**COMMERCIAL-IN-CONFIDENCE**

# EXPERT REPORT ON DEATH OF GILLES MATTAINI

Report prepared and written by

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for

NSW SPECIAL COMMISSION OF INQUIRY INTO LGBTIQ HATE CRIMES

1/6/2023

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## QUALIFICATIONS AND EXPERTISE

1 I am a Professor and coastal geomorphologist in the School of Biological, Earth and Environmental Sciences, University of New South Wales (UNSW Sydney). I have been studying, researching and teaching aspects of coastal landforms and processes since 1988 (35 years).

2 My specific area of scientific expertise is in the field of coastal morphodynamics (involving mutual interactions between waves, currents, tides and nearshore topography) and coastal hazards. I have written 84 published scientific articles, 15 book chapters, and one book on these topics.

3 My broad area of scientific expertise relates to the action of waves, currents, tides and sediment transport that occur within the nearshore zone along coastlines. The nearshore zone extends from the upper beachface, which is impacted by waves and wind, seaward to where waves first start to interact with the bottom of the ocean, typically at depths of 10 – 20 metres. Both boundaries are variable at any given time depending on wave conditions.

4 My specific area of expertise involves the behaviour of rip currents, which are strong, narrow seaward flows of water which extend from the shoreline offshore through the surf zone to the extent of breaking waves, and at times, some distance beyond. The surf zone is the region dominate by breaking waves. Rip currents are primarily related to beaches and do not occur along long stretches of rocky coastlines, and or within bays and harbours.

5 Since 2001, I have run a beach safety community education program called the Science of the Surf (SOS), which is designed to educate the public on beach safety and coastal hazards. This program has been presented to over 50,000 members of the community, including thousands of primary and high school students. SOS has received significant mainstream media attention and both State (NSW) and National Community Safety related awards.

6 In January 2023 I was appointed as a Member to the Order of Australia (AM) for my service towards beach safety research and education. My full CV is attached as Appendix A.

7 I am a Life Member and former caretaker (resident member) of the Tamarama Beach Surf Life Saving Club.

8 I have previously been involved as an expert witness involving the death of Ross Warren which is part of this Special Commission. I provided a report on this case to the Special Commission on 24 May 2023.

9 I have previously provided an expert report involving the death of Simon Blair Wark, which is part of this Special Commission. I provided a report on this case to the Special Commission on 23 March 2023.

10 I took part in a video conference calls with members of the legal team assisting the Special Commission inquiry in regards to the death of Mr Mattaini on 30 January 2023, 8 May 2023 and 17 May 2023.

## EXECUTIVE SUMMARY

11 Mr Gilles Mattaini was last seen walking in the Bondi area on or around 15 September 1985. The exact circumstances of his disappearance remain unknown and his body has never been found.

12 The period from 15 – 17 September 1985 was characterised by fine weather conditions with mild daytime temperatures and cooler nights with calm to light winds. Offshore wave heights were higher and wave periods were longer than normal, particularly on 17 September 1985. Wave direction was likely from the southeast. It is likely that rip currents were present at Tamarama Beach, Mackenzies Bay and Bondi Beach, particularly against the headlands.

13 The period 15 – 17 September 1985 was characterised by large tidal ranges associated with spring tide conditions. Very high tides occurred in the late morning/mid-day and very low tides occurred in the very early mornings and evenings. This would have resulted in distinct periods of time when the rocky coastline along the location of interest would have been alternately exposed at low tide and fully inundated by wave action at high tide.

14 Given the wave conditions and likely presence of rip currents along the beaches between 15 – 17 September 1985, swimming conditions would have been challenging regardless of swimming ability, particularly outside of the lifeguard patrolled red and yellow flag area(s). It is my opinion that Mr Mattaini would likely have encountered some difficulty regardless of swimming ability if he swam outside of the flags.

15 Given the wave conditions, it is my opinion that Mr Mattaini would have encountered considerable difficulty if he had gone swimming off of any of the rocky coastline in the area of interest between 15 – 17 September 1985.

16 Given wave conditions between 15 – 17 September 1985, it is my opinion that if Mr Mattaini's body entered the water at any point along the coastal walk around Marks Park, it would have remained offshore of the rock platforms at distances ranging from several metres to potentially 30 – 40 metres due to wave reflection off the rock platforms. This would be the case regardless of whether Mr Mattaini was floating or submerged and alive or deceased.

17 Given wave conditions, between 15 – 17 September 1985, if Mr Mattaini's body entered the water at any point along the walk from Bondi Beach to Ben Buckler Point (at the end of Brighton Boulevard), it would have remained offshore of the rock platforms at distances ranging from several metres to potentially 30 – 40 metres due to wave reflection off the rock platforms. This would be the case regardless of whether Mr Mattaini was floating or submerged and alive or deceased.

18 It is my opinion that if Mr Mattaini's body had remained floating during the daylight hours between 15 – 19 September 1985 in the vicinity of the coastal walk around Marks Park and the vicinity of Ben Buckler that his body would likely have been visible from elevated vantage points.

19 It is my opinion that if Mr Mattaini had entered the water from the rocky coastline fully conscious and uninjured between 15 – 19 September 1985 he would likely have remained in the same vicinity as described in Paragraphs 16 and 17 and been able call or signal for help. It is my opinion that if this had happened during daylight hours, he would likely have attracted attention. If it had happened during night-time hours, particularly between 10 pm and 5 am, the chances of attracting attention would be reduced due to poor visibility and fewer people about.

20 It is my opinion that if Mr Mattaini had entered the water alive at night between 15 – 19 September 1985 that there is a strong possibility that he would have drowned due to the combination of cooler water temperatures, wave breaking and reflection, poor visibility and the possibility that he was fully or partially clothed.

21 On 19 September 1985, wave heights began to increase and reached extremely high significant wave heights of 4 – 5 metres on 20 – 21 September 1985. These conditions would likely have caused mega rip circulation along beaches and embayments in the locations of interest and extreme turbulence and reflection in the vicinity of rock platforms resulting in dominantly offshore transport.

22 It is my opinion that if Mr Mattaini's body had been in the water in the vicinity between Tamarama Beach and Ben Buckler Point (and distances beyond), that the extreme wave and current conditions between 19 – 21 September would have transported Mr Mattaini's body considerable distances offshore.

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23 It is my opinion that assuming that Mr Mattaini's body was in the water, this extreme wave and current event is the primary reason why his body has never been found.

## 1. INTRODUCTION

24 This report has been prepared at the request of the Special Commission of Inquiry into LGBTIQ hate crimes in relation to the death of Mr Gilles Mattaini.

25 Mr Mattaini was last seen walking in the Bondi area on or around 15 September 1985. The exact circumstances of his disappearance remain unknown and his body has never been found.

26 I have been provided with a copy of the Uniform Civil Procedure Rules 2005 – Schedule 7 – Expert witness code of conduct.

27 I, Professor Robert Brander, acknowledge for the purpose of Rule 31.23 of the Uniform Civil Procedure Rules 2005 that I have read the Expert Witness Code of Conduct in Schedule 7 to the said rules and agree to be bound by it.

28 I have been asked to undertake an expert report in relation to Mr Mattaini's death to assist the Inquiry and have been provided with the following materials:

29 On 25 January 2023: i) a letter enclosing material in relation to the death of Gilles Mattaini; ii) Weather, synoptic and rainfall observations for the Bondi area from 8 September 1985 to 29 September 1985 from the Australian Government Bureau of

Meteorology; and iii) an Excel spreadsheet of Sea Level Observations at Fort Denison (Sydney) for 1985.

30 On 3 April 2023: i) a letter of instruction providing further information to guide this expert report; ii) An Expert Brief providing items ii) and iii) from Paragraph 29 above as well as iii) Sydney offshore wave data for 7 – 30 September 1985; and iv) Synoptic charts from 9 – 21 September 1985.

31 On 17 May 2023 a copy of email correspondence from Waverley Council lifeguard Bruce Hopkins in relation to water movement patterns in the region of interest.

32 On 18 May 2023 a copy of a report by Dr L.E. Iles, a forensic pathologist, in relation to the buoyancy and decomposition of bodies in water post-mortem.

33 I have been asked to address the following matters in my report:

34 **1.** Following my review of the briefing material, please identify:

35 **a)** Any additional areas of expert opinion you consider would assist his Honour on the issues of Mr Mattaini's location, date and manner of death, and

**b)** If relevant, appropriate experts from whom his Honour may wish to seek further expert opinion.

36 **2.** Provide a summary of the prevailing weather, tidal, current and rip conditions at and around Bondi, Ben Buckler Point and Mackenzies Point on 15 – 17 September 1985.

37 **3.** Whether Mr Mattaini would have encountered difficulty if he had gone swimming at or around the identified areas (noting that he may not have been a strong swimmer)

38 **4.** Approximately where Mr Mattaini's body may have travelled on the assumption that he entered the sea from the shoreline:

39 **a.** At any point along the coastal walk around Marks Park; or

**b.** At any point along the walk from Bondi Beach to Ben Buckler Point (at the end end of Brighton Boulevard).

40 My knowledge, findings and opinions based on the material I have been provided with and the queries above are contained within this report.

41 In this report, I have made the following assumptions:

- The weather and Fort Denison tidal data provided by the Bureau of Meteorology provides an accurate estimate of weather conditions and tidal time and stage at the locations of relevance.

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- The offshore wave data provided by the NSW Department of Environment and Planning Manly Hydraulics Laboratory from the Sydney offshore wave rider buoy provides an approximation only of wave condition in the locations of relevance.

- Meteorological synoptic charts from the Bureau of Meteorology (sourced from the Sydney Morning Herald) for the period of interest provide an approximation of wave direction along the Sydney coast based on my own interpretations.

## POINT 1: ADDITIONAL AREAS OF EXPERTISE

42 One of the key questions in the matter of Mr Mattaini's disappearance is the direction of water movement in the vicinity of the rocky coastline between Mackenzies Bay and Ben Buckler Point. I feel that my opinions expressed in regards to water movements in this region would be similar to those of any coastal geomorphologist or oceanographer. It should also be noted that this is an extremely complex environment and water movement will vary almost constantly with changing wave, tide and current activity making completely accurate estimations difficult.

43 I would recommend that a focus group session is organised and conducted in the future with the purpose of bringing relevant experts together to discuss and document their opinions on water movements in the region of interest based on their knowledge and experience. I would suggest that this focus group consists of those with experience in search and rescue, Waverley Council lifeguards, surf life

savers, coastal geomorphologists, oceanographers and those with ocean swimming and rock fishing experience in the area.

44 It is my opinion that the information gained from such a focus group session would be of value not just to the matter of Mr Mattaini's disappearance, but other disappearances which have occurred in this region – both related to the Special Inquiry and otherwise. Having this information documented formally would also be of benefit to future search and recovery efforts as well as future cases involving missing persons believed to have entered the water in this region. To my knowledge, such a focus group session and formal documentation of multiple expert opinions regarding this matter has not yet occurred.

## POINT 2. SUMMARY OF PREVAILING ENVIRONMENTAL CONDITIONS AT AND AROUND BONDI, BEN BUCKLER HEADLAND AND MACKENZIES POINT ON 15 – 17 SEPTEMBER 1985.

### P2.1 Weather

45 The maximum and minimum temperatures recorded at Sydney Observatory Hill on the 15$^{th}$, 16$^{th}$ and 17$^{th}$ of September 1985 were 20.3, 23.1 and 19.4 degrees Celsius and 12.5, 12.0 and 11.4 degrees Celsius respectively. Temperature conditions could be considered mild during the day with cool nights.

46 Weather conditions in Sydney and the Bondi region between 15 to 17 September 1985 were fine and no rain was recorded.

47 Winds recorded at Sydney Observatory Hill on 15 September 1985 varied between 0 – 18 km/hr (calm to light winds) and were from the west until noon when the direction shifted from the north-northeast for the remainder of the day and evening.

48 Winds recorded at Sydney Observatory Hill on 16 September 1985 varied between 0 – 13 km/hr (calm to light winds) and were again from the west until noon when they again shifted to a more easterly direction.

49 Winds recorded at Sydney Observatory Hill on 17 September 1985 varied between 0 – 13 km/hr (calm to light winds) and were quite variable in direction ranging from the west in the morning to the east in the afternoon and evening.

50 While the period 15 -17 September 1985 was characterised by calm to light winds, some moderate to fresh wind gusts did occur each day. On 15 September 1985 the maximum wind gust was 30 km/hr from the west south-west at 12:30 am. On 16 September 1985, the maximum wind gust was 30 km/hr from the west at 1:10 pm and on 17 September 1985, the maximum wind gust was 28 km/hr from the east at 5:10 pm.

51 In the weeks following 17 September 1985, the most noticeable changes in the weather occurred on 20 – 21 September with colder weather conditions, rain and southerly winds and on 25 – 26 September when moderate to strong winds from the west occurred.

**P2.2 Tides**

52 Tidal data was sourced from the Bureau of Meteorology tidal station at Fort Denison within Sydney Harbour. Tidal conditions recorded at Fort Denison are representative of tidal conditions along the open ocean coast throughout New South Wales (Short, 2007).

53 Sea level observations at Fort Denison for 15 – 17 September 1985 were:

54 Low tide = 05:00 am on 15 September = 0.33 metres

55 High tide = 11:00 am on 15 September = 1.91 metres

56 Low tide = 17:00 pm on 15 September = 0.16 metres

57 High tide = 23:00 pm on 15 September = 1.66 metres

58 Low tide = 05:00 am on 16 September = 0.24 metres

59 High tide = 11:00 am on 16 September = 1.76 metres

60 Low tide = 18:00 pm on 16 September = 0.12 metres

61 High tide = 00:00 am on 17 September = 1.66 metres

62 Low tide = 06:00 am on 17 September = 0.17 metres

63 High tide = 12:00 am on 17 September = 1.63 metres

64 Low tide = 18:00 pm on 17 September = 0.19 metres

65 High tide = 01:00 am on 18 September = 1.73 metres

66 These tidal conditions occurred during a period of spring tides, where tidal ranges (the difference in sea level elevation between low and high tide) are maximised.

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During spring tides, high tides are higher than usual and low tides are lower than usual. Spring tides occur for several days around each full moon and new moon period. A new moon occurred on 14 September 1985. Of note, conditions would have been very dark during the night time hours from 15 – 17 September 1985.

67 During the period 15 – 17 September, early mornings were characterised by low tide conditions; late morning/noon was characterised by high tide conditions; early evenings were characterised by low tide conditions and late evenings/midnight was characterised by high tide conditions. The implications of these tidal conditions are discussed in Paragraphs 167 – 170.

68 Very high tides (1.91 and 1.76 metres) and very low tides (0.16 and 0.12 metres) were experienced in the late morning and early evenings of both 15 and 16 September 1985. The implications of these tidal conditions are discussed in Paragraphs 167– 170.

69 After 17 September 1985, the tides gradually reduced in range as they transitioned into a period of neap tidal cycles where high tides are lower than usual and low tides are higher than usual (i.e. tide range is minimised).

### P2.3 Waves and wave direction

70 Offshore wave data was supplied from the Sydney offshore Waverider buoy by the NSW Department of Planning and Environment. This buoy is located approximately 9 – 10 km offshore of Long Reef, on Sydney's Northern beaches. In September 1985, the buoy provided 20 minute averages of : i) significant wave height ($H_s$), which is the

average of the highest 1/3 of wave heights recorded during each time interval; ii) maximum wave height ($H_{max}$), which is the highest wave recorded in that time interval; and iii) wave period ($T_p$), which is the mean of wave periods (time between two waves) over the time interval.

71 Wave direction was not available from the offshore buoy in 1985. The buoy also did not record data between 13:30 pm on 16 September and 8:40 am on 17 September 1985.

72 It is acknowledged that wave conditions at this offshore location only provide an approximation of wave conditions occurring along the Sydney open ocean coastline or within Sydney Harbour. Wave heights (but not wave period) will vary between offshore deepwater locations and shallow water coastlines due to processes of wave shoaling (slowing down of the waves), wave refraction (bending of the wave crests and direction due to variable bathymetry and topography), and wave breaking. Headlands at North and South Head and promontories within Sydney Harbour will also create wave sheltering effects depending on wave direction.

73 Based on long-term determination of the Sydney wave climate (Short and Trenaman, 1992), the mean significant wave height in the month of September is 1.54 metres and the mean wave period is 8.0 seconds. These values are close to the yearly averages experienced in Sydney.

74 Significant wave heights recorded at the offshore buoy on 15 September ranged from 1.6 metres to 2.1 metres and wave periods ranged from 7.1 seconds to 9.2 seconds.

There was no discernible trend in wave height or wave period throughout the day. Wave heights were slightly higher than normal, while wave period was consistent with normal conditions.

75 Significant wave heights recorded at the offshore buoy on 16 September ranged from 1.6 metres to 1.9 metres and wave periods ranged from 8.2 seconds to 9.6 seconds. Of note, data was not available on this day from 13:30 to 24:00 hours. When measurements were being taken, there was no discernible trend in wave height and waves were slightly lower than on 15 September 1985. Wave period did seem to increase after 12:00 noon to 9 – 10 seconds.

76 The offshore wave buoy did not start recording wave data until 08:40 am on 17 September 1985. Significant wave heights were higher on this day ranging from 1.9 metres to 2.5 metres and wave periods were longer ranging from 11.2 to 12.1 seconds. Both significant wave height and wave period were higher than normal conditions.

77 Overall, waves on 15 and 16 September 1985 were relatively consistent with only slightly higher significant wave heights than mean conditions, but on 17 September 1985 (and possibly after 13:30 pm on 16 September 1985) there was a noticeable increase in wave height associated with long period swell wave conditions.

78 Given the calm to light winds present, the waves between 15 – 17 September 1985 would have been manifest as clean swell waves without wind chop/whitecapping present.

79 Following this period of interest, significant wave heights were slightly smaller (1.5 – 2 metres) on 18 – 19 September 1985, but began to increase in height to 2.5 – 3 metres late on the 19th and early on the 20th of September 1985.

80 The 20th and 21st of September 1985 were characterised by extremely large waves with significant wave heights between 4 – 5 metres and wave periods on the order of 10 seconds. Wave heights of this magnitude along the Sydney coast are relatively uncommon, occurring only several times in a typical year.

81 Larger than normal waves (significant wave heights > 2 metres continued until 24 September 1985 when waves decreased to lower than average significant wave heights between 0.7 – 1.5 m between 24 – 26 September 1985.

82 It should be noted that swell refers to waves that have been formed by wind blowing across a long fetch (open water distance) for an extended period of time (days). In general, swell waves require wind to blow across a fetch of 1000 kilometres or more and are classified as having periods of between 8 seconds and 20 seconds. Swell waves that reach the Sydney coast are formed significant distances away from Sydney (1000's of kilometres) and may take several days to reach the Sydney coastline. The longer the wave period, the further the waves have travelled.

83 It should also be noted that ocean waves tend to travel in groups (often referred to as wave sets) of 3 – 10 larger waves separated by several minutes of smaller waves. The number of waves in a group and the time interval between groups is random and

cannot be predicted. However, longer period waves which have travelled further distances, tend to have a more pronounced group structure. This suggests that wave groups were particularly pronounced from 17 – 19 September when long period swell waves were present. The implications of these wave groups are discussed in Paragraph 128.

84 The offshore wave rider buoy did not record direction and local winds do not determine the direction of swell waves.

85 In the absence of directional wave data from the Sydney wave rider buoy, I have been provided with daily synoptics (both forecast and observed) created by the Bureau of Meteorology and printed in the Sydney Morning Herald. These synoptics cover the period 8 – 20 September 1985 and a forecast for 21 September 1985.

86 It is my opinion that between 8 – 10 September, a high pressure weather system dominated wave conditions along the Sydney coast would have resulted in waves approaching the coast from a north-easterly direction.

87 It is my opinion that the slow moving low pressure system moving across NSW and the Sydney region between 11 – 14 September 1985 would have resulted in waves approaching the Sydney coastline from the south-east.

88 It is my opinion that as the low pressure system moved further offshore of Sydney into the Tasman Sea between 15 – 17 September 1985, swell waves approaching the Sydney coastline would have been from the south-east.

89 As the low pressure system in the Tasman Sea moved further to the south-east, it would have created longer period swell from 17 – 19 September. This is evident from the offshore wave data which indicates wave periods along the Sydney coast of between 11 and 12.5 seconds during this time.

90 The offshore low pressure system in the Tasman Sea appeared to intensify on the 18th and 19th Sept 1985. This would account for the extremely large significant wave heights of between 4 – 5 metres along the Sydney coast between the 20th and 21st of September 1985.

91 I acknowledge that while I do not have expertise in meteorology or interpreting synoptic charts, I understand the basic principles through my own university study and interest in waves and wave prediction. I believe that my interpretations provide a reasonable approximation of the wave direction over the period of interest.

**P2.4 Currents**

92 Surface drift caused by wind can transport floating objects, such as human bodies both alive and deceased, in the direction the wind is blowing. The period 15 – 18 September 1985 was characterised by some offshore winds, but these winds were calm and light in strength and variable in direction. It is my opinion that winds were not strong enough, or sustained in any particular direction, to have exerted any influence on the potential travel direction of a human body in the region of interest.

93 Tidal currents along the coastline from Tamarama Beach extending north past Tamarama Point, Mackenzies Point, Bondi Beach and Ben Buckler Point are negligible, even during spring tide conditions such as experienced from 15 – 17 September. In general, tidal currents are not present on open ocean coastlines in micro-tidal environments (tide ranges less than 2 meters). They are generally restricted to inlets, rivermouths, estuaries and the areas immediately surrounding any constricted opening to the ocean (such as a tidal inlet or harbour entrance – both natural and engineered).

94 The areas of Tamarama Point, Mackenzies Point and Ben Buckler are rocky coast headlands, which represent a natural focus for wave energy due to patterns of wave refraction – the bending of wave crests as they travel from deeper to shallower water. This causes larger, more energetic wave breaking conditions at the seaward extremity of the headlands with smaller, less energetic wave breaking conditions along the sheltered/lee sides of the headland. This difference in wave breaking generally produces a net drift of water from the seaward extremity of the headland along the rock coast towards the more sheltered areas. In general, the larger the waves, the stronger this drift will be. However, few, if any, measurements of this drift exist in the scientific literature.

95 The existence of such a headland drift on either side of Tamarama Point and the southern side of Mackenzies Point (Marks Park headland) is complicated by the presence of boundary rip currents which often flow offshore from the northern ends of Tamarama Beach and Mackenzies Bay. More information on boundary rip currents is given in Paragraph 102.

96 The existence of such a headland drift on the northern side of Mackenzies Point is complicated by the presence of a rock outcrop just north of the Bondi Icebergs complex, which also creates and area of wave focussing and breaking. Any drift from this quasi-headland is also complicated by the presence of a persistent boundary rip current at the southern end of Bondi Beach.

97 The existence of such a headland drift on the southern side of Ben Buckler Point is complicated by the common presence of a boundary rip current flowing out from the northern end of Bondi Beach.

98 It should be acknowledged that the rocky coasts in this area are characterised by a complicated geologic geometry including rock platforms of varying widths, slopes and orientation and the presence of eroded sandstone boulders of varying sizes and locations. This makes it extremely hard to ascertain current action in these environments under variable wave conditions and, as mentioned previously, measurements of drift patterns along headlands and rock platforms are rare.

99 The rocky coast stretching from Tamarama Point north around Mackenzies Point to the southern end of Bondi Beach and the section extending from the northern end of Bondi Beach around Ben Buckler Point is characterised by semi-continuous rock (or shore) platforms. The region seaward of rock/shore platforms is extremely hydrodynamically energetic and turbulent, even during small wave conditions. This is largely due to a combination of waves breaking on the rock platform as well as the reflection of wave energy from the rock platform. This area of turbulence does not

necessarily move objects in a net direction parallel to the rock platform, but can induce a general drift in a direction perpendicular to the shore platform, which is generally offshore. However, if waves are approaching the rocky coastline and shore platform from a particular angle (direction), it is possible that a general drift may develop in the direction that the waves are moving.

100 Tamarama Beach, Mackenzies Bay, and Bondi Beach are all characterised by strong, narrow flows of water that extend from the shoreline, through the surf zone (region of breaking waves) to variable distances offshore.

101 It should be noted that a beach is sometimes present in Mackenzies Bay (Mackenzies Beach), but it is an ephemeral beach that usually only appears during an extended period of beach recovery, typically associated with El Niño weather cycles. According to the Bureau of Meteorology, September 1985 occurred after several years of a neutral phase of the Southern Oscillation Index (neither established El Niño or La Niña conditions) and it is unlikely that a beach was present at Mackenzies during this time.

102 There are three primary types of rip currents (Castelle et al., 2016): i) channelised rip currents, which occupy deeper channels between sand bars and are persistent in location and time. When present, these rip currents tend to be approximately 5 – 20 metres wide and occur approximately every 150 – 200 m along a beach; ii) boundary rip currents, which occur adjacent to headlands and structures and are persistent in location and often occupy deeper channels; and iii) flash rip currents which are sporadic in occurrence and may only last for a minute or less. Flash rips do not

occupy deeper channels, but are formed when several large waves, or a wave group, break and the water is forced offshore.

103 In general these types of rips will flow offshore to the seaward extent of the surf zone and a short distance beyond before they stop – under typical wave conditions, this is usually about 50 to 100 metres from the shoreline.

104 Another type of rip current is a 'mega-rip' which forms in pocket and embayed beaches (such as Tamarama, Mackenzies Bay) during extremely large wave conditions where significant wave heights are greater than 3 metres (Castelle et al., 2016). Mega rip currents can flow hundreds of meters offshore (McCarroll et al., 2016).

105 Channel and boundary rip current flow behaviour can exhibit two scenarios: i) the flow may exit beyond the surf zone before slowing down in an expanding region known as the rip head; or ii) the flow may recirculate without leaving the surf zone. It is impossible to predict which pattern of rip current flow behaviour will occur as rip current flow is variable between different types of rip currents, adjacent rip currents, and within the same rip current over time. However, there is some evidence that boundary rip currents are more prone to flowing further distances offshore (Castelle et al., 2016).

106 Channel and boundary rip currents tend to flow fastest (in microtidal environments) approximately 1.5 hours either side of low tide when wave breaking is maximised. Under spring tide conditions, such as those that occurred between 15 – 17 September, any rip currents that may have been present would have exhibited strong

rip current flow, regardless of wave height, approximately 3 hours either side of low tide.

107 It is not uncommon for channel and boundary rip current flow to cease completely around high tide due to greater water depths and reduced wave breaking. This is particularly true around high tide during spring tide conditions.

108 Channelised and boundary rip currents are subject to pulsations in their flow – sudden accelerations in flow speed that may last for 30 – 60 seconds. These pulsations have been linked to the existence of wave groups and cause rip current flow to extend well beyond the surf zone (Brander and Short, 2001).

109 Tamarama Beach is an 80 m long embayed sandy beach that is typically characterised by boundary rip currents at one, if not both ends. There is almost always a boundary rip current at the northern end (Short, 2007). It is prone to megarips during very large swell events with significant wave heights greater than 3 metres.

110 Mackenzies Beach is a very small (typically 20 to 50 metres when present) and ephemeral pocket beach that is usually dominated by a rip current flowing along the rocks whether the sand is present or not (Short, 2000). As noted in Paragraph 101, it is unlikely that a beach was present in September 1985, however the Mackenzies embayment is prone to megarips during very large swell events with significant wave heights greater than 3 metres.

111 Bondi Beach is a 900 metre long sandy beach characterised by a prominent boundary rip current at the southern end and is generally characterised by 2 – 4 channelised rip currents along the beach and often a boundary rip current at the northern end. It is also prone to megarips during very large swell events with significant wave heights greater than 3 metres.

112 It should be noted that rip currents are not always present at these beaches and it is not possible to determine the presence of rip currents at any of these locations between 15 – 17 September 1985 with complete confidence. However, rip currents are common features at these beaches it is probable that rip current activity would have been present on the beaches given that wave heights were above normal during this period.

113 A summary of idealised currents and water movement directions based on environmental conditions for the period 15 – 17 September 1985 is provided in Figure 1. This ideal scenario assumes that channelised and boundary rip currents were present although they might not have been.

114 A summary of idealised currents and water movement directions associated with the large wave conditions during the period 20 – 21 September 1985 is provided in Figure 2.

115 On 17 May 2023 I was provided with an email setting out observations made by Waverley Council Lifeguard Bruce Hopkins in relation to human bodies in the water and drift and water currents. Mr Hopkins states that '*With bodies that have been in the*

*water it depends on the currents under the water on which way the body will go*' and '*Often it can be in the opposite direction of the wind*'.

116 It is my opinion that Mr Hopkins is referring to currents moving a human body in a particular direction regardless of whether it is floating at the surface or submerged (including resting on the bottom). I would agree with his observation as current strength can over-ride any surface drift caused by wind, particularly in the case of beach rip currents.

117 If Mr Hopkins is referring to currents in deeper water he may inadvertently be referring to an effect termed an Ekman Transport where the combination of friction and the Coriolis force causes water at the bottom of the ocean to move in the opposite direction to the direction that wind is blowing at the surface. However, Ekman Transport only really occurs in waters depths of over 100 metres, which only occur approximately 20 – 25 kilometres offshore of Sydney and is unlikely to be a factor in this case.

118 My Hopkins also writes that '*In my opinion if the body was not found the body would have drifted toward Sth Head from Bondi then in the current which would go roughly 3kms out to sea and into either the Nth running current heading to QLD or the Sth running current heading to Victoria*'.

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**Figure 1.** Representation of idealised water movements in the region of interest from Tamarama Beach to Ben Buckler between 15 – 18 September 1985. Note that the image was taken on 4 October 2021 and is used as a guide only. Actual wave and beach morphology present on this day are not the same as the period of interest. Arrows indicate approximate locations of rip currents assuming they were present. (Image Source: Nearmap).

120 This observation by Mr Hopkins assumes that a human body would first have to be either floating or submerged offshore of Ben Buckler Point in order to drift northwards to South Head. It also assumes that there is an outgoing current out of Sydney Harbour, which I assume would be the ebb tidal prism (volume of water) moving out during a falling tide, although I am not aware of any data which has tracked the offshore distance of this offshore tidal current. I agree with Mr Hopkins that at distances of 3 kilometres offshore, deeper ocean currents would determine the direction of a human body, whether it was floating or submerged. I am not aware of the nature or direction of these currents, but the dominant deepwater

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current offshore of the Sydney Coast is the East Australian Current which is a southward flowing current.

121 


**Figure 2.** Representation of idealised water movements in the region of interest from Tamarama Beach to Ben Buckler between 19 – 21 September 1985. Note that the image was taken on 31 May 2021and is used as a guide only. Actual wave and beach morphology present on this day are not the same as the period of interest. Arrows indicate approximate locations of rip currents assuming they were present. (Image Source: Nearmap).

## POINT 3. WOULD MR MATTAINI HAVE ENCOUNTERED DIFFICULTY IF HE HAD GONE SWIMMING AT OR AROUND THE IDENTIFIED AREAS (NOTING THAT HE MAY NOT HAVE BEEN A STRONG SWIMMER)

122 The month of September in Sydney is characterised by some of the cooler ocean water temperatures of the year with a long-term average of 18.4 degrees Celsius

(www.seatemperature.re) and is not generally associated with recreational ocean swimming unless daytime temperatures are quite high.

123 It is my opinion that given cooler water temperature and mild, but cooler mornings and evenings between 15 – 17 September 1985 that it is unlikely that Mr Mattaini would have gone for a swim during this time.

### P3.1 Swimming around the rocky coastline

124 If Mr Mattaini had gone swimming, it is my opinion that he would not have done so off the rocky coasts around Tamarama Point, Mackenzies Point and Ben Buckler. These areas are difficult and dangerous to access for recreational swimming and it is not a common occurrence at all. The exception would be the rocky coast from the north end of Bondi Beach towards the boat ramp near Ray O'Keefe Reserve which is a popular access point for swimming and snorkelling.

125 Significant wave heights were higher than average between 15 – 17 September 1985 and the rocky coast area around Ben Buckler would have been exposed to the south-east swell waves. Conditions would have been challenging for any swimmer, particularly on 17 September 1985 with the larger waves and longer wave periods on this day.

126 Rocky coastlines are always more hazardous to people walking/swimming on them during high tide conditions, when waves are more likely to overtop and submerge the rock platforms. It is during these conditions that swimmers of all abilities would

encounter difficulty and anyone walking on the rock platforms would be of greatest risk of being swept unwillingly into deeper water.

127 Based on timing and sea level associated with the high tides shown in Paragraphs 54 – 65, this suggests that the most dangerous times for swimmers off any of the rocky coastline of interest, including the region described above around Ben Buckler, for the period of interest was between:

8 am to 2 pm on 15 September 1985 (very high tide at 11 am of 1.91 meters)
9 pm to 1 am on 15/16 September 1985 (high tide of 1.66 metres at 11 pm)
9 am to 1 pm on 16 September 1985 (high tide of 1.76 metres at 11 am)
10 pm to 2 am on 16/17 September 1985 (high tide of 1.66 metres at midnight)
10 am to 2 pm on 17 September 1985 (high tide of 1.63 metres at noon)

128 Of these periods of higher risk for swimming along the rocky coasts, it should be noted that 17 September 1985 was characterised by longer period waves and likely more pronounced sets of larger waves (wave groups – Paragraph 83). Wave groups increase the hazard level around rocky coasts as the larger waves associated with them are more likely to overtop and submerge the rock platform and inundate further inland. For this reason, the period between 10 am to 2 pm on 17 September 1985 would have represented the most dangerous conditions in the region of rocky coast.

129 However, as stated previously, it is my opinion that it is unlikely that Mr Mattaini would have gone swimming in these rocky coast areas due to the air/sea temperature

and the larger than average wave conditions and clear risk – the latter would likely deter someone who was not a strong swimmer.

### P3.2 Swimming from the beach

130 As discussed in Paragraph 101, it is unlikely that a sandy beach was present in Mackenzies Bay between 15 – 17 September 1985.

131 If Mr Mattaini had gone swimming at a beach, it most likely would have been at Tamarama or Bondi Beaches.

132 According to Surf Life Saving Australia (www.beachsafe.org.au), Tamarama Beach, Mackenzies Beach, and Bondi Beach have a mean hazard rating of 8/10, 7/10, and 7/10 respectively, where 1 = low hazard and 10 = extreme hazard. These ratings are largely based on typical wave heights and the presence of rip currents, but do not take into account the presence/absence of lifeguards.

133 I would assume the Waverley Council Lifeguards were on patrol over the period 15-17 September 1985, I am not sure about the presence of lifeguards at Tamarama Beach over this time.

134 Given that wave heights were larger than usual, particularly on 17 September 1985 and that waves were likely from the south-east, it is my opinion that swimming conditions between 15 – 17 September 1985 would have been challenging for swimmers of all abilities.

135 It is my opinion that boundary rip currents most likely would have been present at the north end of Tamarama Beach, Mackenzies Bay, and the southern and northern end of Bondi Beach.

136 It is my opinion that Bondi Beach would likely have been characterised by several channelised rip currents along the beach.

137 It is my opinion that if Mr Mattaini had gone swimming at any of these beaches, particularly outside of the red and yellow flags (if present), he likely would have encountered some difficulty given conditions, particularly if he was not a strong swimmer. It is possible he may have been caught in a rip current if he was swimming outside of the red and yellow flags. However, as expressed in Paragraph 118, it is my opinion that given air/sea temperatures and wave conditions, it is unlikely that Mr Mattaini went swimming voluntarily.

## POINT 4. APPROXIMATELY WHERE MR MATTAINI'S BODY MAY HAVE TRAVELLED ON THE ASSUMPTION THAT HE ENTERED THE SEA FROM THE SHORELINE:

### a) At any point along the coastal walk around Mark's Park

138 I will assume that this area in question extends from Mackenzies Bay around Mackenzies Point (Marks Park headland) to the vicinity of the Bondi Icebergs complex.

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139 This region is dominated by rocky coast geomorphology and as described in Point 104 the region seaward of rock/shore platforms is extremely hydrodynamically energetic and turbulent, even during small wave conditions. This is largely due to a combination of waves breaking on the rock platform as well as the reflection of wave energy from the rock platform. This area of turbulence does not necessarily move objects in a net direction parallel to the rock platform, but can induce a general drift in a direction perpendicular to the shore platform, which is generally offshore. This distance may vary from several metres to 30 – 40 metres or more depending on wave conditions.However, if waves are approaching the rocky coastline and shore platform from a particular angle (direction), it is possible that a general drift may develop in the direction that the waves are moving.

140 Given that waves between 15 – 17 September 1985 were higher than normal and were likely from the south-east, this suggests that if Mr Mattaini's body had entered the water along the southern side of Marks Park, from Mackenzies Bay towards Mackenzies Point, it would likely have remained in that vicinity whether it was floating or submerged. It is likely it would have moved offshore from the rocky shoreline due to wave reflection and turbulence. This distance could have been anywhere from several metres to 30 – 40 metres offshore (Figure 1).

141 If a boundary rip current was operating along the northern end of Mackenzies Bay, this may have assisted the transport of Mr Mattaini's body further offshore (Figure 1).

142 Under the same wave conditions, if Mr Mattaini's body had entered the water along the northern side of Marks Park, from Mackenzies Point towards the Bondi Icebergs complex, it would likely have drifted offshore from the rock platform (Figure 1).

143 However, without knowing if Mr Mattaini's body had entered the water along the coastal walk around Marks Park it is difficult to comment with a high degree of confidence exactly where his body may have travelled.

**b) At any point along the walk from Bondi Beach to Ben Buckler Point (at the end of Brighton Boulevard**

144 If Mr Mattaini had entered the water along the shoreline of Bondi Beach it is possible that offshore flows of water associated with rip currents, subsurface bed return flows, and the return flows associated with the passage of wave troughs, could have transported Mr Mattaini's body in an offshore direction regardless of whether he was floating or submerged or alive or deceased.

145 I have been involved in research at Bondi Beach involving both direct (using GPS drifters) and indirect (remote camera imagery) measurements of nearshore circulation (McCarroll et al., 2016; 2018) and based on these measurements, it is possible that Mr Mattaini's body would have been transported offshore beyond the surf zone into deeper water between 15 – 17 September 1985.

146 Figure 3 shows measurement data of flow behaviour at Bondi Beach based on the deployment of over 25 GPS drifters over a single tidal cycle at Bondi Beach on: a) 26

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July 2012; and b) 3 August 2012. The perspective in this Figure is looking down at the beach from above with the southern end of Bondi Beach to the left and the northern end to the right. Offshore is towards the bottom of the plots. The values on the axes are in units of metres.

147 The flow field shown in Figure 3a took place during wave conditions (measured on site) characterised by significant wave heights of 1.3 metres and wave periods of 10 seconds. Waves were from the east-southeast. Both re-circulating and exiting rip current behaviour was evident with current flow extending approximately 250 metres offshore at times.

148 The flow field shown in Figure 3b took place during wave conditions (measured on site) characterised by significant wave heights of 1. 6 m and wave periods of 10.9 seconds. Waves were from the south-east. Both re-circulating and exiting rip current flow behaviour was evident although the rip current flow in the middle of the beach extended 500 metres offshore.

149 These wave conditions, particularly those in Figure 3b, are similar to those for the period 15-17 1985 and while it is not possible to state with complete accuracy where a human body may have been transported if caught in a rip current along the beach, there is certainly strong potential for a human body to have been transported offshore of the surf zone into deeper water.

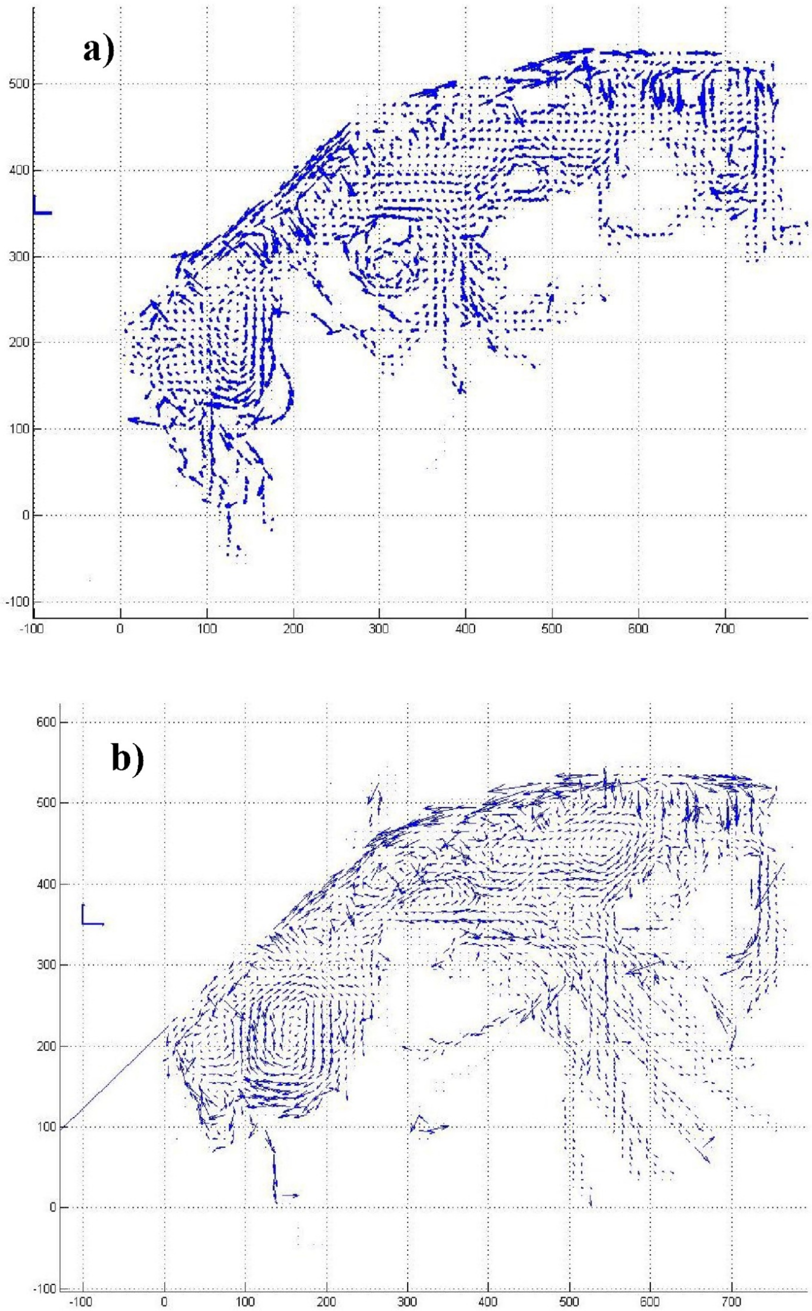


**Figure 3.** Planform (view from above) presentation of flow circulation patterns measured over a tidal cycle at Bondi Beach, Sydney, NSW based on deployment of GPS drifters on: a) 26 July 2012; and b) 3 August 2012. The southern end of the beach is to the left; northern end to the right. Offshore is towards the bottom of the Figure (Source: Professor Rob Brander).

150 If Mr Mattaini's body had entered the water along the shoreline at any point along the walk from Bondi Beach to Ben Buckler Point (at the end of Brighton Boulevard), it would have potentially be subject to a number of factors that could influence where it may have travelled.

151 As waves were likely from the south-east, the section of the coast from Bondi Beach to the Ray O-Keefe Reserve would have been largely protected from wave activity by Ben Buckler Point. In this case a human body would have remained in the vicinity regardless of whether it was floating or submerged.

152 If a boundary rip was operating on the northern end of Bondi Beach, this could move a human body further offshore (but not as far as the Ray O-Keefe Reserve) or re-circulate it back into the surf zone at Bondi Beach regardless of whether it was floating or submerged.

153 If a human body entered the water between the Ray O-Keefe Reserve and Ben Buckler Point at the end of Brighton Boulevard, this region would have received the full impact of breaking waves and it is likely that a human body would have moved offshore due to reflection/turbulence in this region regardless of whether it was floating or submerged.

## 2. OTHER MATTERS ARISING

154 There are several other important considerations to be made in determining where Mr Mattaini's body may been located or travelled to if he had entered the water between Mackenzies Bay and Ben Buckler Point.

## 2.1 Post-mortem buoyancy

155 The direction that a human body floating on the surface of the ocean would travel is influenced by the action of wind, wave action and the presence of currents.

156 The direction that a human body at the bottom of the ocean would travel is influenced by sub-surface currents/drift and post-mortem buoyancy.

157 The implication here is that depending on whether a human body is floating at the surface, or submerged, travel directions and pathways may differ under the same environmental conditions.

158 On 18 May 2023 I was provided with a copy of a report by Dr L.E. Iles, a forensic pathologist, in relation to the buoyancy and decomposition of bodies in water post-mortem. I will not repeat the full details of the report here, but will identify salient points relevant to the disappearance of Mr Mattaini.

159 Dr Iles states that in general a deceased person immersed in seawater will float for a period of time until buoyancy decreases to a point with the body sinks. The body may then be vertically displaced downwards in the water and moved about until such time that the production of gases of decomposition increases the buoyancy to a point where the body resurfaces again. As decomposition increases and gases are released from the body, the buoyancy is reduced and the body remains will sink again.

160 However, Dr Iles states that this is an idealised scenario and the actual occurrence of these stages of buoyancy and the time frames involved is extremely difficult to

determine given the number of uncontrolled variables relating to the individual and the environment.

161 However, based on the report of Dr Iles, it is likely that if Mr Mattaini's body had initially been floating in the water, at some point it would have become submerged.

162 Dr Iles describes a measure called the Post-Mortem Submersion Interval (PMSI) which is an estimate of how long a body has been in the water from when it first entered the water until it was discovered. As Mr Mattaini's body was never recovered, the PMSI is not applicable here, but Dr Iles reports research that suggests that the length of immersion in water is longer in colder water, but acknowledges that this immersion time may include both time spent floating at the surface and time submerged. However, given that September traditionally has cooler ocean water temperatures in Sydney (Paragraph 129), if Mr Mattaini's body had become submerged quickly after entering the water, it may have remained submerged longer due to the colder water temperatures.

163 Dr Iles also describes a measure described as Accumulated Degree Days (ADD) which is the sum average daily water temperature in degrees Celsius for the period in which the body is immersed. Dr Iles refers to research conducted in Portugal which suggests that an ADD range of 100 – 140 hours (approximately 4 – 6 days) correlates with a human body resurfacing once submerged. However, Dr Iles acknowledges the small sample size and the site specific nature of the Portuguese study.

164 However, if the ADD range reported above is assumed to be representative, this suggests that if Mr Mattaini's body had entered the water and become submerged between 15 – 19 September 1985, it likely would not have resurfaced before the extreme wave event which began on 19 September 1985, the implications of which are described in Paragraphs 175 – 180 below.

## 2.2 Rocky coasts and tidal exposure

165 Rocky coasts generally face the full force of ocean waves and are energetic environments in terms of wave activity. Most rock platforms can become fully submerged at high tide and completely, or partially, exposed at low tide, although this depends on the tidal range. During periods of spring tides rock platforms would be fully inundated by wave action around high tide and likely fully emerged around low tide. Considerable water movement occurs across rock platforms in all directions where and when the rock platform is covered by water and exposed to wave activity. The rocky coastline, including both subaerial and subaqueous topography, extending from Tamarama Beach northwards to Ben Buckler Point is shown in Figure 4.

166 The level of inundation of the rocky coastline between Mackenzies Bay and Ben Buckler Point should be considered given that spring tides were present during the period of interest. These may help explain periods where access to the water/shoreline was easier or more difficult/hazardous and/or whether a human body which may have fallen on the rocks/rock platform, would have fallen onto dry rocks or in water.

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**Figure 4.** The rocky coastline between Tamarama Beach to the Bondi Icebergs pool and from North Bondi Beach to Ben Buckler Point. Subaqueous rocky topography is evident by dark shadow areas offshore of the rock platforms. (Source: Nearmap).

167 The level of inundation of the rocky coastline between Mackenzies Bay and Ben Buckler Point should be considered given that spring tides were present during the period of interest. These may help explain periods where access to the water/shoreline was easier or more difficult/hazardous and/or whether a human body which may have fallen on the rocks/rock platform, would have fallen onto dry rocks or in water.

168 On 15 September 1985 the rocky coasts would likely have been exposed (around low tide) between approximately 3:00 pm and 6:00 pm and been inundated with

water (high tide) approximately between 9:00 am to 1:00 pm and between 10:00 pm and midnight.

169 On 16 September 1985 the rocky coasts would likely have been exposed (around low tide) between approximately 3:00 am and 7:00 am and between 4:00 pm and 8:00 pm and been inundated with water (high tide) approximately between 10:00 am and noon and between 11:00 pm and 1:00 am on 17 September 1985.

170 On 17 September 1985 the rocky coasts would likely have been exposed (around low tide) between approximately 4:00 am and 8:00 am and between 4:00 pm and 8:00 pm and been inundated with water (high tide) approximately between 11:00 am and 1:00 pm.

171 It should also be noted that complex and turbulent wave and drift conditions combined with irregular topography makes it very difficult to determine with complete confidence the direction of travel of a human body entering the water at a coastal location such as the rocky coastline between Mackenzies Bay and Ben Buckler Point.

172 These same conditions also make it difficult to conclude whether a human body on a rock platform, or in the water adjacent to a rock platform, would remain in those locations. A human body on a rock platform may be washed into the ocean by wave action or wedged between rocks by wave action. A human body in the water adjacent to a rock platform may remain in the water, be washed back onto the rock platform, be transported offshore, or caught amongst submerged rocks and caves.

## 2.3 Extreme wave heights and mega rip currents

173 It is my opinion that tidal currents are not a factor on the direction of travel of Mr Mattaini's body assuming he entered the water in the locations of interest.

174 It is my opinion that rip currents may have contributed to Mr Mattaini's body being transported offshore assuming that he entered the water for a swim at Bondi Beach or in the vicinity of boundary rip currents (Figure 1), and was caught in a rip current.

175 It is my opinion that a significant wave event occurred between the 19$^{th}$ to 21$^{st}$ September 1985 that is relevant to the fact that Mr Mattaini's body has never been found, assuming that he had somehow ended up in the water between 15 – 17 September 1985.

176 As described in Paragraph 80, the period 19 – 21 September 1985 was characterised by extremely large significant wave heights between 4 – 5 metres. Maximum wave heights during this time reached heights between 8 – 9 metres. This was a very large wave event.

177 As described in Paragraph 99, rocky coastlines are exposed to complex and turbulent wave and drift conditions. Under wave heights of this size, the turbulence and wave reflection along the rocky coastline would have been extremely chaotic. In my opnion, the wave reflection off the rocky coast would have transported Mr Mattaini's body, if present, in an offshore direction (Figure 2).

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178 As described in Paragraph 104, embayed beaches and coasts can experience the formation of very large rip currents, called mega-rips when waves exceed approximately 3 meters in height, which can transport water up to a kilometre offshore if not more (Castelle et al., 2016; McCarroll et al., 2016). It is my opinion that the coastline from Bronte Beach to Bondi Beach experienced mega-rip activity between 19 – 21 September 1985 (Figure 2).

179 It is my opinion that if Mr Mattaini's body had been submerged in the water in the region extending from Bronte Beach to Ben Buckler Point (and some distance north) between 15 – 18 September 1985 then it would have been transported a considerable distance offshore into deeper water sometime between 19 – 21 September 1985.

180 While it is not possible to comment on the potential distance a human body may have been transported offshore during these conditions, it was almost certainly beyond the geological embayments of the region, in which case it would be subject to deeper ocean currents and would therefore be unlikely to return to the region of interest. This supports the observation made by Waverley Council Lifeguard Mr Bruce Hopkins in Paragraph 118.

### 2.4 Visibility and mortality

181 It is my opinion that if Mr Mattaini's body had remained floating during the daylight hours between 15 – 19 September 1985 in the vicinity of the coastal walk around Marks Park and the vicinity of Ben Buckler, it would have been located anywhere from several metres to 30 – 40 metres offshore of the rocky coastline due to wave

reflection and turbulence. In this case it is my opinion that his body would likely have been visible from elevated vantage points. However, it is unlikely that his body would have been visible from these locations during night time hours.

182 It is my opinion that if Mr Mattaini had entered the water in any of the rocky coast locations alive between 15 – 19 September 1985 and remained at the surface that he would have been located anywhere from several metres to 30 – 40 metres offshore of the rocky coastline due to wave reflection and turbulence in these areas. In this regard there is no difference to his location whether he was alive or deceased or whether he was floating at the surface or submerged.

183 It is my opinion that if Mr Mattaini had entered the water fully conscious and uninjured between 15 – 19 September that he would likely have remained in the same vicinity as described in the Point above and been able call or signal for help. It is my opinion that if this had happened during daylight hours, he would likely have attracted attention. If it had happened during night-time hours, particularly between 10 pm and 5 am, the chances of attracting attention would be reduced due to poor visibility and fewer people about.

184 It is my opinion that if Mr Mattaini had entered the water alive at night between 15 – 19 September 1985 that there is a strong possibility he would have drowned due to the combination of cooler water temperatures, wave breaking, wave reflection, poor visibility and the possibility that he was fully or partially clothed.

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## 3. CONCLUDING FINDINGS AND OPINIONS

185 I am a coastal scientist with expertise in coastal morphodynamics, the rip current hazard and beach safety.

186 It is my opinion that local weather and wind conditions during the period of interest would not have influenced the direction of travel of Mr Mattaini's body in the water.

187 It is my opinion that tidal currents would not have influenced the direction of travel of Mr Mattaini's body in the water during the period of interest.

188 While it is my opinion that it is highly unlikely that Mr Mattaini chose to go for a swim between 15 – 17 September 1985 due to air and sea temperature, conditions for swimming along the rocky coastline in the region of interest would have been challenging and hazardous due to the presence of larger and longer period waves than normal.

189 It is my opinion that if Mr Mattaini had chosen to go for a swim at Tamarama or Bondi Beach during the period of interest that rip currents were likely present outside of the patrolled flag locations and conditions would have been challenging for swimming.

190 It is my opinion that given wave conditions between 15 – 17 September that if Mr Mattaini's body had entered the water at any point along the coastal walk around Marks Park that his body would have remained in the vicinity whether it was floating or submerged, but may have travelled a short distance offshore (varying from several

metres to 30 – 40 metres). This would be the case regardless of whether he was alive or deceased at the time of water entry.

191 It is my opinion that given wave conditions between 15 – 17 September that if Mr Mattaini's body had entered the water at any point along the walk from Bondi Beach to Ben Buckler Point, he may have ended up in deeper water beyond the surf zone if caught in a rip current while swimming at the beach. If his body entered the water along the rocky coast from the north end of Bondi Beach to Ben Buckler Point at the end of Brighton Boulevard, he likely would have remained in the vicinity, but travelled further offshore (several metres to 30 – 40 metres) regardless of whether he was floating or submerged. This would be the case regardless of whether he was alive or deceased at the time of water entry.

192 It is my opinion that if Mr Mattaini's body had been in the water anywhere along the coastline between Tamarama Beach and Ben Buckler Point (and even further distances in each direction) that he would have travelled further distances offshore, possibly up to a kilometre, due to wave reflection and mega rip current activity during the extremely large wave conditions that occurred from 19 – 21 September 1985.

193 It is my opinion that if Mr Mattaini's body was in the water at this time, either at the surface or submerged, and either alive or deceased, that this extreme event is the primary reason why Mr Mattaini has never been found.

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Professor Robert W. Brander

BSc, MSc, PhD, AM

# APPENDIX A

## *CURRICULUM VITAE*

## ROBERT W. BRANDER BSC MSC PHD

### CAREER SUMMARY & HIGHLIGHTS

**RESEARCH**

- **PhD in Coastal Morphodynamics with significant international research profile & publication record**
- **Google Scholar *h*-index = 34; *i10*-index = 69; Citations = 4160 as of April 2023**
- **15 scholarly book chapters, 84 international refereed journal papers and 32 internationally refereed conference papers/abstracts**
- **> 1,000,000 in external research funding including Australian Research Council (ARC) funding ($676,000).**
- **36 years research experience in coastal geomorphology and beach safety science**
- **Director UNSW Beach Safety Research Group (ww.beachsafetyresearch.com)**
- **2012 Australian Government *Eureka Prize* winner for *Promoting Understanding of Australian Scientific Research***

**TEACHING**

- **Consistently high undergraduate teaching and course evaluation scores**
- **Course co-ordinator of major first year Physical Geography/Environmental Science course (100+ students) since 1998**
- **$120,000 of UNSW Strategic Educational Development Funding since 2015**
- **UNSW Faculty of Science Excellence in Teaching Award 2011**
- **Supervision of 6 HDR & 27 Honours students**
- **Post-Graduate Co-ordinator UNSW Sydney School of BEES 2014-2016**

**SERVICE & OUTREACH**

- **Appointed as a Member of the Order Australia (AM) on January 26, 2023 for service to coastal science, and to the community, through beach safety research and education**
- **Facilitator of the multi-award winning community education program 'Science of the Surf (SOS) since 2001. SOS presentations given to over 50,000 people.**

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- **Significant mainstream and social media profile in promoting public understanding of rip current science and beach safety hazards. Known as '*Dr Rip*'.**
- **Educational beach safety related YouTube videos with > 2.2 million views**
- **2018 National Geographic documentary 'Rip Current Heroes' and 2022 US PBS documentary 'Rip Current Rescue' and associated Study Guides**
- **Author of 2010 bestselling book *Dr Rip's Essential Beach Book***
- **Rip current education websites at www.scienceofthesurf.com and www.ripcurrentsafety.com**

## PRESENT WORK DETAILS

Professor, School of Biological, Earth and Environmental Sciences (BEES), UNSW Sydney, Sydney, NSW 2052, Australia.

Tel [redacted]; Fax [redacted]; Mobile [redacted]; Email [redacted]

Present Roles and Associated Research Centres:

- Director of UNSW Beach Safety Research Group (UNSW BSRG)
- Member of UNSW Centre for Marine Science and Innovation (CMSI)
- Member UNSW Earth and Sustainability Science Research Centre (ESSRC)

## EDUCATION

**PhD in Marine Science** – *Field Observations on the Morphodynamics of Rip Currents* (1993 – 1997), Department of Geography, University of Sydney, Australia

**MSc in Geography** – *Bedform Constraints on Sediment Re-suspension and Transport under Shoaling and Breaking Waves* (1989 - 1991), University of Toronto, Canada

**BSc in Geography** – (1984 - 1989), University of Toronto, Canada

## EMPLOYMENT HISTORY

**1) PROFESSOR** *NOV 2018 – ONGOING*

School of Biological, Earth and Environmental Sciences, UNSW Sydney

**2) ASSOCIATE PROFESSOR** *SEPT 2013 – NOV 2018*

School of Biological, Earth and Environmental Sciences, UNSW Sydney

**3) ADJUNCT ASSOCIATE PROFESSOR** *OCT 2016 – ONGOING*

College of Public Health, Medical and Veterinary Sciences, JCU

**4) SENIOR LECTURER** *JAN 2008 – SEPT 2013*

School of Biological, Earth and Environmental Sciences, UNSW

**5) NEW SOUTH WALES DEPARTMENT OF EDUCATION SCHOOL PERFORMER**

*JUNE 2006 - DEC 2007*

On Leave Without Pay from UNSW

**6) GHD CONSULTING, NEWCASTLE, NSW** *JAN 2006 – MAY 2006*

On Leave Without Pay from UNSW

**7) SENIOR LECTURER** *JUNE 2004 – DEC 2005*

School of Biological, Earth and Environmental Sciences, UNSW

**8) LECTURER** *JULY 2000 – MAY 2004*

School of Geography; School of Biological, Earth and Environmental Sciences

**9) LECTURER** *JULY 1998 – JUNE 2000*

School of Earth Sciences, Victoria University of Wellington, New Zealand

**10) ARC Research Associate** *Jan 1997 – June 1998*

Department of Geography, University of Sydney

**11) CASUAL LECTURER AND TUTOR** *FEB 1993 – DEC 1996*

Department of Geography, University of Sydney

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**12) Teaching Assistant** Sept 1989 – Sept 1991

Department of Geography, University of Toronto

**Additional Supporting Material**

**INTERESTS & EXPERTISE**

***Who am I and what do I do?***

- I'm an internationally recognised coastal geomorphologist, rip current and beach safety scientist and science communicator.

- My fieldwork in beach surf zones and coral reef environments has led to key advances in the understanding of rip current and coral reef island morphodynamics.

- More recently I have attempted to combine a physical understanding of surf zone processes and natural hazards, such as rip currents, with a social science approach in order to improve understanding of human interactions with these processes/hazards. This has resulted in my pioneering of a new field of coastal research termed 'Beach Safety Research'

- I run an extremely successful community based beach safety education program called 'The Science of the Surf' and have now managed to incorporate that into active research.

- The goals of my work are to:

  - ✓ Explore and develop the interface between physical geoscience and social research in the context of beach and surf zone hazards;
    Improve understanding of beach and surf zone processes in relation to hazards in order to reduce the incidence of drowning and injury along coasts; and
  - ✓ Develop meaningful and appropriate beach and coastal safety education interventions via research outcomes.

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### *Research Interests & Expertise*

- **Coupled human-environment systems** (interactions between beach hazards and socio-demographic and behavioural systems, assessing understanding of public knowledge of coastal hazards)
- **Beach and surf zone safety** (hazard assessment, hazard and human interaction, development and assessment of public education interventions, effective communication strategies)
- **Coastal hazards** (rip currents, waves, storms and storm erosion)
- **Coastal geomorphology and processes** (beach and surf zone morphodynamics, coral reef island and reef morphodynamics, field based studies)
- **Communicating and promoting science to the public**

## PART ONE - RESEARCH

## 1.1 PUBLICATIONS

### BOOKS, REFEREED BOOK CHAPTERS & BOOK REVIEWS (n = 15)

Short, A.D., **Brander, R.W.** (Eds.) (2020). Stories from the Field: 50 Years of Coastal Fieldwork 1970-2020. Journal of Coastal Research, Special Issue No. 101. Allen Press, Lawrence KS, 432 p. https://meridian.allenpress.com/jcr/issue/101/SI

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**Brander, R.W.** (2015). Rip Currents. In: *Sea and Ocean Hazards, Risks and Disasters* (Eds. J. Ellis, D. Sherman). Treatise in Hazards and Disasters. Elsevier, p. 335-380. **ISBN:** 9780123964830

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**Brander, R.W.** (2005). Rip Currents. In: *The Encyclopedia of Coastal Science* (Ed. M. Schwartz), Kluwer Academic Publishers, pp. 811-813. https://doi.org/10.1007/1-4020-3880-1_261

**Brander, R.W.** (2004). Coastal Bars. In: *The Encyclopedia of Geomorphology* (Ed. A. S. Goudie). Routledge Publishers, London, pp. 54-56. ISBN 0415327377

**Brander, R.W.** (2004). Rip Currents. In: *The Encyclopedia of Geomorphology* (Ed. A.S. Goudie). Routledge Publishers, London, pp. 855-857. ISBN 0415327377

**Brander, R.W.**, Osborne, P.D., and Parnell, K. (2003). High-energy beach and nearshore environments. In : *The New Zealand Coast: Te Tai O Aotearoa* (Eds: H.L. Rouse, J.R. Goff, and S. Nichol), Dunmore Press, Auckland, 119–142. ISBN 0864694385

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**2022**

**Brander, R.W.,** Williamson, A., Dunn, N., Hatfield, J., Sherker, S., Hayen, A. (2022). Evaluating the effectiveness of a science-based community beach safety intervention: the Science of the Surf (SOS) presentation. *Continental Shelf Research*, 241:104722. https://doi.org/10.1016/j.csr.2022.104722

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**REFEREED INTERNATIONAL CONFERENCE PUBLICATIONS (n = 14)**

McCarroll, R.J., **Brander, R.W.**, Scott, T. 2017. Wave height and bathymetric controls on surfzone current velocity and dispersion across an embayed beach. *Proceedings of Coastal Dynamics 2017*.

McCarroll, R. and **Brander, R**.W **2013**. Spatial variability in circulation and cross-shore exchange across multiple rip channels on an embayed beach. In: Turner, I.L. and Couriel, E.D., (Eds.). *Proceedings of Coasts & Ports 2013 Conference: 21st Australasian Coastal and Ocean Engineering Conference and the 14th Australasian Port and Harbour Conference*, National Committee for Coastal and Ocean Engineering, Engineers Australia, PIANC and IPENZ, Sydney, Australia, 6 p.

Greenwood, B., **Brander,** R.,G. Perez, B., Joseph, E and Li, J.Z. 2013. Water level modulation of current vectors and sediment flux in a transverse bar-rip cell. Coastal Processes III, 3rd International Conference on Physical Coastal Processes, Management and Engineering, Gran Canaria, Spain, April 2013, p. 203-217, edited by G.R. Rodriguez and C.A. Brebbia, WIT Press, Southampton, U.K.

Greenwood, B., **Brander, R.W**, and Joseph, E. (2011). Far-infragravity and infragravity 'pulses' in a rip current. *Coastal Processes II* – Second International Conference on Physical Coastal Processes, Management and Engineering, Malta, WIT Press, 123–138.

Greenwood, B., **Brander, R.W.**, Joseph, E., Hughes, M.G., Baldock, T.E. and Aagaard, T. (2009). Sediment flux in a rip channel on a barred intermediate beach under low wave energy. *Coastal Processes I* – First International Conference on Physical Coastal Processes, Management and Engineering, Malta, WIT Press, 197–212.

Kench P.S., Parnell K.E. and **Brander R.W.** ( 2003). A process-based assessment of engineered structures on reef islands of the Maldives. *Proceedings of the Coasts and Ports Australasian Conference, Auckland*, 280–290.

Haas, K.A., Svendsen, I.A., **Brander, R.W.** and Nielsen, P. (2002). Modeling of a rip current system on Moreton Island, Australia. *Proceedings of the 28th International Conference on Coastal Engineering*, ASCE, 784–796.

**Brander, R.W.** (2001). Measurements of flow velocity and sediment transport in a rip channel. *Proceedings of the 27th International Conference on Coastal Engineering*, ASCE, 3395–3408.

Nielsen, P., **Brander, R.W.**, and Hughes, M. (2001). Rip currents: observations of hydraulic gradients, friction factors and wave pump efficiency. *Proceedings of Coastal Dynamics '01*, ASCE, 483–492.

Nielsen, P., Hughes, M. and **Brander, R.W**. (1999). A wave pump model for rip currents. *Proceedings of the IAHR Symposium on River Coastal and Estuarine Morphodynamics*, Genova, 415–423.

**Brander, R.W.**, Short, A.D., Osborne, P.D., Hughes, M. and Mitchell, D.M. (1999). Field measurements of a large-scale rip current system. Proceedings of Coastal Sediments '99. American Society of Civil Engineers, New York, 562–575.

Short, A.D. and **Brander, R.W**. (1999). Rip scaling in low- to high-energy wave environments. *Proceedings of Coastal Sediments '99*. American Society of Civil Engineers, New York, 551–561.

**Brander, R.W**. and Greenwood, B. (1993). Bedform roughness and suspended sediment transport in the surf zone. *Proceedings of the 11th Australasian Conference on Coastal and Ocean Engineering*, Townsville, QLD, 241–246.

**Brander, R.W.** and Greenwood, B. (1993). Bedform roughness and the re-suspension and transport of sand under shoaling and breaking waves: a field study. *Proceedings of the 1993 Canadian Coastal Conference*, Vancouver, B.C., 587–599.

**CONFERENCE REFEREED ABSTRACTS AND PRESENTATIONS (n = 31)**

**Brander, R.W.,** Franklin, R., Warton, N., Shaw, W. and Daw, S. (2017). Saving bystanders who are attempting to rescue others. World Conference on Drowning Prevention 2017, Vancouver, Canada.

Brewster, C., Gould, R., and **Brander, R.W.** (2017).

**Brander, R.W.**, Shaw, W.S., and Attard, A. (2015). Surfers as bystander rescuers in Australia. World Conference on Drowning Prevention 2015, Penang, Malaysia. p. 249.

**Brander, R.**, McCarroll, R., Turner, I.L., MacMahan, J.H., and Bradstreet, A. (2013). Measurements of swimmer response in rip currents. *World Conference on Drowning Prevention 2013*, Potsdam, Germany. p. 182.

**Brander, R.**, Dominey-Howes, D., Drozdzewski, D., Shaw, W., Roberts, A. and Sherker, S. (2013). Experiences of swimmers caught in rip currents. *World Conference on Drowning Prevention 2013*, Potsdam, Germany. p. 187.

**Brander, R.W.**, Drozdzewski, D., Dominey-Howes, D., Turner, I., Shaw, W., McCarroll, R., Moraza, M., Goff, J. and Sherker, S. (2012). The RIPSAFE Project – a holistic approach to understanding the rip current hazard. Proceedings of *Australian Water Safety Conference*, Australian Water Safety Council, Sydney, NSW, June 2012, p. 27.

Davey, E., **Brander, R.W.** and Douglas, K., **2012**. Global and regional variation in rip current spacing. *2nd International Rip Current Symposium*, Collaroy, NSW, Oct 30-Nov 1, 2012.

McCarroll, R.J., **Brander, R.W.**, MacMahan, J., Turner, I., Reniers, A. and Brown, J., 2012. RIPSAFE – Rip current swimmer and floater experiments. *2nd International Rip Current Symposium*, Collaroy, NSW, Oct 30-Nov 1, 2012.

Bradstreet, A., **Brander, R.W.**, Sherker, S. and MacMahan, J., 2012. Responses of swimmers caught in rip currents: perspectives on mitigating the global rip current hazard. *2nd International Rip Current Symposium*, Collaroy, NSW, Oct 30-Nov 1, 2012.

Hatfield, J., Williamson, A., **Brander, R.W.**, Sherker, S., Hayen, A., 2012. Development and evaluation of campaigns to reduce rip current related rip current beach drowning. *2nd International Rip Current Symposium*, Collaroy, NSW, Oct 30-Nov 1, 2012.

Drozdzewski, D., **Brander, R.W.**, Dominey-Howes, D., Shaw, W., Goff, J., Moraza, M., Sherker S., 2012. Surveying rip current survivors – preliminary insights into experiences of being caught in rip currents. *2nd International Rip Current Symposium*, Collaroy, NSW, Oct 30-Nov 1, 2012.

**Brander, R.W.**, Williamson, A., Hatfield, J., Sherker, S., 2012. Community presentations on rip currents – content, challenges and the Science of the Surf case study. *2nd International Rip Current Symposium*, Collaroy, NSW, Oct 30-Nov 1, 2012.

Williamson, A., Hatfield, J., Sherker, S., **Brander, R.W.**, Hayen, A., Dunn, N., 2012. Understanding how to address rip current safety for international tourists. *2nd International Rip Current Symposium*, Collaroy, NSW, Oct 30-Nov 1, 2012.

**Brander, R.**, Hatfield, J., Sherker, S., Williamson, A. and Hayen, A. (2011). An evaluation of a community knowledge-based intervention on beach safety: The Science of the Surf (SOS) presentations. *World Conference on Drowning Prevention 2011*, Danang, Vietnam. p. 166.

**Brander, R.**, Turner, I., Jones, B., Jones, W., Brown, J., MacMahan, J., Sherker, S. and Thompson, M. (2011). Measurements of rip current flow and swimmer behaviour in Australian rip current systems using low-cost GPS: implications for beach safety. *World Conference on Drowning Prevention 2011*, Danang, Vietnam. p. 169.

Sherker, S., Thompson, M., Agnew, P., Farmer, N., Bradstreet, A., **Brander, R.** and Drozdzewski, D. (2011). Swim or float? An evidence-based approach to reducing the risk of rip related drowning in Australia. *World Conference on Drowning Prevention 2011*, Danang, Vietnam. p. 167.

Drozdzewski, D., Shaw, W., **Brander, R.**, Goff, J., Dominey-Howes, D., Sherker, S. and Walton, T. (2011). Reducing rip current drowning: lessons from interviews with rip current survivors. *World Conference on Drowning Prevention 2011*, Danang, Vietnam. p. 166.

Williamson, A., Hatfield, J., Sherker, S.. **Brander, R.W.** and Hayen, A. (2011). Why were you swimming there? Analysis of risky swimming behaviour on Australian beaches. *World Conference on Drowning Prevention 2011*, Danang, Vietnam. p. 165.

Hatfield, J., Williamson, A., Sherker, S. and **Brander, R.W.** (2011). Improving beach safety: the Science of the Surf (SOS) research project. *World Conference on Drowning Prevention 2011*, Danang, Vietnam. p. 164.

**Brander, R.W.** (2010). Challenges, limitations and new approaches for reducing rip current drownings in Australia. *Australian Water Safety Conference*, Sydney, NSW, May 2010.

**Brander, R.W**. (2010). Keynote Address: Don't get sucked in by the rip; challenges for rip current research and outreach. *1st International Rip Current Symposium*, Miami, Florida, Feb 17-19, 2010.

Williamson A, Hatfield J, Sherker S, **Brander R**, Hayen A. (2010). Improving beach safety: The Science of the Surf research project Stages 1 & 3: Collection of baseline data to inform a tailored intervention and Evaluation of the effectiveness of the "Don't get sucked in by the rip" campaign. *1st International Rip Current Symposium*, Miami, February, 2010.

Williamson A, Hatfield J, Sherker S, **Brander R,** Hayen A. (2009). Improving beach safety: The Science of the Surf research project Stage 1: Collection of baseline data to inform a tailored intervention. *Be Active '09* (2009 Australian Conference of Science and Medicine in Sport, 7th National Physical Activity Conference and 6th National Sports Injury Prevention Conference), Brisbane, October 2009.

Hatfield J, Williamson A, Sherker S. **Brander R**, Hayen, A. (2009). Improving beach safety: The Science of the Surf research project Stage 2: Development and process evaluation of the "Don't get sucked in by the rip" campaign. *Be Active '09* (2009 Australian Conference of Science and Medicine in Sport, 7th National Physical Activity Conference and 6th National Sports Injury Prevention Conference), Brisbane, October, 2009.

Williamson A, Hatfield J, Sherker S, **Brander R**, Hayen A. Improving beach safety: The Science of the Surf research project Stage 3: Evaluation of the effectiveness of the "Don't get sucked in by the rip" campaign. *Be Active '09* (2009 Australian Conference of Science and Medicine in Sport, 7th National Physical Activity Conference and 6th National Sports Injury Prevention Conference), Brisbane, October, 2009.

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Williamson, A., Hatfield, J., Sherker, S., **Brander, R.** and Hayen, A. (2009). Improving beach safety: the Science of the Surf research project. Stage 3 – Evaluation of the effectiveness of the "Don't get sucked in by the rip" campaign". *Be Active 09*. Brisbane, Australia.

**Brander, R.W.** (2009). Keynote Address: Challenges and future directions for beach safety education. *Australian Professional Ocean Lifeguard Conference*, Coffs Harbour, Australia

Williamson, A., Hatfield, J., Sherker, S., **Brander, R.** and Whibley, B. (2008). Science of the Surf (SOS); The development and evaluation of a national educational campaign for beach safety. *Australian Water Safety Conference*, Sydney, Australia.

**Brander, R.W.**, 1998. Sediment transport in low-energy rip current systems. 8th Meeting of the Australia-New Zealand Geomorphology Group (ANZGG), Goolwa, South Australia.

**Brander, R.W**., 1997. Field monitoring of low-energy rip current systems. Proceedings of the Institute of Australian Geographers and New Zealand Geographical Society Second Joint Conference. Hobart, Tasmania.

**Brander, R.W.**, 1994. Field investigations on the dynamics of rip currents. 6th Meeting of the Australia-New Zealand Geomorphology Group (ANZGG), Hanmer Springs, N.Z.

**REPORTS (n = 2)**

Cooney, N., Daw, S., Brander, R.W., Ellis, A., Lawes, J., 2020. Coastal Safety Brief: Rip Currents. Surf Life Saving Australia, Sydney, Australia, 15 p.

Attard, A., Brander, R.W., Fitzgerald, T., 2019. MyCoast NSW: New South Wales Community Perceptions of Coastal Erosion and Inundation. UNSW Sydney, 126 p.

## 1.2 RESEARCH GRANT INCOME

### Career total income AUS $1,455,658

### Research grants (external) = $1,203,323

AUS**$10,000** – December 2022. Float to Survive. Randwick City and Waverley Councils. Role – Lead Investigator.

AUS**$20,000** – July 2022. Beach Safety Research. Surf Life Saving Australia (SLSA) Internal Research Project. Role – Lead Investigator.

USD**$46,000** - December 2021. Improving water safety at risky Instagram hotspots via targeted information campaigns. Instagram Community Safety Grant. Role – Co-Investigator.

AUS**$28,000** – November 2021. 'Surfers Rescue 24/7: Evaluating the social impact and benefit of a rescue training program for surfers'. UNSW Science Social Good Seed Funding and Surfing NSW.. Role – Lead Investigator

AUS**$10,000** – August 2021. Surfers Rescue 24/7 Project. Surfing NSW Internal Research Project. Role – Lead Investigator

AUS**$32,000** – July 2021. Beach Safety Research. Surf Life Saving Australia (SLSA) Internal Research Project. Role – Lead Investigator

AUS**$23,000** – March 2021. Safeguarding the next generation: evaluating the effectiveness of beach safety interventions for teenagers. UNSW Science Industry Network Seed Fund and Lake Macquarie City Council. Role – Lead Investigator

AUS**$32,000** – July 2020. Beach Safety Research. Surf Life Saving Australia (SLSA) Internal Research Project. Role – **Lead Investigator**

AUS**$32,000** – July 2019. Beach Safety Research. Surf Life Saving Australia (SLSA) Internal Research Project. Role – **Lead Investigator**

AUS**$99,180** – March 2019. Identifying Rip Currents and Beach Usage at Unpatrolled Beach Locations. NSW Department of Justice – Office of Emergency Management/State Emergency Management Water Safety Funds. Role – **Lead Investigator**.

AUS**$32,000** – July 2018. Beach Safety Research. Surf Life Saving Australia (SLSA) Internal Research Project. Role – **Lead Investigator**

AUS**$154,448** – December 2016. Community Understanding of Coastal Erosion: Improving Resiliency and Preparedness to Coastal Storms and Sea Level Rise. NSW Department of Justice – Office of Emergency Management/State Emergency Management Projects (SEMP). Role – **Lead Investigator**.

AUS**$30,840** – December 2016. Improved Bystander Coastal Rescue Capability. Surf Life Saving Australia (SLSA) Internal Research Project. Role – **Lead Investigator** (with 2 others).

AUS**$42,864** – August 2013. The Rip Buoy Project. Australian Government Research in Business (RiB) Grant. Role – **Lead Scientist**.

AUS**$396,000** – June 2011. Rip currents: an evidence based approach to managing the greatest beach hazard. Australian Research Council, *Linkage* Program LP110200134. Role – **Lead Chief-investigator** (with six others).

**AUS$12,116** – June 2010. Measurements of rip current flow and swimmer behaviour in Australian rip current systems using low-cost GPS. Surf Life Saving Australia (SLSA) Internal Research Project. Role – **Lead Investigator**

**AUS$12,272** – June 2010. Demographics, surf knowledge and behavioural response to rip current rescue victims. Surf Life Saving Australia (SLSA) Internal Research Project. Role – **Co- Investigator.**

AUS**$278,593 –** June 2007. The Science of the Surf: the development and evaluation of a national campaign to reduce the risk of coastal drowning. Australian Research Council, *Linkage* Program LP0774843. Role –**Chief-investigator** (with 3 others).

AUS**$3,000 –** November 2003. Waves and currents around a coral cay. *Australian Geographic*. Role – **Chief Investigator**

**<u>Other programs and activities (internal)</u>** <u>=$169,335</u>

AUS**$28,000** – March 2022. Surfers rescue 24/7: evaluating the social impact and benefit of a rescue training program for surfers. UNSW Science Social Good Seed Fund 2021.

AUS**$23,000** – Feb 2021. Safeguarding the next generation: evaluating the effectiveness of beach safety interventions for teenagers. UNSW Science Industry Network Seed Funding. Role – **Lead Investigator**

AUS**$10,840** – Feb 2005. Impact of the 2004 Boxing Day Tsunami on the Maldives. University of New South Wales Vice-Chancellor Discretionary Funds.

AUS**$8,600** – February 2005. Wave characteristics across a fringing reef, Lizard Island, Qld. University of New South Wales, Faculty of Science Research Grant Program

AUS**$17,895** – November 2004. Rip current flow and sediment transport monitoring. University of New South Wales, Faculty of Science Research Grant Program

AUS**$15,000** – November 2003. Coral reef island morphodynamics. University of New South Wales, Faculty of Science Research Grant Program

AUS**$15,000** – March 2002. Coral reef island morphodynamics. University of New South Wales Goldstar Research Award

AUS**$8,000** – November 2001. Rip current morphodynamics. University of New South Wales Research Support Program

AUS**$20,000** – July 2001. University of New South Wales Core Standards Start-up Program.

NZ**$3,000 (AUS$1,800)** – July 1999. Rip current morphodynamics. Victoria University of Wellington Summer Research Grant.

NZ**$20,000** (**AUS$12,500**)– July 1998. Victoria University of Wellington Internal Grant Committee Start Up Funds.

## 1.3 SUPERVISION OF HIGHER DEGREE RESEARCH STUDENTS

**<u>Successful student completions</u>**

**2021 Anna Attard (MSc)** – Community understanding of coastal erosion

**2015 Ben Van Leeuwen (MSc) –** Rip current escape strategies

**2014 Jak McCarroll (PhD) -** Morphodynamics of embayed beaches

**2014 Todd Walton (PhD)** - Australian surf culture and hazards.

**2001 Richard Jennings (PhD)** – Morphodynamics of gravel beaches

**1999 Matthew Paterson (MSc)** –Sediment sorting on gravel beaches

**1999 Samuel Barrow (MSc)** –A wave climate for Titahi Bay, NZ

**Current students**

**William Koon (PhD) –** Coastal drowning and safety interventions in Australia

**Nick Mulcahy (PhD) –** Drowning and rescue relationships with beach type

**Sam Cornell (PhD)** – Interventions for Instagram related selfie-related drowning

## 1.4 SUPERVISION OF 4TH YEAR HONOURS RESEARCH STUDENTS

**2021 Alva Lane (BSc Hons 1st Class)** – Surf Zone Injuries in New South Wales Australia

**2021 Mark Woods (BSc Hons 1st Class)** – Beach Safety Knowledge of Multicultural Communities

**2017 Kirsten Clifford (BSc Hons 1st Class)** – Beach Safety Knowledge of International Students

**2017 Scarlet Davis (BSc Hons 1st Class)** – Community Perceptions of the Shark Hazard

**2016 Nicola Warton (BSc Hons 1st Class)** – Educational Impacts of 'Bondi Rescue'

**2014 Ben Aggar (BSc Hons 1st Class) –** The Rip Buoy Project

**2014 Anna Attard (BSc Hons 1st Class)** – Surfers as bystander rescuers

**2014 Felicity Bain (BSc Hons 1st Class) –** Video imaging of Bondi Beach

**2013 Campbell McKay (BSc Hons 1st Class)** – Beach drowning in Ghana

**2012 Ben van Leeuwen (BSc Hons 1st Class)** – Measurements of topographic rip currents.

**2012 Lara Edwards (CivEng Hons)** – Remote video imagery analysis of the morphologic behaviour of topographic rip currents.

**2011 Erica Davey (CivEng Hons)** – A global analysis of rip current spacing.

**2010 Ben Jones (CivEng HOns)** – Lagrangian measurements of rip current flow at Bondi Beach, NSW.

**2010 Warren Jones** (**Honours-CivEng**) – A physical analysis of swimmer escape strategy in rip currents

**2009 Will Broadfoot (BSc Honours)** – An analysis of lifeguard rescues at Bondi Beach, NSW.

**2005 Cameron Weller (BSc Honours)** – Morphodynamics of low energy beaches in Jervis Bay, NSW.

**2005 Celia Cameron-Smith (BSc Honours)** – Assessment of beach erosion at Narrabeen Beach, NSW using video imagery.

**2005 Michael Daly (BSc Hons 1st Class)** – Wave characteristics across fringing reefs.

**2004 Elpiniki Joseph (BSc Hons)** – Rip current morpodynamics at Bennetts Beach, NSW.

**2004 Tim Jamieson (Hons 1st Class)** –Long term assessment of beach erosion at Wamberal Beach, NSW.

**2003 Chris Bourne (BScHons)** – Bioclastic sediment characteristics of coral cay islands.

**2003 Nicole White (BSc Hons 1st Class)** – Beach profiles of coral sand and shingle cay islands.

**2003 Kurt Plambeck (BSc Hons)** – Temporal behaviour of a high-energy embayed beach, Tamarama, NSW.

**2003 Sherlin Ng (BSc Hons)** – Shoreline dynamics on a coral shingle cay.

**2002 Ashley Robinson (BSc Hons 1st Class)** – Morphological change on a coral shingle cay, Lady Elliot Island, Great Barrier Reef, Australia

**2002 Bronwyn Rutherford (BSc Hons 1st Class)** – Blowout dune formation and morphology at Hawks Nest, NSW.

**2001 Stephanie Ballango (BSc Hons)** – Wave setup as a forcing mechanism of rip current flow.

**2001 Raymond Low (BSc Hons)** – Impact of sand mining on vegetation, Tomago, NSW.

**2001 Andrew Murrell (BSc Hons)** – Impact of storm drain at Tamarama Beach, NSW

**External PhD Examinations**

**2019 Peter Kamstra.** PhD School of Geography, University of Melbourne – *Risk perceptions and behaviour of rock fishers.*

**2016 Edward Beetham**, Doctor of Philosophy in Geography, School of Environment, The University of Auckland – *Field and numerical investigations of wave transformation and inundation on atoll islands.*

**2014 Thomas Murray**, PhD Griffiths University, School of Environment, QLD, Australia – *Morphodynamics of transient rip currents, Gold Coast, QLD Australia*

**2012 Hiroki Ogawa**, Doctor of Philosophy in Geography, School of Environment, University of Auckland, New Zealand – *Wave Characteristics and Transformations on Sub-Horizontal (Type B) Shore Platforms on the East Coast of the North Island, New Zealand.*

**2009 Timothy Scott**, PhD School of Geography, University of Plymouth, United Kingdom – *Rip Currents on Macrotidal Beaches, South-East United Kingdom.*

I have also examined approximately 15 MSc theses internally and externally since 1998.

## 1.4 ACADEMIC AWARDS AND SCHOLARSHIPS

**2012** – Australian Government Eureka Prize for Promoting Understanding of Australian Scientific Research

**2012** – 'Best Conference Presentation Award' at the 2012 Australian Water Safety Conference for a presentation entitled "The RipSafe Project – a holistic approach to understanding the rip current hazard"

**2010** – NSW Government/AusSwim Water Safety Award for Research Project of the Year

**2009** – NSW Sports Safety Gold Award for Outstanding Achievement in Applied Research in Sports Medicine by a Research Team

**1997** – Award for 'Outstanding Student Conference Presentation'. Institute of Australian Geographers (IAG) Conference, Hobart, Tasmania.

**1993–96** – Overseas Post Graduate Research Scholarship; University of Sydney

**1993–96** – University Post Graduate Research Award; University of Sydney

**1990–91** – Post Graduate Scholarship, Natural Sciences and Engineering Research Council, Canada.

**1989–90** – Ontario Graduate Scholarship

**1989** – Undergraduate Research Scholarship, Natural Sciences and Engineering Research Council, Canada

**1989** – University of Toronto Ali Tayyab Geography Award

**1989** – Dean's List, Scarborough College, University of Toronto

**1988** – Undergraduate Research Scholarship, Natural Sciences and Engineering Research Council, Canada

# PART TWO - TEACHING EXPERIENCE

## 2.1 Learning and Teaching Awards and Grants

**2015** UNSW Strategic Educational Development Grant (SEF#2) for '*The UNSW Field Companion A Virtual 'App' for Stage 1-2 Science Students*' ($99,880)

**2015** UNSW Learning and Teaching Innovation Grant (SEF#2) '*The 24/7 Lab: Immersing First Year Environmental Science Students in their own Personal Learning Environment*' ($20,000)

**2011** University of New South Wales Faculty of Science Award for *Excellence in Teaching*

## 2.2 Teaching Experience & Responsibilities

I have always carried a high teaching load at each academic institution I have taught at and have consistently received some of the highest student teaching and course evaluations at those institutions. Examples of student feedback and evaluation are available on request.

Courses taught:

**UNSW Sydney** (2000 – present)

GEOS 1701 Environmental Systems, Processes and Issues (Convenor)
ENVS 1011 Environmental Science
SCIF 1021 Advanced Science Seminar
GEOS 2721 Australian Surface Environments and Landforms
MSCI 2001 Introductory Marine Science
GEOS 3731 Coastal Processes and Hazards (Convenor)

GEOS 3921 Coastal Resource Management
MSCI 0501The Marine Environment
SCIF 2041 Research Internship (Supervisor)
BEES 0006 Special Topics (Supervisor)

**Victoria University of Wellington** (1998 – 2000)

GEOG114 Environments and Resources: The Foundations (Convenor)
GEOG213 Physical Environmental Processes
GEOG319 Atmospheric and Coastal Systems (Convenor)
GEOG323 Advanced Physical Environmental Processes
PHYG401 Geomorphology and its Application
PHYG403 Special Topic (Convenor)
PHYG413 Coastal Processes and Management (Convenor)

**University of Sydney** (1994 – 1998)

IMS2 Introductory Marine Science
GEOGIIP Mega Geomorphology
GEOGIIIP Coastal Depositional Environments

**University of Toronto** (1989 – 1991)

GGRB19Y General Geomorphology
GGRB24Y Hydrology, Land Use and Water Quality
GGRC28Y The Hydrology of Surface and Subsurface Waters

## 2.4 CURRICULUM DEVELOPMENT AND TEACHING INNOVATION

**Curriculum development at University of New South Wales** (2000 – present)

- I have revamped several courses offered with the BSc major in Physical Geography at UNSW and developed one new 3rd year course in the School of BEES, UNSW.

GEOS1701 – Environmental Systems, Processes and Issues. I revamped and modified this course upon my arrival at UNSW in 2000 in my role as Course Co-ordinator. Since my arrival, the course evaluations have increased dramatically and it has always been one of the most successful courses offered in the School of BEES. The course was subsequently modernised and updated with a new title, new core themes, new laboratory exercises, and a new field trip in 2016.

GEOS3731 – Coastal Geomorphology. I developed this new advanced level, field based course in coastal processes and landforms as an entry level course for Honours and PhD students. The course was first offered in July 2011.

**Curriculum development at Victoria University of Wellington** (1998 – 2000)

- I completely revamped an existing course GEOG114 Environments and Resources including all lectures, labs, assignments and a field trip and turned it into one of the most successful undergraduate courses in the School of Earth Sciences, VUW.

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- I developed, introduced and co-ordinated a new 3rd year undergraduate course GEOG314 Atmospheric and Coastal Systems.

## PART THREE – SERVICE, ADMINISTRATION, MANAGEMENT & OUTREACH

### 3.1 Service to UNSW Sydney

- 2017 – 2021 – Deputy Head of School, School of BEES
- 2015 – 2017 – Postgraduate Co-ordinator (Candidature) School of BEES
- 2008 – 2014 – Co-ordinator of the School of BEES Seminar Series
- 2008 – present – School of BEES Undergraduate Teaching Committee

- UNSW TV YouTube videos with over 2 million views combined
- UNSW Faculty of Science 'Rip Current Survival Guide' posters and DVDs

I have given numerous university and faculty 'promotional' lectures on behalf of UNSW to staff, international students, high school students and members of the community.

### 3.2 Service to Society

On January 26, 2023 I was appointed as Member of the Order of Australia (AM) for significant service to coastal science, and to the community, through beach safety research and education.

**<u>'Science of the Surf (SOS)' Community Education Program</u>**

In 2001 I initiated a program called 'The Science of the Surf (SOS)' by giving free community presentations to members of the public at coastal locations in Sydney's Eastern Suburbs. Since then, the program has expanded into primary and high schools, surf life saving clubs, community and corporate groups. The aim of the program is to educate people about beach and surf hazards through an understanding of the basic science of beaches, waves and rip currents. To date, I have given hundreds of talks to over 50,000 people.

The program has garnered numerous community safety awards and media attention and has since expanded into various forms of social media including a dedicated website www.scienceofthesurf.com and numerous YouTube videos including 'How to Survive Beach Rip Currents' which has over 1.4 million views and has won National Australian Government Safer Community Awards.

The program also has freely available material including rip current survival guide posters and dvds.

**<u>National Geographic 'Rip Current Heroes' Documentary</u>**

Produced by National Geographic and Markland Media and premiering on the National Geographic Channel during the 2017/2018 summer season, this 50 minute documentary provides a clear, comprehensive and engaging overview of the rip current hazard. The program follows my research and community education efforts as one of its' central themes. It has been shown on Qantas and Jetstar in-flight video channels since March 2018.

**Rip Currents – National (Australia) Study Guide for Teachers**

In collaboration with Atom Media, Markland Media, I helped design and create a study guide for teachers on the rip current hazard that is closely linked with the National Geographic documentary 'Rip Current Heroes'. This not-for-profit guide is designed for Years 7-10 and is freely available to all teachers around Australia.

**United States Public Broadcasting System (PBS) 'Rip Current Rescue' Documentary**

Produced by Markland Media in collaboration with NOAA, the NWS and the USLA, this full length 50 minute documentary follows my research in relation to rip current drownings across the United States and is shown on the US television network PBS. An accompanying study guide available to all was developed by Markland Media and myself for the USLA.

## Affiliations and Memberships

- Member of the International Lifesaving Federation (ILS) Rip Current Alliance (RipSafe) Committee
- Member of the Surf Life Saving Australia Research Advisory Working Group
- Member of the Australian Coastal Society
- Member of the NSW CALD Water Safety Group
- Member of the Coastal Education Research Foundation (CERF)
- Individual and Organisation (Science of the Surf) membership with the Australian Professional Ocean Lifeguard Association (APOLA)
- Individual Membership with Surf Educators International (SEI)
- Member of Tamarama Beach Surf Life Saving Club since 1993; Life Member since 2016

## 3.3 Social and Multi Media

I have successfully used social media and multi-media tools to communicate the science of rip currents, an understanding of coastal processes and landforms, and an understanding and awareness of beach hazards to the general public, primary and high school students. This has been achieved through a number of methods, primarily via my Science of the Surf program.

**Still Images**

- contributed 75 images to the CD-ROM compilation: Slattery, M. (2000). GEOMORPHOLOGY; A Collection of Images
- contributed 1 image of the 12 Apostles on Victoria's Great Ocean Road to the National Geographic Family Reference Atlas of the World (2002; 2006). This has been translated and distributed across the world
- Images contributed to various textbooks and educational books

**<u>YouTube Videos (> 3,500,000 views)</u>**

- '*How to Survive Beach Rip Currents*'; 1,600,000 views as of Feb 2023 (UNSW TV)*
- '*Where Do Waves Come From?*'; 125,000 views as of Feb 2023 (UNSW TV)
- '*How do Waves Break?*' 82, 000 views as of Feb 2023 (UNSW TV)
- '*Beach Survival Guide*'; 93,000 views as of Feb 2023 (UNSW TV)
- '*Rip Current Time Lapse*' – 420,000 views as of Feb 2023
- '*How Do Tides Work?* 119,000 views as of Feb 2023 (UNSW TV)
- '*Channel 7 News – Rip Currents* 239,000 views of 2023
- '*Something everybody should know about Rip Currents!*' 194,000 views as of Feb 2023

+ many other related videos with total views as of Feb 2023 > 500,000

*This video also has subtitled YouTube versions in Chinese, Spanish, Portuguese, French, Thai

**<u>Websites and Social Media</u>**

I run the very successful community education website www.scienceofthesurf.com which is a portal for educational material on (primarily) the rip current hazard

My Facebook page 'Dr Rip's Science of the Surf' has over 5500 'followers' as of Feb 2023 and is updated regularly with information pertaining to coastal science and beach safety. I have a Twitter account (@Dr_Rip_SOS), but I don't use it often. Not a fan.

## 3.4 Community Based Awards

- 2012 Australian Government Eureka Prize for Promoting Understanding of Australian Scientific Research
- 2011 NSW Water Safety Awards High Commendation Community Education Program of the Year
- 2009 Australian Government Attorney General Safer Communities Award for 'Don't Get Sucked in by the Rip' in the Research Bodies Category
- 2009 Australian Government Attorney General Safer Communities Award for 'Don't Get Sucked in by the Rip' in the Education, Training and Research Category
- 2009 NSW Sports and Recreation Safety Award for Science of the Surf
- 2007 NSW Department of Education and Training (DET) Frater Award for Excellence in School Performances
- 2005 NSW Sport and Recreation AustSwim "Water Safety Event of the Year" for Science of the Surf
- 2005 Tamarama SLSC Senior Clubman of the Year Award
- 2003 Australian Government Attorney-General Emergency Management Australia Award for 'Science of the Surf' in the Pre-Disaster Category
- 2002 Tamarama SLSC Senior Clubman of the Year Award
- 2002 Sydney Branch NSW Surf Life Saving Community Event of the Year
- 2002 NSW Surf Life Saving Award of Excellence (Community Education)

## 3.5 Media Communication, Expertise and Profile

I have a significant media profile in Australia with over 300 radio, newsprint and television appearances across all networks on the rip current hazard and surf science. I provide regular commentary on rip currents, beach safety, and coastal matters for radio, tv and print media and work with journalists to bring science stories to the public.

My significant media profile in Australia is evident by my popular nickname '*Dr Rip*'. While I have lost track of my total number of appearances (*n*) for each category, I have included an accurate estimate and have provided some of the more notable examples of my media exposure below:

****PLEASE NOTE THAT DUE TO VOLUME, I HAVE NOT UPDATED THIS LIST SINCE 2013****

**Print (*n* = 50+ since 2000)**

I have been quoted and profiled on many stories involving rip currents in both major city, regional and local newspapers. Often articles are syndicated around the country. Some of my recent more prominent, self authored op eds, and longer articles are:

- Australian Magazine (insert with Weekend Australian newspaper) – 10 questions profile 26/1/2013
- Illawarra Mercury (15/9/12 Weekend Ed.) – '*A safety tip from Dr Rip*' (cover photo and story)
- Etihad Airlines Inflight Magazine (Dec 2011 issue) – '*The Surf Doctor*' (full page profile)
- Newcastle Herald (24/1/12) – Op Ed: '*Look to rips for real 'jaws of death*'
- Sydney Morning Herald (24/11/11) – '*Rip theories put to the test*' (full page article in Environment/Science section about my ARC research)
- Sydney Morning Herald (3/2/10) – Op Ed: '*Yes, we can slash the death toll from rips at our beaches*'
- Sydney Morning Herald (20/12/2008) – '*Minutes later this man was dead*' (front page article with photo of Saturday edition)

**Radio (*n* = 150+ since 2000)**

Most (but not all) of my radio appearances involve discussing rip currents, usually following a drowning and last from 5-10 minutes. The following are longer appearances (30 minutes to 1 hour):

- ABC 702 Sydney (since 2010) – regular '*Sons of Beaches*' segment on Weekends with Gilles Marnie
- ABC National Breakfast with Fran Kelly (10/02/10) – Live panel rip current debate
- ABC Classic FM (29/3/10 and 29/10/10) – Morning Interview with Margaret Throsby
- ABC Triple J FM (5/2/09) – Science on mornings with 'Dr Karl'

**Television (*n* =25+ since 2000)**

- Foxtel Coast Australia (30/12/2013) – Gold to Sunshine Coast Ep 5 – Rip current segment
- WIN News (3/1/13) – Extended story on rip currents and Illawarra SOS talks
- Bondi Rescue 2012 – Segment on rip currents
- ABC Catalyst (5/4/12) – '*Rip Survivor*'
- Channel 10 The Project (24/1/12) – Live interview discussing rip currents
- Channel 7 Sunrise (24/1/12) – Studio interview discussing rip currents
- Channel 7 Today Tonight (10/1/12) – '*Surviving rips this summer*'
- Channel 9 Today Show (21/11/12) – Studio interview discussing rips
- Channel 9 60 Minutes (7/10/10) – '*The Cruel Sea*'

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- ABC Sleek Geeks (7/2/08)
- Channel 9 A Current Affair (24/1/05)
- ABC 7:30 Report (24/3/04) – '*Science could prove life saving in surf*'
- ABC Catalyst (26/2/02) – '*Science of Surf*'
- Channel 10 Totally Wild (15/8/94 and 24/4/02)

## 3.6 Service to my Discipline

**Journal Reviewing**

I am a regular reviewer for a wide range of high ranking/profile international journals including:

*Australian Geographical Studies, Coastal Engineering, Continental Shelf Research, Earth Surface Processes and Landforms, Geomorphology, Global and Planetary Change, International Journal of Aquatic Research and Education, International Journal of Injury Control and Safety Promotion, Journal of Coastal Research, Journal of Geophysical Research, Marine Geology, Nature Geoscience, Natural Hazards, New Zealand Geographer, Oceanological Studies, Zeitschrift fur Geomorphologie.*

**International Research Council Grant Application Reviewer**

I have been invited to review research grant applications for:

- Australian Research Council (ARC)
- Natural and Environmental Research Council (NERC - UK)
- National Science Foundation (NSF – USA)
- North Carolina SeaGrant

**Conference/Workshop Organisation & Conference Session Chair/Convenor**

- Abstract Reviewer and Field Trip Leader for the International Coastal Symposium, Sydney, Australia Mar 6-10, 2016
- Organising Committee 2nd International Rip Current Symposium, Sydney, Australia, Oct 30- Nov 1, 2012
- Organiser and Convenor of 1st Australian Beach Safety Education Workshop, Coffs Harbour, May 14, 2009

**Conference and Workshop Keynote Speaker Invitations**

- 2017 South Australia Coastal Conference, Adelaide, SA
- 2017 Costa Rica Rip Current Workshop, Jaco Beach, Costa Rica
- 2016 1st Asian Water Safety Symposium, Incheon, Korea
- 2015 University of Otago New Zealand Water Safety Symposium
- 2014 2nd International Rip Current System, Busan, Korea
- 2013 Surf Life Saving Queensland 2013 Conference, Surfers Paradise, QLD '
- 2013 Institute of Australian Geographers Conference, Perth, WA '
- 2010 1st International Rip Current Symposium, Miami, FL, USA '

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## 3.7 Consulting and Expert Witness Experience

2020 Gosford City Police Report on Terrigal Beach Fatality

2020 Waverley Council Report on Bondi Beach Grading

2019 *Expert Witness Report* on William Murray vs Parks Victoria

2017 NSW Police Homicide. Report on Marks Park July 1989 Missing Person Case

2016 Shelly Beach Ocean Pool project – Ballina, NSW

2014 *Expert Witness Report* on Phuket rip current drowning

2006 Senior Coastal Geomorphologist for GHD Pty Ltd, Newcastle

2005 *Expert Witness Report* on Giles Baths, Coogee for Novak Vujanic vs Randwick City Council

2005 *Expert Witness Report* on Wanda Beach for Christopher Dryden vs Sutherland Shire Council

2005 Assessment of the Coco Palm Resort Island Erosion Problem, Maldives

2004 Pacific Coast Partners for *A Geomorphological Assessment of Whale Beach*

2003 Expert Witness for NSW Coroners Court

2002 NSW Police Homicide. Report on Marks Park July 1989 Missing Person Case

1999 Marlborough District Council (MDC), New Zealand. Preparation of : *Natural Hazards of the Marlborough Region*, 55 p.

1996 Waverley Council, Waverley, NSW, Australia. Preparation of: *Report on Site of Tamarama Beach Inspectors' Temporary Observation Building.* 3 p.

1990 BEAK Environmental Consultants, Toronto, Canada. Sampling of battery acid Contamination in an urban environment.