IN THE GENERAL DIVISION OF
THE HIGH COURT OF THE REPUBLIC OF SINGAPORE

[2022] SGHC 20

Admiralty in Rem No 91 of 2017 (Assessment of Damages No 13 of 2020)

Between

(1) Jesse Remalmog
(2) John Haglelgam
(3) Santus Sarongelfeg

… *Plaintiffs*

And

Owner and/or Demise Charterer of the vessel "Sevilla Knutsen"

… *Defendant*

JUDGMENT

[Admiralty and Shipping — Action in rem — Claim on reference]
[Damages — Assessment — Damage to coral reef]
[Damages — Measure of damages — Tort]
[Damages — Rules in awarding — Proof of actual damage]
[Damages — Rules in awarding — Ascertainment difficult or impossible]

TABLE OF CONTENTS

FACTS 1

PROCEDURAL HISTORY 5

THE PARTIES' CASES 8

ISSUES TO BE DETERMINED 12

ISSUE 1: THE DAMAGE ISSUE 12

PROFESSOR CRANE'S EVIDENCE 13

MR CHALLENGER'S EVIDENCE 18

THE PARTIES' ARGUMENTS 19

ANALYSIS AND DECISION 22

ISSUE 2: THE VALUATION ISSUE 46

THE APPLICABLE LAW 46

THE PARTIES' ARGUMENTS 47

ANALYSIS AND DECISION 49

"More reef and fewer people" 50

Loss of "cultural value" 56

What is the value of the Reef? 58

Alternative orders in lieu of damages 69

CONCLUSION 71

ANNEX 1: PHOTOGRAPHS DEPICTING SECTIONS OF THE UNDAMAGED REEF ON THE WESTERN SIDE OF EAURIPIK 75

ANNEX 2: PHOTOGRAPHS DEPICTING SECTIONS OF THE DAMAGED REEF AFTER THE INCIDENT 78

Version No 1: 28 Jan 2022 (11:03 hrs)

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The "Sevilla Knutsen"

[2022] SGHC 20

General Division of the High Court — Admiralty in Rem No 91 of 2017 (Assessment of Damages No 13 of 2020)
S Mohan J
2–5 November 2020, 18, 19 March, 2 July 2021

28 January 2022 Judgment reserved.

S Mohan J:

Facts

1 At the approximate coordinates of Latitude 06° 21' 12" N, Longitude 143° 04' 047" E lies the small Western Pacific island atoll known as Eauripik (see Figure 1 below).



Figure 1: Satellite photo of Eauripik

2 According to Wikipedia, Eauripik has a total land area of only approximately 24 hectares. The coral reef which creates the atoll encloses a deep lagoon with an area of approximately 6km^2.[1] Eauripik is a municipality of the island state of Yap, which in turn is part of four island states that make up the Federated States of Micronesia ("FSM"). The islands that make up the FSM, including Eauripik, are located in the Pacific Ocean close to the Marianas Trench where water depths can reach several thousand feet. The islands in the FSM including Eauripik are, some might say, home to some of the most biodiverse and beautiful coral reefs in the world. In the course of the proceedings before me, various epithets were used to describe the reef in question in Eauripik. For example, counsel for the plaintiffs, Mr Leong Kah Wah, described the reef as a "National Geographic standard" reef.[2] I reproduce, at Annex 1 of this judgment, a selection of underwater photographs depicting sections of the reef located on the western leeward side of Eauripik (the "Reef").

3 The Reef is characterised by a reef crest (or reef top) which slopes down seaward towards a reef wall. The reef wall extends downwards very steeply, in some parts almost vertically, to depths of at least 35m;[3] given where Eauripik is located, it is likely that the Reef wall extends downwards to depths far beyond those visible to the naked eye. According to the plaintiffs' expert, the Reef has exceptionally high biodiversity, high coral cover and high fish biomass.[4]

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1 Wikipedia <https://en.wikipedia.org/wiki/Eauripik> (accessed 13 December 2021).

2 Transcript (2 November 2020) at p 6 (lines 22 to 23).

3 Nicole L Crane's first Affidavit of Evidence-in-Chief ("AEIC") dated 13 May 2020 ("NC1") at p 7.

4 Transcript (4 November 2020) at pp 56 (lines 14 to 17) and 57 (lines 5 to 11).

Version No 1: 28 Jan 2022 (11:03 hrs)

4 On 17 April 2017, the Liquefied Natural Gas carrier "SEVILLA KNUTSEN" ("Vessel"), whilst in the course of her ocean passage, struck the west-facing leeward side of the Reef at several locations, causing damage to it (the "Incident"). Figure 2 below is a screenshot from aerial drone video footage taken some seven weeks after the Incident and gives some visual indication of the damage caused by the Vessel to the Reef. The damaged areas are visible as white "scars" appearing on the outline of the Reef, and are denoted by the red arrows. There were a total of ten scars caused by the Incident. Using Figure 1 above (at [1]) as a reference, the damage occurred at the west-facing edge of the Reef on the left side of the photograph.



Figure 2

5 The plaintiffs in HC/ADM 91/2017 ("ADM 91") are Jesse Remalmog, John Haglelgam and Santus Sarongelfeg. Collectively, they are the traditional leaders, or Chiefs, of Eauripik and represent its people. ADM 91 is an admiralty

Version No 1: 28 Jan 2022 (11:03 hrs)

action *in rem* brought by the plaintiffs against the defendant, the owner of the Vessel, seeking compensation as a result of the damage caused to the Reef by the Incident. It is accepted by the parties that (a) the law of FSM governs the plaintiffs' claim in tort, and (b) under FSM law, the plaintiffs as the traditional Chiefs of Eauripik possess the requisite standing to bring this action against the defendant in their representative capacities on behalf of the people of Eauripik.

6 It is also common ground that (a) FSM law recognises a cause of action for damages in tort arising from negligent damage to a reef, and (b) that the people of Eauripik are entitled to sue (through their traditional Chiefs) based on a shared traditional and collective ownership right to use, and benefit from, the marine coral reef's natural resources.[5]

7 On 14 February 2019, the plaintiffs and the defendant entered into an agreement under O 70 r 34 of the Rules of Court (2014 Rev Ed) ("ROC") to settle liability, which agreement was filed and accepted as an order of Court. Pursuant to that agreement, the defendant admitted 100% liability for the Incident. The hearing before me concerns a claim on reference brought pursuant to O 70 rr 40 and 41 of the ROC to assess the damages due to the plaintiffs as a result of the Incident.

8 The issues that arise in this claim on reference are not particularly complex but they belie the gulf between the parties as to the appropriate level of compensation the plaintiffs are entitled to. To give a flavour of the extent of the divergence in the parties' positions, the plaintiffs seek an award of damages in the sum of approximately US$6.57m whereas the defendant contends that it

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5 Plaintiffs' Closing Submissions dated 26 May 2021 ("PCS1") at para 6.

Version No 1: 28 Jan 2022 (11:03 hrs)

should be no more than US$500,000.[6]

9 Before I turn to the main issues for determination, it would be useful to first summarise the somewhat unusual procedural history surrounding this dispute which, by reason of the course it took, has resulted in this court deciding a claim for the people of Eauripik for tortious compensation, under FSM law, that has no connection to Singapore other than the fact that the Vessel was arrested by the plaintiffs here.

Procedural history

10 On 23 June 2017, the plaintiffs commenced ADM 91 and arrested the Vessel in Singapore. The Vessel was released on 27 June 2017 after the defendant provided security, under protest, by way of a letter of undertaking ("LOU") from its Protection and Indemnity insurers ("P&I Club") in the sum of US$9,247,220 (inclusive of interest and costs).

11 On 13 July 2017, the plaintiffs filed HC/SUM 3223/2017 ("SUM 3223") seeking an order to stay their own action in ADM 91 in favour of the FSM on the grounds of *forum non conveniens*. In response, the defendant commenced proceedings against the plaintiffs in the English courts seeking an anti-suit injunction against the plaintiffs to prevent the commencement or prosecution of legal proceedings in respect of the plaintiffs' claim otherwise than before this court; the basis of the defendant's application was that the LOU by its terms required the plaintiffs to only prosecute their claim in this court. An interim, and subsequently final, anti-suit injunction was granted by the English court in

[6] PCS1 at para 164; Defendant's Closing Submissions dated 26 May 2021 ("DCS1") at paras 267 to 270.

Version No 1: 28 Jan 2022 (11:03 hrs)

favour of the defendant. The English court also made a costs order in the defendant's favour for the sum of £51,830 (the "UK Costs Order"). On 13 February 2019, an assistant registrar of the Supreme Court of Singapore ordered, pursuant to O 14 r 5 of the ROC, that judgment be entered for the defendant against the plaintiffs on its counterclaim for the UK Costs Order (with interest at 8% per annum calculated from 6 February 2018 until payment of the principal sum) and costs of $6,000 (the "Counterclaim Judgment").

12 As a consequence of the English court's anti-suit injunction against the plaintiffs, the plaintiffs decided to withdraw their stay application in SUM 3223 and were granted leave to do so on 27 October 2017. Thus, ADM 91 would continue on its course.

13 On 22 January 2018, the defendant requested for the plaintiffs' agreement to a moderation of the amount of security that had been furnished. The plaintiffs agreed and the defendant furnished a fresh P&I Club letter of undertaking in the sum of US$5,034,647 (inclusive of interest and costs) in substitution for the LOU first furnished (see [10] above).

14 As stated at [7] above, on 14 February 2019, the defendant admitted liability. Parties also agreed that the quantum of the plaintiffs' claim was to be assessed by way of a claim on reference, and for the costs of the action to be taxed if not agreed and paid by the defendant to the plaintiffs.

15 I heard the plaintiffs' claim on reference over the course of two tranches. The first tranche was from 2 to 5 November 2020. Shortly before the hearing was to commence, in a letter dated 28 October 2020, the defendant's solicitors PDLegal LLC wrote to the plaintiffs' solicitors Rajah & Tann Singapore LLP

Version No 1: 28 Jan 2022 (11:03 hrs)

making an open offer to the plaintiffs to pay a sum of US$750,000, after setting off the defendant's Counterclaim Judgment, in full and final settlement of all claims, counterclaims and/or liabilities, whether known or unknown, that each party had arising out of and in connection with ADM 91. The offer was expressed to be an open global offer and the defendant expressly reserved its right to seek indemnity costs against the plaintiffs under O 59 of the ROC. On the first day of the hearing, the letter was brought to my attention, the fact of the offer having been made was placed on the record and the letter was marked as a defendant's exhibit. The offer was not accepted by the plaintiffs and the hearing continued.

16 On the first day of the expert witnesses' evidence, which was given by way of an expert witness conference, it transpired that the plaintiffs intended to put forward a revised set of measurements on the area of damage caused by the Incident and to adduce supplemental evidence from the plaintiffs' expert to support the revised measurements. It was eventually agreed that pending the plaintiffs formally amending their pleadings and adducing further evidence in support of their amended case, and the defendant responding accordingly, the evidence of the expert witnesses on, *inter alia*, the issue of the extent of damage to the Reef would be postponed and further hearing dates fixed after matters had been regularised.[7] In the meantime, the hearing continued but the experts limited their evidence to issues pertaining to the nature of the Reef and its characteristics. The plaintiffs subsequently obtained leave to amend their Claim on Reference and to adduce further evidence from their experts, with the defendant being given consequential leave to file an amended Defence to Claim on Reference and responsive expert evidence. The second tranche of the hearing

[7] Transcript (4 November 2020) at pp 72 to 75.

Version No 1: 28 Jan 2022 (11:03 hrs)

took place on 18 and 19 March 2021 and the experts gave their evidence on the remaining issues that had been held over from the first tranche.

The parties' cases

17 The parties agree that the Incident left ten distinct scars on the Reef (see Figure 2 above at [4]). In this judgment, the scars will be referred to as Scars 1 to 10, with Scar 1 being the northernmost scar and Scar 10 the southernmost. It is also not in dispute that Scars 1 to 5 represent the more significant damage to the Reef, as is apparent just from the relative sizes of these scars. For all the scars, the "layer of living coral" was "scraped completely off", leaving "large chunks of reefs dislodged, and cracks in the remaining underlying structure".[8] I reproduce at Annex 2 of this judgment a selection of photographs depicting some of these scars from which it can be seen that the coral has either been completely or partially sheared or scraped off down to the Reef's white calcium substrate.

18 The plaintiffs contend that the ten scars and/or gouges (the "Direct Impact Scars") can be divided into seven groups or distinct zones known as "Impact Zones", namely Impact Zones A to G.[9] In addition to the area of the Direct Impact Scars, these Impact Zones also represent (a) further damage that exists *below* the Direct Impact Scars, largely due to what is termed as the "avalanche effect" of coral rubble/dislodged coral having been sheared off at the locations of the Direct Impact Scars and cascading down the Reef wall to a depth of at least 28m, thereby causing *secondary* destruction/damage to the

8 Claim on Reference (Amendment No 2) dated 14 January 2021 ("COR2") at para 8(3).

9 COR2 at paras 8(3A) to 8(3C); Transcript (18 March 2021) at pp 27 (lines 10 to 25) to 29 (lines 1 to 4).

Version No 1: 28 Jan 2022 (11:03 hrs)

corals on the Reef wall, and (b) further damage that exists *between* some of the Direct Impact Scars, namely Direct Impact Scars 1 to 4. The plaintiffs' current pleaded case is that the total area of damage, comprising the ten Direct Impact Scars and the seven Impact Zones, is 5,478.46m^2.[10]

19 For completeness, the plaintiffs also refer to a Total Damage *Field* Area of 9,862.72m^2.[11] This represents the *total area* bounded within all ten scars and seven Impact Zones, bearing in mind that the scars are not immediately adjacent to each other but some distance apart, as can be seen in Figure 2 (above at [4]). The Total Damage Field Area is arrived at by multiplying the total length between the extremities of all ten scars (*ie*, 352.24m) by a flattened width of 28m. The plaintiffs' pleaded claim, however, is *not* advanced on the basis of the *Total Damage Field Area*; nor are the plaintiffs advancing their claim on the basis of the *Total Damage Field*.[12] As stated in the preceding paragraph, the plaintiffs' pleaded claim is based on an area of damage of 5,478.46m^2.

20 The defendant, represented by Mr Ramachandran Raghunath Doraisamy as lead counsel, does not dispute that the Reef was damaged as a result of the Incident. It does however vigorously dispute the *extent* of the damage to the Reef said to be caused by the Incident. According to the defendant's calculations and based on its expert's evidence, the total area of the Reef that was damaged (including all the Direct Impact Scars and any damage on the Reef wall) is only

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10 COR2 at para 8(3C).

11 COR2 at para 8(4).

12 PCS1 at para 97.

Version No 1: 28 Jan 2022 (11:03 hrs)

approximately 742m^2.[13] The defendant's expert is adamant that beyond this, no further damage to the Reef was observed, whether on the Reef top or on the Reef wall. The defendant avers that the loss and damage asserted by the plaintiffs is manifestly exaggerated.[14]

21 As for the monetary value to be ascribed to the damage to the Reef, both parties accept that based on FSM caselaw precedent, the court has a discretion to decide how much, in US dollars per square metre, the Reef is worth. This is an exercise to be undertaken based on a consideration of the evidence and various factors that have been alluded to in a number of FSM court judgments. There is some disagreement between the parties on the relevance or applicability to this case of some of these factors, and I will address these points in greater detail later in this judgment.

22 In essence, the plaintiffs claim that a valuation of US$1,200 per square metre for the Reef is appropriate, based on the "features of the coral reef damaged" including the "ecological and cultural significance of the damaged reef, the type of corals affected and density of the coral cover destroyed, as well as inflation".[15]

23 For completeness, while the plaintiffs had advanced a number of alternative methods of valuation in earlier iterations of their Claim on Reference, such as commodity value, contingency value, cost of

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13 Defence to Claim on Reference (Amendment No 3) dated 20 March 2021 ("DCOR3") at paras 8(a) and 10(e); Gregory Edward Challenger's first AEIC dated 30 June 2020 ("GEC1") at p 22.

14 DCOR3 at para 10.

15 COR2 at para 10(3).

Version No 1: 28 Jan 2022 (11:03 hrs)

replacement/restoration and a hybrid valuation method, these alternative bases of valuation were dropped by the plaintiffs in the latest version of their Claim on Reference (Amendment No 2) filed on 14 January 2021. Mr Leong confirmed that the plaintiffs' case on valuation is based on and limited to a US dollar valuation per square metre of damage which can be accepted by the court.[16]

24 Mr Doraisamy on the other hand argues that under FSM law, the plaintiffs are entitled to be compensated on the basis of either diminution in value of the damaged property or the cost of replacement, whichever is *less*. With regard to ascribing a value to the Reef, the defendant submits that on the basis of FSM caselaw precedent, the *cap* on the value of a reef in FSM is US$600 per square metre. It contends that in this case, and for a variety of reasons, including the fact that Eauripik is an outer island atoll with fewer inhabitants and that these inhabitants rely on the Reef's resources only for subsistence (as opposed to commercial exploitation), the valuation of the damaged areas of the Reef should be no more than US$251.85 per square metre; as justification for this figure, the defendant relies on one particular case decided by the FSM courts.[17] Alternatively, the defendant claims that the compensation the plaintiffs are entitled to should not exceed US$500,000 (*ie*, the cost of restoring the damaged portions of the Reef). This is a figure put forward by the defendant's expert as the cost to restore the damaged parts of the Reef. Restoration in this context involves replacing the damaged or destroyed corals with at risk or dislodged corals recovered from other parts of Eauripik and re-

16 Transcript (18 March 2021) at pp 10 (lines 20 to 25) to 11 (lines 1 to 8).

17 DCOR3 at para 10(d).

Version No 1: 28 Jan 2022 (11:03 hrs)

attaching them to the damaged sections of the Reef, thereby allowing the damaged Reef to recover and regenerate itself in time.

Issues to be determined

25 From the potted summary above of the parties' cases, it can be seen, and indeed is common ground between the parties, that the two main issues that arise for my consideration in this claim on reference are:

(a) what is the area (in square metres) of the damage caused to the Reef by the Incident ("the Damage Issue"); and

(b) what is the value (in US$) of the area of the Reef damaged by the Incident ("the Valuation Issue").

26 As I mentioned at [8] above, while both issues are, in and of themselves, not particularly complex, the parties' positions on both issues are sharply divided.

Issue 1: The Damage Issue

27 Both parties engaged experts to measure and opine on the area of damage. The plaintiffs engaged Professor Nicole L Crane ("Professor Crane"), a marine biologist and faculty member of Cabrillo College (Biology Department) in California. Aside from her teaching responsibilities, Professor Crane is also a Project Co-Leader for an ocean conservation project known as One People One Reef ("OPOR"). The OPOR project is a collaboration between a multidisciplinary science team and communities in the outer islands of Micronesia (including the FSM) that work on ocean conservation and management initiatives. Part of the work that OPOR undertakes involves

Version No 1: 28 Jan 2022 (11:03 hrs)

conducting reef surveys and assessments.[18] Professor Crane attended at the Reef site on 9 June 2017, some seven weeks after the Incident, together with other members of the OPOR project team ("OPOR Team"). Professor Crane was personally involved in the survey of the damage of the Reef and also directed and coordinated the survey of the Reef by members of the OPOR Team.[19] The OPOR Team was not commissioned or instructed specifically to undertake the damage survey to the Reef. OPOR happened to be on an expedition to survey reefs in the outer islands of Yap and were requested by the people of Eauripik to assess the damage to the Reef.

28 The defendant engaged Mr Gregory Challenger ("Mr Challenger") as its expert. Mr Challenger is a senior marine scientist and ecologist and the President of Polaris Applied Sciences Inc ("Polaris"), with 35 years of experience in "natural resource assessment and restoration".[20] Mr Challenger and his team attended at the Reef from 21 to 23 November 2017, some seven months after the Incident. As part of the brief, Polaris was instructed to provide coral reef technical expertise, as well as an assessment of the condition of the Reef, its restoration potential, consequences of the injuries from the Incident and recovery projections.

Professor Crane's evidence

29 According to the OPOR Team's preliminary assessment in 2017, the Incident appeared to be a series of "scrapes" where the Vessel "bounced along" the Reef and struck it repeatedly. Some of the impact areas resulted in gouges

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18 NC1 at para 4.

19 NC1 at para 6.

20 GEC1 at para 1.

Version No 1: 28 Jan 2022 (11:03 hrs)

on the Reef (indicating a more direct impact) while others were a glancing blow, shearing off reef material. The living coral material that was scraped off fell down the Reef wall in debris flows, creating an "avalanche";[21] this was explained by Professor Crane in the following terms:[22]

> Professor Crane: So we are looking at very steep reef from this picture. This is a picture from deep around the reef that shows you the near vertical nature of this reef. Here is a diver here for context. We cannot see how steep this reef is.
>
> So I want to point out with these pictures that damage to this portion of the reef when it is sheered [*sic*] off, it doesn't disappear. So many kilos or pounds of material that is scraped off the surface of this reef is going to fall and it will fall down the face of the reef. And this will cause what we have termed as an avalanche effect, or a landslide effect, and not unlike what will happen out here on land.

30 The OPOR Team mapped out rough polygons and recorded the latitude and longitude of each scar.[23] It measured the total area of the scars as 1,178m^2. However, the plaintiffs contend that these measurements did not include a significant amount of damage that had occurred down the Reef wall. During the survey, the OPOR Team had also noted that below the direct impact scar areas, broken coral and rubble fields were seen to depths of at least 28m.[24] As the OPOR Team did not have adequate diving equipment to safely dive to depths close to or beyond 30m or to stay at those depths for very long, the actual area of damage noted and measured by OPOR was limited to the damage to the reef

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21 Nicole L Crane's fourth AEIC dated 18 February 2021 ("NC4") at p 6; NC1 at pp 17 to 18.

22 Transcript (18 March 2021) at pp 14 (lines 16 to 25) to 15 (lines 1 to 3).

23 NC1 at p 8.

24 NC1 at p 11.

Version No 1: 28 Jan 2022 (11:03 hrs)

top.[25] The other areas of damage on the Reef wall were either photographed or recorded on video by the OPOR Team.

31 Subsequently, in or about October 2020, Professor Crane re-analysed the aerial drone imagery of the Reef using a software known as ImageJ and re-calculated the measurements of the damage to Direct Impact Scars 1 to 5; these revised calculations were, according to Professor Crane, limited to the damage on the *Reef top only*, *ie*, they served as a refinement of the OPOR measurements done in 2017. ImageJ is an open-source image processing/analysis software designed for multidimensional imaging that utilises photogrammetry. Professor Crane used the ImageJ software on Figure 3 below. According to Professor Crane's evidence, this aerial image was taken while the drone was directly above the Reef, and therefore the camera was facing directly downwards on to and capturing the full length of the damage field.[26] Mr Challenger disputes this assertion, and I will explain the relevance of this point below.



Figure 3

25 Nicole L Crane's fifth AEIC dated 14 March 2021 ("NC5") at pp 5 to 6.

26 NC4 at p 14.

Version No 1: 28 Jan 2022 (11:03 hrs)

Using the known length of the boat visible on the left side of Figure 3 above (circled in red) of 6.5m, ImageJ is able to appropriately scale the length of the scars. The total length of the damage field differed slightly from the preliminary OPOR measurements. It was assessed using ImageJ at a shorter distance due to latitude and longitude fixes and some of the scars had updated measurements as there was better spatial visibility of the scars in the aerial imagery. This resulted in a smaller area measured for the scars on the Reef at 1,091m^2[27] as compared to 1,1178m^2 in the OPOR 2017 measurements.

32 Professor Crane then utilised Figure 4 (reproduced at [34] below) to explain the plaintiffs' current case of a total damage area of 5,478.46m^2. This damage area comprises (a) Direct Impact Scars 1 to 10 (with Direct Impact Scars 1 to 5 re-calculated using ImageJ), (b) the damage along the Reef wall beneath Direct Impact Scars 1 to 5 as a result of the "avalanche effect" and (c) secondary damage in between Direct Impact Scars 1 to 4.

33 The area of damage at, below and between Scars 1 to 4 are categorised by the plaintiffs as Impact Zone A while the area of damage at and below Scar 5 is identified as Impact Zone B.[28] The damage that is alleged to have been caused at Impact Zones A and B was calculated by Professor Crane using a *flattened* width of 28m (*ie*, see the line marked as "3" in Figure 4 below). According to Professor Crane, using a flattened width of 28m was conservative. Professor Crane explained that 28m was a depth that could be verified from the diving depth data in some of the dive computers of the OPOR Team and the divers' logs/notes. That was also the average depth to which the divers with

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27 NC4 at pp 17 to 19; Transcript (18 March 2021) at pp 22 to 25 (lines 1 to 2).

28 COR2 at paras 8(3B) and 8(3C).

Version No 1: 28 Jan 2022 (11:03 hrs)

scuba diving gear descended when taking photographs and video recordings of the damage. However, the OPOR Team had visually observed damage at depths *greater* than 28m. Nonetheless, Professor Crane's calculations were limited to a depth (or flattened width) of 28m and hence conservative.[29] Using the ImageJ-based re-calculations, the damage to Impact Zones A and B was assessed at 4,887.80m^2 and 481.66m^2 respectively.[30]

34 As for the damage at Scars 6 to 10 (categorised as Impact Zones C to G), due to insufficient objective data, the original measurements from the OPOR assessment undertaken in June 2017 were maintained; these gave a combined area of 109m^2.[31] The sum of the damage to Impact Zones A to G is 5,478.46m^2.[32]

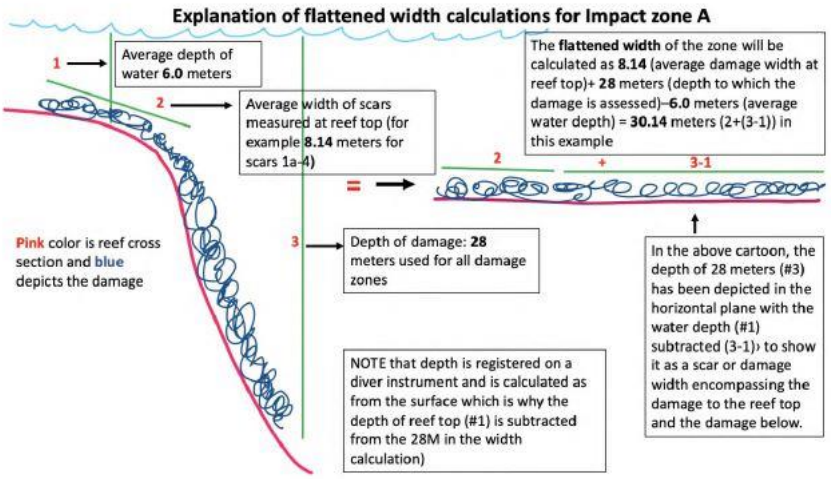


Figure 4

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29 NC4 at p 18; NC5 at p 6; Transcript (18 March 2021) at pp 63 (lines 13 to 22), 64 (line 10) to 66 (line 4).

30 COR2 at paras 8(3B) and 8(3C).

31 PCS1 at paras 88 and 92; Transcript (18 March 2021) at p 27 (lines 21 to 25).

32 COR2 at para 8(3C); NC4 at p 19 (and Figure 16).

Version No 1: 28 Jan 2022 (11:03 hrs)

35 Professor Crane's evidence is that even the revised estimate of 5,478.46m^2 is itself likely to be an underestimate of the actual damage. While the OPOR Team observed additional significant damage down the Reef wall below all the scars even ***beyond*** 28m, this additional damage was not surveyed or documented due to the lack of specialised diving equipment to allow the team to dive safely for any prolonged periods at depths of 30m and greater.[33]

Mr Challenger's evidence

36 Polaris used two methods to compute the damage area measurements: downward-looking scaled photomosaic images, and underwater length and width measurements using what is known as the "fishbone technique".[34] Both methods are used to assist in computing the areas of three-dimensional objects as if they are two-dimensional polygons. Mr Challenger described the photomosaic imaging method as follows:

> [A] measuring tape was carefully placed around the perimeter of the injury and a series of overlapping photographs are taken from 90˚ above the injury. These photographs were stitched together using Agisoft Photoscan™ software, scaled using the measured perimeter and known reference materials (i.e. m^2 quadrats), and digitized for area calculations using ArcMap™ GIS software. The rendered image provides a base for subsequent spatial analysis and display.

The fishbone estimate technique was explained as follows:

> [This] use[s] a measuring tape centerline as a backbone across which numerous cross section measurements are taken creating a diagram that resembles a fish bone. The outer edge of the evidence of scarring from the vessel hull is included in the perimeter. The area of the scar is calculated using the sum of incremental length and width measurements or the average

33 Transcript (18 March 2021) at pp 14 to 18.

34 GEC1 at p 16.

Version No 1: 28 Jan 2022 (11:03 hrs)

> widths of equidistant measurements multiplied by the overall length …

37 Rough sea conditions persisted on the site for the duration of the assessment and the resulting swells did not allow divers to reliably deploy perimeter tapes or collect steady overhead images for photomosaic production for each injury area. As a result, Polaris measured each area using the fishbone method and successfully used the photomosaic technique on two injury sites when conditions permitted for corroboration.[35]

38 The Polaris measurements yielded an area of damage of 742m^2, bound by length and width rectangles with an area of 1,022m^2.[36] Mr Challenger gave evidence that Polaris measured "to the edge of where [they] saw coral that was denuded, including not just completely denuded but damaged".[37] Critically, he said that they "saw no injury beyond the depth [they] dove" and that they had dived beyond the depth where they could discern injury. In other words, the Reef wall below had live corals and no obvious signs of injury.[38] He also stated that "[a]ll visible scars, including those extending partway down the [Reef] wall in some locations have been included in [his] measurements".[39]

The parties' arguments

39 The plaintiffs argue that the discrepancy between Professor Crane's evidence and Mr Challenger's evidence on the area of damage can be explained

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35 GEC1 at p 22.

36 GEC1 at p 22; Gregory Edward Challenger's third AEIC dated 5 March 2021 ("GEC3") at p 6.

37 Transcript (18 March 2021) at p 52 (lines 21 to 25).

38 Transcript (18 March 2021) at p 113 (lines 1 to 5).

39 GEC3 at p 6.

Version No 1: 28 Jan 2022 (11:03 hrs)

because Professor Crane's revised calculations included extensive damage between some of the scars and down the Reef wall whereas Polaris did not measure or document damage between the scars or down the Reef wall, or did not do so as thoroughly as the OPOR Team, or did not fully consider the evidence they had at the time.[40] Mr Challenger did not provide any specific depths to which Polaris had measured the scars.[41] Mr Challenger also conceded that rubble had broken off and gone deeper than Polaris had measured but Polaris did not have data on that because they did not know where to "start … and stop" the measuring tape.[42] Further, since Polaris conducted their survey seven months after the Incident, the boundaries between damaged and undamaged areas would have become less clear over time due to diatomaceous and algae coverage.[43] Mr Challenger and Polaris also failed to measure much of the damage either because they were "not careful enough" or unable or unwilling to differentiate the damaged areas from healthy areas of the Reef.[44] The photographs taken by Polaris conspicuously avoided documenting the state of the Reef wall.[45] Thus, Polaris' evidence is deficient and unreliable on the issue of the damaged area.[46]

40 The defendant argues that Professor Crane does not dispute that Mr Challenger used the appropriate tools and measurement techniques and that she

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40 NC5 at p 5; PCS1 at paras 101 and 122.

41 PCS1 at para 119.

42 PCS1 at para 121.

43 PCS1 at para 103.

44 Plaintiffs' Reply Closing Submissions dated 2 July 2021 ("PCS2") at para 47.

45 PCS2 at para 45.

46 PCS1 at para 122.

Version No 1: 28 Jan 2022 (11:03 hrs)

in fact conceded that their measurements were quite similar.[47] If the plaintiffs' case is that there is damage below the Reef top to a depth of 28m, it is for the plaintiffs to provide evidence and proof of such damage before the court. This was not done save for Professor Crane's oral evidence that she saw significant damage to 28m and below.[48]

41 As regards Professor Crane's evidence and revised calculations, the defendant makes the following arguments. Firstly, Mr Challenger's measurements included portions 1, 2 and 3 of Figure 4 (at [34] above) right down to where he could no longer see any damage.[49] Secondly, the photograph used by Professor Crane as the base for the ImageJ re-calculations (see Figure 3 at [31] above) is an oblique photograph (*ie*, *not* one taken directly over the damaged sections of the Reef but at an angle off it), which means that it captures the scars in totality, *including* the damage *down the Reef wall* as far as light will allow. This would result in double counting of the damage down the Reef wall and Professor Crane's calculations do not factor in or make any allowance for this double counting.[50] Thirdly, the plaintiffs' attempts to re-calculate and re-measure the scars merely days before the first tranche of the trial demonstrates the inaccuracy of their measurements.[51] The plaintiffs have had more than three years to prove that there was damage outside the area of 742m^2 assessed and calculated by the defendant but have not brought any fresh evidence before the

47 DCS1 at paras 109 to 112.

48 DCS1 at paras 117 to 120.

49 DCS1 at para 129.

50 DCS1 at paras 140 to 153.

51 DCS1 at para 154.

Version No 1: 28 Jan 2022 (11:03 hrs)

court.[52] Finally, Mr Challenger's method of diving down and measuring the scars from edge to edge using industry-standard methodologies is more accurate than taking simple length and width measurements of the scar from the surface as was done by the OPOR Team in June 2017.[53]

Analysis and decision

42 It is common ground between the parties that, under FSM law, it is for the parties to prove the area for which damages should be awarded since each case turns on its unique facts.[54] In the first instance decision of the FSM Supreme Court in *People of Rull ex rel Ruepong v M/V Kyowa Violet* 14 FSM Intrm 403 (Yap 2006) ("*Kyowa Violet First Instance*"), Associate Justice Dennis K Yamase (as he then was) succinctly summarised FSM tort law on, *inter alia*, proof of damage in the following terms:[55]

> The general purpose of tort law is to afford a victim compensation for the injuries or damages sustained as the result of another's unreasonable or socially harmful conduct. In other words, tort law's purpose is to make the victim whole. … Compensatory damages are compensation to make the victim whole again. Compensation for an injury is not doubled just because the plaintiff has two different causes of action on which to base that recovery. Only the injury itself is compensated. … *The plaintiffs must prove their damages to a reasonable certainty. … Once the fact of damage is established with reasonable certainty, the amount of damages need only be shown with as much certainty as the tort's nature and the case's circumstances permit.* In such cases, if it is uncertain and speculative whether damages have been incurred, then damages will be denied; however, if it is only the amount of the damages that presents the uncertainty, then the court will allow recovery so long as there is proof of a reasonable basis from

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52 DCS1 at para 162.

53 Defendant's Reply Closing Submissions dated 2 July 2021 ("DCS2") at para 37.

54 PCS1 at para 36; DCS2 at para 61; DBOD at p 211 (para 6).

55 DBOD at p 23.

Version No 1: 28 Jan 2022 (11:03 hrs)

> which the amount can be approximated or inferred … [emphasis added]

43 The principles on proof of damage stated in *Kyowa Violet First Instance* are not dissimilar to those applicable in Singapore, as summarised by our Court of Appeal in *Noor Azlin bte Abdul Rahman and another v Changi General Hospital Pte Ltd* [2021] SGCA 111 (at [59]–[61]):

> 59 It is fundamental and trite that a plaintiff claiming damages must prove his or her damage – the fact of damage and the quantum of loss. If he or she satisfies the court on neither, his or her action will fail, or at the most, he or she will be awarded nominal damages where it is clear that a legal right has been infringed. If the fact of damage is shown, but no evidence is given as to its amount such that it is virtually impossible to assess the quantum of loss, this will generally permit only an award of nominal damages. That said, given the myriad of factual matrices which may give rise to a claim for damages, the law does not *always* demand that the plaintiff prove with complete certainty the exact amount of damage that he or she has suffered, although he or she must do his or her "level best" (see the decision of this court in *Robertson Quay Investment Pte Ltd v Steen Consultants Pte Ltd and another* [2008] 2 SLR(R) 623 ('Robertson Quay') at [27]–[29] and [31]).
>
> 60 The court has to adopt a flexible approach with regard to the proof of damage. Different occasions may call for different evidence with regard to certainty of proof, depending on the precise circumstances of the case and the nature of the damages claimed. There will be cases where absolute certainty is possible, for example, where the plaintiff's claim is for loss of earnings or expenses already incurred (*ie*, expenses incurred between the time of accrual of the cause of action and the time of trial) or for the difference between the contract price and a clearly established market price. On the other hand, there will be instances where such certainty is impossible, for example, where the loss suffered by the plaintiff is non-pecuniary in nature, or is prospective pecuniary loss, such as the loss of prospective earnings or loss of profit (see *Robertson Quay* at [30]).
>
> 61 To summarise, a plaintiff cannot make a claim for damages without placing before the court sufficient evidence of the loss that he or she has suffered, even if he or she is otherwise entitled in principle to recover damages. On the other hand, the court must also adopt a flexible approach and allow

Version No 1: 28 Jan 2022 (11:03 hrs)

> for the fact that, in some cases, absolute certainty and precision is impossible to achieve. Where specific evidence is obtainable, the court naturally expects to have it. Where it is not, the court must do the best it can to assess the plaintiff's loss (see *Robertson Quay* at [30]–[31]; see also James Edelman, *McGregor on Damages* (Sweet & Maxwell, 21st Ed, 2021) ('*McGregor*') at para 3-003 …
>
> [emphasis in original]

44 Further, under FSM law, the court is not bound to accept expert evidence but may decline to accept expert evidence and exercise independent judgment (*M/V Kyowa Violet v People of Rull ex rel, Mafel*, 16 FSM Intrm 49 (App 2008) ("*Kyowa Violet Appellate Court*") at 61).[56] This principle is also not dissimilar to the position under Singapore law (*Poh Soon Kiat v Desert Palace Inc (trading as Caesars Palace)* [2010] 1 SLR 1129 at [22]–[23] and *Sakthivel Punithavathi v PP* [2007] 2 SLR(R) 983 at [76]).

45 After considering the evidence before me and the parties' submissions and bearing the above principles in mind, I am prepared to accept and do find that on the available evidence, the area of damage is **1,056.88m^2**. I shall, in the following paragraphs, elaborate on how I arrived at this figure, since it is not based on the formulations put forward by either party's expert.

46 I am, with respect, unable to accept Professor Crane's evidence that the area of damage is 5,478.46m^2, for the following four reasons (discussed at [46]–[65]). Firstly, the aerial photograph used by Professor Crane for the ImageJ calculations is clearly *not* an overhead shot but an oblique one. Professor Crane opined that she used an aerial image from a drone "*facing directly down on to*, and capturing the full length of, the damage field" [emphasis added] and

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[56] DBOD at p 60.

Version No 1: 28 Jan 2022 (11:03 hrs)

therefore only re-measured the Reef top scars and not the vertical component of the damage.[57] However, there is, in my view, force in Mr Challenger's objection that the ImageJ calculations are inaccurate and thus unreliable. He argues that ImageJ's use with drone images is not accurate or comparable to in-water measurements of the scars themselves. Further, the evidence in the photograph itself shows that it could not have been taken when the drone was directly overhead. In addition to the aerial photo being an "oblique image", it also has "curvature" and was not orthorectified into a flattened "down-looking" 2-D image; these shortcomings in turn adversely affect the accuracy of the scale used to generate the ImageJ measurements.[58]

47 I broadly agree with Mr Challenger's objections. From Figure 3 (see [31] above) and particularly when one zooms in on the boat on the left used to create the scale on ImageJ, it is clear that the aerial image was not taken from directly overhead. Crucially, one is able to see the port side of the boat which should not be the case if the image had indeed been taken directly overhead. Even from the two-dimensional view in Figure 3, it is reasonably apparent for some of the larger scars such as Scars 1, 2 and 3 that the drone image captures not just an overhead shot of the Reef top but also at least some of the damage *down* the steep Reef wall, as far as light and visibility allow. Having also reviewed the drone video footage closely, it is apparent to me that the images captured by the drone were not *just* of the Reef top.

48 There is, on the other hand, no objective corroborative evidence to show that the aerial photo was indeed taken directly overhead the Reef. I have in mind,

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57 NC4 at p 14.

58 GEC3 at p 9; Transcript (18 March 2021) at pp 46 (lines 23 to 25) to 48 (lines 1 to 10), p 102 (lines 12 to 18).

Version No 1: 28 Jan 2022 (11:03 hrs)

for example, Global Positioning System ("GPS") coordinates of the drone corresponding to the screenshot in Figure 3 and cross-referenced with the GPS coordinates of the Reef or where the boat was located.

49 Instead, the plaintiffs rely solely on Professor Crane's oral evidence that the drone was directly overhead as she was in the boat sitting next to the person controlling the drone.[59] Such a recollection, however, is prone to inaccuracy since it is based on Professor Crane's perception with her naked eye as to where the drone was. Professor Crane also sought to establish the accuracy of her ImageJ measurements by comparing them with the initial OPOR Team measurements taken in 2017. Professor Crane argued that the fact that both sets of measurements produced reasonably similar results attested to the accuracy of the ImageJ calculations in depicting the damage to the Reef top.[60] On the other hand, Mr Challenger's position was that the reason for the similarity in both sets of measurements was that the initial OPOR measurements in 2017, by reason of the manner in which the measurements were taken by the snorkelling members of the OPOR team, would *also* have captured the scarring damage on the Reef top *as well as* on the Reef wall. I reproduce below excerpts from the trial transcript where Mr Challenger explained his position on this point:[61]

> Mr Challenger: … There is, you know, it lets you know what depth, you know, unless you put your width measurement to the top of that reef scar with your snorkelers and stop somewhere in the middle of that scar with a certain depth which you consider to be the top of the reef, which I don't believe so, *I mean the way it is described in the original report, he swam overhead of the*

59 Transcript (18 March 2021) at p 74 (lines 17 to 20).

60 Transcript (18 March 2021) at pp 87 (lines 21 to 25) to 88 (lines 1 to 21).

61 Transcript (18 March 2021) at pp 89 (lines 17 to 25), 90 (lines 1 to 5), 91 (lines 17 to 25), 92 (lines 1 to 13), 93 (lines 15 to 25), and 94 (lines 1 to 18).

Version No 1: 28 Jan 2022 (11:03 hrs)

> *white areas and measured the white areas. So that would include, you know, those scars that go down the slope but I wouldn't see those two measurements being that different and they included down to at least -- certainly that aerial image includes down to the edge of the scars in the deeper water as far as you can see whatever the visibility depth is to the white.*
>
> …
>
> The paragraph that OPOR's evidence is -- I understand that is the position but what is happening there, and my position is what is happening there is you can see down in those -- ImageJ is in fact measuring down far when you are using it over those scars and then when you add an additional wall to it, you are double-counting because you are seeing down those areas that are claimed to not be measured are visible in those scars, unless they are underneath the wall. Unless they are under a ledge hiding because even if that is a straight down looking photograph, you would still be able to see down to those depths and *what had happened here is that, you know, your snorkelers are mentioning length and width of the white, and your ImageJ is measuring length and width of the white, that is why they are similar.*
>
> The difference we have is the belief that they are not measuring down far and I am saying that they are measuring down far but I would agree with them that it is at an angle so a two-dimensional -- one-dimensional image doesn't capture -- the two-dimensional doesn't capture the three-dimensional.

…

Professor Crane: … Secondly, our dive team as has already been mentioned also did not take tapes down to those depths [referring to depths of 28 metres] due to the dangers of measuring that deep. So we were all confined to the reef top and the initial curvature down to the deepwater.

Version No 1: 28 Jan 2022 (11:03 hrs)

> The photographers were taken as you have seen by divers who were at those depths.
>
> Mr Challenger: But you say you can see down there when you are snorkeling above. I mean you have said you can see. *And so when they took the tapes they swam on the surface seeing down there how white it was. It is just like ImageJ, when you grab that whole white thing you are getting it all the way down as far as you can see, and then when you add another wall we are -- my belief, you are double -- you are adding some double-counting there.* And I have already made that point and I don't want to belabour this any more.
>
> Professor Crane: You are no doubt correct that the divers could see down there. However, the snorkeling team did not measure anything they couldn't actually measure.
>
> ….
>
> Mr Challenger: So that means nothing then because they couldn't get down -- did they dive down to six metres and put the tape there? Did they only stretch the tape as far as they could dive down and put it on the bottom, so basically the tape stopped in the middle of the scar?
>
> Professor Crane: Yes, the tape stopped at the edge of the reef, yes, because they were diving and they measured everything they could get to, yes.
>
> [Emphasis added]

50 Again, I see the force of the point made by Mr Challenger, which the plaintiffs were not, in my view, able to address satisfactorily. Thus, for the foregoing reasons, it is in my view incorrect for Professor Crane to assert that her ImageJ measurements were *only* of the Reef top damage for Scars 1 to 5 and did not include any part of the damage on the Reef wall. As the ImageJ measurements did appear to have included parts of any scarring damage on the Reef wall, this would mean that Professor Crane's measurement of the area of damage at Impact Zones A and/or B more likely than not contained an element

Version No 1: 28 Jan 2022 (11:03 hrs)

of double counting and thus, would have *overstated* the area of damage. The plaintiffs' submission in reply is that even if there was any double counting, it would only have been to a "tiny" level.[62] With respect, that submission has no basis in evidence and is pure conjecture. Unfortunately, the plaintiffs have not advanced any *alternative* calculations to take into account or neutralise such overlap and double counting.

51 My second reason for rejecting the plaintiffs' figure of 5,478.46m^2 is that the plaintiffs have not shown objective evidence documenting significant damage as a result of the "avalanche effect" throughout the whole of Impact Zones A and B (spanning Scars 1 to 5). While Professor Crane's evidence is that the OPOR Team observed "significant damage" throughout the whole "damage field",[63] these are subjective statements and not objective and quantitatively reliable expert evidence. The plaintiffs have adduced and relied on, *inter alia*, a selection of photographs at certain locations showing evidence of some debris or secondary damage at particular depths, as well as entries in the dive logs or notes of members of the OPOR Team. However, these disparate pieces of evidence do not objectively prove that *entire* sections of the Reef wall (particularly in Impact Zones A and B) suffered significant damage *or* that the coral debris observed was generated by the Incident as opposed to natural forces/events. Overall, I find that there is insufficient objective evidence to prove that there was significant damage of a consistent degree to the Reef wall.

52 I accept that some members of the OPOR Team did dive to a depth of approximately 28m (approximately 92ft), as evidenced by, *inter alia*, some of

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62 PCS2 at para 55.

63 PCS1 at para 54(c); Transcript (18 March 2021) at p 63 (lines 4 to 22).

Version No 1: 28 Jan 2022 (11:03 hrs)

the divers' notes and logs. The data extracted from Professor Crane's own dive computer shows that she was at that depth but even so, only for about two to four minutes.[64] It is also not clear what precise location Professor Crane was at when she was diving at that depth. As Professor Crane acknowledged, given the diving equipment they had and having due regard to diver safety, the OPOR Team could not safely dive to depths beyond 30m and could only be at those depths for a short period of time. Some of the divers' notes also stated that they observed paint debris and metal chips from the Vessel, some of which had come to rest in deeper waters on ledges on the Reef wall.[65] Professor Crane also says that the OPOR Team observed rubble and debris throughout the area and even at depths greater than 28m where there were ledges.[66] However, all of this only advances the plaintiffs' case so far.

53 As I have already noted above at [51], the evidence presented, individually or collectively, does not objectively demonstrate that the secondary damage on the Reef wall or the *severity* of the damage alleged was present *throughout* Impact Zones A and B. These were matters that could have been, in my view, established by the plaintiffs by a further and more comprehensive survey, a point I will return to later (at [61]); the supporting evidence (if it existed as the plaintiffs allege) was thus present and obtainable, and if it had been obtained, the extent of damage would have been ascertainable with reasonable certainty. Secondly, it is also unclear whether the debris found or observed by the OPOR Team was from the Incident or natural debris generated

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64 NC4 at pp 17 to 18; NC5 at p 9; Transcript (18 March 2021) at pp 22 (lines 15 to 25) to 23 (lines 1 to 3).

65 Plaintiffs' Supplementary Bundle of Documents dated 12 March 2021 at pp 5 to 8.

66 PCS1 at para 55; Transcript (18 March 2021) at p 65 (lines 1 to 3)

Version No 1: 28 Jan 2022 (11:03 hrs)

from the action of waves breaking on the Reef top or the aftereffects of a storm or typhoon. Although Professor Crane testifies that there wasn't much natural rubble when the OPOR Team surveyed the Reef in June 2017,[67] the difficulty is that there is no objective evidence from which the court can verify this testimony. If, as Professor Crane accepts, there was *some* natural rubble, quite clearly the Reef was subject to natural forces causing some coral debris/rubble. However, the question remains – how is the court to distinguish how much of the debris/rubble evident in the photographic/videographic evidence presented was natural debris/rubble, and how much was debris/rubble generated as a result of the Incident?

54 I come back to my original point – it is for the plaintiffs to prove with evidence their assertion that there was approximately 5,300m^2 of damage throughout Impact Zones A and B. For the reasons above, it is difficult to conclude that all, or a significant amount of, the debris observed was caused by the alleged "avalanche effect" from the Incident. The disparate selection of photographs and video recordings adduced by the plaintiffs does not shed useful light on this. The presence of coral debris or rubble alone does not necessarily establish that the areas in question on the Reef wall were damaged *as a result of the Incident* due to the alleged "avalanche effect". Ultimately, the plaintiffs bear the burden to prove that the amount of debris observed was caused by the Incident. In my judgment, they have not done so.

55 Mr Challenger accepted that there were corals which were sheared off at the impact scar areas and which would have fallen off the Reef top and descended down into deeper depths. However, he disagreed that there was any

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67 Transcript (5 November 2020) at pp 97 (lines 24 to 25) to 98 (lines 1 to 8).

Version No 1: 28 Jan 2022 (11:03 hrs)

evidence of large scale rubble or coral debris as a result of the Incident (as opposed to naturally-generated rubble or debris) or secondary damage down the Reef wall to the extent claimed by the plaintiffs.[68] Mr Challenger's evidence was that the Polaris team could not find any obvious evidence of rubble from the Incident and that there was loose naturally-occurring rubble on some of the ledges on the Reef wall.[69] During the expert witness conference, Mr Challenger also testified that it would be guesswork to determine how much, if any, secondary damage was caused to the Reef wall at Scars 1 and 2 as a result of any avalanche effect. His evidence on this point is reproduced below:[70]

> Mr Doraisamy: Mr Challenger, we will move away from the field of injury evidence at this point because the experts for the plaintiffs haven't addressed their evidence on the field of injury. Let's come back to the issue of avalanche effect. In your view, in relation to scar 1 and 2, is it in any way possible for this court to quantify loss in relation to the damage that may have been caused secondly by the avalanche effect?
>
> Mr Challenger: *Well, not quantified, no. There would have to be some consideration, x per cent.* ***It would be a guess.***
>
> Mr Doraisamy: It would have to be a rough estimate, right?
>
> Mr Challenger: Essentially, I guess.
>
> [emphasis added in bold and bold italics]

56 Given the significant difficulties that I have highlighted above with the quality and reliability of the evidence that has been adduced and relied upon by the plaintiffs in advancing their case theory on the area of damage at Impact

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68 Gregory Edward Challenger's second AEIC dated 14 September 2020 ("GEC2") at pp 39 and 53.

69 Transcript (18 March 2021) at pp 45 (lines 10 to 25) to 46 (lines 1 to 5).

70 Transcript (5 November 2020) at pp 35 (lines 17 to 25) to 36 (lines 1 to 6).

Version No 1: 28 Jan 2022 (11:03 hrs)

Zones A and B, I agree that, in essence, the court is left to guess how much, if any, secondary damage was caused to the Reef wall at Impact Zones A and B. I reiterate once more that the plaintiffs bear the burden of proving their case. If the court has to resort to guesswork, I cannot see how the plaintiffs could be said to have discharged that burden.

57 Both Professor Crane's scar measurements and Polaris' measurements (based on length multiplied by width) are fairly similar:

Scar	**Professor Crane's measurements (in m^2)** (ImageJ for Scars 1 to 5 and OPOR 2017 measurements for Scars 6 to 10)[71]	**Polaris' measurements (in m^2)**[72]
1	103.78	216
1a	22.54	(included under Scar 1)
2	87.81	102
3	394.63	339
4	256.80	157
5	117.20	108
6-10	109.00	100
Total	**1,091.75**	**1,022**

If the measurements stopped there, the parties' positions would actually be very similar. However, the gulf in the pleaded positions of the parties on the total

[71] NC4 at p 23.

[72] GEC1 at p 23.

Version No 1: 28 Jan 2022 (11:03 hrs)

area of damage emanates from the plaintiffs' ImageJ measurements *and added to that*, the use of a flattened width of 28m to calculate the secondary damage throughout Impact Zones A and B. The plaintiffs assert that Polaris' survey/measurements underestimated the damage and did not include or missed out large sections of damage on the Reef wall below the scars, particularly at Impact Zones A and B.[73] The defendant denies this and maintains that the Polaris survey measured *all* of the observable damage, including the scars at the Reef top and down the Reef wall to depths of 30m.[74]

58 In my judgment, there is no basis to find that Polaris only measured the scars on the top of the Reef but missed a significant amount of damage down the Reef wall or between Direct Impact Scars 1 to 4. Mr Challenger's evidence is that Polaris measured "to the edge of where [they] saw coral that was denuded, including not just completely denuded but damaged".[75] He also testified that they "saw no injury beyond the depth [they] dove" and that they dove below the depth where they could discern injury.[76] The damaged areas were bound inside the tape until there were live corals with no evidence of coral removal on the outside of the tape, including down the Reef slope and wall.[77] Based on Professor Crane's evidence that the damage for Scars 1 to 4 down the Reef wall are obvious, it is reasonable to expect that Polaris would have surveyed and measured these, taking into account Mr Challenger's considerable experience in surveying and assessing reef damage incidents. I accept Mr

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73 PCS1 at para 101.

74 Transcript (5 November 2020) at pp 18 (lines 1 to 25) to 19 (lines 1 to 2), DCS1 at paras 107 to 116; Transcript (18 March 2021) at p 52 (lines 21 to 25)

75 Transcript (18 March 2021) at p 52 (lines 21 to 25).

76 Transcript (18 March 2021) at p 113 (lines 1 to 5).

77 GEC3 at p 9.

Version No 1: 28 Jan 2022 (11:03 hrs)

Challenger's evidence that while the vertical extent of damage on the Reef wall was not as extensive as portrayed by the plaintiffs, it was measured for every scar.

59 Taking Scar 1 for instance, Polaris measured a damaged area of 216m^2 while the OPOR Team's preliminary measurements in 2017 were only 84m^2.[78] Professor Crane observed that Polaris' measurement included Scar 1a which was not included in the OPOR Team's preliminary measurements but was included in Professor Crane's subsequent measurements using ImageJ.[79] In her revised ImageJ calculations (see table at [57] above), Professor Crane calculated Scar 1 as having an area of 103.78m^2 and for Scar 1a, an area of 22.54m^2. If the area of Scar 1a as calculated by Professor Crane is deducted from Polaris' calculations of 216m^2 for the whole of Scar 1 and 1a, then Polaris' measurement for Scar 1 would be 193.46m^2. This may be contrasted with Professor Crane's revised ImageJ calculations for Scar 1 of 103.78m^2; thus, the difference between Polaris' calculation of the area of damage for Scar 1 and Professor Crane's ImageJ calculation is approximately 90m^2. This is a not an insignificant difference and illustrates, in my view, that the Polaris calculations were *not* just of Scar 1 on the Reef top but also included observable damage down the Reef wall below Scar 1. This also provides support to the view that there is some measure of accuracy to Polaris' figures. Further, the photographs adduced by Professor Crane also show that for some of the scars (including, for example, Scar 1), the complete denuding of coral cover was not just on the Reef top but also extended down the Reef wall.[80] As I said, some of this damage down the

78 GEC1 at p 23.

79 Transcript (18 March 2021) at p 157 (lines 3 to 9).

80 NC4 at pp 8 to 9.

Version No 1: 28 Jan 2022 (11:03 hrs)

Reef wall can be seen quite obviously. It is, in my view, not plausible that the Polaris team could have missed any obvious and significant damage down the Reef wall, including at Scar 1, *and* to such a significant extent.

60 The plaintiffs also argue that given the time difference between the OPOR Team attending at the Reef in June 2017 and Polaris' survey in November 2017, the boundaries between damaged and undamaged areas would have become less clear over time due to diatomaceous and algae coverage and Polaris could therefore have missed some of the damage areas or not factored them into its measurements.[81] I reject this argument. A number of photographs taken by Polaris show that the delineation was still very apparent and unlikely to be missed by an experienced survey team.

61 Thirdly, this is a case which, in my view, cried out for a follow-up detailed survey by the plaintiffs with the appropriate equipment so that they could establish, with reasonable accuracy and objectivity, the area of damage to the Reef. While I note the plaintiffs' submission that it is difficult and expensive to organise an expedition to the location,[82] costs alone cannot justify a lowering of the legal and evidential burden of proof. In any case, there was no evidence before me that the costs of arranging a further survey (or even a joint survey with the defendant's expert) would have been prohibitive. If the evidence exists and is obtainable, the court would expect the evidence to be produced – especially where it pertains to evidence of *actual physical damage* to property. I also bear in mind that the plaintiffs have put forward a sizeable claim in excess

81 PCS1 at para 103.

82 PCS2 at para 9.

Version No 1: 28 Jan 2022 (11:03 hrs)

of US$6.5m;[83] indeed, if the plaintiffs had continued to advance a case based on a hybrid valuation, then as posited by the plaintiffs' expert Dr Robert H Richmond ("Dr Richmond") (see [82] below), the claim could have been for as much as US$30m. Somewhat fortuitously, the OPOR Team happened to be on an expedition in the FSM when they were called upon to assist the plaintiffs. The OPOR Team did the best they could with the equipment they had and in the time they had to undertake the survey. However, once the plaintiffs had an idea of the likely substantial quantum of their claim, incurring the cost of undertaking a detailed further survey would have been entirely justifiable and expected of the plaintiffs. There was also no suggestion by the Chiefs that the plaintiffs were unable to afford to undertake such a further survey. I am not aware if, for example, the parties even discussed the possibility of undertaking a joint survey by both sides' experts, perhaps with the costs being initially shared. Even the OPOR Team's report mentioned the possibility of using specialised equipment (for example, a Remotely Operated Vessel) on a follow-up trip to properly document the damage on the Reef wall at depths of 28m and below. Mr Challenger's evidence quite succinctly encapsulated my own view of the matter with regard to how a further (or joint) survey would have significantly reduced the scope of disagreement between the parties' experts on the extent of damage caused by the Incident:[84]

> Mr Challenger: … And I know Dr Crane thinks this is incredibly severe but compared to other cases it is really not. I am not belittling it. Those corals on the top, I am not saying not a lot of coral was not wiped out. I never said that. All that coral cover was wiped out but it is not a lot of rubble. It is a small -- it is kind of a thin layer of rubble and that, a lot of that will cascade down. There can be some big chunks sure but a lot of that will cascade down, just like other rubble in storms, so where is --

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83 COR2 at para 10(4).

84 Transcript (19 March 2021) at p 106 (lines 5 to 25).

Version No 1: 28 Jan 2022 (11:03 hrs)

> again the difference between these intermediate areas and this area here, what is the difference in coral cover? Where is the data? Where is the evidence?
>
> I couldn't develop it because I couldn't see any evidence of injury when I was out there. Again, sometimes, you know, *it is always better to do -- survey these things together. If we were out there at the beginning together, if we were out there seven months later together, we would be much more on the same page*, I am positive of it, but there is some benefit in surveying later and seeing what happened.
>
> [emphasis added]

62 Unfortunately, as no follow-up or joint survey was undertaken, this court is left with the task of assessing the accuracy and probative value of Professor Crane's evidence based on sketchy and disparate *objective* evidence.

63 Finally, there is also, in my judgment, an inherent difficulty in the plaintiffs' case that within Impact Zones A and B in particular, the extent of damage for every square metre of the area of damage is *equally* severe, such that the same multiplier per square metre of US$1,200 ought to be applied for the entire area of damage comprised within those zones. The plaintiffs have not adduced evidence demonstrating this level of uniformity in the severity of damage. Mr Challenger takes issue with adopting such a damage value calculation, as it is based on the assumption that all of that area is completely denuded or destroyed even though this may not in fact be the case.[85] Professor Crane clarifies that she is not claiming that the entire area in Impact Zones A to G was destroyed or denuded of coral, but that these are areas where there was significant damage due to a combination of the rubble and debris observed as well as edge effects.[86] However, at the same time, Professor Crane also accepts

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85 Transcript (18 March 2021) at pp 50 (lines 15 to 25) to 51 (lines 1 to 4).

86 NC5 at p 5.

Version No 1: 28 Jan 2022 (11:03 hrs)

that there is "gradation" of damage, *ie*, that the damage is varied.[87] This however raises a concern that applying a uniform value per square metre over the *entire* area of damage would lead to *overcompensation*. While I accept that the Direct Impact Scars and the damage that occurred on the Reef wall (for example, as observed and recorded by Polaris) may manifest damage to a substantially similar extent, this – or a similar level or severity of damage – may not be the case for *all* parts of the vertical Reef wall insofar as there may have been any secondary damage from falling debris as contended by the plaintiffs. I am unpersuaded that the requisite evidence has been provided by the plaintiffs to demonstrate such uniform and significant damage throughout Impact Zones A and B, which amounts to more than 5,300m^2.

64 In *Kyowa Violet First Instance*, the court applied *different* values per square metre to areas of mangroves on the reef that were damaged to varying degrees as a result of oil contamination. The grounding of the *Kyowa Violet* had caused both physical damage to the reef and oil pollution damage to mangroves as a result of oil that had escaped from the vessel following its grounding. The severity of the contamination was varied and Yamase J applied different values per square metre depending on whether sections of the mangroves were severely oiled, moderately oiled or slightly oiled. A similar approach could, in my view, have been adopted in this case on the extent of the damage to the Reef, *provided* the requisite evidence of the "gradation" of damage was before the court. However, no such evidence was presented by the plaintiffs.

65 For the reasons above, I cannot accept that Professor Crane's evidence and revised measurements accurately and reliably measure the area of damage,

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87 Transcript (19 March 2021) at pp 96 (line 25) to 97 (lines 1 to 4).

Version No 1: 28 Jan 2022 (11:03 hrs)

particularly at Impact Zones A and B which makes up the lion's share of the plaintiffs' claim. The plaintiffs also put forward alternative calculations for the damage to Impact Zone A in the event that I am not persuaded by Professor Crane's primary calculations.[88] However, for the reasons I have given above, those alternative calculations are also, in my view, fraught with the same difficulties and inaccuracies, and I reject them accordingly.

66 Turning now to Mr Challenger's evidence, I also do not fully accept Mr Challenger's evidence that the damage area is limited to only 742m^2. There are three main difficulties with his evidence. Firstly, Mr Challenger failed to correlate, in his first affidavit of evidence-in-chief ("AEIC"), which photographs and videos he used as the raw data to generate the photomosaic images and calculations utilised in his report. He was also unable to do so during the expert witness conference (see [67] below). Just from Mr Challenger's first report, it is clear that there is no raw data referenced in it that would allow the plaintiffs (or the court) to cross-check the accuracy of the measurements or data that was fed into the software to generate the photomosaics or the measurement calculations, or even to cross-check which photographs were used to generate each photogrammetry or fishbone image. Thus, the court had to effectively *assume* that the calculations were accurate.

67 As an aside, I would remind parties that experts owe an overriding obligation to the court and to assist the court on matters within their expertise. During the hearing, a significant amount of time was spent by the plaintiffs questioning and challenging Mr Challenger regarding the photomosaics and the photographs that were taken during the Polaris survey. I note that counsel for

[88] PCS1 at paras 77 to 79.

Version No 1: 28 Jan 2022 (11:03 hrs)

the plaintiffs and counsel for the defendant confirmed that the raw data behind the evidence adduced by Mr Challenger and Polaris was disclosed by the defendant.[89] In my view, questions or issues pertaining to what raw data was utilised by an expert to generate particular calculations or measurements should have been raised and discussed *between the experts* and *prior to* the hearing, for example during the experts' pre-hearing caucus. This would have helped narrow the scope of issues in dispute between the experts and saved court time; instead, a number of questions posed to Mr Challenger during cross-examination for the first time were targeted at asking him to correlate various composite photomosaic polygons that were reproduced in his first report with the raw data that was used to generate each of those photomosaic polygons,[90] which comprised hundreds of underwater digital photographs. Issues of this nature – relating to raw data used as input in software utilised to generate output – are particularly well-suited to being discussed and, where possible, thrashed out at a meeting of the experts. If the experts agree on the provenance or reliability of the raw data, that will help narrow the scope of disagreement. Even if disagreement remains, the experts will be forewarned that they will need to be ready, during the expert witness conference at the hearing, to address questions posed on the raw data utilised in their calculations. At the same time, it was also not completely satisfactory that Mr Challenger was unable to properly answer the questions posed to him in cross-examination on correlating the photographs used to produce the photomosaics and associated calculations. It was also apparent that not all of the work that went into creating the photomosaics was

89 Transcript (19 March 2021) at pp 1 (lines 10 to 25), 2 (lines 1 to 25) and 4 (lines 7 to 23).

90 Transcript (18 March 2021) at pp 139 (lines 2 to 25) to 140 (lines 1 to 2).

Version No 1: 28 Jan 2022 (11:03 hrs)

undertaken by Mr Challenger personally, but by his colleague in Polaris who was assisting him in preparing his expert report.

68 Reverting to Mr Challenger's evidence, the second difficulty is that, as noted above (at [37]), there were also less ideal sea conditions during the Polaris survey as compared to the OPOR Team survey. While Mr Challenger says that the sea conditions did not make the measurements inaccurate but only more time-consuming,[91] I cannot rule out the possibility that this may have contributed to some inaccuracy. As explained by Professor Crane, it would be difficult to use an underwater transect tape at all in rough sea conditions and the fishbone method relies entirely on the proper and accurate use of such transect tapes.[92] Thirdly, Scars 1 to 5 have fairly obvious damage that spreads vertically down the Reef wall. Mr Challenger's report contains a notation referring to injury spreading "down vertically", but the notation appears only for *Scars 1 and 2* with no similar notation for any of the other scars.[93] No explanation was proffered by the defendant as to why this was so. Further, while Mr Challenger asserts that for each scar, Polaris' divers went down to a depth of about 30m because they had a nitrox mixture in their scuba diving tanks which allowed them to dive at that depth for a longer period of time,[94] there were no dive logs provided for the court to verify this or the time the Polaris team members spent at that depth checking for damage at the location of each of the ten scars.

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91 Transcript (5 November 2020) at p 56 (lines 20 to 21).

92 Transcript (5 November 2020) at p 56 (lines 11 to 19).

93 GEC1 at p 23 (Table 1).

94 Transcript (5 November 2020) at p 11 (lines 1 to 12).

Version No 1: 28 Jan 2022 (11:03 hrs)

69 I have also noted that there is a significant difference between Professor Crane's ImageJ measurements for Scar 4 (256.80m^2) and Polaris' Length times Width ("L x W") measurements (157m^2) (see table at [57] above). I cannot rule out the possibility that this difference could be due to the Polaris measurement undermeasuring the damage area at Scar 4.

70 All of these concerns raise in my mind the possibility that Polaris' measurements of the damage area may be understated, at least for Scars 3 to 5. However, I find the plaintiffs' broad-brushed, overarching argument that Polaris only re-measured the OPOR Team's measurements and did not conduct an independent assessment of damage to the Reef to be speculative and without basis.[95] This conclusion is simply not borne out of the evidence.

71 I also find that there is no merit to the plaintiffs' argument that Mr Challenger, as an expert witness, inappropriately gave factual evidence.[96] Mr Challenger's evidence was factual to the same extent as Professor Crane's. Mr Challenger was tasked by the defendant's P&I Club to survey and assess the damage to the Reef. Mr Challenger attended on site and made observations regarding the damage to the Reef in his expert report and evidence as did Professor Crane. There is nothing inappropriate about this. It is not unusual for experts who have attended on site and conducted an inspection or survey to record their observations and thereafter, give their expert opinion on the basis of what they observed. This is clearly distinguishable from the situation in *The "Dream Star"* [2018] 4 SLR 473 (at [34]) where the court did not permit an expert witness in a ship collision, who had also interviewed the crew of one of

95 PCS1 at paras 106 to 107.

96 PCS1 at paras 29 to 34.

Version No 1: 28 Jan 2022 (11:03 hrs)

the ships involved, to opine on or introduce "factual evidence which was not found in the written or oral evidence" of the crew whom the expert had interviewed. In this case, Mr Challenger did not stray out of the realm of the evidence adduced in the expert reports before the court.

72 On the whole, I find it difficult to accept the plaintiffs' contention that the Polaris survey resulted in an undercalculation of the area of damage by some 4,700m^2 (*ie*, 5,478.46m^2 less 742m^2). It is not disputed that the *methods* used by Polaris to measure and calculate the damage are industry-accepted methods; there was no suggestion by Professor Crane to the contrary. I do not think it is plausible that, given Polaris' experience in assessing reef damage, they would have failed to observe or include such a significant amount of damage on the Reef walls in their measurements. This is especially since Polaris was specifically tasked to provide "an assessment of the [Reef] condition, restoration potential, and consequences of the injuries …".[97]

73 All this having been said, for the reasons that have been set out at [66]–[70] above, I am of the view that the state of the totality of the evidence is such that I also cannot rule out the possibility that Polaris' measurements are understated. At the same time, Professor Crane's revised measurements are clearly overstated.

74 Given the concerns and difficulties as regards the accuracy of both experts' measurements as detailed above, where then does this leave the issue of how the court is to best assess the area of the damage?

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97 GEC1 at p 13.

Version No 1: 28 Jan 2022 (11:03 hrs)

75 As the plaintiffs have not proven that there is a significant amount of damage on the Reef wall due to the "avalanche effect" that was not recorded or considered by Polaris, in my view, the best available evidence that the court can rely on is evidence where the views of *both experts* are broadly consistent – this would be the measurements tabulated at [57] above.

76 I have split up the calculations between Scars 1 to 5 (*ie*, Impact Zones A and B) and Scars 6 to 10 (*ie*, Impact Zones C to G). For Scars 1 to 5, Professor Crane's ImageJ measurements add up to 982.76m^2 – while they are professed to be measurements of only the damage on the Reef top, I have already explained why I am of the view that they probably also include at least some (if not all) of the damage on the Reef wall. Polaris' L x W measurements for Scars 1 to 5 add up to 922m^2. The difference in both measurements is less than 10%, at approximately 6%, and the average area is 952.38m^2. As for Scars 6 to 10 (which were not recalculated by Professor Crane using ImageJ), the original OPOR 2017 measurements give an area of 109m^2 while the Polaris L x W measurements add up to 100m^2. The difference between the two measurements is again less than 10%, at approximately 8%, and the average area is 104.50m^2.

77 The sum of both the average measurements (*ie*, 952.38m^2 + 104.50m^2) gives a total area of damage for Scars 1 to 10 and all impact zones of 1,056.88m^2. In my judgment, the calculations above come closest to capturing, as far as possible in the circumstances, the *totality* of the damage to the Reef claimed by the plaintiffs and represents the best the court can do given the state of the evidence in this case. I am sufficiently persuaded that this area of damage would also, on the available evidence, more likely than not manifest a similar extent of damage. I therefore find on the evidence that the area of damage to the Reef is **1,056.88m^2**.

Version No 1: 28 Jan 2022 (11:03 hrs)

Issue 2: The Valuation Issue

78 Having decided the area of damage caused to the Reef by the Incident, I turn now to consider the value to be placed on the damage per square metre in monetary terms.

The applicable law

79 As this issue engages more extensively with FSM law, it would help that I first set out the common ground between the parties' FSM law experts as far as FSM law on damage valuation is concerned:[98]

(a) The court has a discretion in determining monetary damages for damage to a reef. There are various methods that have been recognised for assessing damages in reef damage incidents, including:

(i) damages on the basis of the cost to replace, restore and repair the reef; and

(ii) damages representing the value of the reef to the people of Eauripik, based on a value per square metre of the reef.

(b) While the FSM courts have awarded US$600 per square metre in cases involving reef damage at the main island of Yap, no FSM court has determined the value of a reef in Eauripik. The parties are free to prove the value of a square metre of reef in Eauripik, and may submit evidence of a value higher or lower than the value of US$600 per square metre.

98 DBOD at pp 211 to 212.

Version No 1: 28 Jan 2022 (11:03 hrs)

(c) Under FSM case law, attorneys' fees are usually not awarded to the prevailing party in cases involving reef damage, although it is open to a prevailing party to ask for such fees.

(d) Under FSM law, pre-judgment simple interest at 9% per annum is usually awarded retroactively from the date of the incident in cases involving reef damage.

(e) Summary judgment cases and previous cases involving settlements between parties have limited value when assessing damage to coral reefs.[99]

(f) How compensation for other grounding incidents at Eauripik has been utilised has no bearing on the quantum of damages to be awarded in the present case.[100]

The parties' arguments

80 As I noted above (at [23]), the plaintiffs had advanced a number of alternative methods of valuation in earlier iterations of their Claim on Reference. For instance, in their Claim on Reference (Amendment No 1) dated 20 October 2020, the plaintiffs advanced a claim based on a hybrid valuation approach, which adopted the mid-point of the cost of replacement and restoration of the coral destroyed and the value of the total damage field area.[101]

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99 Transcript (3 November 2020) at pp 29 (lines 14 to 25), 30, 31, 32 (lines 1 to 17) (on previous cases involving settlements); 38 (lines 21 to 25), 39, 40 and 41 (lines 1 to 25) (on summary judgment cases).

100 Transcript (3 November 2020) at pp 46 (lines 10 to 25), 47, and 48 (lines 1 to 25).

101 Claim on Reference (Amendment No 1) dated 20 October 2020 at para 10.4(5).

Version No 1: 28 Jan 2022 (11:03 hrs)

81 However, following the plaintiffs' amendments to their pleadings after the first tranche of the hearing, the plaintiffs' Claim on Reference (Amendment No 2) pleads a claim based on a valuation of US$1,200 per square metre and an area of damage of 5,478.46m^2,[102] and this is the sole basis upon which the plaintiffs' claim is currently based (see [18] above). By comparison, as discussed above (at [24]), the defendant submits on the basis of FSM case law that the value of a reef should be capped at US$600 per square metre, and that in this case, the valuation should not exceed US$251.85 per square metre. In the alternative, the defendant argues that compensation should not in any event exceed the cost of restoration, *ie*, US$500,000.

82 As regards the Valuation Issue, the plaintiffs engaged Dr Richmond, a research professor and director of Kewalo Marine Laboratory, University of Hawaii at Manoa, as an expert to opine on the valuation of damages resulting from the Incident.[103] His research interests are primarily in the area of marine conservation biology, with a focus on coral reefs.[104] Dr Richmond was provided the OPOR preliminary report and the Polaris Report and was asked to provide his views on the methods adopted by OPOR and Polaris in their respective reports and how the value of damages should be assessed in this case.[105] For the defendant, Mr Challenger was also their expert on valuation.[106]

83 In their closing submissions, the plaintiffs contend that they are no longer "claiming compensation in this case based on the commodity value or

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102 COR2 at para 10.

103 Dr Robert H Richmond's first AEIC dated 29 June 2020 ("RHR1") at paras 1 to 2.

104 RHR1 at p 5 (para 6).

105 RHR1 at p 6 (paras 10 to 13).

106 GEC1 at p 2 (para 4(b)).

Version No 1: 28 Jan 2022 (11:03 hrs)

the cost of restoration of the Damaged Reef" but maintain that it is nevertheless useful to consider these alternative methods for "context".[107] Nor do the plaintiffs advance any arguments on the basis of a hybrid valuation approach.

84 Yet, I note that in Dr Richmond's third AEIC filed after the plaintiffs had filed Claim on Reference (Amendment No 2), he still posits a hybrid approach as being "the more appropriate value of the damage caused by the Vessel". Dr Richmond's hybrid valuation ranges between US$28,464,641.43 and US$30,826,353.43.

85 As the plaintiffs themselves are no longer advancing a pleaded claim based on commodity value, cost of restoration or a hybrid valuation, I am unsure what "context" the plaintiffs wish that the court has in presenting those alternative approaches. While Dr Richmond's preferred view is a hybrid valuation, that valuation method is not what *the plaintiffs* are advocating or currently basing their claim on.

86 In the circumstances, I do not consider any of these alternative calculations to be of assistance or relevant *save* where they might be relevant in shedding light on what the appropriate value per square metre should be in this case, applying FSM law.

Analysis and decision

87 I therefore turn to the pith and marrow of Issue 2 – what is the appropriate value per square metre of the damaged Reef in this case? For the

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107 PCS1 at para 143.

Version No 1: 28 Jan 2022 (11:03 hrs)

following reasons, I find that a fair and reasonable value to be ascribed to the damage to the Reef in this case is **US$785 per square metre**.

88 The parties are in agreement that under FSM law, the assessing court has a discretion in awarding monetary damages for damage to a reef. It is also not disputed that the FSM courts have not prescribed a particular method or set of considerations to be taken into account when quantifying damages in cases of damage caused to coral reef and are open to persuasion as to the proper way to measure damages by taking into account all relevant factors in each case.

"More reef and fewer people"

89 In this regard, both parties also accept that precedent cases from the FSM courts, whilst not binding, can provide some guidance on the factors considered by the FSM courts in similar cases of this nature.

90 The defendant contends that one such factor, or "principle", that the court may have regard to is that of "more reef and fewer people". I use the word "principle" within quotation marks because the plaintiffs dispute that there is any such binding principle under FSM law. Going forward, whilst I use the word "principle" as a convenient reference in my analysis below, it is not meant to convey that the existence of such a principle is accepted by the plaintiffs.

91 It would be useful to first explain the genesis of this principle. The phrase "more reef and fewer people" appears to have first been used in the FSM Supreme Court decision in *People of Eauripik ex rel Sarongelfeg v F/V Teraka No 168*, 18 FSM Intrm 532 (Yap 2013) ("*The Teraka No 168*") decided by FSM Chief Justice Martin G Yinug in 2013. *The Teraka No 168* involved a case of reef damage caused by the fishing vessel *Teraka No 168* running aground on a

Version No 1: 28 Jan 2022 (11:03 hrs)

reef in Eauripik. Proceedings were brought against, *inter alia*, the vessel owners by the people of Eauripik through the relevant Chiefs at the time, which included the second and third plaintiffs in ADM 91. In considering the claimants' application for summary judgment, Yinug CJ stated as follows:[108]

> Eauripik also contends that a material fact that exists without substantial controversy is that the damaged reef is valued at $600 a square meter. *While it may be uncontested that the value of the reef on the main island of Yap is $600 per square meter … the court cannot presume, without evidence, that $600 a square meter is an accurate value* ***for any particular Yap outer island reef, especially where on the outer island there may be more reef and fewer people who have the right to rely on or depend on the reef's resources***. The parties are free to prove that Eauripik's reef or that the damaged part of it, is worth more or less than $600 per square meter. [emphasis added in italics and bold italics]

92 The passage above was cited by the FSM Supreme Court in 2018 in *People of Sorol ex rel Marpa v M/Y Truk Master*, 22 FSM R 14 (Yap 2018) ("*The Truk Master*"). That case involved damage caused by the motor yacht *Truk Master* to a reef located in Truk in the municipality of Sorol. In the context of an application for summary judgment, Associate Justice Larry Wentworth stated as follows:[109]

> Furthermore, when it comes to Yapese outer island reefs, the court has previously noted that:
>
> > While it may be uncontested that the value of the reef on the main island of Yap is $600 per square meter, the court cannot presume, without evidence, that $600 a square meter is an accurate value for any particular Yap outer island reef, especially where on the outer island there may be more reef and fewer people who have the right to rely on or depend on the reef's resources.

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108 DBOD at pp 129 to 130.

109 DBOD at p 173.

Version No 1: 28 Jan 2022 (11:03 hrs)

> People of Eauripik ex rel. Sarongelfeg v. F/V Teraka No. 168, 18 FSM R. 532, 541 (Yap, 2013) (citations omitted). The court also notes that an appropriate measure of damages for a damaged coral reef may be "the cost of restoration … without grossly disproportionate expense." … Or it may be that, in this case, the cost of restoration would not be an appropriate measure because it would entail a grossly disproportionate expense. Damages could also be measured by the economic value of the marine resources lost or diminished by the reef damage …
>
> The court is thus open to persuasion on the proper way to measure damages in this case.

93 I agree with the plaintiffs' submissions that the "more reef and fewer people" principle is *obiter dictum* originating from *The Teraka No 168* and is not a binding statement of principle.[110] To be fair, the defendant does not pitch its case on the basis that the principle is binding. The defendant contends that the cases referred to above provide a clear enough reference that the principle does exist and is a relevant one to consider in assessing the value of the damage to the Reef. I agree with the defendant. The "more reef and fewer people" principle is, in my view, a relevant consideration. Let me explain.

94 At a conceptual level, it is logical for a court to take into account the fact that if there are less people on an island atoll such as Eauripik, it would almost inexorably follow that, all other things being equal, there would be more of the reef's resources to go around, bearing in mind that the right of the plaintiffs in question is tied, not so much to the ownership of the physical reef *per se*, but to the exclusive right to exploit or use the *resources* of the reef based on the Yapese traditional concept of a "tabinaw".

95 A tabinaw is, *inter alia*, a traditional Yapese concept of community and family which recognises that the people of Yap, or rather the people of a

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110 Reply (Amendment No 3) at para 5C.

Version No 1: 28 Jan 2022 (11:03 hrs)

particular municipality or village in Yap, possess the right, as members of a tabinaw, to use or exploit (and in that sense, "own") the natural resources of a reef to the exclusion of others, as was well-explained by Yamase J in *Kyowa Violet First Instance*. This right is recognised by and enshrined in the Constitution of the State of Yap 2006 (FSM).

96 An analogy (albeit inexact) can be drawn between the "more reef and fewer people" principle and the concepts of supply and demand in economics – if there is more supply (*eg*, the reef's marine resources like fish and scallops) than demand (*ie*, from human inhabitants on the atoll), *generally* the price (or value) of the resources would be *lower* than in the converse situation.

97 *Kyowa Violet First Instance* and *Kyowa Violet Appellate Court* (collectively, "*The Kyowa Violet*"), which I have referred to earlier in this judgment, are possibly the leading cases in the FSM on reef damage. The incident involved a vessel running aground and damaging a reef in Tomil in Colonia on the main island of Yap, causing both damage to the reef and oil pollution damage. In *Kyowa Violet Appellate Court*, the FSM Supreme Court Appellate Division, in summarising one of the appellant shipowner's arguments on why the trial judge was wrong to award damages based on a valuation of US$600 per square metre, noted that among a number of factors considered by Dr Richmond (who was also the expert in that case for the claimants) was the fact that "the reef area *was closely inhabited*" [emphasis added]. Chief Justice Andon L Amaraich, delivering the judgment of the appellate court, noted as follows:[111]

> Kyowa Violet raises an additional issue on appeal concerning the sufficiency of the evidence to support the amount of

[111] DBOD at pp 75 to 76.

Version No 1: 28 Jan 2022 (11:03 hrs)

> damages that the trial court awarded to the People of Rull and Gilman. According to Kyowa Violet, although they do not contest the trial court's finding that 1,463 square meters of reef was damaged in the incident involving the *Kyowa Violet*, they believe that the trial court's calculation of damages at $600 per square meter was clearly erroneous and not supported by the record.
>
> In support of this argument, Kyowa Violet maintains that the only evidence presented to the trial court concerning a valuation of these damages was the *testimony of Dr. Richmond*, who was an expert witness testifying on behalf of the People of Rull and Gilman. Kyowa Violet notes that Dr. Richmond testified that he had previously assessed the damage to the reef in another case in Yap involving West Fayu at $304 per square meter, *and because of the factors present in the case at hand,* ***including the fact that the reef area was closely inhabited***, ***he doubled the value to $608 per square meter***, which the trial court apparently rounded to an even $600 per square meter, as Kyowa Violet so contends.
>
> [emphasis added in italics and bold italics]

98 The plaintiffs also allude to the passage above in their closing submissions.[112] There was no suggestion by Dr Richmond or the plaintiffs that that factor (*ie*, of the reef area being closely inhabited) had not been considered by Dr Richmond in *Kyowa Violet First Instance* or that the case report had incorrectly summarised his considerations or assumptions in that case. The point I am making is that *Kyowa Violet Appellate Court* does indicate that Dr Richmond himself appears to have had regard to the fact, *and number*, of inhabitants in or near the reef concerned as *one* of the factors relevant to assessing the monetary value per square metre to be ascribed to the damaged sections of the reef. That factor was one of the bases for his *doubling* of the value of the Tomil reef in *Kyowa Violet First Instance* to US$608 per square metre (eventually rounded down by the court to US$600 per square metre) compared to the value of US$304 per square metre estimated by Dr Richmond

112 PCS2 at para 70 (and footnote 53).

Version No 1: 28 Jan 2022 (11:03 hrs)

for the *uninhabited* West Fayu reef damaged in the earlier case of *People of Satawal ex rel Ramoloilug v Mina Maru No 3*, 10 FSM Intrm 337 (Yap 2001) ("*People of Satawal*").[113] As I indicated at [92], the notion of "more reef and fewer people" first mentioned in *The Teraka No 168* was also alluded to in *The Truk Master*.

99 In my judgment, it would not be an unreasonable inference to draw that the demand for resources from the Reef on the basis of say 60 inhabitants on Eauripik would be different to the demand if there were 200 inhabitants. Further, the demand on a reef's resources from the larger number of inhabitants or residents on the *main island* of Yap is also likely to be different to that from the smaller number of inhabitants on an *outer island* atoll like Eauripik. In my judgment, that is in substance the meaning intended to be conveyed by the phrase coined by the FSM courts of "more reef and fewer people". That principle may, as noted by the FSM court in cases such as *The Teraka No 168* and *The Truk Master* (and implicitly from *Kyowa Violet Appellate Court*), be a relevant consideration thrown into the mix or basket of factors to which the court may have regard, when exercising its discretion to determine the monetary value to be ascribed to the reef in question. The appropriate *weight* that factor should be accorded in the court's assessment is a separate matter and would depend on the factual matrix of each case and the evidence before it.

100 In this regard, I prefer the evidence of Mr Seth Forman, the defendant's FSM law expert, to that of Mr Steven Pixley, the plaintiffs' FSM law expert. Mr Pixley's evidence was that the last sentence in the passage I quoted above at [91] meant that the court was free to fix the value at higher or lower than

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113 DBOD at pp 7 and 76.

Version No 1: 28 Jan 2022 (11:03 hrs)

US$600 per square metre and it was for the plaintiff to prove their case for damages. Mr Forman's evidence was more nuanced. He opined that it was clear enough from the language used in *The Teraka No 168* and *The Truk Master* that if there were fewer people on an outer island, *prima facie* a court would consider the value per square metre of damaged reef to be less than US$600, but that having been said, the parties were free to prove their respective positions. Mr Forman also acknowledged that there was no fixed formula adopted by the FSM courts to calculate the value of a reef on a per person basis. His point remained that the court has a discretion to consider the principle and calibrate the value of the reef accordingly.[114]

Loss of "cultural value"

101 I turn next to discuss what is termed as "cultural value". In short, this is the value of the reef as an outlet for cultural activities. Dr Richmond referred to two examples. The first was group fishing among men and its enhancement of cooperation between them as well as building of community cohesion. The second was the communal gleaning of reef resources by women, which activity also afforded an opportunity for the children to be taught and for them to socialise.

102 The parties' reef damage experts disagree on whether the cultural value of the Reef to the plaintiffs is a relevant factor to be considered in assessing the value of the damage to the Reef.[115]

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114 Transcript (3 November 2020) at pp 42 to 45 (lines 1 to 7).

115 DBOD at p 208 (para 15).

Version No 1: 28 Jan 2022 (11:03 hrs)

103 Notwithstanding this disagreement, it is ultimately unnecessary for me to decide this point as the *evidence* from the plaintiffs does not indicate that there had been *any* loss of cultural value as a result of the damage to the Reef caused by the Vessel. For example, there is no evidence that the damage to the Reef had resulted in the plaintiffs being deprived of a "local educational classroom".[116] In contrast, during cross-examination, Mr Haglelgam stated that as far as he was aware, the damage to the Reef had not resulted in a loss of opportunity for the Eauripik inhabitants to fish, to teach their children how to fish, or to swim in the lagoon bounded by the Reef.[117] The plaintiffs' counter is that the defendant presents an incomplete picture of the evidence before the court because none of the questions posed to Mr Haglelgam by the defendant during cross-examination pertained to the Reef but to general activities on Eauripik. His answers thus do not mean that there was no effect on these activities. The fact that the people on Eauripik are still able to carry out the various activities does not mean that they are not diminished in their ability to do so.[118] However, these objections miss the point since it is for the plaintiffs to show that the ability of the inhabitants of Eauripik to carry out the various activities has in fact diminished as a result of the Incident and to what extent. They have not done so. Further, from *Kyowa Violet First Instance*, it is clear that even if cultural damage is recognised, it must at least translate to *an economic loss*. For instance, in *Kyowa Violet First Instance*, the court found that the inability of the plaintiffs in that case to swim and bathe in the lagoon due to oil contamination from the ship had an *economic effect* and thus damages were awarded for that *economic loss*. The inhabitants either had to find a substitute

116 John Haglelgam's 1st AEIC dated 26 May 2020 ("JH1") at para 25.

117 Transcript (2 November 2020) at pp 122 (lines 21 to 25) to 123 (lines 1 to 4).

118 PCS2 at paras 23 and 24.

Version No 1: 28 Jan 2022 (11:03 hrs)

for the therapeutic effects of bathing and swimming in the lagoon or do without it, and any substitute had an economic cost.[119] In contrast, the plaintiffs in the present case have not adduced any evidence of any economic or monetary loss even assuming there was any loss of cultural value. Therefore, whether or not FSM law recognises such "cultural value" as a relevant factor is moot in this case, and I say nothing more about it.

What is the value of the Reef?

104 Since *The Kyowa Violet*, a number of first instance FSM Supreme Court decisions have adopted a per square metre valuation for reef damage cases in the FSM. Specifically, the value of US$600 per square metre has been adopted in a number of cases. The defendant argues that the value of US$600 per square metre represents a *cap* on the value per square metre of a reef in the FSM. The plaintiffs disagree. They contend that the FSM law experts are *ad idem* that under FSM law, parties are at liberty to prove that the value of a reef damaged by a tortfeasor is worth more or worth less than US$600 per square metre.

105 The FSM law experts also agree that no FSM court has determined, by way of a judgment, the value of a reef in Eauripik, and that the parties are free to prove this value. As an aside, while *The Teraka No 168* involved a vessel grounding on a section of reef on Eauripik, that case was settled before trial. Thus, the task of deciding for the first time what the value is, in per square metre terms, of a reef on Eauripik falls on the shoulders of this court.

106 The plaintiffs argue that the value of the damaged reef should be US$1,200 per square metre, *ie*, double the value that was assessed in *The Kyowa*

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119 DBOD at p 25.

Version No 1: 28 Jan 2022 (11:03 hrs)

Violet. In this regard, the plaintiffs rely largely on the evidence and assessment of Dr Richmond. Dr Richmond's opinion as to why a value of US$1,200 per square metre is appropriate is summarised in his third AEIC thus:[120]

> 65. Having said that, if the Court prefers to quantify and value the damages resulting from the Reef Damage Incident solely based on previous cases decided in the FSM, my view is that a higher value than the $600/m^2 used in the Kyowa Violet case is justified both because the value of coral reefs has increased in the 18 years since the Kyowa Violet incident in 2002, and because it must be recognized that the relative value of the Damaged Reef to the people of Eauripik is greater than the value of the Yap reef to the Yap islanders who have greater access to imported resources and locally grown food.
>
> 66. An appropriate value per square meter in this case which would account for these differences is $1,200/m^2, which yields an assessment of $11,835,264 for the total damage field area of 9,862.72 m^2, and $6,574,152 for the area of destroyed corals of 5,478.46 m^2. If the Kyowa Violet case was to take place today, I would have valued the Tomil reef at a much greater valuation than the $608/m^2 assessment which I made in 2002, as our understanding and the value of coral reefs have increased substantially since 2002.
>
> 67. If $1,200/m^2 is not accepted, the bare minimum which the Court should consider is $785/m^2 (the equivalent of $600/m^2 in 2020 according to Challenger), which yields values of at least $7,742,235.20 for the full damage field of 9,862.72 m^2, and at least $4,300,591.10 for just the area of destroyed corals.

107 The defendant takes issue with Dr Richmond's assessment as unsupported by any evidence. Firstly, the defendant contends that there is no evidence that the "value of coral reefs has increased in the 18 years since the *Kyowa Violet* incident in 2002".[121]

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120 Dr Robert H Richmond's third AEIC dated 18 February 2021 ("RHR3") at paras 65 to 67.

121 DCS2 at para 105; RHR3 at para 43(c).

Version No 1: 28 Jan 2022 (11:03 hrs)

108 I agree with the defendant's submission. I would have expected evidence to be adduced on the appreciation in the value of corals, not just generally, but at the very least *in the FSM*, since 2002 to the time of the Incident; but no such evidence was led. Dr Richmond's statement is thus a bare one.

109 Next, insofar as Dr Richmond opines that "it must be recognized that the relative value of the Damaged Reef to the people of Eauripik is greater than the value of the Yap reef to the Yap islanders who have greater access to imported resources and local grown food", this is also a statement made with no supporting basis, and is in my view beyond Dr Richmond's remit as an expert. Significantly, the AEICs of the named *plaintiffs* (*ie*, the three Chiefs) did not contain *any* statement or evidence to that effect. I am not convinced that it is appropriate for Dr Richmond, as a coral scientist and expert witness, to opine on the value placed by the Eauripik *islanders* on their reef as compared to Yap *islanders*. Dr Richmond's evidence or opinion on this point is speculative, and not within the realm of his expertise. I therefore place little weight on it.

110 However, and more fundamentally, the difficulty I have with Dr Richmond's evidence is that, in the final analysis, his opinion on a US$1,200 per square metre value is not based on any scientific formula but is really a *qualitative* assessment – for example, why is the value only double compared to the US$600 per square metre awarded in *The Kyowa Violet* and not triple or quadruple that value, since Dr Richmond feels that US$1,200 per square metre is itself *conservative*?

111 Dr Richmond also seeks to benchmark his US$1,200 per square metre value to valuations derived from various reef damage incidents in the United States of America that were settled. As I discuss in greater detail below, I do not

Version No 1: 28 Jan 2022 (11:03 hrs)

think it appropriate or useful to refer to settlements involving reef damage cases in the waters of the US or other jurisdictions outside the FSM. I note, however, that neither party referred me to *any case* in the FSM, whether reported or settled, where the value per square metre of a reef *anywhere* in the FSM has been assessed at even US$1,000 per square metre, let alone US$1,200 per square metre.

112 In my judgment, the conclusions drawn by Dr Richmond are, in essence, "guesstimates" as opposed to being grounded on any scientific or mathematical basis. I am therefore not satisfied that the plaintiffs have *proven*, on the balance of probabilities, that *based on the evidence*, the value per square metre of the Reef damaged by the Incident is US$1,200 per square metre. I accordingly decline to accept that value.

113 On the other hand, the value of US$251.85 per square metre advocated by the defendant, which is derived from the amounts awarded in *People of Satawal* for damage to an outer island reef in West Fayu, is also not necessarily reflective of the value of the Reef. Nor is that a value binding on me. That having been said, and as I have concluded above at [99], the court can and, in this case ought to, have regard to the fact that Eauripik, like West Fayu, is also an outer island atoll, and therefore more remote and less inhabited as compared to, for example, the main island of Yap. I also note that unlike West Fayu which was uninhabited, Eauripik *is* inhabited.

114 Mr Haglelgam stated in his AEIC sworn in May 2020 that there were, at that time, 84 people resident on Eauripik.[122] During cross-examination on 2

[122] JH1 at para 58.

Version No 1: 28 Jan 2022 (11:03 hrs)

November 2020, Mr Haglelgam clarified that there were then only about 60 people residing on Eauripik.[123]

115 Aside from the fact of and the number of inhabitants, the court can also take into the account the likelihood that the nature and extent of biodiversity, coral cover and fish biomass in the Reef are similar to those in other outer island atolls in the FSM like Ulithi (alluded to by Professor Crane)[124] and West Fayu (the reef in question in *People of Satawal*).

116 With regard to settlements in other cases, while they do give this court some indications as to the values that may be extrapolated from the settlement amounts and the extent of damage in those cases, I am hesitant to venture beyond that. Quite simply, this is because a case may be settled for a variety of reasons. A claimant may, in the context of a negotiated settlement, be prepared to accept a discount on the value of the reef in return for an upfront payment and the attendant savings in costs and time as well as avoidance of litigation risk. Therefore, the evidential value of such settled cases is, in my view, not significant. As the parties' FSM law experts themselves note, settled cases have limited value in assisting the court to assess the damages to be awarded in any particular case before it (see [79(e)] above).

117 Mr Challenger compiled a table of various reef damage cases in the FSM and other jurisdictions like the US with corresponding settlement sums and extrapolated per square metre values for each case for comparison.[125]

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123 Transcript (2 November 2020) at p 116 (lines 4 to 6).

124 Transcript (4 November 2020) at p 84 (lines 3 to 13).

125 GEC3 at pp 22 to 24.

Version No 1: 28 Jan 2022 (11:03 hrs)

118 Firstly, although both experts referred to cases in the US and other jurisdictions outside of the FSM, as I indicated above at [111], I do not consider that to be an appropriate approach. Among others, the nature of the reefs and the type of corals and coral cover may well be different in, for example, Florida or Hawaii than in Eauripik. If at all, any consideration of past settled cases and settlement ranges ought to be limited to cases in the FSM or alternatively, in jurisdictions within the Indo-Pacific region. Even then, the purpose of bringing such settled cases to the attention of the court would be limited to providing those details by way of information and nothing more.

119 With these observations in mind, I reproduce below the table referred to by Mr Challenger in his evidence, but *limited* it to the cases in the Indo-Pacific region (including the FSM):[126]

Vessel Name	**Year**	**Region**	**Injury area (m^2)**	**Settlement (US$)**	**US$ per square metre**
Pacific Falcon	2000	Indo Pacific	1,439	$1,000,000	$695
Bunga Teratai Satu	2000	Indo Pacific	1,500	$600,000	$400
Micronesian Heritage	2003	Indo Pacific	350	$2,000,000	$5,714
Kyowa Violet	2005	Indo Pacific	1,436	$861,000	$600
Shen Neng 1	2010	Indo Pacific	>50,000	$29,660,000	$593

126 GEC3 at pp 22 to 24.

Version No 1: 28 Jan 2022 (11:03 hrs)

Mel Sentosa	2011	Indo Pacific	419	$285,000	$680
Guardian	2013	Indo Pacific	2,345	$2,000,000	$853
Palau Siren	2015	Indo Pacific	698	$723,684	$1,037
Belle Rose	2016	Indo Pacific	28,800	$1,500,000	$52
Caledonia Sky	2017	Indo Pacific	1,600 - 18,882	$1,200,000 to 451,000,000	$38 to $28,188
Lewang	2017	Indo Pacific	>2,000	$75,000	$37
Alex	2017	Indo Pacific	10,177	$1,379,338	$136
Lyric Poet	2017	Indo Pacific	8,416	$1,140,662	$136
Marshall 201	2018	Indo Pacific	4,000	$1,250,000	$313

120 Leaving aside "outliers" like the *Micronesian Heritage* and *Caledonia Sky* cases, the average equivalent value per square metre of the reef damage cases in the Indo-Pacific that were settled is approximately US$461.

121 The defendant also submits that the court should award either the value of the damaged reef or the cost of restoration, whichever is the lower, and relies on the FSM Supreme Court decisions in *Pohnpei v The Ping Da 7*, 20 FSM R

Version No 1: 28 Jan 2022 (11:03 hrs)

75 (Pon 215) ("*Ping Da 7*") and *The Truk Master* as support.[127] The plaintiffs argue that true and complete restoration is unrealistic and simply not practicable in this case as it would entail replacing upwards of 24,000 corals even on the defendant's estimate of 742m^2 of damage. In any event, the defendant's definition of "restoration" does not entail completely restoring the Reef, which is an ecosystem, but merely re-attaching "at risk" or dislodged corals from elsewhere in Eauripik onto damaged sections of the Reef in order to allow the damaged sections to start recovering and regenerating.[128] This method of "restoration" is merely, in Dr Richmond's words, to "borrow from Peter to pay Paul" and would undercompensate the plaintiffs.

122 As stated at [42] above, under FSM law, the "general purpose of tort law is to afford a victim compensation for the injuries or damages sustained as the result of another's unreasonable or socially harmful conduct. In other words, tort law's purpose is *to make the victim whole*" [emphasis added].[129] Both parties' FSM law experts agree that this is the overarching principle applicable under FSM tort law.[130] In the *Ping Da 7*, Acting Chief Justice Ready E Johnny observed that:

> … the usual remedy for trespass to land (and when applicable nuisance and negligence claims are based on similar facts) is either a judgment for an amount equal to the diminution in the land's value or a judgment for an amount that would be needed to *restore the land to its previous condition*, whichever is the lesser amount … To award both would constitute an impermissible double recovery … [emphasis added]

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127 DBOD at pp 150 and 173.

128 PCS1 at para 156; GEC2 at p 47.

129 DBOD at p 23.

130 DCS1 at para 181.

Version No 1: 28 Jan 2022 (11:03 hrs)

123 Bearing in mind the overarching purpose of FSM tort law, and whilst the FSM courts have recognised that the cost of restoring a damaged reef is an acceptable measure of compensation, restoration cost must, if awarded as damages, make the victim *whole*. In order to do that, the restoration proposed must *restore*, in the true sense of the word – the dictionary meaning of "restore" is "to bring back *to the original state*; to improve, repair, or retouch (a thing) *so as to bring it back to its original condition*." [emphasis added].[131]

124 I agree with the plaintiffs that what is being proposed in this case by Mr Challenger is not restoration in the true sense of the word, but *partial* restoration in order to jumpstart or shorten the reef recovery process and duration. Mr Challenger's method of restoration is to re-attach up to 1,000 corals at the damaged parts of the Reef.[132] Mr Challenger candidly acknowledged that his proposed method of restoration would not immediately restore the Reef to its *original* condition. The following extract from the trial transcript bears this out:[133]

> Mr Doraisamy: Just on this issue of your method of restoration, what would you say would be the likely percentage of recovery of the reef after restoration? What is the likelihood of recovery?
>
> Mr Challenger: The reef will recover. I believe the reef will recover if we do nothing, it will just take a lot longer. *But if we go out and actively restore it and find as many corals from the site and attach as many corals as you can,* ***will it immediately be just like the old reef? No.*** It will be in a condition where at that point there is nothing more we can do and Mother

131 Oxford English Dictionary (2nd ed).

132 GEC2 at p 47.

133 Transcript (5 November 2020) at pp 28 (lines 12 to 25) to 29 (lines 1 to 9).

Version No 1: 28 Jan 2022 (11:03 hrs)

> Nature takes over and your recovery time is greatly reduced. We've done this before where we end up with coral cover that is statistically similar to the coral cover prior to the grounding, but, you know, it takes time for the other things to come in, all the little boring critters and urchins and the ecosystem that Prof Crane discussed yesterday. But if we build it, they will come and once the coral cover and the diversity and things start to recover, that's – those techniques of restoration have been widely accepted.

[emphasis added in italics and bold italics]

125 In the circumstances, the cost of restoration of approximately US$500,000 (to replace up to 1,000 corals) as put forward by the defendant would not, in my judgment, make the plaintiffs whole. On the contrary, I am of the view that it would undercompensate them. Accordingly, I reject the defendant's contention that their proposed cost of restoration would be an acceptable measure of damages to award the plaintiffs.

126 There is no other evidence put forward by the defendant on the cost of complete restoration. On the other hand, Dr Richmond posits that the cost of restoration could be in excess of US$28m. While that figure is also, in my view, overstated, of greater relevance is the fact that apart from the restoration costs estimate of approximately US$500,000 put forward by the defendant (which, as I have found, amounts only to a partial restoration at best), there is no evidence before the court that the costs of a true and complete restoration would cost *less* than the diminution in value of the damaged Reef. In the circumstances, in my view, the *only* measure of damages that this court can usefully consider and award the plaintiffs in this case would be based on the diminution in value of the damaged reef as established in accordance with (a) the evidence and (b) acceptable methods recognised under FSM law.

Version No 1: 28 Jan 2022 (11:03 hrs)

127 Since I have rejected the plaintiffs' case that the value of the Reef is to be assessed at US$1,200 per square metre, I turn to the plaintiffs' *alternative* submission that the value of US$785 per square metre should be accepted by the court. This is on the basis that it represents the 2020 value of the US$600 per square metre value affirmed in *Kyowa Violet Appellate Court*, after taking into account inflation.

128 This figure of US$785 per square metre was put forward by the defendant's expert Mr Challenger in his second AEIC.[134] The defendant argues that there is no basis for the plaintiff to rely on this alternative figure as the plaintiff has not adduced any evidence of the rate of inflation.[135] I do not consider this a valid objection. This figure was referred to and put into evidence by the defendant's own expert. I fail to see how the plaintiff is barred from relying on it as an alternative, particularly when the plaintiffs did not challenge that figure as being inaccurate. I take guidance from the approach of the Singapore High Court in *Jet Holding Ltd and others v Cooper Cameron (Singapore) Pte Ltd and another* [2005] 4 SLR(R) 417 (at [161]) where Belinda Ang Saw Ean J (as she then was) dealt with the plaintiffs' claim for damages as follows:

> These are thus far my views on the evidence of JSL and JHL in terms of proving their pleaded loss. But independent of that, upon Cameron's evidence there is Chiasson who was aware that the BOP stack that was lost was at least 20 years old and opined that if it was properly maintained over the 20-year period, it would probably be worth about US$1m. He explained that the BOP stack is made of components and went on to testify on the ready availability of second hand components for a BOP stack and then assembling the components to make a BOP stack at a total cost of US$1m. Cameron or several of its competitors

134 GEC2 at p 51 (Table 1).

135 DCS2 at para 104.

Version No 1: 28 Jan 2022 (11:03 hrs)

> could easily undertake the assembling. Mr Chandra contends that Chiasson is not an expert and cannot give expert opinion on the value of BOP at the time of the loss. Whilst Chiasson is not an expert, *he is in the business and his testimony is of some assistance to put a monetary figure as representing the market value of what was lost and to which I am entitled to take on board. Where there is no precise evidence, I have to do the best I can with the little or limited evidence in order to do justice. …* [emphasis added]

129 Given that I have rejected both the plaintiffs' and defendant's respective primary contentions on the value of the Reef (*ie*, US$1,200m and US$251.85m), I see no impediment in utilising an alternative figure that both parties' experts agree on, especially if it will assist in doing justice in this case in the absence of other more precise evidence.

130 Based on the totality of the evidence and having regard to the relevant factors as gleaned from available FSM caselaw as I have discussed above, in my judgment, a fair and reasonable value to be ascribed to the Reef that was damaged in this case is **US$785 per square metre** and I do so find accordingly.

Alternative orders in lieu of damages

131 Mr Doraisamy submits that *in lieu* of damages, this court has the discretion to make alternative orders as it deems fit. One such alternative proposed by the defendant is for the court to order *the defendant* to "install navigational aids in the channel" *in lieu* of awarding the plaintiffs damages so as "to prevent future incidents from happening". The defendant's second alternative is for the court to order that *the defendant* carries out restoration works on the Reef, on the basis of the defendant's expert's (*ie*, Mr Challenger's)

Version No 1: 28 Jan 2022 (11:03 hrs)

view that "it would cost '*not more than 500,000*' to do so" [emphasis in original in italics].[136]

132 The plaintiffs object to the defendant's submissions. Firstly, they were not pleaded and thus take the plaintiffs by surprise. Secondly, the court is being asked to assess the *damages* due to the plaintiffs and it would be inappropriate for the court to consider, let alone award the plaintiffs, any substantive relief other than damages.[137]

133 I agree with the plaintiffs. The alternative options proposed by the defendant are not pleaded and no evidence was properly led on it. While Mr Doraisamy posed certain questions to Dr Richmond on whether, in his view, monetary compensation or restoration of the Reef would be preferred, those were purely *hypothetical questions* seeking Dr Richmond's personal opinion. They were not even hypothetical questions asked *with reference to Eauripik*. I am thus unable to see the relevance of the answers given by Dr Richmond to those hypothetical questions or how Dr Richmond's hypothetical responses support the defendant's arguments on the alternative orders they wish me to make.

134 Further, I also agree with Mr Leong that the task of this court is to assess the *damages* due to the plaintiffs. The plaintiffs do not seek any other relief apart from damages. Therefore, whilst the plaintiffs' Claim on Reference (Amendment No 2) contains, in the relief section, the generic incantation of such "further or other relief as this Honourable Court deems fit", that does not

136 DCS1 at paras 245 to 253.

137 PCS2 at paras 78 to 79.

Version No 1: 28 Jan 2022 (11:03 hrs)

translate to the *defendant* being entitled to ask the court to make either of the alternative orders it suggests in its closing submissions. In addition, no evidence was led by the defendant on whether, *under FSM law*, the granting of such alternative "relief" *in lieu* of an award of monetary damages is permissible or recognised. I accordingly reject the defendant's submissions and decline to make either of the proposed alternative orders.

Conclusion

135 On Issue 1 (the Damage Issue), I find that on the available evidence, an area of **1,056.88m^2** of the Reef was damaged by the Vessel as a result of the Incident.

136 On Issue 2 (the Valuation Issue), I find that a fair and reasonable estimate of the value of the damaged Reef under FSM law is **US$785** per square metre.

137 The plaintiffs are accordingly entitled to US$829,650.80 as damages from the defendant, being the product of 1,056.88m^2 of damage and US$785 per square metre. Accordingly, I grant final judgment for the plaintiffs against the defendant in the sum of **US$829,650.80**.

Version No 1: 28 Jan 2022 (11:03 hrs)

138 As for pre-judgment interest, it is common ground that under FSM law, a successful party is usually awarded pre-judgment simple interest at the rate of 9% per annum from the date of the incident ([79(d)] above). The defendant accepts that the court has a discretion under section 12(1) of the Civil Law Act 1909 (2020 Rev Ed) ("CLA") to award pre-judgment interest. It however contends that the plaintiffs should not be entitled to any pre-judgment interest at all, or at the rate of 9% per annum applicable under FSM law. In the alternative, it submits that the court should only award pre-judgment interest at the Singapore default rate of 5.33% per annum. Further, the court should also take note of the plaintiffs' dilatoriness in the conduct of their case which caused significant delay to the progress of the claim on reference hearing, including the belated amendment to their claim on reference which necessitated a second tranche of hearing dates some four months later.[138]

139 The plaintiffs also accept that the court has a discretion under section 12(1) of the CLA to award pre-judgment interest. They maintain that they should be awarded pre-judgment interest at the rate of 9% per annum as allowed by FSM law. The plaintiffs disagree with the defendant that there is any basis in this case to depart from the default position under FSM law.

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138 DCS2 at paras 127 to 140.

Version No 1: 28 Jan 2022 (11:03 hrs)

140 Having considered the arguments raised by both parties, I disagree with the defendant that the court should not award any pre-judgment interest or only utilise the default pre-judgment interest rate applied in Singapore. I have taken into consideration the common ground between the parties on the interest rate utilised by the FSM courts for pre-judgment interest in similar cases and the delay to the proceedings occasioned by the amended claim on reference that was eventually put forward by the plaintiffs. I exercise my discretion under s 12(1) of the CLA and award the plaintiffs simple interest on the principal judgment sum at the rate of 9% per annum, not from the date of the Incident, but from 23 June 2017 (*ie*, the date on which the writ in ADM 91 was filed) to the date of judgment.

141 I shall hear the parties separately on costs.

S Mohan
Judge of the High Court

Version No 1: 28 Jan 2022 (11:03 hrs)

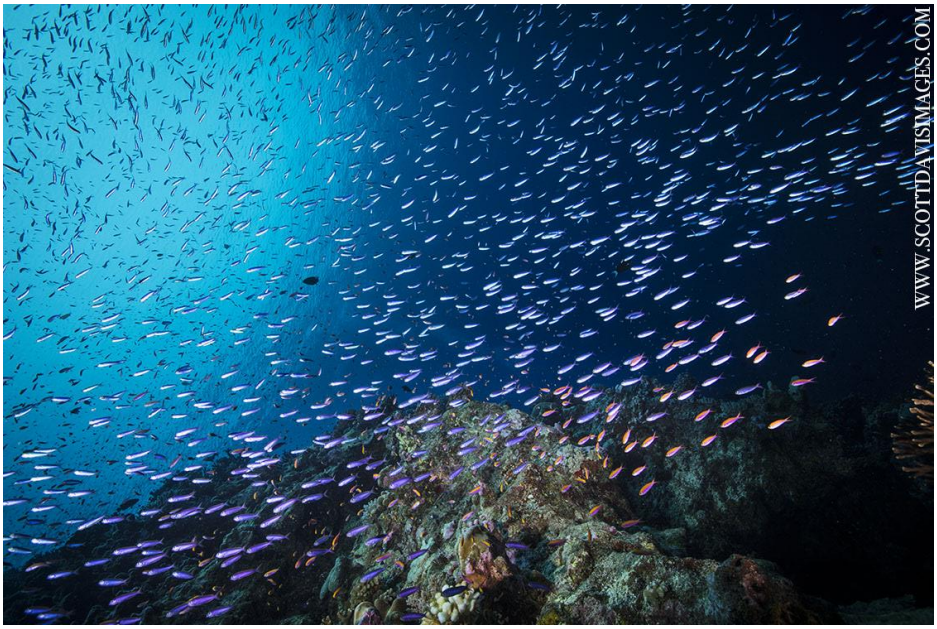
Leong Kah Wah, Aleksandar Anatoliev Georgiev and Chan Qin Pei
(Rajah & Tann Singapore LLP) for the plaintiffs;
Ramachandran Doraisamy Raghunath, Quek Wen Jiang Gerard,
Nicole Kwan Tung Yan and Josiah Fong Ren Jing (PDLegal LLC)
for the defendant.

Version No 1: 28 Jan 2022 (11:03 hrs)

Annex 1: Photographs depicting sections of the undamaged Reef on the western side of Eauripik



Undamaged section of the Reef



Undamaged section of the Reef

Version No 1: 28 Jan 2022 (11:03 hrs)



Undamaged section of the Reef (showing steepness of Reef wall and extent of coral cover)

Version No 1: 28 Jan 2022 (11:03 hrs)



Undamaged section of the Reef

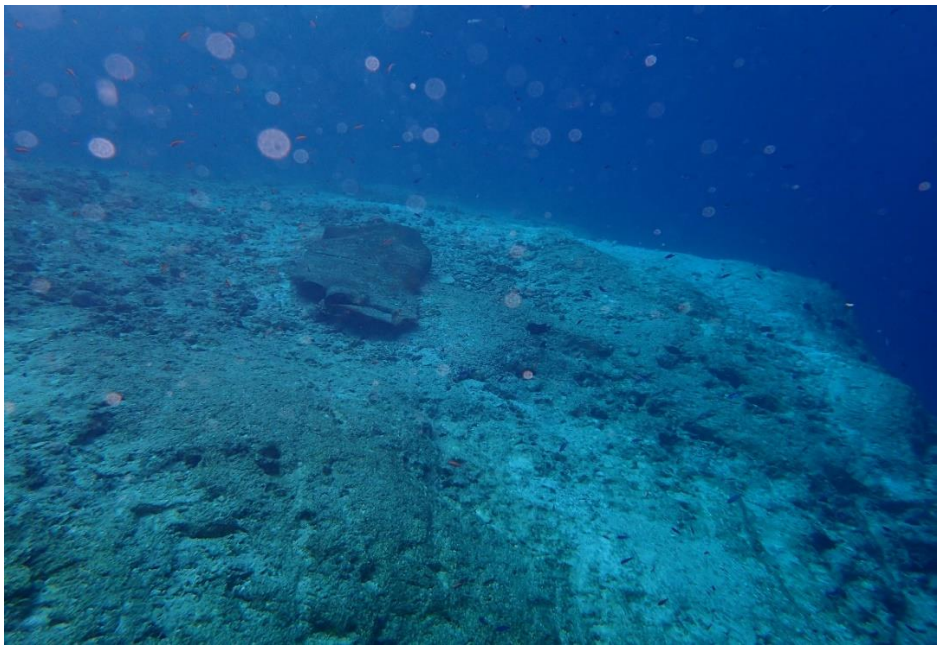
Version No 1: 28 Jan 2022 (11:03 hrs)

Annex 2: Photographs depicting sections of the damaged Reef after the Incident

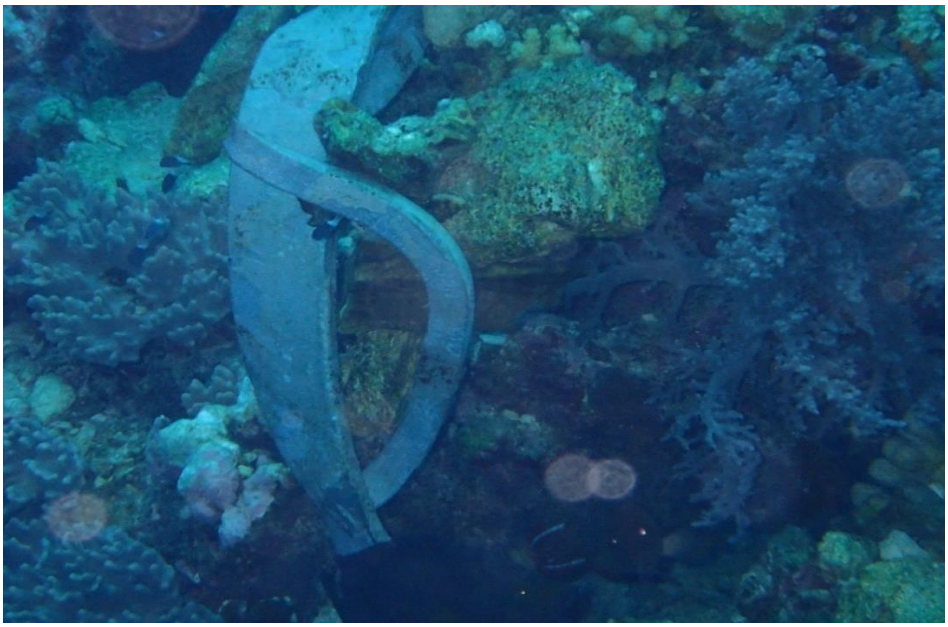


Damaged section of the Reef (coral sheared off down to the calcium substrate)

Version No 1: 28 Jan 2022 (11:03 hrs)

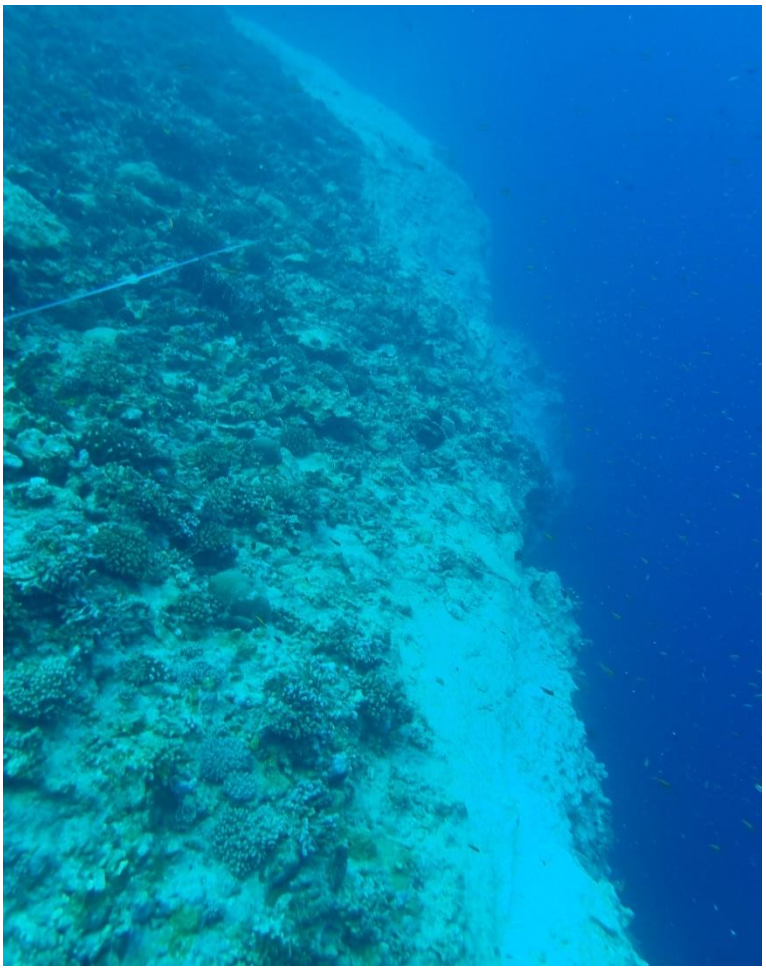


Damaged section of the Reef (coral sheared off down to the calcium substrate)



Metal debris from the Vessel found at sections of the Reef

Version No 1: 28 Jan 2022 (11:03 hrs)



Damaged section of the Reef (with coral partially sheared off down to the calcium substrate)

Version No 1: 28 Jan 2022 (11:03 hrs)