




NSW Coastal Conference 2022

Nearshore nourishment mound placement and temporary surfing outcomes

Dr Tom Murray
 Research Fellow
 Coastal and Marine Research Centre, Cities Research Institute
 t.murray@griffith.edu.au



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Griffith University

Director: Professor Rod Connolly

Research Manager – Coastal : Dr Darrell Strauss

Formerly Griffith Centre for Coastal Management – Professor Emeritus Rodger Tomlinson

Established 1999 (Gold Coast City Council resolution in 1999) – Chair in Coastal Management (Rodger Tomlinson)

- Based on the Gold Coast campus
- Core funding for Centre admin, research and coastal education programs
- Core group of “named” researchers to deliver local government (namely City of Gold Coast) based activities
- *Autonomous Centre within the Cities Research Institute since 2017*

Expertise in Coastal Geoscience and Engineering

- Coastal engineering
- Physical Oceanography
- Environmental Engineering
- Environmental Science
- Geography
- Geomorphology
- Marine biology
- Coastal Management
- Coastal education and community engagement

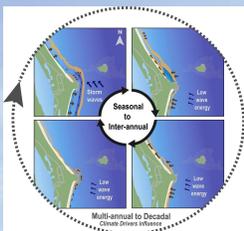
<https://www.griffith.edu.au/coastal-marine-research-centre>



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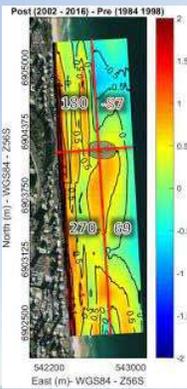
Recent Coastal Engineering and Management Studies

- Nearshore and Beach Nourishments – coastal erosion management and mitigation
- Spit Master Plan – large community development and tourism infrastructure
- Sand bypassing (natural and pumped) – Gold Coast, Sunshine Coast, Tweed, Fingal, Byron
- Surfers Paradise Sand Back-Passing Project – back passing sand from The Spit to Surfers Paradise
- Seawall overtopping / combined wave height and water level ARI studies
- Multi-purpose artificial reefs for coastal protection and surfing benefit
- Holistic Beach Health Reporting and City-wide coastal, ocean and water quality monitoring for establishing trigger levels for decision making
- Community engagement exercises – e.g. presentations to Fingal Heads community groups around sand bypassing
- Conversation article and expert communication of Byron Bay erosion / headland bypassing – c. 2020-2021
- Sediment transport and coastal management under current and future climate scenarios



Seasonal to Inter-annual
Multi-annual to Decadal
Ocean Drive Influence

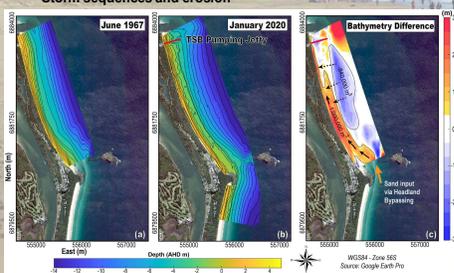
<https://doi.org/10.1016/j.scitotenv.2021.148591>



Post (2002 - 2016) - Pre (1984 - 1998)

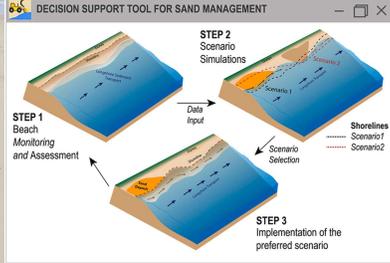
<https://doi.org/10.2112/SI95-137.1>

Storm sequences and erosion



<https://doi.org/10.1016/j.margeo.2021.106625>

DECISION SUPPORT TOOL FOR SAND MANAGEMENT



<https://doi.org/10.1016/j.ocecoaman.2021.105887>



Source: CoGC Skyepics

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Sand mound nourishments and surfing outcomes





Successes?

1. St. Augustine Beach, Florida (c. 2005) – 4 months
2. Scheveningen Beach, The Netherlands – 3 months
3. Sand Slug Cronulla, NSW (c. 2011) – 6 months?
4. Palm Beach, QLD (2017) - 4 to 6 months?

Failures?

1. Long Branch, Monmouth County, New Jersey
2. Copacana Beach, Brazil
3. West Newport Beach, California

Evidence?

- Pictures and Anecdotal
- Longevity of sand mounds generally not recorded

More permanent sand nourishments with successful surfing outcomes

1. The Superbank, GC – 20+ years (permanent sand bypassing)
2. Ebb-tide delta modified surf breaks – fairly steady formations

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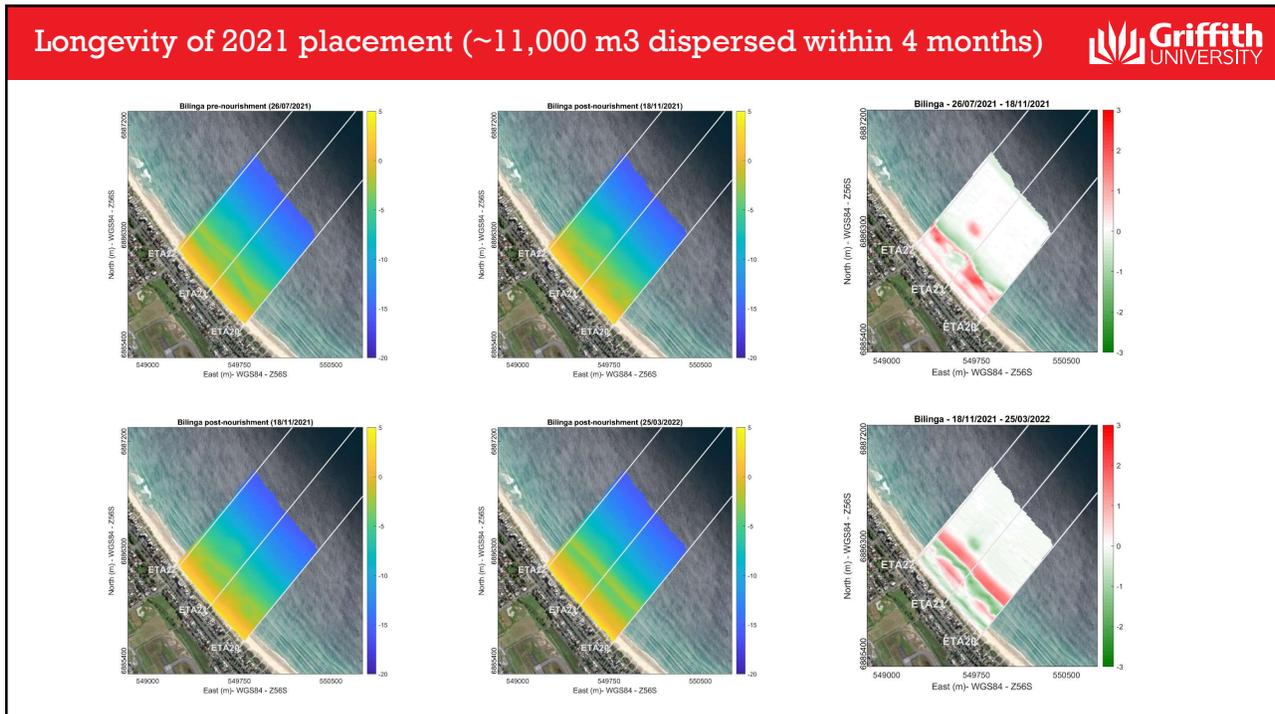




<https://medium.com/surflife-labs/intelligent-surf-cameras-fce6e7e3d03e>

<https://twitter.com/VieiradaSilvaG/status/1427776106002718724?s=20>

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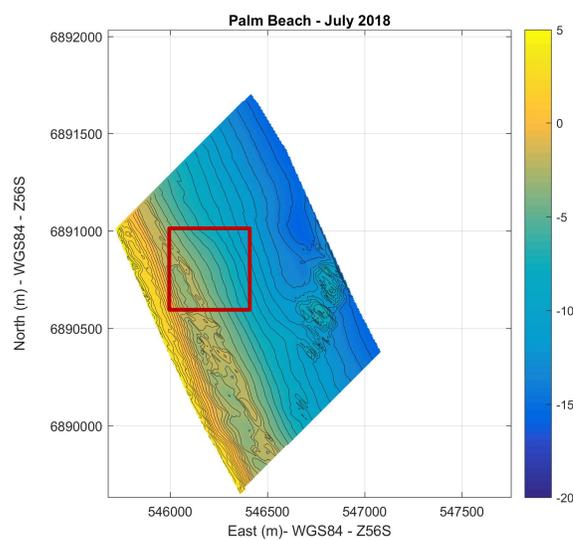
Lessons learnt from previous nourishments / artificial reefs



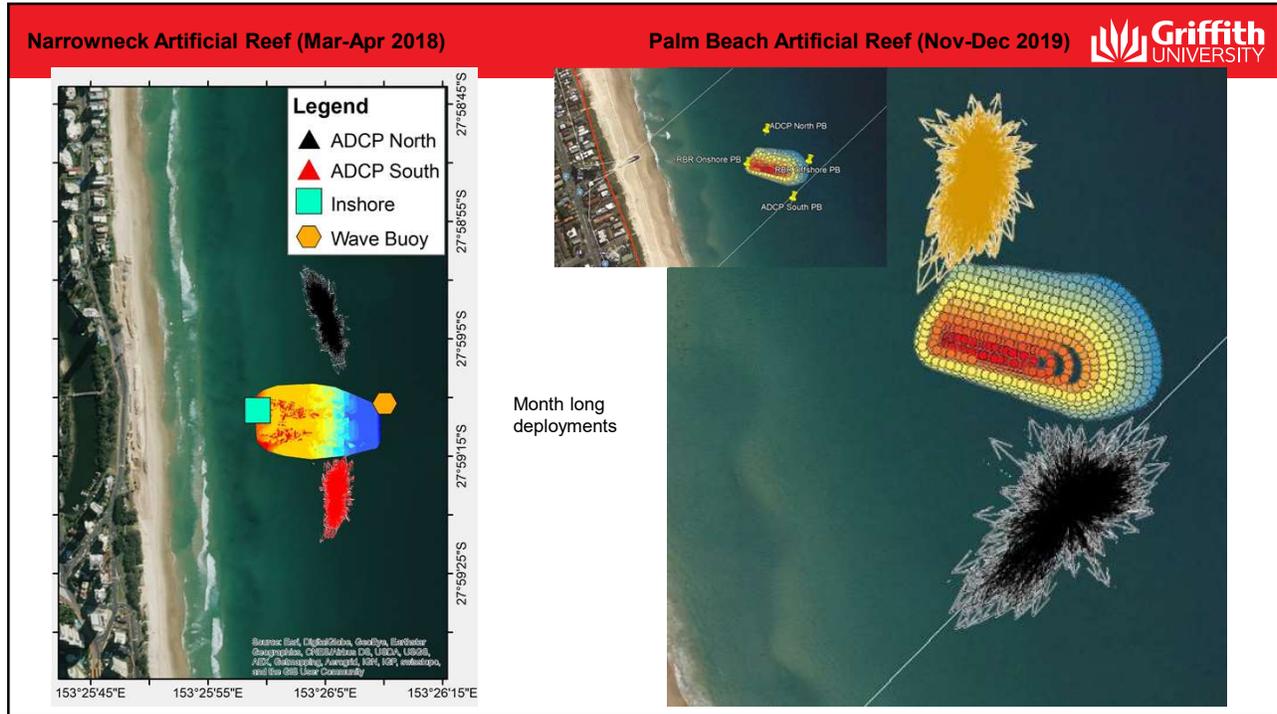
- Regular, high frequency survey of Palm Beach nourishment mound (July 2017 – July 2018)
- Validated, published 3D process-based model (Delft3D) of sand mound dispersion
- Wave transformation across Narrowneck (Mar-Apr 2018) and Palm Beach (Nov-Dec 2019) as well as currents and sediment transport studies around the reef
- Plan to do the Bilinga studies in 2022 – hoping for a decent nourishment placement (~40,000 m³+)

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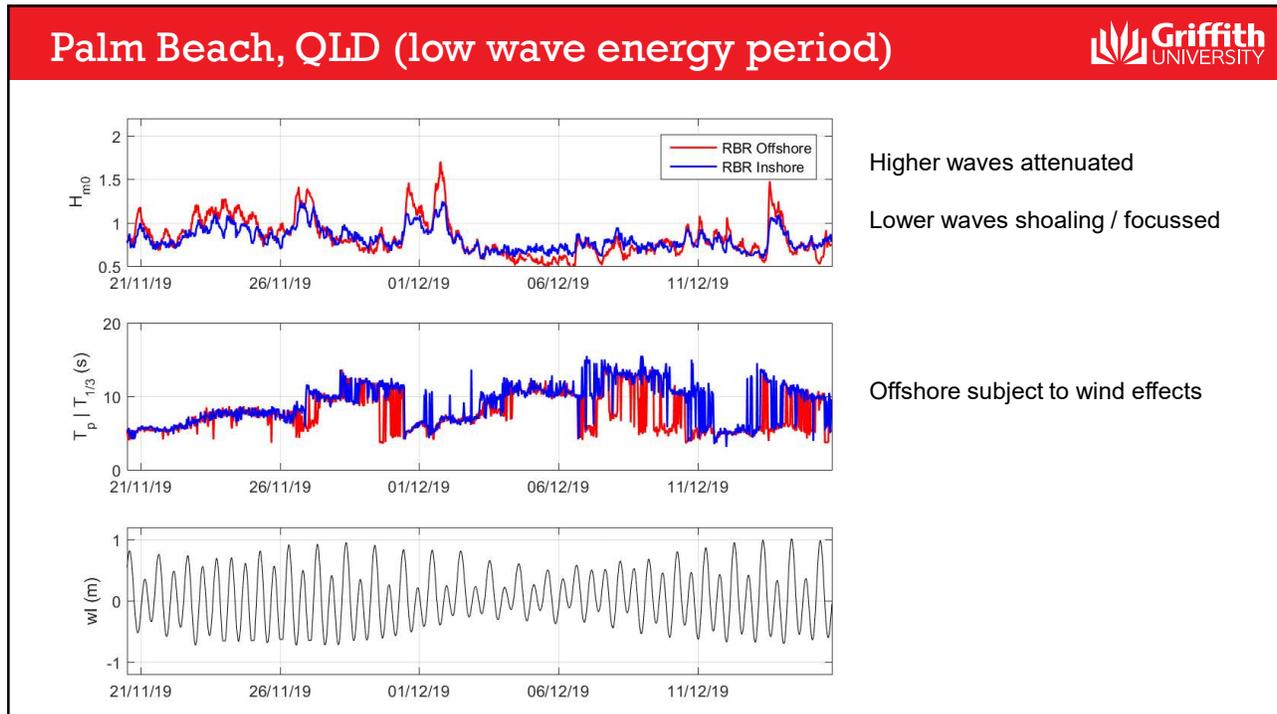
Palm Beach – 80,000 m³ sand mound dispersion



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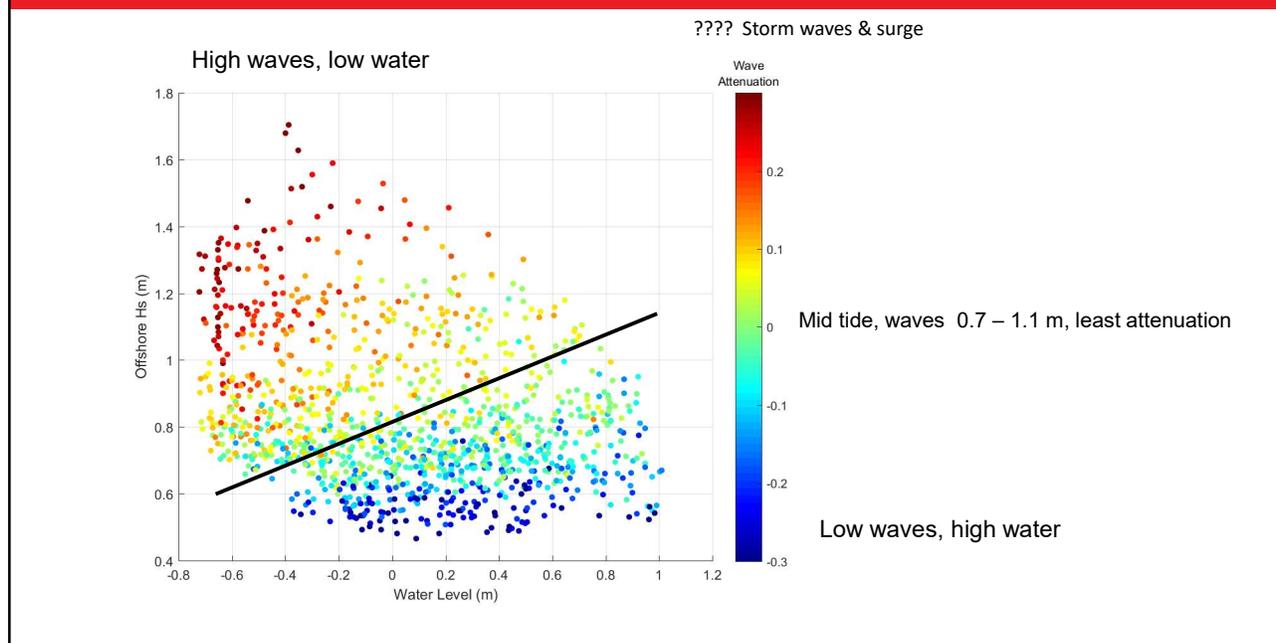


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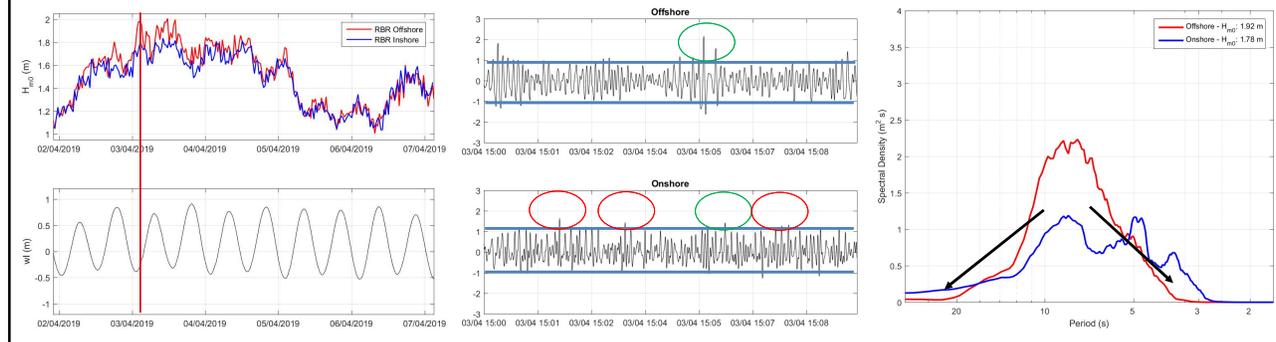
Palm Beach, QLD – Wave Attenuation



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Narrowneck (moderate wave energy event)

- Attenuation starts when $H_{m0} > 1.6$ m, particularly during low tides
- Waves attenuated up to 15%. It is expected that the attenuation would be greater for higher waves.
- Energy transfer from lower to higher frequencies (secondary waves generation)



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Sand mound and Temporary Surfing Opportunities

- **Working with QGHL and Tweed Sand Bypass (NSW) to understand temporary surfing benefits from targeted sand mound nearshore nourishment**

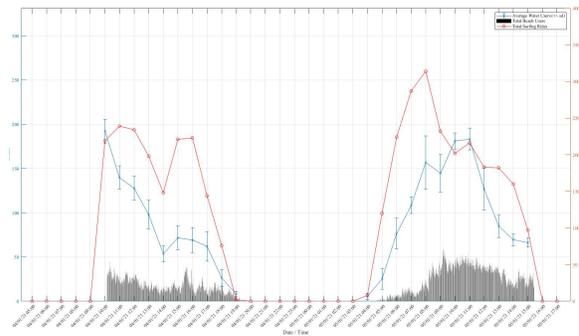
What do we need to know for surfing outcomes?

- Longevity of sand mound (more frequent high density surveys)
- Quality of surfing break (for what type of 'surfer')
- Crowd (vibe, population, demographics)
- Optimal conditions (wave height, direction, tide, wind etc.)

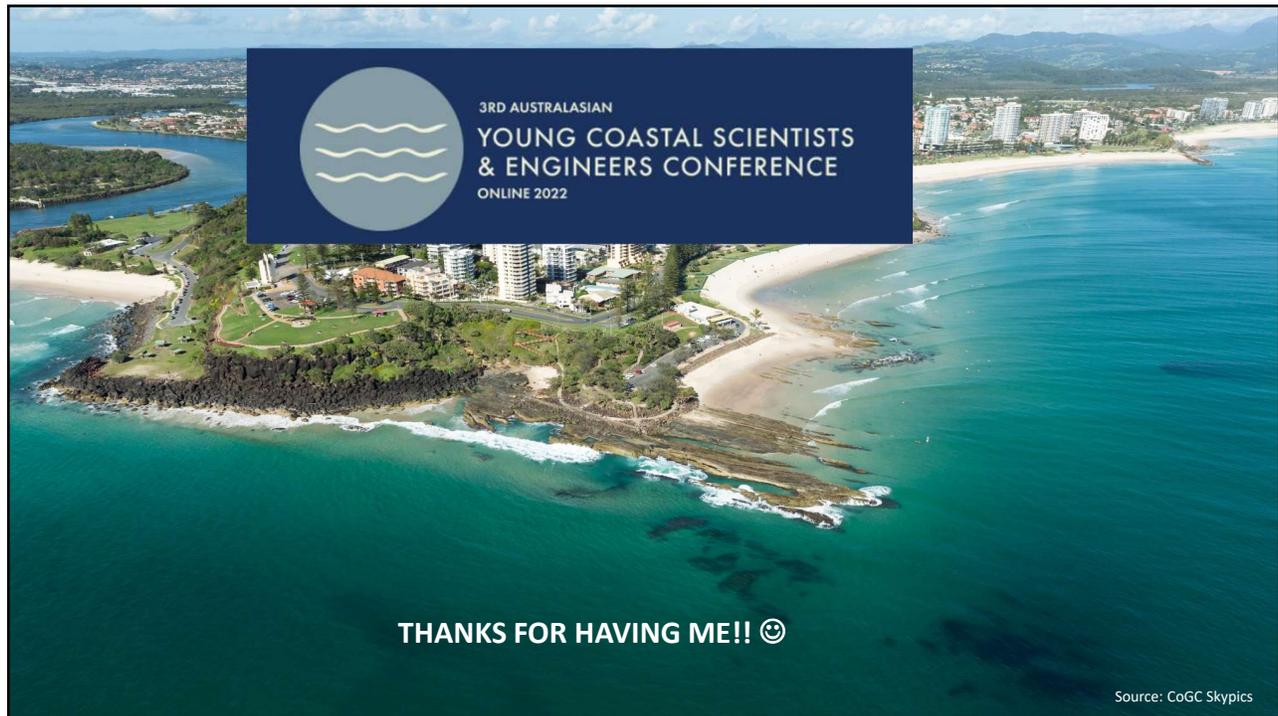


What data do we collect?

- Surfer tracking (GPS, Machine Learning)
 - Surfer counts
 - Surf reports
 - Forecasts
 - Wave and environmental conditions
- The question then becomes: Multi-purpose artificial reefs or targeted sand mound placements to get best cost/benefit ratio for surfing and coastal protection?



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