

**Review of management arrangements that
support the Conservation Dependent listing
of Scalloped Hammerhead shark
(*Sphyrna lewini*) under the EPBC Act**

**Update report to the Threatened Species
Scientific Committee**

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**Report to the Australian Marine Conservation Society and Humane
Society International**

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1. Executive summary

Key findings

Key findings of this update report against the key terms of reference are:

1. Despite progress by both Qld and NT in the implementation and improvement in some management measures expected by the Threatened Species Scientific Committee (TSSC) when listing Scalloped hammerhead as conservation dependent (CD), not all expectations have been met. Therefore, current management arrangements in both Qld and NT do not support a CD listing for Scalloped hammerhead sharks.
2. The IUCN status of Scalloped hammerhead has recently been updated to Critically Endangered (CR) with their recommendation that all fishing for the species should cease.
3. Catches of Winghead shark are relatively low in Qld and the NT, and are restricted to nearshore estuarine coastal areas, their preferred habitat. Reporting has been to species level for some years in the NT and only from 2018 for Qld, making interpretations about Qld catches difficult. Winghead shark are likely to be naturally less abundant than Scalloped hammerheads across northern Australia and the sustainability of current catch levels, although low, is unknown.
4. Based on the Qld Shark Control Program (QSCP) data, hammerhead sharks are estimated to have declined by 68 % in the past 25 years, the period for which the data are considered most reliable. Since 2001 there has been a consistent decline in the numbers of Scalloped hammerhead caught annually, and the average size has declined from 2.06 m in 2001 to 1.38 m in 2019. There is concern over the accuracy of species identification from the QSCP.
5. From September 2019 all shark control equipment has been removed from the Great Barrier Reef Marine Park area resulting in 21 fewer locations with shark control equipment and 141 fewer drumlines overall across Queensland.
6. Commercial logbook data in Qld indicate that reporting to species level for hammerhead sharks is improving, however, the utility of these data in accurately understanding hammerhead catches is dependent on the accuracy of species identification by fishers. Currently in both Qld and the NT the accuracy of identification is unknown.
7. The currently available discarding data in Qld requires more years of data to accurately interpret levels and trends. Further, validation of discarding of hammerhead species needs to be carried out to further ensure accuracy of these data.
8. Since the initial report of Rayns (2019), changes in Qld meeting the requirements for CD listing and of the TSSC are:
 - a. 'All hammerheads landed whole (head & fins attached)' has not changed, however, as part of the current fisheries reform process, regulatory changes have been proposed that include a requirement all shark to be landed whole (gilled and gutted). QDAF report that these regulatory changes are expected to be considered by the Qld government and finalised soon, however it is unclear of the timeline for this decision and if this will apply to all fisheries.

- b. 'Inspections at sea and in port' has improved from 'Partly in place' to 'In place'. This appears to be more of an interpretation difference between Rayns (2019) and this author, with the only difference in current circumstances being the recent recruitment of a number of enforcement officers and an increase in funding that greatly enhance the capacity for inspections.
 - c. 'Cross validation of data (fisher logbooks, VMS data & buyer sourcing)' has changed from 'Not in place' to 'Partly in place'. Fisher logbooks have been used for a number of years and last year VMS was made mandatory thereby providing a significant independent data stream to QDAF for some level of cross validation with logbook data. E-monitoring has been trialed and is scheduled to be introduced to the fishery during 2020. Catch Disposal Records (for quota reporting) are in place and require the recording of shark species landed which enables cross checking with logbooks. Under the *Sustainable Fisheries Strategy*, tracking the sales chain for all quota and TACC species is proposed to be strengthened through a series of catch validation steps.
 - d. Since the Rayns (2019) report hammerhead sharks have become a no-take species in Queensland for recreational fishers.
 - e. A stock assessment for Scalloped hammerhead is currently underway as a partnership between Qld and NT and is expected to provide greater understanding of current status and sustainable catch limits. Information about this assessment will be presented at the February 2020 TSSC meeting.
9. New regulations for the NT Offshore Net and Line Fishery (ONLF), which commenced in December 2018, addresses many of the TSSC's expectations regarding management measures for Scalloped hammerhead shark, however key improvements are still needed with some currently underway. Since the initial report of Rayns (2019), changes in NT meeting the requirements for CD listing and of the TSSC are:
- a. 'Data validation techniques including: Electronic logbooks' has changed from 'Not in place' to 'Partly in place'. E-logbooks are now in place fleet-wide for all ONLF full-time NT-based vessels, and are expected to be installed on part-time operators during 2020. E-monitoring has been implemented on all longline vessels and is proposed for net boats only if they want to fish at sea.
 - b. 'Data validation techniques including: Product unloaded in Darwin & Gove only' remains unchanged as 'Partly in place'. Scalloped Hammerhead (and other species) from the ONLF can only be landed in Gove and Darwin unless an exemption is granted by the Director of Fisheries. Exemptions represent a small minority of the fleet.
 - c. 'Data validation techniques including: Heads remain attached to body unless E-M operational' remains unchanged as 'Not in place'. Only fishing methods deemed to be high risk are required to have E-monitoring in the NT. In the ONLF this only applies to longliners, which have a much greater capacity for increasing catches of sharks.

Key recommendations

- Research into the post-release survival of all hammerhead shark species is needed to better understand the impacts of discarding. As part of these efforts improved knowledge, reporting and validation (by observers and/or e-monitoring) of the condition of animals when they are discarded is also needed.
- The accuracy of fishers' identification of hammerhead sharks to species level is unknown and there is now a greater imperative for this to occur, particularly with doubt cast on some data sets (Qld SCP), increased logbook reporting requirements and species-based quota being implemented. Current species identification programs need to ensure they include training, and validation processes being implemented gradually across both NT and Qld should also be used to verify fisher accuracy in identification.

2. Introduction

Background

In March 2018 a Conservation Dependent (CD) listing was passed for Scalloped hammerhead shark (*Sphyrna lewini*) under the EPBC Act. To support the Conservation Dependent listing a number of management recommendations were put forward by the Commonwealth's Threatened Species Scientific Committee (TSSC) to be implemented by the Queensland (Qld) and Northern Territory (NT) governments. The advice to the Minister for a CD listing was dependent on these recommendations being implemented, and an undertaking to put these measures in place was agreed to by the Qld and NT governments. In May 2019, a report was commissioned by the Australian Marine Conservation Society (AMCS) and Humane Society International to assess progress against these recommendations (Rayns, 2019). The report found that there were actions outstanding more than 18 months after the listing, including the requirement to land sharks with fins attached in Queensland. Consequently, the Qld and NT governments disputed some of the findings as "outdated" and that additional actions had been taken that were not included in the report.

A development since Rayns (2019) been the IUCN revision of Scalloped hammerhead to Critically Endangered (CR) with their recommendation that all fishing for the species should cease: *"To allow recovery, it is recommended that all Scalloped Hammerhead retention and landings be prohibited, at least as long as the global population is classified as Critically Endangered or Endangered. Initiatives to prevent capture, minimize bycatch mortality, promote safe release, and improve catch (including discard) reporting are also urgently needed, as is full implementation of additional commitments agreed through international treaties."* (<https://www.iucnredlist.org/species/39385/2918526#threats>) (Rigby et al, 2019).

The aim of the current report is to provide an update to the TSSC on the management arrangements the Queensland and Northern Territory governments have put in place to meet the requirements of the TSSC listing of the species as Conservation Dependent. Specifically, the report aims to identify where current management arrangements do not support a CD listing for scalloped hammerhead sharks in both Qld and NT, with precise reference to the Committee's recommendations.

Rather than replicate in full the original report by Rayns (2019), this report specifically focuses on new information to provide an update of progress towards the recommendations of the TSSC, drawing on relevant and new information and based on published literature where

available, and consultations with fisheries managers from the respective jurisdictions. Therefore, the original report should be used in conjunction with this update report.

3. Methods

To provide an update to the original report, several specific tasks were requested by AMCS involving both desktop research of published reports and literature, and consultations with relevant fisheries managers. Specifically, these tasks were to:

- Review the QFISH database to provide information to the TSSC on the catch data for Winghead shark;
- Review the Shark Control Program catch of Scalloped hammerhead shark;
- Provide information on discard levels in Qld and NT and identify concerns around the validity of reported discards based on lack of independent monitoring;
- Use the same method of analysis of the original report to update Results and other relevant matters for Qld and the NT;
- Update the Discussion and Conclusion sections;
- Update Tables 1, 2 and 3; and
- Update Key Findings and Recommendations.

The methods necessarily followed a similar qualitative approach of Rayns (2019).

4. Results

Winghead shark catch data

As reported by Rayns (2019) resolution of commercial data reporting to species level for hammerhead sharks effectively only came into effect in 2018. Since then the reported Qld commercial harvest of Winghead shark (*Eusphyr a blochii*) has been relatively low with a total of 385 kg taken in 2018 and 854 kg in 2019¹. The majority of this catch was taken in the Gulf of Carpentaria in both years at 56 % and 96 % for 2018 and 2019 respectively. The rest of the catch were taken in the Great Barrier Reef Marine Park. A further 3,078 and 692 individual animals were reported to be discarded during 2018 and 2019 respectively (<http://qfish.fisheries.qld.gov.au>; accessed 13 January, 2020). Rayns (2019) erroneously report the 2018 Qld Winghead shark catch as 35 t; the QFish database query output data for Winghead shark reports a total catch of ~36 t across all years. This is somewhat confusing as this amount doesn't concur with the sum of individual yearly catches.

There is no data available on the condition of the animals at release nor of their likely survival, however recent research suggests that released hammerhead shark may have high levels of mortality (Dapp et al, 2016; Butcher et al, 2015; Gallagher et al, 2014). Also, as indicated by Rayns (2019) there is likely to be inaccuracies in the identification of hammerhead sharks to species level. Despite this, the improvement in reporting to species level is evident in the data with 1.4 % of all hammerhead catch in 2018 reported as 'unspecified hammerhead', compared to 77 % for the previous 5-year period from 2013-17 (<http://qfish.fisheries.qld.gov.au>; accessed 13 January, 2020). This should be viewed as a strong step in the right direction. However, the utility of these data in accurately understanding catches of all hammerhead species is

¹ At the time of accessing the data, Qld commercial data for 2019 is incomplete with more records to be entered.

dependent on the accuracy of species identification by fishers and in independent validation of reported figures. Currently in both Qld and the NT the accuracy of identification is unknown.

The Queensland Department of Agriculture, Fisheries QFish website also provides some estimates of recreational catch of hammerhead shark from infrequent state-wide surveys. The most recent estimate provided for hammerhead shark catch (2013) indicates approximately 3,000 were caught with 100 % released. The website states that there is a 'medium' level of confidence in these estimates.

Catch reporting of Winghead shark in the NT has been occurring for longer than Qld, and Rayns (2019) reported that *"NT catches of Winghead sharks, including discards, have been reported for many years. In 2018 the total catch was 4.2 tonnes, with about 50% discarded, and five year average total catch of around 6.3 tonnes."*

Although recognized as one of the least well-known hammerhead species, the apparent higher catch levels in the NT are consistent with a proposed higher relative abundance of Winghead sharks in NT waters compared to adjacent jurisdictions of Western Australia, Qld and Papua New Guinea. Their distribution also appears to be in shallow nearshore waters and clumped, often associated with river outfalls, suggesting a preference for estuarine regions. On the east coast a clumped distribution is also noted with the Mackay region thought to be a hotspot as few individuals are found elsewhere in Qld (Heupel et al, 2015).

Shark Control Program data

The Qld Shark Control Program (QSCP) began in 1962 using a system of nets and baited drumlines. In the > 50-year time series of data, hammerheads are reported to have made up approximately 23 % of the total catch from the program. Prior to 1996 identification to species level is considered poor, and after that much more robust due to an education and a species identification program for shark control operators (Roff et al, 2018). A recent comprehensive analysis of the QSCP data estimated that hammerhead populations in Qld had declined by 92 %, based on standardised Catch Per Unit Effort (CPUE) data from the program for all hammerhead species (Roff et al, 2018). They acknowledged the high uncertainty in the data in the early part of the time series, however, despite this, documented a 68 % decline in hammerheads in the past 25 years during which period the data is considered to be far more reliable.

Data specific for Scalloped hammerhead are consistent with these observations with a consistent decline in the number caught since 2001 (<http://qfish.fisheries.qld.gov.au>; accessed 14 January, 2020) (Figure 1a). For the same period, and consistent with findings of Roff et al (2018), the average size of Scalloped hammerhead sharks has declined from 2.06 m in 2001 to 1.38 m in 2019 (<http://qfish.fisheries.qld.gov.au>; accessed 14 January, 2020) (Figure 1b.).

It is possible that declines in hammerhead catches during the time series are confounded to some extent by the decreasing use of nets, which hammerheads are more susceptible to compared to drumlines (Sumpton et al, 2011). However, Roff et al (2018) used standardised CPUE in their analyses that accounted for gear amongst other factors. Also, despite the improvements in the species-specific nature of data collected by the QSCP, Chin et al. (2017) expressed concerns over the accuracy of species identification from this dataset, particularly that of female Scalloped hammerhead data used by Noriega et al (2011), suggesting there may still be improvement needed for accurate identification of hammerhead species. Despite this doubt, the declines noted in CPUE, catch and size appear to be consistent for all groupings of hammerhead data and Roff et al. (2018) give a reasonable synopsis of potential alternative

hypotheses to account for the long-term decline in shark populations observed in the QSCP data (https://static-content.springer.com/esm/art%3A10.1038%2Fs42003-018-0233-1/MediaObjects/42003_2018_233_MOESM1_ESM.pdf).

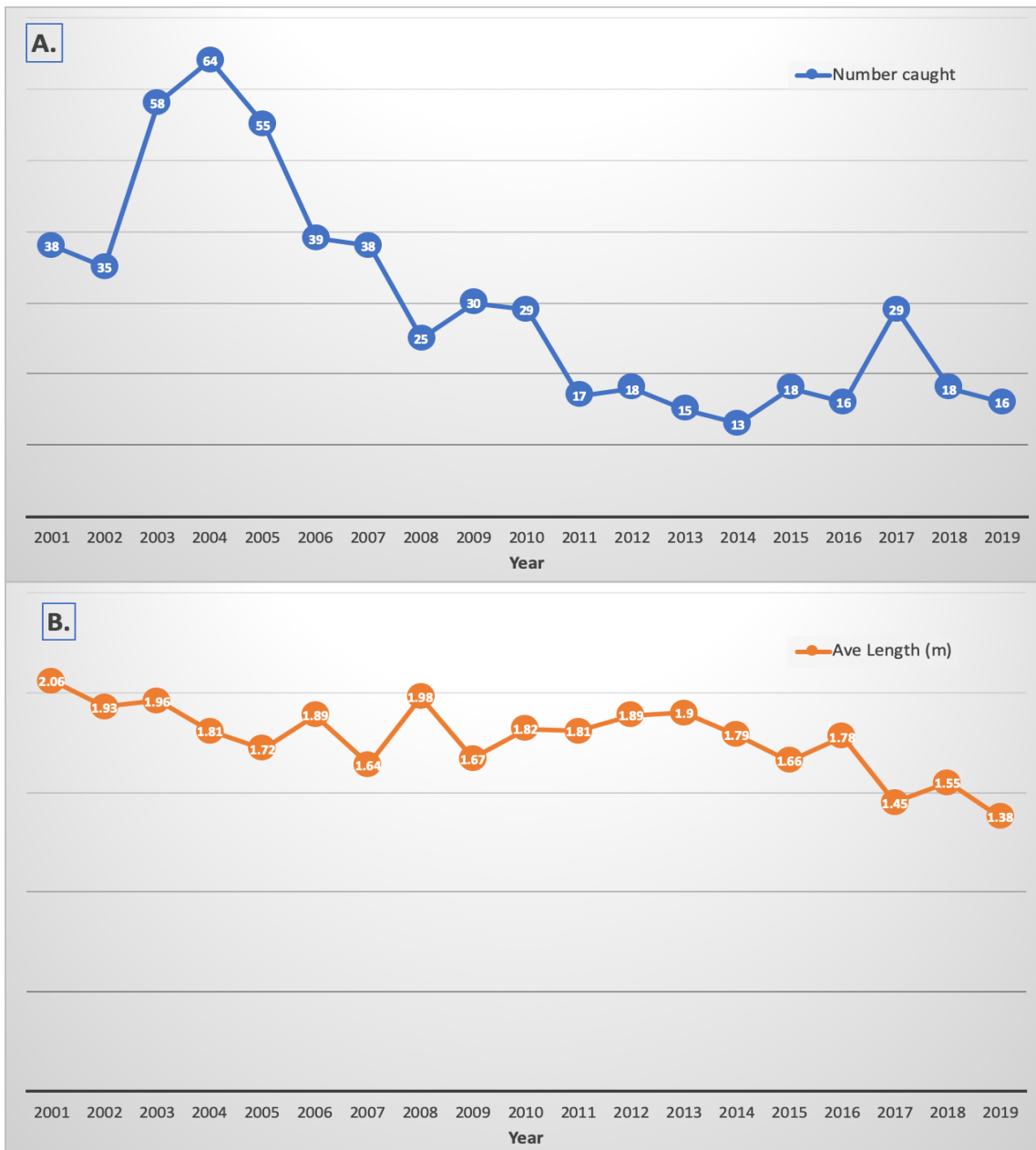


Figure 1. Data for Scalloped hammerhead caught in the Qld Shark Control Program from 2001-2019 showing A. a decline in the number caught annually, and B. a decline in the average size per year. Source: State of Queensland, Department of Agriculture, Fisheries.

Discards in Qld and NT

In Queensland, reporting of hammerhead discards in commercial logbooks was made mandatory from 2018. In the past two years reported discards of Scalloped hammerheads have

been 2,508 and 600 for 2018 and 2019² respectively. Catches in each of those years has been approximately 22 and 11 tonne respectively. Reported numbers for Great hammerhead is also high with over 1,100 discarded during 2018 (<http://qfish.fisheries.qld.gov.au>; accessed 13 January, 2020). Reporting of shark discards in commercial logbooks has been occurring for several years now in the NT.

Concerns over the validity of these estimates are far greater in Qld where independent monitoring has been lacking. Independent fishery observers also accompany some ONLF trips in the NT and the number of trips each year (coverage) is based on catch levels (NTPIR, 2018). E-logbooks have been introduced to most vessels in the NT with E-monitoring in place for high risk operations. In Qld, under WTO conditions a trial of E-monitoring was to be concluded by December 2019, and an “independent data collection and validation program in ECIFFF” implemented from January 2020. QDAF have been conducting at-sea monitoring of shark fishing operations in the ECIFFF since mid 2019, which provides independently validated information on catch composition, size and discards (QDAF, pers. comm.), however E-monitoring is proposed and will be necessary as a long-term independent data validation approach.

One of the key concerns over reporting of hammerhead species is the potential for misidentification. In the ONLF this is likely to only involve Great and Scalloped hammerheads since Winghead sharks are predominantly found close to shore. However, correct identification can be problematic especially for smaller individuals. In both Qld and the NT shark and ray species identification guides have been provided, along with some training, which in the NT at least is generally only done opportunistically (e.g. when observers are on-board) (NTDPIR, pers. comm.). It is unclear how training is provided in Qld, however the shark and ray commercial logbook provides a reference to page numbers of the id guide for each species to encourage more accurate species-level reporting. It is unclear if any ongoing assessment of fisher accuracy in identification is carried out but this would help inform the accuracy of data reported to some extent. Under the Qld *Sustainable Fisheries Strategy* a fisher Best Management Practice (BMP) program is proposed that may include better training in the identification of key species (<https://www.daf.qld.gov.au/business-priorities/fisheries/sustainable/sustainable-fisheries-strategy/fishery-working-groups/east-coast-inshore-working-group/communiques/29-30-august-2018>). Therefore, currently there is a higher possibility of misreporting of hammerhead species in Qld.

Of greater concern is the recent research that suggests that released hammerhead shark may have high levels of mortality (Dapp et al, 2015). The authors documented from literature searches that the immediate mortality (mortality occurring prior to processing, retention, or release) of Scalloped hammerhead from capture by gillnets was 89 %. For Scalloped hammerheads taken by longline this estimate was 57 %. Unfortunately, there are no estimates of post-release mortality available for Scalloped hammerheads. In other research of longline catches in NSW, modeled results indicate close to 100 % mortality for hammerheads combined (*Sphyrna* spp.), of which most were Scalloped hammerhead (Butcher et al, 2015). Great hammerheads have also been shown to have very high blood disturbance and impairment in mobility after capture by longlines relative to other sharks, with an inferred low post-release survival based on SPOT tags (Gallagher et al, 2014). Although these studies have all been based on line fisheries, it is reasonable to expect that post-release mortality levels of net-caught hammerheads is at least similar. These estimates are a cause for concern and suggest that the

² At the time of accessing the data, Qld commercial data for 2019 is incomplete with more records to be entered.

total mortality from fishing operations that discard a portion of their hammerhead catch is potentially much higher than reported catch levels alone.

Although there are concerns highlighted here, particularly for Qld, it should also be noted that: i) reporting of discards is still very new and so there is no time series to accurately understand if the reported levels are 'normal', and ii) under the Qld *Sustainable Fisheries Strategy* several mechanisms proposed will help improve the understanding of hammerhead discarding. It is critical however that validation of reported discard levels, including the condition at release, is carried out to better estimate the potential mortality of hammerheads. For example, from QFISH records in the Great Barrier Reef Marine Park, it was reported that approximately 4 Scalloped hammerhead were discarded for every one retained during 2018, whereas incomplete records for 2019 suggest that approximately only one was discarded for every one retained³. While these data suggest fewer discards the veracity of the information is unknown until independent data validation is done. The current monitoring by QDAF may help better inform discarding levels.

Progress against TSSC recommendations

The update of progress against the TSSC recommendations of management measures for implementation by Qld and NT governments are provided below, adopting the approach taken by Rayns (2019) using the same three outcomes: **IN PLACE**, **PARTLY IN PLACE** or **NOT IN PLACE**. Only TSSC recommendations where new information is provided are included, and a summary of outcomes for all recommendations are given in Tables 1 and 2 for Qld and the NT respectively.

³ Based on the average weight of Scalloped hammerhead taken in Qld of 11 kg based on observer data (Leigh et al, 2015).

Table 1. Performance against requirements for Conservation Dependent listing and expectations of the TSSC for **Queensland**. A comparison of the performance of each measure since the report of Rayns (2019) is also given to assess progress. Performance against the requirements are shown as: ‘in place’ (**green** shading), ‘partly in place’ (**orange**) and ‘not in place’ (**red**).

CD and TSSC requirements	Measure	Performance against measure	
		Rayns (2019)	This report
The species is a species of fish s.179(6)b(i)	Scalloped Hammerhead Shark is a species of fish		
The fish species is the focus of a plan of management that provides for the management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long-term survival in nature are maximised s.179(6)b(ii)	An annual TACC (with regional sublimits)		
	When 75% of the TACC is reached then trip limits (10 net & 4 line) are introduced		
	All hammerheads landed whole (head & fins attached)		
	Data validation (through prior reporting & at unloading)		
	Inspections at sea and in port		
	Reporting catch by phone to enable real-time catch-monitoring		
	Cross validation of data (fisher logbooks, VMS data & buyer sourcing)		
	Species specific catch and discard information in logbooks		
	N4 sector to have VMS		
The plan of management is in force under a law of the Commonwealth or State or Territory s179(6)b(iii)	An annual 150 t TACC for all hammerhead sharks (with regional sub-limits)		
	When 75% of the TACC is reached then regional control rules are triggered		

Cessation of the plan of management would adversely affect the conservation status of the species s179(6)b(iv)	Maintain all of the above measures		
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Table 2. Performance against requirements for Conservation Dependent listing and expectations of the TSSC for the **Northern Territory**. A comparison of the performance of each measure since the report of Rayns (2019) is also given to assess progress. Performance against the requirements are shown as: 'in place' (green shading), 'partly in place' (orange) and 'not in place' (red).

CD and TSSC requirements	Measure	Performance against measure	
		Rayns (2019)	This report
The species is a species of fish s.179(6)b(i)	Scalloped Hammerhead Shark is a species of fish		
The fish species is the focus of a plan of management that provides for the management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long-term survival in nature are maximised s.179(6)b(ii)	Annual TACC of 50t for Scalloped Hammerhead		
	Once catch reaches 37.5t then harvest control rules implemented		
	HCRs could include increased observer coverage, area closures, fishery closure, trip limits, gear restrictions and temporal closures		
	<i>Data validation techniques including:</i>		
	VMS on all vessels		
	Electronic logbooks		
	Product unloaded in Darwin & Gove only		
	Sharks landed with fins naturally attached (with exemptions)		
	Heads remain attached to body unless E-M operational		
Species specific recording in CDRs			

	Random port inspections		
	Increased monitoring to at least 20% where high risk of interactions exist		
The plan of management is in force under a law of the Commonwealth or State or Territory s179(6)b(iii)	Annual TACC of 50t for Scalloped Hammerhead under the NTONLF management plan		
	When 40t is reached then control rules are triggered including increased observer coverage		
	Implementing data validation techniques under the MP		
Cessation of the plan of management would adversely affect the conservation status of the species s179(6)b(iv)	Maintain all of the above measures		

QUEENSLAND

A harvest strategy (HS) is being developed for the ECIFFF and GCIFFF under the *Sustainable Fisheries Strategy*. The HS is expected to contain strategic objectives and performance criteria to measure the effectiveness of management arrangements. This is scheduled to be released for consultation in early 2020 and proposed to be implemented by July 2020.

Recommendation: All hammerheads landed whole (head & fins attached)

NOT IN PLACE

This recommendation remains unmet in Qld. The current TACC in Qld is based on the CITES NDF report with a 150 t limit for all hammerhead shark species combined, of which 78 t applies to northern Qld (GBRMP), 22 t in southern Qld, and 50 t in the Gulf of Carpentaria. Within this TACC a maximum of 100 t can be Scalloped hammerhead. Currently, hammerhead sharks can be processed at sea (fins not attached) until 75 per cent of the TACC is reached. Once this amount has been registered caught, trip limits apply and fishers are required to land sharks with fins (but not the head) attached to aid species identification. Once the TACC is reached Hammerhead shark become a no-take species (QDAF, pers. comm.). As part of the current fisheries reform process, regulatory changes have been proposed that include a requirement for all shark to be landed whole (gilled and gutted). QDAF report that these regulatory changes are expected to be considered by government and finalised soon (QDAF, pers. comm.).

Recommendation: Inspections at sea and in port

IN PLACE (previously assessed as **PARTLY IN PLACE**)

QDAF have adequate capabilities for at sea and in port inspections through the State's Boating and Fisheries Patrol. Further, under the Sustainable Fisheries Strategy, several new officers were recruited recently and new legislation has increased enforcement powers. As reported by Rayns (2019), the QDAF compliance program is guided by a fishery Compliance Risk Assessment framework which provides an overview at sea and in-port capabilities. The successful application of this framework, along with action plans that focus on key risk areas, is enhanced greatly by the mandatory introduction of VMS for all commercial fishing boats in the ECIFFF and GCIFFF from 1 January 2019. Fisheries Queensland produces quarterly compliance reports that detail compliance outcomes, significant detections, apprehensions and court results, although it does not detail the number of inspections, distinguish at-sea vs. in-port inspections, nor does it explicitly specify shark-related events. These are made publicly available online (e.g. https://www.daf.qld.gov.au/data/assets/pdf_file/0011/1285175/Quarterly-Compliance-Report.pdf).

Recommendation: Reporting catch by phone to enable real-time catch-monitoring

IN PLACE

For shark species, including hammerhead sharks, fishers currently must report their catch through QDAF's automated interactive voice response (AIVR) system prior to landing. There are currently variations in reporting requirements between fisheries and licence types for regulatory and practical reasons, however a consistent system across fisheries is proposed to be

implemented over the coming 18 months. Also, QDAF is proposing to remove the 1 hour prior reporting in 2020 given the requirement for vessel tracking on all commercial fishing boats (QDAF, pers. comm.).

Recommendation: Cross validation of data (fisher logbooks, VMS data & buyer sourcing)

PARTLY IN PLACE (previously assessed as **NOT IN PLACE**)

Historically, monitoring of commercial catch and effort data has primarily been through fishing logbooks which provide for reporting of target species including shark and ray species. The introduction of VMS to the ECIFFF and GCIFFF from January 2019 provides a significant independent data stream to QDAF for some level of cross validation with logbook data.

As reported by Rayns (2019), E-monitoring (app) is being investigated by QDAF and will be a significant advancement for the collection of fisher independent data and ultimately the improvement in accuracy of commercial catch data, particularly for the identification of shark species such as hammerheads. Rayns (2019) also noted that “...an independent data collection and validation program (such as electronic monitoring)...” would be implemented “..from 1 January 2020.” This has not yet been implemented, however, there is expected to be a staged implementation of E-monitoring starting in mid 2020. In the meantime, QDAF are undertaking at-sea monitoring and cross-checking logbook data with VMS data (QDAF, pers. comm.). QDAF report that when an appropriate E-monitoring system is identified it will be developed and rolled out over a 12-month period, before becoming mandatory (<https://www.daf.qld.gov.au/business-priorities/fisheries/sustainable/sustainable-fisheries-strategy/fisheries-reforms/proposed-changes-commercial-reporting>).

The QDAF fishery monitoring program currently undertakes at sea monitoring of shark fishing operations which provides independently validated information on catch composition, size and discards. An update will be provided to TSSC on this monitoring program in early 2020 and results published in mid 2020, once a full year’s data has been analysed (QDAF, pers. comm.).

Currently, Catch Disposal Records (for quota reporting) are in place and require the recording of shark species landed which enables cross checking with logbooks. Under the *Sustainable Fisheries Strategy*, tracking the sales chain for all quota and TACC species⁴ is proposed to be strengthened through a series of catch validation steps. This process is proposed as follows:

From January 2020

1. Submit a pre-trip notification via AIVR (Automated Integrated Voice Response) or electronic app
2. Record daily commitment to accurate numbers and estimated weights in a logbook (paper logbook or app)
3. Commit to accurate trip numbers for individual species prior to landing (AIVR or app)
4. Submit an accurate weights notice for individual species (**not quota groupings**) when fish are removed from the vessel (AIVR or app)

⁴ Reporting requirements for other species would not change.

5. Complete a catch disposal record at species level (**not quota groupings**) with accurate weights and accurate numbers at the point of disposal (paper catch disposal record or app)
6. Complete sales docket according to legislation (accurate weights for all sales—wholesale and retail)
7. Send logbook and catch disposal record to Fisheries Queensland (via post within seven business days after fishing, or daily via app).

From January 2021

1. Submit a pre-trip notification via electronic app
2. Record daily commitment to accurate numbers and estimated weights (app)
3. Commit to accurate trip numbers for individual species prior to landing (app)
4. Submit an accurate weights notice for individual species when fish are removed from the vessel (app)
5. Complete a catch disposal record at species level with accurate weights and accurate numbers at the point of disposal (app)
6. Complete sales docket according to legislation (accurate weights for all sales—wholesale and retail)
7. Data sent instantly to Fisheries Queensland (app).

Source: <https://www.daf.qld.gov.au/business-priorities/fisheries/sustainable/sustainable-fisheries-strategy/fisheries-reforms/proposed-changes-commercial-reporting>

Other relevant matters

Recreational fisheries

Since the Rayns (2019) report hammerhead sharks have become a no-take species in Queensland for recreational fishers.

Shark Control Program

In September 2019, a Federal Court decision required that all sharks caught within the Great Barrier Reef Marine Park must now be tagged and released alive within 24 hours of capture. Under the current Shark Control Program it was deemed not possible to comply with these changes and subsequently all shark control equipment has been removed from the Great Barrier Reef Marine Park area, While additional equipment has been installed in some locations outside the marine park, this has resulted in 21 fewer locations in the GBRMP with shark control equipment. However, the changes have resulted in an overall reduction of 141 drumlines across Qld.

Research & assessment

Rayns (2019) identified QDAF research due for completion in July 2020 that was to “..*validate catch composition of shark species in net fisheries along the east coast as well as the Gulf of Carpentaria. This project aims to determine species catch composition of harvest by sampling at ports, processors or on-board/on-water. It also aims to develop a profile of discards, by including data gathered from random on-board observations.*” This has been conducted as part of the QDAF monitoring program and as mentioned above, preliminary results are scheduled to be presented to TSSC in February 2020, with full results published in mid 2020. At-sea monitoring is

also using DNA sampling to obtain better shark species identification in the catch (QDAF, pers. comm.).

A new stock assessment for Scalloped hammerhead is being developed in partnership between Qld and the NT and taking into account stock structure information from recent research. This is expected to provide greater understanding of current status and sustainable catch limits. Information about this assessment will be presented at the February 2020 TSSC meeting (QDAF, pers. comm.).

NORTHERN TERRITORY

New regulations for the NT Offshore Net and Line Fishery (ONLF) commenced in December 2018 along with a management Framework that includes a harvest strategy. These respond to many of the TSSC's expectations regarding management measures for Scalloped Hammerhead shark.

Recommendation: HCRs could include increased observer coverage, area closures, fishery closure, trip limits, gear restrictions and temporal closures

IN PLACE

In regard to the range of management options that could be implemented under harvest control rules in the ONLF, one of the concerns raised by Rayns (2019) was that “While one or more of these measures might be useful none are pre-agreed HCRs so there may be considerable delay before any implementation during which time the TACC could be exceeded.” In the event that the 50 t is reached, it is worth noting that this limit is not a hard limit under NT legislation, although it is a requirement under WTO. Under the ONLF management framework there is a requirement to “Cease all fishing activity within one month of notification” if this limit is breached (NTDPIR, 2018). However, historic catches of Hammerhead sharks (Great and Scalloped combined) in the ONLF are quite low, with annual catches generally ~10 t. Therefore, it is highly unlikely that the 50 t TACC for Scalloped hammerhead will be exceeded, let alone reached. If catches do increase for whatever reason, the current trigger for when 37.5 t is taken (75 % of the TACC) requires trip limits to be introduced of no more than 5 individual Scalloped hammerheads (NTDPIR, 2018; NTDPIR, pers. comm.). The above, and improvements towards real-time data reporting, suggests the risk of reaching the TACC for Scalloped hammerhead at current efforts is low, noting that any increases in longlining effort will increase hammerhead catches. However, discard levels of hammerheads in the ONLF are unknown and as reported above, survival of any hammerhead discards are likely to be very low. If discard mortality estimates were available and taken into account it is possible that the total mortality could be much higher.

Rayns (2019) also noted the high priority that NT had placed on research that informs hammerhead shark assessment and management. Stock structure research for Scalloped hammerhead was recently completed and is likely to be published during early 2020. This research was a critical data gap in the NT and the results are currently being incorporated into a Scalloped hammerhead stock assessment. Preliminary results for this research and the stock assessment may be available at the next TSSC meeting (NTDPIR, pers. comm.).

Recommendation: Data validation techniques including:

- Electronic logbooks

PARTLY IN PLACE (previously assessed as **NOT IN PLACE**)

E-logbooks are now in place fleet-wide for all ONLF full-time NT-based vessels. These have been implemented gradually over the last 12 months, and like all new systems, some teething problems associated with proper training and receiving of data has occurred. These issues have been addressed as they emerge. E-logbooks are yet to be installed on some part-time operators and are to be done during 2020 (NTDPIR, pers. comm.).

E-monitoring has been implemented on all longline vessels and is proposed for net boats only if they want to fish at sea.

- Product unloaded in Darwin & Gove only

PARTLY IN PLACE

Scalloped Hammerhead (and other species) from the ONLF can only be landed in Gove and Darwin unless an exemption is granted by the Director of Fisheries. Exemptions require a satisfactory business case to be presented and if granted involves increased reporting and monitoring requirements for the vessel operator. Not many operators have applied for exemptions and they are generally part-time operators (NTDPIR, pers. comm.), therefore exemptions are likely to represent a small proportion of the fishery, however this is not quantified as it may conflict with privacy laws. It is also not clear what the increased reporting and monitoring constitutes.

- Heads remain attached to body unless E-M operational

NOT IN PLACE

Under the current approach in the NT, fishing methods deemed as being of high risk to sharks must be fitted with electronic monitoring capability. Therefore, all longliners in the ONLF have e-monitoring installed on their vessels and can land hammerheads with the heads removed. For all other vessels the requirement for heads to be attached only applies if the 37.5 t trigger is reached.

Recommendation: Implementing data validation techniques under the MP

IN PLACE (previously assessed as **PARTLY IN PLACE**)

With the implementation of the new regulations for the NT Offshore Net and Line Fishery (ONLF) in December 2018, along with a management framework that includes a harvest strategy, a framework for logbook data validation is in place. Two main techniques are applied: on-board observers and electronic monitoring. How and where these techniques are applied is based on rules associated with the level of catch by the operator, how much has been caught in relation to the TACC, and whether they are classified as a high-risk method (e.g. longlining). Further, VMS is installed on all vessels operating in the ONLF. Validated catch and species interaction (e.g. TEPS) data are linked to reference points under the harvest strategy however it is not clear of the extent in the use of these data validation techniques under the recently implemented plan.

Table 3. Performance of Queensland (Qld) and the Northern Territory (NT) against TSSC Recommendations to the Department of Environment & Energy. Performance against the requirements are shown as: ‘in place’ (green shading), ‘partly in place’ (orange) and ‘not in place’ (red).

Recommendation	Qld	NT
Check catch validation	Orange	Green
Check landing of hammerhead sharks with fins naturally attached	Red	Red
Advise the Committee of the QLD June 2019 review of hammerhead stock status	Green	Grey
Monitor catch levels of winghead sharks compared to scalloped & great hammerhead	Green	Green
A full review of the CITES non-detriment finding following the QLD review	NOT DUE YET	
TACCs to be reviewed in line with the revised non-detriment finding	NOT DUE YET	
An annual report on the performance of the suite of management arrangements relating to 179(6)(b)(ii)	Orange	Orange
Review this listing within 5 years	Grey	Grey

5. Discussion

Based on specific reference to the TSSC recommendations, current management arrangements in both Qld and NT do not support a CD listing for scalloped hammerhead sharks.

Despite progress by both Qld and NT in the implementation and improvement in some management measures expected by the Threatened Species Scientific Committee (TSSC) when listing Scalloped hammerhead as conservation dependent (CD), not all expectations have been met. Therefore, current management arrangements in both Qld and NT do not support a CD listing for Scalloped hammerhead sharks.

Queensland

Two of the recommendations not currently met result in a CD listing for scalloped hammerhead sharks in Qld not being supported: landing all hammerheads whole with head and fins attached (not in place), and the capacity for cross-validation of catch data (partly in place). For the landing of hammerheads whole, while this has not been implemented nearly two years after the CD listing, it has been proposed for implementation and is expected to be approved by government and “finalised soon”. The recommendation for cross-validation of data has made significant progress since with the introduction of VMS in January 2019 and the development of a draft framework for tracing product through the sales chain. Further, cross-validation of logbook data with VMS data has already been occurring (QDAF, pers. comm.).

This has been part of the process under the Qld *Sustainable Fisheries Strategy* which was always scheduled as a necessarily long process, and through its development looks likely to help meet all of the TSSC recommendations to satisfy CD listing. Notwithstanding the time lapsed since CD

listing and that all conditions are not yet met in Queensland, their scheduled activities suggest they will be in a position to meet all requirements sometime during 2020.

Northern Territory

New regulations for the NT Offshore Net and Line Fishery (ONLF) commenced in December 2018, comprising of a management framework and harvest strategy. Collectively these have helped respond to many of the TSSC's expectations regarding management measures for Scalloped Hammerhead shark. However, several recommendations not currently met result in a CD listing for scalloped hammerhead sharks in the NT not being supported: the use of electronic logbooks (partly in place), product landed in Darwin and Gove only (partly in place), and heads remain attached to body unless E-M operational (not in place).

For the use of electronic logbooks, these have been installed on all full-time ONLF operators with only the part-time operators remaining, and this is proposed to be completed during 2020 (NTDPIR, pers. comm.). For landing all product in Darwin and Gove only, this is only partly in place because exemptions are allowed to this but only where a satisfactory business case is presented. Further, if an exemption is granted the vessel operator is subjected to increased reporting and monitoring requirements. These operators also tend to be part-time operators and there are very few exemptions currently (NTDPIR, pers. comm.). Therefore, although this recommendation is only partly in place, depending on the increased conditions placed on the operator, it may be that this could be considered as fully meeting the recommendations. For the recommendation of heads to remain attached to body unless E-M operational, this could be considered as partly in place since all longliners must have e-monitoring installed as they are considered a high risk method. However, all other vessels in the ONLF do not require e-monitoring and can land sharks with the heads removed.

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