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Hydrological Modelling Dataset

Report 3a: 2022 Storage and Spill Series Comparison with 2020

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CONFIDENTIAL





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Preface

A large proportion of New Zealand's electricity needs are met by generation from hydro power. Information about the distribution of inflows and the capability of the various hydro systems is necessary to ensure a reliable, competitive, and efficient market and electricity system.

The hydrological modelling dataset (HMD) is a dataset of hydrological information made available by the Electricity Authority. The dataset was known as the SPECTRA update until 2010. In 2015 the dataset was revised to become the HMD, a comprehensive dataset that can be relied upon by modellers and analysts to test scenarios, provide commentary and inform decisions.

The HMD is comprised of data provided by hydro generators and supplemented with some from other sources. These parties are acknowledged for their contribution and for making this data available.

The HMD consists of three main components:

- 1. Infrastructure and hydrological constraint attributes:**

This dataset records standing information about the capability of the main hydro schemes.

- 2. Flows:**

This time series dataset records data for inflows for reservoirs and flows at various existing or potential hydro generating sites.

- 3. Storage and spill:**

This time series dataset records storage for the main hydro schemes.

This report describes the third component of the HMD, the storage and spill series.



Contents

1	Introduction.....	4
2	Data Differences for Calculated Flow Sites.....	4
3	Storage Sites.....	6
3.1	Lake Waikaremoana	6
3.2	Lake Pukaki	6
3.3	Lake Manapouri.....	6
3.4	Lake Wanaka.....	6
3.5	Lake Hawea	6
3.6	Lake Te Anau.....	6
4	Spill Sites.....	7
4.1	Waikaretaheke River at Piripaua.....	7
4.2	Lake George Scott at Tekapo River	7
4.3	Lake Te Anau.....	7
4.4	Lake Manapouri.....	7
4.5	Lake Taupo.....	7

1 Introduction

Care is taken to ensure consistency of data between successive HMD updates. A comparison of the storage and spill flows for each series was undertaken and any changes are discussed further in Sections 2, 3 and 4.

2 Data Differences for Calculated Flow Sites

Differences between datasets may occur from one update to the next for a variety of reasons. These include: rating changes; data modifications; and various other reasons. Table 2.1 shows if there were any differences in the data between the previous and current update for the storage sites and Table 2.2 shows if there were any differences in the data between the previous and current update for the storage sites. The following sections highlight the reasons for these differences.

Table 2.1: *Data differences for previous and current updates for storage sites*

Storage site name	Data differs
Lake Taupo	NO
Lake Waikaremoana	YES
Lake Ohau	NO
Lake Tekapo	NO
Lake Pukaki	YES
Lake Wanaka	YES
Lake Hawea	YES
Lake Wakatipu	NO
Lake Te Anau	YES
Lake Manapouri	YES

Table 2.2: *Data differences for previous and current updates for spill sites*

Lake	Spill site name	Data differs
Lake Waikaremoana	Onepoto	NO
	Waikareteheke River at Piripaua	YES
	Waikareteheke River at Upstream Mangaone	NO
Lake Tekapo	Lake Tekapo at Gate 17	NO
	Lake George Scott to Tekapo River	YES
Lake Pukaki	Lake Pukaki	NO
Lake Ruataniwha	Lake Ruataniwha	NO
Lake Ohau	Lake Ohau	NO
Lake Benmore	Lake Benmore	NO
Lake Aviemore	Lake Aviemore	NO
Lake Waitaki	Lake Waitaki	NO
Lake Te Anau	Lake Te Anau	YES
Lake Manapouri	Lake Manapouri	YES
Lake Hawea	Lake Hawea	NO
Lake Dunstan	Clyde Dam	NO
Lake Roxburgh	Lake Roxburgh	NO
Lake Taupo	Lake Taupo	YES
Lake Aratiatia	Lake Aratiatia	NO
Lake Ohakuri	Lake Ohakuri	NO
Lake Atiamuri	Lake Atiamuri	NO
Lake Whakamaru	Lake Whakamaru	NO
Lake Maraetai	Lake Maraetai	NO
Lake Waipapa	Lake Waipapa	NO
Lake Arapuni	Lake Arapuni	NO
Lake Karapiro	Lake Karapiro	NO

3 Storage Sites

3.1 Lake Waikaremoana

There are minor differences in the active storage, with an average difference of approximately $\pm 0.03\text{Mm}^3$. These differences are typically caused by some new data provided, and the daily averaging being more consistent; previously the 2020 update had averaged data from 12pm to 12pm sporadically, whereas this update has used the consistent time of 12am to 12am for all daily averaging.

3.2 Lake Pukaki

There are minor differences in the active storage when comparing the data from the previous update (2020) and the data from the current update. These differences are in the magnitude of approximately $\pm 0.05\text{Mm}^3$ and occur near the end of the overlapping period, due to new data being used this update which overwrites the previous data used.

3.3 Lake Manapouri

There are minor differences in the active storage when comparing the data from the previous update (2020) and the data from the current update. These differences are in the magnitude of approximately $\pm 6.01\text{Mm}^3$ and occur near the end of the overlapping period, due to new data being used this update which overwrites the previous data used.

3.4 Lake Wanaka

There are minor differences in the active storage. These differences are caused by the new data provided, which has some differences as large as $+24.17\text{Mm}^3$ but the average does not change (less than 0.0001Mm^3 overall).

3.5 Lake Hawea

There are minor differences in the active storage. These differences are caused by the new data provided, which has some differences as large as -29.04Mm^3 but the average does not change (less than 0.001Mm^3 overall).

3.6 Lake Te Anau

There are minor differences in the active storage. These differences are caused by the new data provided, which has some differences as large as 5.35Mm^3 but the average does not change (less than 0.0001Mm^3 overall).

4 Spill Sites

4.1 Waikaretaheke River at Piripaua

There are minor differences in the daily spill for this site $\pm 1\text{m}^3/\text{s}$ when comparing the flows from the previous update (2020) to the current update. These changes are due to multiple rating changes for this site that have been implemented between the updates.

4.2 Lake George Scott at Tekapo River

A change in the rating for this site from 1978 has resulted in changes in the spill data for this site between the 2020 update and the current update.

4.3 Lake Te Anau

Rating changes at this site of resulted in minor differences in the spill flow between the previous update and the current update. The magnitude of these differences are $\pm 0.3\text{m}^3/\text{s}$.

4.4 Lake Manapouri

Rating changes at this site of resulted in minor differences in the spill flow between the previous update and the current update. The magnitude of these differences are $\pm 1.2\text{m}^3/\text{s}$.

4.5 Lake Taupo

A new rating has been implemented for this site from 2010, which has resulted in minor differences between the data from the 2020 update and the current update. These differences are approximately $\pm 0.2\text{m}^3/\text{s}$.

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