Manaaki Whenua
Landcare Research

Protected Areas Network New Zealand methodology review and report: Phase II – stakeholder engagement

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Protected Areas Network New Zealand methodology review and report. Phase II – stakeholder engagement

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Simon Planzer, Stella Belliss, Tsegaye Gatiso

Manaaki Whenua – Landcare Research

Reviewed by:
Peter Bellingham
Senior Researcher
Manaaki Whenua – Landcare Research

Approved for release by:
Sam Carrick
Portfolio Leader – Characterising Land Resources
Manaaki Whenua – Landcare Research

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Summary

Project and client

The Ministry for the Environment (MfE) commissioned Manaaki Whenua – Landcare Research (MWLR) to review the Protected Areas Network of New Zealand (PAN-NZ) spatial information system, detailing improvements and proposed future revisions as informed by the methodology and by user response.

Background

Protected area information is created by many local and central government entities, as well as other organisations. A PAN-NZ spatial information system was created by MWLR to bring New Zealand's protected area extent data together in one place to provide a national level view of these protections. However, PAN-NZ is not maintained but is compiled ad hoc to meet specific needs, rather than being a service decision makers and others can draw on when required. This, along with recently published policy and strategies highlighting the importance of protected areas to achieving New Zealand's biodiversity goals, has seen MfE commission this review.

This is the second phase of this PAN-NZ review. The first phase (Planzer et al. 2023) focused on the review of protected area data sources and their maturity. This resulted in the recommendations below, which must be considered alongside the findings of this report.

Phase I made the following recommendations.

- A PAN-NZ governance group should be formed. This group should include, but not be limited to, MfE, Statistics New Zealand (Stats NZ), The Department of Conservation (DOC) and MWLR.
- A budget should be developed for PAN-NZ database modernisation, ongoing system maintenance, ongoing data improvement, and the dissemination of PAN-NZ data.
- PAN-NZ should receive sustained funding for database modernisation, ongoing system maintenance, ongoing data improvement, and dissemination of data. Funding should be via those who require current and defensible protected area data for national and international reporting of environmental policy outcomes. We recommend that MfE, DOC and Stats NZ (and possibly other organisations) should have an annual contract with MWLR for delivery of PAN-NZ services.
- The data sharing environment must be improved to allow frictionless transaction and aggregation of protected areas data. These problems are not unique to PAN-NZ and PAN-NZ governance should look to engage with initiatives working to solve these issues.
- Addressing these common data sharing challenges should take heed of recommendations published in:
    - Focusing Aotearoa New Zealand’s Environmental Reporting System (Parliamentary Commissioner for the Environment 2019)
    - Data Investment Plan (Stats NZ 2022).

- Several data sets should be included in PAN-NZ. These include:
  - New Zealand's internationally protected national sites
  - Marine protected areas
  - Mapped significant natural areas (SNAs)[1]
  - Areas as protected by Te Urewera Act 2014 and Te Awa Tupua (Whanganui River Claims Settlement) Act 2017.
- Further work should be commissioned by MfE to classify those additional protected areas recommended for inclusion in PAN-NZ using the system developed and recommended for use in New Zealand by Bellingham et al. 2016.
- To gain the greatest benefit from PAN-NZ, the data it holds should be released publicly under open licensing. Prior to release, a privacy assessment should be undertaken, and the principles outlined in the Māori Data Governance model should be considered (Kukutai et al. 2023).[2]

This phase (II) expands on Phase I by engaging stakeholders via webinar, workshop and survey to gain a comprehensive collective view of PAN-NZ with the goal of informing how to best deliver and access the most value from a national protected areas data set.

Objectives

The following objectives were identified in relation to stakeholder engagement.

- Identify key data providers, stakeholders, and end-users.
- Deliver a webinar to describe PAN-NZ and make a wide range of stakeholders aware of the opportunity to provide input into scoping and development of PAN-NZ.
- Hold an online workshop with stakeholders to collect a wide range of views on PAN-NZ.
- Carry out a survey to gather stakeholder input from data providers and end users. This will allow decisions made about PAN-NZ to be informed from the data providers' and end users' perspectives.
- Make a final presentation to share the results of stakeholder engagement and the survey findings, as related to PAN-NZ. This is to 'close-the-loop' with those that took their time to be involved in the stakeholder engagement and to promote continued stakeholder buy-in.

The following objectives were identified in relation to the delivery of the PAN-NZ stakeholder engagement report.

[1] This report updates the Phase I recommendations by recommending PAN-NZ is first delivered with the recommended protected area types excluding SNAs. Once the current ambiguity in relation to SNAs is resolved, their inclusion may be considered. See section 3.6 for the relevant discussion.

[2] As set out in the contract, it is noted that the project scope covered Māori sectors in central and local government and collective agencies such as Ngā Whenua Rahui, however engagement with iwi and hapu directly was beyond the current project scope

- Document stakeholders feedback on the value of PAN-NZ for regulatory and other decision making.
- Document data providers' data management and sharing.
- Document end-users use cases and outcomes, along with their requirements and preferences with regards to access, privacy, frequency.
- Document technical considerations of privacy constraints and how and where PAN-NZ database, map, or derivatives should be shared to maximise access but manage these privacy concerns.
- Discuss how the stakeholder engagement findings impact future system design. This includes impacts around federated data, frequency of updates, and the process for corrections.

Summary of findings

During this work, over 500 unique stakeholders were engaged. This included 505 participants via the webinar, 29 participants via an online workshop and 75 participants via the PAN-NZ online engagement survey. The stakeholder feedback provided allows conclusions to be drawn about PAN-NZ based on the collective knowledge provided by these PAN-NZ stakeholders. This focus on stakeholders is to ensure that the PAN-NZ system delivers the best values to protected area data users.

Stakeholders highlighted a diverse range of use cases and examples of value that PAN-NZ can deliver. The main takeaway was that, currently, the barriers to compiling a comprehensive national level protected area data set were too great for many projects to include. Provision of a national protected area data set would underpin mandated international reporting while supporting the wide range of activities stakeholders identified.

PAN-NZ users would like a dedicated web view of the PAN-NZ data. This would allow them to communicate protections with others and to gain insights into protections by using custom filtering of PAN-NZ protected area types. The Koordinates platform that MfE, Manaaki Whenua and other stakeholders subscribe to is recommended for disseminating the PAN-NZ data via web APIs (application programming interfaces) and self-service download as files.

Where stakeholders were asked about privacy concerns as related to public releases, their main concerns were:

- landowner details being made publicly available.
- people accessing protected areas on private land.
- people using protected area information to seek out endangered species and environments in a manner that may degrade what they have been put in place to protect.

Stakeholders, however, believed that privacy concerns could be managed and provided methods to mitigate such concerns. This included obscuring sensitive information to ensure it is not publicly released.

Most stakeholder feedback focussed on what constituted PAN-NZ data. This centred around the inclusion of protected area ancillary information such as the conditions of the areas being protected, management plans and environmental health indicators. Though these were identified as requirements for potential PAN-NZ end users, they were considered too broad in scope for PAN-NZ to deliver and be successful. Rather, we recommend PAN-NZ concentrate upon curation and release of a high quality functional foundational layer that will enable these other products.

Ultimately, we concluded that a pure federated system is not currently possible. Under a federated system, PAN-NZ would not store the constituent protected area data sets held by (potential) PAN-NZ data providers, but rather unify and publish them as a national layer. However, for this to be realised, the data providers must supply their data via an API, yet stakeholder engagement identified a low occurrence of API accessible data.

Instead, PAN-NZ should be developed as a centralised information system that aggregates and stores all constituent data sets. A hybrid approach to loading the protected area data into the system should be delivered to support the diverse range of data sharing methods the stakeholder engagement identified. This will ensure no barriers to participation for protected area data holders. However, it is noted each method of providing data to PAN-NZ has its own efficiencies and it should be a target of the PAN-NZ governance group to support an increase in the proportion of data providers sharing data in a mature low-friction manner.

Finally, we note that funding needs to be on-going or else we risk returning to the current situation whereby protected area data has not been publicly released since 2007 (Manaaki Whenua – Landcare Research 2007).

Informed by stakeholder views, we recommend the following actions for PAN-NZ.

- Develop an information system and tools for managing national level protected area data. This initial development is considered a one-off investment. However ongoing investment is required to ensure the tools meet security requirements and remain fit for purpose.
- Develop a hybrid data loading approach to ensure no barriers of participation exist for data providers.
- Support data providers' migration to efficient methods of sharing protected area data.
- PAN-NZ should work with data holders/stakeholders to develop guidelines. For example, guidelines for metadata, licensing, and data formats.
- The PAN-NZ information product(s) should be publicly released and licensed for reuse under Creative Commons licences.
- The PAN-NZ information should be made available via the Koordinates data platform to meet user requirements for self-service-download and API access. This data should be versioned as to detail change over time.
- A dedicated web viewer should be developed to allow users to view, understand and communicate national protected area data. This should provide features for filtering by protected area rank and protected area types.
- An upload portal should be included in the web viewer to allow data providers to upload their data updates and corrections.

- To manage privacy, data holders will be requested to remove private information before supplying data to PAN-NZ. However, if it is included in the data, PAN-NZ will not publish any personal details or information relating to the distribution of endangered species.
- Protected area data identified in Phase I should be included in any future version of PAN-NZ. We note that national policy on SNAs is presently under review, and the inclusion of present and future SNAs would depend on the outcome of that review.
- PAN-NZ architecture and source code should be open-source. This is to allow other projects to potentially use the architecture.
- All data in PAN-NZ should be classified using the ranking system of Bellingham et al. 2016 and mapped to the IUCN classification system.
- PAN-NZ should be a functional spatial foundational layer. This means that ancillary information such as biodiversity condition, management plan details, and catchment information are too broad to be included. However, consideration should be given to providing the ability to capture links to this additional information.
- The challenges PAN-NZ encounters in aggregating data, stemming from low maturity in data sharing practices, are not exclusive to PAN-NZ. Overcoming the barriers associated with sharing environmental data requires a collaborative approach. Therefore, PAN-NZ should advocate for best data practices when engaging with data providers. However, PAN-NZ should actively support government-wide initiatives aimed at improving data sharing practices. PAN-NZ could serve as a test bed for any new initiatives.
- PAN-NZ should consider investing in source data sets to improve their completeness.

1 Introduction

The Environment Aotearoa 2019 report (Ministry for the Environment & Stats NZ 2019) reinforced the significance of the well-known trends in New Zealand's environmental degradation and loss of biodiversity. These encompass both land, freshwater, and marine habitat loss, which can make some native species particularly vulnerable to extinction.

To assist the protection of New Zealand's biodiversity, a unified and complete nationwide view of the extent to which areas are being protected is paramount. Recent national policy highlights the importance of protected areas and makes them a central component of biodiversity protection strategies. This includes Te Mana o Te Taiao – Aotearoa New Zealand Biodiversity Strategy 2020, which states that 'legal protection, such as public conservation land and marine reserves, is an important tool for managing some of the pressures on biodiversity' (Department of Conservation 2020). New Zealand is also a signatory of the Kunming-Montreal Global Biodiversity Framework (GBF). This includes New Zealand's commitment to the '30x30' target to ensure and enable that by 2030 at least 30 percent of terrestrial, inland waters, and marine areas of importance to biodiversity are protected (United Nations n.d.).

Although protected areas are recognised as pivotal to New Zealand's biodiversity conservation successes, data on protected areas are fragmented, incomplete, and poorly funded. This is part of a greater problem that led the 2017 OECD environmental performance review of New Zealand to conclude that 'The shortage of reliable and nationally uniform data is particularly acute in such key environmental policy areas as waste management and biodiversity protection' (OECD 2017, p. 110).

MWLR maintains and periodically updates the Protected Areas Network New Zealand (PAN-NZ) database. These data attempt to provide a complete, national level view of New Zealand's legal protections. PAN-NZ data, however, are not maintained, and are compiled ad-hoc to meet specific needs, rather than being a service decision makers and others can draw on when required. PAN-NZ has not been publicly released since 2007. More recent versions have been compiled (2020, 2014, and 2012); however, these have been funded for specific purposes as opposed to supporting general use and have not been publicly released. These recent versions highlight the need for PAN-NZ as they were compiled at considerable expense for one-off projects to ensure protections were incorporated in decision-making. Such an investment would be much more beneficial if it were not duplicated, and the data was made publicly available.

To understand how PAN-NZ can meet the requirements of those requiring national level protected areas information, two phases of a PAN-NZ review have been commissioned. Phase I considered the protected areas data sources that would need to be unified to provide a nationwide view of protections. Now, Phase II expands on this via stakeholder engagement. Two key groups were consulted to gain a comprehensive collective understanding of PAN-NZ:

- Data providers: Those that create, store, and share protected area data were engaged to understand the data they hold and how they provide this data to others.

- Data end-users: Those that may benefit from national up-to-date protected areas data were engaged to understand their requirements and what would enable them to get maximum value from a refreshed PAN-NZ.

2 Methodology

2.1 Objectives

The following objectives were identified in relation to stakeholder engagement.

- Identify key data providers, stakeholders, and end-users.
- Deliver a webinar to describe PAN-NZ and make a wide range of stakeholders aware of the opportunity to provide input into scoping and development of PAN-NZ.
- Hold an online workshop with stakeholders to collect a wide range of views on PAN-NZ.
- Carry out a survey to gather stakeholder input from data providers and end users. This will allow decisions made about PAN-NZ to be informed from the data providers' and end users' perspectives.
- Make a final presentation to share the results of stakeholder engagement and the survey findings, as related to PAN-NZ. This is to 'close-the-loop' with those that took their time to be involved in the stakeholder engagement and to promote continued stakeholder buy-in.

The following objectives were identified in relation to the delivery of the PAN-NZ stakeholder engagement report.

- Document stakeholders feedback on the value of PAN-NZ for regulatory and other decision making.
- Document data providers' data management and sharing.
- Document end-users use cases and outcomes, along with their requirements and preferences with regards to access, privacy, frequency.
- Document technical considerations of privacy constraints and how and where PAN-NZ database, map, or derivatives should be shared to maximise access but manage these privacy concerns.
- Discuss how the stakeholder engagement findings impact future system design. This includes impacts around federated data, frequency of updates, and the process for corrections.

2.1.1 Approach to objectives

Our main objective is to develop a collective understanding of PAN-NZ requirements via stakeholder engagement. Engagement with PAN-NZ stakeholders was conducted via a webinar, a workshop and a survey. There was also a webinar at projects commencement to report findings and recommendations back to the stakeholders.

2.2 Identifying stakeholders

Using the three methods of engagement mentioned in section 2.1.1, we categorised stakeholders as either PAN-NZ data providers, PAN-NZ end users, or other interested parties. Over 500 individuals, representing a broad range of organisations, were included. Sections 2.2–2.5 outline how stakeholders were identified for each form of engagement.

2.3 Webinar

All members of the MWLR LinkOnline mailing list were invited to attend the PAN-NZ webinar. Members of this list frequently engage with MWLR presentations. Once the invitation is sent to the mailing list, it is known to be shared wider via the invitees to other relevant parties. A total of 623 parties registered for this webinar, of which 505 attended on the day.

The webinar updated attendees on the Phase I work of the PAN-NZ review and made them aware of the coming opportunities to provide feedback on future PAN-NZ developments. This included: introducing the drivers to undertaking a review; describing protected areas in terms of PAN-NZ; summarising the work on identifying data gaps; a discussion on data maturity; and introducing an early version of the soon-to-be-released survey.

To better understand the composition of the data provider stakeholders' group an online poll was run querying who held protected area information within their organisation. Then, at the end of the webinar, participants were asked to provide questions and feedback. This information was published in the LinkOnline webpage (Manaaki Whenua – Landcare Research 2023).

2.4 Workshop

Organisations across central government, local government and other interested parties attended an online PAN-NZ workshop. The workshop's objective was to gain an understanding of PAN-NZ by collecting a range of opinions and requirements from a diverse stakeholder group. To capture feedback, the workshop used an interactive online mural board where participants could add digital Post-it notes throughout the workshop. To provoke this feedback, the following questions were asked.

- Why do we need PAN-NZ?
- How will PAN-NZ be used?
- What will a comprehensive up-to-date PAN-NZ enable / allow us to do / support?
- What would you like to see PAN-NZ do? What is on your PAN-NZ wish list?
- What PAN-NZ data sources are you aware of?
- What do you see as the barriers to compiling / delivering PAN-NZ?
- Who are the users of PAN-NZ?
- What privacy concerns are you aware of surrounding PAN-NZ?
- Who may be stakeholders in this work?

After the workshop, the feedback from the participants was analysed to identify key themes. All feedback was then grouped into themes and the resulting charts shared with the participants.

2.5 Survey

A survey was developed and sent out to a broad group of stakeholders identified from:

- attendance at the webinar
- attendance at the workshop
- identified via the workshop as potential stakeholders
- data providers identified in Phase I of this PAN-NZ review.

The survey was designed to capture feedback from two key stakeholder groups: PAN-NZ data providers and PAN-NZ data users. This required these two distinct groups to only answer the questions relevant to their practices in relation to PAN-NZ. Of course, some stakeholders fell into both groups.

The data providers' component of the survey focused on discovering what protected areas data are held and how these data is stored and shared. This included questions on APIs (application programming interfaces) for the serving of data, the prevalence of metadata, licensing, and any privacy concerns the data providers may have.

The purpose of the end users' component of the survey was to:

- identify those who may gain value from a national up-to-date protected areas data set
- understand how end-users would use a system like PAN-NZ
- gather end users' requirements to ensure the removal of barriers in achieving value.

3 Stakeholder insights

3.1 Stakeholder engagement

We engaged with stakeholders (i.e. both potential users and providers) to ensure that PAN-NZ users were central to decision making concerning the future of this spatial database.

Stakeholder engagement reached 505 participants via the webinar, 29 participants via workshop and 75 participants via the PAN-NZ engagement survey. It appears the webinar was successful in reaching those with a direct interest in PAN-NZ, as of the 505 participants, 54 had never attended an LinkOnline webinar before.

The feedback received via the engagement was broad and has allowed for a comprehensive view of the PAN-NZ system from both the users' and data suppliers' perspectives. Analysis of the stakeholder feedback underpins the sections below.

3.2 Value

> Having a single source of truth for protected areas would be hugely beneficial. Prioritising future protection and areas for integrated conservation effort requires a knowledge of the protected areas network. Council data, in particular, is inconsistent and hard to source and maintain, so would be particularly beneficial to be compiled at a national level. PAN-NZ would save us time and give us confidence that we were consulting current data. (Source: Survey response to question of benefit.)

Through the different forms of stakeholder engagement, we captured a wide range of benefits and feedback attributing value to PAN-NZ. The major themes of value identified across all forms of engagement are shown in the bullets below.

- **Measure, monitor and report:** Participants highlighted that PAN-NZ would allow the measurement of progress towards initiatives such as the worldwide 30x30 initiative, the IUCN Nature in the City Index, SEEA – Economic and Environmental Accounting, and the UN Sustainable development Goals (SDG).
- **Decision making and planning:** Feedback included the following workshop statements: 'informing applications under the Crown Pastoral Land Reform Act', 'inform pest control requirements' and 'informing appropriate management plans and resourcing required to manage protected areas'. Participants also raised points relating to more efficient investment due to having the required protected area information at hand in the early stages of planning.
- **Understand protections:** Participants indicated PAN-NZ would support them in better understanding protections. This included understanding protected area connectedness, land use constraints and opportunities, how species are protected, and identifying where future protections should be prioritised.
- **Data management / ease of access:** Stakeholders saw PAN-NZ could add value and enable other investigations and applications by removing significant barriers to accessing protected area data. Participants also highlighted that there was much duplication of effort in managing and accessing protected area data.

Most significantly, PAN-NZ was seen as a way to improve the cost efficiency of working with protected areas data. Many stakeholders indicated they considered it too costly and time-consuming to produce the comprehensive protected areas data that they need to support policy and decision making.

3.3 User access

The PAN-NZ Phase I report (Planzer et al. 2023) indicated that PAN-NZ data should be made available publicly if it is to render the most value to New Zealanders. This is in line with the New Zealand Government's open data policy (New Zealand Government 2020). This is also supported by comments in the engagement phase of this work.

When the online survey asked potential PAN-NZ users their preferences for accessing national protected area data (results displayed in Figure 1 below), viewing in a dedicated web map application had the highest preference (62%) with the streaming of data

(hereafter referred to as API access) second (52%). Thirty five percent also indicated they would like to download the data.

This has implications for how a future version of PAN-NZ should share data. To meet these user requirements a PAN-NZ webpage should be developed where users can interact with a web map to understand PAN-NZ data. Many users suggested that PAN-NZ had value in communicating protections to their stakeholders and this would support this value stream[3]. As potential PAN-NZ funders (e.g. MfE) and potential suppliers (e.g. MWLR) of PAN-NZ are subscribers to the Koordinates platform [4], we recommend this service is used to allow direct access to the data.

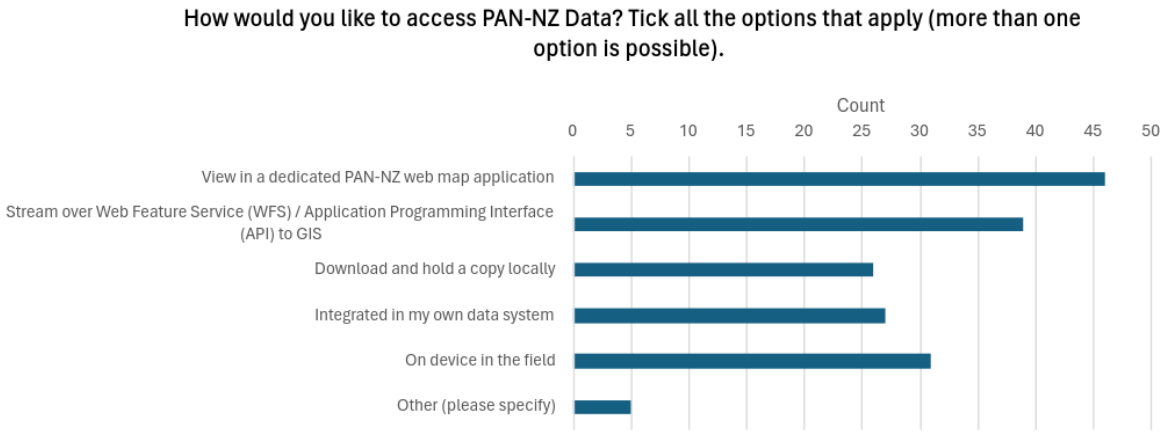

Figure 1. The survey participants' responses on access preferences. The majority of users indicated a preference for accessing protected area data via a dedicated web view followed by streaming (i.e. API) access. Note, while we refer to survey results in terms of percentage in the body of this report, graphed survey results are in terms of count. This is to indicate how many respondents selected to answer each question as all survey questions were optional.

We considered whether the Koordinates platform (https://koordinates.com/) would suffice as the 'dedicated PAN-NZ web map application' (see Figure 2 for an example of the Koordinates data portal). However, as each Koordinates platform holds many data sets, it would not meet the user requirements for a 'dedicated' viewer. By having a dedicated website, PAN-NZ information can be placed front and centre. This can include custom map styling specific to PAN-NZ data to inform the user about protected areas classes, provide custom PAN-NZ related filtering of the data (e.g. by protection rank or type), and place documentation next to the data with high visibility.

Providing a dedicated interactive map view is common practice with national protected area data sets and examples include the USGS protected area explorer (United Stated

[3] For example: 'I deal with protecting remnant bush on private land; having access to mapping of protected areas would provide a useful tool when assessing landscape connectivity, as well as a platform to engage with keen landowners if there are protected areas nearby.'

Another example: 'A lot of NZ is protected but not in an equitable distribution. PAN-NZ will allow us to communicate the ecosystems that are not adequately represented'

[4] For example, the MfE data portal https://data.mfe.govt.nz/

Geological Survey (USGS) n.d.), the Collaborative Australian Protected Areas Database (Australian Government 2020), and the previous PAN-NZ map viewer (Manaaki Whenua – Landcare Research 2007) itself. The web viewer should also provide a data provider administrator section as discussed in section 3.10 to allow the supply (i.e. upload) of protected area data.

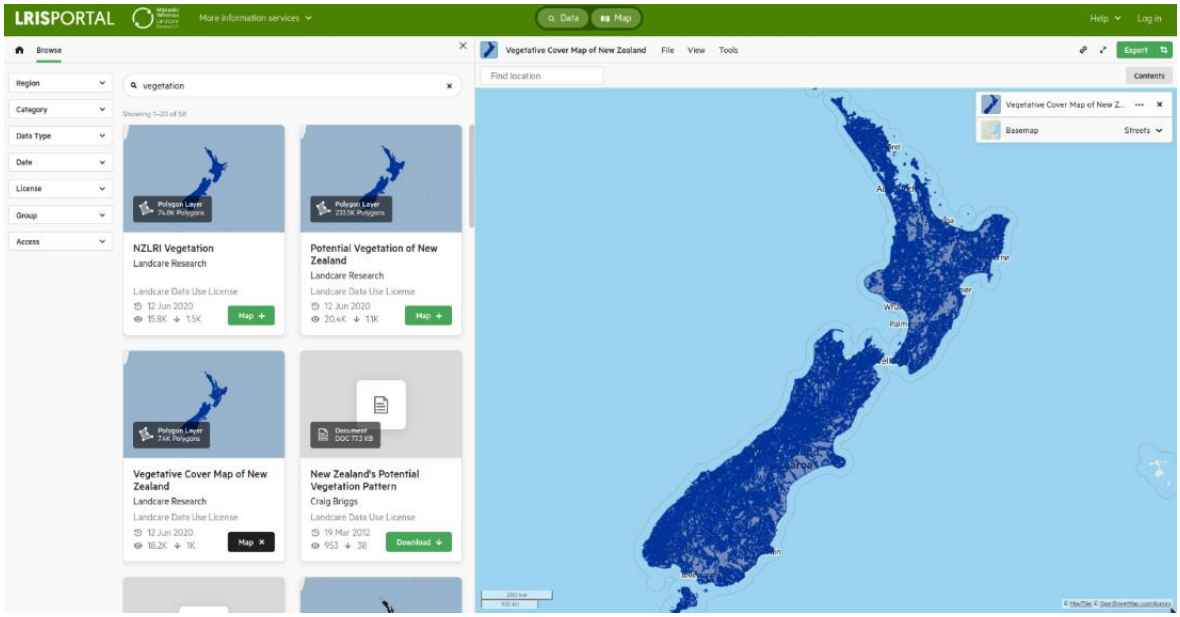

Figure 2. Manaaki Whenua – Landcare Research's LRIS instance of the Koordinates platform (Manaaki Whenua – Landcare Research 2024). This allows users to download the geospatial data an organisation publishes. Due to current service subscriptions, it is recommended that this same system is used to allow download and API access of PAN-NZ data.

3.4 World Database on Protected Areas (WDPA)

Several stakeholders, particularly during the webinar, expressed the view that the World Database on Protected Areas (WDPA) is already meeting the requirements of PAN-NZ. The WDPA is a joint project between the United Nations Environment Programme and the International Union for Conservation of Nature (IUCN). The WDPA aggregates global protected area data and is used in reporting international environmental targets such as the United Nations 2030 Sustainable Development Goals and the Kunming–Montreal 30x30 goals.

Some of the limitations of relying solely on the WDMA for compiling, storing and sharing protected area data are listed below.

- Control and decision-making over all aspects of national level protected data would be ceded to the WDPA.
- The WDPA data structure is fixed and will not meet all the user requirements as captured in this contract report nor all the recommendations captured via PAN-NZ Phase I. For example, it does not allow for national rankings. Therefore, the national ranking system developed and recommended for use in the New Zealand context (Bellingham et al. 2016) could not be included.

- The WDPA also currently excludes many protected areas that are recorded in current New Zealand protected area data sets (see Figure 3).
- The WDPA is updated approximately every 5 years. This does not fit stakeholders' expectations.

Rather, we consider that the WDPA is one of many products that would benefit from an up-to-date, open PAN-NZ data set. This is in line with the many jurisdictions that maintain their own protected area data and supply this data to the WDPA. for example, Australia's CAPAD (Australian Government 2020).

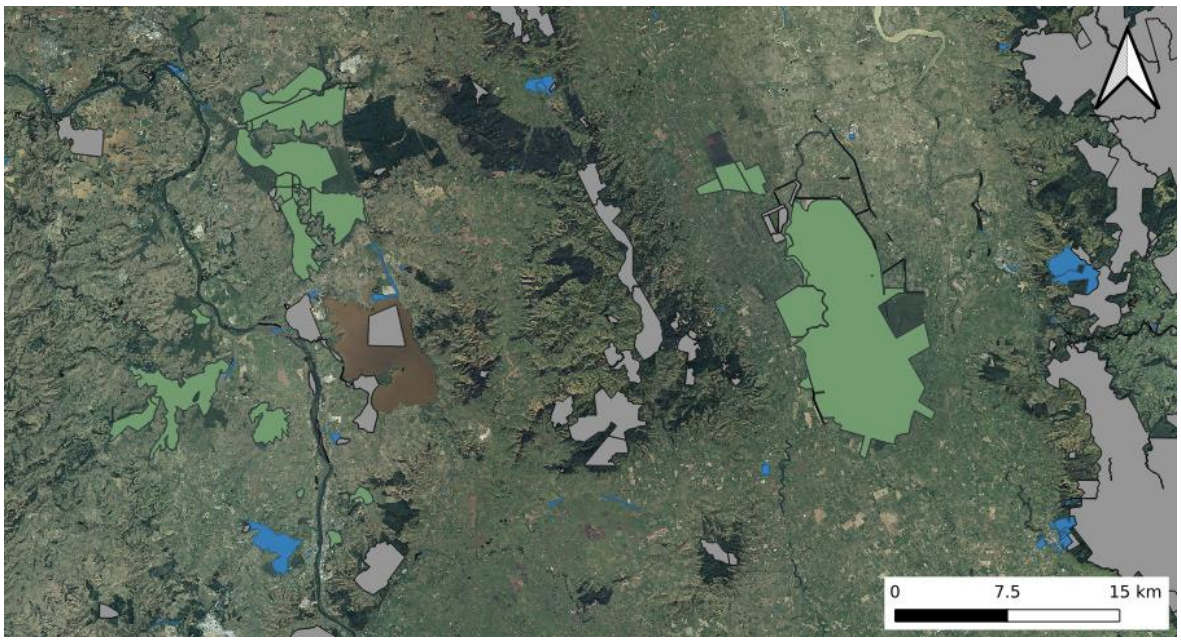

Figure 3. View of the protected areas held by the WDPA (Protected Planet n.d). The WDPA data (grey) is layered over the LINZ (LINZ 2023) and DOC (DOC 2024) protected area data. Thus, the visible LINZ (blue) and DOC (green) protected areas are not included in the WDPA data. The areas excluded from the WDPA data in this region are all reserves with purposes including 'wetland management' and 'wildlife management'.

3.5 Data privacy

Many concerns were raised in the webinar, at the workshop and especially in the survey by stakeholders about making protected area data publicly available. These concerns included:

- landowners concerned that private details may be made public.
- landowners worried that if protected areas on their land were published, then others may believe they have a right of access to their private land.
- participants who were concerned that protected areas may be environmentally degraded due to people seeking out rare fauna and flora, particularly where species occurrence was described.

Stakeholders also offered suggestions for addressing these concerns, the major theme of which is 'privacy through obscurity'.

Suggestions included:

- personal details should not be supplied to PAN-NZ
- any personal details supplied must not be published
- not publishing the occurrence of sensitive species
- including a data field indicating whether the protected area is accessible to the public or is on private land.

We recommend that these suggestions are implemented in any future version of PAN-NZ. We also note that feedback, including a focused discussion during the workshop on protected areas on private land, pointed out that these protections are already in the public domain. However, some organisations that collect and supply protected area data have their own agreements with Landowners. For example, the Queen Elizabeth II National Trust (QEII National Trust) will omit records where landowners have requested that information on protected areas is not publicly released. Such agreements between data suppliers and landowners must be respected by PAN-NZ to maintain the strength of the relationships between the data suppliers, landowners, and PAN-NZ. Therefore, one limitation of PAN-NZ will be that these protected areas are not included in the published data set.

Of the 56 data sets identified via the survey, around a fifth of these data providers' raised privacy concerns with public release; these were all related to protected areas on private land (Figure 4). It should be noted that these findings are heavily skewed by data providers commenting on SNA data. Now that the Government is modifying the rules around these, we are no longer recommending their immediate inclusion in PAN-NZ (see section 3.6 for more information on this).

Where data providers have indicated they cannot share data due to agreements with private landowner, there would need to be negotiated access for PAN-NZ to store this data and not publicly release it. Some information systems have public and private access tiers for data. Under such systems, users are granted access to private data only once they have been vetted and agree to the terms and conditions of data access. We do not currently recommend such an approach as there appears to be few data sets that a PAN-NZ user would gain access to via this model as the agreements stakeholders have commented on forbid this. To manage risks concerning sensitive data breaches, PAN-NZ should not hold such data under any circumstance, even if it is not intended to be released further. We rather recommend the approach of working with data providers to help them understand and manage the risks of releasing protected area data. All known protected area data sets that cannot be publicly released should still be listed in the PAN-NZ metadata record and via a field indicating they are known of but cannot be included in PAN-NZ. This will allow protected area data users to be aware of the data and enquire as to its access when needed. It should be a measured target of PAN-NZ to reduce the number of these metadata only records.

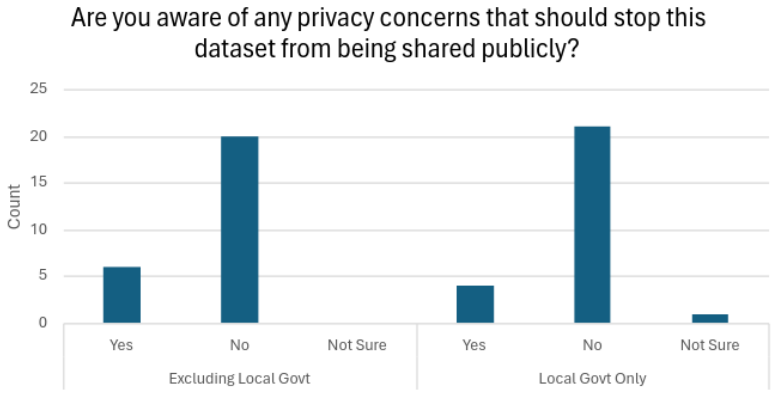

Figure 4. Most data providers saw no reason why privacy concerns should stop their protected area data being released publicly. (Note: These results are just for those who chose to identify their organisation type.) Here, and in subsequent graphs of survey results, the numbers in the scale are numbers of respondents that chose this option.

3.6 Protected area inclusions and types

Any future PAN-NZ should include the protected areas not currently included in PAN-NZ but identified in the PAN-NZ Phase I report for inclusion. These are listed below.

- New Zealand's internationally protected areas (UNESCO World Heritage Sites and RAMSAR wetlands).
- Marine protected areas.
- Areas as protected by Te Urewera Act 2014 and Te Awa Tupua (Whanganui River Claims Settlement) Act 2017.

We collected many opinions on what constitutes PAN-NZ data. These conversations primarily focused on the inclusion (or not) of SNAs and supplementary data describing the condition and management of each protected area (as discussed in section 3.8).

In the workshop, many participants explicitly placed SNAs on their 'wish list' for what they would like to see PAN-NZ deliver. However, for some, the inclusion of SNAs proved to be a contentious topic. This included comments that expressed serious concerns around the inclusion of SNAs in PAN-NZ. Many of the concerns related to the perception that SNAs provided low levels of protection. This view was countered by other stakeholders who indicated that these concerns would be managed by employing the recommended method of ranking all types of protections by the extent they protect biodiversity.

Since our engagement with the stakeholders, the government has signaled that it is reviewing SNA provisions (NZ Government Press Release 12 March 2024) both in the National Policy Statement for Indigenous Biodiversity (NPS-IB) and, more broadly, the Resource Management Act 1991 (which requires SNAs' protection as a matter of national importance). It is unclear what the outcome of those reviews will be; for example, whether existing SNAs in district plans will remain, and whether new areas will be added as required by the present NPS-IB. For this reason, we recommend that PAN-NZ focus on those protections recommended for inclusion in Phase I, excluding SNAs. Once clarity is provided around SNAs, their inclusion may be considered. PAN-NZ should deliver an information system whereby other protected area types can be easily included as required.

Stakeholders also raised the prospect of including protected areas that do not serve the goal of biodiversity protection. These include landform and landscape protections, historic sites, and archaeological protected areas. However, we note:

- the Phase I PAN-NZ report identified the key drivers for developing and maintaining PAN-NZ as being connected to biodiversity policy
- most of the feedback also focused on biodiversity.

For these reasons, we recommend that PAN-NZ initially focuses exclusively on protected areas for biodiversity. Later iterations could consider broadening the information system.

3.7 Rankings of biodiversity protection

Stakeholders highlighted the value of including rankings of biodiversity protection for each protected area. Using the biodiversity protection ranking system of Bellingham et al. (2016), it is expected that users would filter out protections that do not meet the criteria for their analysis and reporting.

New types of protected areas identified for inclusion (as detailed in section 3.6) are not ranked in the Bellingham et al. model. Research/work should be funded to include these in the Bellingham et al. ranking and to map these to IUCN classifications.

3.8 Data attributes

Much of the stakeholder feedback focused on the data describing protected areas. They identified the following protected area attributes for inclusion in PAN-NZ.

- Environmental condition.
- Biodiversity data (e.g. fauna and flora species occurrence).
- Measures of environmental value.
- Catchment information.
- Contact details communicating who manages each area.
- Associated iwi details.
- Descriptions of what is being protected.
- Management plan details.
- Environmental measures (including water quality and plant survival rates).

Clearly, there is a need for this ancillary information. However, these requirements are too broad and would hinder the successful development of PAN-NZ. Rather, we believe that by delivering PAN-NZ as a functional foundational layer onto which other information can

be added, PAN-NZ can enable others to create other specific data products, data products that could not be created without PAN-NZ.[5]

At least one type of ancillary information is also being mobilised and made accessible by other, complementary initiatives. A good example is GBIF (see www.gbif.org.nz), which is already making species occurrence data accessible to inform research, policy and management.

Core protected area data attributes that were identified for inclusion include fields describing:

- protection type
- the legislation under which the area is protected
- when the area was entered into protection (where available)
- the Bellingham et al. 2016 biodiversity protection ranking
- the IUCN ranking
- tenure (whether the land is public or private).

3.9 Data integration architecture

PAN-NZ must ensure it supports the integration of other data sets to support the creation of derivative products.

PAN-NZ needs to ensure that it meets the following requirements to support this practice.

- Maintain a persistent identifier for area protected area.
- License the data for reuse via Create Commons licensing.
- Provide data over APIs.
- Provide versioning to allow users to track change over time and view previous revisions.
- Provide metadata indicating when the data set was last updated.
- Provide metadata to indicate any generalisation, omissions or processes that may impact use of the data.

3.10 System architecture

The findings of the stakeholder engagement have implications for future PAN-NZ architectural design, particularly when considering if the system should be federated or centralised. Under a federated architecture, the distributed protected area data sources are presented as a national unified PAN-NZ data set. The data itself remains held by the data providers and is not stored in a central PAN-NZ database. This does, however, require

[5] This was reinforced by stakeholder feedback. For example, 'Protected area data would be used to inform conservation and restoration of species and ecosystems in the region I work. By having it easy to access and in a standardised format, it will facilitate integration with other datasets.'

all data sources to be shared via machine-to-machine interfaces (e.g. APIs). Alternatively, a centralised database model would fetch protected area data from the data providers and store the data in a central PAN-NZ database.

The federated model is the preferred option as it reduces duplication of effort, latency, and can increase data confidence as it is from the source of 'truth' as opposed to a secondary data store. This also gives data providers greater control over the published data as they can make improvements and corrections to their data and be sure they are propagated in near real time to the end users of the national data set.

However, our survey has found a low occurrence of data sharing over APIs, particularly by local government data providers (See Figure 5). This means PAN-NZ is not suited to a federated system because of the current immaturity of the protected area data sharing environment. For this reason, a centralised database system will need to be developed.

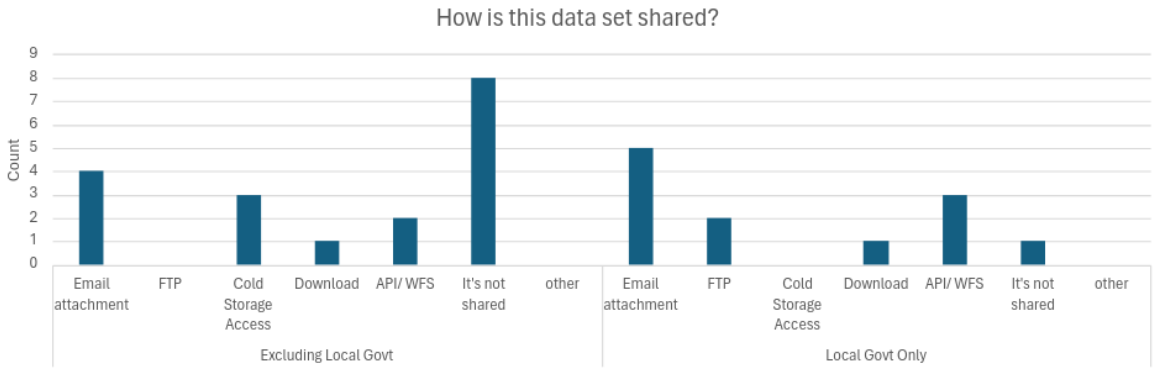

Figure 5. Survey response by stakeholders when asked how they shared each of their protected area data sets. These results include only the responses where the respondents selected to identify their organisation type.

However, by providing a hybrid approach to the fetching and receiving of PAN-NZ data, a centralised system can access many of the same benefits of a federated system, particularly one where the data providers share data in a mature manner. Where data is not shared in a mature manner, a hybrid approach ensures there are no barriers to participation. These methods and tools are charted in Figure 6 and described below.

1 **The PAN-NZ administrator requests protected area data:** For data provided via email request and self-service download, a PAN-NZ administrator would request the data. Once the data has been received, the PAN-NZ administrator would format the data to ensure it aligns with the central database schema. Once correctly formatted, the administrator would use the PAN-NZ upload interface (described below in point 2) to upload the data to the system. We consider this the least efficient means of aggregating protected area data; it should be phased out by working with data providers to migrate them to option 2 or 3 in Figure 6.

2 **Data published by protected area data provider:** The data provider uses the PAN-NZ web-viewer to access the administrator interface, which is password-protected. Via the interface, the data provider deposits their updated protected area data. This data

must be in an agreed format and automated checks will provide feedback to the data loader indicating their data meets these standards.

This gives the data provider control over when they publish their data, and also allows them to publish their data to the national data set at the time they make changes to their local copy. It also allows the data provider to push corrections to the national data set and have them propagate to the end user in near real time.

A condition of the data providers using this method of data upload is their conforming to the agreed data standards. The upload interface would publish these. This will not affect how data providers store their data, but they will need to transform the data on export to match the national schema.

3 **Automated data exchange**: This is seen as the most efficient method of data sharing. The data provider would expose their standardised data via API to the internet. The PAN-NZ system would poll this data endpoint frequently and update the national dataset in near real time. This removes any requirements for the data provider to package their data and manually upload it to the PAN-NZ system.

This proposed PAN-NZ system can deliver diverse hybrid data loading services as each service would benefit from the efficiencies of a common data-processing back-end. This will see the data sharing methods of 1 and 2 (that is, by administrator request for data or by supplier-initiated supply) use the PAN-NZ upload web interface. All methods will apply the same data aggregation engine which will poll APIs and the web upload portal for new data and aggregate any new data to PAN-NZ. Before including the data in PAN-NZ, changes will be flagged to a PAN-NZ reviewer who will review and approve the changes to ensure quality control. Over time, (reliable) data providers could be assigned high confidence rankings, and their data could be loaded with no review.

Note: Figure 6 and what is described in this section is an indicative design based on the findings of the stakeholder engagement. As per the Phase I findings, a Solutions Architect must be engaged and consensus then sought on final system design. The initial investment in the central database, web viewer, upload interface and tooling should be considered a one-off cost. A smaller ongoing cost will be required to ensure the system continues to meet security requirements and the tools remain fit for purpose.

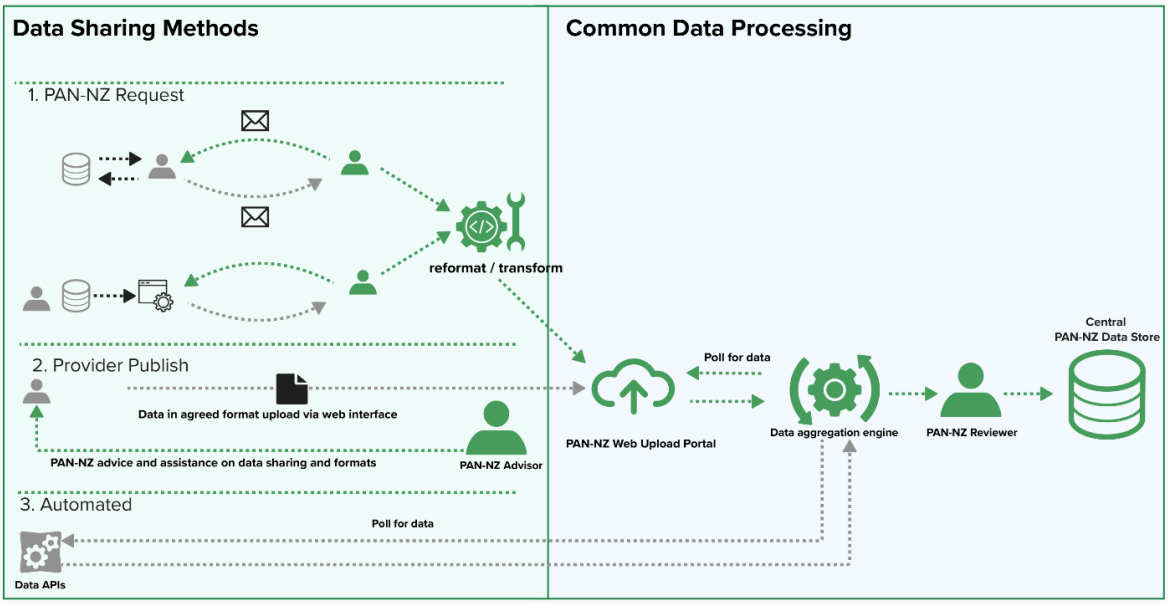

Figure 6. Proposed PAN-NZ hybrid data loading model to support the diverse methods protected area data providers employ to share their data. This will allow data providers to share their data via email and self-service download (option 1), deposit their data via the PAN-NZ web interface (option 2), and share their data via API (option 3). The common data processing steps will support all data sharing methods. Grey icons and connections indicate those interactions and components related to data providers; green indicates PAN-NZ administrator tasks and utilities.

3.11 Data aggregation

To help with data aggregation, providers must be willing to share their data and do so in a standardised manner. This includes providing metadata, licensing details, and using an agreed data schema.

Our stakeholder survey indicated that approximately 60% of the identified protected area data are currently being shared (see Figure 7a). This appears low, but there may be suppressed demand as much of this data has no public presence and therefore it is unlikely that it has been previously requested.

The online survey of data providers indicated a low occurrence of licensing (see 7c below). This is particularly true for respondents who identified as local government entities, with a significant majority indicating they do not provide licensing details for their data sets. A licence conveys explicit permission as to how the data may be used and shared. Without a licence PAN-NZ will not be able to share the data publicly. Noting that many more data sets are shared (Figure 7b) than licensed (Figure 7c), it appears it is not the intention for the data sets to be withheld, but rather a lack of understanding of the importance of choosing an appropriate licence. As most data sets have metadata (as in Figure 7a), once a licence is decided it is easily communicated by the data provider populating the relevant metadata field. This lack of open licensing is of major concern to compiling PAN-NZ. For data sets without a licence the PAN-NZ administrator will need to work with the data providers to support them in providing the required licence details. The PAN-NZ web viewer documentation should provider information for data providers outlining the

requirements around metadata and licensing. This should be used as a resource to educate data providers of the benefits of metadata, how to create metadata and how to select a licence that enables reuse.

Fig 7. Data aggregation: a) Most data providers indicated they have metadata available for their protected area data; b) Approximately 60% of the protected area data sets identified in the survey are already being shared with other agencies; c) There is low occurrence of data licensing, particularly for data supplied by local government. Where a respondent indicated 'Other', their text responses all indicated the respondent was unsure as to the data set's licensing details.

Under PAN-NZ Phase I (Planzer et al. 2023) over 85 potential providers of protected area data were identified, including:

- 3 government agencies (DOC, LINZ, MfE)
- 67 territorial authorities
- 16 regional councils
- several trusts, including QEII National Trust, Banks Peninsula Conservation Trust.

The difficulty of making any improvements to the data sharing ecosystem is compounded by this large number. However, by providing a hybrid approach to data retrieval the PAN-NZ system removes all major barriers to data providers supplying their data.

We expect that initial compilations of PAN-NZ would require a higher effort because of current practices involving inefficient data sharing via email, but the effort will diminish as a greater number of data providers move to more efficient methods of data sharing. Each

request for data via email should be seen as an opportunity to work with the data provider to raise the benefits of employing the more efficient methods of data sharing and migrating them to these methods.

PAN-NZ must work with the data providers to resolve the issues listed below, to ensure data can be integrated with PAN-NZ.

- Ensure all data sets have metadata included.
- Ensure all data sets are licensed for reuse.

PAN-NZ must also work with data providers to resolve the issues below to ensure an efficient system.

- Data providers must use agreed data exchange formats.
- Data providers must use either the web upload interface or enable APIs for their data.

Ongoing funding must be provided to support the work items listed below.

- Develop agreed data exchange standards.
- Document and provide advice on the use of standards.
- Review data updates to ensure quality of the national level PAN-NZ data set.
- Work with data providers where standards or quality requirements are not met.
- Work with data providers were metadata and licensing requirements are not met.
- Annually request and aggregate data supplied via email requests.
- Annually download and aggregate data where it is supplied via self-service download.

3.12 Data update frequency

When the online survey asked data users how frequently they required PAN-NZ data, the majority responded 'yearly' (see Figure 8). When considering how often PAN-NZ should be compiled we must also consider how often the data suppliers update their data sets. When querying data providers on update frequency, the majority indicate not a set frequency but 'other' (see Figure 9). When reviewing the text responses associated with the question of update frequency, it is clear data providers update their data sets not at a set frequency but as change in protections occur. The stakeholder sentiment is summarised by the respondent's comment below.

> 'As a user, we would want to know that the data is current and reliable. As a data provider, we would similarly want to know that data users were accessing the most current version of our data. We edit/update our data on a weekly basis.'
> (Source: Survey response in comment box associated with question about preferred update frequencies.)

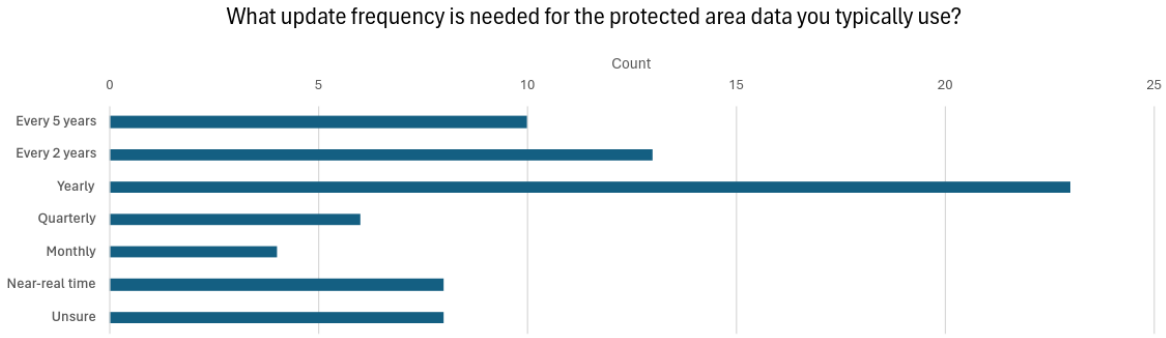

Figure 8. Frequency at which users indicated PAN-NZ should be updated to meet their requirements.

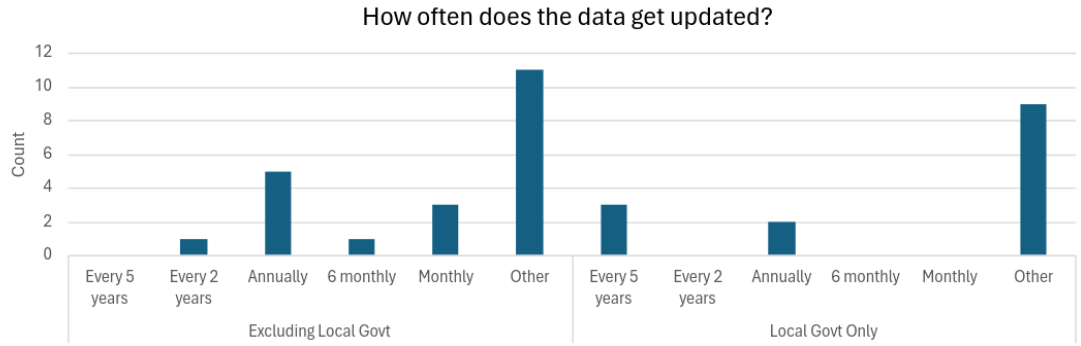

Figure 9. How often the identified protected area data sets are updated. 'Other' was expanded on via a text field. In this field data providers identified that they do not update data at a fixed interval but only when new data is required to be created or modified to reflect changes in protections.

To get an indication of how often change occurs, three data sets were reviewed.

- **LINZ Protected areas (Land Information New Zealand 2023):** This is one of New Zealand's largest protected area data sets. The data was last released 6 Nov 2023. The large numbers of modified records appear to be related to minor (such as geometry representation corrections) data fixes.
  - 2023: 84 records added, 17656 modified and 84 deleted
  - 2022: 0 added, 22 modified, 0 deleted
  - 2021: 54 added, 17538 modified, 60 deleted
  - 2020: 93 added, 18647 modified, 30 deleted.
- **DOC Public Conservation Land (Department of Conservation 2024):** The data is updated weekly. Only additions are evident when viewing the data.
  - 2023: 5 added
  - 2022: 44 added
  - 2021: 71 added
  - 2020: 29 added.
- **QE 11 National Trust:**

- On average, 110 new covenants per year (Queen Elizabeth II National Trust 2017).

The data on additions indicate the data sets are dynamic. In the case of the LINZ data set, it appears a degree of data improvement is also being undertaken. With the Te Mana o te Taiao Aotearoa New Zealand Biodiversity Strategy 2020 placing an emphasis on protecting more terrestrial and marine environments, we can expect this rate of new data generation to continue. This highlights the need to deliver an efficient system with a large degree of automation to ensure the longevity of any future PAN-NZ.

To meet the stakeholders' requirements, we propose a hybrid approach to supplying PAN-NZ data (as in section 3.10). This allows data providers to ensure their data is up-to-date and accurate by having the ability to publish their data to PAN-NZ at any time via the web upload interface or APIs. For those data providers that opt to share their data via email or self-service download, the PAN-NZ administrator will need to manually fetch this data via email or via visiting each of the self-service download web portals. This manual fetching will need to be undertaken at a frequency that balances investment costs and the users' requirements for up-to-date PAN-NZ data. Based on most users indicating a requirement for yearly updates at a minimum, we recommend the PAN-NZ administrator performs the manual updates annually. The PAN-NZ administrator should use this as an opportunity to promote the use of the upload portal and APIs.

3.13 Data gaps

In terms of PAN-NZ, a data gap can either be:

- a complete dataset has not been identified to describe a type of protection at either a regional or national level.
- a data set has been identified, but it is incomplete in its description of protections at either the national or regional level it represents.

The survey engagement asked data providers to estimate how complete their data is (results in Figure 10). While non–local government entities indicated the majority of their data sets were over 91% complete, only approximately 35% of local government entities estimate their data as complete.

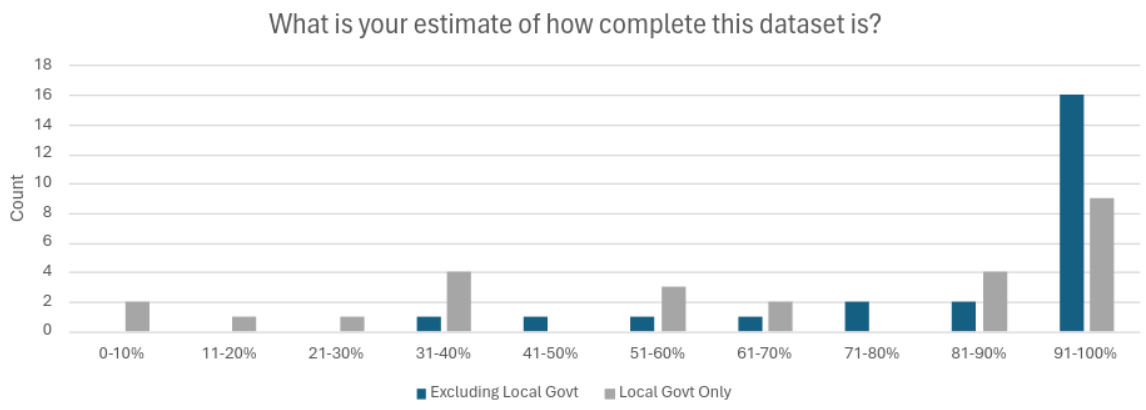

Figure 10. How complete data providers estimate their data sets to be. This only represents the results of the respondents who selected to identify their organisation type. There is a

notable difference between how local government entities and non–local government entities estimated their data set completeness with local government giving a significantly lower estimate. Many of these data sets in local government related to protections on private land including private covenants.

This is a major concern as PAN-NZ data can only be as complete as the supplied constituent data sets. Stakeholder feedback suggested data gaps could be addressed by investing in local data sets.[6] This is something that should be considered by the proposed PAN-NZ governance group.

Many data gaps, where entire data sources are yet to be discovered, were identified in the data investigation of PAN-NZ Phase I. Via the Phase II stakeholder engagement, many more data sets have been identified. However large data gaps do still exist, particularly in relation to protections on private land as held by local government.

Some of these data gaps will not be resolved at the first re-release of PAN-NZ. To manage this, we recommend that each PAN-NZ version should publish a status update that identifies known data gaps. This status update should be visible on the PAN-NZ map viewer website. By creating visibility of the data gaps, we expect that those with knowledge about how these may be resolved, will come forward. With each sequential release, PAN-NZ should work to reduce the number of gaps.

3.14 Data and data sharing environment improvements

Much of the friction identified in the compiling of protected area data is because of how it is being shared – and, in many cases, not shared. The problems that PAN-NZ faces in data collation are not unique, and the New Zealand government has defined many of the difficulties concerning collating environmental data (see, for example Parliamentary Commissioner for the Environment 2019). As many of the data providers that supply PAN-NZ data supply other environmental data for national level aggregation, a joint approach to data improvement should be taken. PAN-NZ should look for opportunities to engage with programmes looking to improve the wider data sharing ecosystem.

While the Data Investment Plan (Statistics New Zealand 2022) does not mention protected areas specifically, it does prioritise investment in land use data. Protected areas are not a land use type per se, though they do limit land use and are often an important component of land use information. For this reason, PAN-NZ should look to work with those responsible for land use data investment under The Data Investment Plan. Under this initiative MfE and the Ministry for Primary Industries are the responsible agencies.

This does not mean the PAN-NZ does not have a role in improving the data sharing environment. As well as looking to support joined-up data sharing initiatives, PAN-NZ

[6] For example, 'We don't particularly need a new mapping platform for existing data. This project could be of use to us if it were to provide resourcing for daylighting and mapping covenant data held in e.g. paper archives, legacy data storage and LINZ land titles etc.'

needs to evangelise better data practices. For instance, when liaising with data providers to request data, or to discuss the possibility of enabling API services with them.

Possible improvements to the PAN-NZ data environment captured via stakeholder engagement are listed in the points below.

- Resourcing – support resolving incomplete data sets. Stakeholders commented that PAN-NZ should invest in supporting data providers to undertake work to resolve data gaps and digitise paper-based protected area information.
- The creation of data standards – many workshop and survey responses indicated this would improve data sharing.
- Roles and responsibilities – in the workshop participants commented that, without clear roles and responsibilities surrounding PAN-NZ, actions such as the above (data standards) are difficult to achieve.

By improving how data is shared, efficiencies can be found for the data aggregators and the data providers. This includes removing the overheads associated with email exchanges to request and supply data. However, the greatest benefits will be to the many users who responded that they require national level protected area data to be compiled and released more frequently than the current data sharing system allows.

3.15 Ongoing funding

The proposed system will require a PAN-NZ administrator to review the uploaded data and provide support. The administrator will also need to request data from those providing data via emails, as well as downloading data annually from data portals for inclusion in PAN-NZ. This is to ensure PAN-NZ best meets its users' requirements around data currency. For these reasons, PAN-NZ will require ongoing funding.

4 Conclusions

PAN NZ is a valuable data set: Stakeholders have identified diverse benefits from releasing up-to-date national level protected area data. The PAN-NZ Phase I report identified that mandated international reporting also relied on New Zealand compiling frequent, up-to-date national protected area data.

PAN NZ should cooperate with other national data-sharing initiatives: Engagement with data providers has shown many of the constituent protected area data sets are shared and accessed via manual means, such as email exchanges. This does not make for efficient data aggregation. The PAN-NZ programme should look to work with data initiatives trying to lift the maturity of environmental data sharing across the wider data ecosystem. The Data Investment Plan (Statistics New Zealand 2022) may be a promising place to start.

PAN-NZ should remain a centralised database: This is as opposed to a federated system and this is recommended because of the low occurrence of data sharing over API. However, by providing a hybrid data uploading model, barriers to data provider participation can be removed resulting in increased data update frequencies.

PAN-NZ should be available online: To meet the captured user requirements, PAN-NZ data should be made available over a dedicated website with a map view, API, and self-service-download. A dedicated website is common practice for such a national protected area data set. The API and download facilities can be provided by the Koordinates service to which MfE and MWLR already subscribe.

PAN-NZ must be long-term funded: Ongoing funding must be committed to ensure ongoing, frequent releases. Funding must also include provisions for database and data tool maintenance to ensure security requirements are met and that the system remains efficient.

5 Recommendations

5.1 PAN-NZ Phase-I recommendations

The PAN-NZ Phase-II recommendations in this document build on the Phase I recommendations.

Phase I recommendations are listed below.

- A PAN-NZ governance group should be formed. This group should include, but not be limited to, MfE, Stats NZ, DOC and MWLR.
- A budget should be developed for PAN-NZ database modernisation, ongoing system maintenance, ongoing data improvement and the dissemination of PAN-NZ data.
- PAN-NZ should receive sustained funding for database modernisation, ongoing system maintenance, ongoing data improvement and dissemination of data. Funding should be via those who require current and defensible protected area data for

national and international reporting of environmental policy outcomes. These prime users are (but not limited to) MfE, the Department of Conservation (DOC) and Statistics New Zealand (Stats NZ) and we recommend that they could have an annual contract with MWLR for delivery of PAN-NZ services.

- The data sharing environment must be improved to allow the frictionless transaction and aggregation of protected areas data. These problems are not unique to PAN-NZ and PAN-NZ governance should look to work with initiatives working to solve these problems in a joint-up way
- Addressing these common data sharing challenges should take heed of recommendations published in:
    - Focusing Aotearoa New Zealand's Environmental Reporting System (Parliamentary Commissioner for the Environment 2019)
    - Data Investment Plan (Statistics New Zealand 2022).
- New Zealand's Internationally protected national sites should be included in PAN-NZ.
- Marine protected areas should be included in PAN-NZ.
- Mapped significant natural areas (SNAs) should be included in PAN-NZ[7]
- Areas as protected by Te Urewera Act 2014 and Te Awa Tupua (Whanganui River Claims Settlement) Act 2017 should also be included.
- Further work should be commissioned by MfE to classify and categorise those additional protected areas recommended for inclusion in PAN-NZ using the system developed and recommended for use in New Zealand by Bellingham et al. 2016.
- To gain the greatest benefit from PAN-NZ, the data it holds should be released publicly under open licensing. Before release a privacy assessment should be undertaken, and the principles outlined in the Māori Data Governance model should be considered (Kukutai et al. 2023).[8]

5.2 PAN-NZ Phase-II recommendations

Informed by stakeholder views, we recommend the following actions for PAN-NZ.

- Develop an information system and tools for managing national level protected area data. This initial development is considered a one-off investment. However ongoing investment is required to ensure the tools meet security requirements and remain fit for purpose.
- Develop a hybrid data loading approach to ensure no barriers of participation exist for data providers.
- Support data providers' migration to efficient methods of sharing protected area data.

[7] This report updates the Phase I recommendation by recommending PAN-NZ is first delivered with the recommended protected area types excluding SNAs. Once the current ambiguity in relation to SNAs is resolved their inclusion may be considered. See section 3.6 for the relevant discussion.

[8] As set out in the contract, it is noted that the project scope covered Māori sectors in central and local government and collective agencies such as Ngā Whenua Rahui, however engagement with iwi and hapu directly was beyond the current project scope.

- PAN-NZ should work with data holders/stakeholders to develop guidelines. For example, guidelines for metadata, licensing, and data formats.
- The PAN-NZ information product(s) should be publicly released and licensed for reuse under Creative Commons licences.
- The PAN-NZ information should be made available via the Koordinates data platform to meet user requirements for self-service-download and API access. This data should be versioned as to detail change over time.
- A dedicated web viewer should be developed to allow users to view, understand and communicate national protected area data. This should provide features for filtering by protected area rank and protected area types.
- An upload portal should be included in the web viewer to allow data providers to upload their data updates and corrections.
- To manage privacy, data holders will be requested to remove private information before supplying data to PAN-NZ. However, if it is included in the data, PAN-NZ will not publish any personal details nor information relating to the distribution of endangered species.
- Protected area data identified in Phase I should be included in any future version of PAN-NZ. We note that national policy on SNAs is presently under review, and the inclusion of present and future SNAs would depend on the outcome of that review.
- PAN-NZ architecture and source code should be open-source. This is to allow other projects to potentially use the architecture.
- All data in PAN-NZ should be classified using the ranking system of Bellingham et al. 2016 and mapped to the IUCN classification system.
- PAN-NZ should be a functional spatial foundational layer. This means that ancillary information such as biodiversity condition, management plan details, and catchment information are too broad to be included. However, consideration should be given to providing the ability to capture links to this additional information.
- The challenges PAN-NZ encounters in aggregating data, stemming from low maturity in data sharing practices, are not exclusive to PAN-NZ. Overcoming the barriers associated with sharing environmental data requires a collaborative approach. PAN-NZ should actively seek out and support government-wide initiatives aimed at improving data sharing practices. PAN-NZ could serve as a test bed for any new initiatives. PAN-NZ should also advocate for best data practices when engaging with data providers.
- PAN-NZ should consider investing in source data sets to improve their completeness.

5.3 Indicative milestones in implementing the recommendations

Indicative milestones in achieving a functional PAN-NZ data set are listed in sections 5.3.1–5.3.3. These are based on the above PAN-NZ Phase-I and Phase II recommendations. These milestones will be subject to change based on the outcomes of the architectural system design by a Solutions Architect (as discussed in PAN-NZ Phase I).

5.3.1 Short-term – First PAN-NZ release

Below are the key milestones required to release the first version of an updated PAN-NZ. Staging of the delivery of these milestones could be considered.

- **Design PAN-NZ system architecture:** Comprehensive PAN-NZ architectural design should be undertaken by a Solutions Architect. This will include the database for data storage, and data loading / data processing functionality.

  The estimated cost of building the system should be part of this design.
- **PAN-NZ budget development:** The budget should include the items below.
  - Initial phase of system build covering data storage, data loading, data processing data review functionality.
  - Initial development of web viewer, including data upload functionality.
  - Initial development of the PAN-NZ web viewer platform.
  - The collaborative development of data standards.
  - Ongoing costs to maintain the PAN-NZ system and tooling.
  - Ongoing costs to maintain the web viewer.
  - Ongoing costs to share data via Koordinates.
  - Ongoing costs to review incoming PAN-NZ data by a PAN-NZ administrator.
  - Ongoing costs to request data from data providers not using APIs and the upload interface.
  - Data sharing improvement. PAN-NZ should budget for improving the data sharing maturity of protected area data. This should be undertaken via engaging with initiatives working towards the common goal of improving data sharing with local government. Failing to connect with a programme undertaking this, PAN-NZ will need to invest in working with data providers directly to improve data sharing for protected area data. We expect this would include workshops with data providers, presenting at conferences, and the development of data standards.
  - Ranking of the protected area types recommended for inclusion in PAN-NZ that are not yet ranked via the Bellingham et al. 2016 ranking system.
  - Development of user documentation. Documentation should be included in the PAN-NZ web viewer. Documentation should focus on enabling users to gain value from the system and support data providers supply data to PAN-NZ.
- **Formation of a governance group:** A group of interested parties should be formed to oversee PAN-NZ governance. This group should include, but not be limited to representatives from: MfE, Stats NZ, DOC and MWLR.
- **Resolve funding:** Funding should be from those who require defensible protected area data for national and international reporting of environmental policy outcomes. It is recommended that (at least) MfE, DOC and Stats NZ have a contract with MWLR for delivery of PAN-NZ services. There must be an ongoing commitment to PAN-NZ to ensure protected area data is updated at least annually and the PAN-NZ system is maintained and remains fit for purpose.
- **Develop a protected area data catalogue:** A data catalogue of all source data sets should be developed. This should include reference to all data sets that constitute the national level data set, the organisation responsible, licence details, the urls for APIs,

and downloaded urls. The catalogue should include the data sets identified in Phase I for inclusion. This can be considered the blueprint for compiling PAN-NZ. This catalogue should be published publicly via the PAN-NZ web viewer.

- **Update the New Zealand protected area biodiversity ranking:** The rankings of Bellingham et al. 2016 should be updated to include those protected area types identified for inclusion in PAN-NZ Phase I that are not currently ranked via this system. This should include mapping these rankings to the IUCN rankings.
- **Develop the centralised PAN-NZ database and tools:** This milestone includes building the database to store the protected area data, as well as the tools to analyse the data for inclusion and updates to the database. It should also include processes for database backups and recovery.
- **Develop the web viewer:** This includes functionality to view all protected areas on a map, filter protected areas by rank and protected area type. This should also allow for the display of PAN-NZ documentation.
- **Notify data providers of upcoming PAN-NZ version:** Notify data providers that a PAN-NZ version is to be compiled and the data is required. This should also provide a reminder of the data requirements (e.g. licensing). Part of this engagement should request that data providers check the protected area viewer to ensure their protected area data is in the data catalogue and that all details are correct. This could be through online presentations, email and attending local government conferences (e.g. the Local Government Geospatial Alliance annual conference).
- **Data sharing improvement:** Efforts should be made to connect to and work with those leading nationwide joined-up efforts to improve environmental data. This should include looking for opportunities to work with the land use initiatives under The Data Investment Plan (Statistics New Zealand 2022).

  For data providers for whom it is clear that they have the infrastructure to enable APIs (for example they have an instance of ArcGIS Online visible on the Internet) PAN-NZ should reach out to each of these data providers and ask them to enable API services. This should be little effort for these data providers.
- **Compile PAN-NZ:** For the data providers that do not adhere to standards and share data via email or self-service download, the PAN-NZ administrator must request this data manually. This action is to be performed annually. This will not result in a complete national level data set (as, for example, it is known some data sets are not stored in digital format). However, with each release we can expect that a more complete product will be realised.
- **Load the data to Koordinates:** Data is uploaded to the Koordinates platform. API services should be enabled, and metadata correctly populated including the licensing details. This should be automated and occur weekly.
- **Update the web viewer:** As well as the national level data set, this should include the data catalogue. The catalogue should indicate if the data set is included in PAN-NZ. This will highlight to an end user that data sets exist but could not be included for reasons such as licensing (i.e. metadata only records). Documentation should also be included on the web viewer webpage. The data should be supplied to the web viewer via the PAN-NZ API and will therefore be a live representation of the PAN-NZ data.

5.3.2 Mid-term – Review, maintenance, improve data aggregation

- System maintenance: Undertake security auditing and patching. Upgrade database versions and operating system when required (for example, operating system long term releases are often only supported with security patches for 5 years after release).
- Ensure data management tools are still fit for purpose and upgrade where required.
- Continue to work with data providers to improve the methods of data sharing and work to resolve data gaps. This may include investing in regional data sets to ensure completeness.

5.3.3 Long-term – Fully automated system

- Review architecture to consider more efficient means of data aggregation. This may include migrating to a federated system when all data providers share open access protected area data over API.

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