Ministry for the Environment
Manatū Mō Te Taiao

Factsheet 2

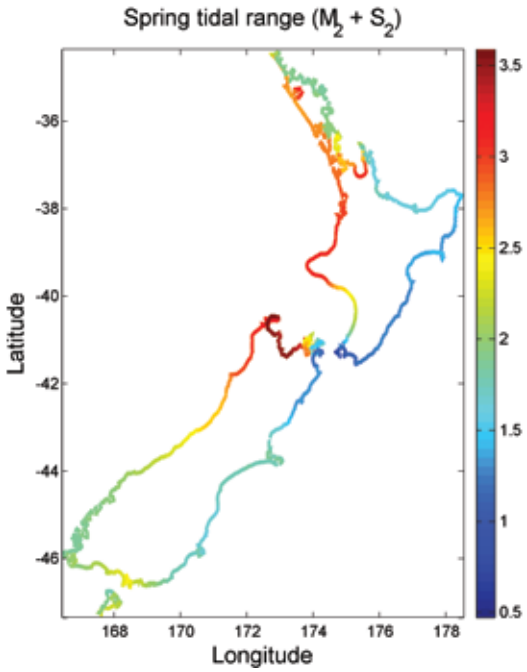
Tides

Tides are generated by gravitational forces exerted by both the sun and moon on the Earth's oceans. Ocean tide waves then propagate onto the continental shelf and into estuaries and harbours. They are then modified by wave shoaling (where the tidal wave slows down and increases in tidal range as the water becomes shallower), and by friction from the seabed and constrictions such as estuary entrances, river mouths and straits.

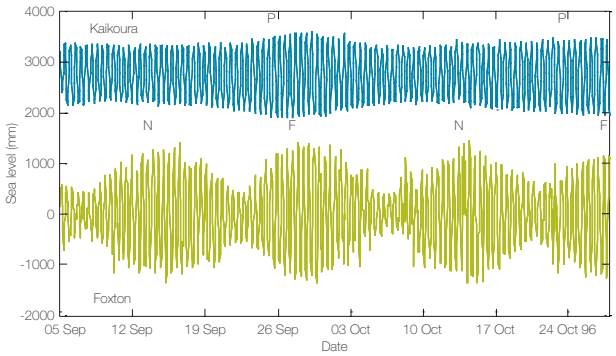
Tides are entirely predictable and can be predicted for any day or period many years in advance.

The tidal range (the difference between high and low waters) varies around New Zealand, reaching 3.5–4 m on the west coast but only 1–2 m on the east coast.

A tide mark commonly used to characterise high tides is mean high water spring (MHWS), which is also used to define the coastal planning boundary. MHWS is traditionally calculated for nautical purposes as the long-term average of the highest high tide that occurs just after every new and full moon (ie, spring tides). Normally, only about 10–20 per cent of all high tides would exceed such a MHWS mark.



Spring tidal range (in metres) around the coast of New Zealand.



Comparison of tidal range characteristics between Kaikoura (east coast) and Foxton (west coast).
P=perigee, N=new moon and F=full moon

Values for MHWS are widely available. Yet, New Zealand tides along the central–eastern coasts do not easily fit with the nautical MHWS definition. For example, at Kaikoura, 50 per cent of high tides exceed the nautical MHWS level. The reason is that there is little difference between the fortnightly neap and spring tides along the central–eastern region. Instead, the highest tides occur once a month (every 27.5 days), when the moon's elliptical orbit takes it closest to the Earth. Therefore, in estuaries and open coast locations on the east coast from Otago to Bay of Plenty, a better 'hazard' definition of the peak monthly tides is to use a 'pragmatical' MHWS, such that only 10 per cent or 12 per cent of local high tides exceed it; or use the mean high perigean-spring tide level (a higher tide that occurs in clusters peaking about every seven months, often referred as a 'king tide', when a perigean and spring tide combine).

New Zealand Government

Published in March 2009 as part of *Preparing for coastal change: A guide for local government in New Zealand* by the Ministry for the Environment, Manatū Mō Te Taiao, PO Box 10362, Wellington 6143. INFO 368