA declaration, MPA Management Plan publication and revision and the designation of special coastal management areas.

6. Access to Information

Improved communication and coordination within the department and across different implementing agencies as well as feedback to its stakeholders (e.g. public, NGOs, fishers and other government departments) was one of the main recommendations by the Panel and several actions have been suggested for inclusion in the updated NPOA.

7. Habitat Protection

The Panel acknowledged that spatial protection is one of the tools in the management measures for sharks and needs to be better integrated into the revised NPOA. The specific application of this management option needs to be carefully considered and weighed against possible unintended negative effects, which can be socio-economic or ecological. Modern marine spatial planning, as used in the design of South Africa's offshore marine protected area network, taking the different pressures into account, ought to be used to inform future spatial protection. The Panel concluded that in order evaluate the specific recommendations, the underlying data and analyses should be included in future spatial planning (Marine Spatial Planning Measures and Protected Areas and MPA expansion efforts). South Africa recently increased its MPA coverage and will need to initiate stakeholder engagement and planning to guide further expansion efforts.

The Panel's deliberations on the requests contained in the letter

The TOR of the Panel does not include approval of requests, but the Panel did deliberate on each point and indicated when the requests were in line with recommendations of the panel.

1. Species-specific TAC (lower than identified in the stock assessments);

Total Allowable Catch based management is only practical in fisheries where all catch is weighed. Disaggregated small-scale fisheries such as the line fishery are managed in terms of effort and catch weight based management is not feasible. Further TAC can have unintended consequences such as discarding and high-grading. These need to be weighed up against perceived benefits.

2. Species-specific slot limits;

Slot limits have been in the implementation phase and where implemented in the DSL permit conditions in May 2020.

3. Independent observers on board;

On-Board observers are not always feasible on small vessels. Some observer coverage has been included in the DSL permit conditions and the pilot phase of electronic monitoring systems for this and other fisheries has started.

4. Buffer areas for MPA's, protected species aggregation- and shark-nursery areas;

Existing MPAs are already zoned for different activities. Aggregation and nursery areas are included in some of the MPAs, but Marine Spatial Planning requires detailed spatial data to be effective. Where available, these data are being considered and new efforts are underway.

5. Liaison and transparent communication with all stakeholder groups involved with shark natural resources;

The improvement of communication has been recommended by the Panel

6. Ministerial approval to effectively implement the recommendations of the Panel and the allocation of adequate funding;

The Panel only provides recommendation to the minister. The need for adequate funding and human capacity has been highlighted by the Panel.

7. Self-assessments and independent compliance audits on fisheries with respect to monitoring and enforcement of permit conditions;

The Panel made recommendations on the improvement of compliance and the communication thereof.

8. Evaluation of the DEFF mandatory compliance status with existing legislation and international agreements

The Panel found that the NPOA covers all the items outlined in the IPOA-Sharks in some way. The Panel also noted that South Africa does comply with conservation measures of regional fisheries management organisations, among others ICCAT, IOTC, CCSBT and FAO. The Panel further noted that South Africa has been a regional leader in shark conservation and management within these organisations and has attained 'green' status with respect to its compliance with bycatch regulations regarding sharks.

1.3. Deliberations by the Panel regarding allegations that the Demersal Shark Longline Fishery (DSL) is responsible for the white shark absence at eco-tourism hotspots in False Bay and Gansbaai

Save Our Sharks (Appendix 1.2) states that the disappearance of white sharks from False Bay and Gansbaai is because the demersal shark longline fishery has overfished demersal sharks. Consequently, Save Our Sharks requests DEFF to halt the demersal shark fishery to allow the white shark population to recover.

White sharks in Southern Africa occur throughout the Southwest Indian Ocean and are capable of extensive coastal and offshore migrations (Bonfil et al., 2005). In South Africa, there are several large aggregation sites, namely, False Bay, Gansbaai, Struisbaai, Mossel Bay, Plettenberg Bay, and Algoa Bay. Most of these aggregation sites have been the focus of research since the early 1990s, and are locations for white shark cage diving and viewing tourism. The absence of white sharks from two of these aggregation sites, False Bay and Gansbaai is cause for concern and deserves attention. This absence has received extensive media coverage since 2018. The cause for the disappearance has been the subject of much deliberation and debate within scientific and white shark industry circles. Since 2015 there has been a significant decline in the sightings of white sharks at Seal Island, False Bay (Hammerschlag et al., 2019). In Gansbaai, sightings of white sharks significantly declined from 2017 (Towner et al. in prep). In both cases, sightings declined steeply at first, followed by extended absences. Presently only a handful of sporadic white shark sightings have been confirmed for False Bay and Gansbaai. This is an unprecedented situation since research at these aggregation sites began in the early 1990s. However, the absence of white sharks has not been observed across their South African range with sightings still regularly reported at Mossel Bay, Plettenberg Bay and Algoa Bay.

The extended absence of white sharks in False Bay and Gansbaai has resulted in several observed changes in ecosystem structure, namely the emergence of sevengill cow sharks at Seal Island (False Bay) (Hammerschlag et al., 2019b), bronze whaler sharks in Gansbaai (Towner et al., in prep) and changes in seal behaviour (personal observation). There are likely other changes, but recording them is challenging in the marine environment. The absence of white sharks has also had a substantial economic and social impact on the economically important white shark cage diving industry (and associated leisure and travel industries) who rely on white sharks for tourist viewing. Therefore understanding the reason for the absence of white sharks is essential to determine if there are interventions or solutions to the problem.

White sharks can live for more than 70 years, and their movement patterns change between the different stages of their lives, e.g. juvenile sharks spend their time along the coast, while adults spend much time away from the coast. Movements are also different between males and females and even between individuals. Furthermore, white shark movements are influenced by the environment, e.g. water temperatures and food availability. They are generalist and are tolerant of a wide range of temperatures (although they seem to prefer 14 – 24 °C).

Prey availability is a key driver for movement and occurrence of predators, including white sharks. One of the primary drivers for white shark occurrence in False Bay and Gansbaai over winter months is the availability of naive Cape fur seals. A substantial body of evidence demonstrates the importance of seals in the white sharks' diet, especially for white sharks >3 m long (Fallows et al.; Hussey et al.; Kock et al., 2013; Martin et al., 2005). Seal populations are

stable in False Bay and Gansbaai (Pfaff et al., 2019), and the abundance of seals offer a predictable food source in time and space. The fact that white sharks have been absent even when naïve, young-of-the-year seals are abundant suggests that prey availability is not the primary reason for their complete absence around the seal colonies during winter months.

In summer months in False Bay and Gansbaai white sharks typically spend most of their time at nearshore sites in these bays where they have been observed feeding on seasonally abundant fish, sharks and rays. Studies on the South African white shark diet have identified they are generalist predators feeding on at least 40 different species from four main functional groups, namely cephalopods, elasmobranchs, teleosts and marine mammals (Hussey et al. 2012). White sharks are highly adaptive and likely predate on species that are most abundant and accessible in time and space. Prey availability of non-seal species may have changed along the South African coastline (due to environmental or anthropogenic reasons) which may influence white shark distribution and occurrence. However, there is no scientific evidence that indicates that demersal sharks such as soupfin and smoothhound sharks compose a significant portion of their diet. Therefore, claiming that white sharks are absent from False Bay and Gansbaai due to declines in some demersal sharks does not account for the fact that there are other prey species available to at least attract a few white sharks.

Some demersal shark species have undergone substantial declines with particular reference to smoothhound and soupfin shark populations. This decline deserves urgent management interventions in its own right.

White sharks have only disappeared from the Western Cape. In terms of catch composition the demersal shark longline fishery only catches soupfin in this region. The hotspot for smoothhound sharks is in the Eastern Cape where this fishery catches the majority of smoothhound sharks (70%). The demersal shark longline is one of three fisheries that catch soupfin (13%), the majority of soupfin is caught by the commercial linefishery (61%), followed by the trawl fishery (25%). Overall historical reconstructed catch data going back as far as the 1950s suggest that the decline in soupfin sharks predates the disappearance of the white sharks by 7 decades (DEFF, 2020).

Furthermore, white sharks have not disappeared from Mossel Bay, Plettenberg Bay and Algoa Bay, even though catches of demersal sharks (specifically smoothhounds) is by this fishery (has been) higher at these locations. Therefore, the decline of demersal sharks cannot explain the pattern of occurrence currently being observed for South Africa's white sharks.

An alternative theory proposed for the disappearance of white sharks from False Bay and Gansbaai is the recent appearance of a pair of killer whales specialising in hunting large, coastal sharks. This killer whale pair first appeared in False Bay in 2015, where they predated on several sevengill sharks which resulted in these sharks disappearing from a large aggregation site (Tamlyn Engelbrecht et al., 2019). In 2017 the same killer whale pair were suspected of predating on at least five large white sharks in Gansbaai. The number of white sharks killed by the killer whales may be higher and more frequent, as not all white shark carcasses would have washed ashore, and not all predation events recorded.

In addition to the direct effects of predation, the indirect effect of predation (or the fear of predation) has a profound influence on animal behaviour. Following these predation events, white sharks in Gansbaai disappeared abruptly. With each subsequent visit of this pair of killer whales, the white sharks fled the area and stayed away for extended periods (Towner et al. in prep). Since 2015, this killer whale pair has been recorded 41 times between False Bay and Gansbaai and to

date has predated on sevengill sharks, white sharks and bronze whaler sharks (David Hurwitz, unpublished data, Tamlyn Engelbrecht et al., 2019). The pair has not been recorded in Mossel Bay, and only once and twice in Plettenberg Bay and Algoa Bay, respectively. The significant impact of killer whales on white sharks is evident elsewhere. At the Southeast Farallon Islands in North America, brief and occasional visits by killer whales close to the island resulted in white sharks fleeing the immediate area and decreased predation by white sharks on pinnipeds during years killers whales were present (Jorgensen et al. 2019). Therefore the increased presence of these shark specialist killer whales may explain why white sharks have remained absent in False Bay and Gansbaai, but present in Mossel Bay, Plettenberg Bay and Algoa Bay.

To provide more conclusive answers on the reasons for the disappearance of the white sharks the following was suggested:

- Investigation of the ecosystem effects of fishing on predators is needed and should be included in the updated NPOA
- Continued investigation into the diet of white sharks, particularly in the Western Cape, and the drivers of movement
- Pooling of existing data from marine scientists to investigate ecosystem changes and possible impact on white shark occurrence
- Investigation of killer whale occurrence, movement and diet to confirm impact

References

Bonfil, R., Meÿer, M., Scholl, M. C., Johnson, R., O'Brien, S., Oosthuizen, H., et al. (2005). Transoceanic migration, spatial dynamics, and population linkages of white sharks. *Science (80-.).* 310, 100–103. doi:10.1126/science.1114898.

Fallows, C., Martin, R. A., and Hammerschlag, N. CHAPTER 9 Comparisons between White Shark-Pinniped Interactions at Seal Island (South Africa) with Other Sites in California. *Group*, 105–118.

DEFF. 2020. Recommendation for the sustainable management of demersal sharks for the 2020/2021 Season. Department of Envirionment, Forestry and Fisheries. pp 1- 15

Hammerschlag, N., Williams, L., Fallows, M., and Fallows, C. (2019a). Disappearance of white sharks leads to the novel emergence of an allopatric apex predator, the sevengill shark. *Sci. Rep.* 9, 1908. doi:10.1038/s41598-018-37576-6.

Hammerschlag, N., Williams, L., Fallows, M., and Fallows, C. (2019b). Disappearance of white sharks leads to the novel emergence of an allopatric apex predator, the sevengill shark. *Sci. Rep.* 9, 6–11. doi:10.1038/s41598-018-37576-6.

Hussey, N. E., Mccann, H. M., Cliff, G., Dudley, S. F. J., Wintner, S. P., and Fisk, A. T. (2012. "CHAPTER 3 Size-Based Analysis of Diet and Trophic Position of the White Shark (Carcharodon carcharias) in South African Waters," in *Global perspective on the biology of the white shark*, 27–50.

Kock, A., O'Riain, M. J., Mauff, K., Mëyer, M., Kotze, D., and Griffiths, C. (2013). Residency, habitat use and sexual segregation of white sharks, Carcharodon carcharias in False Bay, South Africa. *PLoS One* 8, e55048. doi:10.1371/journal.pone.0055048.

Martin, A., Hammerschlag, N., Collier, R. S., and Fallows, C. (2005). Predatory behaviour of white sharks (Carcharodon carcharias) at Seal Island , South Africa. *J. Mar. Biol. Ass. U.K.* 85, 1121–

1135.

Pfaff, M. C. M. C., Logston, R. C. R. C., Raemaekers, S. J. P. N. S. J. P. N., Hermes, J. C. J. C., Blamey, L. K. L. K., Cawthra, H. C. H. C., et al. (2019). A synthesis of three decades of socio-ecological change in False Bay , South Africa : setting the scene for multidisciplinary research and management. *Elementa*. doi:10.1525/elementa.367.

Tamlyn Engelbrecht, Engelbrecht, T. M., Kock, A. A., and O'Riain, M. J. (2019). Running scared: when predators become prey. *Ecosphere* 10. doi:10.1002/ecs2.2531.

1.4. Concerns raised by the South East Coast Fishing Association (S.E.C.I.F.A), an industrial body of the demersal trawl industry

The Panel noted the concerns of S.E.C.I.F.A document number: SEP_2020_08_28#5. These can be grouped into three sections:

1. Concerns about the quality of the shark catch data, due to the failure of species-specific reporting

2. Concerns about the validity of the assessment due to the shortcoming outlined in point 1 and possible omission of other auxiliary factors.

3. A proposal on how the fishery can assist in the required reduction in soupfin catch

The first two points fall into the Terms of Reference of the Expert Panel as they directly relate to action items outlined in the NPOA. The specific proposal in the third point does not fall within the TORs but the Panel deliberated on how it falls within the general recommendations in the NPOA.

1. Quality of catch data and failure of species specific reporting.

The NPOA specifically mentions accurate species-specific reporting as a necessity and prerequisite to effective assessment and management. While there has been progress in a number of fisheries, the Panel noted the lack of species-specific reporting in the trawl fishery as a concern. The quality of catch data needs significant improvement. Soupfin shark is reported as a separate species, apart from a category where shark species are lumped together. As shark species were not consistently reported individually, DEFF used the average proportion of soupfin shark in the catch of the demersal survey over the period 2005 to 2016 to estimate of the proportion of soupfin shark in the unspecified shark catch. While this estimate might be inaccurate it is unbiased and unlikely to produce a consistent over- or underestimate. The Panel is unable to evaluate the veracity of the crude analysis of S.E.C.I.F.A, as no method or data were presented, but applying the proportion (0.63) estimate to the figures that were supplied in the letter (0.5%-2% of 12000 t) would indicate a soupfin catch between 38 t and 151 t, which closely matches the range used in the stock assessment.

2. Validity of the model estimate

The assessment of the soupfin shark is based on a number of data sources. These include life history data, a fisheries independent abundance index and four catch data series. The model is, according to the experts, on par or even beyond what is currently international practice and represents best available science that can make valid inferences on this stock. The abundance index is derived from the annual trawl survey data and the standardization takes into account spatio-temporal changes in abundance. This index is also used in the risk analysis JARA, which complements the model and does not require other fishery-derived input data. This risk analysis, which is now used as a standard in IUCN assessments, indicates this species falls into the critically endangered ICUN category with a probability of 60.6%.

The model was run over four different scenarios with a number competing assumptions and several sensitivity analyses were carried out. All scenarios indicate a >99% probability that the soupfin shark is severely overfished and currently subject to overfishing. Given the life history of this species, the catch has to be reduced by an order of magnitude across all fleets to achieve a turnaround in the

trajectory of this species, which is estimated to lead to commercial extinction by 2055. This is a serious situation and requires immediate action across fisheries.

3. Proposed management actions

The Panel was sympathetic to the request and acknowledged the need for effective communication among stakeholders. The Panel also noted that training of sea going personnel and improved identification and recording of shark by-catch are in line with actions outlined in the current NPOA. However, it is unclear on how the action proposed by S.E.C.I.F.A will aid in halting the decline of the soupfin stock as the proposal does not seem to substantially reduce the catch, as required. It also noted the following: Some right holders already supply species-specific data, which indicates the feasibility of this action within this fishery. PUCLs and move-on rules are already implemented for a range of other by-catch species and represent current bycatch mitigation practice in this fishery.

The NPOA highlights the need for shark specific management interventions in permit conditions in particular in fisheries that impact shark populations. In the case of the soupfin shark, permit conditions in other fisheries that impact on this species (e.g. the midwater trawl fishery, the demersal shark fishery) have already been amended to mitigate against the decline. The implemented measures include an increase in observer coverage, slot limits, electronic monitoring as well as move on rules and precautionary upper catch limits.

1.5. Concerns raised by Hacky Fishing Pty LTD

The Panel noted the concern on the possible omission of socio-economic considerations during the review document number: SEP_2020_08_28#6.

The Panel is guided by the specific aims outlined in the International Plan of Action for the Conservation and Management of sharks (IPOA) developed by the FAO Committee on Fisheries in 1998, within the framework of the Code of Conduct for Responsible Fisheries to which South Africa is a signatory. Rational long-term economic use is one of these aims

(Aim 2): "*Assess threats to shark populations, determine and protect critical habitats and implement harvesting strategies consistent with the principles of biological sustainability and* ***rational long-term economic*** *use*."

Optimum sustainable use is also implicit in the mission statement of the NPOA-Sharks: *"The effective conservation and management of sharks that occur in the South African EEZ to ensure their* ***optimal, long-term, sustainable use*** *for the benefit of all South Africans, including both present and future generations*."

In practical terms, the aims of the IPOA and the mission statement of the NPOA make sustainability of target and bycatch species the primary considerations that inform decisions on rational long-term use. This translates into management practice that aims to reconcile the need for job and food security of current generations of stakeholders to those of future users. In terms of fisheries management, this means that management options that can simultaneously achieve conservation and socio-economic goals will receive preference. Examples thereof would be effective bycatch mitigation (e.g. species-specific management interventions such as size, bag, time and area limits)

The Panel acknowledged the importance of economic data to support decision-making in the management going forward and recommend increased collection and use of socio-economic data in the future. The outcome of the work of the Panel will not only result in the review of the NPOA-Sharks, but will form the basis for an updated NPOA-Sharks which will have some level of public consultation. I hope that you will find the above to address your request.

APPENDIX 2: New Action Table draft

ISSUE CLUSTER	ISSUE DESCRIPTION	ACTION NUMBER	ACTION	MEASURABLE INDICATORS	PRIORITY (as judged by the panel)
Foundations	Species prioritization - prioritise Chondrichthyes in need of research, assessment and management intervention	1	Input into and completion of species profiles report	Completion of report	Yes
		2	Species prioritization through gap analysis and Management Rapid Assessment Indicator procedure (MRAIT). Research plan developed.	Scientific Working Group documents: 1.Gap analysis (life-history vital for assessment and management) of Chondrichthyes caught in SA fisheries. 2. MRAIT assessment and selection of 5 priority species per period	Yes
	Biological sampling (conversion ratios, life-history, genetics) and research related to 5 priority species selected.	3	Biological sampling for prioritized species per fishery sector	Completed scientific reports at relevant scientific and management working groups	
		4	Conduct necessary research (basic life-history required for management) based on samples for priority species	Completed scientific reports at relevant Scientific and Management Working Groups	
	Monitoring catches (landings, observer coverage), web-based catch reporting (recreational)	5	Improve identification of Chondrichthyes caught in fisheries by distributing ID guides to rights holders in major fisheries, observers, compliance, inspectors and Customs	Frequent (TBD) ID courses for each group. Shark ID video instructions to supplement training. Improve	Yes

				communications between units	
		6	Develop and implement a scientific observer programme that includes land based and sea based monitoring with sampling strategy set for sharks. Set targets for monitoring of fin and trunk consignments.	Target strategy presented at relevant Scientific Working Groups (number of sites with effective landing monitoring programs and number of vessels with observers)	Yes
	Assessment of prioritised species	7	Regular assessments for soupfin and smoothhound sharks as per linefish protocol (Annual abundance indices and assessments every 2-3 years)	Presented at relevant Scientific Working Groups	Yes
		8	Investigate other data sources suitable for trend analyses through workshops/ calls for data	Distribute calls for data through SANCOR mailing list	Yes
		9	Risk assessments (JARA) for data deficient chondrichthyan species every 2 years	Presented at Scientific Working Groups of relevance	Yes
Sustainable mangement	Develop shark specific discharge, observer regulations across all fisheries	10	Re-establish, re -assess and expand land and sea based scientific observer coverage	Observer programmes established	Yes
		11	Establish web-based catch recording for recreational fisheries	Web-based recreational catch monitoring and control system implemented	Yes

		12	Establish additional monitoring requirements for fisheries for rare, vulnerable - critically endangered species	Monitoring implemented across relevant fisheries	Yes
	Shark specific regulations in all fisheries (permit conditions, etc.)	13	Review and develop regulatory tools (permit conditions, regulations and policy)	Permits in place, regulations and policies amended	Yes
		14	Develop and implement management protocols for all fisheries	Management protocols operational for all fisheries	Yes
		15	Harmonize shark specific permit conditions across all fisheries	Shark specific permit conditions harmonized	Yes
		16	Review existing mitigation measures, review mitigation measures used in other regions to develop best practice release protocols for all gear types	Presented at relevant working groups	Yes
		17	Develop best practice release protocols and incorporate into permit conditions where appropriate	Best practice release protocols incorporated in all relevant permits	Yes
Optimal use	Optimization of shark products from sustainable fisheries	18	Investigate better utilization of shark carcasses i.e. shark leather, alternative processing of shark meat in non-industrial fisheries etc.	Presented at relevant working groups	
	Develop protocols for ecotoxic species (Concern around health risk of shark meat consumption)	19	Develop research into prioritised commercial species for ecotoxicology and food safety	Presented at scientific working groups of relevance	

	Fisheries vs Tourism (MLRA vs TOPS?)	20	Develop protocols for removing sharks from permitted fisheries retention lists according to standardised criteria	Presented at scientific working groups of relevance	Yes
	Retained sharks are not fully utilized	21	Develop and apply finning legislation to existing fisheries, include skate wings	Finning legislation applied to existing fisheries and extended to include skates	Yes
Understanding and Management of threats	Ecosystem threats of related fishing (pollution, gear (ghost),	22	Review and identify fisheries and non-extractive impacts on sharks	Presented at relevant working groups	
		23	Investigate indirect, fisheries-related threats (i.e. post release mortality, plastic strops, etc.)	Advice for mitigation provided	
		24	Develop permit conditions to mitigate against these threats across fisheries	Permits in place, regulations and policies amended	
	IUU	25	Investigate Illegal, Unregulated and Unreported fishing activities	Regular, comprehensive, transparent updates on response to IUU activities provided	Yes
	Understanding the impact of fishing Chondrichthyes on ecosystems	26	Promote and encourage research that investigates the impacts of fishing Chondrichthyes on ecosystems. Link to BMP	Scientific report or published paper	Yes
	Spatial management and protection against fishery impacts (MPAs?)	27	Review existing protection for Chondrichthyes in MPAs.	List and quantification of Chondrichthyes occurring in each MPA	Yes
		28	Develop a spatial conservation plan for Chondrichtyes	Shark Biodiversity Management Plan updated, reviewed and implemented	Yes

		29	Promoting and encourage research that investigates the effectiveness of spatial protection	Scientific report or published paper	Yes
Co-ordination, stakeholder engagement and communication	Education and awareness	30	Determine requirements for educational material at various levels (school, tertiary, public etc.).	Educational material provided at relevant level	Yes
		31	Implement training on Shark identification (including fin, fillet, chain of custody)	Number of courses, number of staff trained	
		32	Develop responsible fisheries programs pertaining to sharks	Awareness programme rolled out to fishing community	
	Internal coordination within the Department	33	Coordination across Scientific Working Groups at DEFF: Fisheries Research and with DEFF: Oceans and Coasts	Scientists integrated across Branches. Regular research Indabas.	Yes
		34	Close coordination between science, management and enforcement	Increase in transparency of decisions. Scientific advice is acknowledged on reception. Deviations from advice is substantiated and documented in writing. Implementation of scientific advice is fed back to science and enforcement groups. Science to policy loop completed in one year.	Yes

		35	Coordination of assistance of enforcement activities	Number of affidavits and cross sectional groups established.	Yes
	Coordination among agencies	36	Formal use of the South African Seafood Naming standards in all permitting documents (exports, sale, transport, etc.)	Only official names and scientific names used for relevant documentation schemes (exports, imports, sale and transport)	Yes
		37	Relevant stakeholders are incorporated in scientific and management fisheries working groups	Stakeholders integrated into relevant working groups	Yes
	Communication	38	Develop mechanism to share new developments related to research, management and conservation of sharks	Rapid and frequent communication on new research, management and conservation efforts	Yes
		39	Roll out regular, transparent means of communication with stakeholders. Rapid response to incorrect and misleading media content. Timeous and comprehensive response to queries from stakeholders, including journalist, conservation agencies and fishers.	Number of responses produced within agreed time frame. Close communication lines	Yes
		40	Review of communication by means of modern technology (i.e. social media, electronic publication etc.)	Social media strategy developed and implemented	

	Explore funding opportunities	41	Explore funding opportunities through local and international agencies.	Additional funding sources established	