

**Lyn Low**

---

**From:** Daryl McPhee  
**Sent:** Monday, 10 May 2021 2:18 PM  
**To:** SCOTT-HOLLAND Tracey  
**Cc:** MIKITIS Michael  
**Subject:** Re: Shark Control Program - Target Species List

Thanks Tracey,

I can do this for you and will contact you this week.

Daryl

Daryl McPhee  
Associate Professor of Environmental Management  
Faculty of Society and Design



Phone: +61 7 5595 0554 - Personal Information  
Bond University | Gold Coast, Queensland, 4229, Australia  
CRICOS Provider Code 00017B



---

**From:** SCOTT-HOLLAND Tracey <Tracey.Scott-Holland@daf.qld.gov.au>  
**Sent:** Monday, 10 May 2021 1:07 PM  
**To:** Daryl McPhee <dmcphoe@bond.edu.au>  
**Cc:** MIKITIS Michael <Michael.Mikitis@daf.qld.gov.au>  
**Subject:** Shark Control Program - Target Species List  
**[CAUTION: External Sender]**

Hi Daryl,

As discussed, we are interested in engaging your professional services to assist with reviewing the Target Species List for the Queensland Shark Control Program.

Can you please advise if you have the capacity to deliver the following services and provide a quote for this.

- Review the attached Target Species Criteria in consultation with the Shark Control Program Scientific Working Group (Attachment 1);
- Assess 19 target shark species (Attachment 2) against the revised target species criteria;
- Provide a report on the assessment; and
- Deliver a presentation on the findings to the Shark Control Program Scientific Working Group (either in person or via an online platform e.g. zoom/Microsoft teams).

Attachment 2 also includes a history of species taken in the Program.

Kind Regards  
Tracey



**Dr Tracey Scott-Holland**

Research & Policy Coordinator (Shark Control Program), Fisheries Queensland  
Department of Agriculture and Fisheries

Sch **W** **Personal Information** [tracey.scott-holland@daf.qld.gov.au](mailto:tracey.scott-holland@daf.qld.gov.au) **W** [www.daf.qld.gov.au](http://www.daf.qld.gov.au)

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**Lyn Low**

---

**From:** FOSTER Kimberly  
**Sent:** Friday, 30 July 2021 1:52 PM  
**To:** SCOTT-HOLLAND Tracey; MIKITIS Michael  
**Subject:** RE: Shark Control Program Scientific Working Group - draft agenda 24-25 August

Hi

Had a quick look.

Rather than put net replacement in lights I think we just raise it in the verbal update. Will this include an update on catch alert drumlines as well?

Otherwise all good with me.

Michael – we may need to socialise the target species list with ED/DDG before it goes out.

K



Regards,

Kimberly Foster

Director (Management & Reform), Fisheries Queensland  
Department of Agriculture and Fisheries

Sch 4 - Personal Information  
[kimberly.foster@daf.qld.gov.au](mailto:kimberly.foster@daf.qld.gov.au)  
Mineral House, Level 5, 41 George Street, Brisbane QLD 4000  
GPO Box 46, Brisbane QLD 4001

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**From:** SCOTT-HOLLAND Tracey <Tracey.Scott-Holland@daf.qld.gov.au>  
**Sent:** Friday, 30 July 2021 1:43 PM  
**To:** FOSTER Kimberly; MIKITIS Michael  
**Subject:** Shark Control Program Scientific Working Group - draft agenda 24-25 August

Hi Michael and Kimberly,

Draft agenda for the Shark Control Program Scientific Working Group is attached.

I will work on the agenda papers while you are on leave Kimberly so when you get back you can review them and we can get all of the materials out to our members well before the meeting.

Let me know if you want to see any additional items on there.

Michael and I have discussed a few things that can be updated verbally within the SCP update or other agenda items but may not specifically need an item of its own.

Thanks

Trace



**Dr Tracey Scott-Holland**

Research & Policy Coordinator (Shark Control Program), Fisheries Queensland  
Department of Agriculture and Fisheries

Sch 41 - Personal Information **Dr Tracey Scott-Holland** [Tracey.scott-holland@daf.qld.gov.au](mailto:Tracey.scott-holland@daf.qld.gov.au) [W www.daf.qld.gov.au](http://www.daf.qld.gov.au)

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## Lyn Low

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**From:** Michael Mikitis  
**Sent:** Friday, 1 April 2022 8:53 AM  
**To:** Tracey Scott-Holland  
**Subject:** RE: Shark Control Program Scientific Working Group - request vessel visit Townsville

More than happy to accommodate but the same rules need to apply. Yes he will need to be covered by work cover etc.

---

**From:** Tracey Scott-Holland <Tracey.Scott-Holland@daf.qld.gov.au>  
**Sent:** Friday, 1 April 2022 8:49 AM  
**To:** Michael Mikitis  
**Subject:** FW: Shark Control Program Scientific Working Group - request vessel visit Townsville

Hi Michael,  
I'm trying to work out the best way to accommodate this.  
Would Adam need to have his own insurances?  
Trace

---

**From:** adam.smith <[adam.smith@reefecologic.org](mailto:adam.smith@reefecologic.org)>  
**Sent:** Thursday, 31 March 2022 4:56 PM  
**To:** Tracey Scott-Holland  
**Subject:** Re: Shark Control Program Scientific Working Group - request vessel visit Townsville

Tracey  
It has been about 2 years and I am interested to do another trip on the local Townsville shark control vessel.to keep up to date  
Can you please ask if this is possible and what days and times  
Adam



**Dr Adam Smith**  
Managing Director  
14 Cleveland Terrace, Townsville QLD 4810  
Msch 4 - Personal Information  
[adam.smith@reefecologic.org](mailto:adam.smith@reefecologic.org)



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On 31 Mar 2022, at 4:27 pm, Tracey Scott-Holland <[Tracey.Scott-Holland@daf.qld.gov.au](mailto:Tracey.Scott-Holland@daf.qld.gov.au)> wrote:

Dear Members,

I hope you are all well and 2022 has been kind to you so far.

Can you please complete the survey below to advise your availability for the next Shark Control Program Scientific Working Group meeting.  
The meeting will be online via Teams (we look forward to being able to meet in person again soon!). It's likely that the meeting will be split across two sessions on different days so please ensure you select ALL dates that would be suitable for you.  
<https://www.surveymonkey.com/r/BVMMBKF>

In addition to our standard recurring agenda items the following items are on the agenda.

- Shark barrier trial
- SharkSmart drone trial
- Catch alert drumline trial
- Trial – targeting bull sharks with traditional drumlines (net replacement will be discussed).
- Target species list review

If you have any other suggestions for agenda items please let me know.

Please note I will be on leave next week and will finalise the meeting arrangements and agenda when I return.

Thanks  
Tracey

<image004.png>

**Dr Tracey Scott-Holland**

Research & Policy Coordinator (Shark Control Program), Fisheries Queensland  
Department of Agriculture and Fisheries

Sch M- Personal Information [tracey.scott-holland@daf.qld.gov.au](mailto:tracey.scott-holland@daf.qld.gov.au) W [www.daf.qld.gov.au](http://www.daf.qld.gov.au)

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---

**From:** Tracey Scott-Holland  
**Sent:** Thursday, 14 April 2022 9:13 AM  
**To:** adam.smith; Michael Mikitis; Samuel Fary  
**Cc:** Sch 4 - Personal Information  
**Subject:** RE: Shark Control Program Scientific Working Group - Townsville

Thanks Adam.  
Appreciate the feedback. Kevin certainly runs a very tight ship.  
Shame you didn't get to see them tag a big tiger. Maybe next time!  
Cheers  
Tracey

---

**From:** adam.smith <adam.smith@reefecologic.org>  
**Sent:** Thursday, 14 April 2022 8:47 AM  
**To:** Michael Mikitis; Samuel Fary; Tracey Scott-Holland  
**Cc:** Sch 4 - Personal Information  
**Subject:** Re: Shark Control Program Scientific Working Group - Townsville

Thank you Michael, Sam and Tracey  
Myself and JCU intern Sch 4 - Personal Information travelled with the Townsville shark control vessel yesterday Wed 13 April. I was very informative to talk with Kevin and meet Oliver- they are a very professional team. They changed gear and rebaited hooks and interacted with one member of the public who was in a vessel and attached to a drumlines at Horseshoe bay  
No sharks were caught  
Adam



**Dr Adam Smith**  
Managing Director  
14 Cleveland Terrace, Townsville QLD 4810  
Sch 4 - Personal Information  
adam.smith@reefecologic.org



*Multi-award, sustainable business that collaborates, researches and restores marine systems.  
We respect the Traditional owners of the Moo'ga (Great Barrier Reef)*

On 4 Apr 2022, at 12:37 pm, Michael Mikitis <Michael.Mikitis@daf.qld.gov.au> wrote:

Hi Adam,

Thank you for supplying the attached information. Your request is approved.

Please work with Sam to arrange suitable dates with Kevin for the trip to occur.

Sam, please check Kevin's maximum passenger/crew capacity for the vessel.

Regards

<image004.png> **Michael Mikitis**  
Manager (Shark Control Program) Fisheries Queensland  
Department of Agriculture and Fisheries

Sch 4 - Personal Information michael.mikitis@daf.qld.gov.au W www.daf.qld.gov.au  
Level 5, 41 George Street, Brisbane QLD 4000  
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**From:** adam.smith <adam.smith@reefecologic.org>  
**Sent:** Monday, 4 April 2022 9:25 AM  
**To:** Michael Mikitis; Samuel Fary  
**Cc:** Tracey Scott-Holland  
**Subject:** Re: Shark Control Program Scientific Working Group - request vessel visit Townsville

Good morning Michael and Samuel

As requested - some details and attachments below

Purpose of the trip

Adj Assoc prof Adam Smith is a member of the Queensland Government Shark Control Scientific Working Group I believe it is vital to connect with all people involved in the activity. A very important group is the contractors who undertake the shark control activities. Several years ago I travelled out on the Townsville shark control boat to observe activities and talk to the operator Kevin. We did not observe or catch any sharks on the day. I am keen to do this again and see if there are any changes. If possible I would also like to request attendance on our JCU Master in Fisheries intern 4 - Personal Information to join the trip

No activities will be conducted (just observing)

Copies of insurances attached

On 1 Apr 2022, at 8:57 am, Tracey Scott-Holland <tracey.scott-holland@daf.qld.gov.au> wrote:

Hi Adam,

This shouldn't be a problem.

Can you please send an email to Michael Mikitis with the following information:

- Purpose of the trip (including activities to be conducted – if any);
- If any activities are to be conducted include copies of your risk assessments (not required if just observing);
- Attach copies of your insurances (Workcover, public liability).

Michael can approve the trip and then our Operations Coordinator Sam Fary will be able to check the Townsville service schedule to help you find a suitable time.

Thanks  
Tracey

---

**From:** adam.smith <adam.smith@reefecologic.org>  
**Sent:** Thursday, 31 March 2022 4:56 PM  
**To:** Tracey Scott-Holland  
**Subject:** Re: Shark Control Program Scientific Working Group - request vessel visit Townsville

Tracey  
It has been about 2 years and I am interested to do another trip on the local Townsville shark control vessel.to keep up to date  
Can you please ask if this is possible and what days and times  
Adam  
<image001.png>

On 31 Mar 2022, at 4:27 pm, Tracey Scott-Holland <Tracey.Scott-Holland@daf.qld.gov.au> wrote:

Dear Members,

I hope you are all well and 2022 has been kind to you so far.

Can you please complete the survey below to advise your availability for the next Shark Control Program Scientific Working Group meeting.

The meeting will be online via Teams (we look forward to being able to meet in person again soon!).

It's likely that the meeting will be split across two sessions on different days so please ensure you select ALL dates that would be suitable for you.

<https://www.surveymonkey.com/r/BVMMBKF>

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- Shark barrier trial
- SharkSmart drone trial
- Catch alert drumline trial
- Trial – targeting bull sharks with traditional drumlines (net replacement will be discussed).
- Target species list review

If you have any other suggestions for agenda items please let me know.

Please note I will be on leave next week and will finalise the meeting arrangements and agenda when I return.

Thanks  
Tracey

<image004.png>

**Dr Tracey Scott-Holland**  
Research & Policy Coordinator (Shark Control Program), Fisheries Queensland

Sch 41. Personal Information  
M. Personal Information: [Francesy.scott-holland@daf.qld.gov.au](mailto:Francesy.scott-holland@daf.qld.gov.au) W [www.daf.qld.gov.au](http://www.daf.qld.gov.au)  
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<Reef Ecologic Company details March 2022 2.docx>

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---

**From:** Simpfendorfer, Colin <colin.simpfendorfer@jcu.edu.au>  
**Sent:** Friday, 4 June 2021 7:15 AM  
**To:** SCOTT-HOLLAND Tracey  
**Subject:** RE: Shark Control Program Scientific Working Group - update for your information

Thanks for the update Tracey

Cheers

Colin

Colin Simpfendorfer PhD  
Adjunct Professor  
College of Science and Engineering  
James Cook University  
(Hobart based)  
E: [colin.simpfendorfer@jcu.edu.au](mailto:colin.simpfendorfer@jcu.edu.au)  
Mobile - Personal Information  
Web: [jcu.me/colin.simpfendorfer](http://jcu.me/colin.simpfendorfer)  
Twitter: @sharkcolin  
Instagram: @sharkcolin

---

**From:** SCOTT-HOLLAND Tracey <Tracey.Scott-Holland@daf.qld.gov.au>  
**Sent:** Wednesday, 2 June 2021 11:21 AM  
**To:** Simpfendorfer, Colin <colin.simpfendorfer@jcu.edu.au>; MITCHELL Jonathan <Jonathan.Mitchell@daf.qld.gov.au>; Julia Chandler <julia.chandler@gbmpa.gov.au>; Peta Lawlor <plawlor@lifesaving.com.au>; Richard Fitzpatrick <richard.fitzpatrick@biopixel.tv>; Angela Freeman <angela@wildlifetnq.com>; adam.smith <adam.smith@reefecologic.org>; KILPATRICK Carley <Carley.Kilpatrick@des.qld.gov.au>  
**Cc:** FOSTER Kimberly <KIMBERLY.FOSTER@daf.qld.gov.au>; MIKITIS Michael <Michael.Mikitis@daf.qld.gov.au>  
**Subject:** Shark Control Program Scientific Working Group - update for your information

Dear Members,

For your information:

**SharkSmart Drone Trial:**

Following on from our discussions at the last meeting, the SharkSmart drone trial has been extended to 4 October 2021 (the end of the spring school holidays) in south east Queensland.

In addition, flights will commence at Palm Cove (Cairns) and Alma Bay (Magnetic Island), this month and will continue until November 2021 when stinger nets are returned to the water.

Cairns Regional Council, Townsville City Council and local indigenous groups have been advised and offered a briefing about the trial.

We are preparing for a possible media announcement and will share those details with you once released so **please treat this as confidential until publicly announced.**

Should you receive any enquiries from the community, please encourage them to visit

<https://www.daf.qld.gov.au/sharksmart/drone-trial> or call DAF on 13 25 23.

**SMART drumline trial:**

Thank you all for endorsing the SMART drumline trial sampling and analysis plan. The plan has now been submitted to GBRMPA for approval.

We are working through final approvals and operational details for the trial to commence as soon as possible.



### Shark Control Program Target Species List Review

The SCP has engaged Professor Daryl McPhee to review the current target species list against the criteria developed in consultation with the Scientific Working Group.

Professor McPhee will present his assessment to the group at the next meeting.

### SCP SWG Meeting Communique

The communique from the last meeting has been submitted for publication on the DAF website and will be available in the coming days.

Kind Regards

Tracey



#### Dr Tracey Scott-Holland

Research & Policy Coordinator (Shark Control Program), Fisheries Queensland  
Department of Agriculture and Fisheries

Sch W Personal Information [tracey.scott-holland@daf.qld.gov.au](mailto:tracey.scott-holland@daf.qld.gov.au) W [www.daf.qld.gov.au](http://www.daf.qld.gov.au)

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**From:** Simpfordorfer, Colin <colin.simpfordorfer@jcu.edu.au>  
**Sent:** Tuesday, 23 November 2021 12:53 PM  
**To:** Tracey Scott-Holland; Jonathan Mitchell; Julia Chandler; Peta Lawlor; Richard Fitzpatrick; Angela Freeman; Angela Freeman; adam.smith; Carley Kilpatrick; Marcel Green  
**Cc:** Kimberly Foster; Michael Mikitis  
**Subject:** RE: Shark Control Program Scientific Working Group draft communique for review  
**Attachments:** Communique 24 and 25 August 2021 Draft cs.docx

Tracey

My comments on the communique in the attached. Mostly minor.

Sch 4 - Personal Information

Now on the Target Species Review.

Sch 4 - Deliberative Process

Sch 4 - Deliberative Process

Cheers

Colin

Colin Simpfordorfer PhD  
Adjunct Professor  
College of Science and Engineering  
James Cook University  
(Hobart based)  
E: [colin.simpfordorfer@jcu.edu.au](mailto:colin.simpfordorfer@jcu.edu.au)  
Mobile: [redacted] - Personal Information  
Web: [jcu.me/colin.simpfordorfer](http://jcu.me/colin.simpfordorfer)  
Twitter: @sharkcolin  
Instagram: @sharkcolin

---

**From:** Tracey Scott-Holland <Tracey.Scott-Holland@daf.qld.gov.au>  
**Sent:** Friday, 19 November 2021 3:43 PM  
**To:** Jonathan Mitchell <Jonathan.Mitchell@daf.qld.gov.au>; Simpfordorfer, Colin <colin.simpfordorfer@jcu.edu.au>; Julia Chandler <julia.chandler@gbrmpa.gov.au>; Peta Lawlor <plawlor@lifesaving.com.au>; Richard Fitzpatrick <richard.fitzpatrick@biopixel.tv>; Angela Freeman <angela@wildlifetnq.com>; Angela Freeman <angela@iig.com.au>; adam.smith <adam.smith@reefecologic.org>; Carley Kilpatrick <Carley.Kilpatrick@des.qld.gov.au>; Marcel Green <marcel.green@dpi.nsw.gov.au>  
**Cc:** Kimberly Foster <KIMBERLY.FOSTER@daf.qld.gov.au>; Michael Mikitis <Michael.Mikitis@daf.qld.gov.au>  
**Subject:** RE: Shark Control Program Scientific Working Group draft communique for review

Hi Everyone,

A couple of members have requested some more time to review the draft communique so I'm extending the time for feedback to next Tuesday 23 November. If you need more time than this can you please let me know otherwise if I haven't heard from you we will finalise the communique for publication.

Thanks  
Tracey

---

**From:** Tracey Scott-Holland

**Sent:** Friday, 12 November 2021 9:05 AM

**To:** Jonathan Mitchell; Simpfendorfer, Colin; Julia Chandler; Peta Lawlor; Richard Fitzpatrick; Angela Freeman; Angela Freeman; adam.smith; Carley Kilpatrick; Marcel Green

**Cc:** Kimberly Foster; Michael Mikitis

**Subject:** Shark Control Program Scientific Working Group draft communique for review

Hi Everyone,

Please find attached the draft communique from the last meeting (apologies for the delay in getting this to you). Can you please provide any feedback via tracked changes by next Friday 19 November.

I have also reattached the information about the target species review as discussed at the meeting (please treat this as confidential).

If you would like to provide any additional feedback on this please also provide this to me by Friday 19 November.

Can you also advise your availability for our next meeting during the week of 13-17 December. I am proposing a half day meeting where we will review the drone trial evaluation and discuss the next steps.

Kind Regards  
Tracey



**Dr Tracey Scott-Holland**

Research & Policy Coordinator (Shark Control Program), Fisheries Queensland  
Department of Agriculture and Fisheries

Sch 41 - Personal Information [Tracey.scott-holland@daf.qld.gov.au](mailto:Tracey.scott-holland@daf.qld.gov.au) W [www.daf.qld.gov.au](http://www.daf.qld.gov.au)

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## Communique 24 and 25 August 2021

The Shark Control Program Scientific Working Group (the Group) met on 24 and 25 August 2021.

The Group received an update on the draft *Queensland Shark Management Plan 2021-25* (the Plan). The Plan was amended to address ~~minor~~ feedback received from Group members and during an internal government consultation process. The Plan ~~and~~ is progressing through an internal approval process.

Members were advised that the Shark Control Program (the Program) has received additional funding to 1) cover the increased cost of delivering the Program in the Great Barrier Reef Marine Park on an ongoing basis, 2) provide ongoing funding for the SharkSmart drone trial/program; and 3) to temporarily engage a contractor to review the end-to-end data management processes. The Group was advised that no decision had been made about the proposed net replacement trial so there would be no changes made to the configuration of equipment during 2021. The Group will be further consulted about the proposed trial for 2022. The Group discussed claims made that the Program has increased its footprint since the commencement of the EPBC Act. Fisheries Queensland advised that the basis for these claims was unclear.

NSW Fisheries provided an update on the program in NSW. Members noted that 4VRG listening stations, drones and the netting program are continuing in 2021/22. Further details of the 2021/22 program are yet to be announced by the NSW Government. NSW Fisheries continues to operate under a Memorandum of Understanding with NSW ~~police~~ Police and Surf Life Saving NSW for shark incident response. NSW Fisheries has piloted a community support program in partnership with Rural Adversity Mental Health Program (RAMHP) and 'Bite Club' to respond to shark bite incidents. RAMHP counsellors and psychologists provide mental health support, while NSW Fisheries staff provide information about sharks and shark mitigation, with 'Bite Club' members providing emotional peer support. Feedback on the initiative has been mostly positive and constructive with NSW Fisheries seeking to formalise an arrangement with RAMHP and 'Bite Club' to deliver future programs.

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**Commented [CS1]:** I think it is also fair to say that the Group was disappointed that the trial was not undertaken in 2021. I'm not proposing that this be included here. But I think if it does not occur in 2022 then I think the Group may become more vocal in its concerns.

**Commented [CS2]:** Is this the right term? I thought they were VR4G – worth checking

The Group noted and discussed the circumstances of several serious shark bite incidents that occurred in New South Wales since the previous meeting and noted that no serious shark bite incidents ~~have had~~ been recorded in Queensland since the previous meeting.

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The Group discussed the development of bite proof wetsuits, noting that NSW Fisheries has invested some funding into the development and testing of some materials.

The next meeting is planned for late November/early December 2021.



**From:** Tracey Scott-Holland  
**Sent:** Friday, 19 November 2021 2:43 PM  
**To:** Jonathan Mitchell; Simpfendorfer, Colin; Julia Chandler; Peta Lawlor; Richard Fitzpatrick; Angela Freeman; Angela Freeman; adam.smith; Carley Kilpatrick; Marcel Green  
**Cc:** Kimberly Foster; Michael Mikitis  
**Subject:** RE: Shark Control Program Scientific Working Group draft communique for review  
**Attachments:** Communique 24 and 25 August 2021 Draft.docx; Agenda Item 4 - CONFIDENTIAL - Target Species List Review.pdf; Agenda Item 4 - CONFIDENTIAL - Attachment 1 - A Review of the Shark Control Program Target Shark Species List.docx; Agenda Item 4 - CONFIDENTIAL - Attachment 2 - SCP Target Species List Appendix 1.docx

Hi Everyone,

A couple of members have requested some more time to review the draft communique so I'm extending the time for feedback to next Tuesday 23 November. If you need more time than this can you please let me know otherwise if I haven't heard from you we will finalise the communique for publication.

Thanks  
Tracey

---

**From:** Tracey Scott-Holland  
**Sent:** Friday, 12 November 2021 9:05 AM  
**To:** Jonathan Mitchell; Simpfendorfer, Colin; Julia Chandler; Peta Lawlor; Richard Fitzpatrick; Angela Freeman; Angela Freeman; adam.smith; Carley Kilpatrick; Marcel Green  
**Cc:** Kimberly Foster; Michael Mikitis  
**Subject:** Shark Control Program Scientific Working Group draft communique for review

Hi Everyone,

Please find attached the draft communique from the last meeting (apologies for the delay in getting this to you). Can you please provide any feedback via tracked changes by next Friday 19 November.

I have also reattached the information about the target species review as discussed at the meeting (please treat this as confidential).

If you would like to provide any additional feedback on this please also provide this to me by Friday 19 November.

Can you also advise your availability for our next meeting during the week of 13-17 December. I am proposing a half day meeting where we will review the drone trial evaluation and discuss the next steps.

Kind Regards  
Tracey



**Dr Tracey Scott-Holland**

Research & Policy Coordinator (Shark Control Program), Fisheries Queensland  
Department of Agriculture and Fisheries

Sch 4 Personal Information [Tracey.scott-holland@daf.qld.gov.au](mailto:Tracey.scott-holland@daf.qld.gov.au) W [www.daf.qld.gov.au](http://www.daf.qld.gov.au)

**In the office:** Tuesday and Thursday  
Level 5, 41 George Street, Brisbane QLD 4000  
GPO Box 46, Brisbane QLD 4001

**Customer Service Centre** 13 25 23

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## Communique 24 and 25 August 2021

The Shark Control Program Scientific Working Group (the Group) met on 24 and 25 August 2021.

The Group received an update on the draft *Queensland Shark Management Plan 2021-25* (the Plan). The Plan was amended to address minor feedback received from Group members and during an internal government consultation process and is progressing through an internal approval process.

Members were advised that the Shark Control Program (the Program) has received additional funding to 1) cover the increased cost of delivering the Program in the Great Barrier Reef Marine Park on an ongoing basis, 2) provide ongoing funding for the SharkSmart drone trial/program; and 3) to temporarily engage a contractor to review the end-to-end data management processes. The Group was advised that no decision had been made about the proposed net replacement trial so there would be no changes made to the configuration of equipment during 2021. The Group will be further consulted about the proposed trial. The Group discussed claims made that the Program has increased its footprint since the commencement of the EPBC Act. Fisheries Queensland advised that the basis for these claims was unclear.

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The next meeting is planned for late November/early December 2021.

# Shark Control Program Scientific Working Group

## Agenda Paper 1

24 August 2021

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**TITLE:** *Target Species List Review*

**AGENDA ITEM NO: 4**

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**CONFIDENTIAL – NOT FOR FURTHER DISSEMINATION**

### Recommendation:

#### That working group members:

- **Note** the draft report 'A Review of the Shark Control Program Target Shark Species List' (Attachment 1 & 2) and presentation by Dr Daryl McPhee.
- **Provide** initial feedback on the draft report and application of the criteria used to develop the revised target species list for the Shark Control Program (the Program).
- **Provide** advice on possible issues or risks Fisheries Queensland would need to consider in reviewing the target species list.

### Background

- The Department of Agriculture and Fisheries (DAF) maintains a target shark species list. Target sharks are those that pose a significant risk to water users and are euthanised if caught in the Program.
- The target species list does not apply to the Program in the GBRMP where all animals (including sharks) caught on drumlines are released alive if possible and safe to do so.
- A set of criteria to determine which sharks should be included on the target species list was developed in consultation with the Shark Control Program Scientific Working Group.
- Dr Daryl McPhee, Associate Professor, Environmental Management, Bond University was engaged to undertake the assessment of the current 19 target shark species against the criteria and to deliver a report with recommendations to the Department.

**Responsible officer:** Dr Tracey Scott-Holland

**Position:** Research & Policy Coordinator, Shark Control Program

# **A Review of the Shark Control Program Target Shark Species List**

**Dr Daryl McPhee**

**Draft - 1<sup>st</sup> July 2021**

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## EXECUTIVE SUMMARY

This report applied three criteria to the current list of target species of the Queensland Shark Control Program (QSCP). The three criteria used were:

- Criteria 1: Is the species known to occur in coastal Queensland waters where the shark program operates outside of the Great Barrier Reef Marine Park?
- Criteria 2: Has the species been associated with unprovoked bite/s resulting in serious injury or fatality in Australia?
- Criteria 3: Is the number of unprovoked bites resulting in serious injury or fatality relatively high?

A review of habitat requirements and the known distribution of shark species was used to address criteria 1.

The Global Shark Accident File (GSAF) was used to determine the occurrence of unprovoked bites from the species considered and this was augmented where possible with peer-reviewed literature. The focus of the assessment was on Australia but information from other countries was used to provide a broader context. Severe bites were defined with respect to comparing available information on injuries sustained with a previously published bite severity index. It is not possible in all instances to reliably determine the species of shark involved in an unprovoked bite.

The results of the review are summarised in Table 1.

It is recommended that based on the criteria applied the QSCP should have three species only as target species - bull, white and tiger sharks.

Of the remaining species considered, one is unlikely to or rarely occur in nearshore coastal waters where the QCSP operates. A further nine species are known to occur at times in nearshore coastal waters where the QCSP operates but are not recorded as the species involved in unprovoked bites in Australia, or in the case of blue sharks are highly likely to have been misidentified. The remaining four species have been recorded as the species involved in unprovoked bites in Australia although the frequency of bites is low (1 or 2). In the case of the bite attributed to a mako shark, the involvement of a mako shark is plausible but it may have been the result of another species.

**Table 1 Summary of the Application of the Three Criteria for Determining Whether a Shark Species are Recommended for Inclusion on the QSCP Target Species List.**

Species	Criteria 1.	Criteria 2.	Criteria 3.	Target Species List
White Shark	YES	YES	YES	YES
Tiger Shark	YES	YES	YES	YES
Bull Shark	YES	YES	YES	YES
Blacktip Whalers	YES	YES	NO	NO
Great Hammerhead	YES	YES	NO	NO
Grey Reef Whaler	YES	YES	NO	NO
Longfin and Shortfin Mako Shark	YES	YES <sup>1</sup>	NO	NO
Lemon Shark	YES	NO	NO	NO
Blue Shark	YES	NO <sup>2</sup>	NO	NO
Dusky Whaler	YES	NO	NO	NO
Spinner Shark	YES	NO	NO	NO
Pigeye Shark	YES	NO	NO	NO
Sandbar Shark	YES	NO	NO	NO
Silky Whaler	YES	NO	NO	NO
Silvertip Whaler	YES	NO	NO	NO
Big Nose Whaler	YES	NO	NO	NO
Oceanic Whitetip Shark	NO	NO	NO	NO

<sup>1</sup> This assumes the single recorded bite was correctly attributed to the species.

<sup>2</sup> While an unprovoked fatal bite has been attributed to this species in Queensland, the weight of evidence suggests the species involved was a white shark.

## INTRODUCTION

The Queensland Department of Primary Industries Shark Control Program has continued to evolve in response to knowledge, technology, and changes in community attitudes towards sharks and shark bite. The Queensland Shark Control Program (QSCP) operates mesh nets and baited drumlines at beaches popular for surfers and swimmers. The program commenced in 1962 and very early in the program's inception a decision was made to release several species alive as they posed no risk of serious injury to beach goers. This included Port Jackson sharks, tawny sharks, and whale sharks. In 2001, grey nurse sharks were also to be released alive if caught in the program. This decision was based on concerns for the status of the east coast population of the species as well as general recognition that their risk to humans from an unprovoked shark bite may have been historically overstated.

In 2017 the Great Barrier Reef Marine Park Authority issued a renewed permit for the QSCP to operate in the GBRMP. Under the permit, a target species list was established. This is the first time a target species list was established for the Program. Prior to this, a non-dangerous shark list was maintained and all species on the non-dangerous list were released alive. This list of non-dangerous species included a further 16 species identified in 2015 through a comprehensive review of all shark species taken in the program was undertaken by DAF, GBRMPA and JCU with input from NSW DPI. Species identified as non-dangerous included the scalloped hammerhead shark, spot-tail shark and bronze whaler. A further review of the target species list in 2018 resulted in the following shark species removed from it: black tip reef whaler, three thresher shark species, school shark, Galapagos shark, and white tip reef shark.

Following a decision in 2019 in the Administrative Appeals Tribunal (AAT) the target species list was removed from the GBRMP Permit, thus requiring all sharks caught to be released alive. The Target Species list continues to apply to all waters outside of Commonwealth GBRMP waters. Target sharks captured outside of the Commonwealth GBRMP are euthanised. Currently the SCP Target Species list includes the following (in alphabetical order):

- Australian Blacktip
- Big Nose Whaler
- Blue Shark
- Bull Whaler
- Common Blacktip Whaler
- Dusky Whaler
- Great Hammerhead
- Grey Reef Whaler
- Long Nose Whaler (Spinner Shark)
- Longfin Mako
- Shortfin Mako
- Oceanic Whitetip Whaler
- Pigeye Whaler
- Sandbar Whaler
- Sharptooth Shark/Lemon Shark
- Silky Whaler
- Silvertip Whaler
- Tiger Shark
- White Shark

The purpose of this report is to review the Target Shark Species list through the application of specific criteria.

## METHODOLOGY

The three criteria used to assess each shark species are as follows:

- Criteria 1: Is the species known to occur in coastal Queensland waters where the shark program operates outside of the Great Barrier Reef Marine Park?
- Criteria 2: Has the species been associated with unprovoked bite/s resulting in serious injury or fatality in Australia?
- Criteria 3: Is the number of unprovoked bites resulting in serious injury or fatality relatively high?

The definition of a provoked and unprovoked shark is as per the Australian Shark Attack File<sup>3</sup>. An 'unprovoked' encounter between a human and a shark is defined as an incident where a shark is in its natural habitat and has made a determined attempt to bite a human where that person is not engaged in provocative activities. The focus on natural habitat excludes incidents involving captive animals in aquaria. A 'provoked' incident relates to circumstances where the person attracts or initiates physical contact with a shark (accidentally or on purpose) or was fishing for, spearing, stabbing, feeding, netting or handling a shark or where the shark was attracted to the victim by activities such as fishing, spearfishing, commercial diving activities (actively collecting abalone, pearl shells, or other marine animals) and cleaning of captured fish.

In determining what constitutes a serious injury, the report has been guided by Lentz et al. (2010) who designed a shark bite scoring severity system based on five levels (Table 2). For this report, only bites that are best described as Level 3, 4 are deemed to be a serious injury while a Level 5 bite is a fatal bite.

**Table 2 Levels of Bite Severity and the Description of the Levels (From Lentz et al., 2010). Bite Severity Levels in Bold are Considered Serious Injuries in this Report.**

Bite Severity	Description
Level 1	Simple lacerations involving the skin and soft tissue, blood pressure is typically unaffected, loss of function is not seen.
Level 2	Skin and soft tissue injuries that tend to involve a muscle, tendon, or bone; patients are quickly stabilized without much blood loss; function of extremity is not compromised.
<b>Level 3</b>	<b>Complex lacerations that typically involve muscle, tendon, or bone; patients may have transient hypotension and loss of function of a tendon; they likely require future surgical procedures for adequate repair of the wounds.</b>
<b>Level 4</b>	<b>Aggressive attacks that result in deep tissue damage and loss of function of an extremity or organ; a major vessel is likely to be injured; patients are hypotensive and require immediate surgical intervention to prevent fatality.</b>
<b>Level 5</b>	<b>Most likely a fatal injury resulting from the severity of the bite, the hypotension, loss of function of an extremity or organ, and rapid blood loss.</b>

In determining what constitutes a relatively high level of serious injury or fatality, the approach used was that a species had to be implicated in one or more unprovoked fatal bites over a five year period or, be implicated in two or more serious bites over a five year period.

<sup>3</sup> <https://taronga.org.au/conservation-and-science/australian-shark-attack-file/analysing-the-data>

In addition to the three criteria, the conservation status of the species at the State, National or International level, and other source of legal fishing mortality in Queensland are discussed.

The Global Shark Accident file (GSAF)<sup>4</sup> was used to determine the species responsible for unprovoked shark bite incidents. This database is freely available, searchable and in most cases provides links to curated information for each incident. In many instances, the species of shark responsible for an unprovoked shark bite is completely unknown, not known with a high degree of certainty, or possibly misidentified (McPhee, 2014; Ricci et al., 2016). The latter is particularly relevant for several historical bites (prior to 1980) where “grey nurse sharks”, “blue pointers” and “bronze whalers” may have been assigned by eyewitnesses purely based on the animal’s general colour. Ricci et al. (2016) estimated that species identification only occurred in 27% of bites. Where possible, peer reviewed literature that discusses individual case studies of shark bites has been used to augment information in the GSAF.

## SPECIES CONSIDERED

The remainder of this section discusses each species in turn. Appendix 1 includes information extracted from the GSAF on shark bites<sup>5</sup> in Australia with additional comments where necessary from the author. Appendix 1 does not include information on bites from white, bull and tiger sharks.

### WHITE SHARK

The white shark (*Carcharodon carcharias*) is well known to occur in Australian coastal waters including in Queensland, although it does range into oceanic waters to depths of approximately 350 metres on the continental shelf (Bruce, 1992; Bruce et al., 2006; Lee et al., 2021). White sharks are found from the latitude of Rockhampton south to the NSW border (Lee et al., 2021) and are more abundant in Queensland during winter and spring (Werry et al., 2012a). They are occasionally captured by the Queensland Shark Control Program (Dudley, 1997; Sumpton et al., 2011; Werry et al., 2012a) and there is a high degree of certainty that they are correctly identified.

The white shark is well known to cause bites that result in serious injury or fatalities in Australia and overseas (Ritter and Levine, 2004; West, 2011; McPhee, 2014; Ricci et al., 2016; Lippmann, 2018). Bites which cause serious injuries or fatalities from white sharks are relatively common compared to other shark species (McPhee, 2014; Chapman and McPhee, 2016; Lippmann, 2018). Between 1982 and 2011, 41 unprovoked shark bites are attributed to white sharks with just under half of these being fatal (McPhee, 2014). A recent fatality attributed with certainty to a white shark in Queensland occurred on the Gold Coast (Greenmount) in 2020. While in NSW recent fatal bites attributed with certainty to white sharks were recorded at Kingscliff and Woolli in 2020 and Tuncurry Beach in 2021.

The white shark is listed as “Vulnerable” under the Commonwealth EPBC Act 1999 and internationally by the IUCN. There is no targeted recreational or commercial fishery for the species and the species is protected under Queensland fisheries legislation. Very occasional individuals may be captured by gamefishers (Pepperell, 1992), but are released.

Based on the occurrence of white sharks in Queensland coastal waters and the records of serious bites and fatalities from the species it is recommended that white sharks remain a target species in the QSCP.

<sup>4</sup> <https://www.sharkattackfile.net/>

<sup>5</sup> The Appendix does not include information on bites from white, bull and tiger sharks because, as discussed in the body of this report, it is well established that these three species have caused unprovoked bites that result in serious injuries and fatalities.

## TIGER SHARK

The tiger shark occurs widely in subtropical and tropical waters and is found along the entire length of the Queensland east coast (Last and Stephens, 2009; Holmes et al., 2012). Tiger sharks can occur in shallow nearshore areas but also in the open ocean where they can dive down to depths of approximately 1,000 metres or more (Holmes et al., 2014; Lipscombe et al., 2020). The tiger shark is captured frequently in the Queensland SCP (Sumpton et al., 2011; Simpfendorfer, 2012; Holmes et al., 2014).

The tiger shark is well known to cause bites that result in serious injury or fatalities in Australia and overseas (Lowry et al., 2009; West, 2011; Clua et al., 2014; McPhee, 2014; Ricci et al., 2016). Bites which cause serious injuries or fatalities from tiger sharks are relatively common compared to other shark species (West, 2011; McPhee, 2014; Chapman and McPhee, 2016). At least ten fatal unprovoked bites can be attributed to tiger sharks in Australia. Further fatalities occurred on spearfishers. The last fatal shark bite in Australia from a tiger shark was in 2020 at Cable Beach (WA). Bites resulting in serious injuries occurred in the Whitsundays in 2019.

The tiger shark is targeted by a small number of sportfishers and gamefishers in Australia (Stevens, 1984; Pepperell, 1992; Braccini et al., 2021). It is not specifically targeted in the ECIFF, but is captured (Tobin et al., 2014).

Tiger sharks are identified internationally by the IUCN as "Near Threatened", but the species are not listed as threatened species under Commonwealth or State legislation.

Based on the occurrence of tiger sharks in Queensland coastal waters and the records of serious bites and fatalities from the species it is recommended that tiger sharks remain a target species in the QSCP.

## BULL SHARK

The bull shark (*Carcharhinus leucas*) occurs widely in subtropical and tropical waters and is found along the entire length of the Queensland east coast (Last and Stephens, 2009). The bull shark occurs in coastal and nearshore waters and is the only very large shark species that occurs consistently in rivers and estuaries including natural and man-made waterways (e.g. residential canals and lakes) (Thorburn and Rowland, 2008; Werry et al., 2011, 2012b; Smoothey et al., 2019). Bull sharks are frequently caught in the Queensland SCP (Sumpton et al., 2011; Haig et al., 2018). Bull sharks can reside for periods of time in freshwater habitats (Gausmann, 2008).

The bull shark is well known to cause bites that result in serious injury or fatalities in Australia and overseas (Hazin et al., 2008; West, 2011; McPhee, 2014; Ricci et al., 2016). Bites from bull sharks which cause serious injuries or fatalities are relatively common compared to other shark species (West, 2011; McPhee, 2014). Overall, the GSAF records identify at least 11 fatal bites have been attributed to bull sharks in Australia, and in further instances bull sharks are likely to have been involved given the bites occurred in rivers where bull sharks are likely to be the only very large shark species present. Between 1982 and 2011 in Australia, 16 unprovoked shark bites were attributed to bull sharks with two of these being fatal (McPhee, 2014). Globally, bull sharks are implicated in many unprovoked bites including fatalities across a large geographic range. Unprovoked bites that have resulted in serious injuries or fatalities are recorded from Brazil, Reunion, Bahamas, USA, Iran, Nicaragua and South Africa.

The last fatal bite in Australia attributed with a high degree of certainty to bull sharks was at Ballina (NSW) in 2008. Bull sharks may have been involved in several recent fatalities in Queensland, but this is yet to be confirmed. In Queensland fatal unprovoked bites have been recorded from Amity Point (2006), Burleigh Lake (2003), Miami Lake (2002) and the Brisbane River (1880). Although not confirmed, given the location and some of the circumstances described bull sharks may have also been the shark species involved in fatal bites at



Noosa (1961), Wynnum (1959), Pioneer River (1956), Fitzroy River (1951), Rubbish Dump Creek (1939), Ross River (1907, 1912, 1919, 1929, 1931 and 1937), Logan River (1903), and the Brisbane River (1860).

Bull sharks are identified internationally by the IUCN as “near threatened”, but the species are not listed as threatened species under Commonwealth or State legislation.

The bull shark is a species widely targeted by recreational fishers in the rivers and estuaries of south-east Queensland in particular (D. McPhee, pers. ob.). It is frequently retained by anglers if it is below the maximum legal size, although fish of all sizes are also released alive. The species is a byproduct in Queensland commercial net fisheries.

Based on the occurrence of bull sharks in Queensland coastal waters and the records of serious bites and fatalities from the species, it is recommended that bull sharks are included as a target species of the Queensland Shark Control Program.

#### AUSTRALIAN BLACKTIP WHALER AND COMMON BLACKTIP WHALER

The Australian blacktip whaler (*Carcharhinus tilstoni*) is endemic to Australia and bears morphological similarities with the common blacktip whaler (*Carcharhinus limbatus*) and the two species can co-occur and can also hybridise (Harry et al., 2012; Morgan et al., 2012). This means that reliable assignment of a bite specifically to a species blacktip whaler is highly problematic in Australia and both species should be considered together. Both species have ranges extends the entire length of the Queensland east coast and they occur in coastal waters (Boomer et al., 2010). They are relatively small shark species with the maximum size of the Australian blacktip whaler being about two metres and the common blacktip whaler about three metres.

While unprovoked bites attributed to black tip sharks are recorded in several locations around the world, the endemic status of the Australian blacktip whaler means that this species is not responsible for these bites. However, the common blacktip whaler is responsible for many unprovoked bites in Florida (Resko and Johnson, 2014), although for at least some of these bites there is uncertainty in the exact species as spinner sharks (*Carcharhinus brevipinna*) may have been responsible in some instances. Most unprovoked bites from blacktip sharks globally do not result in serious injuries and no fatalities have been recorded. Most bites involve relatively minor lacerations to hands, feet or calves.

Three possible bites from black tip whalers have been recorded from Australian waters but only two are unprovoked. One occurred on Heron Island and resulted in minor injuries, but a black tip reef shark (*Carcharhinus melanopterus*) may have been the species involved as they are common at that location. The second bite occurred in Yallingup (Western Australia) with no injury occurring, but teeth marks in the surfboard were identified as being from an Australian blacktip whaler. A provoked bite occurred offshore of Townsville on a spearfisher who had fish in the water that had been speared. This bite resulted in serious injury (level 3).

The Australian blacktip whaler and common blacktip whaler are target species for commercial fisheries in Queensland, the Northern Territory and Western Australia (Davenport and Stevens, 1988). For the Queensland east coast the total commercial catch of the Australian blacktip whaler and common blacktip whaler in 2018-2019 was 25 tonnes and 22 tonnes respectively and the average annual harvest over a ten-year period was 79 tonnes and 70 tonnes respectively<sup>6</sup>. Most of this catch is taken in the East Coast Inshore Finfish Fishery (ECIFF). Both blacktip whaler species are also captured by recreational fishers in Queensland (de Faria, 2012). The commercial fishery has a substantially greater impact on the populations of the two species than the

<sup>6</sup> <https://www.fish.gov.au/report/416-Australian-Blacktip-Shark-2020>

Queensland SCP but much of this catch is unlikely to be taken near popular coastal locations utilised by water users.

The common blacktip whaler is listed internationally by the IUCN as Near Threatened while the Australian blacktip whaler is listed as Least Concern. Neither species are listed under Commonwealth or State legislation.

Both species of blacktip whaler occur in coastal waters, and while unprovoked bites from blacktip sharks are known from Australian waters, the number is very low, and they have not resulted in serious injury or fatalities. The only serious injury recorded was from a provoked incident. On this basis it is recommended that both the Australian black tip shark and common black tip shark not be included as a target species in the QSCP.

#### GREAT HAMMERHEAD SHARK

The great hammerhead shark (*Sphyrna mokarran*) is the largest of the hammerhead shark species reaching a maximum size of approximately 4.5 metres (Last and Stevens, 2009). The species has a wide geographic distribution and can occur along the entire Queensland east coast and is known to be captured in the Queensland SCP (Harry et al., 2011; Sumpton et al., 2011; Taylor et al., 2011; Raoult, et al., 2109, 2020; Roff et al., 2018).

Globally the GSAF identifies that there have been no fatalities attributed to bites from hammerhead sharks although three bites can be classified as serious (Level 3). It is not known with certainty which species of hammerhead shark are responsible for the bites recorded. Globally, there has not been a recorded unprovoked bite attributed to a hammerhead shark since 1992.

There are six shark bites attributed to hammerhead sharks in Australia with the last one occurring in 1990. It is not known with certainty which species of hammerhead shark was responsible. Three bites occurred in Queensland with two most likely being provoked bites on two people snorkelling together, one of whom was holding a fish. The third was in 1873 in Hervey Bay and was possibly unprovoked but little detail regarding it is available. A provoked bite occurred in Darwin on an angler attempting to remove a hook from a captured shark. An unprovoked bite occurred near Fremantle (Western Australia) which resulted in minor injuries.

The great hammerhead shark is captured in commercial fisheries including the ECIF (Tobin et al., 2014) and their fins are considered high value. The species is also captured by recreational fishers including gamefishers (Pepperell, 1992; de Faria, 2012).

The great hammerhead shark is listed internationally by the IUCN as "Critically Endangered". The species is not listed under Commonwealth or State environment legislation.

The great hammerhead occurs in coastal waters, and while unprovoked bites from are known from Australian waters, the number is very low, and none have resulted in fatalities or serious injury. On this basis it is recommended that the hammerhead shark not be included as a target species in the QSCP.

#### GREY REEF WHALER

The grey reef whaler (*Carcharhinus amblyrhynchos*) is a widespread, common species that occurs in the central Pacific and Indian Ocean (Last and Stevens 2009). It is a coastal species generally associated with reef environments with a preference for waters of 20 to 60 metres deep (Papastamatiou et al., 2006), but does utilise shallower water. It is captured in the Queensland SCP (Sumpton et al., 2011). The species is known to form aggregations (McKibben and Nelson, 1986; Economakis et al., 1998; Vianna et al., 2013) although individuals alone occur and these lone animals can demonstrate clear territorial behaviour at times (McKibben and Nelson, 1986; Nelson et al., 1986).

Globally the GSAF identifies unprovoked bites from grey reef whalers have occurred but no fatalities from the species are recorded, with most bites resulting in only minor injuries. In addition to unprovoked bites, grey reef sharks are also known to cause provoked bites on spearfishers (Jublier and Clua, 2018). Only one unprovoked shark bite has been reliably attributed to grey reef whalers in Australia – at Line Reef in the Great Barrier Reef in 2019. This bite resulted in minor injuries only. The GSAF identifies a further unprovoked bite as occurring at Lizard Island in 2019 that resulted in serious injury (Level 3), however video evidence identifies that fish were being fed offal by other vessel members at the location and time the bite occurred. As such, it may be better classified as a provoked incident, although the person bitten was may not have been directly involved in the provocation.

The grey reef whaler is not a common component of Queensland commercial fisheries such as the ECIFF, but is captured in low volumes (Tobin et al., 2014). Although data is lacking, the species is unlikely to be specifically targeted by recreational fishers in Queensland but may be caught as bycatch. They are a common component of the shark fauna caught by charter fishers in Great Barrier Reef waters (de Faria, 2012). Braccini et al. (2014) records that it is caught infrequently by recreational fishers in Western Australia but generally released.

The grey reef whaler is identified internationally by the IUCN as “near threatened”, but the species is not listed as a threatened species under Commonwealth or State legislation.

The species meets criteria 1 given it is known to occur in coastal Queensland waters. Grey reef sharks have been known to cause a single unprovoked bite that resulted in minor injuries only. The only bite attributed to the species in Australia that resulted in serious injury could be classified as a provoked incident. On this basis it is recommended that the grey reef whaler is not included as a target species in the QSCP.

## LEMON SHARK

The lemon shark (*Negaprion acutidens*) is a large shark (> 3 metres) known to occur in Queensland coastal waters although they do range into reef habitats (Schultz et al., 2008; Chin et al., 2012). The lemon shark is recorded as being caught in the Queensland SCP in southern Queensland (Taylor et al., 2011).

Globally there are 43 bites attributed to lemon sharks but many of these are attributed to the species *Negaprion brevirostris* which does not occur in Australia. Available information from the GSAF database suggest that many bites have been provoked incidents involving angling or spearfishing or simply collisions between a lemon shark and a water user. Provoked bites have also included those that have occurred in the hand feeding of animals by scuba divers (Clua and Torrente, 2015). Clua and Haguenaue (2020) identified territoriality rather than feeding as an explanation for bites on humans from lemon sharks. Most injuries resulting from lemon sharks are not serious and no fatalities have been attributed with certainty to a lemon shark. A fatality at Reunion in 1992 was attributed to either a bull shark or lemon shark. Bull sharks are a known source of fatalities at Reunion and is the most likely species involved in that instance.

One bite from a lemon shark has been recorded in Australia at North West Island (Queensland) in 2020 which may have been an illegally provisioned animal and thus a provoked bite. The bite resulted in minor injuries. In this case the provisioning may have occurred by someone else some time prior to the incident occurring (up to a week before). The person bitten was not associated with any provisioning activity. A reported incident<sup>7</sup> at the same location a week earlier was attributed to a shovelnose ray but was also likely to be a lemon shark. At the time of writing an additional shark bite at Varanus Island was attributed to a lemon shark, all the specific details are currently lacking, the circumstances suggest that it may have been a provoked bite.

<sup>7</sup> <https://thenewdaily.com.au/news/queensland/2019/12/30/shark-attack-north-west-island/>

The lemon shark is listed internationally by the IUCN as “Vulnerable”. The species is not listed under Commonwealth or State legislation. There is no targeted recreational or commercial fishery for the species and the species is not identified as a component of the shark catch in the ECIF (Tobin et al., 2014). Very occasional individuals may be captured by recreational fishers in Queensland (de Faria, 2012). Braccini et al. (2021) identifies that it is caught in moderate abundance by recreational fishers in Western Australia but it is generally released.

While lemon sharks occur in Queensland, including in coastal areas and are of relatively large size, the bite involving the species in Australia cannot be classified as an unprovoked bite. Globally there is no compelling evidence that the lemon shark is frequently responsible for unprovoked bites. It is recommended that the lemon shark is not included as a target species in the QSCP.

## BLUE SHARK

The blue shark (*Prionace glauca*) is a circumglobal species and typically occurs in offshore waters throughout the water column to depths of over 1,000 metres (Stevens et al., 2010; Queiroz et al., 2010; Vandeperre et al., 2016; Young et al., 2010). Given available information on the species, the amount of time that blue sharks would spend overlapping with coastal areas where swimming and surfing is occurring is very low. Between 1992 and 2008, only three blue sharks were caught in the Queensland SCP (Sumpton et al., 2011). Between 2009 and 2016 only one more was caught.

Globally several bites are potentially attributed to blue sharks although there is reasonable uncertainty regarding whether the species has been correctly identified, particular in very old records. Most bites attributed to blue sharks with certainty have been a result of fishing accidents including accidents with blue sharks after their death. There are two fatal bites attributed to blue sharks from Japan and while this is feasible the available information does not support with certainty that the species was involved. Other shark bites in Japan have been attributed with certainty to white sharks (Nakaya, 1993). One bite was also attributed to a blue shark in the Nicobar and Andaman Islands in 1956 where the victim was climbing up to the ship after repairing the stern of the tuna boat in the water and one in American Samoa in 1955.

The GSAF attributes two unprovoked bites from blue sharks in Australia and one bite was fatal. The fatal bite attributed to the species occurred at Pinalba in Hervey Bay in 1922. Given the location of this fatal bite compared to the habitat preference of blue sharks, and the (limited) narrative around the incident, it is highly plausible that it was a white shark rather than a blue shark responsible. The second unprovoked bite in the GSAF recorded in Australia from a blue shark was from near Mackay and again the location would suggest another species was responsible. A further six provoked bites from Australia are recorded from blue sharks but one of these is highly likely to be a misidentification as it was from an estuarine location (Pimpama River, Gold Coast).

The blue shark is a significant bycatch and byproduct in tuna longline fisheries including in Australian waters by international (historically) and domestic vessels (Stevens, 1992; Young et al., 2010). It is not typically caught in fisheries managed by Queensland (Tobin et al., 2014). The species is caught by recreational gamefishers – mostly in southern Australian waters (Stevens, 1984; Pepperell, 1992; Lowry et al., 2007).

The blue shark is listed by the IUCN as “Near Threatened”. The species is not listed under Commonwealth or State environment legislation.

The blue shark is known to occur in Queensland coastal waters where the SCP operates but it is very rarely caught, and the species has a clear preference for offshore waters. Nonetheless, it does occur and for this reason, the species does meet the requirements of criteria 1. While the species is recorded as causing an unprovoked fatal bite in Queensland, the weight of evidence would suggest a white shark was the species

involved. A second unprovoked bite is also highly likely to have been from another species. On this basis it is recommended that the blue shark is not be included as a target species in the QSCP.

#### LONGFIN AND SHORTFIN MAKO SHARK

The longfin mako shark (*Isurus paucus*) and shortfin mako shark (*Isurus oxyrinchus*) will be considered together. Records of shark bite and catches in the SCP do not consistently differentiate the two species. The two species are circumglobal species and typically occur in offshore waters throughout the water column but can also be found in nearshore coastal waters (Francis et al., 2019). Between 2001 and 2016, mako sharks were caught (< 5) in small numbers each year in the southern regions of the SCP.

Globally, incidents involving mako sharks have generally been provoked incidents – including spearfishing with speared fish present and fishing accidents including hooked mako sharks jumping into boats. However, mako sharks have been implicated with a relatively high degree of certainty in fatalities and serious injuries (Level 3 and 4) in Egypt in 2010, 2015 and 2016, Venezuela in 2003, the Bahamas in 1981 and the USA (South Carolina in 1924 and California in 2015). The biophysical characteristics of the location in Egypt where bites occur allow for oceanic shark species such as mako sharks to venture into shallow water where people are undertaking water-based activities (Levine et al., 2014). Provisioning of sharks at this location is also believed to have contributed to the series of bites there (Levine et al., 2014).

In the GSAF there are four records of unprovoked shark bite attributed to mako sharks in Australia – three of which were identified as provoked bites. There are additional shark interactions involving mako sharks biting or ramming boats. There is uncertainty regarding the identity of the species attributed to the unprovoked bite which resulted in serious injury (Level 3) in 1932 at Newcastle which was identified in the GSAF as either a mako or a grey nurse shark. Plausibly given the location adjacent to a known aggregation of juvenile white sharks, that species may have been involved. However, there is no reliable information to determine the species with certainty.

Both species of mako shark are listed internationally by the IUCN as “Endangered”. Neither species are listed as threatened species under Commonwealth or State legislation, but both are listed migratory species by the Commonwealth.

The shortfin mako shark is targeted for both consumption and catch-and-release by recreational anglers (Pepperell, 1992; French et al., 2019). The species is not identified as a component of the shark catch in the ECIF (Tobin et al., 2014). Any mako sharks that are captured alive in Commonwealth commercial fisheries must be released.

Mako sharks are known to be present in Queensland coastal waters, albeit likely in low abundance. Globally, the species is responsible for a small number of unprovoked fatal bites and bites resulting in serious injury – particularly in Egypt. Assuming despite the uncertainties that the only record of an unprovoked shark bite from a mako shark in Australia was indeed a mako shark, the species meets criteria 2 but does not meet criteria 3. It is recommended that the two mako shark species are not included as target species in the QSCP.

#### DUSKY WHALER

The dusky whaler (*Carcharhinus obscurus*) has a wide but disjointed global distribution with population structuring (Benavides et al., 2011). The dusky whaler is found the entire length of the Queensland east coast (Last and Stephens, 2009). It occurs in coastal and oceanic waters (Last and Stephens, 2009; Hoffmayer et al., 2014) and is captured within the Queensland SCP (Sumpton et al., 2011), particularly from Rainbow Beach south to the Gold Coast. The species is migratory, tending to move north during austral winter/spring with some gender-based differences in migratory patterns (Braccini et al., 2018).

Globally there are a small number of unprovoked bites (approximately eight) attributed to the dusky whaler and no fatalities with all but one resulting in minor injuries. There is a single bite attributed with certainty to the dusky whaler in Australia. It occurred in Lake Illawarra (NSW) in 2009.

The dusky whaler is listed internationally by the IUCN as endangered, but the species are not listed as a threatened species under Commonwealth or State legislation.

Dusky whalers are not a shark species targeted by recreational or commercial fishers in Queensland, but they may be taken as bycatch or byproduct. The species is frequently targeted and caught by recreational and commercial fishers in Western Australia and represents a large proportion of the retained shark catch (Simpfendorfer and Donahue, 1998; Braccini et al., 2021). It is also caught by commercial longline fishers in NSW (Macbeth et al., 2009).

The species is also a focus of commercial shark fisheries in other parts of the world (Marshall et al., 2015).

The dusky whaler occurs in Queensland nearshore coastal waters and meets criteria 1. While unprovoked bites from the species are known in Australia, there has only been a single incident attributed to the species. As such, the species does not meet criteria 2 or 3. It is recommended that the lemon shark is not included as a target species in the QSCP.

#### SPINNER SHARK

The spinner shark (*Carcharhinus brevipinna*) is a coastal species. It is one of the commonest species caught in the QSCP and they are more frequently caught during Spring and Summer which is their breeding period (Sumpton et al., 2010).

Unprovoked shark bites have been attributed to spinner sharks particularly in Florida (Resko and Johnson, 2014; Chapman and McPhee, 2016). Many of the recorded bites occur at a single location in Florida – New Smyrna Beach (Resko and Johnson, 2014). As already identified in this report, some bites attributed to spinner sharks in the USA may have been from blacktip whalers. The GSAF records show that no fatal unprovoked bites have been attributed to spinner sharks and no bites resulting in serious injuries have occurred. No bites from spinner sharks have been recorded from Australia.

The spinner shark is frequently caught by commercial fishers in Australia (Tillett et al., 2012; Geraghty et al., 2014; Butcher et al., 2015) and is caught in the Queensland ECIF particularly south of the Great Barrier Reef (Tobin et al., 2014). The species is also caught by recreational fishers (Stevens, 1984), but it is unlikely to be specifically targeted on a frequent basis in Queensland. It is captured relatively frequently by recreational fishers in Western Australia (Braccini et al., 2021).

The spinner shark is identified internationally by the IUCN as “Near Threatened”, but the species is not listed as a threatened species under Commonwealth or State legislation.

The spinner shark meets criteria 1 given it is known to occur in coastal Queensland waters. However, it does not meet criteria 2 or 3 as there are unprovoked bites attributed to the species in Australia. It is recommended that the spinner shark is not included as a target species in the QSCP.

#### PIGEYE SHARK

The pignose shark (*Carcharhinus amboinensis*) is sporadically distributed throughout tropical and subtropical waters of the Indo-West Pacific and Atlantic Oceans (Last and Stevens 2009). It is found throughout northern Australia from Carnarvon (Western Australia) to Moreton Bay (Last and Stevens 2009). The pignose shark is morphologically similar to the bull shark and the two species are easily confused. The species resides in



shallow coastal waters including turbid waters (Knip et al., 2011; Tillett et al., 2011). The species is captured in the QSCP (Sumpton et al., 2011).

There are no records in the GSAF of unprovoked shark bites from the pigeye shark. It is plausible that some bites from this species are misidentified as bites from bull sharks as they occur in similar habitats and their morphological similarities. The pigeye shark typically reaches a maximum length of between 1.9 and 2.5 metres while bull sharks are recorded as reaching a maximum length of at least 3.5 metres.

The pigeye shark is identified internationally by the IUCN as “Data Deficient”, but the species is not listed as a threatened species under Commonwealth or State legislation.

Pigeye sharks are caught in small numbers in various commercial fisheries, mostly in northern Australia. This includes in the ECIFF but it is not specifically targeted in that fishery (Tobin et al., 2014). Although data is lacking in Queensland, the species is unlikely to be specifically targeted by recreational fishers but may be caught as bycatch. Pigeye sharks are caught frequently by recreational fishers in Western Australia but is generally released (Braccini et al., 2021).

The pigeye shark meets criteria 1 given it is known to occur in coastal Queensland waters. However, it does not meet criteria 2 or 3 as there are no unprovoked bites attributed to the species in Australia. The caveat to this conclusion is that bites from this species may be mistaken for bites from bull sharks of a similar size. Nonetheless, it is recommended on the available information that the pigeye shark is not included as a target species in the QSCP.

#### SANDBAR SHARK

The sandbar shark (*Carcharhinus plumbeus*) ranges along the length of the Queensland east coast into northern NSW and is also found in Western Australia (McAuley et al., 2007; Last and Stevens, 2009; Macbeth et al., 2009). The sandbar shark is a coastal species but does extend down to depths of approximately 280 metres. The species is captured in the Queensland SCP (Sumpton et al., 2011).

There are unprovoked bites attributed to the sandbar shark in the GSAF although in several instances there is uncertainty as to whether bites were from sandbar sharks or other species. All bites are recorded from the USA and no bites have been attributed to the species in Australia.

The sandbar shark is identified internationally by the IUCN as “Vulnerable”, but the species is not listed as a threatened species under Commonwealth or State legislation.

The sandbar shark is caught in commercial fisheries in NSW and Western Australia (McAuley et al., 2007; Macbeth et al., 2009) although it is not a significant commercial species in the ECIFF (Tobin et al., 2014). Although data is lacking, the species is unlikely to be specifically targeted by recreational fishers in Queensland but may be caught as bycatch. It is captured relatively frequently by recreational fishers in Western Australia (Braccini et al., 2021).

The sandbar shark meets criteria 1 as it is known to occur in coastal Queensland waters. However, it does not meet criteria 2 or 3 as there are no unprovoked bites attributed to the species in Australia. It is recommended that the spinner shark is not included as a target species in the QSCP.

#### SILKY WHALER

The silky whaler (*Carcharhinus falciformis*) has a circumtropical distribution and occurs in coastal waters and the open ocean although they are typically found along the edge of continental shelves (Bonfil, 2008) and also associates with offshore Fish Aggregating Devices (FADs) (Filmatler et al. 2011). The species is though captured in the Queensland SCP albeit relatively infrequently (Sumpton et al., 2011).

Globally, there are only three unprovoked bites attributed to the silky whaler in the GSAF – two from the USA and one from one Spain. One of the bites in the USA was serious and burleying by recreational fishers of the area prior to when the bite occurred may have been an factor that provoked the bite. There are no unprovoked shark bites attributed to this species in Australia.

Silky whalers are not recoded as being caught in the ECIF (Tobin et al., 2014), but the species is likely to be taken as by-catch. The species is caught by gamefishers in NSW although it is not an important target species in recreational fisheries (Stevens, 1984). It is a very minor component of the recreational shark catch in Western Australia (Braccini et al., 2021).

The silky whaler is identified internationally by the IUCN as “Vulnerable”, but the species is not listed as threatened species under Commonwealth or State legislation.

While more common in oceanic waters, the silky whaler is captured in the Queensland SCP and the species meets criteria 1. The species does not meet criteria 2 or 3 as there are no unprovoked bites attributed to the species in Australia. It is recommended that the spinner shark is not included as a target species in the QSCP.

#### SILVERTIP WHALER

The silvertip shark (*Carcharhinus albimarginatus*) has a fragmented distribution through the tropical Indian and Pacific oceans. It is found in northern Australian waters from Carnarvon (Western Australia), across the Northern Territory to at least Bundaberg (Last and Stevens, 2009). It is a reef associated species (Espinoza et al., 2015) but also utilises deep pelagic waters (Bond et al., 2015). In the Great Barrier Reef the species typically utilises offshore reefs rather than inshore reefs (Espinoza et al., 2014). There is a single record of a silvertip whaler caught in the Queensland SCP at Rainbow Beach in 2014.

Globally, there are no unprovoked bites attributed to silvertip whalers in the GSAF. There are two provoked bites recorded from provisioned animals being fed by divers in Papua New Guinea and Sudan which resulted in minor injuries. There are no unprovoked bites attributed to the species in Australia.

Silky whalers are not recoded as being caught in Queensland fisheries (Tobin et al., 2014), but the species is likely to be taken as by-catch. The species was recorded in low numbers by charter fishers in the Great Barrier Reef (de Faria, 2012). Although data is lacking, the species is unlikely to be specifically targeted by recreational fishers in Queensland but may be caught as bycatch. It is a very minor component of the recreational shark catch in Western Australia (Braccini et al., 2021).

The silky whaler is identified internationally by the IUCN as “vulnerable”, but the species is not listed as threatened species under Commonwealth or State legislation.

While rare in nearshore, the silky whaler is captured in the Queensland SCP and the species meets criteria 1. The species does not meet criteria 2 or 3 as there are no unprovoked bites attributed to the species in Australia. It is recommended that the silky whaler is not included as a target species in the QSCP

#### BIG NOSE WHALER

The big nose whaler (*Carcharhinus altimus*) is principally a deep water species that resides in waters between 50 and 900 metres deep during the day although they do move into shallow water and vertically migrate at night (Anderson and Stevens, 1996). The species most likely has a circumglobal distribution (Last and Stevens, 2009). In Queensland it is known from waters between depths of 205 and 266 metres in the north of the state (Anderson and Stevens, 1996), although its range is likely to be much wider.

There are no records in the GSAF of unprovoked bites attributed to big nose whalers.



Big nose whalers are identified internationally by the IUCN as “Near Threatened”, but the species is not listed as a threatened species under Commonwealth or State legislation.

Big nose whalers are not targeted by Queensland commercial or recreational fisheries. Five big nose whalers have been recorded in the QSCP since 1962 although the species identification was not verified (T. Scott-Holland pers. comm). They are not recorded as being caught in the ECIF. The species is a very minor component of the recreational shark catch in Western Australia (Braccini et al., 2021).

Assuming the species identification in the QSCP is correct, the species is recorded as occurring inshore albeit rarely. The species meets criteria one. However, no unprovoked bites have been attributed to the species. It is recommended that the big nose whaler is not included as a target species in the QSCP.

## OCEANIC WHITETIP SHARK

The oceanic whitetip shark (*Carcharhinus longimanus*) is a large epipelagic species with a circumglobal distribution in tropical and subtropical waters and a clear preference for open ocean waters (Bonfil et al., 2008; Howey-Jordan et al., 2013; Young and Carlson, 2020). Between 2001 and 2016 there are no records on oceanic whitetip sharks being captured in the QSCP. There are also no records of the species being caught in the QSCP dating back to 1962 (T. Scott-Holland pers. comm.).

The oceanic whitetip shark is known to cause bites that result in serious injuries or fatalities with the geographic location of bites centred around Egypt. GSAF records identify that 17 of the 23 unprovoked bites attributed to oceanic white sharks occurred in Egypt. The biophysical characteristics of the locations where bites occur in Egypt allow for oceanic shark species such as the oceanic whitetip to venture into shallow water where people are undertaking water-based activities (Levine et al., 2014). In Egypt, three bites attributed to oceanic whitetips occurred over a six-day period in 2010 along an eight kilometre stretch of beach (Levine et al., 2014). Levine et al. (2014) produced evidence that the same individual shark may have been responsible for the three bites and that provisioning of animals may have been one of the significant contributing factors to the series of incidents. There are no unprovoked shark bites attributed to oceanic white tip sharks in Australia.

Oceanic whitetip sharks are not targeted by Queensland commercial or recreational fisheries and are rarely caught, but they are caught in the Commonwealth East Coast Tuna and Billfish Fishery. They are a frequent catch in commercial longline fisheries throughout the Pacific, Indian and Atlantic oceans (Young and Carlson, 2020).

Oceanic whitetip sharks are identified internationally by the IUCN as “Critically Endangered”, but the species are not listed as threatened species under Commonwealth or State legislation.

The oceanic whitetip shark is not a species that is ordinarily found in nearshore coastal waters that water users frequent. Globally, unprovoked bites from oceanic whitetip sharks are concentrated along the coast of Egypt where local biophysical conditions facilitate the overlap with shallow coastal waters used by people. Such conditions do not occur in Queensland and on this basis the species does not meet criteria 1 of this analysis. Additionally, there are no unprovoked shark bites attributed to the species in Australia and therefore criteria 2 is also not met. It is recommended that the oceanic whitetip shark is not included as a target species in the QSCP

## CONCLUSION

Only three species of shark meet all three criteria for inclusion on the Queensland SCP target species list – bull, white and tiger sharks. These three species are implicated in the majority of unprovoked shark bites globally.

A review of habitat preferences of shark species identified that oceanic white tip shark and bignose whalers are pelagic species which are highly unlikely to be encountered in nearshore areas where the Queensland SCP operates.

A further eight species known to occur in nearshore coastal areas at times have not been associated with serious or fatal unprovoked shark bites in Australia. This includes the lemon shark, dusky whaler, spinner shark, pigeye shark, silky whaler, silvertip whaler and blue shark. A single fatality in Queensland has been recorded from a blue shark but this is highly likely to have involved a white shark. A recent bite that caused minor injuries attributed to a lemon shark was from an animal that had been provisioned and thus better described as a provoked incident, although the victim was not involved in the provisioning of the animal.

Unprovoked bites in Australia have been attributed to a further four species or species groups: blacktip whalers, hammerhead sharks, mako sharks and the grey reef whaler. None of the unprovoked bites from the four species have resulted in fatalities. An unprovoked bite attributed to a mako shark which resulted in serious injury may have been a bite from a grey nurse shark or a white shark. For the other three species no unprovoked bites have resulted in serious injury. The frequency of unprovoked bites attributed to the four species is low: blacktip whalers (1 or 2), hammerhead sharks (1 or 2), mako sharks (possibly 1) and grey reef whalers (1). The GSAF lists a further bite from a grey reef whaler and two bites from hammerhead sharks that were provoked by animals being fed or in the process of being fed at the time of the bite.

It is recommended that the QSCP should have three species only as target species - bull, white and tiger sharks. There should be scope and a process to amend this list over time as new information becomes available.

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APPENDIX 1 Recorded Shark Bites in Australia from species currently listed on the SCP target shark list other than bull, white and tiger sharks

Date sourced from the Global Shark Accident File (www. <https://www.sharkattackfile.net/>)

Year	Type of Bite	State	Location	Water Activity	Injury	Comments
<b>Blacktip Whalers</b>						
2021	Unprovoked	Western Australia	Yallingup	Paddle boarding	No injury, board bitten	Teeth marks from <i>Carcharhinus tilstoni</i> identified on the surfboard.
2016	Unprovoked	Queensland	Heron Island	Wading	Laceration to right calf	Possibly a black tip reef shark ( <i>Carcharhinus melanopterus</i> )
2005	Provoked	Queensland	Townsville	Spearfishing	Severe injury to lower leg	Speared fish present when bite occurred
<b>Blue Shark</b>						
2000	Provoked	New South Wales	Wollongong	Fell onto dead shark	Foot lacerated from toe to heel when he tripped on shark during fishing competition	Very limited information on this bite
1968	Provoked	New South Wales	Stockton Bight		Foot lacerated.	
1937	Provoked	Queensland	Moreton Island	Fishing	Left shoulder bitten by netted shark.	Highly likely to have been another species given the estuarine location.
1935	Provoked	Queensland	Pimpana River	Hauling in net with shark in it	Calf & shin bitten	
1934	Provoked	New South Wales	Off Mooloolabah	Fishing	Hand bitten while landing shark	Highly likely to have been a white shark. May have been another species given the habitat where the bite occurred. Limited information to support any species identification.
1933	Provoked	South Australia	Port River, Adelaide	Fishing	Forearm injured by hooked shark	
1922	Unprovoked	Queensland	Hervey Bay	Bathing	FATAL	
1910	Unprovoked	Queensland	Mackay	Bathing	Foot bitten	

### Hammerhead Shark

2002	Unprovoked	Queensland	Great Barrier Reef (near Upolu Bay)	Snorkeling	Left arm lacerated
1990	Unprovoked	Queensland	Outer Barrier Reef near Port Douglas	Snorkeling	Lacerations
1990	Unprovoked	Queensland	Outer Barrier Reef near Port Douglas	Snorkeling, possibly holding a fish	Lacerations
1981	Unprovoked	Western Australia	Leighton Beach, north of Fremantle	Exercising his dog in the shallows	Puncture wounds to foot
1961	Provoked	Northern Territory	Stokes Hill Wharf, Darwin	Fishing	Finger bitten by hooked shark.
1873	Unprovoked	Queensland	White Cliffs	Bathing	No details

Both snorkelling together

Both snorkelling together

### Gray Reef Whaler

2019	Unprovoked	Queensland	Line Reef	Swimming	Puncture marks to left hip and buttocks
2018	Provoked	Queensland	Lizard Island	Diving	Severe laceration to left forearm

A level 3 injury. Shark species confirmed by video evidence. Fish were being fed at the time of the bite.

### Lemon Shark

2020	Unprovoked	Queensland	North West Island	Swimming	Lacerations to leg
------	------------	------------	-------------------	----------	--------------------

While this bite was classified in GSAF as an unprovoked bite.

Further information suggests that shark provisioning had occurred at the location.

## Mako Sharks

2008	Provoked	Queensland	200 km east of Coolangatta	Accidentally stood on hooked shark's tail before attempting to gut it	Laceration to left knee
2005	Provoked	New South Wales	Bermagui	Fishing	Laceration on left thigh
1969	Provoked	New South Wales	Newcastle		Foot lacerated.
1932	Unprovoked	New South Wales	Redhead Beach, Newcastle	Swimming	Torso bitten with pneumothorax, slight lacerations on left hand

Incomplete information on this bite.

Uncertainty as to the species involved that was identified as either a mako or a grey nurse shark. A level 3 injury.

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RTI Act 2009

**From:** [Tracey Scott-Holland](#)  
**To:** [Simpfendorfer, Colin](#)  
**Subject:** RE: Shark Control Program Scientific Working Group meeting 1 of 2022 - please advise your availability  
**Date:** Monday, 4 April 2022 10:54:00 AM  
**Attachments:** [image001.png](#)  
[image005.jpg](#)  
[image002.png](#)

---

Thanks

---

**From:** Simpfindorfer, Colin <[colin.simpfindorfer@jcu.edu.au](mailto:colin.simpfindorfer@jcu.edu.au)>  
**Sent:** Monday, 4 April 2022 10:52 AM  
**To:** Tracey Scott-Holland  
**Subject:** RE: Shark Control Program Scientific Working Group meeting 1 of 2022 - please advise your availability

I should not be allowed to fill in doodle polls on Friday afternoon.

May 4<sup>th</sup> I have a TSSC meeting all day. Available on the 6<sup>th</sup>.

Cheers

Colin

Colin Simpfindorfer PhD  
Adjunct Professor  
College of Science and Engineering  
James Cook University  
(Hobart based)

E: [colin.simpfindorfer@jcu.edu.au](mailto:colin.simpfindorfer@jcu.edu.au)

Mobile: Personal Information

Web: [jcu.me/colin.simpfindorfer](http://jcu.me/colin.simpfindorfer)

Twitter: @sharkcolin

Instagram: @sharkcolin

---

**From:** Tracey Scott-Holland <[Tracey.Scott-Holland@daf.qld.gov.au](mailto:Tracey.Scott-Holland@daf.qld.gov.au)>  
**Sent:** Monday, 4 April 2022 10:50 AM  
**To:** Simpfindorfer, Colin <[colin.simpfindorfer@jcu.edu.au](mailto:colin.simpfindorfer@jcu.edu.au)>  
**Subject:** FW: Shark Control Program Scientific Working Group meeting 1 of 2022 - please advise your availability

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Hi Colin,

Just double checking your availability.

You selected 6<sup>th</sup> May AM as available but comment says you are only available on the 4<sup>th</sup>.

Trace

**From:** Tracey Scott-Holland

**Sent:** Thursday, 31 March 2022 4:28 PM

**To:** Jonathan Mitchell; Simpfendorfer, Colin; Julia Chandler; Peta Lawlor; Richard Fitzpatrick; Angela Freeman; Angela Freeman; Adam Smith; Carley Kilpatrick; Marcel Green

**Cc:** Kimberly Foster; Michael Mikitis

**Subject:** Shark Control Program Scientific Working Group meeting 1 of 2022 - please advise your availability

Dear Members,

I hope you are all well and 2022 has been kind to you so far.

Can you please complete the survey below to advise your availability for the next Shark Control Program Scientific Working Group meeting.

The meeting will be online via Teams (we look forward to being able to meet in person again soon!).

It's likely that the meeting will be split across two sessions on different days so please ensure you select ALL dates that would be suitable for you.

<https://www.surveymonkey.com/r/BVMMBKE>

In addition to our standard recurring agenda items the following items are on the agenda.

- Shark barrier trial
- SharkSmart drone trial
- Catch alert drumline trial
- Trial – targeting bull sharks with traditional drumlines (net replacement will be discussed).
- Target species list review

If you have any other suggestions for agenda items please let me know.

Please note I will be on leave next week and will finalise the meeting arrangements and agenda when I return.

Thanks

Tracey

**Dr Tracey Scott-Holland**

Research & Policy Coordinator (Shark Control Program), Fisheries Queensland  
Department of Agriculture and Fisheries

---

Sch **Personal Information** [tracey.scott-holland@daf.qld.gov.au](mailto:tracey.scott-holland@daf.qld.gov.au) **W** [www.daf.qld.gov.au](http://www.daf.qld.gov.au)

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RTI Act 2009

**Lyn Low**

---

**From:** Tracey Scott-Holland  
**Sent:** Monday, 11 April 2022 10:57 AM  
**To:** Peta Lawlor  
**Subject:** RE: Shark Control Program Scientific Working Group meeting 1 of 2022 - please advise your availability

Thanks Peta,  
No problem.  
Enjoy your break if we don't see you before you go.  
Cheers  
Tracey

---

**From:** Peta Lawlor <plawlor@lifesaving.com.au>  
**Sent:** Tuesday, 5 April 2022 8:02 AM  
**To:** Tracey Scott-Holland  
**Subject:** RE: Shark Control Program Scientific Working Group meeting 1 of 2022 - please advise your availability

Hey Tracey

Hope you are well.

I've just completed the survey

Sch 4 - Personal Information



**Peta Lawlor | General Manager - Lifesaving and Community**  
**Surf Life Saving Queensland**

PO Box 3747, South Brisbane QLD 4101 | 18 Manning Street, South Brisbane QLD 4101  
ph. 07 3846 8054 | f. 07 3846 8099 | w. [lifesaving.com.au](http://lifesaving.com.au)



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---

**From:** Tracey Scott-Holland <[Tracey.Scott-Holland@daf.qld.gov.au](mailto:Tracey.Scott-Holland@daf.qld.gov.au)>  
**Sent:** Thursday, 31 March 2022 4:28 PM

**To:** Jonathan Mitchell <[Jonathan.Mitchell@daf.qld.gov.au](mailto:Jonathan.Mitchell@daf.qld.gov.au)>; Simpfindorfer, Colin <[colin.simpfindorfer@jcu.edu.au](mailto:colin.simpfindorfer@jcu.edu.au)>; Julia Chandler <[julia.chandler@gbrmpa.gov.au](mailto:julia.chandler@gbrmpa.gov.au)>; Peta Lawlor <[plawlor@lifesaving.com.au](mailto:plawlor@lifesaving.com.au)>; Richard Fitzpatrick <[richard.fitzpatrick@biopixel.tv](mailto:richard.fitzpatrick@biopixel.tv)>; Angela Freeman <[angela@wildlifetng.com](mailto:angela@wildlifetng.com)>; Angela Freeman <[angelaf@iig.com.au](mailto:angelaf@iig.com.au)>; Adam Smith <[adam.smith@reefecologic.org](mailto:adam.smith@reefecologic.org)>; Carley Kilpatrick <[Carley.Kilpatrick@des.qld.gov.au](mailto:Carley.Kilpatrick@des.qld.gov.au)>; Marcel Green <[marcel.green@dpi.nsw.gov.au](mailto:marcel.green@dpi.nsw.gov.au)>  
**Cc:** Kimberly Foster <[KIMBERLY.FOSTER@daf.qld.gov.au](mailto:KIMBERLY.FOSTER@daf.qld.gov.au)>; Michael Mikitis <[Michael.Mikitis@daf.qld.gov.au](mailto:Michael.Mikitis@daf.qld.gov.au)>  
**Subject:** Shark Control Program Scientific Working Group meeting 1 of 2022 - please advise your availability

Dear Members,

I hope you are all well and 2022 has been kind to you so far.

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<https://www.surveymonkey.com/r/BVMMBKF>

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- Target species list review

If you have any other suggestions for agenda items please let me know.

Please note I will be on leave next week and will finalise the meeting arrangements and agenda when I return.

Thanks

Tracey



**Dr Tracey Scott-Holland**

Research & Policy Coordinator (Shark Control Program), Fisheries Queensland  
Department of Agriculture and Fisheries

Sch 41. Personal Information [Tracey.scott-holland@daf.qld.gov.au](mailto:Tracey.scott-holland@daf.qld.gov.au) W [www.daf.qld.gov.au](http://www.daf.qld.gov.au)

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**Lyn Low**

---

**From:** MIKITIS Michael  
**Sent:** Monday, 14 June 2021 4:18 PM  
**To:** SCOTT-HOLLAND Tracey  
**Subject:** RE: Shark Target Species List

Hi Tracey,

I like the approach. Although some of the recommendations may be a little subjective, this will also prompt discussion at the SWG which can be incorporated into the final if required.

Agree an appendix with shark bite data would be good.

Also a table/matrix of the assessments.



**Michael Mikitis**  
Manager (Shark Control Program) Fisheries Queensland  
Department of Agriculture and Fisheries

Sch 4 - Personal Information Michael.mikitis@daf.qld.gov.au W [www.daf.qld.gov.au](http://www.daf.qld.gov.au)  
Level 5, 41 George Street, Brisbane QLD 4000  
GPO Box 46, Brisbane QLD 4001

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---

**From:** SCOTT-HOLLAND Tracey <Tracey.Scott-Holland@daf.qld.gov.au>  
**Sent:** Friday, 11 June 2021 3:54 PM  
**To:** MIKITIS Michael  
**Subject:** FW: Shark Target Species List

Hi Michael,

Daryl has made a start on the review of the target species list and is keen to see if we are generally happy with this approach.

I have had a quick look and it is looking pretty good to me. I think it would be useful to include the shark bite data for Australia for each species as an appendix.

Do you want to have a look and we can discuss early next week. Daryl expects to have a complete draft in the next couple of weeks.

I think we should be on track to hold the next SWG meeting around mid to late July.  
We can seek feedback from the SWG on Daryl's assessment.

Trace

**From:** Daryl McPhee <[dmcphree@bond.edu.au](mailto:dmcphree@bond.edu.au)>

**Sent:** Friday, 11 June 2021 2:34 PM

**To:** SCOTT-HOLLAND Tracey

**Subject:** Shark Target Species List

Hi Tracey,

I have attached a very early draft of some of the material for the review of the target shark species list. I have provided it so you can get an early feel for the direction the document will take and the information content. Don't worry about typos and formatting at this stage. I want to particularly draw your attention to the criteria used which I have modified slightly from what you have provided and my approach to defining a serious bite.

I am aiming where relevant to provide a global overview of bites from the various species, but then honing into Australia and more specifically Queensland in terms of application of the criteria.

Regards,

Daryl

Daryl McPhee

Associate Professor of Environmental Management

Faculty of Society and Design



Phone: +61 7 5595 0155 Sch 4 - Personal Information

Bond University | Gold Coast, Queensland, 4229, Australia

CRICOS Provider Code 00017B



**Lyn Low**

---

**From:** SCOTT-HOLLAND Tracey  
**Sent:** Tuesday, 15 June 2021 1:17 PM  
**To:** Daryl McPhee  
**Subject:** RE: Shark Target Species List

Hi Daryl,

We are happy with this approach.

Can you please plan to incorporate feedback from the scientific working group in the final version.

An appendix with the raw shark bite records would be a useful addition (maybe just the Australian records).

Does GSAF allow you to use the data like this?

Cheers

Tracey

---

**From:** Daryl McPhee <dmcphree@bond.edu.au>  
**Sent:** Friday, 11 June 2021 2:34 PM  
**To:** SCOTT-HOLLAND Tracey  
**Subject:** Shark Target Species List

Hi Tracey,

I have attached a very early draft of some of the material for the review of the target shark species list. I have provided it so you can get an early feel for the direction the document will take and the information content. Don't worry about typos and formatting at this stage. I want to particularly draw your attention to the criteria used which I have modified slightly from what you have provided and my approach to defining a serious bite.

I am aiming where relevant to provide a global overview of bites from the various species, but then honing into Australia and more specifically Queensland in terms of application of the criteria.

Regards,

Daryl

[Daryl McPhee](#)

Associate Professor of Environmental Management

Faculty of Society and Design



Phone: +61 7 5595 0155 | Sch 4 - Personal Information

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**Lyn Low**

**From:** EMMERT Katie  
**Sent:** Tuesday, 13 July 2021 8:51 AM  
**To:** SCOTT-HOLLAND Tracey  
**Subject:** RE: Shark Target Species List

This is very interesting. I had a quick look through and suggest a few minor edits are needed — Sch 4 - Deliberative Process

Also needs to be DAF in the opening para, not DPI. Just needs a proofread.

**Katie Emmert**

Senior Education Officer (Shark Control Program), Fisheries Queensland  
Department of Agriculture and Fisheries

T (07) 3087 8662 E [katie.emmert@daf.qld.gov.au](mailto:katie.emmert@daf.qld.gov.au)  Chat with me on Teams W [www.daf.qld.gov.au](http://www.daf.qld.gov.au)  
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	WFH	41 George St	41 George St	41 George St	WFH
Wk 2	Mon	Tue	Wed	Thu	Fri
	WFH	41 George St	WFH	41 George St	Non-working day



**From:** SCOTT-HOLLAND Tracey <[Tracey.Scott-Holland@daf.qld.gov.au](mailto:Tracey.Scott-Holland@daf.qld.gov.au)>  
**Sent:** Tuesday, 13 July 2021 7:37 AM  
**To:** MIKITIS Michael  
**Cc:** FARY Samuel; EMMERT Katie  
**Subject:** FW: Shark Target Species List

Hi Michael,

Daryl has completed the review of the target species list.  
Please see attached.

Do you want me to review prior to the SWG or are we happy to send this version to the SWG?

Trace

**From:** Daryl McPhee <[dmcphee@bond.edu.au](mailto:dmcphee@bond.edu.au)>  
**Sent:** Monday, 12 July 2021 7:12 PM  
**To:** SCOTT-HOLLAND Tracey  
**Subject:** Shark Target Species List

Hi Tracey,

Please find a draft of the Review of the Shark Species list and Appendix 1.

I have attached the invoice for the work. The invoice is within budget and inclusive on any further edits required on the draft document and presentation of the results of the Scientific Working Group.

Regards,

Daryl

Daryl McPhee

Associate Professor of Environmental Management

Faculty of Society and Design



Phone: +61 7 5595 0155 Sch 4 - Personal Information

Bond University | Gold Coast, Queensland, 4229, Australia

CRICOS Provider Code 00017B



**Lyn Low**

**From:** SCOTT-HOLLAND Tracey  
**Sent:** Tuesday, 13 July 2021 8:52 AM  
**To:** EMMERT Katie  
**Subject:** RE: Shark Target Species List

Thanks I haven't read it yet other than a quick look at the assessment 😊

---

**From:** EMMERT Katie <Katie.Emmert@daf.qld.gov.au>  
**Sent:** Tuesday, 13 July 2021 8:51 AM  
**To:** SCOTT-HOLLAND Tracey  
**Subject:** RE: Shark Target Species List

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**Katie Emmert**

Senior Education Officer (Shark Control Program), Fisheries Queensland  
Department of Agriculture and Fisheries

T (07) 3087 8662 E [katie.emmert@daf.qld.gov.au](mailto:katie.emmert@daf.qld.gov.au)  Chat with me on Teams W [www.daf.qld.gov.au](http://www.daf.qld.gov.au)  
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**From:** Daryl McPhee <[dmcphoe@bond.edu.au](mailto:dmcphoe@bond.edu.au)>

**Sent:** Monday, 12 July 2021 7:12 PM

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Regards,

Daryl

Daryl McPhee

Associate Professor of Environmental Management

Faculty of Society and Design



Phone: +61 7 5595 0355 4 - Personal Information

Bond University | Gold Coast, Queensland, 4229, Australia

CRICOS Provider Code 00017B





## Lyn Low

**From:** EMMERT Katie  
**Sent:** Tuesday, 13 July 2021 8:54 AM  
**To:** SCOTT-HOLLAND Tracey  
**Subject:** RE: Shark Target Species List

All good, just thought I'd let you know while fresh in my mind because the other SWG members will pick it up for sure 😊

### Katie Emmert

Senior Education Officer (Shark Control Program), Fisheries Queensland  
Department of Agriculture and Fisheries

T (07) 3087 8662 E [katie.emmert@daf.qld.gov.au](mailto:katie.emmert@daf.qld.gov.au)  Chat with me on Teams W [www.daf.qld.gov.au](http://www.daf.qld.gov.au)  
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**Sent:** Tuesday, 13 July 2021 8:52 AM  
**To:** EMMERT Katie  
**Subject:** RE: Shark Target Species List

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**From:** EMMERT Katie <[Katie.Emmert@daf.qld.gov.au](mailto:Katie.Emmert@daf.qld.gov.au)>  
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**To:** SCOTT-HOLLAND Tracey  
**Subject:** RE: Shark Target Species List

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### Katie Emmert

Senior Education Officer (Shark Control Program), Fisheries Queensland  
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Please see attached.

Do you want me to review prior to the SWG or are we happy to send this version to the SWG?

Trace

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**From:** Daryl McPhee <[dmcphoe@bond.edu.au](mailto:dmcphoe@bond.edu.au)>

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**To:** SCOTT-HOLLAND Tracey

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Regards,

Daryl

Daryl McPhee

Associate Professor of Environmental Management

Faculty of Society and Design



Phone: +61 7 5595 0155 | 4 - Personal Information

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CRICOS Provider Code 00017B



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**Lyn Low**

---

**From:** MIKITIS Michael  
**Sent:** Thursday, 15 July 2021 9:51 AM  
**To:** SCOTT-HOLLAND Tracey  
**Subject:** RE: Shark Target Species List

Given the low risk and low value I'm happy to pay now.  
We have a draft report.



**Queensland  
Government**

**Michael Mikitis**  
Manager (Shark Control Program) Fisheries Queensland  
Department of Agriculture and Fisheries

Sch 41 Personal Information [Michael.mikitis@daf.qld.gov.au](mailto:Michael.mikitis@daf.qld.gov.au) W [www.daf.qld.gov.au](http://www.daf.qld.gov.au)  
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**From:** SCOTT-HOLLAND Tracey <[Tracey.Scott-Holland@daf.qld.gov.au](mailto:Tracey.Scott-Holland@daf.qld.gov.au)>  
**Sent:** Thursday, 15 July 2021 7:18 AM  
**To:** MIKITIS Michael  
**Subject:** FW: Shark Target Species List

Hi Michael,

Daryl has sent an invoice for this work now and has indicated that this price includes any further edits on the document and presentation to the SWG.

Are you happy to approve payment of this now or do we have to wait until the final version is delivered after the SWG?

Trace

---

**From:** Daryl McPhee <[dmcphee@bond.edu.au](mailto:dmcphee@bond.edu.au)>  
**Sent:** Monday, 12 July 2021 7:12 PM  
**To:** SCOTT-HOLLAND Tracey  
**Subject:** Shark Target Species List

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Regards,

Daryl

Daryl McPhee

Associate Professor of Environmental Management

Faculty of Society and Design



Phone: +61 7 5595 0554 - Personal Information

Bond University | Gold Coast, Queensland, 4229, Australia

CRICOS Provider Code 00017B



**Lyn Low**

---

**From:** Michael Mikitis  
**Sent:** Friday, 12 November 2021 8:31 AM  
**To:** Tracey Scott-Holland  
**Subject:** RE: SWG Communique

Yes 15<sup>th</sup> should be fine.



**Michael Mikitis**  
Manager (Shark Control Program) Fisheries Queensland  
Department of Agriculture and Fisheries

Sch 4 Personal Information [Michael.mikitis@daf.qld.gov.au](mailto:Michael.mikitis@daf.qld.gov.au) W [www.daf.qld.gov.au](http://www.daf.qld.gov.au)  
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---

**From:** Tracey Scott-Holland <[Tracey.Scott-Holland@daf.qld.gov.au](mailto:Tracey.Scott-Holland@daf.qld.gov.au)>  
**Sent:** Friday, 12 November 2021 8:20 AM  
**To:** Kimberly Foster; Michael Mikitis  
**Subject:** RE: SWG Communique

Thanks both.

I will send out to members for a final check.

I will also give them another opportunity to provide feedback on the target species list review. So far I only have feedback from Jon Mitchell.

It definitely won't be ready to publish before your meeting next week and will come to you for web approval Kimberly.

Michael, does the week of 15 Dec suit you?

We could probably fit this one in a half day meeting as we will mainly be discussing the drone trial evaluation and giving some quick updates on other things.

Thanks  
Tracey

---

**From:** Kimberly Foster <[KIMBERLY.FOSTER@daf.qld.gov.au](mailto:KIMBERLY.FOSTER@daf.qld.gov.au)>  
**Sent:** Thursday, 11 November 2021 6:05 PM  
**To:** Tracey Scott-Holland; Michael Mikitis  
**Subject:** RE: SWG Communique

Hi Tracey

I'm happy for this to go to members for a final check.

But can we hold publishing pending our discussion with ED/DDG next week.

Week of 15 December is better for me for next meeting.

Thanks

K



Regards,

Kimberly Foster

Director (Management & Reform), Fisheries Queensland  
Department of Agriculture and Fisheries

Sch 44 - Personal Information [kimberly.foster@daf.qld.gov.au](mailto:kimberly.foster@daf.qld.gov.au)  
Mineral House, Level 5, 41 George Street, Brisbane QLD 4000  
GPO Box 46, Brisbane QLD 4001

*I work flexibly ... I work online on Wednesdays and Thursdays outside the office and sometimes it takes me longer than normal to reply, if it is urgent please call my mobile and leave a message. I also work at irregular times, please do not feel obliged to read, action or respond outside your regular work hours.*

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---

**From:** Tracey Scott-Holland <[Tracey.Scott-Holland@daf.qld.gov.au](mailto:Tracey.Scott-Holland@daf.qld.gov.au)>

**Sent:** Wednesday, 10 November 2021 1:14 PM

**To:** Kimberly Foster; Michael Mikitis

**Subject:** SWG Communique

Hi Michael and Kimberly,

Can you please review the draft communique from the last meeting before I send it out to members.

[G:\Fisheries\Ops\SharkControlProgram\Science & Research\SCIENTIFIC WORKING GROUP\Meetings\Meeting 11 2021 August 24 & 25](#)

When I send it out to members I will check availability for our next meeting.

I'm proposing to hold it during the week of 8-12 or 15-19 December. Can you please let me know your availability during this time?

The main agenda item will be review of the drone trial results/evaluation.

Thanks

Trace



**Dr Tracey Scott-Holland**

Research & Policy Coordinator (Shark Control Program), Fisheries Queensland  
Department of Agriculture and Fisheries

Sch 41. Personal Information [tracey.scott-holland@daf.qld.gov.au](mailto:tracey.scott-holland@daf.qld.gov.au) W [www.daf.qld.gov.au](http://www.daf.qld.gov.au)

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**Lyn Low**

---

**From:** Michael Mikitis  
**Sent:** Thursday, 11 November 2021 1:46 PM  
**To:** Tracey Scott-Holland; Kimberly Foster  
**Subject:** RE: SWG Communique

No issues from me other than we will need to discuss 1) Noosa Biosphere proposal and 2) target shark list with DDG and ED on Monday. From that we will be able to advise next steps.

Regards



**Queensland  
Government**

**Michael Mikitis**  
Manager (Shark Control Program) Fisheries Queensland  
Department of Agriculture and Fisheries

Sch 47 Personal Information Michael.mikitis@daf.qld.gov.au W [www.daf.qld.gov.au](http://www.daf.qld.gov.au)  
Level 5, 41 George Street, Brisbane QLD 4000  
GPO Box 46, Brisbane QLD 4001

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---

**From:** Tracey Scott-Holland <Tracey.Scott-Holland@daf.qld.gov.au>  
**Sent:** Wednesday, 10 November 2021 1:14 PM  
**To:** Kimberly Foster; Michael Mikitis  
**Subject:** SWG Communique

Hi Michael and Kimberly,

Can you please review the draft communique from the last meeting before I send it out to members.

[G:\Fisheries\Ops\SharkControlProgram\Science & Research\SCIENTIFIC WORKING GROUP\Meetings\Meeting 11 2021 August 24 & 25](#)

When I send it out to members I will check availability for our next meeting.

I'm proposing to hold it during the week of 8-12 or 15-19 December. Can you please let me know your availability during this time?

The main agenda item will be review of the drone trial results/evaluation.

Thanks  
Trace



**Dr Tracey Scott-Holland**

Research & Policy Coordinator (Shark Control Program), Fisheries Queensland  
Department of Agriculture and Fisheries

Sch W- Personal Information [tracey.scott-holland@daf.qld.gov.au](mailto:tracey.scott-holland@daf.qld.gov.au) W [www.daf.qld.gov.au](http://www.daf.qld.gov.au)

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## Lyn Low

---

**From:** MIKITIS Michael  
**Sent:** Monday, 24 May 2021 4:53 PM  
**To:** SCOTT-HOLLAND Tracey  
**Subject:** RE: Target Shark Species List

Approved,

Go ahead and engage Daryl. We need this work done and he has the relevant experience and knowledge. No need for a contract. This email and the attachments are enough. Once complete, he can simply send through the invoice for payment.



**Michael Mikitis**  
Manager (Shark Control Program) Fisheries Queensland  
Department of Agriculture and Fisheries

Sch 4 Personal Information [Michael.mikitis@daf.qld.gov.au](mailto:Michael.mikitis@daf.qld.gov.au) W [www.daf.qld.gov.au](http://www.daf.qld.gov.au)  
Level 5, 41 George Street, Brisbane QLD 4000  
GPO Box 46, Brisbane QLD 4001

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---

**From:** SCOTT-HOLLAND Tracey <[Tracey.Scott-Holland@daf.qld.gov.au](mailto:Tracey.Scott-Holland@daf.qld.gov.au)>  
**Sent:** Monday, 24 May 2021 3:28 PM  
**To:** MIKITIS Michael  
**Subject:** FW: Target Shark Species List

Hi Michael,  
Can we please discuss next steps for this.  
Daryl has indicated he doesn't feel the need to enter into a contract for this.  
Thanks  
Tracey

---

**From:** Daryl McPhee <[dmcphee@bond.edu.au](mailto:dmcphee@bond.edu.au)>  
**Sent:** Monday, 17 May 2021 9:18 AM  
**To:** SCOTT-HOLLAND Tracey  
**Subject:** Target Shark Species List

Dear Tracey,

Many thanks for the invitation to assist Fisheries Queensland with the target shark species list for the Queensland Shark Control Program. This list continues to apply to all Queensland waters outside of Great Barrier Reef Marine Park.

I will present the findings of the report in person or remotely to the Scientific Working Group.

I can undertake the work for a one-off fixed fee of \$5,400 which comprises 36 hours work at \$150/hr. A draft report will be forwarded to Fisheries Queensland for review and comment.

Daryl

Daryl McPhee

Associate Professor of Environmental Management

Faculty of Society and Design



Phone: +61 7 5595 0355 - Personal Information

Bond University | Gold Coast, Queensland, 4229, Australia

CRICOS Provider Code 00017B



**From:** SCOTT-HOLLAND Tracey  
**Sent:** Monday, 10 May 2021 1:08 PM  
**To:** Daryl McPhee  
**Cc:** MIKITIS Michael  
**Subject:** Shark Control Program - Target Species List  
**Attachments:** Attachment 2 - Target Shark List - History.docx; Attachment 1 - Target Species Criteria 2020 - Draft for consultation.docx

Hi Daryl,

As discussed, we are interested in engaging your professional services to assist with reviewing the Target Species List for the Queensland Shark Control Program.

Can you please advise if you have the capacity to deliver the following services and provide a quote for this.

- Review the attached Target Species Criteria in consultation with the Shark Control Program Scientific Working Group (Attachment 1);
- Assess 19 target shark species (Attachment 2) against the revised target species criteria;
- Provide a report on the assessment; and
- Deliver a presentation on the findings to the Shark Control Program Scientific Working Group (either in person or via an online platform e.g. zoom/Microsoft teams).

Attachment 2 also includes a history of species taken in the Program.

Kind Regards  
Tracey



**Dr Tracey Scott-Holland**  
Research & Policy Coordinator (Shark Control Program), Fisheries Queensland  
Department of Agriculture and Fisheries

Sch 4 - Personal Information Tracey.scott-holland@daf.qld.gov.au W [www.daf.qld.gov.au](http://www.daf.qld.gov.au)  
**In the office:** Tuesday and Thursday  
Level 5, 41 George Street, Brisbane QLD 4000  
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## Shark Control Program

### Target Shark Species Criteria

The criteria will be used to determine which species are euthanised and which species are released alive where possible if caught in Shark Control Program apparatus.

The target species list does not apply to Commonwealth Great Barrier Reef Marine Park waters.

An 'unprovoked' encounter between a human and a shark is defined as an incident where a shark is in its natural habitat and has made a determined attempt to bite a human where that person is not engaged in provocative activities.

A 'provoked' incident relates to circumstances where the person attracts or initiates physical contact with a shark (accidentally or on purpose) or was fishing for, spearing, stabbing, feeding, netting or handling a shark or where the shark was attracted to the victim by activities such as fishing, spear-fishing, commercial diving activities (actively collecting abalone, pearl shells, or other marine animals) and cleaning of captured fish.

These definitions are as per the Australian Shark Attack File.

<https://taronga.org.au/conservation-and-science/australian-shark-attack-file/analysing-the-data>

### CRITERIA

1. Is the species known to occur in Queensland?
  - a. Yes (go to 2.)
  - b. No (**Non-target species**)
2. Has the species been associated with unprovoked bite/s resulting in serious injury or fatality in Australia?
  - a. Yes (go to 3.)
  - b. No (**Non-target species**)
3. Is the number of unprovoked bites resulting in serious injury or fatality relatively high?
  - a. Yes (**Target species**)
  - b. No (go to 4.)
4. The circumstances of each incident should be examined with consideration given to the species' biology to determine the applicability to Queensland waters where people are engaged in in-water activities.

**Commented [ST1]:** Advice from SWG on defining a value here.

## Queensland Shark Control Program

### Target Shark List (as at 27 June 2018)

Australian Blacktip  
Big Nose Whaler  
Blue Shark  
**Bull Whaler**  
Common Blacktip Whaler  
Dusky Whaler  
Great Hammerhead  
Grey Reef Whaler  
Long Nose Whaler (Spinner Shark)  
Longfin Mako  
Shortfin Mako  
Oceanic Whitetip Whaler  
Pigeye Whaler  
Sandbar Whaler  
Sharptooth Shark/Lemon Shark  
Silky Whaler  
Silvertip Whaler  
**Tiger Shark**  
**White Shark**

### A history of shark species taken in the Program.

#### 1962 – Queensland Shark Control Program commenced in 1962.

Early in the Program's operation (date unknown), a policy decision was made to release the following species alive.

Grey Carpet Shark  
Gummy Shark  
Port Jackson Shark  
Tawny Shark  
Tropical Sawshark  
Whale Shark  
Wobbegong Shark spp.  
Zebra (Leopard) Shark

Prior to **2001** (date unknown) Grey Nurse Sharks were removed from the target species list given the conservation concerns for this species.

#### 2015 Review

A comprehensive review of all shark species taken in the program was undertaken by DAF, GBRMPA and JCU with input from NSW DPI.

The following species were assessed as non-dangerous and no longer a target species in the Program:

Australian Sharpnose Shark  
Bronze Whaler Shark  
Creek Whaler Shark  
Fossil Shark

Graceful Shark  
 Grey Sharpnose Shark  
 Hardnose Shark  
 Milk Shark  
 Nervous Shark  
 Scalloped Hammerhead Shark  
 Sliteye Shark  
 Speartooth Shark  
 Spot-tail Shark  
 Weasel Shark  
 Whitecheek Shark  
 Winghead Hammerhead Shark

## 2017

In 2017 the Great Barrier Reef Marine Park Authority issued a renewed permit for the Shark Control Program to operate in the GBRMP. Under the permit, a target species list was established. This is the first time a Target Species list was established for the Program. Prior to this, a non-dangerous shark list was maintained and all species on the non-dangerous list were released alive.

## 2018 Review

Species removed from the Target Shark list and justification for the decision.

Species	Justification
Blacktip Reef Whaler, <i>Carcharhinus melanopterus</i>	Grows to a relatively small size in Australia (rarely greater than 1.4m). Bite incidents may inflict injury but no fatalities recorded in Queensland attributed to this species. The species typically inhabits coral reef areas.
Galapagos Shark, <i>Carcharhinus galapagensis</i>	Not known to be found in Queensland and has never been caught in the Shark Control Program.
School Shark, <i>Galeorhinus galeus</i>	Grows to a relatively small size and are rarely encountered in Qld.
Thresher Sharks (3 species), <i>Alopias</i> spp.	Thresher sharks are oceanic species that are rarely seen in inshore areas where the SCP operates. The last reported thresher shark caught in the SCP was in 1989. This species has a relatively small mouth. There are no bite incidents recorded in Queensland attributed to thresher sharks (Australian Shark Attack file). Can grow to a large size but a significant amount of the length is attributed to the very large tail.
Whitetip Reef Shark, <i>Triaenodon obesus</i>	Grows to a relatively small size. Bite incidents are generally provoked and non-fatal e.g. spearfishing.

## 2019

In 2019, an Administrative Appeals Tribunal decision removed the target species list from the GBRMP Permit and required all sharks caught to be released alive. The Target Species list continues to apply to all waters outside of Commonwealth GBRMP waters.



**From:** SCOTT-HOLLAND Tracey  
**Sent:** Wednesday, 2 June 2021 11:21 AM  
**To:** Simpfendorfer, Colin; MITCHELL Jonathan; Julia Chandler; Peta Lawlor; Richard Fitzpatrick; Angela Freeman; adam.smith; KILPATRICK Carley  
**Cc:** FOSTER Kimberly; MIKITIS Michael  
**Subject:** Shark Control Program Scientific Working Group - update for your information

Dear Members,

For your information:

**SharkSmart Drone Trial:**

Following on from our discussions at the last meeting, the SharkSmart drone trial has been extended to 4 October 2021 (the end of the spring school holidays) in south east Queensland.

In addition, flights will commence at Palm Cove (Cairns) and Alma Bay (Magnetic Island), this month and will continue until November 2021 when stinger nets are returned to the water.

Cairns Regional Council, Townsville City Council and local indigenous groups have been advised and offered a briefing about the trial.

We are preparing for a possible media announcement and will share those details with you once released so **please treat this as confidential until publicly announced.**

Should you receive any enquiries from the community, please encourage them to visit

<https://www.daf.qld.gov.au/sharksmart/drone-trial> or call DAF on 13 25 23.

**SMART drumline trial:**

Thank you all for endorsing the SMART drumline trial sampling and analysis plan. The plan has now been submitted to GBRMPA for approval.

We are working through final approvals and operational details for the trial to commence as soon as possible.

**Shark Control Program Target Species List Review**

The SCP has engaged Professor Daryl McPhee to review the current target species list against the criteria developed in consultation with the Scientific Working Group.

Professor McPhee will present his assessment to the group at the next meeting.

**SCP SWG Meeting Communique**

The communique from the last meeting has been submitted for publication on the DAF website and will be available in the coming days.

Kind Regards

Tracey



**Dr Tracey Scott-Holland**

Research & Policy Coordinator (Shark Control Program), Fisheries Queensland  
Department of Agriculture and Fisheries

Sch 4 - Personal Information E [Tracey.scott-holland@daf.qld.gov.au](mailto:Tracey.scott-holland@daf.qld.gov.au) W [www.daf.qld.gov.au](http://www.daf.qld.gov.au)

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**From:** SCOTT-HOLLAND Tracey  
**Sent:** Wednesday, 18 August 2021 5:19 PM  
**To:** FOSTER Kimberly; MIKITIS Michael; MITCHELL Jonathan; Julia Chandler; Peta Lawlor; Richard Fitzpatrick; Angela Freeman; Angela Freeman; adam.smith; KILPATRICK Carley; Simpfendorfer, Colin; EMMERT Katie; FARY Samuel; Marcel Green  
**Subject:** Shark Control Program Scientific Working Group 24-25 August 2021 - Agenda and attachments - email 1 of 2  
**Attachments:** SCP SWG Agenda August 2021.pdf; Agenda Item 4 - CONFIDENTIAL - Attachment 2 - SCP Target Species List Appendix 1.docx; Agenda Item 4 - CONFIDENTIAL - Attachment 1 - A Review of the Shark Control Program Target Shark Species List.docx; Agenda Item 4 - CONFIDENTIAL - Target Species List Review.pdf; Agenda Item 5 - Shark bite incidents.pdf

Dear members and invited guests,

Please find attached the Agenda, agenda papers and attachments for the Shark Control Program Scientific Working Group meeting to be held on 24 & 25 August 2021.

Note: agenda attachments will be provided in 2 separate emails.

Please maintain confidentiality in relation to agenda items and attachments where identified.

If you have any technical issues joining the meeting on the day please contact me via the mobile phone number listed below.

We look forward to seeing you next week.

Kind Regards

Tracey



**Dr Tracey Scott-Holland**

Research & Policy Coordinator (Shark Control Program), Fisheries Queensland  
Department of Agriculture and Fisheries

Sch 4 - Personal Information [tracey.scott-holland@daf.qld.gov.au](mailto:tracey.scott-holland@daf.qld.gov.au) W [www.daf.qld.gov.au](http://www.daf.qld.gov.au)

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**QUEENSLAND SHARK CONTROL PROGRAM**  
**SCIENTIFIC WORKING GROUP**  
**Meeting Agenda**

**24 August 2021 1:00pm – 4:00pm**

**25 August 2021 9:00am – 12:00pm**

**Microsoft Teams**

**Tuesday 24 August 2021**

Agenda item	Attachments	Lead/Facilitator	Time
1. Preliminary Business	Verbal update	Kimberly Foster	1:00pm – 4:00pm
2. Shark Control Program update	Verbal update	Michael Mikitis	
3. NSW shark management update	Verbal update	Marcel Green	
4. Target Species List Review CONFIDENTIAL	Agenda Paper 1	Dr Daryl McPhee	
5. Shark bite incidents	Agenda Paper 2	Michael Mikitis	
6. Noosa Biosphere – Marine Species Protection Symposium – Report CONFIDENTIAL	Agenda Paper 3	Dr Tracey Scott-Holland	
MEETING BREAK 4:00pm			

**Wednesday 25 August 2021**

Agenda item	Attachments	Lead/Facilitator	Time
7. SharkSmart update	Agenda Paper 4	Katie Emmert	9:00am – 12:00pm
8. Shark Control Program research update	Presentation	Dr Tracey Scott-Holland	
9. Operation of the Shark Control Program in the Great Barrier Reef Marine Park	Agenda Paper 5	Michael Mikitis	
10. General Discussion	Discussion	Kimberly Foster	
11. Communique	Verbal Update	Kimberly Foster	
MEETING CLOSE 12:00pm			

## Attendees - Members

Name	Position / Organisation
Kimberly Foster	Chair, Department of Agriculture and Fisheries
Michael Mikitis	Department of Agriculture and Fisheries
Dr Jonathan Mitchell	Department of Agriculture and Fisheries
Julia Chandler	Great Barrier Reef Marine Park Authority
Dr Colin Simpfendorfer	James Cook University
Peta Lawlor	Surf Life Saving Queensland
Angela Freeman	Tourism Representative
Dr Adam Smith	Townsville Local Marine Advisory Committee; Reef Ecologic
Dr Carley Kilpatrick	Department of Environment and Science

## Apologies

Name	Position / Organisation
Richard Fitzpatrick	Biopixel Oceans Foundation

## Invited Observers and Guests

Name	Position / Organisation
Sam Fary	Department of Agriculture and Fisheries
Katie Emmert	Department of Agriculture and Fisheries
Marcel Green	NSW Fisheries
Dr Daryl McPhee	Bond University

## Secretariat

Name	Position / Organisation
Dr Tracey Scott-Holland	Department of Agriculture and Fisheries

# Shark Control Program Scientific Working Group

## Agenda Paper 1

24 August 2021

---

**TITLE:** *Target Species List Review*

**AGENDA ITEM NO: 4**

---

**CONFIDENTIAL – NOT FOR FURTHER DISSEMINATION**

### Recommendation:

#### That working group members:

- **Note** the draft report 'A Review of the Shark Control Program Target Shark Species List' (Attachment 1 & 2) and presentation by Dr Daryl McPhee.
- **Provide** initial feedback on the draft report and application of the criteria used to develop the revised target species list for the Shark Control Program (the Program).
- **Provide** advice on possible issues or risks Fisheries Queensland would need to consider in reviewing the target species list.

### Background

- The Department of Agriculture and Fisheries (DAF) maintains a target shark species list. Target sharks are those that pose a significant risk to water users and are euthanised if caught in the Program.
- The target species list does not apply to the Program in the GBRMP where all animals (including sharks) caught on drumlines are released alive if possible and safe to do so.
- A set of criteria to determine which sharks should be included on the target species list was developed in consultation with the Shark Control Program Scientific Working Group.
- Dr Daryl McPhee, Associate Professor, Environmental Management, Bond University was engaged to undertake the assessment of the current 19 target shark species against the criteria and to deliver a report with recommendations to the Department.

**Responsible officer:** Dr Tracey Scott-Holland

**Position:** Research & Policy Coordinator, Shark Control Program

# **A Review of the Shark Control Program Target Shark Species List**

**Dr Daryl McPhee**

**Draft - 1<sup>st</sup> July 2021**

Published on DAF Disclosure Log  
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## EXECUTIVE SUMMARY

This report applied three criteria to the current list of target species of the Queensland Shark Control Program (QSCP). The three criteria used were:

- Criteria 1: Is the species known to occur in coastal Queensland waters where the shark program operates outside of the Great Barrier Reef Marine Park?
- Criteria 2: Has the species been associated with unprovoked bite/s resulting in serious injury or fatality in Australia?
- Criteria 3: Is the number of unprovoked bites resulting in serious injury or fatality relatively high?

A review of habitat requirements and the known distribution of shark species was used to address criteria 1.

The Global Shark Accident File (GSAF) was used to determine the occurrence of unprovoked bites from the species considered and this was augmented where possible with peer-reviewed literature. The focus of the assessment was on Australia but information from other countries was used to provide a broader context. Severe bites were defined with respect to comparing available information on injuries sustained with a previously published bite severity index. It is not possible in all instances to reliably determine the species of shark involved in an unprovoked bite.

The results of the review are summarised in Table 1.

It is recommended that based on the criteria applied the QSCP should have three species only as target species - bull, white and tiger sharks.

Of the remaining species considered, one is unlikely to or rarely occur in nearshore coastal waters where the QCSP operates. A further nine species are known to occur at times in nearshore coastal waters where the QCSP operates but are not recorded as the species involved in unprovoked bites in Australia, or in the case of blue sharks are highly likely to have been misidentified. The remaining four species have been recorded as the species involved in unprovoked bites in Australia although the frequency of bites is low (1 or 2). In the case of the bite attributed to a mako shark, the involvement of a mako shark is plausible but it may have been the result of another species.

**Table 1 Summary of the Application of the Three Criteria for Determining Whether a Shark Species are Recommended for Inclusion on the QSCP Target Species List.**

Species	Criteria 1.	Criteria 2.	Criteria 3.	Target Species List
White Shark	YES	YES	YES	YES
Tiger Shark	YES	YES	YES	YES
Bull Shark	YES	YES	YES	YES
Blacktip Whalers	YES	YES	NO	NO
Great Hammerhead	YES	YES	NO	NO
Grey Reef Whaler	YES	YES	NO	NO
Longfin and Shortfin Mako Shark	YES	YES <sup>1</sup>	NO	NO
Lemon Shark	YES	NO	NO	NO
Blue Shark	YES	NO <sup>2</sup>	NO	NO
Dusky Whaler	YES	NO	NO	NO
Spinner Shark	YES	NO	NO	NO
Pigeye Shark	YES	NO	NO	NO
Sandbar Shark	YES	NO	NO	NO
Silky Whaler	YES	NO	NO	NO
Silvertip Whaler	YES	NO	NO	NO
Big Nose Whaler	YES	NO	NO	NO
Oceanic Whitetip Shark	NO	NO	NO	NO

<sup>1</sup> This assumes the single recorded bite was correctly attributed to the species.

<sup>2</sup> While an unprovoked fatal bite has been attributed to this species in Queensland, the weight of evidence suggests the species involved was a white shark.

## INTRODUCTION

The Queensland Department of Primary Industries Shark Control Program has continued to evolve in response to knowledge, technology, and changes in community attitudes towards sharks and shark bite. The Queensland Shark Control Program (QSCP) operates mesh nets and baited drumlines at beaches popular for surfers and swimmers. The program commenced in 1962 and very early in the program's inception a decision was made to release several species alive as they posed no risk of serious injury to beach goers. This included Port Jackson sharks, tawny sharks, and whale sharks. In 2001, grey nurse sharks were also to be released alive if caught in the program. This decision was based on concerns for the status of the east coast population of the species as well as general recognition that their risk to humans from an unprovoked shark bite may have been historically overstated.

In 2017 the Great Barrier Reef Marine Park Authority issued a renewed permit for the QSCP to operate in the GBRMP. Under the permit, a target species list was established. This is the first time a target species list was established for the Program. Prior to this, a non-dangerous shark list was maintained and all species on the non-dangerous list were released alive. This list of non-dangerous species included a further 16 species identified in 2015 through a comprehensive review of all shark species taken in the program was undertaken by DAF, GBRMPA and JCU with input from NSW DPI. Species identified as non-dangerous included the scalloped hammerhead shark, spot-tail shark and bronze whaler. A further review of the target species list in 2018 resulted in the following shark species removed from it: black tip reef whaler, three thresher shark species, school shark, Galapagos shark, and white tip reef shark.

Following a decision in 2019 in the Administrative Appeals Tribunal (AAT) the target species list was removed from the GBRMP Permit, thus requiring all sharks caught to be released alive. The Target Species list continues to apply to all waters outside of Commonwealth GBRMP waters. Target sharks captured outside of the Commonwealth GBRMP are euthanised. Currently the SCP Target Species list includes the following (in alphabetical order):

- Australian Blacktip
- Big Nose Whaler
- Blue Shark
- Bull Whaler
- Common Blacktip Whaler
- Dusky Whaler
- Great Hammerhead
- Grey Reef Whaler
- Long Nose Whaler (Spinner Shark)
- Longfin Mako
- Shortfin Mako
- Oceanic Whitetip Whaler
- Pigeye Whaler
- Sandbar Whaler
- Sharptooth Shark/Lemon Shark
- Silky Whaler
- Silvertip Whaler
- Tiger Shark
- White Shark

The purpose of this report is to review the Target Shark Species list through the application of specific criteria.

## METHODOLOGY

The three criteria used to assess each shark species are as follows:

- Criteria 1: Is the species known to occur in coastal Queensland waters where the shark program operates outside of the Great Barrier Reef Marine Park?
- Criteria 2: Has the species been associated with unprovoked bite/s resulting in serious injury or fatality in Australia?
- Criteria 3: Is the number of unprovoked bites resulting in serious injury or fatality relatively high?

The definition of a provoked and unprovoked shark is as per the Australian Shark Attack File<sup>3</sup>. An 'unprovoked' encounter between a human and a shark is defined as an incident where a shark is in its natural habitat and has made a determined attempt to bite a human where that person is not engaged in provocative activities. The focus on natural habitat excludes incidents involving captive animals in aquaria. A 'provoked' incident relates to circumstances where the person attracts or initiates physical contact with a shark (accidentally or on purpose) or was fishing for, spearing, stabbing, feeding, netting or handling a shark or where the shark was attracted to the victim by activities such as fishing, spearfishing, commercial diving activities (actively collecting abalone, pearl shells, or other marine animals) and cleaning of captured fish.

In determining what constitutes a serious injury, the report has been guided by Lentz et al. (2010) who designed a shark bite scoring severity system based on five levels (Table 2). For this report, only bites that are best described as Level 3, 4 are deemed to be a serious injury while a Level 5 bite is a fatal bite.

**Table 2 Levels of Bite Severity and the Description of the Levels (From Lentz et al., 2010). Bite Severity Levels in Bold are Considered Serious Injuries in this Report.**

Bite Severity	Description
Level 1	Simple lacerations involving the skin and soft tissue, blood pressure is typically unaffected, loss of function is not seen.
Level 2	Skin and soft tissue injuries that tend to involve a muscle, tendon, or bone; patients are quickly stabilized without much blood loss; function of extremity is not compromised.
<b>Level 3</b>	<b>Complex lacerations that typically involve muscle, tendon, or bone; patients may have transient hypotension and loss of function of a tendon; they likely require future surgical procedures for adequate repair of the wounds.</b>
<b>Level 4</b>	<b>Aggressive attacks that result in deep tissue damage and loss of function of an extremity or organ; a major vessel is likely to be injured; patients are hypotensive and require immediate surgical intervention to prevent fatality.</b>
<b>Level 5</b>	<b>Most likely a fatal injury resulting from the severity of the bite, the hypotension, loss of function of an extremity or organ, and rapid blood loss.</b>

In determining what constitutes a relatively high level of serious injury or fatality, the approach used was that a species had to be implicated in one or more unprovoked fatal bites over a five year period or, be implicated in two or more serious bites over a five year period.

<sup>3</sup> <https://taronga.org.au/conservation-and-science/australian-shark-attack-file/analysing-the-data>

In addition to the three criteria, the conservation status of the species at the State, National or International level, and other source of legal fishing mortality in Queensland are discussed.

The Global Shark Accident file (GSAF)<sup>4</sup> was used to determine the species responsible for unprovoked shark bite incidents. This database is freely available, searchable and in most cases provides links to curated information for each incident. In many instances, the species of shark responsible for an unprovoked shark bite is completely unknown, not known with a high degree of certainty, or possibly misidentified (McPhee, 2014; Ricci et al., 2016). The latter is particularly relevant for several historical bites (prior to 1980) where “grey nurse sharks”, “blue pointers” and “bronze whalers” may have been assigned by eyewitnesses purely based on the animal’s general colour. Ricci et al. (2016) estimated that species identification only occurred in 27% of bites. Where possible, peer reviewed literature that discusses individual case studies of shark bites has been used to augment information in the GSAF.

## SPECIES CONSIDERED

The remainder of this section discusses each species in turn. Appendix 1 includes information extracted from the GSAF on shark bites<sup>5</sup> in Australia with additional comments where necessary from the author. Appendix 1 does not include information on bites from white, bull and tiger sharks.

### WHITE SHARK

The white shark (*Carcharodon carcharias*) is well known to occur in Australian coastal waters including in Queensland, although it does range into oceanic waters to depths of approximately 350 metres on the continental shelf (Bruce, 1992; Bruce et al., 2006; Lee et al., 2021). White sharks are found from the latitude of Rockhampton south to the NSW border (Lee et al., 2021) and are more abundant in Queensland during winter and spring (Werry et al., 2012a). They are occasionally captured by the Queensland Shark Control Program (Dudley, 1997; Sumpton et al., 2011; Werry et al., 2012a) and there is a high degree of certainty that they are correctly identified.

The white shark is well known to cause bites that result in serious injury or fatalities in Australia and overseas (Ritter and Levine, 2004; West, 2011; McPhee, 2014; Ricci et al., 2016; Lippmann, 2018). Bites which cause serious injuries or fatalities from white sharks are relatively common compared to other shark species (McPhee, 2014; Chapman and McPhee, 2016; Lippmann, 2018). Between 1982 and 2011, 41 unprovoked shark bites are attributed to white sharks with just under half of these being fatal (McPhee, 2014). A recent fatality attributed with certainty to a white shark in Queensland occurred on the Gold Coast (Greenmount) in 2020. While in NSW recent fatal bites attributed with certainty to white sharks were recorded at Kingscliff and Woolli in 2020 and Tuncurry Beach in 2021.

The white shark is listed as “Vulnerable” under the Commonwealth EPBC Act 1999 and internationally by the IUCN. There is no targeted recreational or commercial fishery for the species and the species is protected under Queensland fisheries legislation. Very occasional individuals may be captured by gamefishers (Pepperell, 1992), but are released.

Based on the occurrence of white sharks in Queensland coastal waters and the records of serious bites and fatalities from the species it is recommended that white sharks remain a target species in the QSCP.

<sup>4</sup> <https://www.sharkattackfile.net/>

<sup>5</sup> The Appendix does not include information on bites from white, bull and tiger sharks because, as discussed in the body of this report, it is well established that these three species have caused unprovoked bites that result in serious injuries and fatalities.

## TIGER SHARK

The tiger shark occurs widely in subtropical and tropical waters and is found along the entire length of the Queensland east coast (Last and Stephens, 2009; Holmes et al., 2012). Tiger sharks can occur in shallow nearshore areas but also in the open ocean where they can dive down to depths of approximately 1,000 metres or more (Holmes et al., 2014; Lipscombe et al., 2020). The tiger shark is captured frequently in the Queensland SCP (Sumpton et al., 2011; Simpfendorfer, 2012; Holmes et al., 2014).

The tiger shark is well known to cause bites that result in serious injury or fatalities in Australia and overseas (Lowry et al., 2009; West, 2011; Clua et al., 2014; McPhee, 2014; Ricci et al., 2016). Bites which cause serious injuries or fatalities from tiger sharks are relatively common compared to other shark species (West, 2011; McPhee, 2014; Chapman and McPhee, 2016). At least ten fatal unprovoked bites can be attributed to tiger sharks in Australia. Further fatalities occurred on spearfishers. The last fatal shark bite in Australia from a tiger shark was in 2020 at Cable Beach (WA). Bites resulting in serious injuries occurred in the Whitsundays in 2019.

The tiger shark is targeted by a small number of sportfishers and gamefishers in Australia (Stevens, 1984; Pepperell, 1992; Braccini et al., 2021). It is not specifically targeted in the ECIF, but is captured (Tobin et al., 2014).

Tiger sharks are identified internationally by the IUCN as "Near Threatened", but the species are not listed as threatened species under Commonwealth or State legislation.

Based on the occurrence of tiger sharks in Queensland coastal waters and the records of serious bites and fatalities from the species it is recommended that tiger sharks remain a target species in the QSCP.

## BULL SHARK

The bull shark (*Carcharhinus leucas*) occurs widely in subtropical and tropical waters and is found along the entire length of the Queensland east coast (Last and Stephens, 2009). The bull shark occurs in coastal and nearshore waters and is the only very large shark species that occurs consistently in rivers and estuaries including natural and man-made waterways (e.g. residential canals and lakes) (Thorburn and Rowland, 2008; Werry et al., 2011, 2012b; Smoothey et al., 2019). Bull sharks are frequently caught in the Queensland SCP (Sumpton et al., 2011; Haig et al., 2018). Bull sharks can reside for periods of time in freshwater habitats (Gausmann, 2008).

The bull shark is well known to cause bites that result in serious injury or fatalities in Australia and overseas (Hazin et al., 2008; West, 2011; McPhee, 2014; Ricci et al., 2016). Bites from bull sharks which cause serious injuries or fatalities are relatively common compared to other shark species (West, 2011; McPhee, 2014). Overall, the GSAF records identify at least 11 fatal bites have been attributed to bull sharks in Australia, and in further instances bull sharks are likely to have been involved given the bites occurred in rivers where bull sharks are likely to be the only very large shark species present. Between 1982 and 2011 in Australia, 16 unprovoked shark bites were attributed to bull sharks with two of these being fatal (McPhee, 2014). Globally, bull sharks are implicated in many unprovoked bites including fatalities across a large geographic range. Unprovoked bites that have resulted in serious injuries or fatalities are recorded from Brazil, Reunion, Bahamas, USA, Iran, Nicaragua and South Africa.

The last fatal bite in Australia attributed with a high degree of certainty to bull sharks was at Ballina (NSW) in 2008. Bull sharks may have been involved in several recent fatalities in Queensland, but this is yet to be confirmed. In Queensland fatal unprovoked bites have been recorded from Amity Point (2006), Burleigh Lake (2003), Miami Lake (2002) and the Brisbane River (1880). Although not confirmed, given the location and some of the circumstances described bull sharks may have also been the shark species involved in fatal bites at

Noosa (1961), Wynnum (1959), Pioneer River (1956), Fitzroy River (1951), Rubbish Dump Creek (1939), Ross River (1907, 1912, 1919, 1929, 1931 and 1937), Logan River (1903), and the Brisbane River (1860).

Bull sharks are identified internationally by the IUCN as “near threatened”, but the species are not listed as threatened species under Commonwealth or State legislation.

The bull shark is a species widely targeted by recreational fishers in the rivers and estuaries of south-east Queensland in particular (D. McPhee, pers. ob.). It is frequently retained by anglers if it is below the maximum legal size, although fish of all sizes are also released alive. The species is a byproduct in Queensland commercial net fisheries.

Based on the occurrence of bull sharks in Queensland coastal waters and the records of serious bites and fatalities from the species, it is recommended that bull sharks are included as a target species of the Queensland Shark Control Program.

#### AUSTRALIAN BLACKTIP WHALER AND COMMON BLACKTIP WHALER

The Australian blacktip whaler (*Carcharhinus tilstoni*) is endemic to Australia and bears morphological similarities with the common blacktip whaler (*Carcharhinus limbatus*) and the two species can co-occur and can also hybridise (Harry et al., 2012; Morgan et al., 2012). This means that reliable assignment of a bite specifically to a species blacktip whaler is highly problematic in Australia and both species should be considered together. Both species have ranges extends the entire length of the Queensland east coast and they occur in coastal waters (Boomer et al., 2010). They are relatively small shark species with the maximum size of the Australian blacktip whaler being about two metres and the common blacktip whaler about three metres.

While unprovoked bites attributed to black tip sharks are recorded in several locations around the world, the endemic status of the Australian blacktip whaler means that this species is not responsible for these bites. However, the common blacktip whaler is responsible for many unprovoked bites in Florida (Resko and Johnson, 2014), although for at least some of these bites there is uncertainty in the exact species as spinner sharks (*Carcharhinus brevipinna*) may have been responsible in some instances. Most unprovoked bites from blacktip sharks globally do not result in serious injuries and no fatalities have been recorded. Most bites involve relatively minor lacerations to hands, feet or calves.

Three possible bites from black tip whalers have been recorded from Australian waters but only two are unprovoked. One occurred on Heron Island and resulted in minor injuries, but a black tip reef shark (*Carcharhinus melanopterus*) may have been the species involved as they are common at that location. The second bite occurred in Yallingup (Western Australia) with no injury occurring, but teeth marks in the surfboard were identified as being from an Australian blacktip whaler. A provoked bite occurred offshore of Townsville on a spearfisher who had fish in the water that had been speared. This bite resulted in serious injury (level 3).

The Australian blacktip whaler and common blacktip whaler are target species for commercial fisheries in Queensland, the Northern Territory and Western Australia (Davenport and Stevens, 1988). For the Queensland east coast the total commercial catch of the Australian blacktip whaler and common blacktip whaler in 2018-2019 was 25 tonnes and 22 tonnes respectively and the average annual harvest over a ten-year period was 79 tonnes and 70 tonnes respectively<sup>6</sup>. Most of this catch is taken in the East Coast Inshore Finfish Fishery (ECIFF). Both blacktip whaler species are also captured by recreational fishers in Queensland (de Faria, 2012). The commercial fishery has a substantially greater impact on the populations of the two species than the

<sup>6</sup> <https://www.fish.gov.au/report/416-Australian-Blacktip-Shark-2020>

Queensland SCP but much of this catch is unlikely to be taken near popular coastal locations utilised by water users.

The common blacktip whaler is listed internationally by the IUCN as Near Threatened while the Australian blacktip whaler is listed as Least Concern. Neither species are listed under Commonwealth or State legislation.

Both species of blacktip whaler occur in coastal waters, and while unprovoked bites from blacktip sharks are known from Australian waters, the number is very low, and they have not resulted in serious injury or fatalities. The only serious injury recorded was from a provoked incident. On this basis it is recommended that both the Australian black tip shark and common black tip shark not be included as a target species in the QSCP.

#### GREAT HAMMERHEAD SHARK

The great hammerhead shark (*Sphyrna mokarran*) is the largest of the hammerhead shark species reaching a maximum size of approximately 4.5 metres (Last and Stevens, 2009). The species has a wide geographic distribution and can occur along the entire Queensland east coast and is known to be captured in the Queensland SCP (Harry et al., 2011; Sumpton et al., 2011; Taylor et al., 2011; Raoult, et al., 2109, 2020; Roff et al., 2018).

Globally the GSAF identifies that there have been no fatalities attributed to bites from hammerhead sharks although three bites can be classified as serious (Level 3). It is not known with certainty which species of hammerhead shark are responsible for the bites recorded. Globally, there has not been a recorded unprovoked bite attributed to a hammerhead shark since 1992.

There are six shark bites attributed to hammerhead sharks in Australia with the last one occurring in 1990. It is not known with certainty which species of hammerhead shark was responsible. Three bites occurred in Queensland with two most likely being provoked bites on two people snorkelling together, one of whom was holding a fish. The third was in 1873 in Hervey Bay and was possibly unprovoked but little detail regarding it is available. A provoked bite occurred in Darwin on an angler attempting to remove a hook from a captured shark. An unprovoked bite occurred near Fremantle (Western Australia) which resulted in minor injuries.

The great hammerhead shark is captured in commercial fisheries including the ECIF (Tobin et al., 2014) and their fins are considered high value. The species is also captured by recreational fishers including gamefishers (Pepperell, 1992; de Faria, 2012).

The great hammerhead shark is listed internationally by the IUCN as "Critically Endangered". The species is not listed under Commonwealth or State environment legislation.

The great hammerhead occurs in coastal waters, and while unprovoked bites from are known from Australian waters, the number is very low, and none have resulted in fatalities or serious injury. On this basis it is recommended that the hammerhead shark not be included as a target species in the QSCP.

#### GREY REEF WHALER

The grey reef whaler (*Carcharhinus amblyrhynchos*) is a widespread, common species that occurs in the central Pacific and Indian Ocean (Last and Stevens 2009). It is a coastal species generally associated with reef environments with a preference for waters of 20 to 60 metres deep (Papastamatiou et al., 2006), but does utilise shallower water. It is captured in the Queensland SCP (Sumpton et al., 2011). The species is known to form aggregations (McKibben and Nelson, 1986; Economakis et al., 1998; Vianna et al., 2013) although individuals alone occur and these lone animals can demonstrate clear territorial behaviour at times (McKibben and Nelson, 1986; Nelson et al., 1986).



Globally the GSAF identifies unprovoked bites from grey reef whalers have occurred but no fatalities from the species are recorded, with most bites resulting in only minor injuries. In addition to unprovoked bites, grey reef sharks are also known to cause provoked bites on spearfishers (Jublier and Clua, 2018). Only one unprovoked shark bite has been reliably attributed to grey reef whalers in Australia – at Line Reef in the Great Barrier Reef in 2019. This bite resulted in minor injuries only. The GSAF identifies a further unprovoked bite as occurring at Lizard Island in 2019 that resulted in serious injury (Level 3), however video evidence identifies that fish were being fed offal by other vessel members at the location and time the bite occurred. As such, it may be better classified as a provoked incident, although the person bitten was may not have been directly involved in the provocation.

The grey reef whaler is not a common component of Queensland commercial fisheries such as the ECIFF, but is captured in low volumes (Tobin et al., 2014). Although data is lacking, the species is unlikely to be specifically targeted by recreational fishers in Queensland but may be caught as bycatch. They are a common component of the shark fauna caught by charter fishers in Great Barrier Reef waters (de Faria, 2012). Braccini et al. (2014) records that it is caught infrequently by recreational fishers in Western Australia but generally released.

The grey reef whaler is identified internationally by the IUCN as “near threatened”, but the species is not listed as a threatened species under Commonwealth or State legislation.

The species meets criteria 1 given it is known to occur in coastal Queensland waters. Grey reef sharks have been known to cause a single unprovoked bite that resulted in minor injuries only. The only bite attributed to the species in Australia that resulted in serious injury could be classified as a provoked incident. On this basis it is recommended that the grey reef whaler is not included as a target species in the QSCP.

#### LEMON SHARK

The lemon shark (*Negaprion acutidens*) is a large shark (> 3 metres) known to occur in Queensland coastal waters although they do range into reef habitats (Schultz et al., 2008; Chin et al., 2012). The lemon shark is recorded as being caught in the Queensland SCP in southern Queensland (Taylor et al., 2011).

Globally there are 43 bites attributed to lemon sharks but many of these are attributed to the species *Negaprion brevirostris* which does not occur in Australia. Available information from the GSAF database suggest that many bites have been provoked incidents involving angling or spearfishing or simply collisions between a lemon shark and a water user. Provoked bites have also included those that have occurred in the hand feeding of animals by scuba divers (Clua and Torrente, 2015). Clua and Haguenaue (2020) identified territoriality rather than feeding as an explanation for bites on humans from lemon sharks. Most injuries resulting from lemon sharks are not serious and no fatalities have been attributed with certainty to a lemon shark. A fatality at Reunion in 1992 was attributed to either a bull shark or lemon shark. Bull sharks are a known source of fatalities at Reunion and is the most likely species involved in that instance.

One bite from a lemon shark has been recorded in Australia at North West Island (Queensland) in 2020 which may have been an illegally provisioned animal and thus a provoked bite. The bite resulted in minor injuries. In this case the provisioning may have occurred by someone else some time prior to the incident occurring (up to a week before). The person bitten was not associated with any provisioning activity. A reported incident<sup>7</sup> at the same location a week earlier was attributed to a shovelnose ray but was also likely to be a lemon shark. At the time of writing an additional shark bite at Varanus Island was attributed to a lemon shark, all the specific details are currently lacking, the circumstances suggest that it may have been a provoked bite.

<sup>7</sup> <https://thenewdaily.com.au/news/queensland/2019/12/30/shark-attack-north-west-island/>

The lemon shark is listed internationally by the IUCN as “Vulnerable”. The species is not listed under Commonwealth or State legislation. There is no targeted recreational or commercial fishery for the species and the species is not identified as a component of the shark catch in the ECIF (Tobin et al., 2014). Very occasional individuals may be captured by recreational fishers in Queensland (de Faria, 2012). Braccini et al. (2021) identifies that it is caught in moderate abundance by recreational fishers in Western Australia but it is generally released.

While lemon sharks occur in Queensland, including in coastal areas and are of relatively large size, the bite involving the species in Australia cannot be classified as an unprovoked bite. Globally there is no compelling evidence that the lemon shark is frequently responsible for unprovoked bites. It is recommended that the lemon shark is not included as a target species in the QSCP.

## BLUE SHARK

The blue shark (*Prionace glauca*) is a circumglobal species and typically occurs in offshore waters throughout the water column to depths of over 1,000 metres (Stevens et al., 2010; Queiroz et al., 2010; Vandeperre et al., 2016; Young et al., 2010). Given available information on the species, the amount of time that blue sharks would spend overlapping with coastal areas where swimming and surfing is occurring is very low. Between 1992 and 2008, only three blue sharks were caught in the Queensland SCP (Sumpton et al., 2011). Between 2009 and 2016 only one more was caught.

Globally several bites are potentially attributed to blue sharks although there is reasonable uncertainty regarding whether the species has been correctly identified, particular in very old records. Most bites attributed to blue sharks with certainty have been a result of fishing accidents including accidents with blue sharks after their death. There are two fatal bites attributed to blue sharks from Japan and while this is feasible the available information does not support with certainty that the species was involved. Other shark bites in Japan have been attributed with certainty to white sharks (Nakaya, 1993). One bite was also attributed to a blue shark in the Nicobar and Andaman Islands in 1956 where the victim was climbing up to the ship after repairing the stern of the tuna boat in the water and one in American Samoa in 1955.

The GSAF attributes two unprovoked bites from blue sharks in Australia and one bite was fatal. The fatal bite attributed to the species occurred at Pinalba in Hervey Bay in 1922. Given the location of this fatal bite compared to the habitat preference of blue sharks, and the (limited) narrative around the incident, it is highly plausible that it was a white shark rather than a blue shark responsible. The second unprovoked bite in the GSAF recorded in Australia from a blue shark was from near Mackay and again the location would suggest another species was responsible. A further six provoked bites from Australia are recorded from blue sharks but one of these is highly likely to be a misidentification as it was from an estuarine location (Pimpama River, Gold Coast).

The blue shark is a significant bycatch and byproduct in tuna longline fisheries including in Australian waters by international (historically) and domestic vessels (Stevens, 1992; Young et al., 2010). It is not typically caught in fisheries managed by Queensland (Tobin et al., 2014). The species is caught by recreational gamefishers – mostly in southern Australian waters (Stevens, 1984; Pepperell, 1992; Lowry et al., 2007).

The blue shark is listed by the IUCN as “Near Threatened”. The species is not listed under Commonwealth or State environment legislation.

The blue shark is known to occur in Queensland coastal waters where the SCP operates but it is very rarely caught, and the species has a clear preference for offshore waters. Nonetheless, it does occur and for this reason, the species does meet the requirements of criteria 1. While the species is recorded as causing an unprovoked fatal bite in Queensland, the weight of evidence would suggest a white shark was the species

involved. A second unprovoked bite is also highly likely to have been from another species. On this basis it is recommended that the blue shark is not be included as a target species in the QSCP.

#### LONGFIN AND SHORTFIN MAKO SHARK

The longfin mako shark (*Isurus paucus*) and shortfin mako shark (*Isurus oxyrinchus*) will be considered together. Records of shark bite and catches in the SCP do not consistently differentiate the two species. The two species are circumglobal species and typically occur in offshore waters throughout the water column but can also be found in nearshore coastal waters (Francis et al., 2019). Between 2001 and 2016, mako sharks were caught (< 5) in small numbers each year in the southern regions of the SCP.

Globally, incidents involving mako sharks have generally been provoked incidents – including spearfishing with speared fish present and fishing accidents including hooked mako sharks jumping into boats. However, mako sharks have been implicated with a relatively high degree of certainty in fatalities and serious injuries (Level 3 and 4) in Egypt in 2010, 2015 and 2016, Venezuela in 2003, the Bahamas in 1981 and the USA (South Carolina in 1924 and California in 2015). The biophysical characteristics of the location in Egypt where bites occur allow for oceanic shark species such as mako sharks to venture into shallow water where people are undertaking water-based activities (Levine et al., 2014). Provisioning of sharks at this location is also believed to have contributed to the series of bites there (Levine et al., 2014).

In the GSAF there are four records of unprovoked shark bite attributed to mako sharks in Australia – three of which were identified as provoked bites. There are additional shark interactions involving mako sharks biting or ramming boats. There is uncertainty regarding the identity of the species attributed to the unprovoked bite which resulted in serious injury (Level 3) in 1932 at Newcastle which was identified in the GSAF as either a mako or a grey nurse shark. Plausibly given the location adjacent to a known aggregation of juvenile white sharks, that species may have been involved. However, there is no reliable information to determine the species with certainty.

Both species of mako shark are listed internationally by the IUCN as “Endangered”. Neither species are listed as threatened species under Commonwealth or State legislation, but both are listed migratory species by the Commonwealth.

The shortfin mako shark is targeted for both consumption and catch-and-release by recreational anglers (Pepperell, 1992; French et al., 2019). The species is not identified as a component of the shark catch in the ECIF (Tobin et al., 2014). Any mako sharks that are captured alive in Commonwealth commercial fisheries must be released.

Mako sharks are known to be present in Queensland coastal waters, albeit likely in low abundance. Globally, the species is responsible for a small number of unprovoked fatal bites and bites resulting in serious injury – particularly in Egypt. Assuming despite the uncertainties that the only record of an unprovoked shark bite from a mako shark in Australia was indeed a mako shark, the species meets criteria 2 but does not meet criteria 3. It is recommended that the two mako shark species are not included as target species in the QSCP.

#### DUSKY WHALER

The dusky whaler (*Carcharhinus obscurus*) has a wide but disjointed global distribution with population structuring (Benavides et al., 2011). The dusky whaler is found the entire length of the Queensland east coast (Last and Stephens, 2009). It occurs in coastal and oceanic waters (Last and Stephens, 2009; Hoffmayer et al., 2014) and is captured within the Queensland SCP (Sumpton et al., 2011), particularly from Rainbow Beach south to the Gold Coast. The species is migratory, tending to move north during austral winter/spring with some gender-based differences in migratory patterns (Braccini et al., 2018).

Globally there are a small number of unprovoked bites (approximately eight) attributed to the dusky whaler and no fatalities with all but one resulting in minor injuries. There is a single bite attributed with certainty to the dusky whaler in Australia. It occurred in Lake Illawarra (NSW) in 2009.

The dusky whaler is listed internationally by the IUCN as endangered, but the species are not listed as a threatened species under Commonwealth or State legislation.

Dusky whalers are not a shark species targeted by recreational or commercial fishers in Queensland, but they may be taken as bycatch or byproduct. The species is frequently targeted and caught by recreational and commercial fishers in Western Australia and represents a large proportion of the retained shark catch (Simpfendorfer and Donahue, 1998; Braccini et al., 2021). It is also caught by commercial longline fishers in NSW (Macbeth et al., 2009).

The species is also a focus of commercial shark fisheries in other parts of the world (Marshall et al., 2015).

The dusky whaler occurs in Queensland nearshore coastal waters and meets criteria 1. While unprovoked bites from the species are known in Australia, there has only been a single incident attributed to the species. As such, the species does not meet criteria 2 or 3. It is recommended that the lemon shark is not included as a target species in the QSCP.

#### SPINNER SHARK

The spinner shark (*Carcharhinus brevipinna*) is a coastal species. It is one of the commonest species caught in the QSCP and they are more frequently caught during Spring and Summer which is their breeding period (Sumpton et al., 2010).

Unprovoked shark bites have been attributed to spinner sharks particularly in Florida (Resko and Johnson, 2014; Chapman and McPhee, 2016). Many of the recorded bites occur at a single location in Florida – New Smyrna Beach (Resko and Johnson, 2014). As already identified in this report, some bites attributed to spinner sharks in the USA may have been from blacktip whalers. The GSAF records show that no fatal unprovoked bites have been attributed to spinner sharks and no bites resulting in serious injuries have occurred. No bites from spinner sharks have been recorded from Australia.

The spinner shark is frequently caught by commercial fishers in Australia (Tillett et al., 2012; Geraghty et al., 2014; Butcher et al., 2015) and is caught in the Queensland ECIF particularly south of the Great Barrier Reef (Tobin et al., 2014). The species is also caught by recreational fishers (Stevens, 1984), but it is unlikely to be specifically targeted on a frequent basis in Queensland. It is captured relatively frequently by recreational fishers in Western Australia (Braccini et al., 2021).

The spinner shark is identified internationally by the IUCN as “Near Threatened”, but the species is not listed as a threatened species under Commonwealth or State legislation.

The spinner shark meets criteria 1 given it is known to occur in coastal Queensland waters. However, it does not meet criteria 2 or 3 as there are unprovoked bites attributed to the species in Australia. It is recommended that the spinner shark is not included as a target species in the QSCP.

#### PIGEYE SHARK

The pigeye shark (*Carcharhinus amboinensis*) is sporadically distributed throughout tropical and subtropical waters of the Indo-West Pacific and Atlantic Oceans (Last and Stevens 2009). It is found throughout northern Australia from Carnarvon (Western Australia) to Moreton Bay (Last and Stevens 2009). The pigeye shark is morphologically similar to the bull shark and the two species are easily confused. The species resides in

shallow coastal waters including turbid waters (Knip et al., 2011; Tillet et al., 2011). The species is captured in the QSCP (Sumpton et al., 2011).

There are no records in the GSAF of unprovoked shark bites from the pigeye shark. It is plausible that some bites from this species are misidentified as bites from bull sharks as they occur in similar habitats and their morphological similarities. The pigeye shark typically reaches a maximum length of between 1.9 and 2.5 metres while bull sharks are recorded as reaching a maximum length of at least 3.5 metres.

The pigeye shark is identified internationally by the IUCN as “Data Deficient”, but the species is not listed as a threatened species under Commonwealth or State legislation.

Pigeye sharks are caught in small numbers in various commercial fisheries, mostly in northern Australia. This includes in the ECIFF but it is not specifically targeted in that fishery (Tobin et al., 2014). Although data is lacking in Queensland, the species is unlikely to be specifically targeted by recreational fishers but may be caught as bycatch. Pigeye sharks are caught frequently by recreational fishers in Western Australia but is generally released (Braccini et al., 2021).

The pigeye shark meets criteria 1 given it is known to occur in coastal Queensland waters. However, it does not meet criteria 2 or 3 as there are no unprovoked bites attributed to the species in Australia. The caveat to this conclusion is that bites from this species may be mistaken for bites from bull sharks of a similar size. Nonetheless, it is recommended on the available information that the pigeye shark is not included as a target species in the QSCP.

#### SANDBAR SHARK

The sandbar shark (*Carcharhinus plumbeus*) ranges along the length of the Queensland east coast into northern NSW and is also found in Western Australia (McAuley et al., 2007; Last and Stevens, 2009; Macbeth et al., 2009). The sandbar shark is a coastal species but does extend down to depths of approximately 280 metres. The species is captured in the Queensland SCP (Sumpton et al., 2011).

There are unprovoked bites attributed to the sandbar shark in the GSAF although in several instances there is uncertainty as to whether bites were from sandbar sharks or other species. All bites are recorded from the USA and no bites have been attributed to the species in Australia.

The sandbar shark is identified internationally by the IUCN as “Vulnerable”, but the species is not listed as a threatened species under Commonwealth or State legislation.

The sandbar shark is caught in commercial fisheries in NSW and Western Australia (McAuley et al., 2007; Macbeth et al., 2009) although it is not a significant commercial species in the ECIFF (Tobin et al., 2014). Although data is lacking, the species is unlikely to be specifically targeted by recreational fishers in Queensland but may be caught as bycatch. It is captured relatively frequently by recreational fishers in Western Australia (Braccini et al., 2021).

The sandbar shark meets criteria 1 as it is known to occur in coastal Queensland waters. However, it does not meet criteria 2 or 3 as there are no unprovoked bites attributed to the species in Australia. It is recommended that the spinner shark is not included as a target species in the QSCP.

#### SILKY WHALER

The silky whaler (*Carcharhinus falciformis*) has a circumtropical distribution and occurs in coastal waters and the open ocean although they are typically found along the edge of continental shelves (Bonfil, 2008) and also associates with offshore Fish Aggregating Devices (FADs) (Filmlalter et al. 2011). The species is though captured in the Queensland SCP albeit relatively infrequently (Sumpton et al., 2011).

Globally, there are only three unprovoked bites attributed to the silky whaler in the GSAF – two from the USA and one from one Spain. One of the bites in the USA was serious and burleying by recreational fishers of the area prior to when the bite occurred may have been an factor that provoked the bite. There are no unprovoked shark bites attributed to this species in Australia.

Silky whalers are not recoded as being caught in the ECIF (Tobin et al., 2014), but the species is likely to be taken as by-catch. The species is caught by gamefishers in NSW although it is not an important target species in recreational fisheries (Stevens, 1984). It is a very minor component of the recreational shark catch in Western Australia (Braccini et al., 2021).

The silky whaler is identified internationally by the IUCN as “Vulnerable”, but the species is not listed as threatened species under Commonwealth or State legislation.

While more common in oceanic waters, the silky whaler is captured in the Queensland SCP and the species meets criteria 1. The species does not meet criteria 2 or 3 as there are no unprovoked bites attributed to the species in Australia. It is recommended that the spinner shark is not included as a target species in the QSCP.

#### SILVERTIP WHALER

The silvertip shark (*Carcharhinus albimarginatus*) has a fragmented distribution through the tropical Indian and Pacific oceans. It is found in northern Australian waters from Carnarvon (Western Australia), across the Northern Territory to at least Bundaberg (Last and Stevens, 2009). It is a reef associated species (Espinoza et al., 2015) but also utilises deep pelagic waters (Bond et al., 2015). In the Great Barrier Reef the species typically utilises offshore reefs rather than inshore reefs (Espinoza et al., 2014). There is a single record of a silvertip whaler caught in the Queensland SCP at Rainbow Beach in 2014.

Globally, there are no unprovoked bites attributed to silvertip whalers in the GSAF. There are two provoked bites recorded from provisioned animals being fed by divers in Papua New Guinea and Sudan which resulted in minor injuries. There are no unprovoked bites attributed to the species in Australia.

Silky whalers are not recoded as being caught in Queensland fisheries (Tobin et al., 2014), but the species is likely to be taken as by-catch. The species was recorded in low numbers by charter fishers in the Great Barrier Reef (de Faria, 2012). Although data is lacking, the species is unlikely to be specifically targeted by recreational fishers in Queensland but may be caught as bycatch. It is a very minor component of the recreational shark catch in Western Australia (Braccini et al., 2021).

The silky whaler is identified internationally by the IUCN as “vulnerable”, but the species is not listed as threatened species under Commonwealth or State legislation.

While rare in nearshore, the silky whaler is captured in the Queensland SCP and the species meets criteria 1. The species does not meet criteria 2 or 3 as there are no unprovoked bites attributed to the species in Australia. It is recommended that the silky whaler is not included as a target species in the QSCP

#### BIG NOSE WHALER

The big nose whaler (*Carcharhinus altimus*) is principally a deep water species that resides in waters between 50 and 900 metres deep during the day although they do move into shallow water and vertically migrate at night (Anderson and Stevens, 1996). The species most likely has a circumglobal distribution (Last and Stevens, 2009). In Queensland it is known from waters between depths of 205 and 266 metres in the north of the state (Anderson and Stevens, 1996), although its range is likely to be much wider.

There are no records in the GSAF of unprovoked bites attributed to big nose whalers.



Big nose whalers are identified internationally by the IUCN as “Near Threatened”, but the species is not listed as a threatened species under Commonwealth or State legislation.

Big nose whalers are not targeted by Queensland commercial or recreational fisheries. Five big nose whalers have been recorded in the QSCP since 1962 although the species identification was not verified (T. Scott-Holland pers. comm). They are not recorded as being caught in the ECIF. The species is a very minor component of the recreational shark catch in Western Australia (Braccini et al., 2021).

Assuming the species identification in the QSCP is correct, the species is recorded as occurring inshore albeit rarely. The species meets criteria one. However, no unprovoked bites have been attributed to the species. It is recommended that the big nose whaler is not included as a target species in the QSCP.

## OCEANIC WHITETIP SHARK

The oceanic whitetip shark (*Carcharhinus longimanus*) is a large epipelagic species with a circumglobal distribution in tropical and subtropical waters and a clear preference for open ocean waters (Bonfil et al., 2008; Howey-Jordan et al., 2013; Young and Carlson, 2020). Between 2001 and 2016 there are no records on oceanic whitetip sharks being captured in the QSCP. There are also no records of the species being caught in the QSCP dating back to 1962 (T. Scott-Holland pers. comm.).

The oceanic whitetip shark is known to cause bites that result in serious injuries or fatalities with the geographic location of bites centred around Egypt. GSAF records identify that 17 of the 23 unprovoked bites attributed to oceanic white sharks occurred in Egypt. The biophysical characteristics of the locations where bites occur in Egypt allow for oceanic shark species such as the oceanic whitetip to venture into shallow water where people are undertaking water-based activities (Levine et al., 2014). In Egypt, three bites attributed to oceanic whitetips occurred over a six-day period in 2010 along an eight kilometre stretch of beach (Levine et al., 2014). Levine et al. (2014) produced evidence that the same individual shark may have been responsible for the three bites and that provisioning of animals may have been one of the significant contributing factors to the series of incidents. There are no unprovoked shark bites attributed to oceanic white tip sharks in Australia.

Oceanic whitetip sharks are not targeted by Queensland commercial or recreational fisheries and are rarely caught, but they are caught in the Commonwealth East Coast Tuna and Billfish Fishery. They are a frequent catch in commercial longline fisheries throughout the Pacific, Indian and Atlantic oceans (Young and Carlson, 2020).

Oceanic whitetip sharks are identified internationally by the IUCN as “Critically Endangered”, but the species are not listed as threatened species under Commonwealth or State legislation.

The oceanic whitetip shark is not a species that is ordinarily found in nearshore coastal waters that water users frequent. Globally, unprovoked bites from oceanic whitetip sharks are concentrated along the coast of Egypt where local biophysical conditions facilitate the overlap with shallow coastal waters used by people. Such conditions do not occur in Queensland and on this basis the species does not meet criteria 1 of this analysis. Additionally, there are no unprovoked shark bites attributed to the species in Australia and therefore criteria 2 is also not met. It is recommended that the oceanic whitetip shark is not included as a target species in the QSCP

## CONCLUSION

Only three species of shark meet all three criteria for inclusion on the Queensland SCP target species list – bull, white and tiger sharks. These three species are implicated in the majority of unprovoked shark bites globally.

A review of habitat preferences of shark species identified that oceanic white tip shark and bignose whalers are pelagic species which are highly unlikely to be encountered in nearshore areas where the Queensland SCP operates.

A further eight species known to occur in nearshore coastal areas at times have not been associated with serious or fatal unprovoked shark bites in Australia. This includes the lemon shark, dusky whaler, spinner shark, pigeye shark, silky whaler, silvertip whaler and blue shark. A single fatality in Queensland has been recorded from a blue shark but this is highly likely to have involved a white shark. A recent bite that caused minor injuries attributed to a lemon shark was from an animal that had been provisioned and thus better described as a provoked incident, although the victim was not involved in the provisioning of the animal.

Unprovoked bites in Australia have been attributed to a further four species or species groups: blacktip whalers, hammerhead sharks, mako sharks and the grey reef whaler. None of the unprovoked bites from the four species have resulted in fatalities. An unprovoked bite attributed to a mako shark which resulted in serious injury may have been a bite from a grey nurse shark or a white shark. For the other three species no unprovoked bites have resulted in serious injury. The frequency of unprovoked bites attributed to the four species is low: blacktip whalers (1 or 2), hammerhead sharks (1 or 2), mako sharks (possibly 1) and grey reef whalers (1). The GSAF lists a further bite from a grey reef whaler and two bites from hammerhead sharks that were provoked by animals being fed or in the process of being fed at the time of the bite.

It is recommended that the QSCP should have three species only as target species - bull, white and tiger sharks. There should be scope and a process to amend this list over time as new information becomes available.

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APPENDIX 1 Recorded Shark Bites in Australia from species currently listed on the SCP target shark list other than bull, white and tiger sharks

Date sourced from the Global Shark Accident File (www. <https://www.sharkattackfile.net/>)

Year	Type of Bite	State	Location	Water Activity	Injury	Comments
<b>Blacktip Whalers</b>						
2021	Unprovoked	Western Australia	Yallingup	Paddle boarding	No injury, board bitten	Teeth marks from <i>Carcharhinus tilstoni</i> identified on the surfboard.
2016	Unprovoked	Queensland	Heron Island	Wading	Laceration to right calf	Possibly a black tip reef shark ( <i>Carcharhinus melanopterus</i> )
2005	Provoked	Queensland	Townsville	Spearfishing	Severe injury to lower leg	Speared fish present when bite occurred
<b>Blue Shark</b>						
2000	Provoked	New South Wales	Wollongong	Fell onto dead shark	Foot lacerated from toe to heel when he tripped on shark during fishing competition	Very limited information on this bite
1968	Provoked	New South Wales	Stockton Bight		Foot lacerated.	
1937	Provoked	Queensland	Moreton Island	Fishing	Left shoulder bitten by netted shark.	Highly likely to have been another species given the estuarine location.
1935	Provoked	Queensland	Pimpana River	Hauling in net with shark in it	Calf & shin bitten	
1934	Provoked	New South Wales	Off Mooloolabah	Fishing	Hand bitten while landing shark	Highly likely to have been a white shark. May have been another species given the habitat where the bite occurred. Limited information to support any species identification.
1933	Provoked	South Australia	Port River, Adelaide	Fishing	Forearm injured by hooked shark	
1922	Unprovoked	Queensland	Hervey Bay	Bathing	FATAL	
1910	Unprovoked	Queensland	Mackay	Bathing	Foot bitten	

### Hammerhead Shark

2002	Unprovoked	Queensland	Great Barrier Reef (near Upolu Bay)	Snorkeling	Left arm lacerated
1990	Unprovoked	Queensland	Outer Barrier Reef near Port Douglas	Snorkeling	Lacerations
1990	Unprovoked	Queensland	Outer Barrier Reef near Port Douglas	Snorkeling, possibly holding a fish	Lacerations
1981	Unprovoked	Western Australia	Leighton Beach, north of Fremantle	Exercising his dog in the shallows	Puncture wounds to foot
1961	Provoked	Northern Territory	Stokes Hill Wharf, Darwin	Fishing	Finger bitten by hooked shark.
1873	Unprovoked	Queensland	White Cliffs	Bathing	No details

Both snorkelling together

Both snorkelling together

### Gray Reef Whaler

2019	Unprovoked	Queensland	Line Reef	Swimming	Puncture marks to left hip and buttocks
2018	Provoked	Queensland	Lizard Island	Diving	Severe laceration to left forearm

A level 3 injury. Shark species confirmed by video evidence. Fish were being fed at the time of the bite.

### Lemon Shark

2020	Unprovoked	Queensland	North West Island	Swimming	Lacerations to leg
------	------------	------------	-------------------	----------	--------------------

While this bite was classified in GSAF as an unprovoked bite.

Further information suggests that shark provisioning had occurred at the location.



## Mako Sharks

2008	Provoked	Queensland	200 km east of Coolangatta	Accidentally stood on hooked shark's tail before attempting to gut it	Laceration to left knee
2005	Provoked	New South Wales	Bermagui	Fishing	Laceration on left thigh
1969	Provoked	New South Wales	Newcastle		Foot lacerated.
1932	Unprovoked	New South Wales	Redhead Beach, Newcastle	Swimming	Torso bitten with pneumothorax, slight lacerations on left hand

Incomplete information on this bite.

Uncertainty as to the species involved that was identified as either a mako or a grey nurse shark. A level 3 injury.

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# Shark Control Program Scientific Working Group

## Agenda Paper 2

24 August 2021

TITLE: *Shark Bite incidents*

AGENDA ITEM NO: 5

### Recommendation:

#### That working group members:

- **Note** the serious shark bite incidents that occurred in New South Wales since the previous Scientific Working Group Meeting on 18 February 2021.
- **Note** that no serious shark bite incidents have been recorded in Queensland since the previous meeting.

### Background

#### Shark bite incidents:

- On 13 March 2021, [redacted] (a 63-year-old woman) was bitten by a shark while swimming off the main beach at Merimbula on the NSW south coast.
  - The shark bite occurred at around 7.00am.
  - The woman was bitten on her shoulder, hip, back and buttocks and was taken to hospital in a stable condition.
  - Bystanders on scene reported seeing fins and a large animal.
  - The size or species of shark responsible for the bite has not been identified.
  - Beaches surrounding Merimbula and Pambula were temporarily closed. Surf Life Saving NSW launched drones to patrol the area following the shark bite.
- On 18 May 2021, [redacted] (a 59-year-old man) was bitten by a shark while surfing at Tuncurry beach on the NSW mid-north coast. He died at the scene.
  - The shark bite occurred at around 11.15am.
  - The man was bitten on the upper right thigh and died of his injuries at the scene.
  - A 4.5m white shark is thought to be responsible for the bite.
  - NSW DPI deployed SMART drumlines at Tuncurry and Forster beaches following the incident. Four sharks were captured, tagged and released, but none were confirmed as the 4.5m shark responsible for the bite.
- On 5 July 2021, [redacted] (a 25-year-old man) was bitten by a shark while surfing at Killick Beach, Crescent Head on NSW mid north coast.
  - The shark bite occurred at around 4.30pm.
  - He was bitten on the left arm and had a chunk of his arm removed. He was taken to hospital and has required multiple surgeries.
  - Life savers responded to assist the man.
  - A 2.8m to 3.2m white shark is thought to be responsible for the bite.

- Surf Life Saving NSW launched drones to patrol the area following the shark bite.

**Responsible officer:** Michael Mikitis

**Position:** Manager Shark Control Program

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**From:** Tracey Scott-Holland  
**Sent:** Friday, 12 November 2021 9:05 AM  
**To:** Jonathan Mitchell; Simpfendorfer, Colin; Julia Chandler; Peta Lawlor; Richard Fitzpatrick; Angela Freeman; Angela Freeman; adam.smith; Carley Kilpatrick; Marcel Green  
**Cc:** Kimberly Foster; Michael Mikitis  
**Subject:** Shark Control Program Scientific Working Group draft communique for review  
**Attachments:** Communique 24 and 25 August 2021 Draft.docx; Agenda Item 4 - CONFIDENTIAL - Target Species List Review.pdf; Agenda Item 4 - CONFIDENTIAL - Attachment 1 - A Review of the Shark Control Program Target Shark Species List.docx; Agenda Item 4 - CONFIDENTIAL - Attachment 2 - SCP Target Species List Appendix 1.docx

Hi Everyone,

Please find attached the draft communique from the last meeting (apologies for the delay in getting this to you). Can you please provide any feedback via tracked changes by next Friday 19 November.

I have also reattached the information about the target species review as discussed at the meeting (please treat this as confidential).

If you would like to provide any additional feedback on this please also provide this to me by Friday 19 November.

Can you also advise your availability for our next meeting during the week of 13-17 December. I am proposing a half day meeting where we will review the drone trial evaluation and discuss the next steps.

Kind Regards

Tracey



**Dr Tracey Scott-Holland**

Research & Policy Coordinator (Shark Control Program), Fisheries Queensland  
Department of Agriculture and Fisheries

Sch 4 - Personal Information [tracey.scott-holland@daf.qld.gov.au](mailto:tracey.scott-holland@daf.qld.gov.au) W [www.daf.qld.gov.au](http://www.daf.qld.gov.au)

**In the office:** Tuesday and Thursday

Level 5, 41 George Street, Brisbane QLD 4000

GPO Box 46, Brisbane QLD 4001

**Customer Service Centre** 13 25 23

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## Communique 24 and 25 August 2021

The Shark Control Program Scientific Working Group (the Group) met on 24 and 25 August 2021.

The Group received an update on the draft *Queensland Shark Management Plan 2021-25* (the Plan). The Plan was amended to address minor feedback received from Group members and during an internal government consultation process and is progressing through an internal approval process.

Members were advised that the Shark Control Program (the Program) has received additional funding to 1) cover the increased cost of delivering the Program in the Great Barrier Reef Marine Park on an ongoing basis, 2) provide ongoing funding for the SharkSmart drone trial/program; and 3) to temporarily engage a contractor to review the end-to-end data management processes. The Group was advised that no decision had been made about the proposed net replacement trial so there would be no changes made to the configuration of equipment during 2021. The Group will be further consulted about the proposed trial. The Group discussed claims made that the Program has increased its footprint since the commencement of the EPBC Act. Fisheries Queensland advised that the basis for these claims was unclear.

NSW Fisheries provided an update on the program in NSW. Members noted that 4VRG listening stations, drones and the netting program are continuing in 2021/22. Further details of the 2021/22 program are yet to be announced by the NSW Government. NSW Fisheries continues to operate under a Memorandum of Understanding with NSW police and Surf Life Saving NSW for shark incident response. NSW Fisheries has piloted a community support program in partnership with Rural Adversity Mental Health Program (RAMHP) and 'Bite Club' to respond to shark bite incidents. RAMHP counsellors and psychologists provide mental health support, while NSW Fisheries staff provide information about sharks and shark mitigation, with 'Bite Club' members providing emotional peer support. Feedback on the initiative has been mostly positive and constructive with NSW Fisheries seeking to formalise an arrangement with RAMHP and 'Bite Club' to deliver future programs.

Fisheries Queensland advised that Dr Daryl McPhee was contracted to compile a range of information to inform a review of the target species list. Members noted that target species are euthanised and the target species list only applies to the operation of the Program outside of the GBRMP. Dr McPhee presented information about species occurrence in Queensland, incidence of unprovoked bites and severity of bites with a focus on those resulting in serious injuries or fatalities. The Group was invited to provide feedback on the draft report and application of the criteria used to develop the revised target species list. Members were also invited to provide advice on possible issues and risks for Fisheries Queensland to consider. NSW Fisheries advised that species targeted by the NSW program were refined over time eventually resulting in only white, bull and tiger sharks being targeted since 2016. Data quality was discussed, including the accuracy of species identification in official shark bite records and how this might be considered during the review. The Group also discussed provisioning (intentional/unintentional feeding) of sharks which may increase the risk of shark bite. Shark bites in response to provisioning would normally be considered 'provoked', however the person bitten may not have been involved in the provisioning behaviour. The Group recommended that the potential impact of climate change on species' distributions be considered and the conservation status of species is acknowledged. The Group discussed issues around future shark bite incidents and how these might be assessed to inform future decisions about the target species list.

The Group noted and discussed the circumstances of several serious shark bite incidents that occurred in New South Wales since the previous meeting and noted that no serious shark bite incidents have been recorded in Queensland since the previous meeting.

The Group noted a Marine Species Protection Symposium was hosted by Noosa Biosphere Reserve Foundation (NBRF). The aim of the Symposium was to identify alternative shark bite mitigation technology suitable for trial in Noosa in line with UNESCO objectives. The Group noted and discussed the symposium report and recommendations for the following measures to be trialled in the Noosa Shire, ranked in order of preference (1) Education; (2) Drones; (3) SMART drumlines; (4) Seasonal removal of nets. Fisheries Queensland advised that a trial of targeted education in the Noosa Shire in line with the SharkSmart education program could be facilitated. This initiative was supported by the Group. The Group supported a trial of drones on Noosa Main Beach and Fisheries Queensland advised the site could be included in the next phase of the SharkSmart drone trial, subject to local government approvals. The Group noted advice that some constituents in the Noosa community are opposed to the use of drones on local beaches, with concerns relating to noise and privacy. Further, the Noosa Shire Council has not approved the operation of drones by SLSQ at Noosa to date. The Group recommended a demonstration be offered to Noosa Shire Council. The Group did not support a trial of SMART drumlines at Noosa if the Queensland Government's policy of euthanising target shark species (outside the Great Barrier Reef Marine Park) would apply. The Group noted that nets are generally more effective at catching bull sharks than traditional drumlines and that traditional drumlines would likely be more effective than SMART drumlines for catching bull sharks as SMART drumlines are only set during daylight hours for work health safety reasons. The Group discussed options to better target bull sharks with traditional drumlines which could then be considered by government as an alternative to nets which are associated with greater levels of non-target catch. The Group also discussed using hook timers on drumlines and nets to determine when bull sharks are caught. Members have previously noted their support for a trial to replace some nets with drumlines during the whale migration period.

Fisheries Queensland provided a presentation on the SharkSmart education program. An overview of the upcoming SharkSmart 2021/22 campaign was provided, centred around a plan of SharkSmart messages targeted to different water users in different geographic areas of Queensland. The campaign is based on three pillars 1) advertising during school holiday periods (a key time of water use for locals and tourists); 2) SharkSmart messages targeted to geographic area and type of water based activity; and 3) contingency messages for when unplanned risks arise. Fisheries Queensland sought feedback on draft SharkSmart messages for swimmers; surfers; snorkellers/divers; spearfishers; fishers and boaties to be incorporated into the SharkSmart web page. Fisheries Queensland provided an overview of the SharkSmart sponsorship with Sea World Gold Coast. SharkSmart messages will be incorporated into the Shark Bay exhibit and used in a new education trail for school groups visiting Sea World. The Group was supportive of the future approach to the SharkSmart campaign and the Sea World exhibit and education trail.

The Group received an update on research and trials delivered, funded or supported by the Program. The SharkSmart drone trial commenced in September 2020 in South East Queensland with North Queensland sites added in June 2021. The trial will be evaluated in late 2021 with results informing the next phase of the trial/program. The catch alert drumline trial will be commencing soon on the Capricorn Coast. Planning for the barrier trial will recommence soon. Flinders University has been appointed, following an open tender process, to deliver research into the effectiveness of personal electric shark deterrent devices on tiger sharks with field work to commence later this year. The program continues to maintain acoustic receivers at Program locations to support the

Queensland coastal telemetry array and is supporting several research projects conducted by University researchers and postgraduate students through the provision of specimens and biological samples. The Group discussed reviewing the research priorities at a future meeting.

Fisheries Queensland summarised operations, research and trials within the Great Barrier Reef Marine Park and the Group noted the recent catch data for the GBRMP. The Group noted that following three shark bites at North West Island over a four-month period from December 2019 to April 2020 and reports of continuing shark provisioning behaviour by visitors to the island, Fisheries Queensland and the Department of Environment and Science (DES) have collaborated on an approach to reduce shark bite risk in the area. In April 2021, DES banned the dumping of fish frames, scraps and bait in waters around the island through the declaration of a Special Activity Area (SAA) around the island which extends for approximately three nautical miles. A Communication and Engagement plan has been developed to boost education and SharkSmart behaviour at North West Island and to educate visitors about the SAA. DES advised that a research project is in development involving tagging and tracking of sharks to better understand shark behaviour in the region. The Group noted feedback from the Whitsundays sub-group supporting the proposed shift to advisory, icon-based signage in Cid Harbour, similar to that in use at North West Island.

The Group discussed recent media attention relating to the use of terminology by government departments involved in shark bite mitigation. The Group supported the use of terminology such as 'shark bite' and 'incidents' by the Program, as opposed to 'attacks' which can sensationalise the issue, noting that individuals can make their own decisions about the language they use.

The Group discussed the development of bite proof wetsuits, noting that NSW Fisheries has invested some funding into the development and testing of some materials.

The next meeting is planned for late November/early December 2021.

# Shark Control Program Scientific Working Group

## Agenda Paper 1

24 August 2021

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**TITLE:** *Target Species List Review*

**AGENDA ITEM NO: 4**

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**CONFIDENTIAL – NOT FOR FURTHER DISSEMINATION**

### Recommendation:

#### That working group members:

- **Note** the draft report 'A Review of the Shark Control Program Target Shark Species List' (Attachment 1 & 2) and presentation by Dr Daryl McPhee.
- **Provide** initial feedback on the draft report and application of the criteria used to develop the revised target species list for the Shark Control Program (the Program).
- **Provide** advice on possible issues or risks Fisheries Queensland would need to consider in reviewing the target species list.

### Background

- The Department of Agriculture and Fisheries (DAF) maintains a target shark species list. Target sharks are those that pose a significant risk to water users and are euthanised if caught in the Program.
- The target species list does not apply to the Program in the GBRMP where all animals (including sharks) caught on drumlines are released alive if possible and safe to do so.
- A set of criteria to determine which sharks should be included on the target species list was developed in consultation with the Shark Control Program Scientific Working Group.
- Dr Daryl McPhee, Associate Professor, Environmental Management, Bond University was engaged to undertake the assessment of the current 19 target shark species against the criteria and to deliver a report with recommendations to the Department.

**Responsible officer:** Dr Tracey Scott-Holland

**Position:** Research & Policy Coordinator, Shark Control Program



# **A Review of the Shark Control Program Target Shark Species List**

**Dr Daryl McPhee**

**Draft - 1<sup>st</sup> July 2021**

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## EXECUTIVE SUMMARY

This report applied three criteria to the current list of target species of the Queensland Shark Control Program (QSCP). The three criteria used were:

- Criteria 1: Is the species known to occur in coastal Queensland waters where the shark program operates outside of the Great Barrier Reef Marine Park?
- Criteria 2: Has the species been associated with unprovoked bite/s resulting in serious injury or fatality in Australia?
- Criteria 3: Is the number of unprovoked bites resulting in serious injury or fatality relatively high?

A review of habitat requirements and the known distribution of shark species was used to address criteria 1.

The Global Shark Accident File (GSAF) was used to determine the occurrence of unprovoked bites from the species considered and this was augmented where possible with peer-reviewed literature. The focus of the assessment was on Australia but information from other countries was used to provide a broader context. Severe bites were defined with respect to comparing available information on injuries sustained with a previously published bite severity index. It is not possible in all instances to reliably determine the species of shark involved in an unprovoked bite.

The results of the review are summarised in Table 1.

It is recommended that based on the criteria applied the QSCP should have three species only as target species - bull, white and tiger sharks.

Of the remaining species considered, one is unlikely to or rarely occur in nearshore coastal waters where the QCSP operates. A further nine species are known to occur at times in nearshore coastal waters where the QCSP operates but are not recorded as the species involved in unprovoked bites in Australia, or in the case of blue sharks are highly likely to have been misidentified. The remaining four species have been recorded as the species involved in unprovoked bites in Australia although the frequency of bites is low (1 or 2). In the case of the bite attributed to a mako shark, the involvement of a mako shark is plausible but it may have been the result of another species.

**Table 1 Summary of the Application of the Three Criteria for Determining Whether a Shark Species are Recommended for Inclusion on the QSCP Target Species List.**

Species	Criteria 1.	Criteria 2.	Criteria 3.	Target Species List
White Shark	YES	YES	YES	YES
Tiger Shark	YES	YES	YES	YES
Bull Shark	YES	YES	YES	YES
Blacktip Whalers	YES	YES	NO	NO
Great Hammerhead	YES	YES	NO	NO
Grey Reef Whaler	YES	YES	NO	NO
Longfin and Shortfin Mako Shark	YES	YES <sup>1</sup>	NO	NO
Lemon Shark	YES	NO	NO	NO
Blue Shark	YES	NO <sup>2</sup>	NO	NO
Dusky Whaler	YES	NO	NO	NO
Spinner Shark	YES	NO	NO	NO
Pigeye Shark	YES	NO	NO	NO
Sandbar Shark	YES	NO	NO	NO
Silky Whaler	YES	NO	NO	NO
Silvertip Whaler	YES	NO	NO	NO
Big Nose Whaler	YES	NO	NO	NO
Oceanic Whitetip Shark	NO	NO	NO	NO

<sup>1</sup> This assumes the single recorded bite was correctly attributed to the species.

<sup>2</sup> While an unprovoked fatal bite has been attributed to this species in Queensland, the weight of evidence suggests the species involved was a white shark.

## INTRODUCTION

The Queensland Department of Primary Industries Shark Control Program has continued to evolve in response to knowledge, technology, and changes in community attitudes towards sharks and shark bite. The Queensland Shark Control Program (QSCP) operates mesh nets and baited drumlines at beaches popular for surfers and swimmers. The program commenced in 1962 and very early in the program's inception a decision was made to release several species alive as they posed no risk of serious injury to beach goers. This included Port Jackson sharks, tawny sharks, and whale sharks. In 2001, grey nurse sharks were also to be released alive if caught in the program. This decision was based on concerns for the status of the east coast population of the species as well as general recognition that their risk to humans from an unprovoked shark bite may have been historically overstated.

In 2017 the Great Barrier Reef Marine Park Authority issued a renewed permit for the QSCP to operate in the GBRMP. Under the permit, a target species list was established. This is the first time a target species list was established for the Program. Prior to this, a non-dangerous shark list was maintained and all species on the non-dangerous list were released alive. This list of non-dangerous species included a further 16 species identified in 2015 through a comprehensive review of all shark species taken in the program was undertaken by DAF, GBRMPA and JCU with input from NSW DPI. Species identified as non-dangerous included the scalloped hammerhead shark, spot-tail shark and bronze whaler. A further review of the target species list in 2018 resulted in the following shark species removed from it: black tip reef whaler, three thresher shark species, school shark, Galapagos shark, and white tip reef shark.

Following a decision in 2019 in the Administrative Appeals Tribunal (AAT) the target species list was removed from the GBRMP Permit, thus requiring all sharks caught to be released alive. The Target Species list continues to apply to all waters outside of Commonwealth GBRMP waters. Target sharks captured outside of the Commonwealth GBRMP are euthanised. Currently the SCP Target Species list includes the following (in alphabetical order):

- Australian Blacktip
- Big Nose Whaler
- Blue Shark
- Bull Whaler
- Common Blacktip Whaler
- Dusky Whaler
- Great Hammerhead
- Grey Reef Whaler
- Long Nose Whaler (Spinner Shark)
- Longfin Mako
- Shortfin Mako
- Oceanic Whitetip Whaler
- Pigeye Whaler
- Sandbar Whaler
- Sharptooth Shark/Lemon Shark
- Silky Whaler
- Silvertip Whaler
- Tiger Shark
- White Shark

The purpose of this report is to review the Target Shark Species list through the application of specific criteria.

## METHODOLOGY

The three criteria used to assess each shark species are as follows:

- Criteria 1: Is the species known to occur in coastal Queensland waters where the shark program operates outside of the Great Barrier Reef Marine Park?
- Criteria 2: Has the species been associated with unprovoked bite/s resulting in serious injury or fatality in Australia?
- Criteria 3: Is the number of unprovoked bites resulting in serious injury or fatality relatively high?

The definition of a provoked and unprovoked shark is as per the Australian Shark Attack File<sup>3</sup>. An 'unprovoked' encounter between a human and a shark is defined as an incident where a shark is in its natural habitat and has made a determined attempt to bite a human where that person is not engaged in provocative activities. The focus on natural habitat excludes incidents involving captive animals in aquaria. A 'provoked' incident relates to circumstances where the person attracts or initiates physical contact with a shark (accidentally or on purpose) or was fishing for, spearing, stabbing, feeding, netting or handling a shark or where the shark was attracted to the victim by activities such as fishing, spearfishing, commercial diving activities (actively collecting abalone, pearl shells, or other marine animals) and cleaning of captured fish.

In determining what constitutes a serious injury, the report has been guided by Lentz et al. (2010) who designed a shark bite scoring severity system based on five levels (Table 2). For this report, only bites that are best described as Level 3, 4 are deemed to be a serious injury while a Level 5 bite is a fatal bite.

**Table 2 Levels of Bite Severity and the Description of the Levels (From Lentz et al., 2010). Bite Severity Levels in Bold are Considered Serious Injuries in this Report.**

Bite Severity	Description
Level 1	Simple lacerations involving the skin and soft tissue, blood pressure is typically unaffected, loss of function is not seen.
Level 2	Skin and soft tissue injuries that tend to involve a muscle, tendon, or bone; patients are quickly stabilized without much blood loss; function of extremity is not compromised.
<b>Level 3</b>	<b>Complex lacerations that typically involve muscle, tendon, or bone; patients may have transient hypotension and loss of function of a tendon; they likely require future surgical procedures for adequate repair of the wounds.</b>
<b>Level 4</b>	<b>Aggressive attacks that result in deep tissue damage and loss of function of an extremity or organ; a major vessel is likely to be injured; patients are hypotensive and require immediate surgical intervention to prevent fatality.</b>
<b>Level 5</b>	<b>Most likely a fatal injury resulting from the severity of the bite, the hypotension, loss of function of an extremity or organ, and rapid blood loss.</b>

In determining what constitutes a relatively high level of serious injury or fatality, the approach used was that a species had to be implicated in one or more unprovoked fatal bites over a five year period or, be implicated in two or more serious bites over a five year period.

<sup>3</sup> <https://taronga.org.au/conservation-and-science/australian-shark-attack-file/analysing-the-data>

In addition to the three criteria, the conservation status of the species at the State, National or International level, and other source of legal fishing mortality in Queensland are discussed.

The Global Shark Accident file (GSAF)<sup>4</sup> was used to determine the species responsible for unprovoked shark bite incidents. This database is freely available, searchable and in most cases provides links to curated information for each incident. In many instances, the species of shark responsible for an unprovoked shark bite is completely unknown, not known with a high degree of certainty, or possibly misidentified (McPhee, 2014; Ricci et al., 2016). The latter is particularly relevant for several historical bites (prior to 1980) where “grey nurse sharks”, “blue pointers” and “bronze whalers” may have been assigned by eyewitnesses purely based on the animal’s general colour. Ricci et al. (2016) estimated that species identification only occurred in 27% of bites. Where possible, peer reviewed literature that discusses individual case studies of shark bites has been used to augment information in the GSAF.

## SPECIES CONSIDERED

The remainder of this section discusses each species in turn. Appendix 1 includes information extracted from the GSAF on shark bites<sup>5</sup> in Australia with additional comments where necessary from the author. Appendix 1 does not include information on bites from white, bull and tiger sharks.

### WHITE SHARK

The white shark (*Carcharodon carcharias*) is well known to occur in Australian coastal waters including in Queensland, although it does range into oceanic waters to depths of approximately 350 metres on the continental shelf (Bruce, 1992; Bruce et al., 2006; Lee et al., 2021). White sharks are found from the latitude of Rockhampton south to the NSW border (Lee et al., 2021) and are more abundant in Queensland during winter and spring (Werry et al., 2012a). They are occasionally captured by the Queensland Shark Control Program (Dudley, 1997; Sumpton et al., 2011; Werry et al., 2012a) and there is a high degree of certainty that they are correctly identified.

The white shark is well known to cause bites that result in serious injury or fatalities in Australia and overseas (Ritter and Levine, 2004; West, 2011; McPhee, 2014; Ricci et al., 2016; Lippmann, 2018). Bites which cause serious injuries or fatalities from white sharks are relatively common compared to other shark species (McPhee, 2014; Chapman and McPhee, 2016; Lippmann, 2018). Between 1982 and 2011, 41 unprovoked shark bites are attributed to white sharks with just under half of these being fatal (McPhee, 2014). A recent fatality attributed with certainty to a white shark in Queensland occurred on the Gold Coast (Greenmount) in 2020. While in NSW recent fatal bites attributed with certainty to white sharks were recorded at Kingscliff and Woolli in 2020 and Tuncurry Beach in 2021.

The white shark is listed as “Vulnerable” under the Commonwealth EPBC Act 1999 and internationally by the IUCN. There is no targeted recreational or commercial fishery for the species and the species is protected under Queensland fisheries legislation. Very occasional individuals may be captured by gamefishers (Pepperell, 1992), but are released.

Based on the occurrence of white sharks in Queensland coastal waters and the records of serious bites and fatalities from the species it is recommended that white sharks remain a target species in the QSCP.

<sup>4</sup> <https://www.sharkattackfile.net/>

<sup>5</sup> The Appendix does not include information on bites from white, bull and tiger sharks because, as discussed in the body of this report, it is well established that these three species have caused unprovoked bites that result in serious injuries and fatalities.

## TIGER SHARK

The tiger shark occurs widely in subtropical and tropical waters and is found along the entire length of the Queensland east coast (Last and Stephens, 2009; Holmes et al., 2012). Tiger sharks can occur in shallow nearshore areas but also in the open ocean where they can dive down to depths of approximately 1,000 metres or more (Holmes et al., 2014; Lipscombe et al., 2020). The tiger shark is captured frequently in the Queensland SCP (Sumpton et al., 2011; Simpfendorfer, 2012; Holmes et al., 2014).

The tiger shark is well known to cause bites that result in serious injury or fatalities in Australia and overseas (Lowry et al., 2009; West, 2011; Clua et al., 2014; McPhee, 2014; Ricci et al., 2016). Bites which cause serious injuries or fatalities from tiger sharks are relatively common compared to other shark species (West, 2011; McPhee, 2014; Chapman and McPhee, 2016). At least ten fatal unprovoked bites can be attributed to tiger sharks in Australia. Further fatalities occurred on spearfishers. The last fatal shark bite in Australia from a tiger shark was in 2020 at Cable Beach (WA). Bites resulting in serious injuries occurred in the Whitsundays in 2019.

The tiger shark is targeted by a small number of sportfishers and gamefishers in Australia (Stevens, 1984; Pepperell, 1992; Braccini et al., 2021). It is not specifically targeted in the ECIF, but is captured (Tobin et al., 2014).

Tiger sharks are identified internationally by the IUCN as "Near Threatened", but the species are not listed as threatened species under Commonwealth or State legislation.

Based on the occurrence of tiger sharks in Queensland coastal waters and the records of serious bites and fatalities from the species it is recommended that tiger sharks remain a target species in the QSCP.

## BULL SHARK

The bull shark (*Carcharhinus leucas*) occurs widely in subtropical and tropical waters and is found along the entire length of the Queensland east coast (Last and Stephens, 2009). The bull shark occurs in coastal and nearshore waters and is the only very large shark species that occurs consistently in rivers and estuaries including natural and man-made waterways (e.g. residential canals and lakes) (Thorburn and Rowland, 2008; Werry et al., 2011, 2012b; Smoothey et al., 2019). Bull sharks are frequently caught in the Queensland SCP (Sumpton et al., 2011; Haig et al., 2018). Bull sharks can reside for periods of time in freshwater habitats (Gausmann, 2008).

The bull shark is well known to cause bites that result in serious injury or fatalities in Australia and overseas (Hazin et al., 2008; West, 2011; McPhee, 2014; Ricci et al., 2016). Bites from bull sharks which cause serious injuries or fatalities are relatively common compared to other shark species (West, 2011; McPhee, 2014). Overall, the GSAF records identify at least 11 fatal bites have been attributed to bull sharks in Australia, and in further instances bull sharks are likely to have been involved given the bites occurred in rivers where bull sharks are likely to be the only very large shark species present. Between 1982 and 2011 in Australia, 16 unprovoked shark bites were attributed to bull sharks with two of these being fatal (McPhee, 2014). Globally, bull sharks are implicated in many unprovoked bites including fatalities across a large geographic range. Unprovoked bites that have resulted in serious injuries or fatalities are recorded from Brazil, Reunion, Bahamas, USA, Iran, Nicaragua and South Africa.

The last fatal bite in Australia attributed with a high degree of certainty to bull sharks was at Ballina (NSW) in 2008. Bull sharks may have been involved in several recent fatalities in Queensland, but this is yet to be confirmed. In Queensland fatal unprovoked bites have been recorded from Amity Point (2006), Burleigh Lake (2003), Miami Lake (2002) and the Brisbane River (1880). Although not confirmed, given the location and some of the circumstances described bull sharks may have also been the shark species involved in fatal bites at



Noosa (1961), Wynnum (1959), Pioneer River (1956), Fitzroy River (1951), Rubbish Dump Creek (1939), Ross River (1907, 1912, 1919, 1929, 1931 and 1937), Logan River (1903), and the Brisbane River (1860).

Bull sharks are identified internationally by the IUCN as “near threatened”, but the species are not listed as threatened species under Commonwealth or State legislation.

The bull shark is a species widely targeted by recreational fishers in the rivers and estuaries of south-east Queensland in particular (D. McPhee, pers. ob.). It is frequently retained by anglers if it is below the maximum legal size, although fish of all sizes are also released alive. The species is a byproduct in Queensland commercial net fisheries.

Based on the occurrence of bull sharks in Queensland coastal waters and the records of serious bites and fatalities from the species, it is recommended that bull sharks are included as a target species of the Queensland Shark Control Program.

#### AUSTRALIAN BLACKTIP WHALER AND COMMON BLACKTIP WHALER

The Australian blacktip whaler (*Carcharhinus tilstoni*) is endemic to Australia and bears morphological similarities with the common blacktip whaler (*Carcharhinus limbatus*) and the two species can co-occur and can also hybridise (Harry et al., 2012; Morgan et al., 2012). This means that reliable assignment of a bite specifically to a species blacktip whaler is highly problematic in Australia and both species should be considered together. Both species have ranges extends the entire length of the Queensland east coast and they occur in coastal waters (Boomer et al., 2010). They are relatively small shark species with the maximum size of the Australian blacktip whaler being about two metres and the common blacktip whaler about three metres.

While unprovoked bites attributed to black tip sharks are recorded in several locations around the world, the endemic status of the Australian blacktip whaler means that this species is not responsible for these bites. However, the common blacktip whaler is responsible for many unprovoked bites in Florida (Resko and Johnson, 2014), although for at least some of these bites there is uncertainty in the exact species as spinner sharks (*Carcharhinus brevipinna*) may have been responsible in some instances. Most unprovoked bites from blacktip sharks globally do not result in serious injuries and no fatalities have been recorded. Most bites involve relatively minor lacerations to hands, feet or calves.

Three possible bites from black tip whalers have been recorded from Australian waters but only two are unprovoked. One occurred on Heron Island and resulted in minor injuries, but a black tip reef shark (*Carcharhinus melanopterus*) may have been the species involved as they are common at that location. The second bite occurred in Yallingup (Western Australia) with no injury occurring, but teeth marks in the surfboard were identified as being from an Australian blacktip whaler. A provoked bite occurred offshore of Townsville on a spearfisher who had fish in the water that had been speared. This bite resulted in serious injury (level 3).

The Australian blacktip whaler and common blacktip whaler are target species for commercial fisheries in Queensland, the Northern Territory and Western Australia (Davenport and Stevens, 1988). For the Queensland east coast the total commercial catch of the Australian blacktip whaler and common blacktip whaler in 2018-2019 was 25 tonnes and 22 tonnes respectively and the average annual harvest over a ten-year period was 79 tonnes and 70 tonnes respectively<sup>6</sup>. Most of this catch is taken in the East Coast Inshore Finfish Fishery (ECIFF). Both blacktip whaler species are also captured by recreational fishers in Queensland (de Faria, 2012). The commercial fishery has a substantially greater impact on the populations of the two species than the

<sup>6</sup> <https://www.fish.gov.au/report/416-Australian-Blacktip-Shark-2020>

Queensland SCP but much of this catch is unlikely to be taken near popular coastal locations utilised by water users.

The common blacktip whaler is listed internationally by the IUCN as Near Threatened while the Australian blacktip whaler is listed as Least Concern. Neither species are listed under Commonwealth or State legislation.

Both species of blacktip whaler occur in coastal waters, and while unprovoked bites from blacktip sharks are known from Australian waters, the number is very low, and they have not resulted in serious injury or fatalities. The only serious injury recorded was from a provoked incident. On this basis it is recommended that both the Australian black tip shark and common black tip shark not be included as a target species in the QSCP.

#### GREAT HAMMERHEAD SHARK

The great hammerhead shark (*Sphyrna mokarran*) is the largest of the hammerhead shark species reaching a maximum size of approximately 4.5 metres (Last and Stevens, 2009). The species has a wide geographic distribution and can occur along the entire Queensland east coast and is known to be captured in the Queensland SCP (Harry et al., 2011; Sumpton et al., 2011; Taylor et al., 2011; Raoult, et al., 2109, 2020; Roff et al., 2018).

Globally the GSAF identifies that there have been no fatalities attributed to bites from hammerhead sharks although three bites can be classified as serious (Level 3). It is not known with certainty which species of hammerhead shark are responsible for the bites recorded. Globally, there has not been a recorded unprovoked bite attributed to a hammerhead shark since 1992.

There are six shark bites attributed to hammerhead sharks in Australia with the last one occurring in 1990. It is not known with certainty which species of hammerhead shark was responsible. Three bites occurred in Queensland with two most likely being provoked bites on two people snorkelling together, one of whom was holding a fish. The third was in 1873 in Hervey Bay and was possibly unprovoked but little detail regarding it is available. A provoked bite occurred in Darwin on an angler attempting to remove a hook from a captured shark. An unprovoked bite occurred near Fremantle (Western Australia) which resulted in minor injuries.

The great hammerhead shark is captured in commercial fisheries including the ECIF (Tobin et al., 2014) and their fins are considered high value. The species is also captured by recreational fishers including gamefishers (Pepperell, 1992; de Faria, 2012).

The great hammerhead shark is listed internationally by the IUCN as "Critically Endangered". The species is not listed under Commonwealth or State environment legislation.

The great hammerhead occurs in coastal waters, and while unprovoked bites from are known from Australian waters, the number is very low, and none have resulted in fatalities or serious injury. On this basis it is recommended that the hammerhead shark not be included as a target species in the QSCP.

#### GREY REEF WHALER

The grey reef whaler (*Carcharhinus amblyrhynchos*) is a widespread, common species that occurs in the central Pacific and Indian Ocean (Last and Stevens 2009). It is a coastal species generally associated with reef environments with a preference for waters of 20 to 60 metres deep (Papastamatiou et al., 2006), but does utilise shallower water. It is captured in the Queensland SCP (Sumpton et al., 2011). The species is known to form aggregations (McKibben and Nelson, 1986; Economakis et al., 1998; Vianna et al., 2013) although individuals alone occur and these lone animals can demonstrate clear territorial behaviour at times (McKibben and Nelson, 1986; Nelson et al., 1986).

Globally the GSAF identifies unprovoked bites from grey reef whalers have occurred but no fatalities from the species are recorded, with most bites resulting in only minor injuries. In addition to unprovoked bites, grey reef sharks are also known to cause provoked bites on spearfishers (Jublier and Clua, 2018). Only one unprovoked shark bite has been reliably attributed to grey reef whalers in Australia – at Line Reef in the Great Barrier Reef in 2019. This bite resulted in minor injuries only. The GSAF identifies a further unprovoked bite as occurring at Lizard Island in 2019 that resulted in serious injury (Level 3), however video evidence identifies that fish were being fed offal by other vessel members at the location and time the bite occurred. As such, it may be better classified as a provoked incident, although the person bitten was may not have been directly involved in the provocation.

The grey reef whaler is not a common component of Queensland commercial fisheries such as the ECIFF, but is captured in low volumes (Tobin et al., 2014). Although data is lacking, the species is unlikely to be specifically targeted by recreational fishers in Queensland but may be caught as bycatch. They are a common component of the shark fauna caught by charter fishers in Great Barrier Reef waters (de Faria, 2012). Braccini et al. (2014) records that it is caught infrequently by recreational fishers in Western Australia but generally released.

The grey reef whaler is identified internationally by the IUCN as “near threatened”, but the species is not listed as a threatened species under Commonwealth or State legislation.

The species meets criteria 1 given it is known to occur in coastal Queensland waters. Grey reef sharks have been known to cause a single unprovoked bite that resulted in minor injuries only. The only bite attributed to the species in Australia that resulted in serious injury could be classified as a provoked incident. On this basis it is recommended that the grey reef whaler is not included as a target species in the QSCP.

#### LEMON SHARK

The lemon shark (*Negaprion acutidens*) is a large shark (> 3 metres) known to occur in Queensland coastal waters although they do range into reef habitats (Schultz et al., 2008; Chin et al., 2012). The lemon shark is recorded as being caught in the Queensland SCP in southern Queensland (Taylor et al., 2011).

Globally there are 43 bites attributed to lemon sharks but many of these are attributed to the species *Negaprion brevirostris* which does not occur in Australia. Available information from the GSAF database suggest that many bites have been provoked incidents involving angling or spearfishing or simply collisions between a lemon shark and a water user. Provoked bites have also included those that have occurred in the hand feeding of animals by scuba divers (Clua and Torrente, 2015). Clua and Haguenaue (2020) identified territoriality rather than feeding as an explanation for bites on humans from lemon sharks. Most injuries resulting from lemon sharks are not serious and no fatalities have been attributed with certainty to a lemon shark. A fatality at Reunion in 1992 was attributed to either a bull shark or lemon shark. Bull sharks are a known source of fatalities at Reunion and is the most likely species involved in that instance.

One bite from a lemon shark has been recorded in Australia at North West Island (Queensland) in 2020 which may have been an illegally provisioned animal and thus a provoked bite. The bite resulted in minor injuries. In this case the provisioning may have occurred by someone else some time prior to the incident occurring (up to a week before). The person bitten was not associated with any provisioning activity. A reported incident<sup>7</sup> at the same location a week earlier was attributed to a shovelnose ray but was also likely to be a lemon shark. At the time of writing an additional shark bite at Varanus Island was attributed to a lemon shark, all the specific details are currently lacking, the circumstances suggest that it may have been a provoked bite.

<sup>7</sup> <https://thenewdaily.com.au/news/queensland/2019/12/30/shark-attack-north-west-island/>

The lemon shark is listed internationally by the IUCN as “Vulnerable”. The species is not listed under Commonwealth or State legislation. There is no targeted recreational or commercial fishery for the species and the species is not identified as a component of the shark catch in the ECIF (Tobin et al., 2014). Very occasional individuals may be captured by recreational fishers in Queensland (de Faria, 2012). Braccini et al. (2021) identifies that it is caught in moderate abundance by recreational fishers in Western Australia but it is generally released.

While lemon sharks occur in Queensland, including in coastal areas and are of relatively large size, the bite involving the species in Australia cannot be classified as an unprovoked bite. Globally there is no compelling evidence that the lemon shark is frequently responsible for unprovoked bites. It is recommended that the lemon shark is not included as a target species in the QSCP.

## BLUE SHARK

The blue shark (*Prionace glauca*) is a circumglobal species and typically occurs in offshore waters throughout the water column to depths of over 1,000 metres (Stevens et al., 2010; Queiroz et al., 2010; Vandeperre et al., 2016; Young et al., 2010). Given available information on the species, the amount of time that blue sharks would spend overlapping with coastal areas where swimming and surfing is occurring is very low. Between 1992 and 2008, only three blue sharks were caught in the Queensland SCP (Sumpton et al., 2011). Between 2009 and 2016 only one more was caught.

Globally several bites are potentially attributed to blue sharks although there is reasonable uncertainty regarding whether the species has been correctly identified, particular in very old records. Most bites attributed to blue sharks with certainty have been a result of fishing accidents including accidents with blue sharks after their death. There are two fatal bites attributed to blue sharks from Japan and while this is feasible the available information does not support with certainty that the species was involved. Other shark bites in Japan have been attributed with certainty to white sharks (Nakaya, 1993). One bite was also attributed to a blue shark in the Nicobar and Andaman Islands in 1956 where the victim was climbing up to the ship after repairing the stern of the tuna boat in the water and one in American Samoa in 1955.

The GSAF attributes two unprovoked bites from blue sharks in Australia and one bite was fatal. The fatal bite attributed to the species occurred at Pinalba in Hervey Bay in 1922. Given the location of this fatal bite compared to the habitat preference of blue sharks, and the (limited) narrative around the incident, it is highly plausible that it was a white shark rather than a blue shark responsible. The second unprovoked bite in the GSAF recorded in Australia from a blue shark was from near Mackay and again the location would suggest another species was responsible. A further six provoked bites from Australia are recorded from blue sharks but one of these is highly likely to be a misidentification as it was from an estuarine location (Pimpama River, Gold Coast).

The blue shark is a significant bycatch and byproduct in tuna longline fisheries including in Australian waters by international (historically) and domestic vessels (Stevens, 1992; Young et al., 2010). It is not typically caught in fisheries managed by Queensland (Tobin et al., 2014). The species is caught by recreational gamefishers – mostly in southern Australian waters (Stevens, 1984; Pepperell, 1992; Lowry et al., 2007).

The blue shark is listed by the IUCN as “Near Threatened”. The species is not listed under Commonwealth or State environment legislation.

The blue shark is known to occur in Queensland coastal waters where the SCP operates but it is very rarely caught, and the species has a clear preference for offshore waters. Nonetheless, it does occur and for this reason, the species does meet the requirements of criteria 1. While the species is recorded as causing an unprovoked fatal bite in Queensland, the weight of evidence would suggest a white shark was the species

involved. A second unprovoked bite is also highly likely to have been from another species. On this basis it is recommended that the blue shark is not be included as a target species in the QSCP.

#### LONGFIN AND SHORTFIN MAKO SHARK

The longfin mako shark (*Isurus paucus*) and shortfin mako shark (*Isurus oxyrinchus*) will be considered together. Records of shark bite and catches in the SCP do not consistently differentiate the two species. The two species are circumglobal species and typically occur in offshore waters throughout the water column but can also be found in nearshore coastal waters (Francis et al., 2019). Between 2001 and 2016, mako sharks were caught (< 5) in small numbers each year in the southern regions of the SCP.

Globally, incidents involving mako sharks have generally been provoked incidents – including spearfishing with speared fish present and fishing accidents including hooked mako sharks jumping into boats. However, mako sharks have been implicated with a relatively high degree of certainty in fatalities and serious injuries (Level 3 and 4) in Egypt in 2010, 2015 and 2016, Venezuela in 2003, the Bahamas in 1981 and the USA (South Carolina in 1924 and California in 2015). The biophysical characteristics of the location in Egypt where bites occur allow for oceanic shark species such as mako sharks to venture into shallow water where people are undertaking water-based activities (Levine et al., 2014). Provisioning of sharks at this location is also believed to have contributed to the series of bites there (Levine et al., 2014).

In the GSAF there are four records of unprovoked shark bite attributed to mako sharks in Australia – three of which were identified as provoked bites. There are additional shark interactions involving mako sharks biting or ramming boats. There is uncertainty regarding the identity of the species attributed to the unprovoked bite which resulted in serious injury (Level 3) in 1932 at Newcastle which was identified in the GSAF as either a mako or a grey nurse shark. Plausibly given the location adjacent to a known aggregation of juvenile white sharks, that species may have been involved. However, there is no reliable information to determine the species with certainty.

Both species of mako shark are listed internationally by the IUCN as “Endangered”. Neither species are listed as threatened species under Commonwealth or State legislation, but both are listed migratory species by the Commonwealth.

The shortfin mako shark is targeted for both consumption and catch-and-release by recreational anglers (Pepperell, 1992; French et al., 2019). The species is not identified as a component of the shark catch in the ECIFF (Tobin et al., 2014). Any mako sharks that are captured alive in Commonwealth commercial fisheries must be released.

Mako sharks are known to be present in Queensland coastal waters, albeit likely in low abundance. Globally, the species is responsible for a small number of unprovoked fatal bites and bites resulting in serious injury – particularly in Egypt. Assuming despite the uncertainties that the only record of an unprovoked shark bite from a mako shark in Australia was indeed a mako shark, the species meets criteria 2 but does not meet criteria 3. It is recommended that the two mako shark species are not included as target species in the QSCP.

#### DUSKY WHALER

The dusky whaler (*Carcharhinus obscurus*) has a wide but disjointed global distribution with population structuring (Benavides et al., 2011). The dusky whaler is found the entire length of the Queensland east coast (Last and Stephens, 2009). It occurs in coastal and oceanic waters (Last and Stephens, 2009; Hoffmayer et al., 2014) and is captured within the Queensland SCP (Sumpton et al., 2011), particularly from Rainbow Beach south to the Gold Coast. The species is migratory, tending to move north during austral winter/spring with some gender-based differences in migratory patterns (Braccini et al., 2018).

Globally there are a small number of unprovoked bites (approximately eight) attributed to the dusky whaler and no fatalities with all but one resulting in minor injuries. There is a single bite attributed with certainty to the dusky whaler in Australia. It occurred in Lake Illawarra (NSW) in 2009.

The dusky whaler is listed internationally by the IUCN as endangered, but the species are not listed as a threatened species under Commonwealth or State legislation.

Dusky whalers are not a shark species targeted by recreational or commercial fishers in Queensland, but they may be taken as bycatch or byproduct. The species is frequently targeted and caught by recreational and commercial fishers in Western Australia and represents a large proportion of the retained shark catch (Simpfendorfer and Donahue, 1998; Braccini et al., 2021). It is also caught by commercial longline fishers in NSW (Macbeth et al., 2009).

The species is also a focus of commercial shark fisheries in other parts of the world (Marshall et al., 2015).

The dusky whaler occurs in Queensland nearshore coastal waters and meets criteria 1. While unprovoked bites from the species are known in Australia, there has only been a single incident attributed to the species. As such, the species does not meet criteria 2 or 3. It is recommended that the lemon shark is not included as a target species in the QSCP.

#### SPINNER SHARK

The spinner shark (*Carcharhinus brevipinna*) is a coastal species. It is one of the commonest species caught in the QSCP and they are more frequently caught during Spring and Summer which is their breeding period (Sumpton et al., 2010).

Unprovoked shark bites have been attributed to spinner sharks particularly in Florida (Resko and Johnson, 2014; Chapman and McPhee, 2016). Many of the recorded bites occur at a single location in Florida – New Smyrna Beach (Resko and Johnson, 2014). As already identified in this report, some bites attributed to spinner sharks in the USA may have been from blacktip whalers. The GSAF records show that no fatal unprovoked bites have been attributed to spinner sharks and no bites resulting in serious injuries have occurred. No bites from spinner sharks have been recorded from Australia.

The spinner shark is frequently caught by commercial fishers in Australia (Tillett et al., 2012; Geraghty et al., 2014; Butcher et al., 2015) and is caught in the Queensland ECIF particularly south of the Great Barrier Reef (Tobin et al., 2014). The species is also caught by recreational fishers (Stevens, 1984), but it is unlikely to be specifically targeted on a frequent basis in Queensland. It is captured relatively frequently by recreational fishers in Western Australia (Braccini et al., 2021).

The spinner shark is identified internationally by the IUCN as “Near Threatened”, but the species is not listed as a threatened species under Commonwealth or State legislation.

The spinner shark meets criteria 1 given it is known to occur in coastal Queensland waters. However, it does not meet criteria 2 or 3 as there are unprovoked bites attributed to the species in Australia. It is recommended that the spinner shark is not included as a target species in the QSCP.

#### PIGEYE SHARK

The pignose shark (*Carcharhinus amboinensis*) is sporadically distributed throughout tropical and subtropical waters of the Indo-West Pacific and Atlantic Oceans (Last and Stevens 2009). It is found throughout northern Australia from Carnarvon (Western Australia) to Moreton Bay (Last and Stevens 2009). The pignose shark is morphologically similar to the bull shark and the two species are easily confused. The species resides in



shallow coastal waters including turbid waters (Knip et al., 2011; Tillett et al., 2011). The species is captured in the QSCP (Sumpton et al., 2011).

There are no records in the GSAF of unprovoked shark bites from the pigeye shark. It is plausible that some bites from this species are misidentified as bites from bull sharks as they occur in similar habitats and their morphological similarities. The pigeye shark typically reaches a maximum length of between 1.9 and 2.5 metres while bull sharks are recorded as reaching a maximum length of at least 3.5 metres.

The pigeye shark is identified internationally by the IUCN as “Data Deficient”, but the species is not listed as a threatened species under Commonwealth or State legislation.

Pigeye sharks are caught in small numbers in various commercial fisheries, mostly in northern Australia. This includes in the ECIFF but it is not specifically targeted in that fishery (Tobin et al., 2014). Although data is lacking in Queensland, the species is unlikely to be specifically targeted by recreational fishers but may be caught as bycatch. Pigeye sharks are caught frequently by recreational fishers in Western Australia but is generally released (Braccini et al., 2021).

The pigeye shark meets criteria 1 given it is known to occur in coastal Queensland waters. However, it does not meet criteria 2 or 3 as there are no unprovoked bites attributed to the species in Australia. The caveat to this conclusion is that bites from this species may be mistaken for bites from bull sharks of a similar size. Nonetheless, it is recommended on the available information that the pigeye shark is not included as a target species in the QSCP.

#### SANDBAR SHARK

The sandbar shark (*Carcharhinus plumbeus*) ranges along the length of the Queensland east coast into northern NSW and is also found in Western Australia (McAuley et al., 2007; Last and Stevens, 2009; Macbeth et al., 2009). The sandbar shark is a coastal species but does extend down to depths of approximately 280 metres. The species is captured in the Queensland SCP (Sumpton et al., 2011).

There are unprovoked bites attributed to the sandbar shark in the GSAF although in several instances there is uncertainty as to whether bites were from sandbar sharks or other species. All bites are recorded from the USA and no bites have been attributed to the species in Australia.

The sandbar shark is identified internationally by the IUCN as “Vulnerable”, but the species is not listed as a threatened species under Commonwealth or State legislation.

The sandbar shark is caught in commercial fisheries in NSW and Western Australia (McAuley et al., 2007; Macbeth et al., 2009) although it is not a significant commercial species in the ECIFF (Tobin et al., 2014). Although data is lacking, the species is unlikely to be specifically targeted by recreational fishers in Queensland but may be caught as bycatch. It is captured relatively frequently by recreational fishers in Western Australia (Braccini et al., 2021).

The sandbar shark meets criteria 1 as it is known to occur in coastal Queensland waters. However, it does not meet criteria 2 or 3 as there are no unprovoked bites attributed to the species in Australia. It is recommended that the spinner shark is not included as a target species in the QSCP.

#### SILKY WHALER

The silky whaler (*Carcharhinus falciformis*) has a circumtropical distribution and occurs in coastal waters and the open ocean although they are typically found along the edge of continental shelves (Bonfil, 2008) and also associates with offshore Fish Aggregating Devices (FADs) (Filmatler et al. 2011). The species is though captured in the Queensland SCP albeit relatively infrequently (Sumpton et al., 2011).

Globally, there are only three unprovoked bites attributed to the silky whaler in the GSAF – two from the USA and one from one Spain. One of the bites in the USA was serious and burleying by recreational fishers of the area prior to when the bite occurred may have been an factor that provoked the bite. There are no unprovoked shark bites attributed to this species in Australia.

Silky whalers are not recoded as being caught in the ECIF (Tobin et al., 2014), but the species is likely to be taken as by-catch. The species is caught by gamefishers in NSW although it is not an important target species in recreational fisheries (Stevens, 1984). It is a very minor component of the recreational shark catch in Western Australia (Braccini et al., 2021).

The silky whaler is identified internationally by the IUCN as “Vulnerable”, but the species is not listed as threatened species under Commonwealth or State legislation.

While more common in oceanic waters, the silky whaler is captured in the Queensland SCP and the species meets criteria 1. The species does not meet criteria 2 or 3 as there are no unprovoked bites attributed to the species in Australia. It is recommended that the spinner shark is not included as a target species in the QSCP.

#### SILVERTIP WHALER

The silvertip shark (*Carcharhinus albimarginatus*) has a fragmented distribution through the tropical Indian and Pacific oceans. It is found in northern Australian waters from Carnarvon (Western Australia), across the Northern Territory to at least Bundaberg (Last and Stevens, 2009). It is a reef associated species (Espinoza et al., 2015) but also utilises deep pelagic waters (Bond et al., 2015). In the Great Barrier Reef the species typically utilises offshore reefs rather than inshore reefs (Espinoza et al., 2014). There is a single record of a silvertip whaler caught in the Queensland SCP at Rainbow Beach in 2014.

Globally, there are no unprovoked bites attributed to silvertip whalers in the GSAF. There are two provoked bites recorded from provisioned animals being fed by divers in Papua New Guinea and Sudan which resulted in minor injuries. There are no unprovoked bites attributed to the species in Australia.

Silky whalers are not recoded as being caught in Queensland fisheries (Tobin et al., 2014), but the species is likely to be taken as by-catch. The species was recorded in low numbers by charter fishers in the Great Barrier Reef (de Faria, 2012). Although data is lacking, the species is unlikely to be specifically targeted by recreational fishers in Queensland but may be caught as bycatch. It is a very minor component of the recreational shark catch in Western Australia (Braccini et al., 2021).

The silky whaler is identified internationally by the IUCN as “vulnerable”, but the species is not listed as threatened species under Commonwealth or State legislation.

While rare in nearshore, the silky whaler is captured in the Queensland SCP and the species meets criteria 1. The species does not meet criteria 2 or 3 as there are no unprovoked bites attributed to the species in Australia. It is recommended that the silky whaler is not included as a target species in the QSCP

#### BIG NOSE WHALER

The big nose whaler (*Carcharhinus altimus*) is principally a deep water species that resides in waters between 50 and 900 metres deep during the day although they do move into shallow water and vertically migrate at night (Anderson and Stevens, 1996). The species most likely has a circumglobal distribution (Last and Stevens, 2009). In Queensland it is known from waters between depths of 205 and 266 metres in the north of the state (Anderson and Stevens, 1996), although its range is likely to be much wider.

There are no records in the GSAF of unprovoked bites attributed to big nose whalers.



Big nose whalers are identified internationally by the IUCN as “Near Threatened”, but the species is not listed as a threatened species under Commonwealth or State legislation.

Big nose whalers are not targeted by Queensland commercial or recreational fisheries. Five big nose whalers have been recorded in the QSCP since 1962 although the species identification was not verified (T. Scott-Holland pers. comm). They are not recorded as being caught in the ECIF. The species is a very minor component of the recreational shark catch in Western Australia (Braccini et al., 2021).

Assuming the species identification in the QSCP is correct, the species is recorded as occurring inshore albeit rarely. The species meets criteria one. However, no unprovoked bites have been attributed to the species. It is recommended that the big nose whaler is not included as a target species in the QSCP.

## OCEANIC WHITETIP SHARK

The oceanic whitetip shark (*Carcharhinus longimanus*) is a large epipelagic species with a circumglobal distribution in tropical and subtropical waters and a clear preference for open ocean waters (Bonfil et al., 2008; Howey-Jordan et al., 2013; Young and Carlson, 2020). Between 2001 and 2016 there are no records on oceanic whitetip sharks being captured in the QSCP. There are also no records of the species being caught in the QSCP dating back to 1962 (T. Scott-Holland pers. comm.).

The oceanic whitetip shark is known to cause bites that result in serious injuries or fatalities with the geographic location of bites centred around Egypt. GSAF records identify that 17 of the 23 unprovoked bites attributed to oceanic white sharks occurred in Egypt. The biophysical characteristics of the locations where bites occur in Egypt allow for oceanic shark species such as the oceanic whitetip to venture into shallow water where people are undertaking water-based activities (Levine et al., 2014). In Egypt, three bites attributed to oceanic whitetips occurred over a six-day period in 2010 along an eight kilometre stretch of beach (Levine et al., 2014). Levine et al. (2014) produced evidence that the same individual shark may have been responsible for the three bites and that provisioning of animals may have been one of the significant contributing factors to the series of incidents. There are no unprovoked shark bites attributed to oceanic white tip sharks in Australia.

Oceanic whitetip sharks are not targeted by Queensland commercial or recreational fisheries and are rarely caught, but they are caught in the Commonwealth East Coast Tuna and Billfish Fishery. They are a frequent catch in commercial longline fisheries throughout the Pacific, Indian and Atlantic oceans (Young and Carlson, 2020).

Oceanic whitetip sharks are identified internationally by the IUCN as “Critically Endangered”, but the species are not listed as threatened species under Commonwealth or State legislation.

The oceanic whitetip shark is not a species that is ordinarily found in nearshore coastal waters that water users frequent. Globally, unprovoked bites from oceanic whitetip sharks are concentrated along the coast of Egypt where local biophysical conditions facilitate the overlap with shallow coastal waters used by people. Such conditions do not occur in Queensland and on this basis the species does not meet criteria 1 of this analysis. Additionally, there are no unprovoked shark bites attributed to the species in Australia and therefore criteria 2 is also not met. It is recommended that the oceanic whitetip shark is not included as a target species in the QSCP

## CONCLUSION

Only three species of shark meet all three criteria for inclusion on the Queensland SCP target species list – bull, white and tiger sharks. These three species are implicated in the majority of unprovoked shark bites globally.

A review of habitat preferences of shark species identified that oceanic white tip shark and bignose whalers are pelagic species which are highly unlikely to be encountered in nearshore areas where the Queensland SCP operates.

A further eight species known to occur in nearshore coastal areas at times have not been associated with serious or fatal unprovoked shark bites in Australia. This includes the lemon shark, dusky whaler, spinner shark, pigeye shark, silky whaler, silvertip whaler and blue shark. A single fatality in Queensland has been recorded from a blue shark but this is highly likely to have involved a white shark. A recent bite that caused minor injuries attributed to a lemon shark was from an animal that had been provisioned and thus better described as a provoked incident, although the victim was not involved in the provisioning of the animal.

Unprovoked bites in Australia have been attributed to a further four species or species groups: blacktip whalers, hammerhead sharks, mako sharks and the grey reef whaler. None of the unprovoked bites from the four species have resulted in fatalities. An unprovoked bite attributed to a mako shark which resulted in serious injury may have been a bite from a grey nurse shark or a white shark. For the other three species no unprovoked bites have resulted in serious injury. The frequency of unprovoked bites attributed to the four species is low: blacktip whalers (1 or 2), hammerhead sharks (1 or 2), mako sharks (possibly 1) and grey reef whalers (1). The GSAF lists a further bite from a grey reef whaler and two bites from hammerhead sharks that were provoked by animals being fed or in the process of being fed at the time of the bite.

It is recommended that the QSCP should have three species only as target species - bull, white and tiger sharks. There should be scope and a process to amend this list over time as new information becomes available.

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APPENDIX 1 Recorded Shark Bites in Australia from species currently listed on the SCP target shark list other than bull, white and tiger sharks

Date sourced from the Global Shark Accident File (www. <https://www.sharkattackfile.net/>)

Year	Type of Bite	State	Location	Water Activity	Injury	Comments
<b>Blacktip Whalers</b>						
2021	Unprovoked	Western Australia	Yallingup	Paddle boarding	No injury, board bitten	Teeth marks from <i>Carcharhinus tilstoni</i> identified on the surfboard.
2016	Unprovoked	Queensland	Heron Island	Wading	Laceration to right calf	Possibly a black tip reef shark ( <i>Carcharhinus melanopterus</i> )
2005	Provoked	Queensland	Townsville	Spearfishing	Severe injury to lower leg	Speared fish present when bite occurred
<b>Blue Shark</b>						
2000	Provoked	New South Wales	Wollongong	Fell onto dead shark	Foot lacerated from toe to heel when he tripped on shark during fishing competition	Very limited information on this bite
1968	Provoked	New South Wales	Stockton Bight		Foot lacerated.	
1937	Provoked	Queensland	Moreton Island	Fishing	Left shoulder bitten by netted shark.	Highly likely to have been another species given the estuarine location.
1935	Provoked	Queensland	Pimpana River	Hauling in net with shark in it	Calf & shin bitten	
1934	Provoked	New South Wales	Off Mooloolabah	Fishing	Hand bitten while landing shark	Highly likely to have been a white shark. May have been another species given the habitat where the bite occurred. Limited information to support any species identification.
1933	Provoked	South Australia	Port River, Adelaide	Fishing	Forearm injured by hooked shark	
1922	Unprovoked	Queensland	Hervey Bay	Bathing	FATAL	
1910	Unprovoked	Queensland	Mackay	Bathing	Foot bitten	

### Hammerhead Shark

2002	Unprovoked	Queensland	Great Barrier Reef (near Upolu Bay)	Snorkeling	Left arm lacerated
1990	Unprovoked	Queensland	Outer Barrier Reef near Port Douglas	Snorkeling	Lacerations
1990	Unprovoked	Queensland	Outer Barrier Reef near Port Douglas	Snorkeling, possibly holding a fish	Lacerations
1981	Unprovoked	Western Australia	Leighton Beach, north of Fremantle	Exercising his dog in the shallows	Puncture wounds to foot
1961	Provoked	Northern Territory	Stokes Hill Wharf, Darwin	Fishing	Finger bitten by hooked shark.
1873	Unprovoked	Queensland	White Cliffs	Bathing	No details

Both snorkelling together

Both snorkelling together

### Gray Reef Whaler

2019	Unprovoked	Queensland	Line Reef	Swimming	Puncture marks to left hip and buttocks
2018	Provoked	Queensland	Lizard Island	Diving	Severe laceration to left forearm

A level 3 injury. Shark species confirmed by video evidence. Fish were being fed at the time of the bite.

### Lemon Shark

2020	Unprovoked	Queensland	North West Island	Swimming	Lacerations to leg
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While this bite was classified in GSAF as an unprovoked bite.

Further information suggests that shark provisioning had occurred at the location.

## Mako Sharks

2008	Provoked	Queensland	200 km east of Coolangatta	Accidentally stood on hooked shark's tail before attempting to gut it	Laceration to left knee
2005	Provoked	New South Wales	Bermagui	Fishing	Laceration on left thigh
1969	Provoked	New South Wales	Newcastle		Foot lacerated.
1932	Unprovoked	New South Wales	Redhead Beach, Newcastle	Swimming	Torso bitten with pneumothorax, slight lacerations on left hand

Incomplete information on this bite.

Uncertainty as to the species involved that was identified as either a mako or a grey nurse shark. A level 3 injury.

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RTI Act 2009

**From:** Tracey Scott-Holland  
**Sent:** Thursday, 31 March 2022 4:28 PM  
**To:** Jonathan Mitchell; Simpfendorfer, Colin; Julia Chandler; Peta Lawlor; Richard Fitzpatrick; Angela Freeman; Angela Freeman; Adam Smith; Carley Kilpatrick; Marcel Green  
**Cc:** Kimberly Foster; Michael Mikitis  
**Subject:** Shark Control Program Scientific Working Group meeting 1 of 2022 - please advise your availability

Dear Members,

I hope you are all well and 2022 has been kind to you so far.

Can you please complete the survey below to advise your availability for the next Shark Control Program Scientific Working Group meeting.

The meeting will be online via Teams (we look forward to being able to meet in person again soon!).

It's likely that the meeting will be split across two sessions on different days so please ensure you select ALL dates that would be suitable for you.

<https://www.surveymonkey.com/r/BVMMBKF>

In addition to our standard recurring agenda items the following items are on the agenda.

- Shark barrier trial
- SharkSmart drone trial
- Catch alert drumline trial
- Trial – targeting bull sharks with traditional drumlines (net replacement will be discussed).
- Target species list review

If you have any other suggestions for agenda items please let me know.

Please note I will be on leave next week and will finalise the meeting arrangements and agenda when I return.

Thanks

Tracey



**Dr Tracey Scott-Holland**

Research & Policy Coordinator (Shark Control Program), Fisheries Queensland  
Department of Agriculture and Fisheries

Scholarship: Personal Information: [tracey.scott-holland@daf.qld.gov.au](mailto:tracey.scott-holland@daf.qld.gov.au) W [www.daf.qld.gov.au](http://www.daf.qld.gov.au)

**In the office:** Tuesday, Wednesday and Thursday  
Level 5, 41 George Street, Brisbane QLD 4000  
GPO Box 46, Brisbane QLD 4001

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**From:** SCOTT-HOLLAND Tracey  
**Sent:** Wednesday, 18 August 2021 3:55 PM  
**To:** FOSTER Kimberly; MIKITIS Michael  
**Subject:** Target list appendix  
**Attachments:** SCP Target Species List Appendix 1.docx



**Dr Tracey Scott-Holland**

Research & Policy Coordinator (Shark Control Program), Fisheries Queensland  
Department of Agriculture and Fisheries

Sch 4 - Personal Information [Tracey.scott-holland@daf.qld.gov.au](mailto:Tracey.scott-holland@daf.qld.gov.au) W [www.daf.qld.gov.au](http://www.daf.qld.gov.au)

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APPENDIX 1 Recorded Shark Bites in Australia from species currently listed on the SCP target shark list other than bull, white and tiger sharks

Date sourced from the Global Shark Accident File (www. <https://www.sharkattackfile.net/>)

Year	Type of Bite	State	Location	Water Activity	Injury	Comments
<b>Blacktip Whalers</b>						
2021	Unprovoked	Western Australia	Yallingup	Paddle boarding	No injury, board bitten	Teeth marks from <i>Carcharhinus tilstoni</i> identified on the surfboard.
2016	Unprovoked	Queensland	Heron Island	Wading	Laceration to right calf	Possibly a black tip reef shark ( <i>Carcharhinus melanopterus</i> )
2005	Provoked	Queensland	Townsville	Spearfishing	Severe injury to lower leg	Speared fish present when bite occurred
<b>Blue Shark</b>						
2000	Provoked	New South Wales	Wollongong	Fell onto dead shark	Foot lacerated from toe to heel when he tripped on shark during fishing competition	Very limited information on this bite
1968	Provoked	New South Wales	Stockton Bight		Foot lacerated.	
1937	Provoked	Queensland	Moreton Island	Fishing	Left shoulder bitten by netted shark.	Highly likely to have been another species given the estuarine location.
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Both snorkelling together

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## Mako Sharks

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Incomplete information on this bite.

Uncertainty as to the species involved that was identified as either a mako or a grey nurse shark. A level 3 injury.

Published on DAF Disclosure Log  
RTI Act 2009



**Lyn Low**

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**From:** SCOTT-HOLLAND Tracey  
**Sent:** Tuesday, 24 August 2021 12:54 PM  
**To:** FOSTER Kimberly  
**Cc:** MIKITIS Michael  
**Subject:** Today's agenda - Julia Chandler request for change in order of agenda items

**Importance:** High

Hi Kimberly,

Julia Chandler is not going to be able to attend the whole SWG meeting today [Sch 4 - Personal Information]

[Sch 4 - Personal Information]

Julia will pop in at the start of the meeting but will have to go [Sch 4 - Personal Information]  
[ ] after which she will rejoin our meeting.

We can discuss at the start of the meeting with Julia if you like.

Trace



**Dr Tracey Scott-Holland**

Research & Policy Coordinator (Shark Control Program), Fisheries Queensland  
Department of Agriculture and Fisheries

Sch 4 - Personal Information [ ]  
M [Tracey.scott-holland@daf.qld.gov.au](mailto:Tracey.scott-holland@daf.qld.gov.au) W [www.daf.qld.gov.au](http://www.daf.qld.gov.au)

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