5 years of analysing Open Access in Aotearoa

2017-2021

Executive Summary

Nearly half of our research is open	The proportion of NZ research that is open has increased gradually, from 4 out of 10 in 2017 to just below 5 out of 10 in 2021.
Citation advantage remains	Open work continues to have demonstrably higher rates of impact, as measured by citations and other metrics.
We are spending more and more on APCs each year – US$4.5m in 2021	Researchers increasingly publish in journals that charge APCs, particularly Gold OA journals, very few of which fall within current library Read and Publish agreements. Nearly ¼ of all publications were in journals published by large scale, Gold OA publishers like MDPI and Frontiers in 2021. We are spending considerably more on APCs than in 2017, estimated spending trebling to approximately US$4.5 million in 2021.
The rise of Open Access only publishers	Over the past five years, the “Big Four” commercial publishers (Elsevier, Wiley-Blackwell, Springer Nature and Informa) have remained dominant. Despite the clear gap between these four and other publishers, we note the increase of OA only publishers. MDPI, the most prominent of these, has seen a significant increase from 2.1% of all publications in 2017 (262 publications) to 7% in 2021 (1008).
Potential for open remains high and unrealised	Our institutional repositories remain under-utilised. Depositing articles, as allowed by publishers, would increase the proportion of our work that is open to 8 out of 10 papers.
Funded work is more likely to be open than non-funded research	Work funded by NZ’s major funding agencies is more likely to be open than other NZ research, though the proportion is lower than funded work from other countries. The total proportion of research funded by the top five New Zealand funding agencies that is openly available has been consistent across the last three years, sitting at 57% in 2021.
New Zealand lags behind others	New Zealand lags behind the rest of the world, both in terms of the proportion of research that is open, and in the utilisation of repositories.

Introduction

2022 marks the fourth year that a project team, commissioned by CONZUL, has gathered data on the state of Open Access (OA) in Aotearoa New Zealand (NZ). The OA landscape has experienced dramatic changes since the project's inception. In previous years, the team's approach was to examine OA data related to publications with a Digital Object Identifier (DOI) with at least one researcher affiliated with a NZ university, assessing publications two years prior to the date of analysis, e.g., 2019 publications were assessed in 2021. This allowed time to account for both embargo periods and citation accumulation. This year, the team included both 2020 and 2021 publications in the dataset. Over the last 4 years, interest in the broader OA landscape has developed and discussions have been more nuanced. In addition to increasing publication costs, changing publication patterns and the rise of Read and Publish agreements, several major changes are currently underway which will drastically affect the context in which universities will operate. Given this, our 2022 report aims to characterise the last five years of Open Access in Aotearoa New Zealand (2017 to 2021) and discuss the factors that should be considered for the future.

Nearly half of our research is Open

The 2020 and 2021 data show that nearly 50% of the publications in our dataset are open: 49% in 2020; 48% in 2021. This is a gradual increase from 41% in 2017. The slight dip in 2021 is likely due to embargoes; some publications that will be deposited in repositories are not open as yet because they are still under embargo. When we filter the proportion of open on the corresponding author being affiliated with a NZ university, the proportion of open work drops, a consistent finding over the 5 years of data. Using 2021 as an example, when the corresponding author is from NZ, the open proportion decreases to 43% compared to 55% open when the corresponding author is from overseas. The evidence clearly shows that corresponding authors from a NZ university are less likely to make work open.

The increase in the proportion of open publications can be attributed to Gold OA, which has risen from 14% of all publications in 2017 to 23% in 2021 (almost 1 in 4 publications, an increase of 64%). This is significant, since Gold OA requires payment of APCs and few Gold journals are covered under current Read and Publish agreements. Hybrid OA has seen a modest increase (from 5 to 7%) over the same period. One benefit of our researchers increasingly using Gold OA is that the proportion of publications in our dataset permanently open from the point of publication (i.e. Gold, Hybrid and Diamond) has increased from 22% to 34% over five years, an increase of 55%.

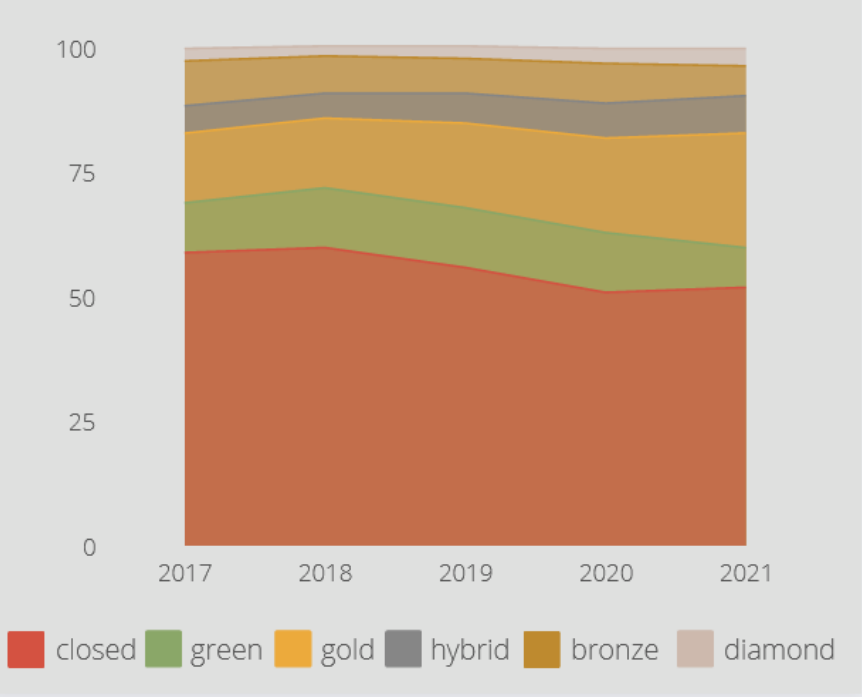

Figure 1. Open Access status 2017-2021.

Citation advantage remains

Four years of data have confirmed that Open Access has a positive effect on citations. For material published in 2020, OA publications received 72% more citations than closed ones, with an average of 8.1 citations (open) compared to 4.7 citations (closed). Although the citation advantage has been relatively consistent across the duration of this project, 2020 publications in our dataset saw the highest citation advantage to date.

The Open Access advantage appears to apply to other types of research impact as well. In 2020, open publications were four times more likely to generate a media story than closed ones, and ten times more likely to be cited in policy. Closed publications received the lowest scores in each category and hybrid papers received the highest.

Publications made open by the Hybrid model consistently perform better than the other types of OA, and, though they may benefit in citation terms from their immediate open status, two other factors may be relevant. The first is selection: authors may be more prepared to pay for their best, or most citable, papers. They may also choose more highly-cited journals when paying APCs. The second factor is promotion: the media coverage advantage for Hybrid publications may suggest that publishers may promote papers for which an APC has been paid more than others.

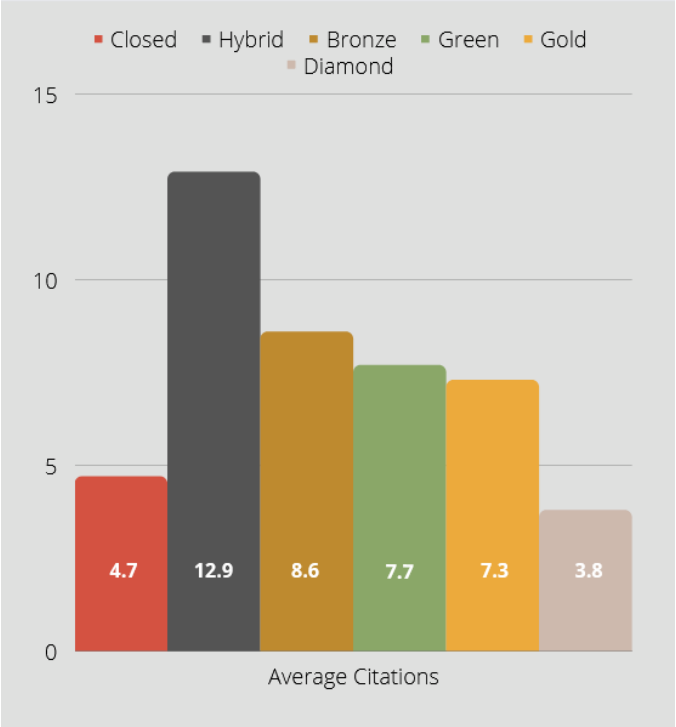

Figure 3. Average citations according to OA Status, 2020. Hybrid OA generates the highest average citations. All types of OA, except Diamond, record a citation advantage over closed publications

NZ researchers increasingly favour paid OA

NZ researchers increasingly favour paid OA, particularly Gold OA. Consequently, we see a consistent increase in the estimated APC spend year by year, with the estimated total APC spend reaching US$4.7 million for 2021 publications, three times the estimate in 2017. The sharpest increase has occurred between 2019 and 2020, with approximately US$1m more spent. Cumulatively, the APC spend over five years for the eight universities for the publications in our datasets is estimated to be in the region of US$15m.[1]

Consistently across the five years, Gold accounts for 75-80% of the estimated total spend. This is noteworthy given that few Gold OA journals are covered by current Read and Publish agreements, and therefore such agreements may have little impact on the rising APC spend in the coming years.

[1] A note on methodology: APC costs are estimated by filtering for journal articles published as Gold or Hybrid OA with a NZ university corresponding author. Costs are calculated at journal level in US dollars (US$). However, we cannot be sure that an APC was actually paid, as sometimes they are waived. Here we present what is effectively a “list price” for all Hybrid and Gold publications in our dataset.

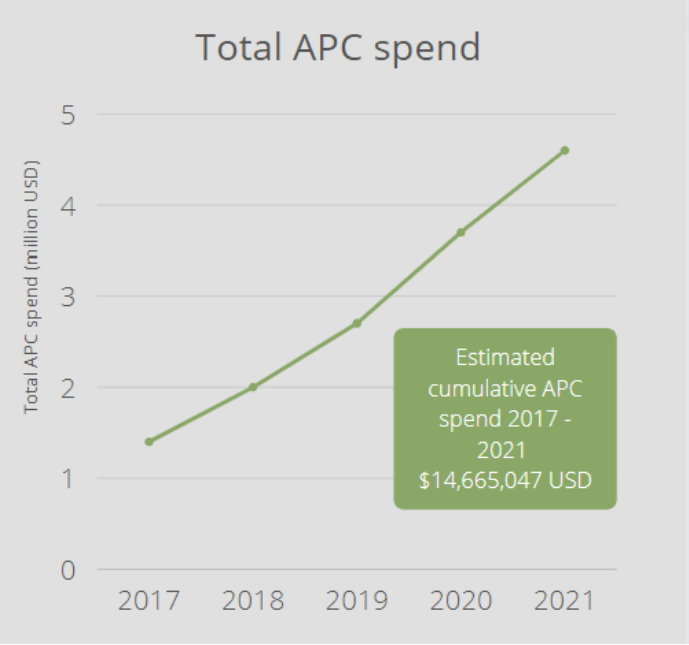

Figure 4. Estimated total APC spend 2017-2021 (US$) NZ corresponding author. Total APCs paid have steadily increased from $1,469,329 in 2017 to $4,675,683 in 2021.

Average APC costs across the five year period are estimated to have increased by about a third for both Gold and Hybrid. In 2021, the average APC for a Gold publication was US$2,267 (over a total of 1,840 articles, up from 699 in 2017). For Hybrid, the average in 2021 was US$3,391 (364 publications, up from 153 in 2017).

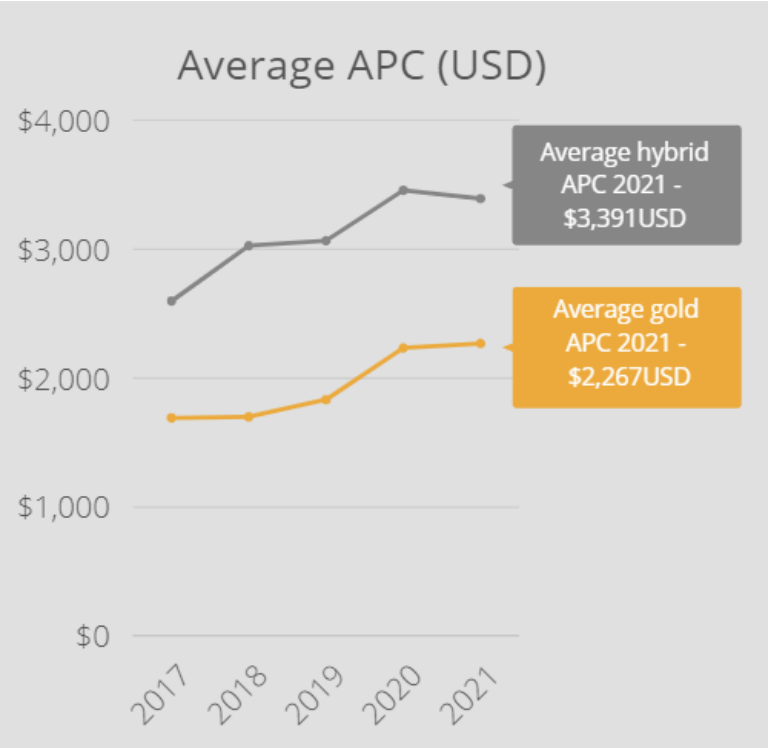

Figure 5. Average APC costs 2017-2021 (US$).

The rise of Open Access only publishers

Over the past five years, the “Big Four” commercial publishers (Elsevier, Wiley-Blackwell, Springer Nature and Informa) have remained dominant. Looking at all research publications in our dataset, NZ research is published in one of these four more than 50% of the time (in 2021 this was 7,333 out of 14,313 publications). Despite the clear gap between these four and other publishers, we note the increase of OA only publishers. MDPI, the most prominent of these, has seen a significant increase from 2.1% of all publications in 2017 (262 publications) to 7% in 2021 (1008). In 2021 MDPI accounted for nearly one in four APC-incurring publications. Frontiers is another of the OA publishers that has seen growth across the five years, from 1.4% of all publications (171) to 3.1% (440). For the sake of comparison, in 2021 Informa UK/Taylor and Francis had 9.7% (ranking fourth, 1383 publications) and Sage 3.8% (546, ranking sixth, well behind MDPI).

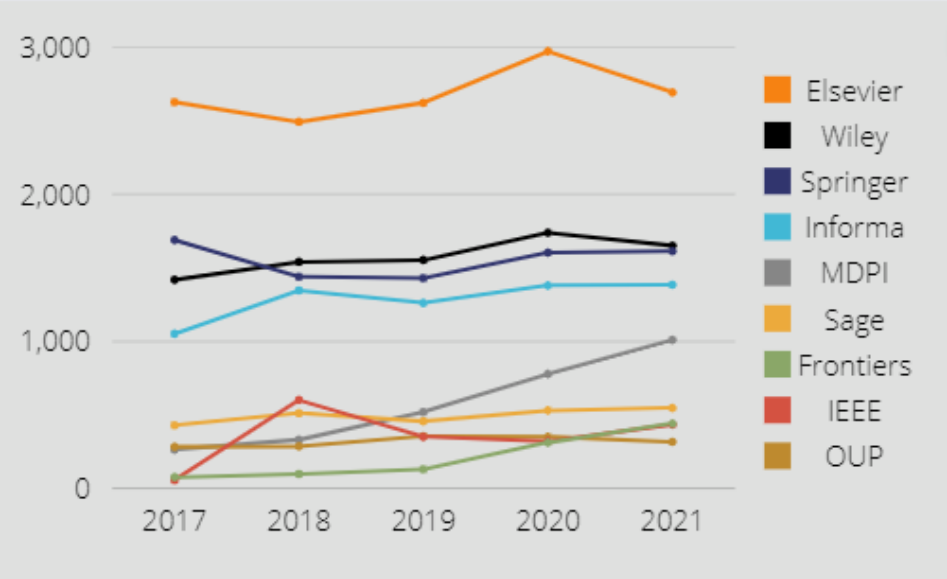

Figure 6. Total publications per publisher 2017-2021 (all authors). Gold OA publishers MDPI and Frontiers have both seen the most significant increases in publications.

Potential for open remains high but unrealised

The data collected over the last five years clearly show that our institutional repositories (IR) are under-utilised. As in previous years, a large number of the closed articles in our dataset could be made open by uploading an accepted manuscript into an IR. Looking at 2020 outputs, 75% of 4,571 closed publications are eligible to be made open in accordance with publishers’

policies. If every one of those publications was able to be uploaded to an IR, the overall OA proportion for 2020 would rise from 48% to 80%.

For 2021, the ‘potential Green’ figure is much lower (19% or 1,148 of closed outputs could be deposited), demonstrating the impact of embargoes, most of which are still in effect for these publications. We would expect this figure to increase to a similar level to other years as embargoes expire.

Some publications are open both on the publisher platform and in a repository; others are in several repositories (e.g. PubMed or arxiv.org). Where a work is open only because it was deposited in NZ university IR, the numbers are very small, in the range of 100 to 200 per year across all eight universities combined. As noted above, in 2020 there were 4,571 publications that *could* have been deposited that were still closed; that same year only 190 publications *were* deposited in an IR, where that copy was the difference between being open and closed. That is, in 2020 the potential for IR-based OA was 24 times what was actually realised.

Funded work is more likely to be open than non-funded research

About 15% of all publications in our dataset are funded by one of the top five New Zealand funding agencies (Ministry of Business, Innovation and Employment (MBIE), Health Research Council (HRC), Rutherford Discovery Fellowship, Marsden Fund, and Royal Society Te Apārangi). The total proportion of research funded by these five agencies that is openly available has been consistent across the last three years, sitting at 57% in 2021. This compares to 48% OA for all research, including funded, and 46% for all research not funded by the top five funding agencies.

Given that New Zealand funders do not have OA mandates, this measure is being driven by researcher choice. As with our general findings this year, Gold OA is the key variable, increasing from 21% of publications funded by the top five agencies in 2019 to 31% in 2021. Green, Bronze and Diamond OA have decreased, explaining why the overall OA proportion has remained static. In short, more research publications from work funded by the top five funders are being paid to be open. By publication volume, Gold OA has increased from 433 publications in 2019 to 688 in 2021, a 59% increase in 2 years.

Comparing work funded by a NZ agency to that funded by overseas agencies, we see that NZ’s OA proportion is significantly lower. In 2020, with sufficient time elapsed for the majority of embargoes to have expired, New Zealand funded work was 58% open, compared to 70% for Australia, 78% for the USA, and 90% for the UK. For 2021, where 12 month embargoes are still in effect, the NZ rate remains largely static with 57% open, but the Australia, USA and UK rates are decreased on their previous years (-12%, -7% and -6%, respectively). This discrepancy is

likely the result of a stronger culture of repository deposit supported by policies in these countries, meaning the Green OA route pushes their open rates up after embargoes lapse.

New Zealand lags behind others

We have demonstrated that NZ publications are less likely to be open in various contexts: when the corresponding author is NZ-based; when we compare how much of our work is in our repositories; and when work is funded by major funding agencies.

We can validate this by using the COKI dashboard to show that NZ lags behind the rest of the world, both in terms of the proportion of research that is open, and in the utilisation of repositories. Publications from 2020 show a significant increase in Open Access across the world - a sign of developments on a global level. However, New Zealand is still among the countries with the lowest OA rates.

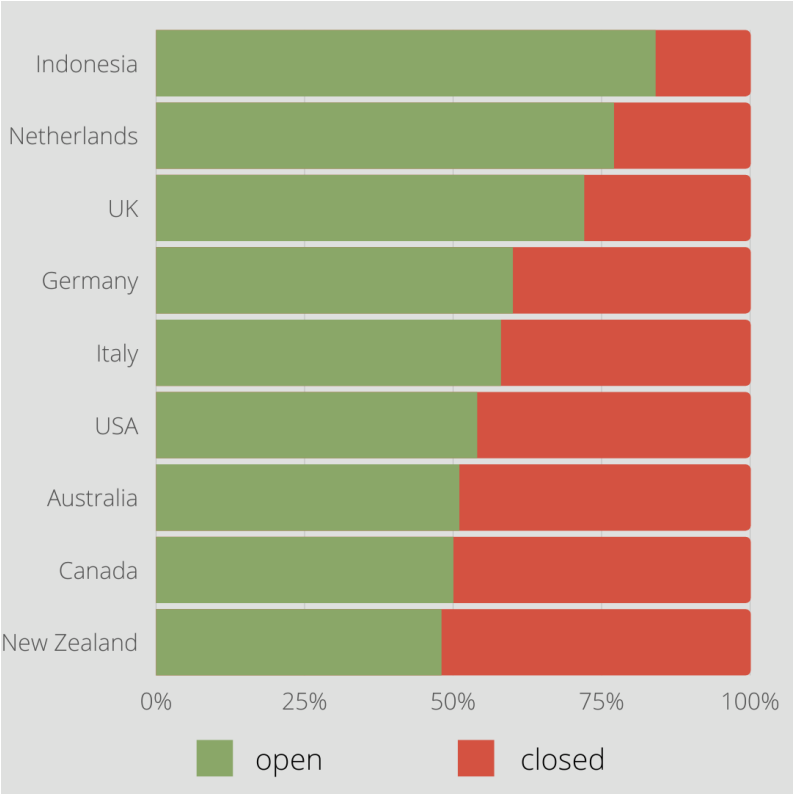

Figure 7. Global open versus closed rates, 2020 (from the COKI Dashboard). While NZ OA publication rates have increased, they have also increased globally. NZ needs to publish more OA at more speed to catch up with Indonesia and European countries.

Rapidly changing landscape

Local

- CONZUL adopted Strategic Priorities 2022 - 2025, including sustainable access and open scholarship as two of four foci.
- CAUL Read and Publish deals were expanded to include four major publishers (snapshot 12 August 2022).
- The Future is Open: Establishing Wider Open Access for Research Publications in Aotearoa New Zealand was released by the Office of the Prime Minister's Chief Science Advisor | Kaitohutohu Mātanga Pūtaiao Matua ki te Pirimia. Broadly, this report recommends a national strategy for Aotearoa's research publishing, and adoption of the principles of open science.
- The Royal Society established the Aotearoa New Zealand National Committee on Data in Research.
- OA policies - AUT (2020) and University of Auckland (2022) took the number of NZ universities with open access policies up to 7 (of 8).
- Universities New Zealand established a Working Group on Open Access.

Global

- The UNESCO Recommendation on Open Science was adopted in 2021. UNESCO is taking the lead in creating a global consensus on what Open Science is - including a shared definition, values and principles.
- 2021, UK Research and Innovation (UKRI) announced a new Open Access Policy, requiring immediate open access for UKRI funded articles, open licences and funding support for transformative agreements.
- 2021, The G7 announced a five-point action plan and working group in support of Open Science
- Ahead of COP25, 2021, the UN Department of Economic and Social Affairs, Division for Sustainable Development Goals released the report Open Science for Climate Action
- Science Europe and cOAlition S funded the 2020/ 2021 OA Diamond Journal Study . In 2022, Science Europe, cOAlition S, OPERAS and the French National Research Agency have presented an action plan for Diamond Open Access. These are a set of priority actions to further develop and expand a sustainable, community-driven Diamond scholarly publishing
- In 2022, cOAlition S released the Journal Comparison Service (JCS). The service aims to provide users with more transparency at journal level including prices and services offered by individual journals.Currently publishers are able to register journals with the system, whilst librarians can register later in 2022.
- In 2022 the White House Office of Science and Technology Policy (OSTP) released the report Protecting the Integrity of Government Science . Recommendations include

transparency in sharing science and the permitting of scientific manuscripts to be posted as preprints (once they have cleared agency review).

Where to next?

Global and local developments, together with the findings outlined here, point to a period of accelerated progress in the OA space. How organisations in Aotearoa will respond is uncertain, but the coming years will be a formative time. The decisions made during this period will determine the extent to which we can reap the benefits of a more open scholarly ecosystem. The findings from this research can inform this in several ways:

- Each university should use its local subset of the national dataset to enhance their understanding of the OA landscape and develop strategy in individual institutions, particularly with regard to Read and Publish deals
- The financial implications of the upward trends described here are significant. Institutions carrying this cost will need to work internally to figure out how a transition to OA can be managed in a way that is sustainable and equitable
- Our repositories are still under-utilised. How can we change this? The Saunders Report provides some impetus for considering national strategy, funder mandates and increased repository use.
- Work will be undertaken to determine the future of the project that produces this data