

TWEED SAND BYPASSING

OVERVIEW

In May 2019:

- 26,935 m³ of sand was pumped to Snapper Rocks East.
- 0 m³ of sand was dredged and placed at Snapper Rocks East.
- Significant wave heights were mostly calm (0.26 m to 1.17 m), with a maximum significant wave height of 1.17 m on 14th May. Wave directions were predominantly from the ENE and ESE.
- 1,786 vessel crossings were recorded for the month (This is 90% of the May average (2002 – 2019)).
- The modelled estimated amount of sand moving north towards the Tweed River entrance by natural processes was in the order of 27,000 m³ (this is 41% of the May average of 64,587 m³).

1. SAND PUMPING & DREDGING

Sand Delivery May 2019

| | |
|----------|-----------------------|
| Pumped: | 26,935 m ³ |
| Dredged: | 0 m ³ |
| Total: | 26,935 m ³ |

The number of days sand was pumped this month = 16

Sand Delivery January 2019 to December 2019

| | |
|----------|------------------------|
| Pumped: | 165,050 m ³ |
| Dredged: | 0 m ³ |
| Total: | 165,050 m ³ |

Stage II Sand Delivery May 2000 to May 2019

| | |
|----------|-----------------------------|
| Pumped: | 9,454,450 m ³ |
| Dredged: | 2,320,514 m ³ * |
| Total: | 11,774,964 m ³ * |

* This Includes 22,870 m³ of sand delivered by dredge to Palm Beach between June and September 2005

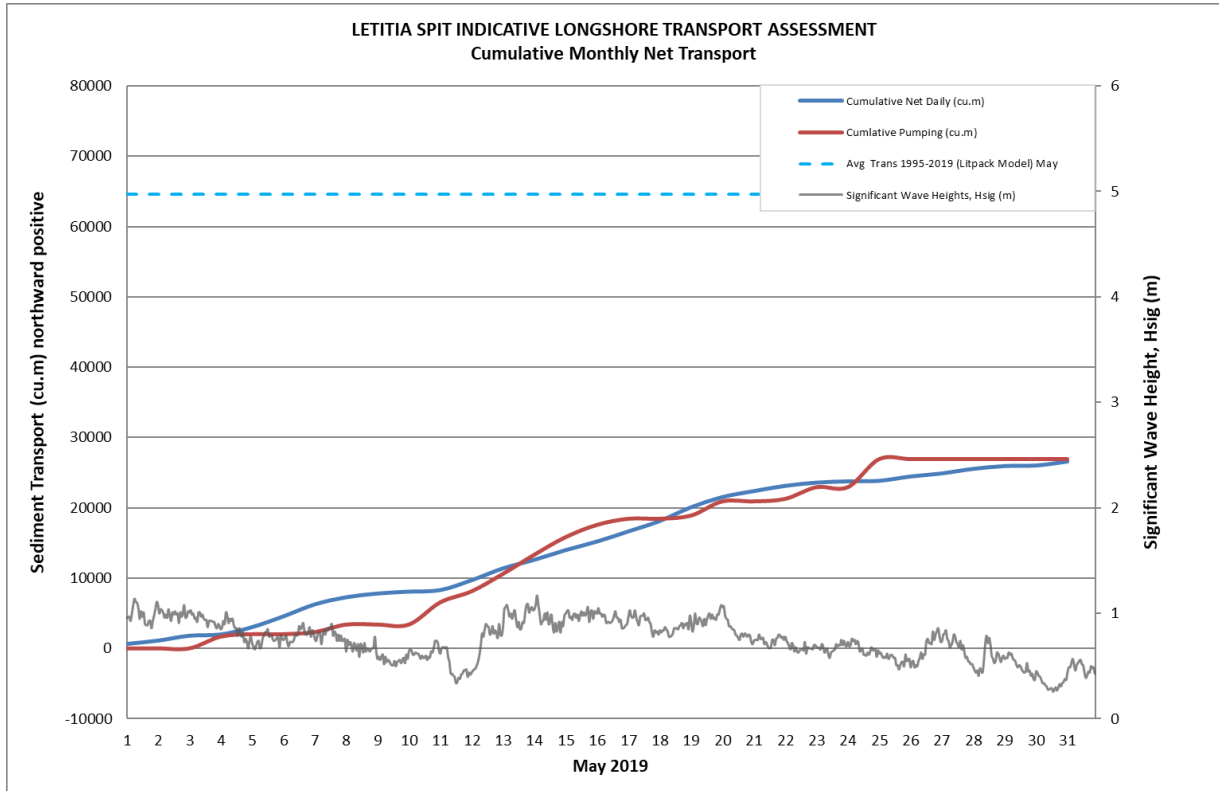
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2. INDICATIVE LONGSHORE TRANSPORT

The graph below is based on simplified sediment transport modelling and is indicative only.

In May 2019 the estimated natural sand transport moving north towards the Tweed River entrance was calculated to be 26,565 m³.

This result is 41% of the average estimated sand transport quantity of approximately 64,587 m³ for the month of May.



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3. TWEED RIVER ENTRANCE USAGE

Marine Rescue NSW - Monitoring Results (Not including trawlers)

 Weekends

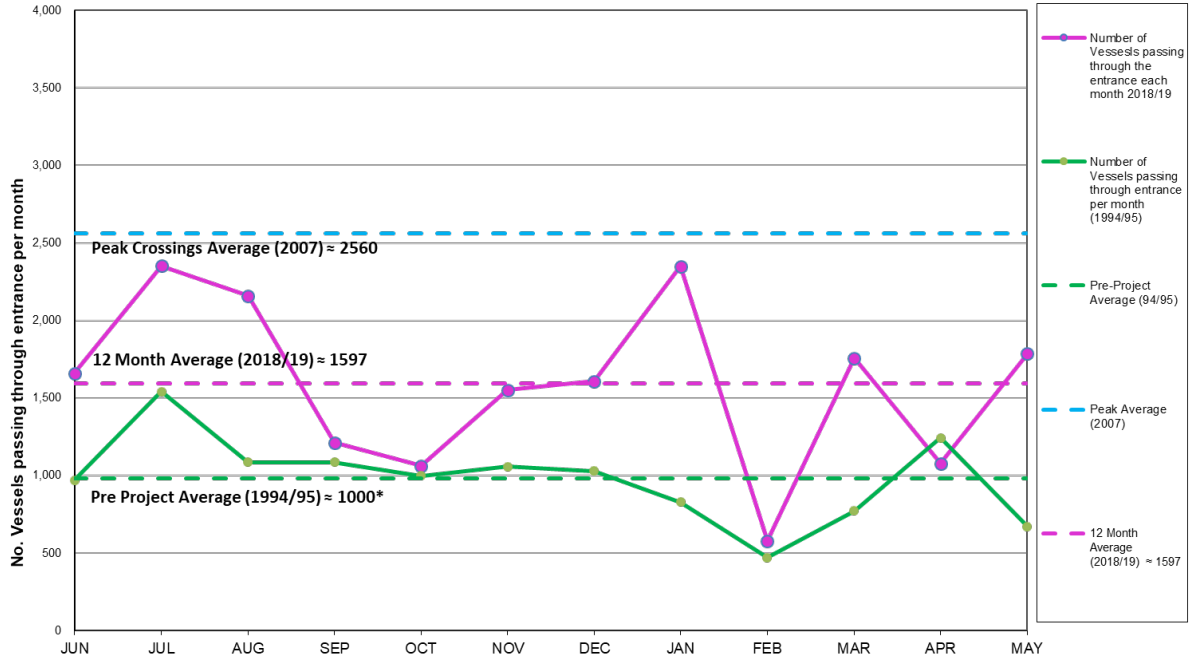
| Date May 2019 | Navigation Rating | | | | | Number of Crossings |
|------------------|-----------------------------|---------------------------|-----------------------------------|--------------------------------|--------------------|------------------------|
| | Impassable < - - - - > Good | | | | | |
| | Impassable | Difficulty Encountered | Some Difficulty Encountered | Relatively Good Crossing | Good Conditions | |
| | 1 | 2 | 3 | 4 | 5 | |
| 1 | | | | | | 1 |
| 2 | | | | | | 14 |
| 3 | | | | | | 55 |
| 4 | | | | | | 60 |
| 5 | | | | | | 72 |
| 6 | | | | | | 83 |
| 7 | | | | | | 72 |
| 8 | | | | | | 28 |
| 9 | | | | | | 105 |
| 10 | | | | | | 68 |
| 11 | | | | | | 51 |
| 12 | | | | | | 25 |
| 13 | | | | | | 0 |
| 14 | | | | | | 20 |
| 15 | | | | | | 8 |
| 16 | | | | | | 9 |
| 17 | | | | | | 25 |
| 18 | | | | | | 54 |
| 19 | | | | | | 25 |
| 20 | | | | | | 21 |
| 21 | | | | | | 115 |
| 22 | | | | | | 46 |
| 23 | | | | | | 43 |
| 24 | | | | | | 91 |
| 25 | | | | | | 256 |
| 26 | | | | | | 125 |
| 27 | | | | | | 34 |
| 28 | | | | | | 86 |
| 29 | | | | | | 42 |
| 30 | | | | | | 44 |
| 31 | | | | | | 108 |
| | | | | | Total: | 1786 |

Source: Marine Rescue NSW, Point Danger

* Total does not include trawlers

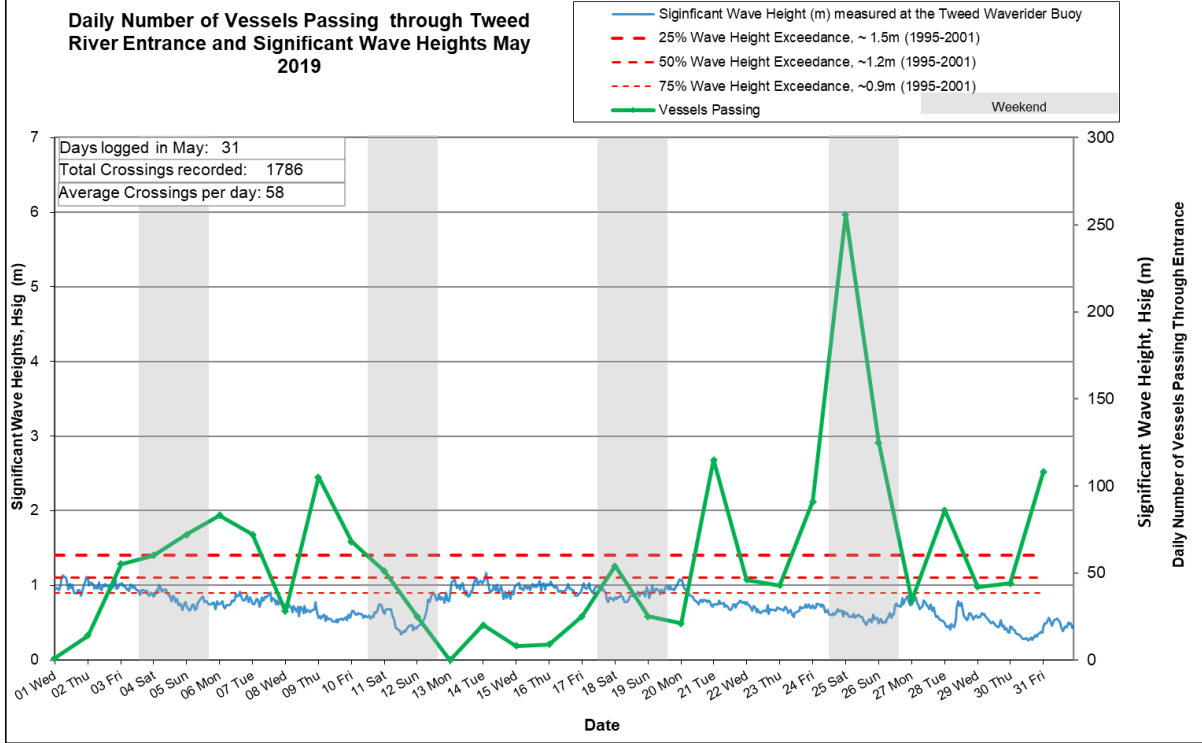
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Comparison of the number of vessels passing through the entrance per month 2018/19 compared to 2007 (peak crossings) and 1994/95 (prior to entrance improvements)



*Note 1 - Assuming the number of incoming boats = outgoing boats in 94/95

Daily Number of Vessels Passing through Tweed River Entrance and Significant Wave Heights May 2019



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4. WAVE CONDITIONS

Wave conditions over the month: Significant wave heights were mostly calm (0.26 m to 1.17 m), with a peak significant wave height of 1.17 m on 14th May. Wave directions were predominantly from the ENE and ESE.

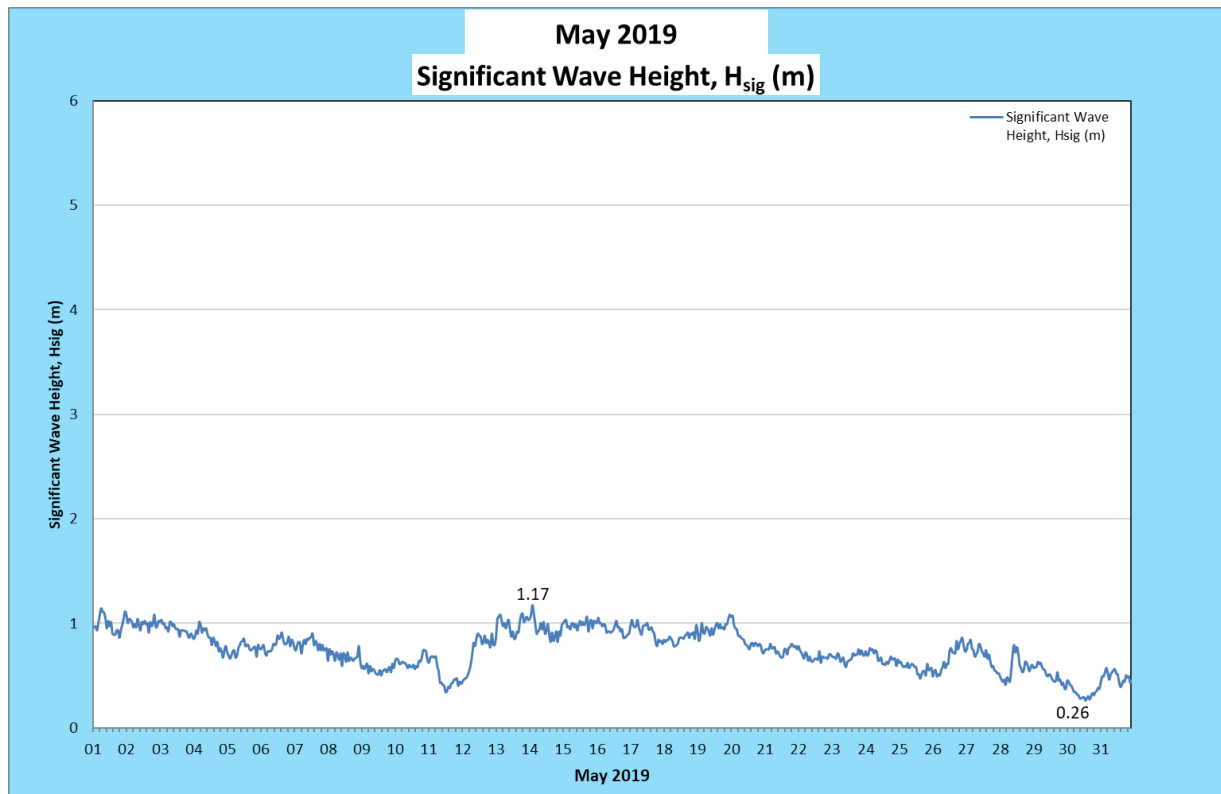
Monthly minimum significant wave height: 0.26 m on 30th May

Monthly maximum significant wave height: 1.17 m on 14th May

Number of days on which waves were below 1.0 m at some point in the day: 31 days

Number of days on which waves were above 2.0 m at some point in the day: 0 days

Note: Significant wave height (H_{sig}) is defined as the average of the highest one-third of waves recorded over a period of approximately 30 minutes

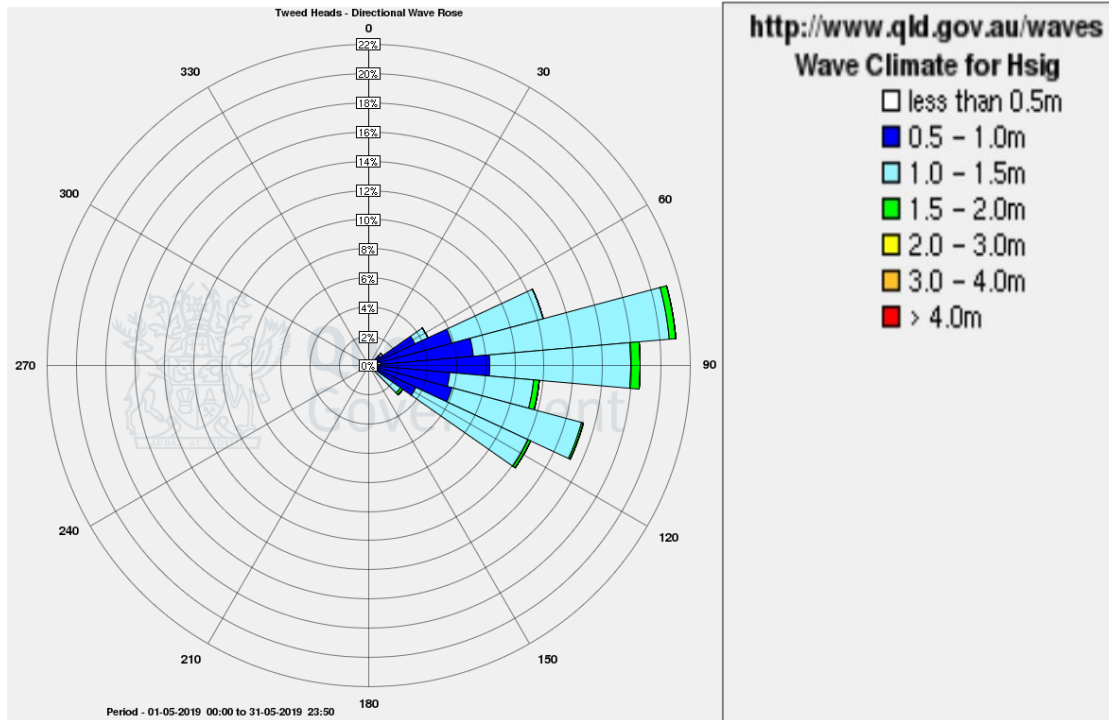


(Source: Tweed Heads Waverider Buoy; Queensland Government)

A link to data recorded by the Tweed Waverider Buoy is available at: <http://www.qld.gov.au/waves>

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WAVE DIRECTION



(Source: Tweed Heads Waverider Buoy; Queensland Government)