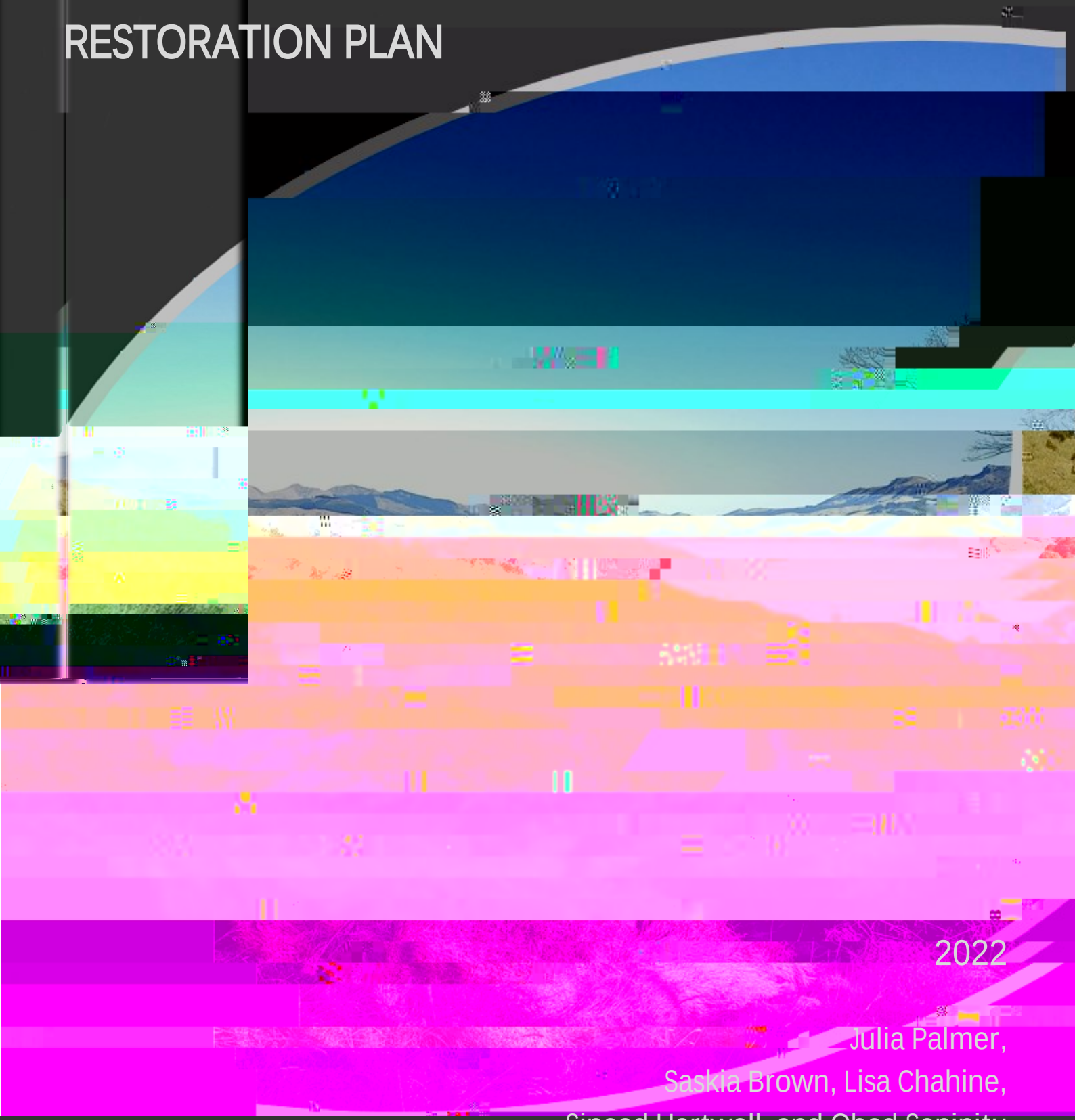
ASSESSING THE HEALTH OF STEADFAST STREAM AS PART OF A RIPARIAN RESTORATION PLAN



2022

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GEOG309 – Research for Resilient Environments and Communities

1. Executive summary

This research aimed to assess stream health and establish monitoring for Motukauatirahi Reserve to inform current and future restoration efforts. These efforts will support the long-term goals of improving water quality, native biodiversity, recreational opportunities in Motukauatirahi (Cass Bay). This project worked alongside Jenny Healey from Cass Bay Residents Association and aligns closely with the goals outlined by WhakaOra Healthy Harbour initiative.

The research question developed was “

For more in-depth investigation, several subthemes were identified. They included identifying the challenges and benefits of stream restoration; utilisation of mapping in restoration; riparian planting; identifying and implementing holistic metrics of stream health; and long-term monitoring programs’ importance and protocols.

An extensive review of stream restoration literature and consultation with experts was necessary to develop freshwater sampling methodologies and a riparian planting guide. Consultation and engagement with the local community and Ngāti Wheke (local hāpu) w

Aims and methods were developed based on expert consultation and review of the literature, covering topics including the use of riparian planting in stream restoration (Hogsden et al., 2021); assessing what environmental factors need to be considered when selecting plants (Feld et al., 2011); holistic metrics of stream health (Harmsworth et al., 2011); and the importance of long-term monitoring protocol (Buchanan et al., 2014). The overall aim of this project is to assess the current conditions of Steadfast stream, establish a monitoring protocol, and developed and planting plan. We achieved this through various methodological approaches including quantitative data collection and assessment of the cultural values of the site. Our results will guide future riparian planting efforts, stream monitoring, and provide recommendations for further research. Overall, this project will establish a baseline of the current condition of Steadfast Stream an effective comparison for restoration success in the future.

3. Concepts and literature review

3.1 Stream restoration

Human activities have resulted in extensive modification and degradation of freshwater environments (Parkyn et al., 2003), for example, through excess sediment inputs, altered flow regimes, and terrestr modification (Feld et al., 2011). Recognition of the important role waterways play in supporting biodiversity and providing ecosystem services has prompted an increased interest in restoration. Re-establishing riparian vegetation is a common method of stream restoration and is being implemented in Motukauatirahi Reserve (Hogsden et al., 2021). The riparian zone connects the terrestrial and the aquatic environments and therefore has a disproportionately large contribution to in.77 460.99 Tm65n1871

environments

Miller et al., 2010). Despite this, very few projects have some form of monitoring or assessment (Bernhardt et al., 2005) primarily due to limited resources and a lack of incentive for long-term monitoring

Incorporating mixed riparian buffers will provide organic matter for the stream community. Different plant species have different decomposition rates, for example, cabbage trees provide a have slow decomposition rates, whereas Coprosmas provide a quick release of energy to the stream (Hogsden et al. 2021). From this we can incorporate species with varying rates of leaf decomposition throughout the riparian zone of Steadfast Stream, supporting stream macroinvertebrates (Hogsden et al. 2021). Riparian species selection can also promote bird biodiversity, particularly be incorporating large canopy species that will provide cover, perching, and nesting sites will contribute to higher bird abundance (Krejcek, 2009). Choosing appropriate plants to create habitat is important for increasing biodiversity. To enhance restoration success native plants should be eco-sourced from Banks peninsula ultimately retaining genetic diversity and local adaptations (Department of Conservation, n.d.; Parkyn et al., 2000).

Through this riparian planting plan, we have aimed to maximise future diversity and rehabilitate the aesthetic value (Hogsden et al. 2021). Appropriate plant selection to match the local environment is crucial for establishing a foundation for natural regeneration and colonisation of wider biodiversity that once thrived in these stream environments (Feld et al., 2011).

Figure 2

5.2 Physiochemical

Overall, water chemistry within Steadfast Stream was within healthy parameters (Table 2 and refer to Appendix D for suitable ranges). While water temperature was not an issue as the Lyttleton side of the Harbour is relatively shady, riparian vegetation has significant ability to regulate instream temperatures (Collins et al., 2013). Once riparian vegetation has matured it will cool instream

temperatures, increasing gas exchange and the amount of dissolved oxygen present in the water (Parkyn et al., 2003)

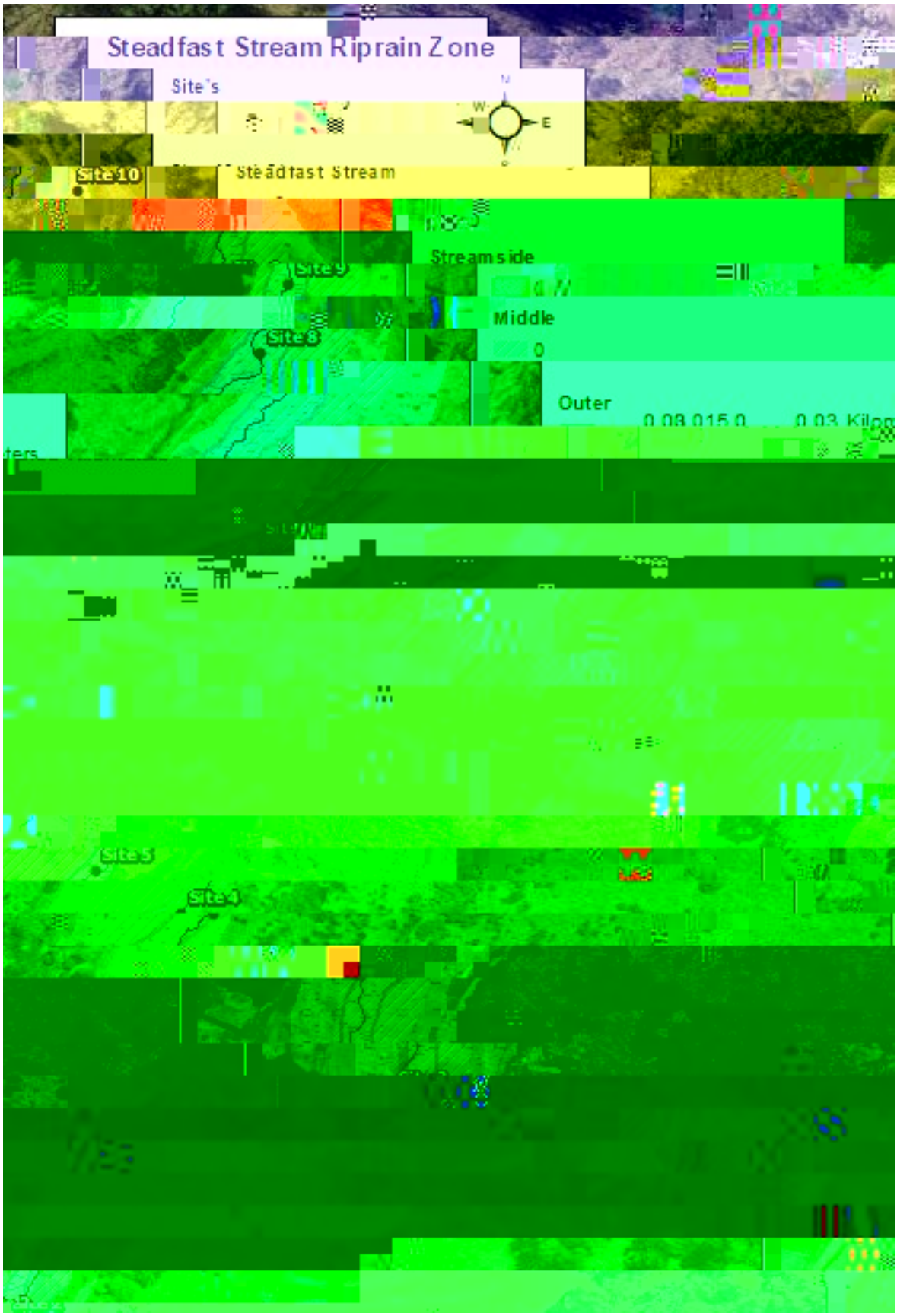
5.3 Biological

Table 3: .

Component 1:	Component 2:	Component 3:	
Score: A-1	Score: 2.75	Score: 1.59	
This is a traditional site Tangata whenua would return in the future	There is an absence of mahinga kai species Traditional mahinga kai species are no longer present Barriers to access Tangata whenua would return to the site	Catchment land-use Riparian vegetation Use of riparian margin	1.25 1.88 1.75

Fadaeff, N. (2022). . Retrieved October 3, 2022 from https://niwa.co.nz/climate/monthly/climate-summary-

Riparian planting zones alongside Steadfast Stream, used in the riparian planting plan. Streamside (blue), Middle (darker green), and Outer (light green).



Planting species list developed for riparian planting plan. Abbreviations Streamside (S), Middle (M) and Outer (O) indicate proximity to the Steadfast Stream.

Tree species

Grasses and flax species

	Flax/Harakeke	S	Stream edge, damp locations.
	Toe Toe	S	Str

Rapid Habitat Assessment (RHA) and water chemistry ranges, including Steadfast Stream values for easy comparison and general comments.

	80 - 120 % or 6.5 - 8 mg/L for healthy stream	81% and 11mg/L	(Department of Environment and Natural

Cultural health index assessment: