Excellence

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[Please copy in the student work – Excellence]

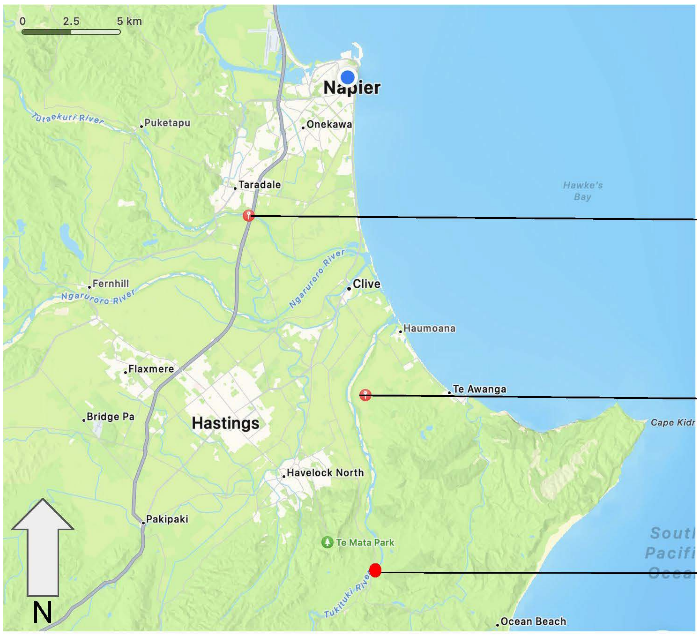


Figure 1
Sampling locations

Location 3: Guppy Road - Tūtaekurī River

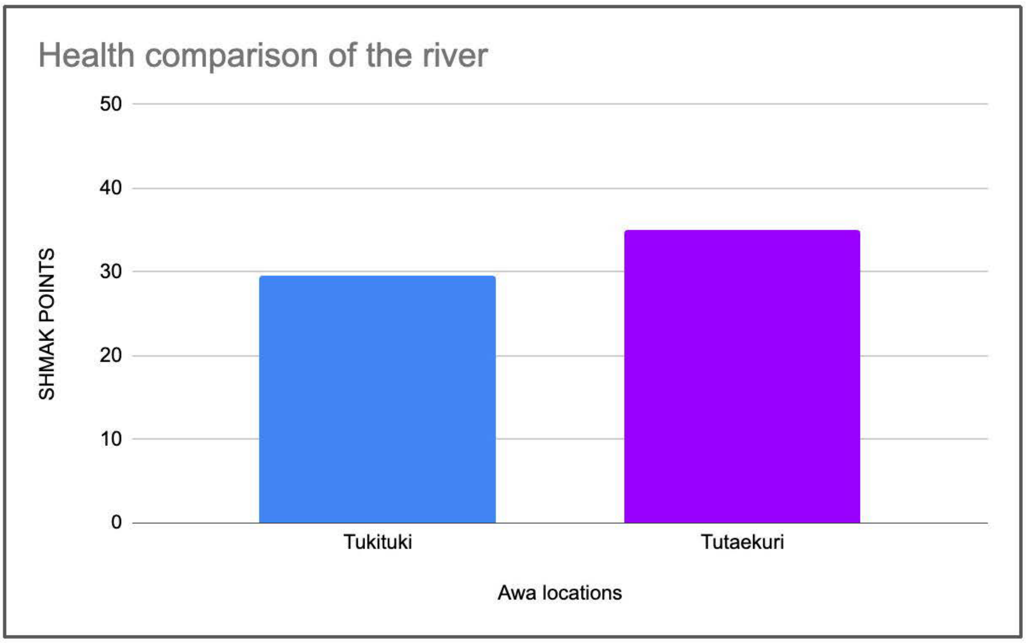
Location 2: Tennant Road - Tukituki River

Location 1: Red Bridge - Tukituki River

Tukituki
Tutaekuri

Figure 2

This graph identifies the overall health of the two awa using SHMAK points, a scoring system used for assessing a river under many categories such as critters, clarity, erosion, algae etc etc). The Tukituki illustrates a score of 29.5 out of 50 SHMAK points and the Tūtaekurī displays 35 SHMAK points out of 50. The higher score of the Tūtaekurī suggests better conditions across these factors.



Tukituki
Tutaekuri

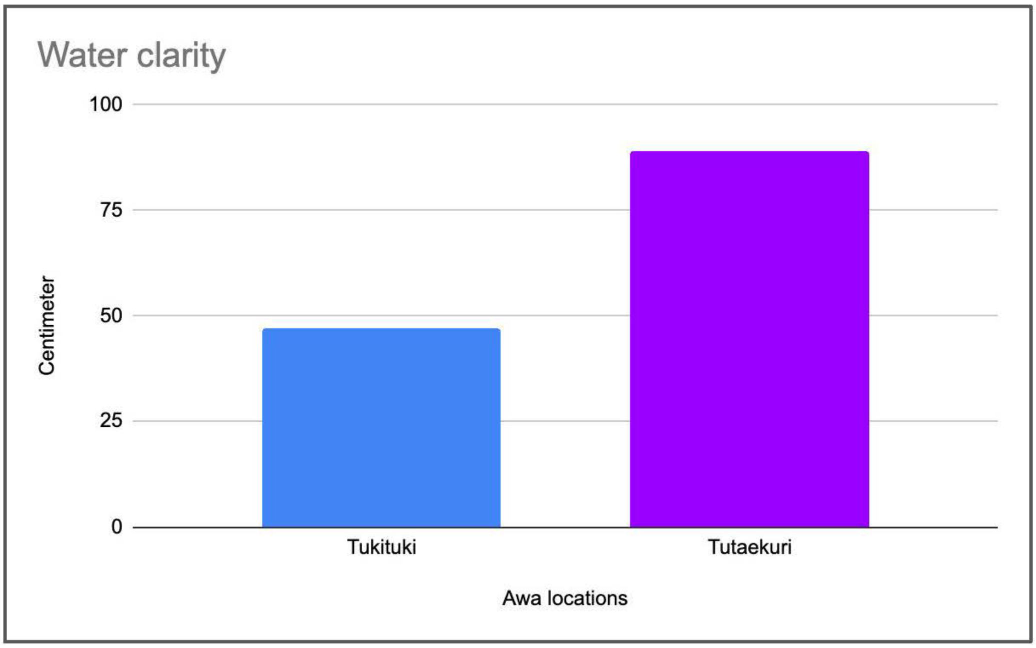


Figure 3

For this water clarity graph, the Tukituki river scores a solid 47 out of 100 centimeters, whereas the Tūtaekurī boasts an impressive 89 centimeters out of 100. We efficiently identified the water clarity of each river by filling a long clear tube from each river with water, then, using two magnets and dragging them down the tube until the person looking down the tube would indicate when they couldn't see the magnets anymore.

Figure 4 - Tukituki river, Red Bridge

Red Bridge was the first location we embarked on. While the location was difficult to get too, it could be seen from the bridge above it. As there was a popular bridge overhead of the river, this demonstrated the river could possibly be more polluted compared to other areas of the river.

This was where we were located.

As Tukituki is in close proximity to Te Mata Peak, this could result in a negative effect of Sediment runoff (the buildup of eroded soil particles that are transported in runoff from their site of origin, and deposited in bodies of water*). Steep slopes and soil disturbance associated with Te Mata Peak could contribute to sediment run off into the Tukituki river, leading to many negative consequences such as habitat loss for critters or degraded water quality.

As this was the most inland location of the Tukituki river that we visited, we noticed there was less infrastructure compared to other areas closer to the ocean (houses, schools etc).

*https://dem.ri.gov/sites/g/files/xkgbur861/files/programs/benviron/water/permits/ripdes/stwater/pdfs/factsh1.pdf

Figure 5 - Tūtaekurī river, Guppy Road

This is where we were located

As I have mentioned, this area around the Tūtaekurī is a bustling community, and this includes paddocks and livestock. This may contribute to both negative and positive impacts on the river. For example, positively, the livestock may help naturally fertilize the soil, making riverbanks and plants healthy. However, if this is uncontrolled, too much livestock manure may lead to pollution of the river, affecting many areas such as water clarity and aroma

This area of the Tūtaekurī river, is very populated and surrounded by houses and infrastructure, displaying the area is urbanized and developed. This indicates many negative consequences such as water quality degradation of this area of the river. Runoff from roofs and roads during rainfall may contaminate the river, as this runoff often contains heavy metals, oils and fertilizers. Overall, urbanization may lead to loss of natural habitats along the river.

Tūtaekurī river runs through many urbanized areas, which could contribute to both positive and negative consequences of the river. It's a notably well-used river for swimming, and is often used for many recreational activities such as canoeing and kayaking.

Algae

In the Tukituki river, a thin to medium film or mat is observed, mainly on the top part of the rocks, gently coating the riverbed. We discovered that the further you went out into the river, the thicker the Algae became.

In comparison to the Tukituki, the Tūtaekurī presented stringy, thick mats of Algae clinging to rocks and floating across the river.

Location: Red Bridge
River: Tukituki

Location: Tennant Road
River: Tukituki

Location: Guppy Road
River: Tūtaekurī

The differing Algae formations the two rivers have to offer link to Mauri: the Tūtaekurī algae suggests a delicate balance and positive quality of the water, whereas the Tukituki algae suggests a potential imbalance or stress within the water.

Fig 9 - Vegetation & River Banks Tūtaekurī river - guppy road

The Tūtaekurī river consisted of large bushy trees close to the river bank, providing not only adequate shading for the river but temperature regulation as well. As this cooled the river, it established a supportive community for critters were they can grow and reproduce, overall improving the quality for the aquatic environment.

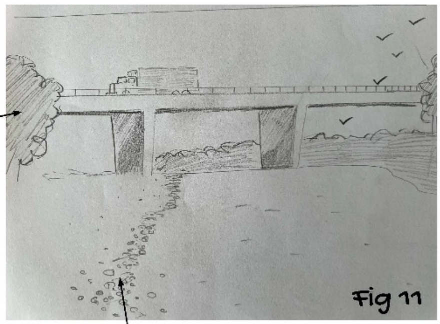


Fig 11

The bushy trees and nature also linked back to bank stabilization, helping to stabilize the river banks, reducing erosion and sedimentation. The stabilization will assist in preventing soil runoff into the river in the future.

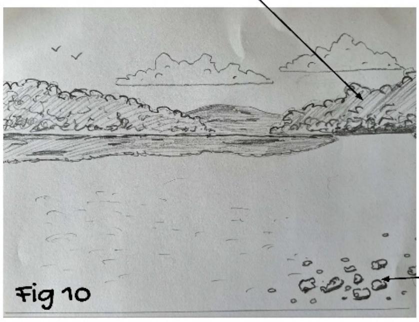


Fig 10

The Tūtaekurī also had noticeable stones and gravel circling around the river. This creates erosion protection, acting as a barrier to help prevent the river bank from being potentially washed away by the waters force. As the gravel and stones prevent erosion, it indicates there are less sedimentation in the river, displaying that the river is fast flowing and has a strong current.

Findings/Conclusion, Part 1

The comparison of the Tukituki and Tūtaekurī river displayed a diverse contrast of these factors, water clarity, algae, erosion and river bank and the overall health of the two awa. Understanding these numerous aspects of the river provides us with insights of the vitality of the river for us and the community. In figure one, we identify the respective conditions of the two rivers. The Tukituki scores an average of 29.5 out of 50, whereas the Tūtaekurī scores 35 out of 50. The graph illustrates the pressing need for conservation efforts in the Tukituki river, while also raising questions about it's health score compared to Tūtaekurī. What has inflicted the low score Tukituki has exhibited?

To begin with, the water clarity graph in figure 2 illustrates a significant difference between the two rivers, with the Tukituki ranking 47 out of 100 and the Tūtaekurī ranking 89 out of 100. Various factors play a role in the significant difference of clarity between the two waterways, including the amount of erosion or stream-bed disturbance upstream. This is often caused by land use practices (agricultural runoff) and natural process (recent heavy rainfall) which impact elevated sedimentation levels. Cyclone Gabrielle's devastating effect on the river played a major part in today's clarity. During the cyclones passage, increased rainfall upstream lead to runoff of the riverbanks surrounding the river, carrying sediments and debris into the water. The intense increase of water flow and erosion caused by the runoff also disrupted the riverbed and surrounding areas, further contributing to sedimentation. The effects upstream travel downstream, overall affecting the entire awa. Therefore, it's reasonable to assume that Cyclone Gabrielle has particularly degraded the Tukituki awa. According to secondary data* which displays a clarity graph for the Tukituki river from January 2022-Early 2023, it shows a slow positive increase in clarity in the months leading up to the cyclone, before significantly decreasing, presuming the cyclone was the cause of this sudden decrease. To add, the damage and destruction caused by the cyclone will take many years to stabilize. However, understanding out roll of Kaitiakitanga is essential for preserving the awa and is a crucial opportunity for the community and others.
For reference, this gives you an idea of what the Tukituki awa looked like before and after the cyclone ↓


Before


After

Furthermore, algae had an interesting effect on both rivers and there was a diverse range of algae presented at the rivers. The Tukituki, as shown in figure 6 and 7, displayed a thin to medium layer on the riverbed. However, the Tūtaekurī river demonstrated stringy, thick mats of algae attached to its river bed, as you can see from figures 8-9. Long filaments like the ones found in the Tūtaekurī river indicate that there is a high enrichment of phosphate and/or nitrogen (conductivity). The conductivity score on the Tūtaekurī river was 370, demonstrating the factors are true as this score is particularly high for a river. Nutrient-rich awa provides an environment for a robust ecosystem to flourish, making the awa a common home for critters. The potential thriving ecosystem reflects interconnectedness with Te Taiao, where the health of the river is connected to the ecosystems living amongst it and providing a healthy awa for growth. In comparison, the Tukituki river delivered a different algae profile. This may indicate lower nutrient levels in the water, influenced by elements such as agricultural runoff, potentially affected by Cyclone Gabrielle. The two destinations of the Tukituki river give a combined average of 221 for conductivity, which is relatively low. A total Nitrogen 2022 - early 2023 graph presented from secondary data* illustrates a trend that is likely decreasing and states it's in the 'worst 50% of all sites'. The graph shows a decreasing trend near the end of the year from October - December, indicating the conductivity has been recently worsened, overall contributing to the state of the algae.

*https://www.lawa.org.nz/explore-data/hawkes-bay-region/river-quality/tukituki-river/tukituki-at-red-br-niwa/

Findings/Conclusion, Part 2

Finally, while sketching and photographing the two rivers, I observed many things related to vegetation and river banks. To begin with, the Tūtaekurī river, as illustrated in figures 10-11, lush vegetation is common and large bushy trees are distinguished along the river banks. The presence of vegetation not only provides adequate shading and temperature regulation, but also a many native plants to flourish, providing essential habitats for the ecosystem and aquatic organisms living in the river. The surface of the area surrounding the river consist of gravel and stones, providing protection against water force and acts as a barrier to prevent erosion. All these factors prevented the river from possibly being more extensively damaged by Cyclone Gabrielle, compared to the Tukituki which didn't have these factors as strongly as the Tūtaekurī. Vegetation wasn't uncommon at the Tukituki awa, but was less extensive as the Tūtaekurī, we can see from this photograph below that trees and bush were situated much further back from the riverbank. As the Tukituki river is less densely vegetated, it results in less shading of the river, impacting temperature regulation and habitat diversity along the river, potentially impacting the growth and reproduction of aquatic life. The sparse vegetation of the Tukituki river left it vulnerable for damage inflicted by Cyclone Gabrielle, as it had less protection compared to the Tūtaekurī. While the surface of the Tukituki was littered with gravel which is good for erosion prevention, the limited distribution of vegetation could leave the awa with more long-lasting damage after weather events, making it harder for the community to reconstruct it. Understanding the variations of vegetation between the two rivers is crucial and is important for ensuring the preservation of it's Mana Whenua, emphasizing the rivers significance to the local community and what we can do to help.


Photo of the Tukituki river at Tennant Road

In conclusion, the analysis between the Tūtaekurī and Tukituki awa has provided us with extensive knowledge and insight of the ecological and cultural significance of the two waterways. Overall, the factors at play have illustrated that the Tūtaekurī river is healthier than the Tukituki, boasting lush vegetation, healthy algae and stunning water clarity. These aspects indicate a thriving ecosystem with favorable conditions for aquatic life, and for the community to enjoy. Cultural characteristics like Mauri and Mana Whenua highlight the rivers importance to the community and how dedicated they are to make it enjoyable for everyone else by keeping it clean and well maintained.

Strengths, Weaknesses & Improvements

During any type of testing, there will be notable things that work well, and things that don't. In light of these findings, opportunities become available such as potential improvements to enhance a better understanding of the awa.

Looking back on our observations about the awa, numerous strengths were identifiable, such as the ease and accessibility of the equipment that was used to test the water. Considering how easy the SHMAK equipment was to use, like the clarity tube and the critter search tray, it enabled us to gather crucial data we needed, that overall assisted us in making informed conclusions of the awas health. We conducted 12 tests, some which were quantitative and some which were qualitative, and this resulted in a range of data. Taking part in 12 different tests, such as water quality, temperature and conductivity, helped us to comprehend the various aspects of the awas health, and identify whether the rivers were healthy or unhealthy. Another strength was the rapid responses we were able to collect from the equipment. Compared to other equipment, which could possibly take days to give results, the SHMAK equipment allowed real-time results of the water quality, water temperature, and various other things. These strengths were beneficial because they allowed for timely action analysis and rapid responses for potential problems to be quickly identified and assessed.

One notable limitation during our data collection was the fact that we only tested things such as the water clarity and velocity, near the edge of the river. Testing the SHMAK material further out into the water could have given us much different results. The depth limitation hindered our ability to access deeper into the water and therefore missed out on studying potential habitat conditions and quality in other sections, overall not fully capturing the overall water quality of that section of the river.

In summary, we managed to get a good general understanding of the awas health, using the resources and amount of time that we had. However, if we were looking for a more precise analysis, I would suggest expanding our locations further down the river, and allowing a whole day to do extensive research about the awa. Starting from southern Hawkes Bay towards Haumoana to test the Tukituki river, and stopping roughly every 25 km to test. The same goes for the Tūtaekurī, beginning at the Kaweka Range and finishing just south of Napier, using all 12 testing methods for every 25 km. By covering multiple points across the river, and engaging in more extensive research such as habitat assessments, a wider range and depth of data could be collected, capturing different conditions the water may be in and a diverse range of habitats. We could also have a better opportunity to really unpack everything at the river, rather than having to write everything down and quickly move on to the next location. Another suggestion would be to utilize digital resources for a more accurate result, an example would be an iPad, that we could enter the results directly into. This would be easy to compare to other teams results. Furthermore, testing during different seasons and weather conditions would enable insight into how the data varies over certain seasons, and the environmental impacts. By adding these improvements, it would make the data more reliable and valid, ultimately allowing a better understanding of the health of the awa.