

Doubtful Sound

Some twenty years ago I was involved in a re-survey of Doubtful Sound, in the isolated Fiordland area of New Zealand. The existing chart dated from 1851 but was adequate for the small fishing vessels and local tourist vessels that frequented the area. Such larger vessels as occasionally visited tended to keep to the centre of the Sound, not relying on the chart for more than guidance.

In the 1960s an underground hydroelectric power station had been constructed at Lake Manapouri to supply an aluminium smelter, a discharge tunnel having been bored for 12km through solid granite to the Sound. Our survey was required because of a proposal to export some of the discharged water. Tankers of one hundred thousand tonnes and over were to be used, and the existing chart was inadequate for the safe navigation of such vessels. We were stunned to learn that something like six hundred tonnes of water per second now flowed out into the Sound, and impressed to discover that the water was deemed to be 'the second-most pure water in the world' ... apparently, the first prize went to a lake in Wales.

The survey was an exciting and exacting professional challenge, and a rare opportunity to undertake a complete survey in an area that was, essentially, unsurveyed. It presented considerable technical and logistic-al challenges and is one upon which I still look back with considerable pride.

Ultimately the project came to naught, largely due to difficulties overcoming environmental concerns and battling bureaucracy. However, many areas of the world, including New Zealand's large near neighbour Australia, are now experiencing water shortages and the value of fresh water is going up. Perhaps we shall see another proposal to use this renewable resource?

Hydro is the backbone of electricity generation in New Zealand. Large earthwork dams and underground power stations provide around 75% of our electricity requirements. Hydrographic surveys are necessary to assist in the design of the tailrace below the dam or at the end of the exhaust tunnel, where it discharges into existing rivers or sea outfalls.

One of the largest, the Clyde Dam, was built on the Clutha River over a geological fault and features a special keystone to connect one side of the dam to the other. The river was deepened for a distance of 10km to create a low-flow channel to cater for extremes in generation and to reduce exhaust back-pressure on the turbines.

Many of the hydro-lakes suffer from increased deposition and damage from erosive wind and wave action and require monitoring by way of profiling using conventional surveying, RTK-GPS, and general hydrographic techniques. Some lakes are actually slow flowing, wide rivers, where hydrographic surveys are used to measure the hydraulic capacity of the channel, deposition rate and the potential for flooding during storm conditions. Some schemes have been re-engineered using modern techniques to improve efficiency. Special flushing techniques have been developed to shift material downstream to deeper areas to alleviate the flooding potential. All these measures must be monitored. Many kiwi hydrographic surveyors are expert practitioners in this specialised area.

Our effort of twenty years ago was not wasted. Nowadays, the good modern chart enables a number of passenger liners to safely cruise down Doubtful Sound to take in its scenic beauty. A renewable resource in abstract form, to the exploitation of which the hydrographic survey has contributed.