Waikato Regional Council Internal Series 2012/26

Whangamata Catchment Condition Assessment

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Te Kaunihera ā Rohe o Waikato

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Richard Glass provided the technical expertise to set up data capture devises as well as provide data processing through the catchment survey process.

Greg Jenks and Nathan Sutherland (Wild About New Zealand) conducted the field survey and provided feedback on methodology, and provided a concise report of the field process. Much of this report has been reproduced in the methods section of this document.

The RCS Coromandel Zone team provided input into the catchment assessment for the entire catchment condition survey process.

Contents

Executive summary v

1 Introduction 1

2 Methods 1

2.1 Formation of criteria 1
2.2 Consultation with landowners 2
2.3 Field survey 2
2.3.1 Field work 2
2.3.2 Data capture 3
2.3.3 Data processing 3
2.4 Subcatchment groups 3

3 Results 5

3.1 Whangamata catchment survey summary 5
3.1.1 Riparian condition 5
3.1.2 Upper catchment condition 7
3.1.3 Overall catchment ranking 8
3.1.4 Spatial analyses 9
3.2 Whangamata coastal margin survey results 13

4 Discussion 15

4.1 Future surveys 15
4.1.1 Additional information gathering 15

Appendix 1 Initial letter to landowners 16

Appendix 2 Maps showing features not entirely visible in results maps above 17

Tables

Table 1 Summary of features captured within the Whangamata survey 1
Table 2 Summary of erosion types within the Whangamata catchment 8
Table 3 Subcatchment ranking for management features 8

Figures

Figure 1 Whangamata catchment and the subcatchment areas surveyed 4
Figure 2 Summary of riparian condition within the Whangamata catchment 5
Figure 3 Fencing and vegetation composition within the Whangamata catchment 6
Figure 4 Percentage of exotic and native vegetation within each subcatchment group 6
Figure 5 Percentage of stock proof/not stock proof riparian margins within each subcatchment 7
Figure 6 Percentage of riparian areas with erosion problems within each subcatchment group 7
Figure 7 Area of landscape erosion (hectares) within each subcatchment group 8
Figure 8 Results map of Wentworth subcatchment 10
Figure 9 Results map of Waikiekie subcatchment 11
Figure 10 Results map of Tapaparoroa subcatchment 12
Figure 11 Northern part of Tapaparoroa subcatchment 17
Figure 12 Southern part of Tapaparoroa subcatchment 18
Figure 13 Waikiekie subcatchment 19
Figure 14 Wentworth subcatchment 20

Photos

Photo 1	Significant Paspalum vaginatum invasion on the margins of the Otahu estuary	13
Photo 2	Bank erosion leading to collapse caused by undercutting of the dense thatch growth habit evident in Paspalum vaginatum invasion, Otahu estuary margins	14
Photo 3	Dune erosion induced by storm water impact on the integrity of restored dune function at Whangamata beach	14

Executive summary

The Whangamata catchment condition survey outlined in this document is designed to provide baseline information on agricultural land to support the implementation phase of the Whangamata Harbour and Catchment Management Plan (HCMP).

The field survey was undertaken utilising two Yuma tablet devices in which general basic RCS attributes were recorded. These included riparian conditions such as stock exclusion, vegetation types, erosion and stream blockages. Landscape features were recorded such as: Significant Natural Areas, stock exclusion, other natural areas, hill country erosion, and condition of harbour or coastal margins. Biodiversity issues such as significant weed infestations and threatened species were also recorded where found.

Within the Whangamata catchment 8.19ha of hill country erosion was recorded; 73% of the riparian margins had successful stock exclusion in place; nearly 41% of these margins had native riparian vegetation dominant, and a low 1.3% of riparian margins revealed recordable riparian erosion.

The extensive coastal component of Whangamata catchment was included in this survey as other sources of contemporary information were lacking. Harbour margins exhibit a large proportion of remnant native vegetation, the main exception being the Otahu estuary, on the southern boundary of the catchment. This estuary suffers from the deleterious effects of a large invasion of salt-water paspalum (*Paspalum vaginatum*). The 3.7km extent of sand dunes along Whangamata Beach are stock proof and reveal a superior improved ability to function naturally due to restoration of native dune plant species. The main exception to this improved situation being areas adjacent to storm water outlets onto the beach – see plate 3. The nearly 1km long Onemana beach has similarly been restored and is also stock proof. However a population of salt-water paspalum is also present near a storm water outlet and this pest plant shows signs of colonising dune lands at this location.

The 3.6km of beaches fronting agricultural land seaward of Onemana Peninsula Road were largely stock proof, the only exception being a small 'pocket' of beach about 140m in length.

The Whangamata catchment was split into three subcatchment areas for ease of reporting – Wentworth, Waikiekie and Tapaparoroa subcatchments. All had at least 65% of their riparian margins fenced. Despite being the smallest of the subcatchments, the Tapaparoroa had the poorest stream fencing record, with a relatively modest 33% of its riparian areas not stock proof. However the Waikiekie subcatchment had the best record of effective stock exclusion, no riparian erosion and with over 82% of stream banks fenced. Riparian erosion of all subcatchments was low, with small amounts observed in the Wentworth subcatchment (about 2%), and only 0.1% in the Waikiekie. Hill country erosion was similarly small-scale, with a total of just over 8.19ha recorded over the entire Whangamata catchment. Landscape erosion was not observed in the Waikiekie subcatchment.

The survey provides a snapshot into the state of the Whangamata catchment's agricultural land and it can act as a baseline for further surveys. This will provide a reporting tool on changes within the catchment over time. The geographical mapping of this survey provides information to staff and could help with prioritisation of future land management and protection work.

1 Introduction

Waikato Regional Council is committed to managing harbours and catchments using an integrated approach. Harbour and Catchment Management plans are integral to this approach. The catchment condition survey outlined in the document is designed to provide baseline information on agricultural land to support the implementation phase of the Whangamata HCMP.

A physical assessment of the state of the land and coastal areas is necessary to understand the current health of the catchment assets and the environmental linkages throughout. The catchment survey is an opportunity to gauge temporal changes within the catchment, particularly to ascertain changes both positively and negatively and be able to respond to those changes.

The survey also spatially defines where assets and issues are located within the catchment, allowing staff to identify priority areas for the implementation of catchment management work programmes.

A field survey of the catchment was undertaken to assess stream condition, soil erosion and significant natural area protection. The survey was designed to assess agricultural land within the catchment. However, brief notes were included if any relevant features were noted on neighbouring land with native forest, plantation forestry cover, plus the state of the harbour and coastal margins.

2 Methods

2.1 Formation of criteria

The set of criteria measured and recorded in the Whangamata survey was focussed around RCS priority work and HCMP reporting. This meant that these features were assessed only within private land, predominantly pastoral and horticultural land.

Features selected for the survey had to fall into the following criteria, they had to be: objective, repeatable (by other field operators), measurable, reportable and valuable.

The Whangamata survey was split into priority one features and priority two features for this assessment. This was designed to help field staff prioritise their time while conducting the survey. Priority one features were classed as “must have” for the whole survey area and priority two features were classes as “nice to have”. Table 1 outlines the features assessed in the survey and the GIS attributes used to map the features. Coastal features were included in this survey, in contrast to the Tairua survey where coastal data was covered by resource information of the Tairua harbour survey.

Table 1 Summary of features captured within the Whangamata survey

Feature	Capture	Comment	Priority
Riparian fence (stock proof/ not stock proof)	line	This was designed to capture fencing that was ineffective or absent	One

Riparian vegetation (exotic / native)	line	5m riparian vegetation from water's edge. Either: Exotic (including grass) or Native	One
Land erosion (e.g. sheet, rill, mass movement, slip, slump)	polygon	Measured as an area. set up as rill/ sheet (land use issue) mass movement (soil conservation works issue)	One
Riparian erosion (stream bank erosion present)	line	Stream bank erosion	One
Significant features (SNA's: stock proof, not stock proof. Other significant areas not recorded in SNA database)	polygon	Difficult to record large SNAs as stock proof. Also captured were natural areas which were not part of the SNA Layer but were still worth noting	One
Stream blockage (e.g. Gravel build up, vegetation in channel)	point	Recorded where there is a potential to cause erosion or gather debris	One
Stream structures (e.g. culvert, bridge, fords, riprap)	point	Recorded when seen during riparian assessment. Useful for stock in streams (ie ford or bridge) or perched culvert recording	Two
Farmer comments	n/a	Recorded only if significant to information required in the survey.	Two
Weed Issues	point	Only significant weeds. Weeds that are generally present were ignored eg gorse, woolly nightshade.	Two
Threatened species	point	Only if noticed while conducting the rest of the survey.	Two

For further details of the catchment condition survey process see document #2092684.

2.2 Consultation with landowners

Letters were sent out prior to the survey to landowners within the catchment who own land greater than one hectare (see appendix 1 for letter). This explained the catchment assessment process and that access to private land would be required for the field survey.

Landowners were phoned where possible to request access for the assessment. All attempts were made to confirm permission from landowners beforehand.

2.3 Field survey

2.3.1 Field work

The field survey was undertaken by Greg Jenks and Nathan Sutherland (Wild about NZ) on the 14 - 18 May 2012. The streams were walked to record features listed above and most of the features recorded in the upper catchment were walked or observed from a near distance.

2.3.2 Data capture

Two Trimble Yuma tablets were employed for the field data entry. The data was backed up each day onto a laptop computer. The attribute data was collected by using forms created in ArcPad.

The Riparian portion of the survey concentrated on assessing the streams defined by the Hydro_50k stream dataset, although other streams were entered where they were considered to be significant and floodplain drains were also included. Stream riparian condition and erosion was plotted along the Hydro_50k line, except where drains and streams were aligned differently than the 50k dataset.

The riparian vegetation area was assessed out to 5m from the stream / drain bank. The objective was to capture the extent of native vegetation which was the predominant vegetation type along the stream bank.

2.3.3 Data processing

Data was downloaded from both of the Yuma tablets and amalgamated together to form one table for each of the captured layers. Processes to identify any inaccuracies such as duplication and positioning errors were utilised to verify data integrity.

Data was initially loaded into the ArcPad application and then exported to Geomedia via shape files. Geomedia was used to manipulate, analyse and report on the raw data.

2.4 Subcatchment groups

For ease of reporting and to help focus the location of issues, the catchment has been split up into four subcatchment areas (See Figure 1 below).

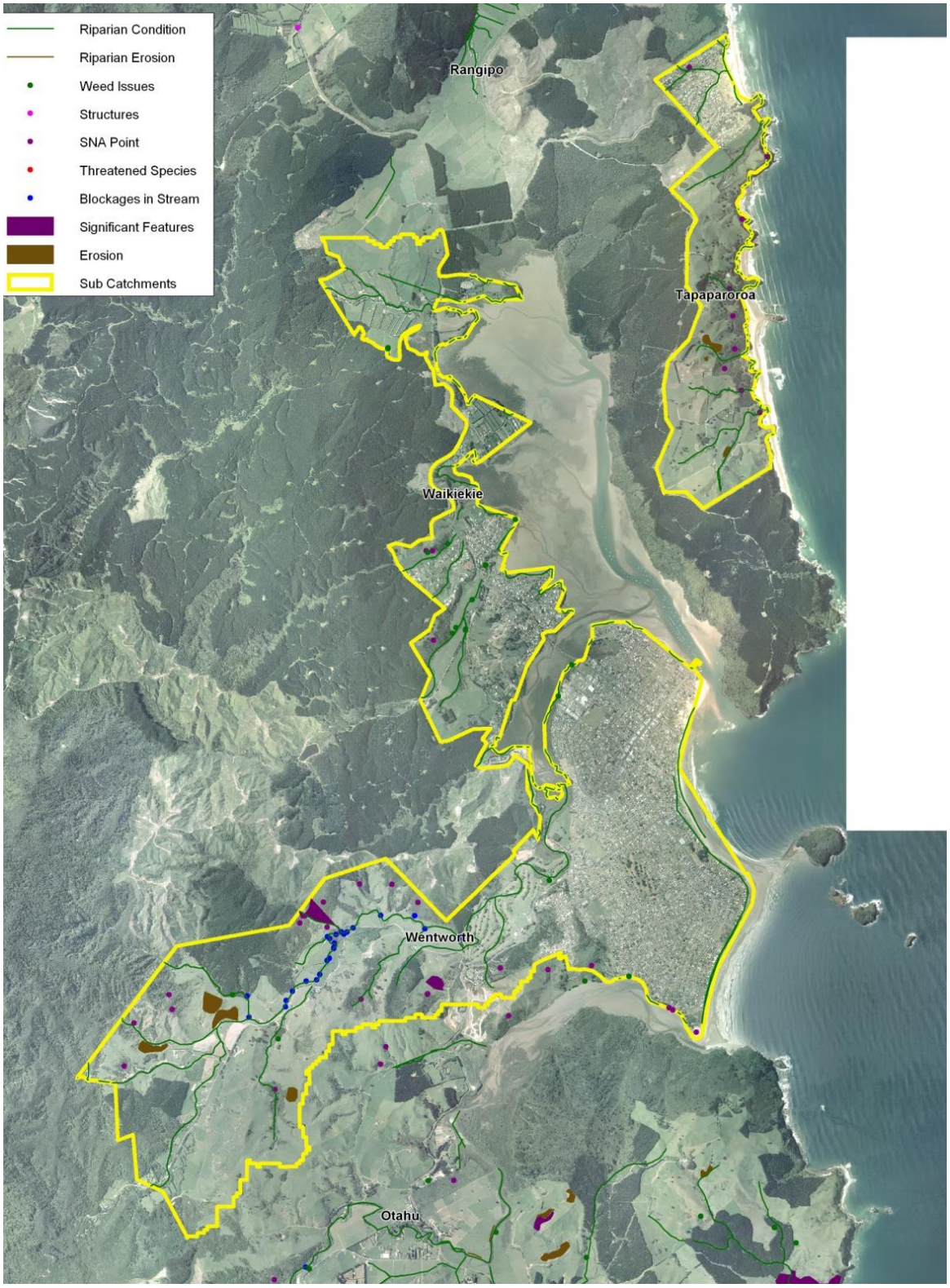

Figure 1 Whangamata catchment and the subcatchment areas surveyed

3 Results

3.1 Whangamata catchment survey summary

3.1.1 Riparian condition

The riparian condition of the entire catchment is summarised in Table 2. A total of three separate conditions were recorded, which included:

1. The presence of riparian erosion
2. The nature of riparian vegetation
3. Successful or unsuccessful exclusion of stock.

Riparian erosion only affected a small percentage of the catchment (Table 2), with the majority of this occurring within the Wentworth subcatchment (97.6%).

Riparian vegetation was dominated by exotic plants (including pasture) which occupied nearly 60% of the stream-banks within the Whangamata catchment. A high portion of the catchment waterways were fenced to prevent stock access (nearly 75%).

Figure 2 Summary of riparian condition within the Whangamata catchment

Type	Sum of length (kilometres)	Percentage of streams
Total stream bank	65.3	100%
Riparian erosion	0.85	1.3%
Exotic riparian vegetation	38.6	59.1%
Native riparian vegetation	26.7	40.9%
Stock proof	47.7	73%
Not stock proof	17.6	27%

Stock proof riparian margins contained a reasonably balanced mix of native and exotic vegetation (Figure 2 below), consisting of 35% and 38% of the surveyed waterways respectively. Unfenced riparian margins were dominated by exotic flora, primarily introduced pasture, whereas only 6% of the surveyed stream banks contained unprotected native vegetation.

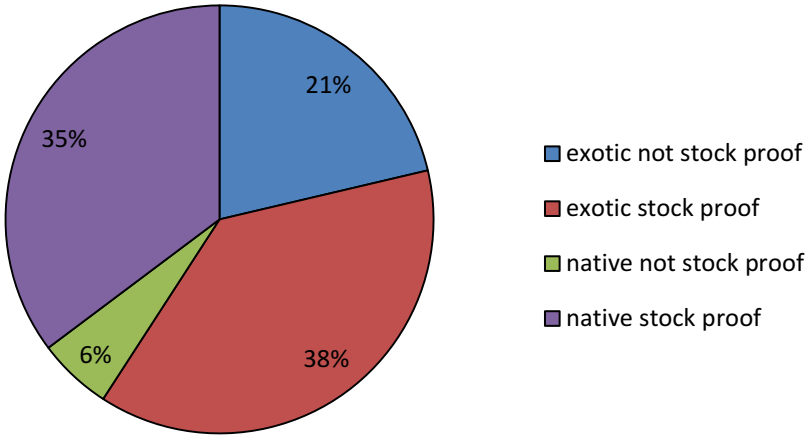

Figure 3 Fencing and vegetation composition within the Whangamata catchment

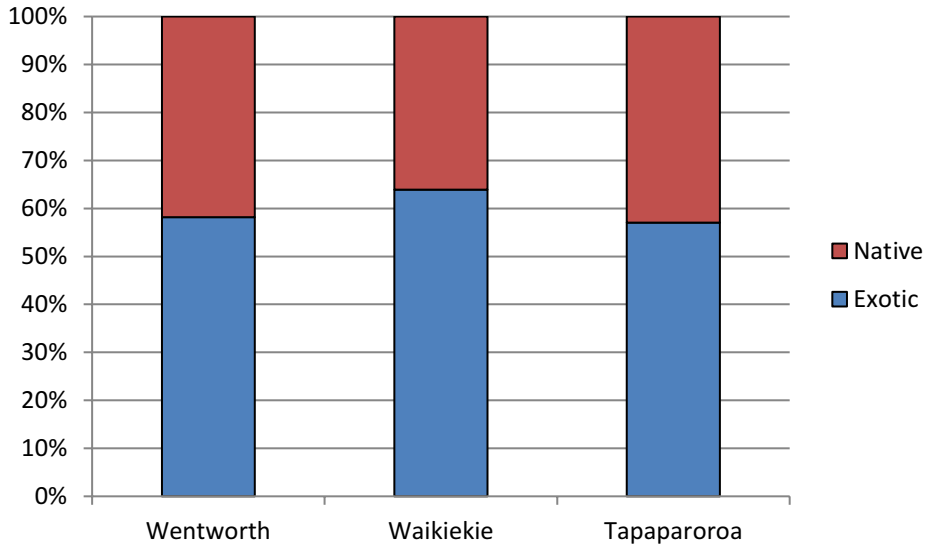

Figure 4 Percentage of exotic and native vegetation within each subcatchment group

The riparian margins within each subcatchment were dominated by exotic vegetation; however, they all contained a relatively similar ratio of native to exotic (40:60) (Figure 3). The Waikiekie subcatchment had the greatest percentage of exotic flora, 64%, while exotic plants occupied between 57-59% of stream banks in both the Wentworth and Tapaparoroa subcatchments.

The different subcatchments had similar proportions of fenced and unfenced water courses. The Waikiekie subcatchment had the largest percentage of riparian margins protected from stock access, with approximately 82% of the riparian zone stock proof (Figure 4 below). However, with only 67% of waterways fenced, the Tapaparoroa subcatchment was revealed to have the lowest amount of riparian margin fenced, despite being the smallest subcatchment.

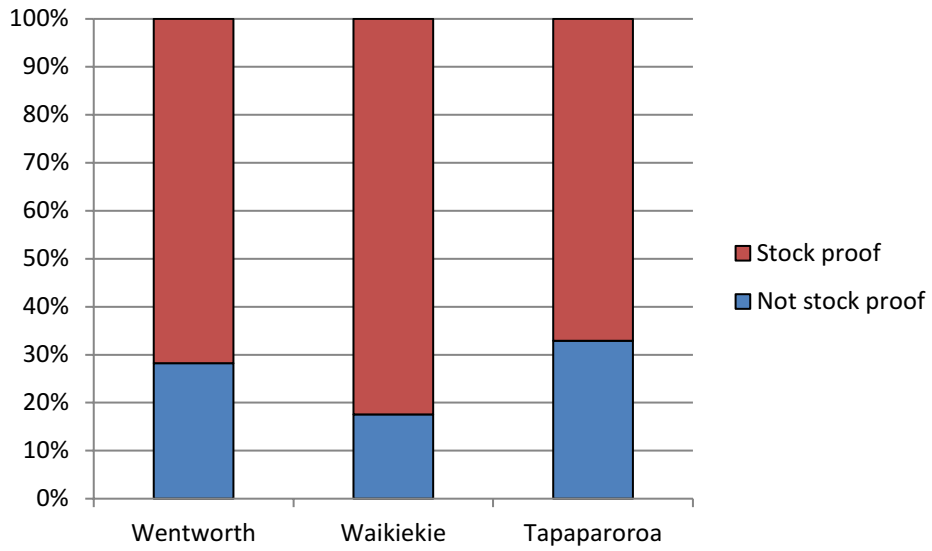

Figure 5 Percentage of stock proof/not stock proof riparian margins within each subcatchment

Riparian erosion was more frequent in the Wentworth subcatchment and occupied 2.1% of the riparian margins (Figure 4 below), whereas stream bank erosion in the Waikiekie only occurred along 0.1% of surveyed waterways. Significant riparian erosion was not evident in the Tapaparoroa subcatchment.

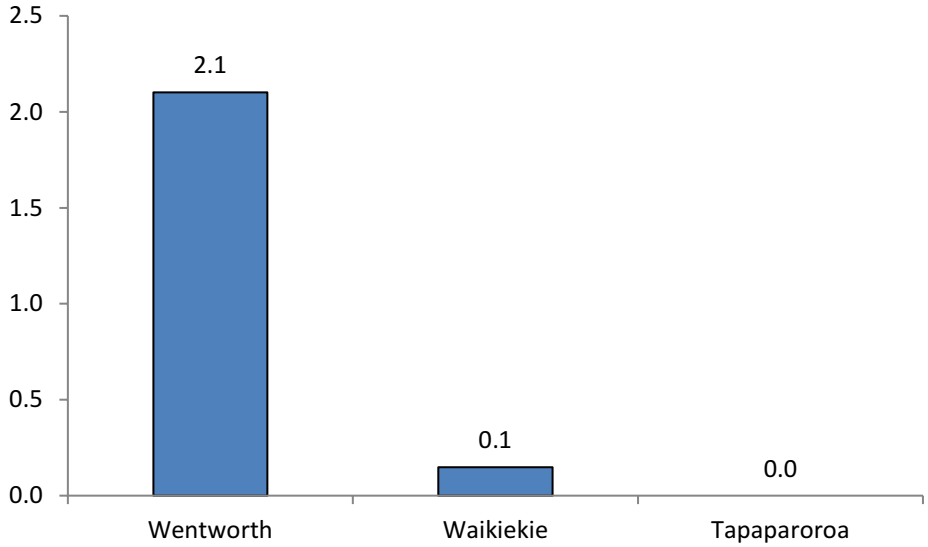

Figure 6 Percentage of riparian areas with erosion problems within each subcatchment group

3.1.2 Upper catchment condition

Sheet and rill type erosion was the most widely occurring landscape erosion issue across the Whangamata catchment (Table 3), occupying an area just over 8ha (or 0.47%) of the total land area. The mass movement of earth was infrequent and indeed the small area recorded emanated from a sole event in the Tapaparoroa subcatchment.

Table 2 Summary of erosion types within the Whangamata catchment

Erosion type	Area/distance
Mass movement: slips/slumps/earthflow	0.07 ha
Sheet/rill	8.12 ha
Stream bank	846.1 m

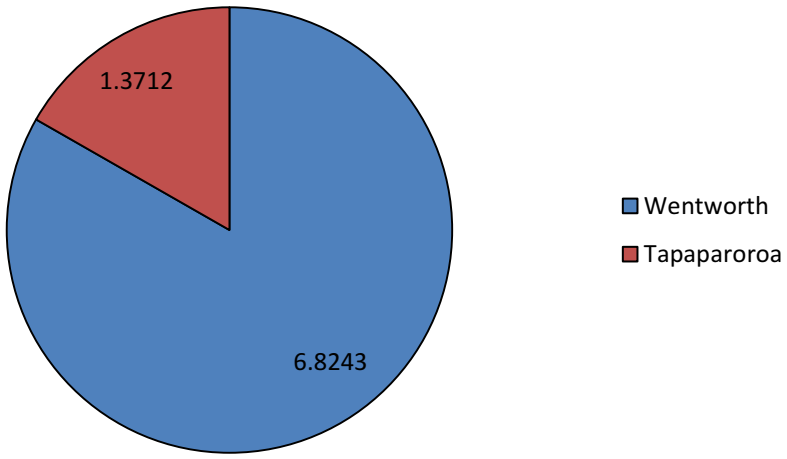

Figure 7 Area of landscape erosion (hectares) within each subcatchment group

The Wentworth subcatchment contained 83% of the landscape (sheet and rill) erosion that is present within the entire Whangamata catchment, the remainder being in the Tapaparoroa subcatchment (Figure 6). Landscape erosion occurring in the Tapaparoroa subcatchment was also dominated by sheet and rill type, however there was a small occurrence of mass earth movement recorded, which equated to around 5.4% of the area affected by erosion. No landscape erosion was noted in the Waikiekie subcatchment.

3.1.3 Overall catchment ranking

A simple ranking exercise has been completed for each subcatchment group (Table 3). The purpose of this ranking is to provide a quick reference to how each subcatchment compares to the others. Those with the lowest scores in each category could be seen as the leading catchments. Catchments have then been ranked with the lowest overall average score.

Ranking is based on most intact features: Least erosion, highest percentage of native vegetation, highest percentage of stock exclusion. Ranking from the best (1) through to worst (3) has been undertaken. The subcatchments have then been ranked from the lowest average score.

Table 3 Subcatchment ranking for management features

Subcatchment group	Riparian erosion	Landscape erosion	Riparian vegetation	Riparian stock exclusion	Ave	Rank
Wentworth	3	3	2	2	2.5	3

Waikiekie	2	1	3	1	1.75	1equal
Tapaparoroa	1	2	1	3	1.75	1equal

3.1.4 Spatial analyses

One of the benefits to this survey is the ability to examine the data in a spatial sense. This allows for on-going analysis or prioritisation, as well as a preparation tool for staff working in the Whangamata area. This is useful for the examination of attributes that do not necessarily have measurable outcomes. For example: weed and threatened species locations, significant natural areas that have been excluded from stock, stream structures and photo points.

The 3 maps below show the results of the field surveys overlaid with the aerial photography for the area. Some features do not appear on the printed maps as they must be viewed “live” in Geo-Media to observe all features, for example whether a SNA is fenced or not. Most features reveal descriptor notes when clicked on in GeoMedia. See Appendix II for more results maps.

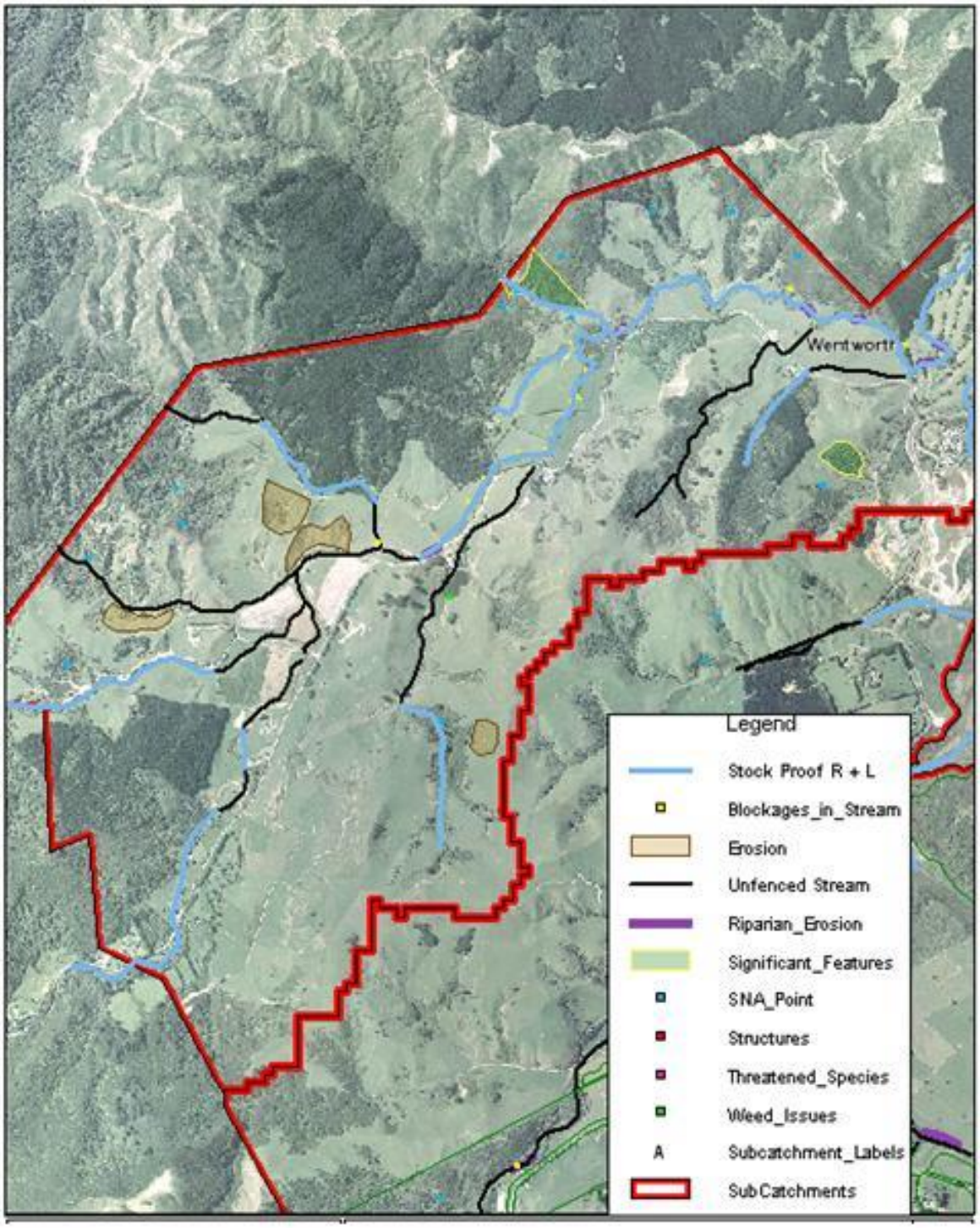

Figure 8 Results map of Wentworth subcatchment

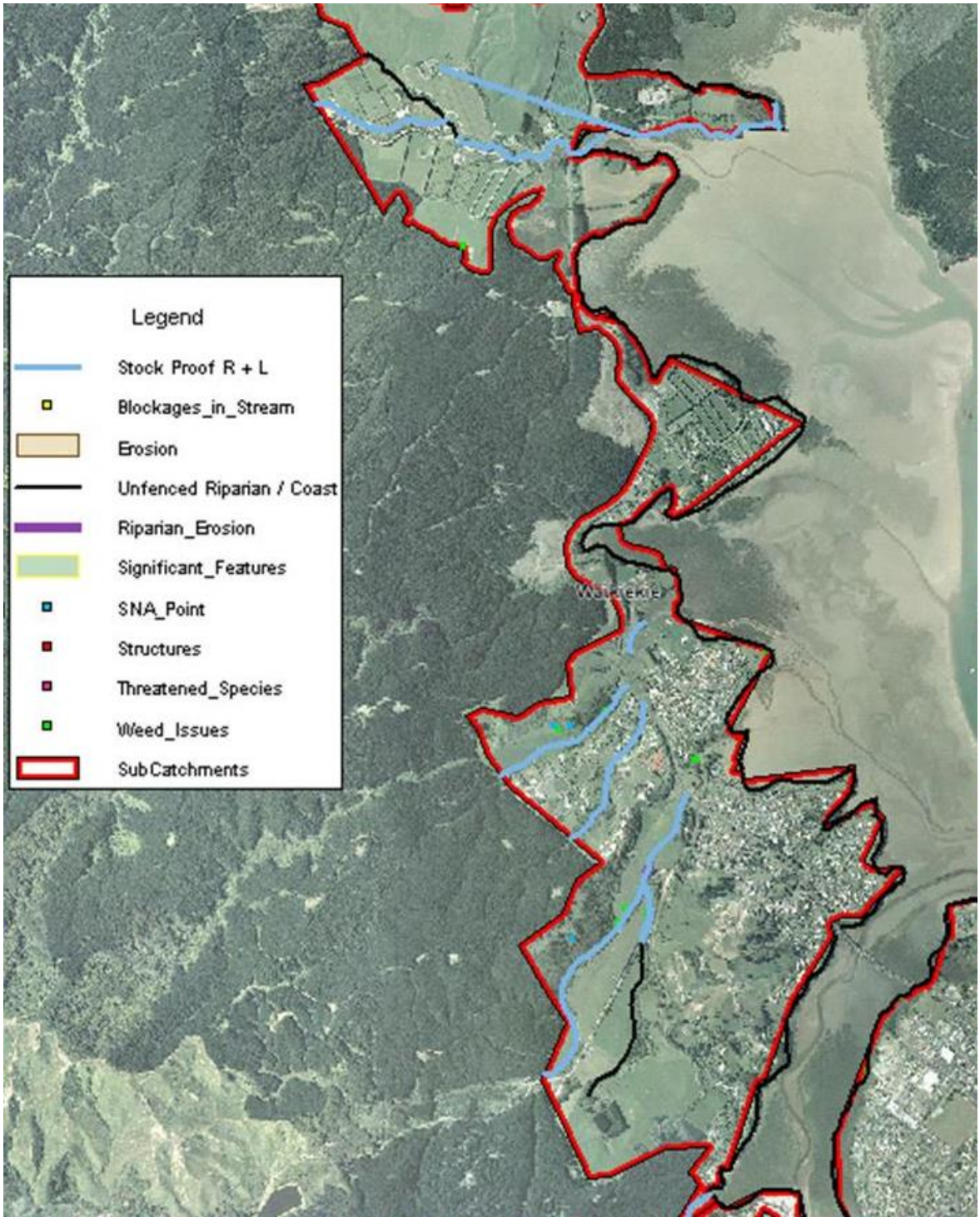

Figure 9 Results map of Waikiekie subcatchment

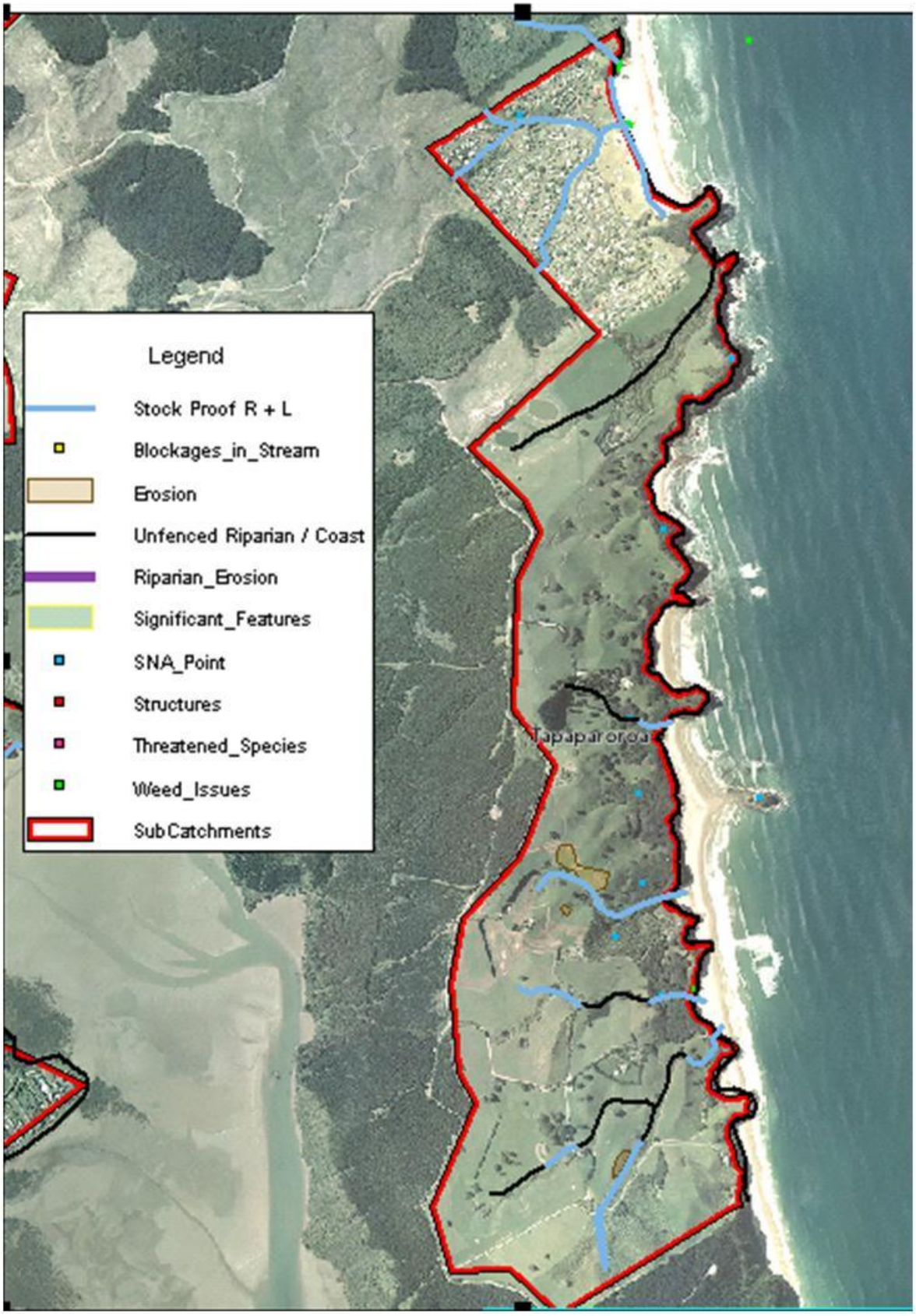

Figure 10 Results map of Tapaparoroa subcatchment

3.2 Whangamata coastal margin survey results

The coastal component of the Whangamata catchment was included in this survey to assess the natural state of this important and relatively lengthy erosion-buffer zone. The normal role of dunes is to provide a buffer against intrusion by storm surges, particularly during periods of inclement coastal weather, and so to protect valuable areas landward of the shore.

The harbour margins exhibit a large proportion of remnant native vegetation, the main exception being the Otahu estuary, on the southern boundary of the catchment. This estuary suffers from the deleterious effects of a large invasion of salt-water paspalum (*Paspalum vaginatum*). The 3.7km extent of sand dunes along Whangamata Beach are stock proof and reveal a superior improved ability to function naturally due to restoration of native dune plant species. The main exception to this improved situation being areas adjacent to storm water outlets onto the beach – see plate 3. The nearly 1km long Onemana beach has similarly been restored and is also stock proof. However a population of salt-water paspalum is also present near a storm water outlet and this pest plant shows signs of colonising dune lands at this location.

The 3.6km of beaches fronting agricultural land seaward of Onemana Peninsula Road were largely stock proof, the only exception being a small 'pocket' of beach about 140m in length.

Normal expectations of shore and dune improvement are a return of the storm buffer function (increasingly important with the predicted climate change impacts), enhanced opportunities for habitat improvement (e.g. increasingly secure nesting sites for coastal birds like the endangered NZ Dotterel), and restoration of back dune areas to improve winter foraging opportunities for native birds.



Photo 1 Significant Paspalum vaginatum invasion on the margins of the Otahu estuary



Photo 2 **Bank erosion leading to collapse caused by undercutting of the dense thatch growth habit evident in Paspalum vaginatum invasion, Otahu estuary margins**



Photo 3 **Dune erosion induced by storm water impact on the integrity of restored dune function at Whangamata beach**

4 Discussion

This survey will help to provide baseline information for the catchment for the attributes measured. A similar survey conducted in the future will give an accurate assessment of changes within the catchment.

With only 21% overall of the agricultural land requiring fencing, good progress has been made in the riparian management goals of the Whangamata catchment. The smallest sub- catchment (Tapaparoroa), with 33% of stream margins requiring fences for stock exclusion, presents the greatest challenge. The riparian margins with exotic vegetation amount to approximately 60%, an area that is in need of some concerted work. The Waikiekie area is marginally behind the others in need of native plant conversion, with 64% of stream margins dominated by exotic vegetation.

The catchments riparian condition, for the purposes of this report, can be expressed in terms of “best case” which is native plants along a stock proof stream. Or in the “worst case” which can be described as exotics along a stream with stock access. Stream margins in the best case group are 35% of riparian margins, with 21% in the worst case group, and 6% of the area being clad in native plants and open to stock.

Even within a small catchment such as Whangamata, differences can be observed geographically. The issues within the three subcatchments varied somewhat. The Wentworth subcatchment contained the largest area of landscape erosion; however, the majority of its erosion (83%) came from sheet and rill erosion of soil totalling 6.8ha. Nearly 1.4 hectares of landscape erosion was recorded in Tapaparoroa subcatchment, all of which was also sheet or rill in origin. Examples of landscape erosion were not observed in the Waikiekie subcatchment, so taken as a whole, landscape erosion in this catchment has been managed well, and consequently is of relatively low significance at 8.19ha.

Other than its use as a reporting tool, the value of this survey is in the spatial mapping of features. Staff are able to access the survey in Geomedia and examine any attributes they want at which ever scale required. This could help guide the type of work required and prioritise which areas to target.

4.1 Future surveys

The Whangamata survey was completed within relatively tight timeframes and collated useful information that can measure changes within the catchment and help guide future RCS work. Surveys can be as detailed as required, capturing all information within an area. The main balance that was considered, particularly in regards to costs and time, was attaining a high enough level of detail without slowing down the process unnecessarily.

4.1.1 Additional information gathering

Land use classification (LUC) mapping could be a useful tool to gauge changes within a catchment. Once LUC classes have been defined an overlay of land cover would pinpoint where land may be inappropriately used. This could guide land management staff to those areas that have a higher likelihood of erosion, and provide a reporting tool on how much of these areas are retired.

Appendix 1 Initial letter to landowners

File No: Z21 H090
Enquiries to: Warren Coffey

<<Date>>

«Initals» «Surname»
«Address1»
«Address2»
«ADDRESS3» «ADDRESS4» «POSTCODE»

To Whom It May Concern

Whangamata Catchment Survey
A catchment survey is being carried out within the Whangamata catchment and harbour area over the next two months. The survey will collect field data to estimate the extent and characteristics of features like vegetation, fencing, streams and erosion within the Whangamata area.

The aim of the survey is to provide an initial baseline assessment to mark what "state" the catchment is in. This will be functional information which will help guide the harbour and catchment management plan for Whangamata, assess what issues or key sites exist and help focus our catchment work. It will also help us track future improvements and long term changes that will occur.

The contractors will be able to complete some of the catchment survey from public areas but will also need to access private land in some places to get a good handle on what's within the catchment. This will generally be along stream margins and other natural features. The contractors have been instructed to make contact with the landowner where able, and to be mindful of hazards, privacy, and farm management issues. If there are any site related hazards or issues that we need to know of please let the contractor know when they contact you. For any significant hazards on site please contact Warren Coffey on the numbers below as soon as practical.

The results of the survey will be applied within a greater catchment focus and will not be published in relation to individual properties. This survey will however help Waikato Regional Council staff identify specific issues within the catchment. Any areas that might need work will be done so in consultation with the landowner. It will also fit into our regular work programmes where potential funding assistance is available to landowners.

Your assistance in allowing access to your property for this survey is appreciated. If you have any concerns regarding access, then please call Warren Coffey on the Waikato Regional Council freephone 0800 800 401.

Yours faithfully

Warren Coffey
Land Management Officer

Appendix 2 Maps showing features not entirely visible in results maps above

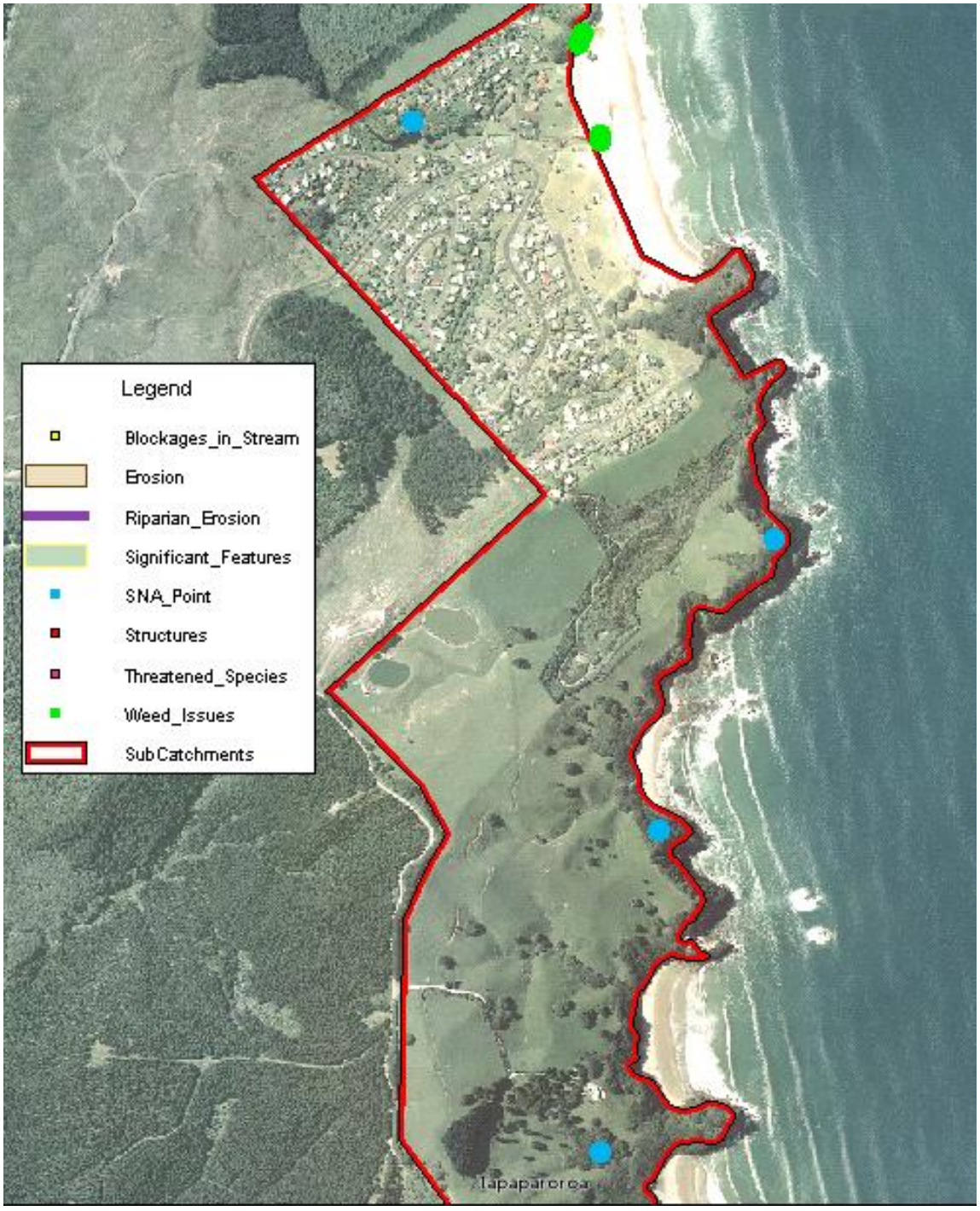

Figure 11 Northern part of Tapaparoroa subcatchment

Notes captured: Top 3 SNA areas are stock proof, lower one is not stock proof. Weed issues – mainly Saltwater Paspalum, and Pampas.

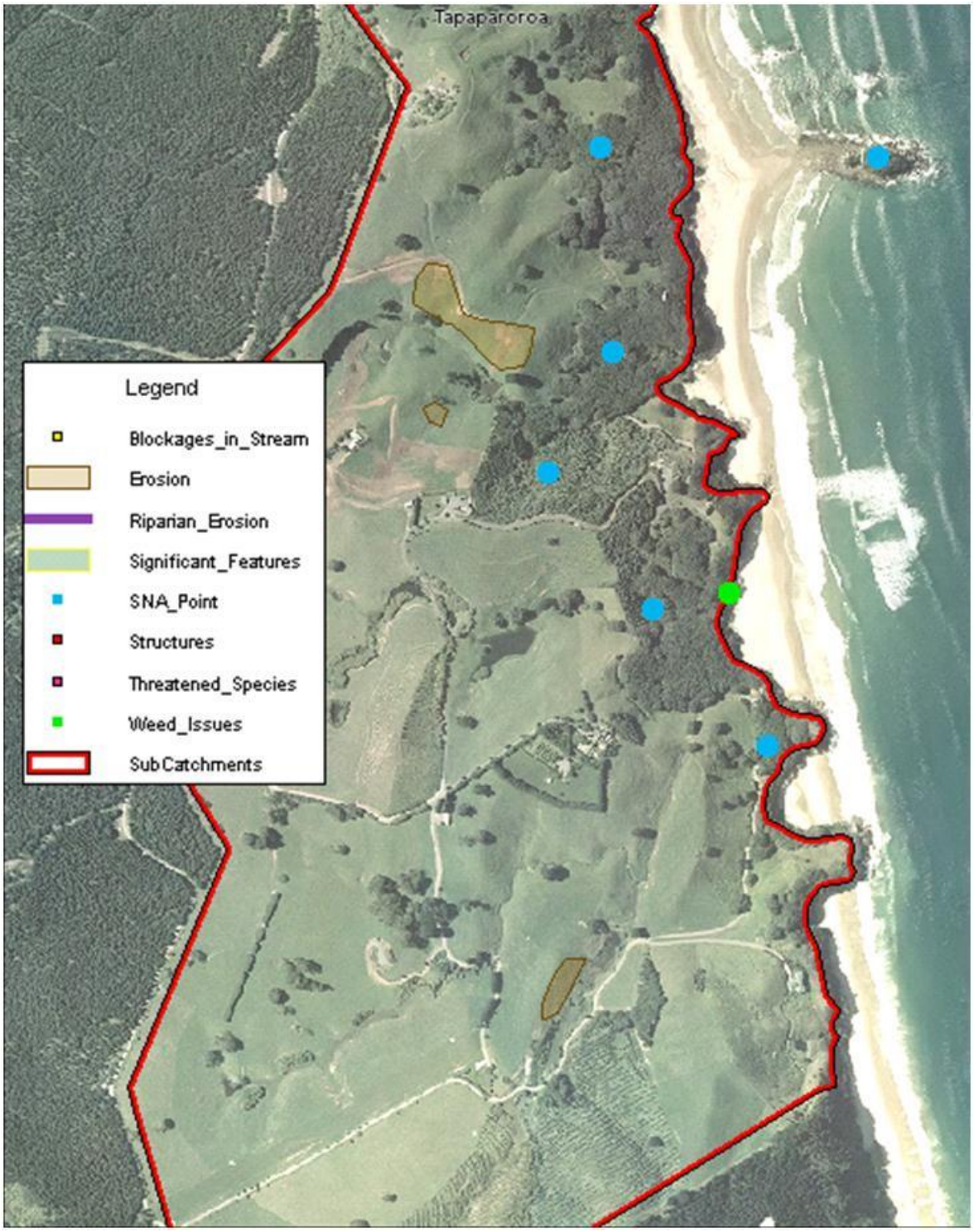

Figure 12 Southern part of Tapaparoroa subcatchment

Notes captured: All SNA areas are stock proof. Erosion – 2 larger areas marked are both Sheet / Rill erosion, the smaller area to the right of the legend is mass movement slip. Weed issue is Saltwater Paspalum.

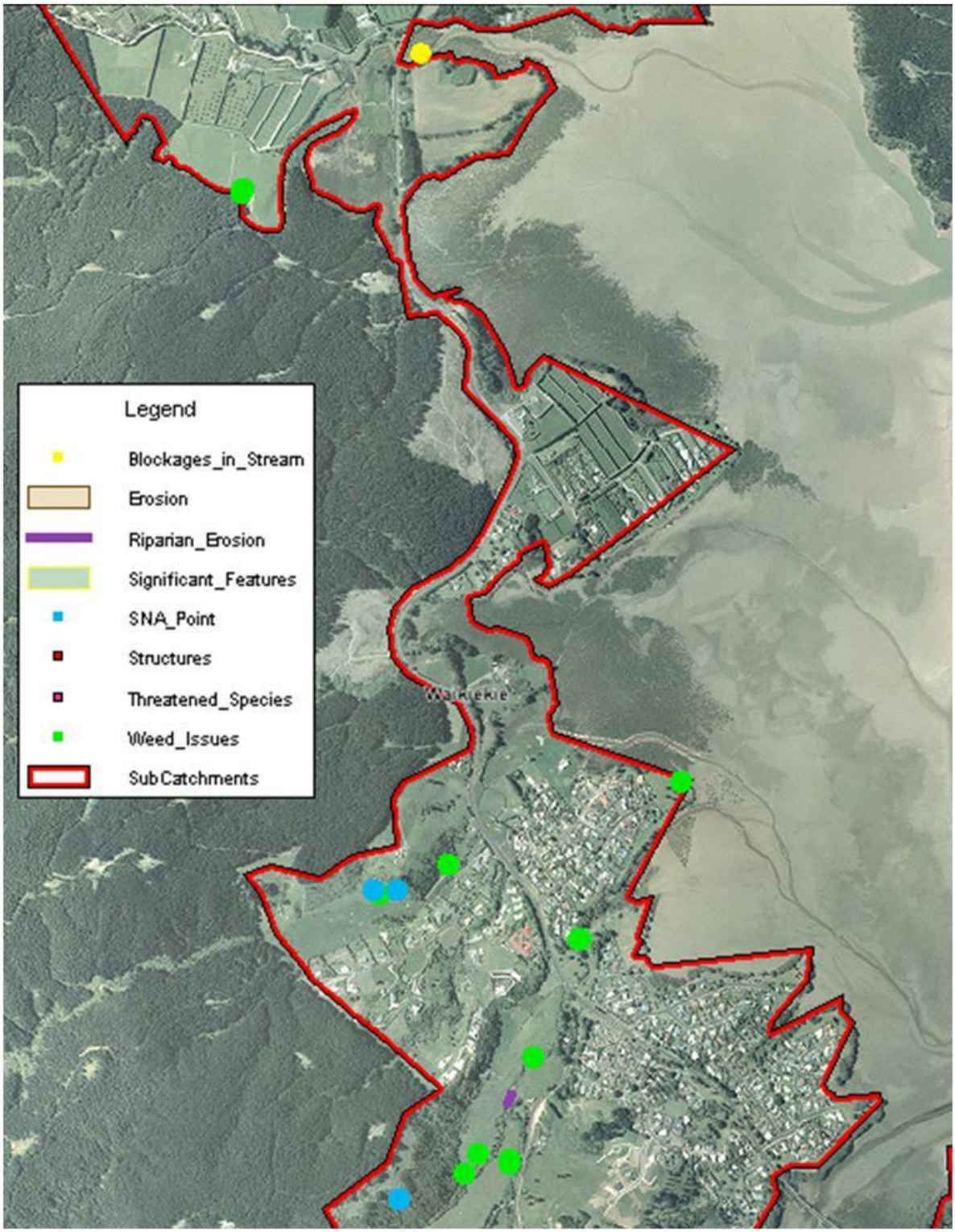

Figure 13 Waikiekie subcatchment

Notes captured: All SNA areas are stock proof. Riparian Erosion = true right bank, 20m in length. Weed issue vary, including Wild Ginger, Privet, Pampas, Saltwater Paspalum on coastal margin, dominating.

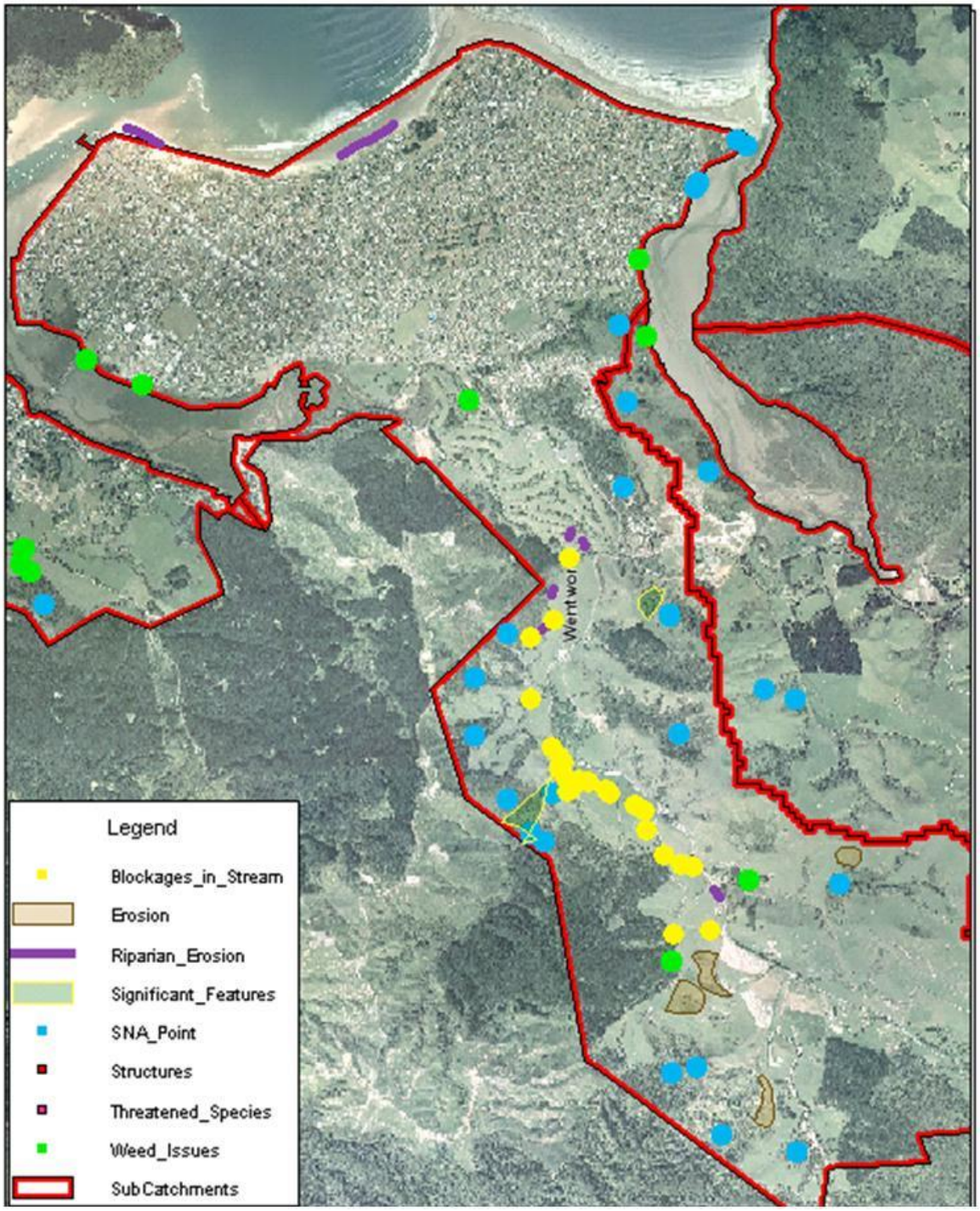

Figure 14 Wentworth subcatchment

Notes captured: Not all SNA areas are stock proof (see GeoMedia as too many to mention here). Blockages are mainly vegetation – willow trees, but some have been cleared since printing of this report by council employed contractor. Significant features are not stock proof; larger one contains wetland and forest. Riparian erosion are stretches of between 30 – 50m in length. Weed issue are mainly Pampas. Coastal erosion of dunes is extensive – 180m and 300m in length.