Learning Opportunities at the Te Ahu Pātiki Park

Prepared for Te Pātaka o Rākaihautū / Banks Peninsula Geopark By:

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Executive Summary:

- Recently, 500 hectares of land on Mt Herbert and Mt Bradley on Banks Peninsula, collectively known as Te Ahu Pātiki Park (TAPP), has been purchased through crowdfunding by Rod Donald Banks Peninsula Trust (RDBPT). The intention is for this land to become a conservation park and assist in aspirations to make Banks Peninsula a United Nations Educational, Scientific and Cultural Organisation (UNESCO)-accredited Geopark. To achieve Geopark status, the Banks Peninsula area will need to show evidence of community collaboration, use of the landscape in learning, and a strong sense of sustainability.

- Therefore, this project sought to answer, "how can the opinions, views and aspirations of a range of partners be incorporated into plans for learning opportunities at the Te Ahu Pātiki Park?"

- A survey sent to primary and secondary teachers gauged whether they use Banks Peninsula for teaching, and what could be done to encourage them to use the peninsula more for teaching. Secondary data on TAPP was also gathered. Finally, a series of Geographic Information System (GIS) maps were used to develop recommendations for interpretation methods to use within the park.

- A key finding was many teachers already use Banks Peninsula for teaching. National Certificate of Educational Achievement (NCEA) geographic research and skills standards are commonly taught on the peninsula. Resources designed for field-trips were popular, as were classroom resources. However, a wide range of concerns about teaching on the peninsula were also identified. Citizen science, including platforms such as iNaturalist and iPhone cradles, presents opportunities to get schools and the public engaged in the park. Signage and tours were identified as the most reliable interpretation methods and should be used on popular tracks. Alternatives to signage are needed for Te Ara Pātaka (Summit Walkway) due to the risk of visual pollution.

- The Covid-19 lockdown and lambing season prevented site auditing from occurring, meaning the interpretation recommendations are generalized. However, they still provide a useful guide for the Geopark. These limitations also meant fewer park partners were contacted than desired.

- Future research should trial citizen science projects such as smartphone cradles and stream monitoring, though the ethics of this needs to be considered. Gathering perspectives from other park partners on future use of the park is important alongside completing site auditing to create a more detailed interpretation model.

Introduction:

This report seeks to recommend educational and learning opportunities for the new Te Ahu Pātiki Park (TAPP) on Banks Peninsula. TAPP is located above Orton Bradley Park and spans Mt Herbert and Mt Bradley (RDBPT, n.d.). The land was purchased through crowdfunding (RDBPT, n.d.). The vision is that TAPP becomes a 500ha conservation park for regeneration and protection of native species (RDBPT, n.d.). It will be publicly accessible and complete ki uta ki tai (protection from mountains to the sea) (RDBPT, n.d.).

The research question for this report was 'how can the opinions, views and aspirations of a range of partners be incorporated into plans for learning opportunities at the Te Ahu Pātiki Park?'

This research is needed as TAPP is part of wider plans to make Banks Peninsula a UNESCO-accredited Geopark (Te Pātaka O Rākaihautū Banks Peninsula Geopark, n.d.). To achieve this, community collaboration and infrastructure supporting the delivery of information and learning is required (UNESCO, n.d.). Therefore, developing a relationship with local community partners was one aim of this project, to ensure plans for TAPP are aligned with the views of its key partners. Intended partners included Banks Peninsula Geopark/Te Pātaka o Rākaihautū, Rod Donald Banks Peninsula Trust, Orton Bradley Park, Te Hapū o Ngāti Wheke, the local community and schools. A second aim of the project was to consider possible learning opportunities in the park. A third aim was deciding potential methods for how information about the park will be delivered through interpretation.

This report begins by reviewing relevant literature, followed by methods, results and discussion covering learning and interpretation, and then recommendations and future research.

This research is being undertaken for GEOG 309. This is a unique undergraduate course offered at the University of Canterbury where group work and project-based learning approaches are used to complete a research project in collaboration with a community partner (University of Canterbury, n.d.). Read more at: https://www.canterbury.ac.nz/courseinfo/GetCourseDetails.aspx?course=GEOG309&occurrence=21S2(C)&year=2021

Literature Review:

Citizen Science:

To fulfil the vision that TAPP could be a space for learning, citizen science is one learning opportunity that could engage the community in the park. Citizen science involves public participation and collaboration in scientific research (Kullenberg et al., 2016). This literature review focused on the limitations and benefits of citizen science.

The biggest limitation to citizen science is the perceived quality of results. Public involvement in data collection is seen to negatively impact output quality (Viduka, 2019). Another disadvantage is that projects may become limited to super volunteers; people with pre-existing skills, time to commit to the project, and resources for gear (Viduka, 2019). These over-exclusionary, demanding citizen science projects with smaller pools of participants, risk exclusion of potential volunteers (Viduka, 2019).

One key advantage to citizen science is how people may feel they are contributing to a greater good (Bonney et al., 2014). Marketing citizen science projects toward big-picture goals creates a positive feedback loop between participant motivation and meaningful outputs (Bonney et al., 2014). Projects that bring together people of different backgrounds can leverage underappreciated knowledge sources such as indigenous and traditional knowledge, achieving better results and building stronger communities (Bonney et al., 2014). Additionally, there are benefits to getting young people involved in citizen science. Giving voice to youth helps advance environmental protection at policy level, shown by Greta Thunberg (Makuch & Aczel, 2019). Participation in citizen science also improves environmental stewardship and justice in adults (Makuch & Aczel, 2019).

Therefore, while citizen science has limitations, its advantages make it a powerful tool. Therefore, it was decided to research examples of citizen science relevant to the Geopark and ask park partners for their perspectives on its use.

Interpretation:

As the project focuses on learning within TAPP, and the Geopark more broadly, how the stories of the landscape are told is important, particularly for the learning of visitors. This is determined by interpretation methods. These include signage/panels, pamphlets, tours, and technology-based approaches, including virtual reality (VR) and augmented reality (AR). This literature review focused on the advantages and disadvantages of each method. The key findings are presented in Table 1. These findings were used, in combination with secondary data and GIS maps, to inform recommendations for where to use each interpretation method within TAPP and the Geopark.

Table 1 *- Summary of advantages and disadvantages for selected traditional and modern interpretation methods.*

Interpretation	Advantages	Disadvantages
Signage	Can hold visitor interest, especially with imagery (Hughes & Morrison-Saunders, 2002; Wolf et al., 2013). Visitors choose what information to read (Wolf et al., 2013). No technical issues (Wolf et al., 2013).	Visual pollution risk where too many signs harm a view (Wolf et al. (2013; Davis & Thompson, 2011). Poor design can cause information overload (Wolf et al., 2013; Davis & Thompson, 2011). Regular maintenance required, challenging in remote locations (Wolf et al., 2013).
Pamphlets	Can be read anywhere, anytime, allowing learning post-visit (Moscardo, 1999; Wolf et al., 2013).	Often require maps for navigation to sites, challenging if they are small (Moscardo, 1999; Wolf et al., 2013). Visitors, especially young visitors, engage less with pamphlets during a visit (Moscardo, 1999; Wolf et al., 2013).
Guided Tour	Effective at preventing information overload (Edwards et al., 2014). Generally, receive higher visitor satisfaction than other methods (Henker & Brown, 2011; Edwards et al., 2014). Visitors may enjoy expert knowledge and insight (Edwards et al., 2014).	Does not provide choice in information engagement (Edwards et al., 2014). Cost may be prohibitive for some visitors, compared to self-guided (Edwards et al., 2014).
Audio Tour	Effective at preventing information overload (Novey & Hall, 2007; Wolf et al., 2013).	Technological faults (Cayla, 2014; Liu, 2020; Wolf et al., 2013). Not always intuitive to use (Cayla, 2014; Liu, 2020; Wolf et al., 2013).

	Can perform as well as signage and pamphlets for knowledge retention (Novey & Hall, 2007; Wolf et al., 2013). Can hold people's interest better than signage (Davis & Thompson, 2011; Hughes & Morrison-Saunders, 2002). Can allow remote learning, such as a podcast (Henker & Brown, 2011)	If pre-recorded, will not provide visitors choice in what information to engage with (Wolf et al., 2013).
Augmented Reality (AR) and Virtual Reality (VR)	Can be used to create interactive experiences via apps (Cayla, 2014; Liu, 2020). Could utilise QR codes to provide more information about a location (Basiri et al., 2014; Cayla, 2014). Novelty factor may attract some users (Liu, 2020; Wolf et al., 2013). Can allow people to experience the environment from home (Cayla, 2014; Wolf et al., 2013).	Technological faults (Liu, 2020; Wolf et al., 2013). GPS location accuracy of smartphones and internet coverage (Muñoz et al., 2019). Difficulty of use (Cayla, 2014; Liu, 2020; Wolf et al., 2013). Cost potentially prohibitive for development and implementation (Cayla, 2014). Can overwhelm users (Wolf et al., 2013), especially if using AR/VR (Liu, 2020).

Methods:

Data was collected and analysed through a review of existing secondary research on TAPP, a survey and several GIS maps.

Secondary Data

One data source was a report on visitor characteristics to Orton Bradley Park (Moore & Espiner, 2014). Additionally, information from Kā Huru Manu (n.d.), books on the history of Banks Peninsula (Ogilvie, 2017) and other resources were used to compile Appendix A. This is a list of significant sites within TAPP, ready to be audited in future research.

Survey

To assist in the learning aspect of the project, a survey was developed using Qualtrics survey design software (Qualtrics, n.d.). The intended participants were teachers at primary schools local to TAPP, and geography teachers at Christchurch secondary schools. Surveying is an efficient method to collect a range of in-depth responses over a given period (Gideon, 2012; Opdenakker, 2006), so was an appropriate choice. Surveying combined qualitative, open-ended questions and quantitative, tick-box questions (Leavy, 2017).

The survey was piloted to GEOG-309 staff and friends and family. The intention was to identify any errors in survey design and flow (Stopher, 2012). Participants were recruited through snowball sampling and convenience sampling. Lyttleton School distributed the survey to staff at other local schools, and Professor Simon Kingham sent it to Christchurch geography teachers.

GIS Mapping

To assist in the interpretation aspect of the project, a series of maps were created. This included layers of existing tracks on Banks Peninsula and the main entry points to TAPP, shown in figure 1. Information from the school survey regarding accessibility was displayed in ArcGIS online using the 'create buffers' tool (ArcGIS, n.d.). Walking times were obtained from Orton Bradley Park (n.d.) and Department of Conservation (DOC) (2016). They were separated into three categories and colour-coded – local walk, half-day walk and day-walk and displayed in ArcGIS online. The final map was also colour-coded in ArcGIS online, showing recommended interpretation by track.

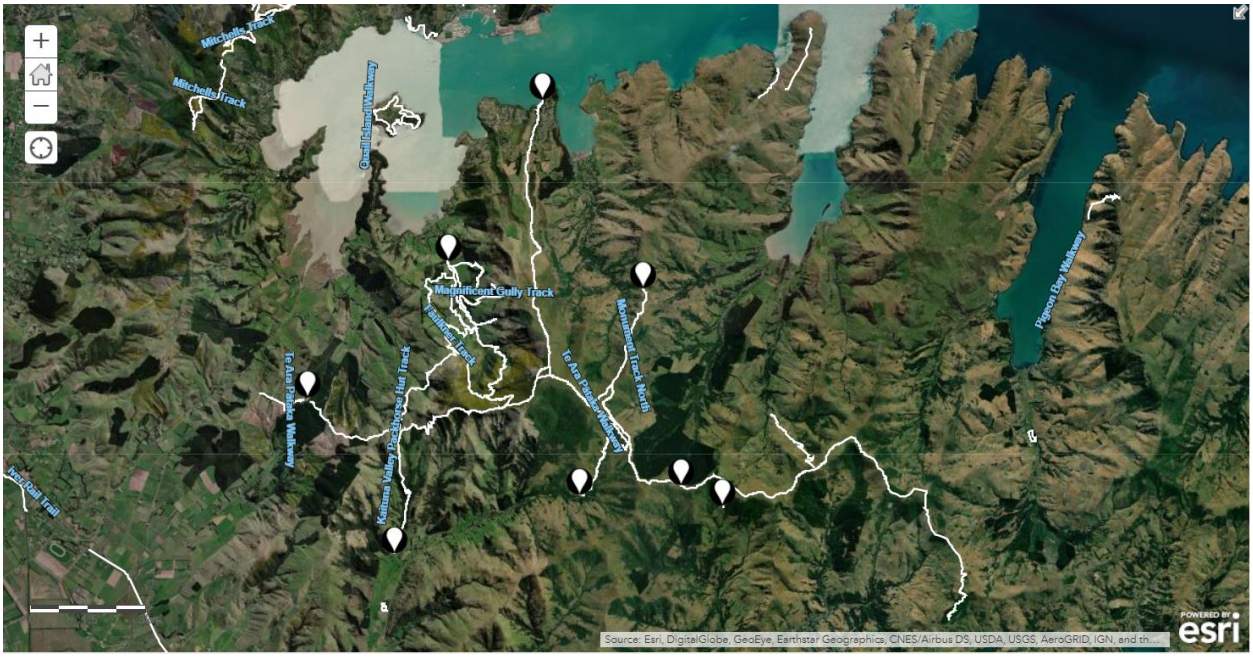

Figure 1 - *Map of TAPP showing the base tracks layer (in white) and the main entry points into TAPP from left to right, Gebbies Pass, Kaituna Valley, Orton Bradley Park, Diamond Harbour (top), Monument Track South (bottom), Purau-Port Levy Road, Port Levy Saddle and Waipuna Saddle.*

Results and Discussion:

Learning:

This section focuses on information gathered from the survey, and case studies of citizen science. These results indicate how Banks Peninsula is used in terms of learning and provides ideas for how to encourage more learning within TAPP and Banks Peninsula.

Primary and Secondary Survey Results and Analysis:

The survey had 20 participants - 14 secondary and 6 primary teachers. Primary teachers were asked a closed question about what areas they were interested in teaching within Banks Peninsula where they could select multiple choices. Secondary teachers were asked an open question about what NCEA standards they taught on the peninsula.

Figure 2 shows primary teachers are interested in teaching a wide range of areas on Banks Peninsula, particularly water quality, conservation, natural and cultural history. Therefore, there is a strong interest from primary teachers in the natural and cultural environment of TAPP and the Geopark. Publicizing the attempts to attain Geopark status could be an effective way to capitalize on this interest, as many of the respondents were interested in learning more about the Geopark (see Appendix B for contact details of these respondents).

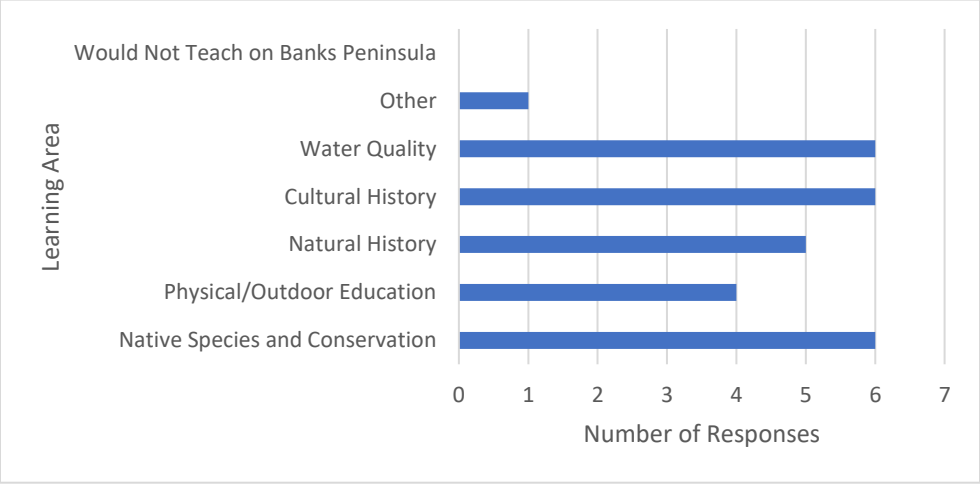

***Figure 2** - Potential areas for teaching on Banks Peninsula indicated by primary school teachers.*
Note. The 'other' response said "earth science"

In terms of secondary schools, geography standards dominate what is taught across all three NCEA levels which was expected. The most common standards were geographic research (AS91011, 91244, 91430) and geographic skills (AS91010, 91243, 91429). Therefore, these can be a starting point for developing secondary school teaching resources for Banks Peninsula.

Preferred Resources by Teachers:

One survey question asked teachers to rank their preferred teaching resource/method. The popularity of each choice is shown in figure 3. Over 40% selected the 'learning package' which encompasses learning about the site in class, then a field-trip, followed by classroom learning. The subsequent open question asked teachers why they chose this option. Responses generally included how the classroom could be used to introduce topics to meet learning outcomes, the field-trip then allowed experiential learning, possibly including primary data collection. The follow-up classroom activities would then reinforce learning post field-trip.

Over 30% of respondents selected a self-guided field-trip as they felt students learn best in the field. Nearly 20% of respondents chose the guided field-trip because it provided opportunities for teachers and students to learn, and that having expert safety knowledge is useful, especially when teaching younger children. There is a desire from teachers to use Banks Peninsula for field-trips as this is seen as an effective way for students, and teachers, to learn. However, learning in the classroom is still useful for learning pre- and post-trip.

The more technology-based options received little support. Online resources were seen as useful for shorter learning experiences and the virtual reality tour was selected as it gives students the opportunity to discover things for themselves. However, these options received little to no support from other teachers, indicating a reluctance from teachers to use this option.

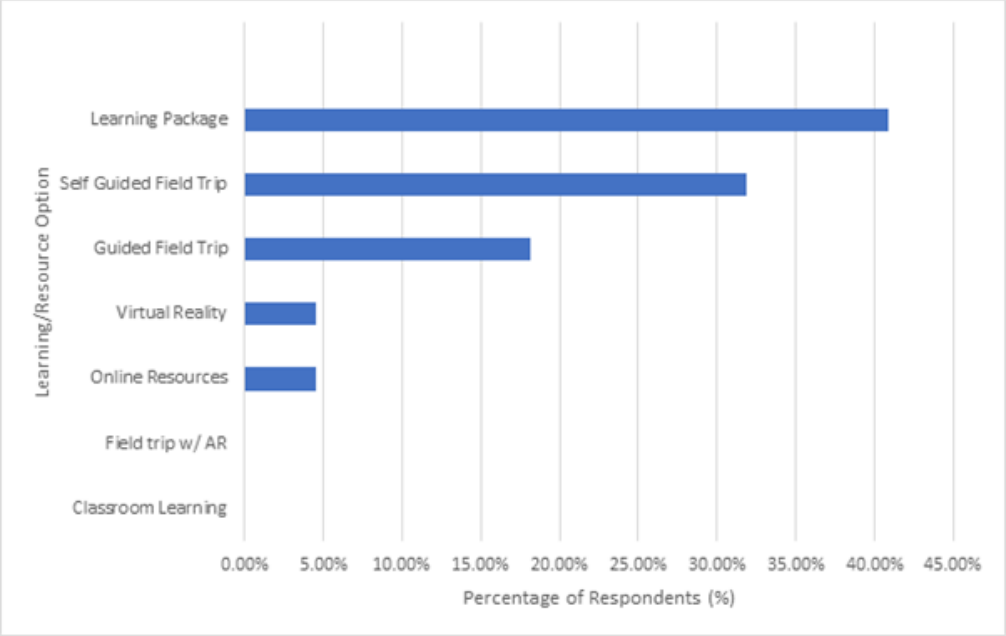

Figure 3 *– The popularity of each learning resource option with teachers, in terms of percentage of respondents who selected it as their first choice*

Barriers to Using Banks Peninsula for Teaching:

As can be seen in figure 4, there were several categories of barriers teachers identified to teaching on Banks Peninsula.

The student accessibility category included concerns about access for disabled students and those with allergies. The student requirements category included concerns about student fitness and having suitable equipment such as sturdy footwear. The staff supervision category included concerns about staff-to-student ratios and students going off-task. Weather and terrain included five responses about concerns over the track quality, and weather conditions. Transport included concerns about how easy it would be to take a bus to Banks Peninsula, and the associated cost of this. Administration covered concerns about taking students (particularly secondary) out of class, as well as the time-consuming nature of completing Risk Analysis and Management (RAMS) health and safety forms. The two responses included in the 'other category' were a concern whether a walk on Banks Peninsula would meet curriculum requirements and that there may be number limits on taking students to Banks Peninsula. Addressing as many of these barriers as possible could assist TAPP, and the Geopark more broadly, in supporting more teaching opportunities, and assisting aspirations to reach Geopark status.

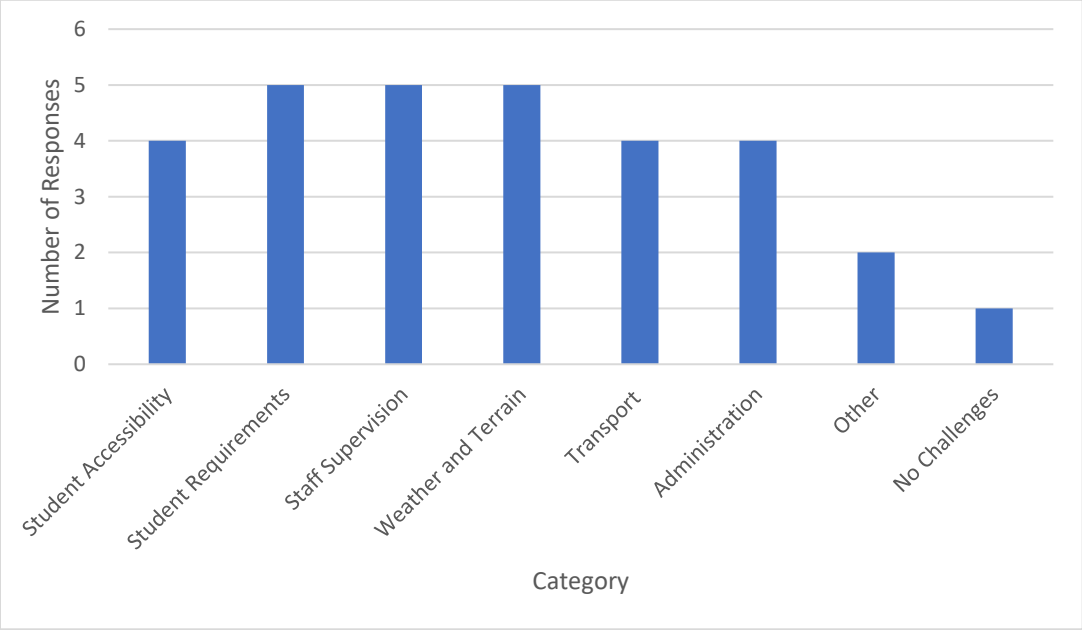

Figure 4 *– Number of responses to categories for challenges foreseen for students if teaching on Banks Peninsula.*

Citizen Science:

Survey Questions:

Survey results indicate positivity towards citizen science. Only 50% of participants had used citizen science with their students, however, 94.44% said they would be interested in using citizen science during a field-trip to TAPP. Additionally, 100% of participants would use data collected from citizen science in classroom learning. These results show there is a desire from teachers to incorporate citizen science in their teaching.

Case Studies:

There are several examples of successful citizen science projects which TAPP and the Geopark could learn from. One example is iNaturalist, an online platform with an established community that allows nature enthusiasts to add to a central database of over 77 million observations. iNaturalist's primary aim is to increase knowledge, understanding, and appreciation of New Zealand's natural history – an aim in line with Geopark status requirements (iNaturalist NZ, 2021; UNESCO, n.d.). Observations are used to document biodiversity change over time or study the spread of invasive species (iNaturalist, n.d.). An example is the New Zealand Garden Bird Survey, used by Manaaki Whenua - Landcare Research to influence environmental policy (iNaturalist NZ, 2021). This is an example of big-picture goals encouraging participation. iNaturalist has received international endorsement from the scientific community.

A further example is CoastSnap. Coastsnap is a community beach monitoring program using photographs taken from the same location using smartphone cradles to develop algorithms to map shoreline change (Coastsnap, n.d.). Smartphone cradles ensure parameters are the same for each photograph, reducing margins for error (Viduka, 2019). Additionally, installing cradles at highly trafficked locations encourages more people to take part. Cradles have been installed at Taylors Mistake and New Brighton Pier, with results uploaded to the CoastSnap app, via Twitter, Instagram, or email (Christchurch City Council, 2021).

However, it is important to consider the ethical issues associated with citizen science. Visitors and schools are not classified as researchers or research subjects (Goodwin & Roberts, 2019). Participants must give informed consent and told how data collected will be used (Schonfeld, 2019). For schools, learning resources must be co-created with teachers with consideration given to how data is used and stored. Each school may feel differently about how public results should be made. Clear communication helps create an equal transaction between participant and output, key for successful citizen science projects (Goodwin & Roberts, 2019). Any citizen science project also needs to be supported by the community (Goodwin & Roberts, 2019). These ethical concerns should be addressed before projects begin and throughout the course of scientific investigation, to avoid jeopardizing outputs.

As well-designed citizen science is effective in engaging the community, this encourages kaitiakitanga (guardianship) and a local community to develop turangawaewae (a place to stand) within their local environment (Ministry for the Environment, 2021). This shows why citizen science could be beneficial to achieving TAPP's overarching vision and aspirations of becoming a Geopark.

Interpretation:

This section begins by presenting important background information on visitor characteristics to Orton Bradley Park, track length and accessibility within TAPP, before combining these to provide recommended interpretation by track within TAPP. The general findings are applicable across the Geopark.

Orton Bradley Visitor Characteristics:

A report by Moore and Espiner (2014) summarized characteristic Orton Bradley Park visitors as:

- Thirty-five--fifty years old
- Families with young children
- Living within 20km of the park. Only 12% of visitors were from outside Canterbury
- Visiting for its tranquil environment. This included visitors returning due to fond childhood memories, so word-of-mouth recommendation is important.

27.5% of visitors completed walks (Moore & Espiner, 2014). Of those, 58% completed a walk of less than two hours. 42% completed a half-day walk, while 26% completed day walks (Moore & Espiner, 2014). Figure 5 shows the most popular walking tracks from Orton Bradley (Moore & Espiner, 2014). Big Rock, Waterfall Gully and the Mt Herbert tracks all use the Valley Track, so this is a popular walk. Hunters and Magnificent Gully, Tablelands and Packhorse Hut tracks are less popular (Moore & Espiner, 2014).

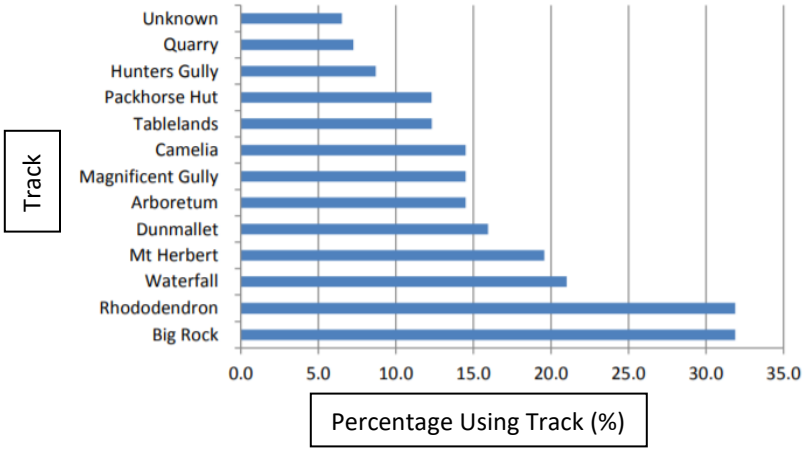

Figure 5 *– The most popular tracks originating from Orton Bradley carpark in terms of percentage of visitors intending to compete the walk (Moore & Espiner, 2014).*

Accessibility for Schools:

In the survey, teachers were asked what a suitable walking distance for them and their students would be when teaching on Banks Peninsula. For primary schools, this was 3km. For secondary schools this was 5km. This is shown in figures 6 and 7. In both cases, Orton Bradley Park is suitable for accessing lower valley walks. However, primary schools should use Kaituna Valley or Gebbies Pass to access Packhorse Hut, regarded as the easiest tramping tracks to Te Ara Pātaka/Summit Walkway (DOC, 2016), assuming the terrain is suitable for small children. Secondary schools can use any of Kaituna Valley, Gebbies Pass or Orton Bradley Park to access Packhorse Hut. To access Mount Herbert, the Monument Tracks or the Port Levy Saddle are suitable entry points for both. Diamond Harbour is too far away to access the Te Ara Pātaka/Summit Walkway.

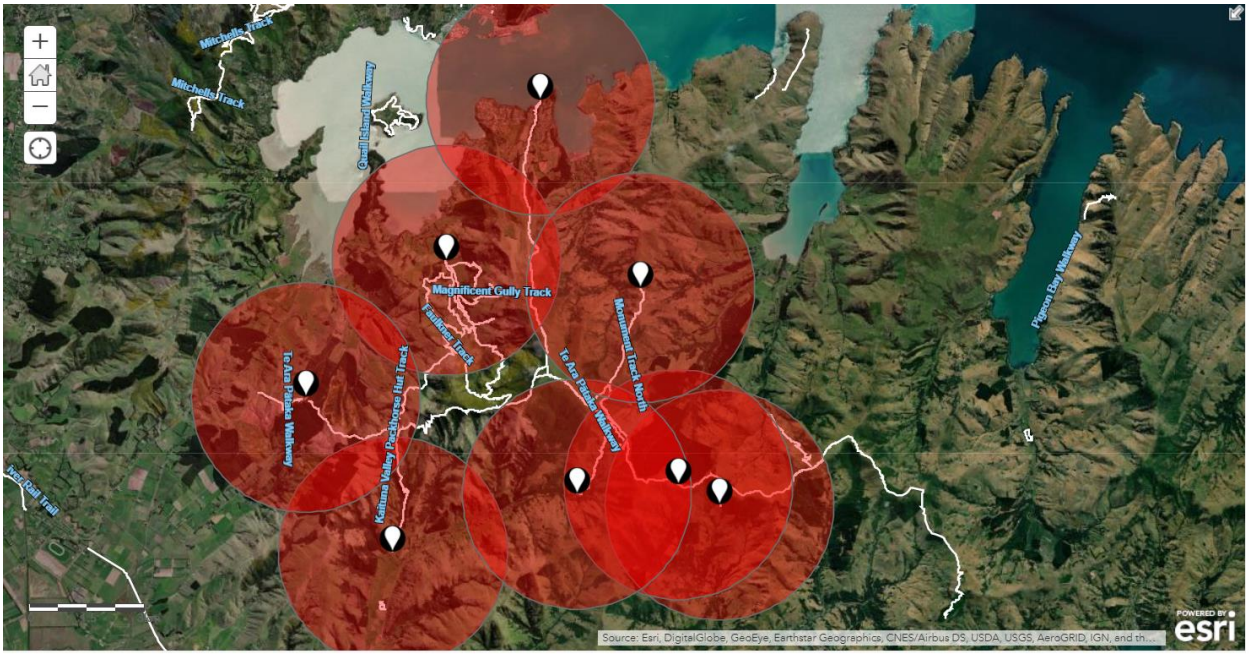

Figure 6 *– Map of the eight main entry points to Te Ahu Pātiki with a 3km buffer around each point, representing a suitable walking distance for primary school teachers and their students in the landscapes of Banks Peninsula around TAPP*

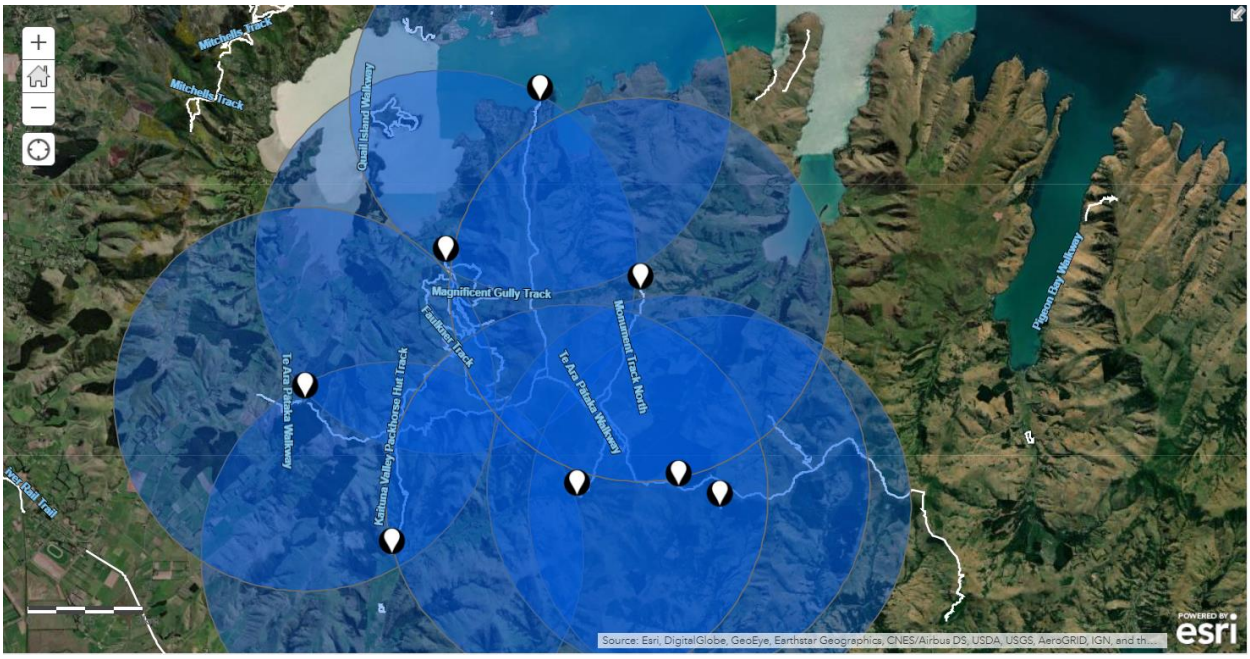

Figure 7 *– Map of the eight main entry points to Te Ahu Pātiki with a 5km buffer around each point, representing a suitable walking distance for secondary teachers and their students in the landscapes of Banks Peninsula*

Walking Time by Track:

From figure 8, local walks are confined to the lower valley of Orton Bradley. Tracks linking to Te Ara Pātaka (Summit Walkway) as well as Gebbies Pass/Kaituna Valley to Packhorse Hut tracks are half-day walks. Walks from Orton Bradley, or Diamond Harbour to Te Ara Pātaka are day walks.

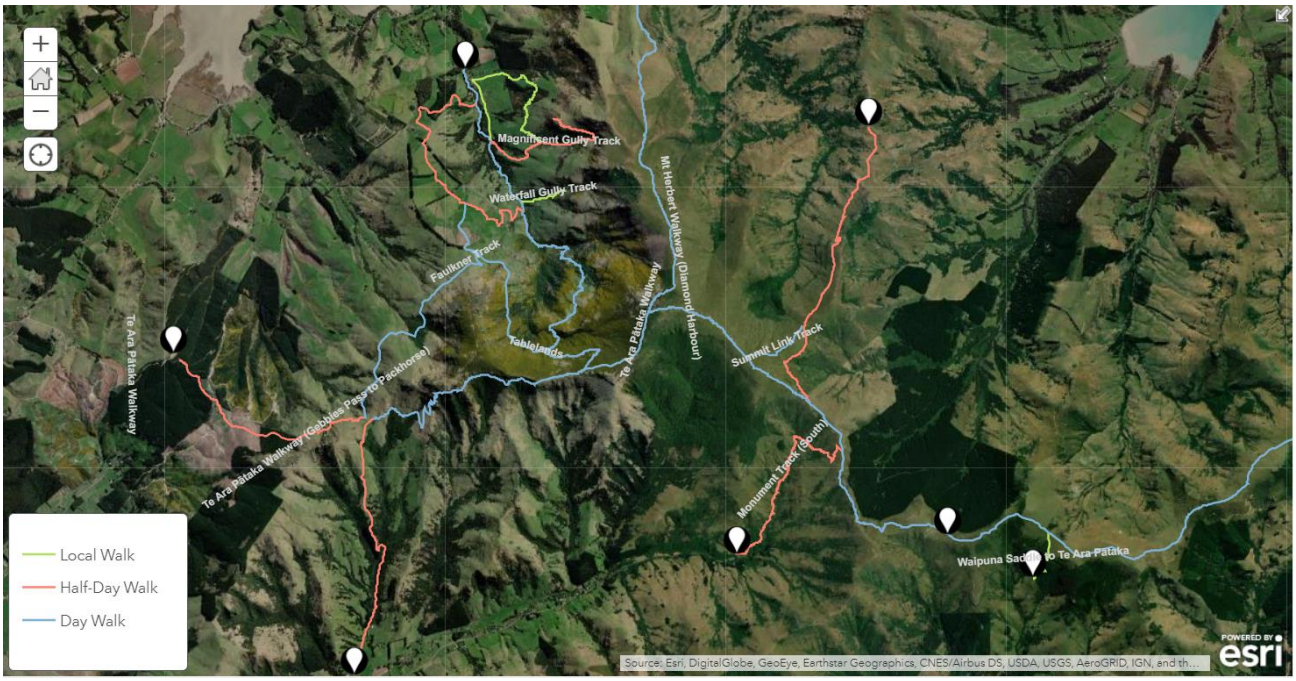

Figure 8 *– Colour-coded map of the tracks within Te Ahu Pātiki representing the time taken to complete a given walking track*

Recommended Interpretation by Track:

Multiple options have been provided for each track to give the Geopark and visitors flexibility in which method to use. A map summarizing the recommended interpretation is given in figure 9.

Valley Track from Orton Bradley. One of the most heavily trafficked routes in TAPP and an access point for several popular tracks including Waterfall Gully (Orton Bradley Park, n.d.; Moore & Espiner, 2014). The lower valley sections are a good length for schools (figures 6 and 7) and Orton Bradley visitors (Moore & Espiner, 2014). Therefore, signage should be used to capitalize on the high traffic, due to its strong advantages (table 1). As the tracks are accessible, especially in the lower valley, this mitigates the maintenance concern of Wolf et al. (2013). However, caution must be taken in signage placement closer to Mount Herbert due to the risk of visual pollution (Wolf et al., 2013). The recommendation to use tours, both guided and audio, is also due to the high traffic, and effectiveness of these methods (table 1). They also provide options for people who learn aurally.

Mt Herbert Walkway from Diamond Harbour. This track falls outside the distance requirements for schools (figures 6-7). However, as an alternative entrance, similar resources to the track from Orton Bradley should be provided to give visitors choice. Careful signage placement is key to avoid visual pollution (Wolf et al., 2013). If this route is less popular than the Orton Bradley track, developing an app and pamphlets could be a suitable alternative (Basiri et al., 2014; Cayla et al., 2014), encouraging self-guiding.

Kaituna Valley, Gebbies Pass to Packhorse Hut. These tracks should be priorities for educational resources and interpretation specifically designed for schools as they fall within distance requirements (figures 6 and 7). They are also the easiest and shortest tramping tracks along Te Ara Pātaka (DOC, 2016; figure 8). Therefore, guided tours could capitalize on the potential educational opportunities. Signage can be used for the public or self-guiding schools, bearing in mind the risk of visual pollution (Wolf et al., 2013).

Te Ara Pātaka/Summit Walkway tracks. Tours, alongside apps and pamphlets are recommended due to the visual pollution risk (Wolf et al., 2013). Similar information could be delivered through audio and/or guided tours, with guided tours a non-technology-based option. Pamphlets provide a traditional option for self-guiding. An app in combination with small, inconspicuous posts or panels with QR codes to provide further information could be explored but should not be a priority due to the identified disadvantages (table 1) and lack of popularity towards technological methods in the survey.

For the remaining tracks, pamphlets and exploring app development is recommended. This is because they are either lower trafficked – Hunters Gully, Tablelands (Moore & Espiner, 2014; figure 8), or are not clearly marked - Monument North and South (DOC, 2016). Hunters and Magnificent Gully could be marketed as suitable tracks for self-guiding, including for schools, as they are a suitable distance (figures 6 and 7). The Te Ara Pātaka link tracks (Monument tracks) could be part of a wider app or pamphlet guide for the Summit Walkway. Alongside this, despite being a good distance for schools to access Mt Herbert, the challenging nature of these tracks, according to DOC (2016), means they should be a lower priority for educational resources.

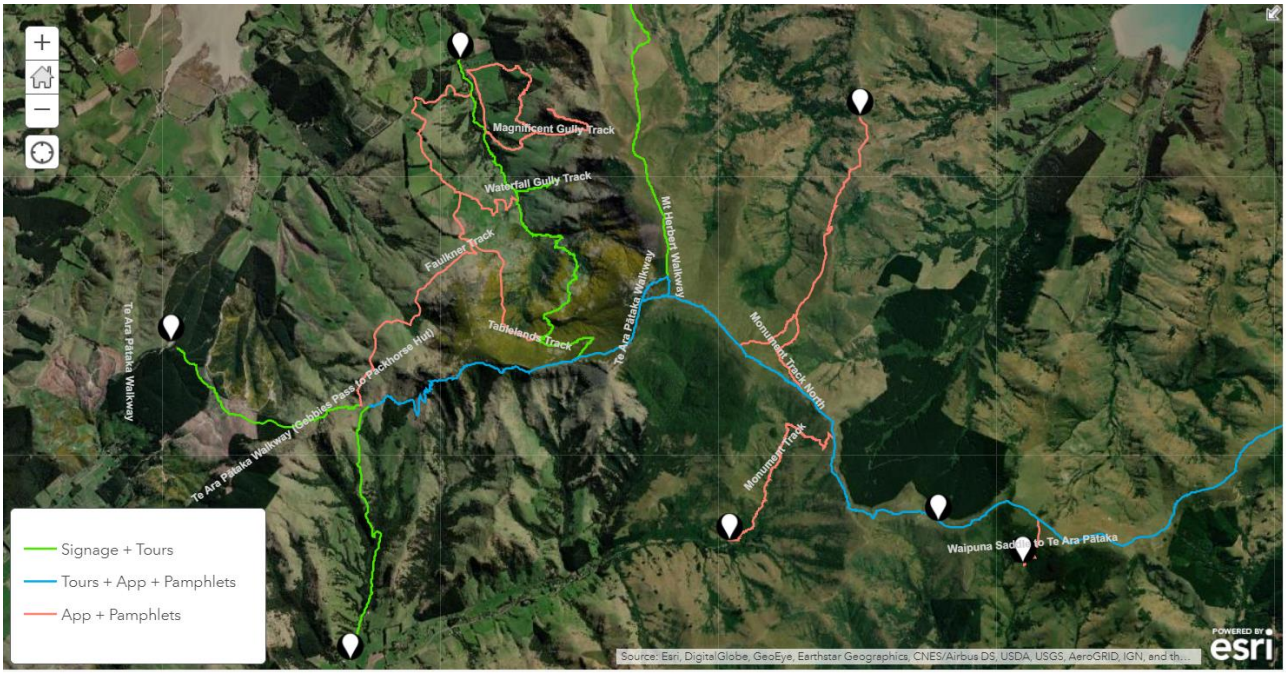

Figure 9 *– Colour-coded map showing recommended interpretation methods for each track within Te Ahu Pātiki.*

Limitations:

Covid-19 and lambing season made it impossible to complete site auditing. This means that conclusions about interpretation are generalized and cannot account for terrain or vegetation differences on each track. However, this does mean the suggestions are widely applicable across Banks Peninsula. Therefore, this aim of the research has been met, just not in as much detail as originally intended. Also, being unable to visit the field means recommendations about citizen science are dependent on network coverage. This may limit the ability to run online-based citizen science projects within the Geopark.

Covid also made it challenging to contact park partners. One partner, after initially being helpful, did not respond to further contact. This meant interviews were not completed. Therefore, data was unable to be collected on a *range* of views about aspirations for TAPP, so this research aim was not met.

When creating figures 6 and 7, the buffers use straight-line distance. However, the tracks on Banks Peninsula are not straight. Therefore, this overestimated the suitable distance for schools to travel within the park.

The survey response rate, particularly for secondary schools, was primarily of geography teachers. This cannot provide insight into whether other schools use Banks Peninsula to teach other subjects such as biology, chemistry, or physical education. Therefore, the results about NCEA standards are unlikely to be representative. They are also unlikely to be representative of all teachers' perspectives about teaching on Banks Peninsula.

Recommendations:

Learning:

In terms of resources for schools:

- Prioritize developing field-trip resources, as this was a popular teaching method. Topics could include conservation, water quality and the natural and cultural history of Banks Peninsula.
- Develop classroom resources, both to assist introducing the area and to help reinforce learning post-visit. Development of both classroom and field-trip resources should involve collaboration with schools to meet their needs. There is already interest in this (see Appendix B).
- Develop pre-packaged NCEA resources tailored to specific achievement standards beginning with geographic research and geographic skills standards (New Zealand Qualifications Authority, n.d.). Also useful would be the development of resources assisting the completion of health and safety forms.

In terms of overcoming barriers to teaching, it is recommended:

- Tracks suitable for disabled access be clearly marked, especially in lower valleys. Track maintenance will be important to ensure ease of access.
- Explore a flexible, booking-based bus service to the park, to help reduce travel concerns for schools.
- Develop the 'learning' section of the Geopark's website. Included in this could be the teaching and RAMS resources as recommended above. Consider appointing a reliable person who is easily contactable for schools to liaise with to make organizing field-trips straightforward.

In terms of citizen science:

- Install smartphone cradles at key vantage points across the peninsula. For TAPP this should especially be within the 3km and 5km buffer zones (figures 6 and 7), being careful to avoid visual pollution. This could document native species regeneration or landscape change over time and be used in combination with iNaturalist. Using the iNaturalist platform to collect and collate observations would give the Geopark access to an existing citizen science community with international scientific recognition. To meet ethical requirements, it is recommended panels accompany iPhone cradles, stating how observations will be stored and used.
- A project monitoring the health of Te Wharau stream (which runs through TAPP), with results helping achieve targets within the Whaka-Ora Healthy Harbour plan. This is a plan for improving the ecology and water quality of tributaries to Whakaraupō/Lyttelton harbour (Whaka-Ora Healthy Harbour, n.d.). The program could follow the existing model used by Orton Bradley Bush School.
- Other projects should be linked to big-picture goals such as Pest Free Banks Peninsula or specific climate change targets, to help create a sense of kaitiakitanga for the environment.

Interpretation:

- Tracks recommended for signage and tours should be a priority for interpretation development as these are the strongest methods (table 1). This recommendation can be applied to all popular tracks on the peninsula not at risk of visual pollution.
- Te Ara Pātaka presents a challenge as signage is less suitable. Tours should be utilized, alongside pamphlets as an alternative. An app is worth exploring, though dependent on internet and coverage. This recommendation can apply to any summit/higher elevation track across the peninsula.
- Less popular, accessible, or poorly marked tracks should use self-guiding interpretation such as pamphlets or apps.
- As Te Ara Pātaka includes day tramps, there is an opportunity to explore development of multi-day walking tours across Banks Peninsula. This has had success in Australian National Parks (Wolf et al., 2015). Within TAPP, this could include, for example, a day hike to Packhorse Hut, followed by a day hike to Rod Donald Hut. Guided tours are likely more effective for this (Wolf et al., 2015). These tours could target secondary school students and community groups with an interest in the environment.

Future Research:

Learning:

- Gathering perspectives of a range of park partners is strongly recommended. This could include surveys for teachers in other school subjects, such as biology, as well as interviews with geography teachers, to better understand how TAPP may assist in teaching. See Appendix B for contact details of teachers or schools who, in the survey, indicated an interest in further interviews or assisting the park in developing learning resources.
- Consider the ethics of running citizen science projects. Future research should gather perspectives from park partners on the use of citizen science within the park, with a particular focus on ethical considerations
- Establish whether there is network coverage across the entire site. If not, identify locations which do receive coverage. Explore the development of learning projects around these locations, or the use of these locations as 'pause points' on field-trips where groups can upload their data from.

Interpretation:

- Despite receiving minimal support in the survey, the technology-based methods should not be discounted. They will only keep improving. Therefore, while developing an app or AR interpretation should not be a priority, investigating the viability of one should still be considered. This could also include further surveys and interviews with park partners and schools to further understand perspectives.
- Consider a higher spatial resolution model for interpretation. This includes completing detailed site auditing (see Appendix A for suggested sites) to determine if specific sites need interpretation, alongside determining suitable locations for waypoint interpretation. However, when completing site auditing knowing the value of the landscape is important, as it may be inappropriate in some locations, for example sites of cultural importance.

Conclusion:

This research aimed to support TAPP's and Banks Peninsula's aspiration of becoming a Geopark through gathering community perspectives and providing suggestions for information delivery and learning opportunities.

The results were focused on learning and interpretation. Perspectives of community partners, other than teachers, were not gathered due to the Covid-19 lockdown inhibiting partner contact. In terms of learning, from the survey, there was interest in using the environment of Banks Peninsula for teaching. This included for NCEA geography standards, as well as natural and cultural history. Use of citizen science was popular with teachers. However, teachers did express concerns about several factors including accessibility and health and safety. Orton Bradley Park, Kaituna Valley and Gebbies Pass are key entry points for schools. In terms of interpretation methods, signage and tours are reliable for popular tracks. Higher elevation areas will need alternatives such as pamphlets.

Going forward, site auditing could provide a more detailed model of interpretation, and modern technological methods, such as AR, will need further research on partner perspectives before any development. The Geopark should work with schools in developing learning resources, including the 'learning package'. Collaboration is also needed in relation to the ethics of citizen science. The survey showed there is great interest in TAPP and the Geopark and identified several contacts to begin the collaboration process with.

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Appendices:

Appendix A - Sites of Interest Within TAPP for Site Auditing:

Note these are just the sites that were found through research and does not represent an exhaustive list of key sites for auditing within TAPP. Also provided is a short description of some key information that may be useful when developing interpretation/resources associated with the site.

Te Wharau Stream

Flows into a shallow bay in Whakaraupo/Lyttleton Harbour, important for mahinga kai (valuable, life-sustaining natural resources) such as pipi and tuaki (Kā Huru Manu, n.d.).

Mt Herbert / Te Ahu Pātiki:

The 920m peak Mt Herbert is the highest point on Banks Peninsula. Prominent feature of the skyline from Diamond Harbour (Kā Huru Manu, n.d.; Ogilvie, 2017). Named after (Rt. Hon.) Sidney Herbert (1810-61), a noted Conservative politician. Te Ahu Pātiki (Māori name for Mt Herbert) means "shaped like a flounder". This is particularly important to Chatham Islanders, who have a tradition that their ancestors were from the mountain.

For Ngāi Tahu, Te Ahu Pātiki holds the significance of being a passenger on Arai-te-uru waka that capsized off the coast of Otago (Ōtāuko). The passengers on the waka explored the land onshore, but did not return to the waka before daylight, so became many of the geographical features of the South Island, including Te Ahu Pātiki (Kā Huru Manu, n.d.).

Charteris Bay:

The most easterly of the three bays at the head of Lyttleton Harbour (the others being Governors Bay and Head of the Bay). Situated between Moepuku Point and Hays Bay, with Quail Island (the largest island in the harbour) located just offshore. Named after Hon. Francis Richard Charteris (1818-1914, was 95 at his death), a prominent Whig party politician. Was originally meant to be the location of the botanic gardens of the Canterbury settlement (Ogilvie, 2017).

Mt Bradley:

Is 856m high, the second highest peak on the peninsula, located west of Mt Herbert, behind Charteris Bay and Orton Bradley Park, at the head of the valley (Ogilvie, 2017). Named in honour of the Bradley family of Charteris Bay. Has also been called Herbert Peak and Castle Hill (due to its square, rampart-shaped summit).

Sign of the Packhorse:

Located on a scenic reserve of 105 hectares on a saddle between Mt Bradley and the Remarkable Dykes. Opened in 1916, it affords views of Te Ahu Pātiki, Lyttleton Harbour and even the distant Southern Alps (Ogilvie, 2017).

The hut is built with quarried volcanic stone and timber joinery. It was designed by Samuel Hurst Seager in the vernacular style, intended to blend into the landscape (like the Sign of the Kiwi and Bellbird).

Otarahaka / Remarkable Dykes– Only audit if appropriate:

A ladder/path of volcanic rock forged as a path for travellers down the mountainside. Created with ash from North Island volcanoes, following a karakia by Tamatea Pokai Whenua when his travelling party got stuck in a storm (Kā Huru Manu, n.d.).

Appendix B - Contact Details for Survey Respondents:

Table 2 contains the contact details of survey respondents who indicated interest in either learning more about Te Pātaka O Rākaihautū Banks Peninsula Geopark, would be interested in completing an interview, or both.

Table 2 *- Contact details of survey respondents interested in further contact with the Geopark*

Contact Details:	Interested in:
Burttmm @staff.cbhs.school.nz	I would like to receive more information about Te Pātaka O Rākaihautū / Banks Peninsula Geopark I would be interested in completing an interview discussing my responses further
Brouwers @staff.cbhs.school.nz	I would like to receive more information about Te Pātaka O Rākaihautū / Banks Peninsula Geopark
Ed Finch: finche@staff.cbhs.school.nz	I would like to receive more information about Te Pātaka O Rākaihautū / Banks Peninsula Geopark I would be interested in completing an interview discussing my responses further
mco@lincoln.school.nz M:021 1173878	I would like to receive more information about Te Pātaka O Rākaihautū / Banks Peninsula Geopark I would be interested in completing an interview discussing my responses further
bx@burnside.school.nz	I would like to receive more information about Te Pātaka O Rākaihautū / Banks Peninsula Geopark
hy@hornby.school.nz	I would like to receive more information about Te Pātaka O Rākaihautū / Banks Peninsula Geopark
sam.fazio-smith @stmargarets.school.nz	I would like to receive more information about Te Pātaka O Rākaihautū / Banks Peninsula Geopark
Kathryn.ferguson @rollestoncollege.nz	I would like to receive more information about Te Pātaka O Rākaihautū / Banks Peninsula Geopark I would be interested in completing an interview discussing my responses further
0277771710	I would like to receive more information about Te Pātaka O Rākaihautū / Banks Peninsula Geopark I would be interested in completing an interview discussing my responses further
Diamond Harbour School	“As the local school, we would be very interested, if there was an opportunity, to be involved with the creation of signage. We have done this with regards to water quality at Orton Bradley Park and this was a wonderful project.”

	I would like to receive more information about Te Pātaka O Rākaihautū / Banks Peninsula Geopark I would be interested in completing an interview discussing my responses further
Office @littleriver.school.nz	I would like to receive more information about Te Pātaka O Rākaihautū / Banks Peninsula Geopark

In addition, one survey response said “If you need local guinea pigs then we are open to providing students to help out with development of spaces and programmes. Thank you!”. Unfortunately, they did not leave their contact details. They have indicated they are a primary school teacher, so it is assumed they are from a local school to TAPP/school on Banks Peninsula, but it is unknown which one.