

# Tsunami loading characteristics on power poles

- Motivation
- Methods
- Results
- Outlook

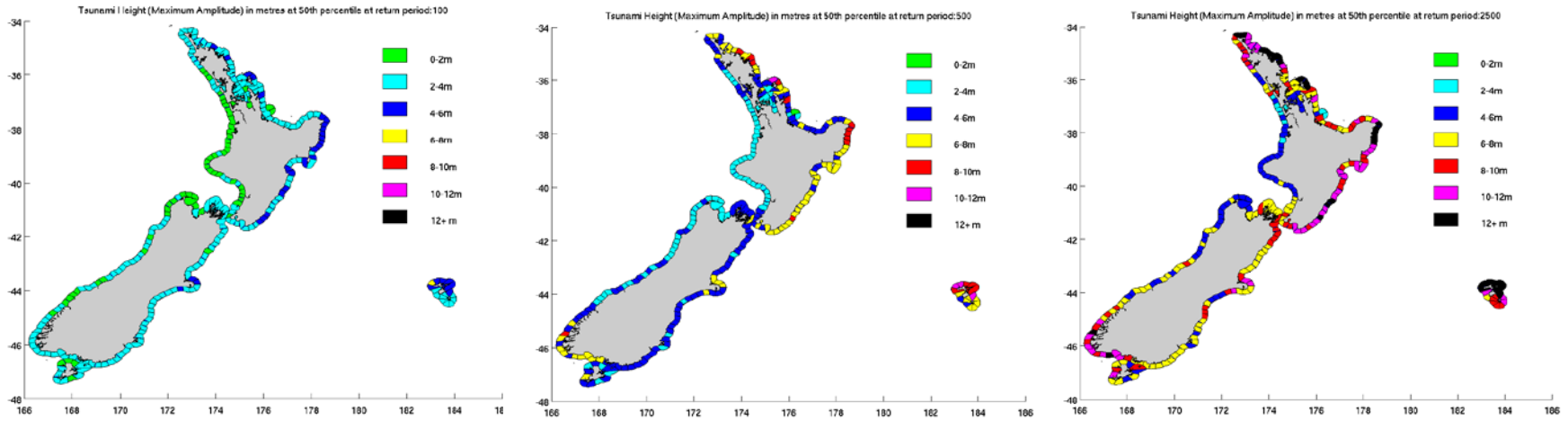
Colin Whittaker, Liam Wotherspoon, Bruce Melville, Farzad Farvizi,  
Benjamin Popovich, Jonathan Andrew, Charles Tucker



ENGINEERING



# Motivation

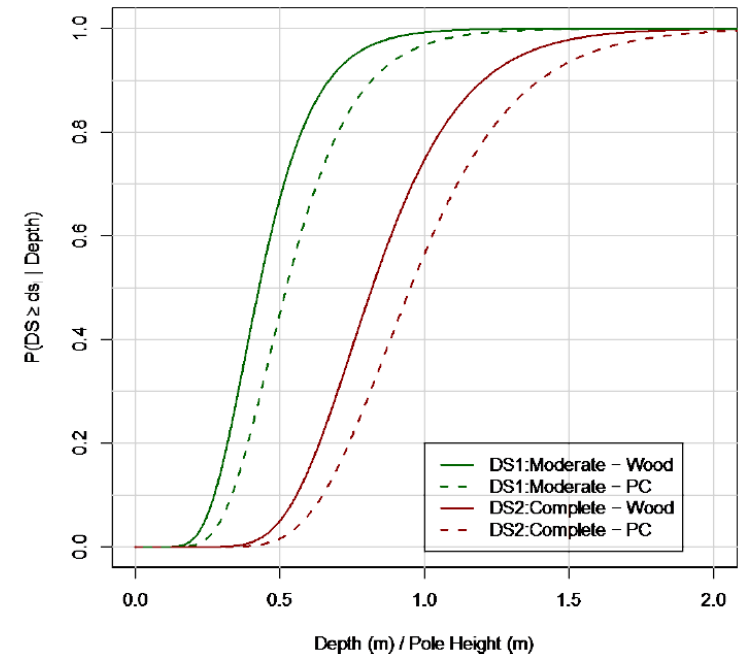


Review of Tsunami Hazard in New Zealand (Power, 2013)



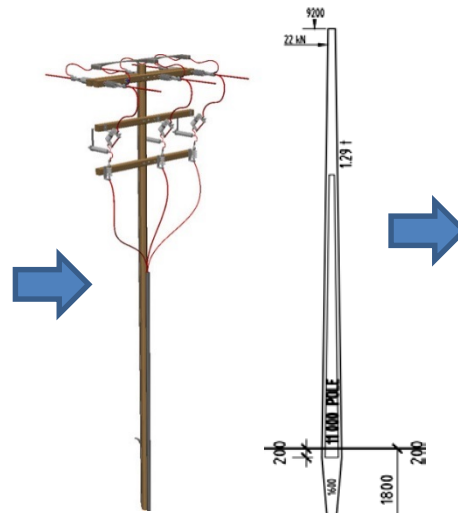
Utility poles being reinstated following the 2011 Japan Tsunami

Utility Poles



An Analysis of Tsunami Impacts to Lifelines (Horspool & Fraser, 2016)

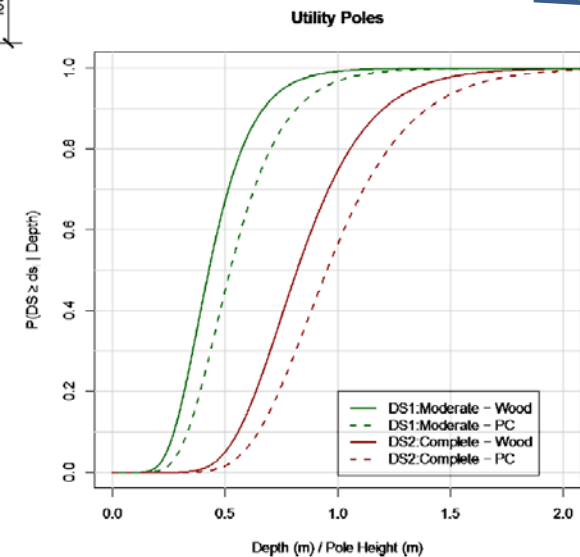
# Objectives



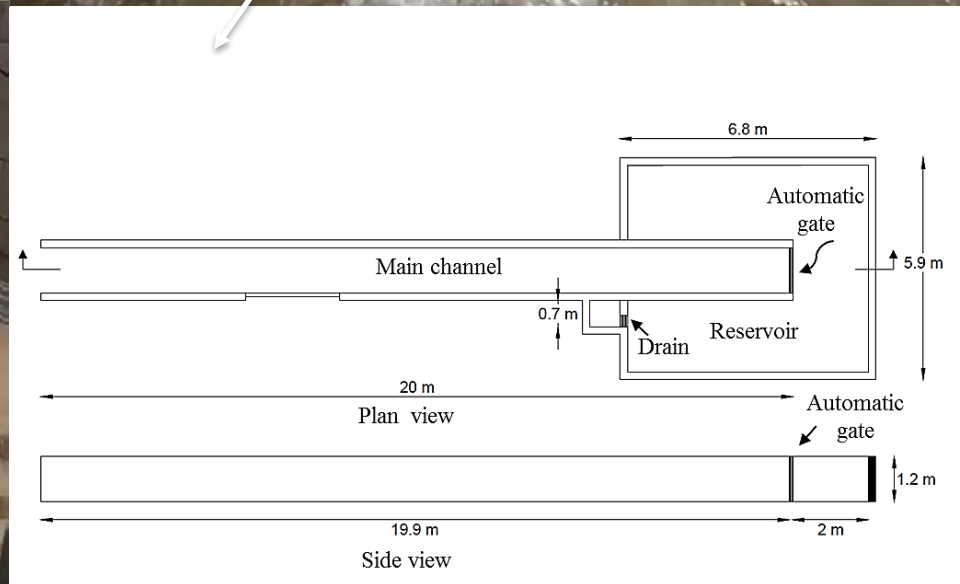
An Analysis of Tsunami Impacts to Lifelines  
(Horspool & Fraser, 2016)



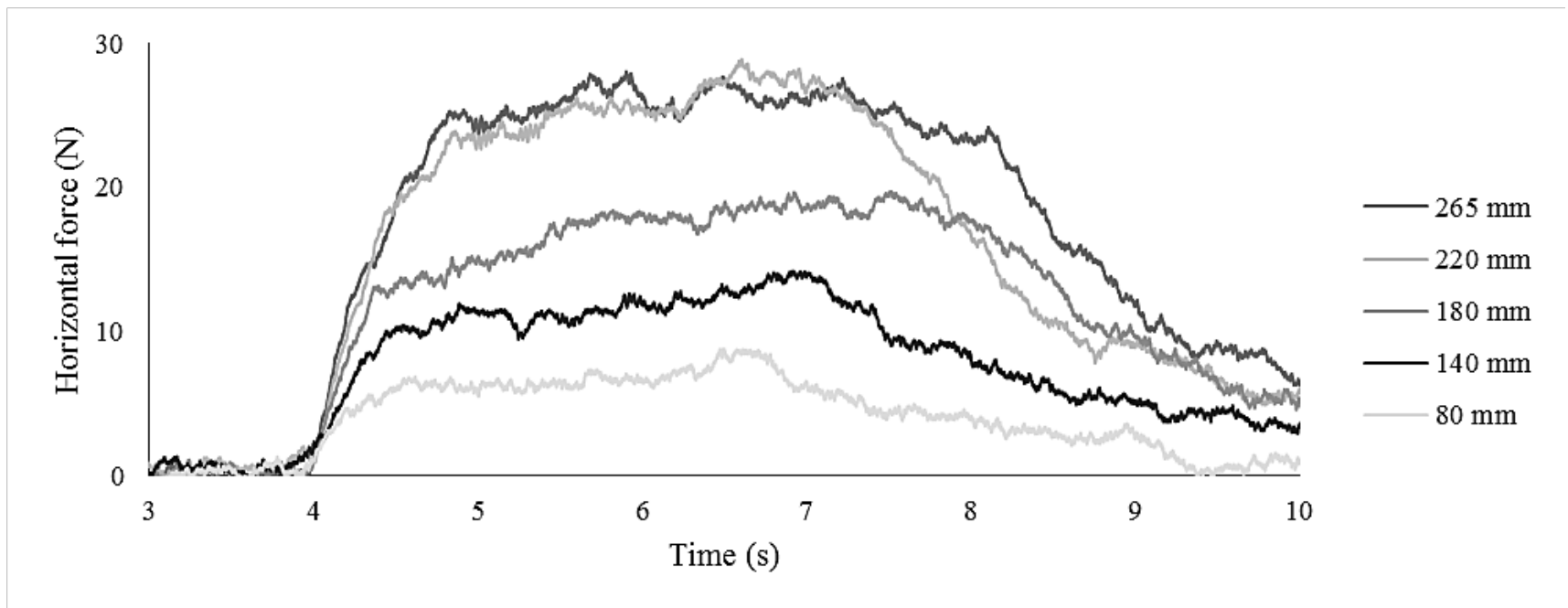
<https://www.riskscape.org.nz/>



An Analysis of Tsunami Impacts to Lifelines  
(Horspool & Fraser, 2016)



# Representative force time history

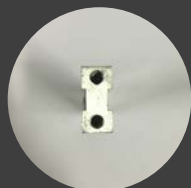


# Measured forces

Concrete I-Section



11m (11kV)

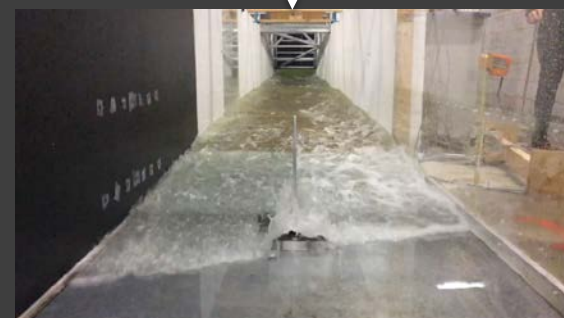
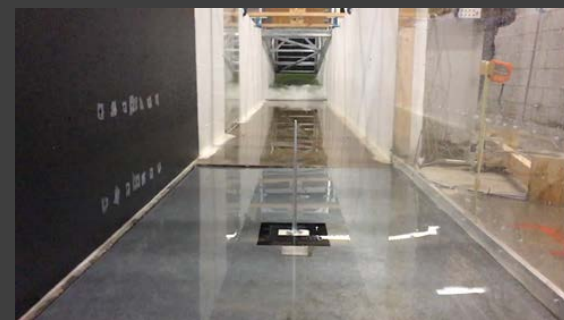
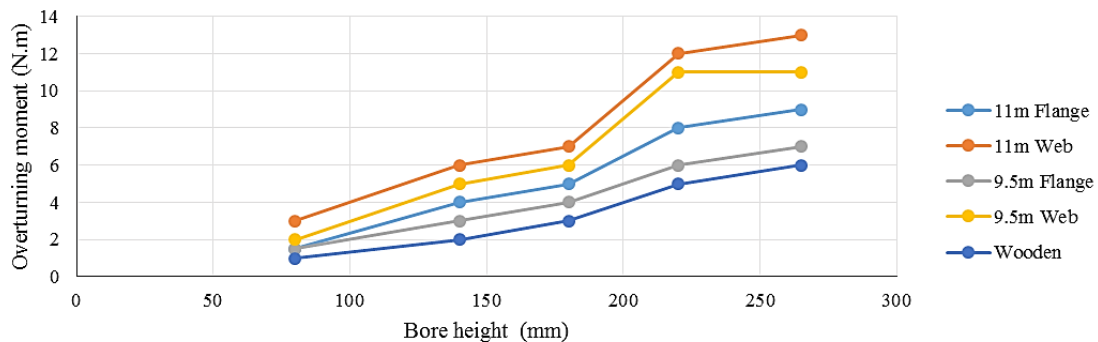
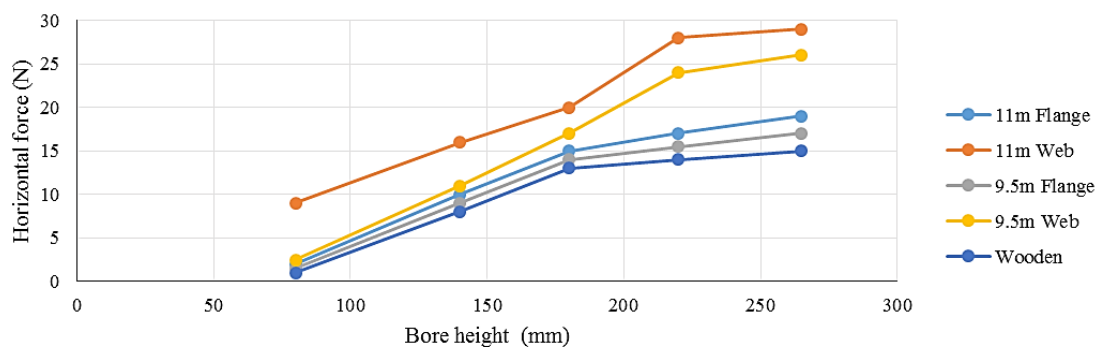


9.5m (400V)

Wooden Cylindrical Section



9m



# Key findings and next steps

- The utility poles attracted lower loads when the flange faced the direction of flow under bore attack, suggesting a preferred alignment to improve utility pole resilience under tsunami attack.
- Structural modelling ongoing:
  - Looking at generalized load distributions that describe the force/moment dependence on the bore height.
  - Determining the damage states associated with the different load conditions.
  - Checking damage states against available field data.
- Note: Our approach does not include consideration of conductors or stays supporting the structures.

# This year's RfP project

- Still trying to secure a suitable Masters student for this year's RfP project.
- Two part 4 students looking at debris, scour and extending the types of infrastructure modelled. Visitor from Ottawa for debris work.



**Thank you!**

