Statement from Robert BRANDER

Product Type: TEXT DOCUMENTS:Statement

Completed Date: 1 Aug 2001

Brief Description: Doctor BRANDER is a Lecturer at the School of Geography, UNSW. He has gained his PhD from University of Sydney, conducting a thesis on the measurement and behaviour of rip currents. Studies were conducted at Palm Beach which is comparable to beaches on the Eastern Suburbs of Sydney. He is a member of the Tamarama Surf Club and is familiar with the currents and submarine topography of McKenzies Bay and Tamarama. He discusses the nature of waves, currents, rips and underflows.

Summary:

Para 3: Doctor BRANDER is currently employed as a lecturer at the school of Geography at the UNSW with a specialty of coastal geomorphology.

Para 4: BSc (1989) and MSc (1991) from Uof Toronto, and PhD from SydUni in 1997, with a thesis on measurement and behaviour of rip currents. Research continues into wave, current and sediment movement in the surf zone.

Para 5: Arrived in Australia in 1993 and conducted studies at Palm Beach which has a comparable rip system to Sydney's Eastern Beaches.

Para 6: Was an active member of Tamarama Surf Club, and was previously resident caretaker at the club. Has snorkelled extensively around Tamarama and McKenzies Bay and is familiar with submarine topography, rock platforms, caves and currents.

Para 7: Commenced formal studies of Tamarama and Bronte beaches in August 2000, examining movement of sediment as a result of wave conditions. Study expected to have a duration of 20 years.

Para 8: Is familiar with the pattern of waves and currents in McKenzies Bay and Tamarama during periods of sand surplus and deficit and the cyclic behaviour of surf zone.

Para 9: Discusses nature of waves, with equal amount of water to be returned seaward through narrow rip currents or widely spaced undertow.

Para 10: Discusses movement of sediment from beaches during high energy conditions and return of sediment to beaches during low energy conditions.

Para 11: Discusses the three dominant processes along the McKenzies rock platform as wave reflection, rip currents and undertow.

Para 12: Discusses rip currents as being more active during larger waves, particularly headland rips. Rip movement is generally off shore, and flow faster during low tide. Under normal conditions a rip will only extend 50 to 100 metres seaward of the surf zone.

Para 13: Discusses undercurrents as being stronger when waves are larger and usually occurring across sandbars and can exist concurrent with rips.

Para 14: Describes the bottom topography around McKenzies Bay as being sand with boulders at the base of the rock platform.

New South Wales Police **P.190**
v3.0

STATEMENT in the matter of:

Place: Paddington Police Station
Date : 1 August 2001

Name: Robert Williams BRANDER
Address: C/O New South Wales University **Tel. No.:** [redacted]
Occupation: Lecturer , School of Geography **STATES:-**

1. This statement made by me accurately sets out the evidence which I would be prepared, if necessary, to give in court as a witness. The statement is true to the best of my knowledge and belief and I make it knowing that, if it is tendered in evidence, I shall be liable for prosecution if I have wilfully stated in it anything which I know to be false, or do not believe to be true.

2. I am 36 years of age.

3. I am currently a Lecturer in the School of Geography at the University of New South Wales with a research specialty in coastal geomorphology.

4. I obtained a Bachelor of Science (1989) and Master of Science (1991) in Physical Geography from the University of Toronto, Canada and a Doctor of Philosophy from Sydney University in 1997. The subject of my thesis was the measurement and behaviour of rip currents and I published my findings in numerous articles in Marine Geology, the Journal of Coastal Research, Coastal Engineering and have written the entry on Rip Currents in the Encyclopaedia of Marine Science. I have been conducting research on wave, current and sediment movements in the surf zone since 1987 and continue this research.

5. I first came to Australia in 1992 on vacation and arrived

Witness: _____ **Signature:** _____

in 1993 to commence my studies for a doctorate. The wave, current and sediment movements used in my thesis were measured at Palm Beach which has comparable rip systems to Sydney's Eastern Suburbs Beaches including South Bondi headland.

6. On 1 April, 1995 I moved into the Tamarama Surf Life Saving Club as resident caretaker. I lived there until June, 1998. During that time I was an active member of the Surf Club and performed patrols. I have also snorkelled extensively around Tamarama and McKenzies Bay and became very familiar with the submarine topography, rock platforms, caves and currents over a period of several years.

7. I commenced formal monthly surveys of Tamarama and Bronte Beaches in August, 2000 in order to monitor beach sediment volume in response to changing wave conditions over the long term. I anticipate this study will have a duration of 20 years.

8. I have become familiar with the pattern of waves and currents in the Mackenzies/Tamarama area during periods of sand surplus and deficit and the cyclic behaviour of the system today is similar to what has occurred in the past. The conditions ten or twelve years ago would again be replicated as part of an ongoing cycle.

9. Waves physically transport water towards the shore. In order for a balance to be maintained, an equal amount of water must be returned seaward. The most common mechanisms of returning this water seaward are through reflection of the wave, narrow seaward flowing rip currents and gentle widely spaced bed return flow (undertow). Movement of water can extend from the surface to the bottom.

Witness: _____ **Signature:** _____

10. During the movement of water toward and away from the shore, there is an associated movement of sediment. This sediment is generally moved offshore during storm or high energy conditions and is moved landward during calm or low energy conditions. On the Sydney coastline high energy conditions generally occur when breaking wave heights are greater than 1.5 to 2 metres although this definition is arbitrary. The movement of sand or sediment is cyclic and can cause significant changes in the depth of the sand beach levels.

11. The three dominant processes occurring along the MacKenzies rock platform are wave reflection, rip currents and bed return flow (undertow). Wave refection occurs when an incoming wave hits a wall, like a cliff or edge of the shore platform and is reflected back out to sea. This reflected wave often interacts with the next incoming wave and a turbulent zone is created. The motion in this zone is very energetic and orbital or circular in nature. Reflection of this type will occur under all wave conditions but is enhanced during larger wavers and at low tide when there is a more sheer face of rock that the wave can hit.

12. Rip currents on beaches and headlands are quite different. Rips on beaches tend to form in channels between sand bars. On headlands water is forced to one side by the dominant angle of wave approach and the rip flows against the headland and does not necessarily occupy a channel in the sea bed. Usually the rip is along or close to the rocky shore line. In small headland bay/beaches such as MacKenzies, the entire bay may exhibit rip current flow during large waves. All types of rip currents flow faster when waves are larger. This is particularly true of headland rips. The velocity of water in a

Witness: _____ **Signature:** _____

rip flow increases from the sea bottom, reaches a maximum towards the middle of the water column and decreases again towards the surface. Flow in rips is virtually always off shore and flow velocities are typically 0.5 to 1.5 metres per second dependant on wave height. Rip flow is also known to pulse such that following groups of large waves the rip may flow 0.5 metres per second faster for a period of several minutes. During large storm conditions with waves greater than 3 metres, McKenzies Bay is characterised by mega rips which may flow on the order of 2 metres per second and may extend up to half a kilometre off shore. Under normal conditions the rip will only extend approaximately 50 to 100 metres seaward of the breaking waves. Rip currents tend to flow faster at low tide.

13. Undertow is a gentle seaward return flow that occurs in a layer close to the sea bottom across large areas of shoreline. it commonly flows at speeds of 10 to 30 centimetres per second. Undertow is stronger when waves are larger. Undertow usually occurs across sandbars and can occur concurrently with the existence of rips. By itself, undertow is not considered a hazard to swimmers contrary to public perception.

14. The bottom topography around south bondi headland and McKenzies Bay is sand with boulders restricted to the base of the rock platform and isolated submerged rock platforms and rock outcrops. The boulders come from rock falls from the cliff and are eroded by wave action to become rounded. In the front of the headland is a submerged rock platform that extends about 50 metres seaward.

Witness: _____ **Signature:** _____