LOSS AND GAIN OF INDIGENOUS VEGETATION AND HABITATS WITHIN IDENTIFIED NATURAL AREAS IN THE BAY OF PLENTY, 2003-2019

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1. INTRODUCTION

District Councils are required under Section (6c) of the Resource Management Act 1991 to identify and provide for "the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna" on land under their administration. In the Bay of Plenty Region, most District and City Councils have identified and mapped areas of significant indigenous vegetation and habitats in their respective district plans. District Plans in the Bay of Plenty Region refer to scheduled sites of significant indigenous vegetation and habitats by a range of names (e.g. Natural Heritage Sites in the Kawerau District Plan, Significant Natural Areas in the Rotorua District Plan, and Significant Indigenous Biodiversity Sites in the Whakatāne District Plan).

Bay of Plenty Regional Council commissioned Wildland Consultants to analyse real changes in extent of indigenous vegetation in recent times (based on mapped boundaries of significant indigenous vegetation and habitats in District and City Plans) in the Bay of Plenty District. This analysis was undertaken for each of the local authority districts in the Bay of Plenty in 2019 (Ōpōtiki District (Wildland Consultants 2019)) and 2020 (Taupō District, Rotorua District including the Lakes A Zone, Whakatāne District, Western Bay of Plenty District, Kawerau District, and Tauranga City (Wildland Consultants 2020a-g)). This report provides a summary and comparison of the real losses and real gains of extent of significant indigenous vegetation and habitats within and between each district.

2. METHODS

2.1 Collation of data

Data from each of the recent assessments of real loss and real gain of extent of significant indigenous vegetation and habitats in each district in the Bay of Plenty Region (Wildland Consultants 2019 and 2020a-g) was collated.

Further attributes were assigned to the GIS layer of real loss in Ōpōtiki District, and the GIS layer of real loss and real gain in Taupō District to enable comparison of real changes by timing, bioclimatic zone, Threatened Land Environment, and ecosystem type. Methods used to update these GIS layers are described in the following two sections.

2.2 Ōpōtiki District

Approximate dates for when each real loss occurred were determined for each polygon (polygons of all sizes) of real loss of indigenous vegetation and habitats, by using historical imagery on GoogleEarth.

Real losses (polygons of all sizes) were analysed by bioclimatic zone, Threatened Land Environment classification (Walker *et al.* 2015), and ecosystem type. Real loss polygons which were located offshore, and therefore beyond the cover of the Threatened Land Environment GIS layer, were assigned the same classification as the nearest classified land area for the purposes of this analysis.

Ecosystem types (adapted from New Zealand Land Cover Database (LCDB Version 5.0) cover class categories (Landcare Research 2020) to include additional types such as sand dunes, early successional, and managed lawn) were assigned to each real loss polygon based on the vegetation and habitats present within each polygon on the relevant aerial photographs available on Google Earth (generally 2003) and/or described in Wildland Consultants (1999).

The updated GIS layer called "Losses of the extent of sites of significant indigenous vegetation and habitats in Ōpōtiki District between 2003 and 2015/2017" was provided to the client. The attribute table for this layer contains notes on the reason for each area of loss between 2003 and 2015/17, and the approximate date of each polygon of real change.

2.3 Taupō District

Approximate dates for when each real change (>0.5 ha) occurred were determined for each polygon of real loss and real gain of indigenous vegetation and habitats, by using historical imagery on GoogleEarth.

Real losses and real gains (polygons of all sizes) were analysed by bioclimatic zone, Threatened Land Environment classification (Walker *et al.* 2015), and ecosystem type (for polygons >0.5 ha). Ecosystem types (adapted from New Zealand Land Cover Database (LCDB version 5.0) cover class categories (Landcare Research 2020) to include additional types such as early successional, and managed lawn) were assigned to each real change polygon based on the vegetation and habitats present within each polygon on the WRAPS 2012-2013 or 2017 aerial photography.

The updated GIS layer called "Losses and gains of the extent of sites of significant indigenous vegetation and habitats in Taupō District between 2008/9 and 2017" was provided to the client. The attribute table for this layer contains notes on the reason for each area of loss and real gain between 2008/9 and 2017, and the approximate date of each polygon of real change.

2.4 Analyses and discussion

For Rotorua and Taupō Districts, real losses and real gains were excluded from this analysis if they were not within the Bay of Plenty Region. In this report, analyses presented for Rotorua and Taupō Districts, refer only to the parts within the Bay of Plenty Region.

To enable a more direct comparison of the extent of real loss and real gain between each of the districts which differ in size, data was expressed as percentages of the previously mapped extent of sites of significant indigenous vegetation and habitats in each district (see Table 1). For comparisons of real loss and real gain between districts, based on bioclimatic zone, Threatened Land Environment, and ecosystems, data for each district was expressed as a percentage of the total real loss in each given district.

Table 1: Total area of mapped sites of significant indigenous vegetation and habitats in each district in the Bay of Plenty prior to this assessment.

District	Area (ha)
Ōpōtiki District (as mapped in Wildland Consultants 2005)	225,025.5
Taupō District (as per Taupō District Plan 2019[1], part within Bay of Plenty Region)	15,558.0
Rotorua District (as per notified Plan Change 3[2], part within Bay of Plenty Region)	27,498.0
Rotorua Lakes A Zone (as per Wildland Consultants 2012)	25,561.2
Whakatāne District (as per Whakatāne District Plan 2017[3])	219,657.0
Western Bay of Plenty (as per Western Bay of Plenty District Plan 2012[4])	18,340.0
Kawerau District (as per Kawerau District Plan 2012[5], Beadel and Shaw (1996), and Beadel, Shaw, and Gosling (2011))	285.7
Tauranga City (as per Tauranga City Plan 2013[6])	875.0

Comparisons were made for the following attributes:

- Total extent of real loss in each district,
- Reasons for real loss in each district,
- Timing, bioclimatic zone, Threatened Land Environment, and ecosystem type of real losses in each district,
- Total extent of real gain in each district (for districts for which this has been assessed, Taupō District, Whakatāne District, Western Bay of Plenty District, Kawerau District, and Tauranga City),
- Reasons for real gain in each district (for districts for which this has been assessed),
- Timing, bioclimatic zone, Threatened Land Environment, and ecosystem type of real gains in each district (for districts for which this has been assessed).

A commentary was prepared to discuss key comparisons between districts in the Bay of Plenty Region. A limitation to the comparisons is that each district has been

1 Sourced from Taupō District Council, Operative Taupō District Plan, Section 7 (https://taupo.isoplan.co.nz/eplan/#Rules/0/13/1/6999/0). Accessed on 21 March 2019.

2 Sourced from Rotorua Lakes Council, Operative Rotorua District Plan 2016-2026 - Appendix 2 Updated July 2019, with changes proposed by Plan Change 3 (notified 27 July 2019) (http://geo.rdc.govt.nz/BOPLASS/Tiny/TRIM.aspx?recNum=RDC-945182). Accessed on 24 January 2020.

3 Sourced from Whakatāne District Council, Operative Whakatāne District Plan 2017 - Chapter 15, Section 15.7 Appendices (date 21 June 2017) (https://www.whakatane.govt.nz/sites/www.whakatane.govt.nz/files/documents/documents-section/council-plans/operative-district-plan/2017-chapters/Chapter%2015%20-%20Updated%2021%20June%202017.pdf). Accessed on 21 February 2020.

4 Sourced from Western Bay of Plenty District Council, Operative Western Bay of Plenty District Plan 2012 - Appendix 1 (date 17 September 2016) (https://www.westernbay.govt.nz/repository/libraries/id:25p4fe6mo17q9stw0v5w/hierarchy/property-rates-building/district-plan/operative-district-plan-2012/Appendix%201%20-%20Schedule%20of%20Identified%20Significant%20Ecological%20Features%20-%20CHANGED%20-%20PDF.pdf). Accessed on 21 February 2020.

5 Sourced from Kawerau District Council, Operative Kawerau District Plan 2012 - Appendix C (https://www.kaweraudc.govt.nz/files/documents/appendix_c_schedule_of_heritage_sites_and_places.pdf). Accessed on 21 February 2020.

6 Sourced from Tauranga City Council, Operative Tauranga City Plan 2013 - Chapter 5 Natural Environment, Appendix 5A (date 11 September 2018) (http://econtent.tauranga.govt.nz/data/city_plan/ch/5/appendix5a_special_ecological_areas_(SEA)_register.pdf). Accessed on 21 February 2020.

analysed on slightly different timeframes, depending on the timing of earlier work to delineate sites of significant indigenous vegetation and habitats and the timing of aerial photographs available for the analyses (Table 2). This limitation is not considered to severely compromise the current summary report of changes in the extent of sites of significant indigenous vegetation and habitats in the Bay of Plenty Region. In general changes were analysed between 2003/2007 and 2017/2018. An exception is Rotorua Lakes A Zone which had a more recent date for the initial comparison of 2011.

Table 2: Dates of aerial photographs used for analyses of real change in extent of sites of significant indigenous vegetation and habitats in each district in the Bay of Plenty Region, and reference for assessment of each district.

District	Range of Dates of Aerial Photographs Used for Analysis	Reference
Ōpōtiki District	2003 - 2015/2017	*Wildland Consultants Ltd Contract Report No. 4929.*
Taupō District	2007/2008 - 2013/2017	*Wildland Consultants Ltd Contract Report No. 4881.*
Rotorua District	2003 - 2019	*Wildland Consultants Ltd Contract Report No. 5314a.*
Rotorua Lakes A Zone	2011 - 2016/2019	*Wildland Consultants Ltd Contract Report No. 5314b.*
Whakatāne District	2003/2007 - 2016/2019	*Wildland Consultants Ltd Contract Report No. 5314c.*
Western Bay of Plenty	2003/2007 - 2016/2019	*Wildland Consultants Ltd Contract Report No. 5314d.*
Kawerau District	2007 - 2016/2019	*Wildland Consultants Ltd Contract Report No. 5314e.*
Tauranga City	2007 - 2018/2019	*Wildland Consultants Ltd Contract Report No. 5314f.*

3. FINDINGS - REAL LOSS

3.1 Overview of total extent of loss

Real loss of extent from sites of significant indigenous vegetation and habitats was assessed in every district in the Bay of Plenty Region. Overall, in the Bay of Plenty Region there was a total real loss of approximately 624 hectares of extent from sites of significant indigenous vegetation and habitat between 2003 and 2019 (see Table 3). Most of this real loss (*c.*254 hectares, or 41% of the total real loss in the Bay of Plenty Region) occurred in the semi-coastal bioclimatic zone. The majority of real loss in the Bay of Plenty Region occurred in the Acutely Threatened (*c.*238 hectares, or 38% of the total real loss in the Bay of Plenty Region) and Underprotected (*c.*210 hectares, or 33% of the total real loss in the Bay of Plenty Region) Land Environments (see Table 4).

Table 3: Total area and percent of real loss and real gain of mapped sites of significant indigenous vegetation and habitats in the Bay of Plenty, per bioclimatic zone.

Bioclimatic Zone	Loss in Bay of Plenty Region		Gain in Bay of Plenty Region	
	Total Area (ha)	Percent of Total Real Loss	Total Area (ha)	Percent of Total Real Gain
Coastal	111.2	18	145.9	43
Semi-coastal	254.5	41	51.8	15
Lowland	158.6	25	81.6	24
Submontane	100.3	16	53.5	16
Montane	0	0	3.2	1
Subalpine	0	0	0	0
Total	**624.5**	**100%**	**336.0**	**100%**

Table 4: Total area and percent of real loss and real gain of mapped sites of significant indigenous vegetation and habitats in the Bay of Plenty, per Threatened Land Environment.

Threatened Environment Classification	Loss in Bay of Plenty Region		Gain in Bay of Plenty Region	
	Total Area (ha)	Percent of Total Real Loss	Total Area (ha)	Percent of Total Real Gain
Acutely Threatened	238.5	38.2	74.4	22.1
Chronically Threatened	64.3	10.3	72.7	21.6
At Risk	4.8	0.8	56.8	16.9
Critically Underprotected	1.8	0.3	0	0.0
Underprotected	210.9	33.8	96.0	28.6
Less Reduced and Better Protected	104.4	16.7	36.1	10.7
Total	**624.5**	**100%**	**336.0**	**100%**

Real loss occurred across ten ecosystems in the Bay of Plenty Region (see Table 5). About 20% (or *c.*135 hectares) of the total real loss in the Bay of Plenty Region was loss of lowland indigenous broadleaved species scrub. About 10-15% (or *c.*70-100 hectares) of the total real loss in the Bay of Plenty Region was loss of each of the following ecosystems: mānuka and/or kānuka scrub, indigenous forest, early successional ecosystems, and frost flats. About 10% (or *c.*68 hectares) of the total real loss in the Bay of Plenty Region was loss of sand dune ecosystems, and about seven percent (or *c.*42 hectares) of the total real loss in the Bay of Plenty Region was loss of freshwater wetlands. Loss of fernland, geothermal ground and/or water, and mangroves each accounted for less than five percent of the total real loss in the Bay of Plenty Region.

When considered irrespective of the previous mapped extent of sites, the district with the largest total extent of real loss of sites of indigenous vegetation and habitats was Whakatāne District (*c.*187.4 ha, or 30% of the total real loss in the Bay of Plenty Region), closely followed by Ōpōtiki District (*c.*186.8 ha, or 29% of the total real loss in the Bay of Plenty Region). The district with the smallest total extent of real loss of sites of indigenous vegetation and habitats was Kawerau District (*c.*0.6 ha, 0.1% of the total real loss in the Bay of Plenty Region), followed by Rotorua Lakes A Zone (7.3 ha, or 1.2% of the total real loss in the Bay of Plenty Region) (see Appendix 1). It is apparent that these comparisons are affected by the total size of each district, with larger districts (e.g. Whakatāne District and Ōpōtiki District) experiencing greater total real loss and smaller districts (e.g. Kawerau District) experiencing smaller total real loss (see Table 6 for total size of each district in the Bay of Plenty Region).

Table 5: Total area and percent of real loss and real gain of mapped sites of significant indigenous vegetation and habitats in the Bay of Plenty, per ecosystem lost and ecosystem gained.

Ecosystem Type	Loss in Bay of Plenty Region		Gain in Bay of Plenty Region	
	Total Area (ha)	Percent of Total Real Loss	Total Area (ha)	Percent of Total Real Gain
Early Successional[1]	84.42	13.52	3.53	1.05
Lowland Indigenous Broadleaved Species Scrub[2]	135.58	21.71	163.32	48.60
Freshwater Wetland	42.59	6.82	40.77	12.13
Estuarine Wetland	-	-	63.29	18.83
Fernland	19.96	3.20	-	-
Indigenous Forest[3]	81.46	13.04	0.67	0.20
Geothermal ground/water	5.75	0.92	-	-
Frost Flat	99.41	15.92	8.66	2.58
Mangrove	15.43	2.47	37.79	11.25
Mānuka and/or Kānuka Scrub	71.5	11.45	7.64	2.27
Sand Dune - Foredune	25.94	4.15	7.69	2.29
Sand Dune - Back Dune	42.49	6.80	1.94	0.58
Sand Dune - Subtotal	68.43	10.96	9.60	2.86
Total	**624.5**	**100%**	**336.0**	**100%**

Table 6: Total area of each district in the Bay of Plenty Region.

District	Area (ha)
Ōpōtiki District	308,978
Taupō District (part within Bay of Plenty Region)	99,627
Rotorua District (part within Bay of Plenty Region, excluding Lakes A Zone)[4]	126,389
Rotorua Lakes A Zone	34,703
Whakatāne District	445,009
Western Bay of Plenty	195,112
Kawerau District	2,356
Tauranga City	13,511
Total in the Bay of Plenty Region	**122,5685**

When considered relative to the previously mapped extent of sites of indigenous vegetation and habitats within each district, the highest percentage of real loss was recorded in Tauranga City (3.6% of the previous mapped extent of sites was lost, *c.*31.5 hectares) (see Figures 1a-b). The district with the second highest percentage of real loss relative to previous mapped extent was Taupō District (0.65% of the previous mapped extent of sites was lost, *c.*100.9 hectares), with more than five times less loss relative to the previous mapped extent in Taupō District than in Tauranga City. A similar percentage of real loss of sites of indigenous vegetation and habitats was

[1] Ecosystems in an early stage of succession such as fernland, shrubland, and scrub. Indigenous plant species are common to dominant but exotic plants such as gorse and blackberry are also often present.

[2] Lowland scrub communities dominated by a mixture of indigenous broadleaved shrubs such as makomako (wineberry; *Aristotelia serrata*), māhoe (*Melicytus ramiflorus*), whauwhaupaku (five-finger; *Pseudopanax arboreus*), kōhūhū (*Pittosporum tenuifolium*), kōtukutuku (*Fuchsia excorticata*), and tree ferns. This ecosystem type is usually indicative of advanced succession toward indigenous forest.

[3] Tall forest dominated by indigenous broadleaved or conifer species.

[4] The total areas of Rotorua District and Rotorua Lakes A Zone include the lakes.

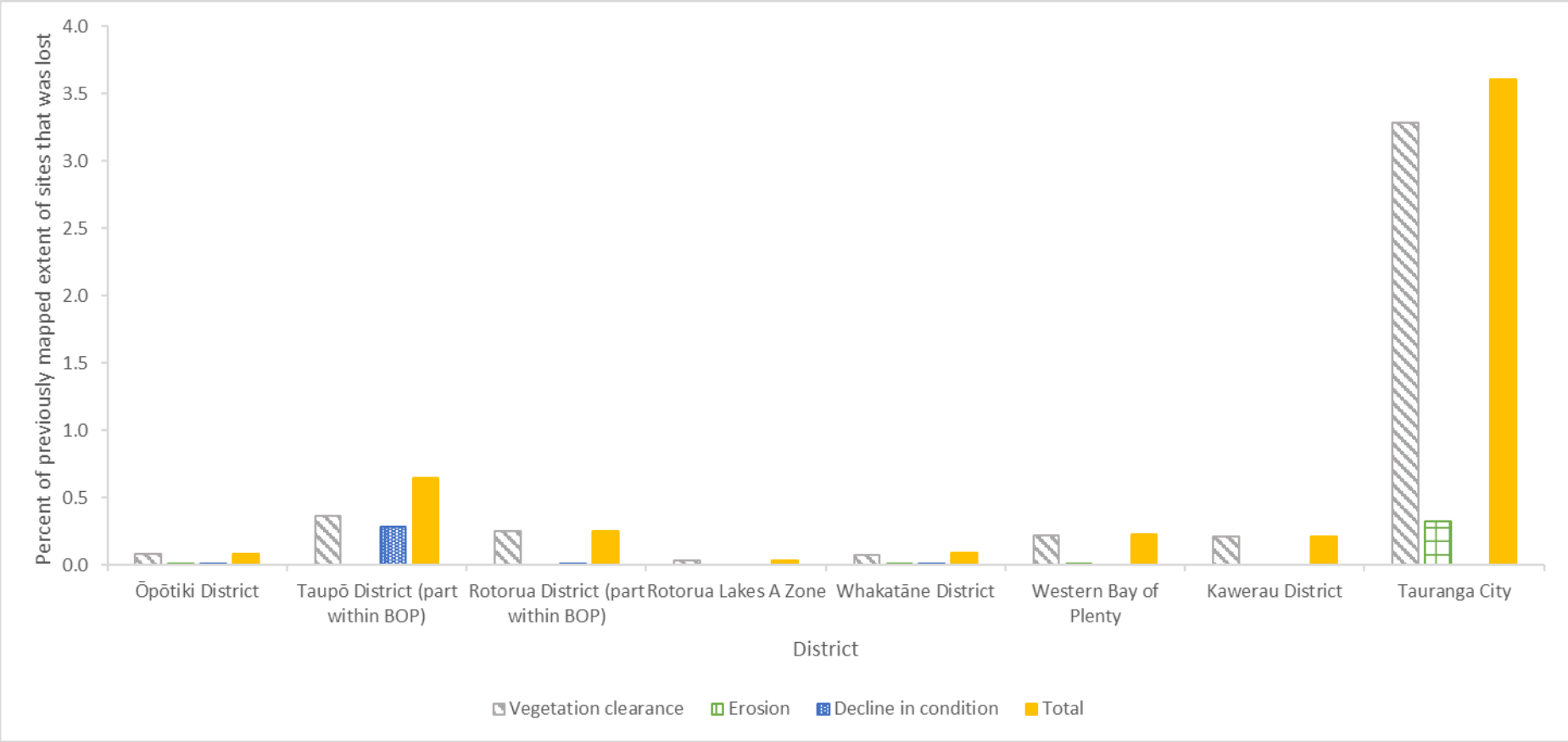

Figure 1a: Percent of mapped extent of sites of significant indigenous vegetation and habitats in each district in the Bay of Plenty Region that was lost for each reason and in total.

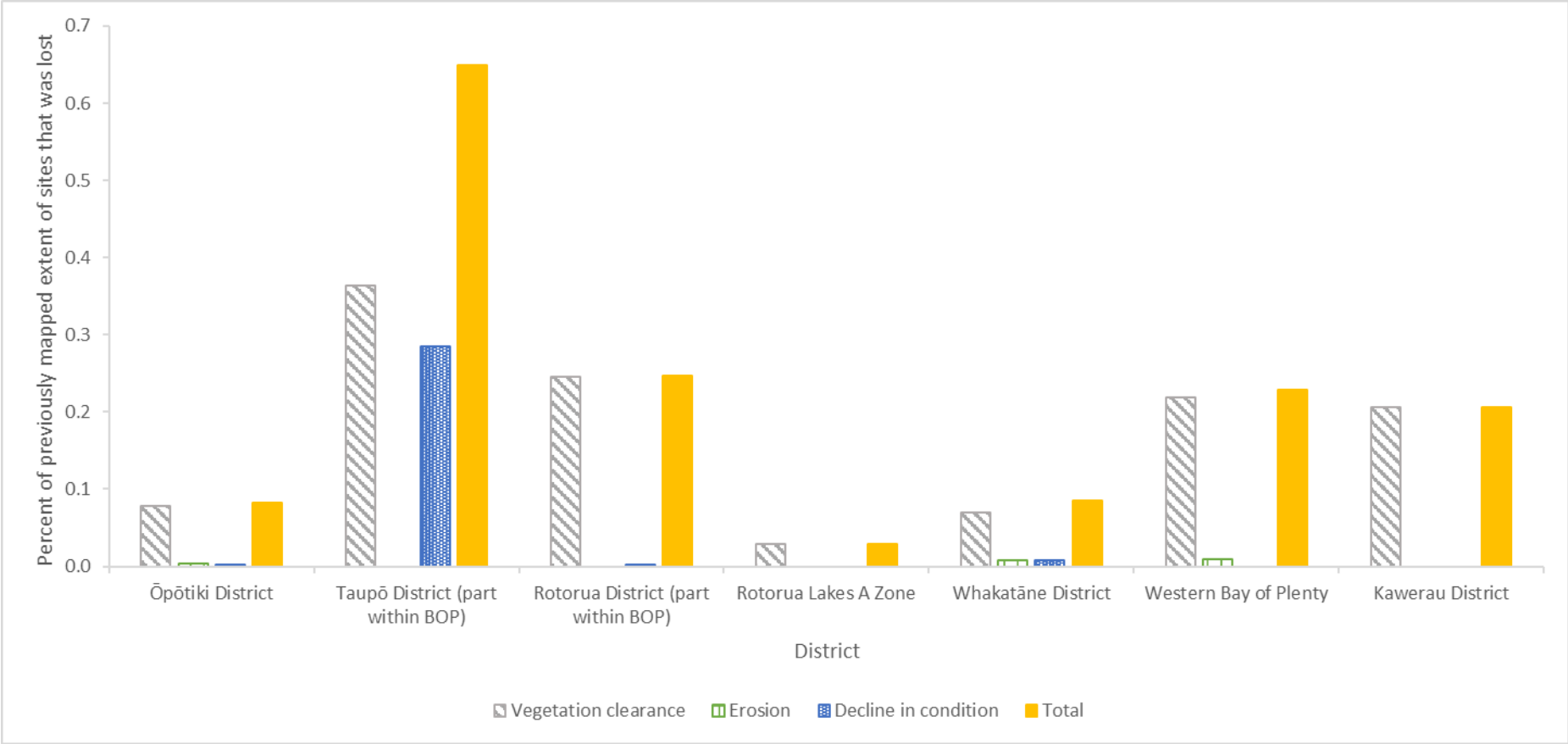

Figure 1b: Percent of mapped extent of sites of significant indigenous vegetation and habitats in each district in the Bay of Plenty Region (excluding Tauranga City) that was lost for each reason and in total.

recorded in Rotorua (0.25% of the previous mapped extent of sites was lost, *c.*68.1 hectares), Western Bay of Plenty (0.23% of the previous mapped extent of sites was lost, *c.*41.9 hectares), and Kawerau (0.21% of the previous mapped extent of sites was lost) Districts. A comparatively low percent of loss was recorded in each of the remaining districts (Ōpōtiki (0.08% of the previous mapped extent of sites was lost, *c.*186.8 hectares), Whakatāne District (0.09% of the previous mapped extent of sites was lost, *c.*187.4 hectares), and Rotorua Lakes A Zone (0.03% of the previous mapped extent of sites was lost, *c.*7.3 hectares)).

3.2 Reasons for loss

Vegetation clearance was the main cause of loss of extent of sites of significant indigenous vegetation and habitats in all districts in the Bay of Plenty Region between 2003 and 2019 (see Figures 1a-b and Appendices 1 and 2). There was a total real loss of extent of *c.*529 hectares due to vegetation clearance in the Bay of Plenty Region. Vegetation clearance was the cause of real loss of extent of *c.*3.3% of the previously mapped extent of sites in Tauranga City; *c.*0.4% of the previously mapped extent of sites in Taupō District; *c.*0.2% of the previously mapped extent of sites in each of Rotorua, Western Bay of Plenty, and Kawerau Districts; *c.*0.1% of the previously mapped extent of sites in Ōpōtiki and Whakatāne Districts; and <0.1% of the previously mapped extent of polygons in Rotorua Lakes A Zone.

Vegetation clearance in Tauranga City comprised mangrove clearance (across six sites); conversion to pasture (at SEA 11 Kaituna Sand Dunes and Wetlands); conversion to managed lawn (at two sites); vegetation clearance for construction of access tracks (at SEA 14 Kopurererua Stream Wetland); and for residential development (at two sites). Most of the vegetation clearance in Taupō District was attributed to conversion to exotic plantation forest and spray damage of indigenous vegetation during wilding pine control. Vegetation clearance in Rotorua, Western Bay of Plenty, and Ōpōtiki Districts was attributed to a range of seven reasons. Vegetation clearance in Whakatāne District was attributed to a range of eight reasons. Vegetation clearance in Rotorua Lakes A Zone was attributed to three reasons (conversion to exotic plantation forest, management of contiguous plantation forest, and residential development). Vegetation clearance in Kawerau District was a result of development of a site for a geothermal power station (Site 10. Tarawera River Kānuka).

There was a total real loss of extent of *c.*30 hectares from sites of significant indigenous vegetation and habitats in the Bay of Plenty Region due to erosion between 2003 and 2019. Real loss occurred as a result of erosion in half of the districts in the Bay of Plenty Region (Ōpōtiki, Whakatāne, Western Bay of Plenty, and Tauranga City). Erosion was the cause of real loss of extent of *c.*0.3% of the previously mapped extent of sites in Tauranga City (*c.*2.8 hectares) and <0.1% of the previously mapped extent of sites in Ōpōtiki (*c.*8.4 hectares), Whakatāne (*c.*17.5 hectares), and Western Bay of Plenty (*c.*1.7 hectares) Districts. Coastal erosion occurred in all four of these districts. Erosion due to changes in river course (Site 130. Maungaroa Farm, Mōtū Ecological District) and landslips (Site 136. Hāwai-Mōtū River, Mōtū Ecological District) also occurred in Ōpōtiki District.

There was a total real loss of extent of *c.*64 hectares from sites of significant indigenous vegetation and habitats in the Bay of Plenty Region due to a decline in condition between 2003 and 2019. Decline in condition was a cause of real loss of extent of sites of significant indigenous vegetation and habitats in half of the districts in the Bay of Plenty Region (Ōpōtiki, Taupō, Rotorua, and Whakatāne Districts). Decline in condition was the cause of real loss of extent of *c.*0.3% of the previously mapped extent of sites in Taupō District (*c.*44.3 hectares) and <0.1% of the previously mapped extent of sites in Ōpōtiki (*c.*3.7 hectares), Rotorua (*c.*0.5 hectares), and Whakatāne (*c.*3.7 hectares) Districts. In Taupō, Rotorua, and Whakatāne Districts, decline in condition was caused by invasion of pest plants. In Rotorua District there was also some decline in condition due to management of lawns (SNA 113 Tangatarua (Old Taupō Road Reserve)), and in Whakatāne District there was also some decline in condition due to excavation of wetlands to create ponds (SIBS BS27 A Kohika). In Ōpōtiki District decline in condition (total of *c.*3.7 hectares) was due to the development of vehicle tracks (Site No. 139 Te Waiiti Stream, Mōtū Ecological District).

3.3 Loss per bioclimatic zone and land environment

Overall, in the Bay of Plenty, real loss was most extensive in the semi-coastal (*c.*254 hectares, or 41% of the total real loss in the Bay of Plenty Region) and lowland bioclimatic zones (*c.*158 hectares, or 25% of the total real loss in the Bay of Plenty Region) (see Table 3). Real loss in one or both of these bioclimatic zones occurred in every district in the Bay of Plenty Region (see Figure 2). Real loss in the coastal bioclimatic zone was recorded in Tauranga City (*c.*28 hectares, or 89% of the total extent of real loss in Tauranga District), Ōpōtiki District (*c.*44 hectares, or 24% of the total extent of real loss in Ōpōtiki District), Whakatāne District (*c.*32 hectares, or 17% of the total extent of real loss in Whakatāne District), and Western Bay of Plenty District (5.7 hectares, or 14% of the total extent of real loss in Western Bay of Plenty District). Overall, in the Bay of Plenty, total real loss in the coastal bioclimatic zone (*c.*111 hectares, 18% of the total real loss in the Bay of Plenty Region) was less than total real loss in both the semi-coastal and lowland bioclimatic zones (see values in first sentence of this paragraph), but slightly more than the total real loss in the submontane bioclimatic zone (*c.*100 hectares, 16% of the total real loss in the Bay of Plenty Region). All of the real loss in the submontane bioclimatic zone was recorded in Taupō District. Ōpōtiki District, Rotorua District, Rotorua Lakes A Zone, Whakatāne District, and Western Bay of Plenty District also have parts of their Districts in the submontane bioclimatic zone however no loss occurred in this zone in these Districts. Parts of the Ōpōtiki District, Taupō District, Rotorua District, and Whakatāne District occur in the montane bioclimatic zone and parts of the Ōpōtiki District and Whakatāne District occur in the subalpine bioclimatic zone, however no real loss was recorded in these bioclimatic zones which reflects the fact that much of the indigenous vegetation within these bioclimatic zones is legally protected.

Real loss was recorded in at least one of the three most threatened land environments (Acutely Threatened, Chronically Threatened, and At Risk Land Environments) in every district in the Bay of Plenty Region (see Figure 3). Most of the total extent of real loss in the Bay of Plenty Region occurred in the Acutely Threatened (38% of the

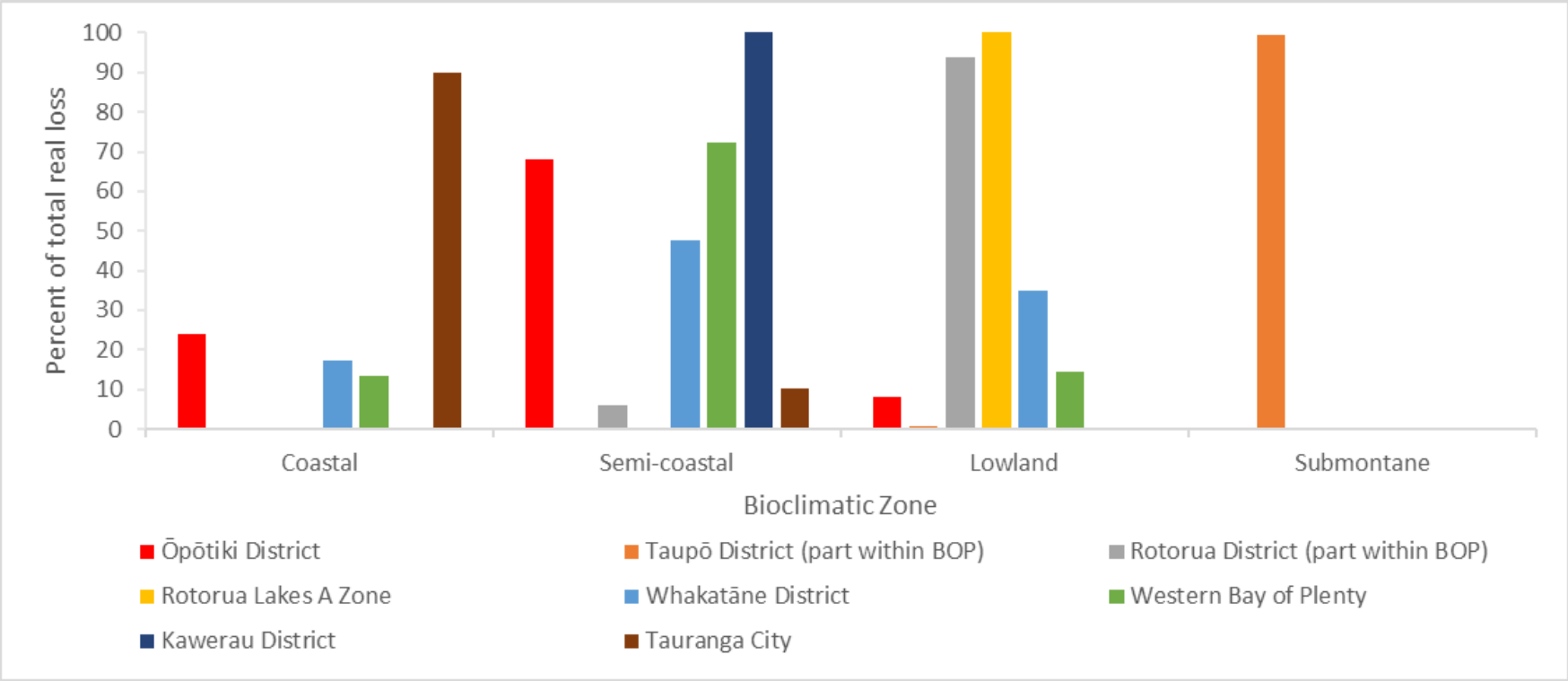

Figure 2: Percent of total real loss in each district in the Bay of Plenty Region that occurred within each bioclimatic zone.

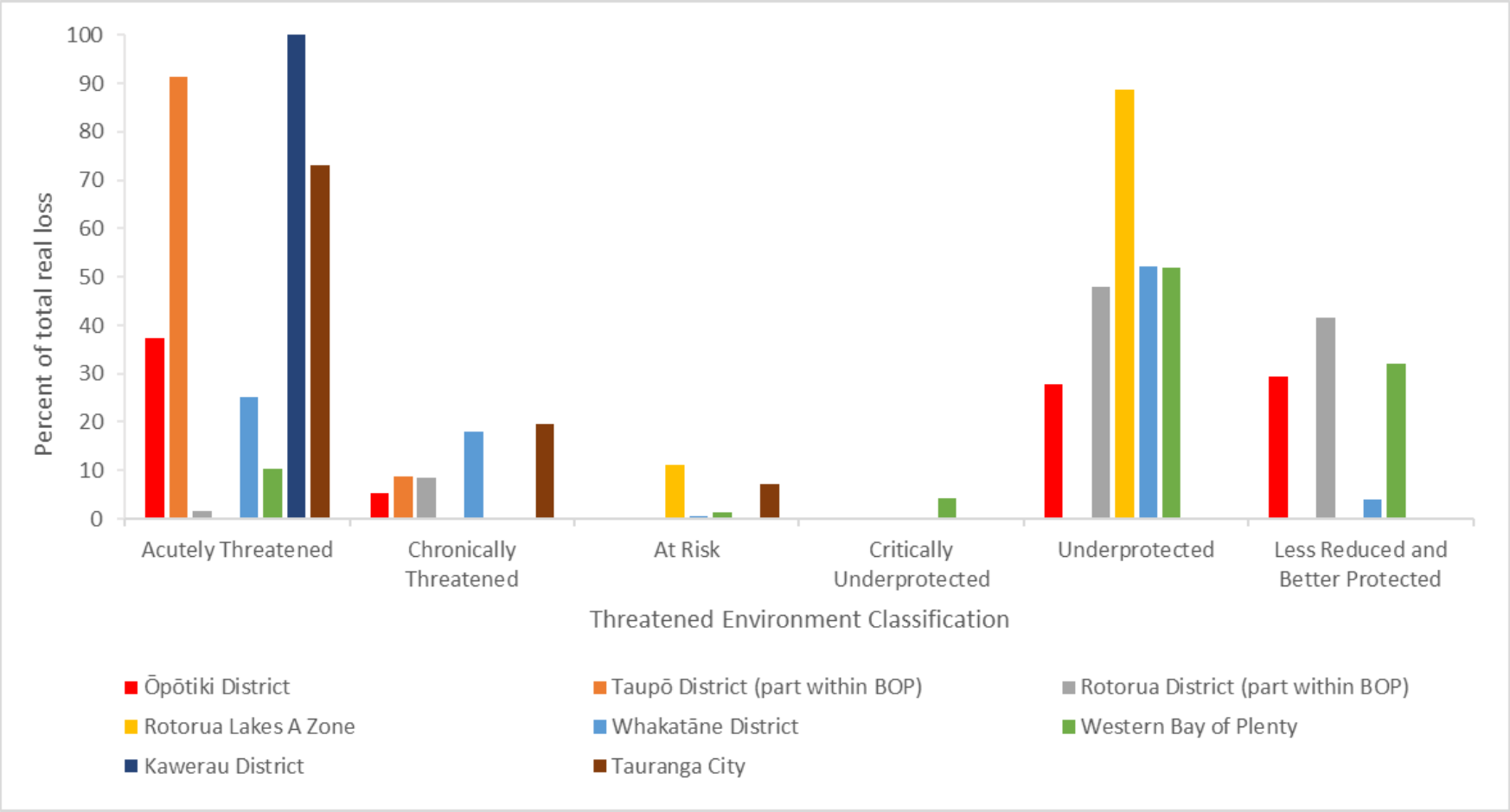

Figure 3: Percent of total real loss in each district in the Bay of Plenty Region that occurred within each Threatened Land Environment.

total real loss in the Bay of Plenty Region, *c.*238.5 hectares) and Underprotected (33% of the total real loss in the Bay of Plenty Region, *c.*210.9 hectares) Land Environments (see Table 4). More than about 35% of the total real loss in each of Ōpōtiki District (37% of the total real loss in Ōpōtiki District, *c.*70 hectares), Tauranga City (73% of the total real loss in Tauranga City, *c.*23 hectares), Taupō District (91% of the total real loss in Taupō District, *c.*92 hectares), and Kawerau District (100% of the total real loss in Kawerau District, *c.*0.6 hectares) occurred within Acutely Threatened Land Environments (the most threatened land environment). More than about 45% of the total real loss in each of Rotorua District (48% of the total real loss in Rotorua District, *c.*32 hectares), Whakatāne District (52% of the total real loss in Whakatāne District, *c.*97 hectares), Western Bay of Plenty District (52% of the total real loss in Western Bay of Plenty District, *c.*22 hectares), and Rotorua Lakes A Zone (88% of the total real loss in Rotorua Lakes A Zone, *c.*6.5 hectares) occurred within Underprotected Land Environments.

3.4 Loss per ecosystem

The ecosystem with the largest percent of total real loss in the Bay of Plenty Region was lowland indigenous broadleaved species scrub, which accounted for about 20% (or *c.*135 hectares) of the total real loss in the Bay of Plenty Region (see Table 5). Compared to other ecosystems, indigenous forest and lowland indigenous broadleaved species scrub were the ecosystems where loss occurred in the highest number of districts (see Figure 4). Loss of indigenous forest and/or lowland indigenous broadleaved species scrub occurred in seven of the eight districts in the Bay of Plenty Region (all except for Tauranga City). Loss of indigenous forest (kānuka forest) accounted for 100% of the total real loss in Kawerau District (*c.*0.6 hectares). Approximately 40% of the total real loss in Rotorua District (*c.*28 hectares) was loss of indigenous forest. A further *c.*20% of the total real loss in Rotorua District (*c.*13 hectares) was loss of lowland indigenous broadleaved species scrub. Lowland indigenous broadleaved species scrub was the most commonly lost ecosystem in Rotorua Lakes A Zone (*c.*73% of the total real loss, *c.*5 hectares) and Ōpōtiki District (*c.*43% of the total real loss, *c.*79 hectares).

Early successional ecosystems were the main ecosystems lost in both Whakatāne District (*c.*29% of the total real loss in Whakatāne District, *c.*53 hectares) and Western Bay of Plenty District (*c.*74% of the total real loss in Western Bay of Plenty District, *c.*30 hectares). Loss of mānuka and/or kānuka scrub occurred in Ōpōtiki (*c.*23% of the total real loss in Ōpōtiki District, *c.*42 hectares), Rotorua (*c.*13% of the total real loss in Rotorua District, *c.*9 hectares), and Whakatāne Districts (*c.*11% of the total real loss in Whakatāne District, *c.*20 hectares). Loss of fernland was comparatively uncommon, occurring in Rotorua District (*c.*12% of the total real loss in Rotorua District, *c.*8 hectares) and Whakatāne District (*c.*6% of the total real loss in Whakatāne District, *c.*12 hectares).

Loss of freshwater wetland occurred within five of the eight districts (see Figure 4). Whakatāne District and Tauranga City were the districts with the largest percent of loss of freshwater wetland (both *c.*14% of the total real loss in each district,

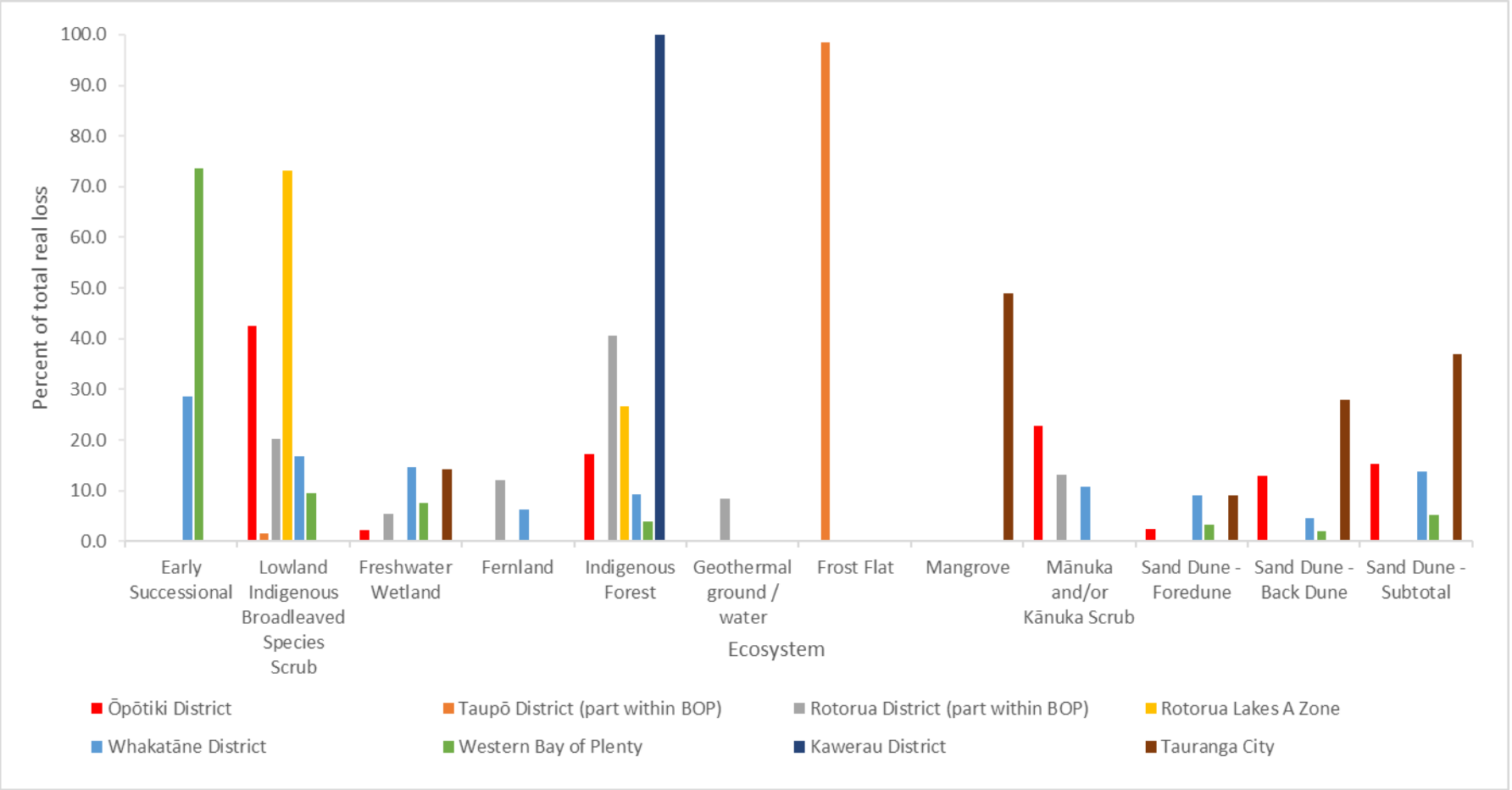

Figure 4: Percent of total real loss in each district in the Bay of Plenty that occurred within each ecosystem.

*c.*27 hectares in Whakatāne District and *c.*4.5 hectares in Tauranga City[1]) relative to other ecosystems. Loss of freshwater wetland also occurred in Western Bay of Plenty (*c.*7.5% of the total real loss in Western Bay of Plenty, *c.*3 hectares), Rotorua District (*c.*5% of the total real loss in Rotorua District, *c.*4 hectares), and Ōpōtiki District (*c.*2% of the total real loss in Ōpōtiki District, *c.*4 hectares).

Loss of sand dune ecosystems occurred in all of the districts where this ecosystem is present. Loss of sand dunes contributed to *c.*37% of the total real loss in Tauranga City (*c.*12 hectares), *c.*14-15% of the total real loss in Whakatāne (*c.*26 hectares), and Ōpōtiki Districts (*c.*29 hectares), and *c.*5% of the total real loss in Western Bay of Plenty (*c.*2 hectares).

Loss of mangroves was only recorded in Tauranga City, where it contributed to *c.*49% (*c.*15 hectares) of the total real loss.

Almost all of the real loss in Taupō District was loss of frost flat ecosystems (*c.*99 hectares, *c.*98.5% of the total real loss in Taupō District). Most of this loss was associated with areas in the upper Rangitāiki River catchment.

Loss of geothermal ground and/or water was recorded in Rotorua District (*c.*8.5% of the total real loss, *c.*5.8 hectares). The majority of the loss of geothermal ground and/or water in Rotorua District was recorded at SNA 36 Tikitere Northwest. The remainder was occurred at SNA 113 Tangatarua (Old Taupo Road Reserve) and SNA 130 Marguerita Street (Wonderland; Leisureland).

3.5 Timing of real losses

Real losses in Ōpōtiki District, Taupō District, Rotorua District, Whakatāne District, and Western Bay of Plenty District were recorded between 2003 and 2019[2] (see Figure 5). Real losses in Rotorua Lakes A Zone were recorded between 2011 and 2018. Real losses in Tauranga City were recorded between 2007 and 2019. Real losses in Kawerau District were recorded at one site (Site 10. Tarawera River Kānuka) between 2011-2012.

In Ōpōtiki District, the year bracket with the highest number of sites with real losses was 2006-2008 (with 44 of the 165 SNAs (Significant Natural Areas) included in the assessment showing real losses).

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[1] Real loss of freshwater wetland in Tauranga City is likely to be slightly under delineated. This is because at SEA 14 Kopurererua Stream Wetland only the larger and more compact areas of vegetation clearance for construction of a network of raised walking tracks and managed lawn were identified. Additional vegetation clearance for further raised walking tracks, managed lawn, and creation of ponds has been undertaken in areas throughout SEA 14. However, these areas were beyond the scale of detail for mapping in this project and are still integral parts of this site. The largest extent of real loss of freshwater wetland in Tauranga City occurred at SEA 14 (*c.*3.2 hectares). The remaining real loss of freshwater wetland in Tauranga City occurred at SEA 1 Wairoa River (*c.*1.3 hectares).

[2] The most recent aerial photographs which were available on GoogleEarth at the time of the assessment, were typically from 2019. Therefore, in some cases, where 2019 is the latest year that real loss ended, there may be ongoing real losses.

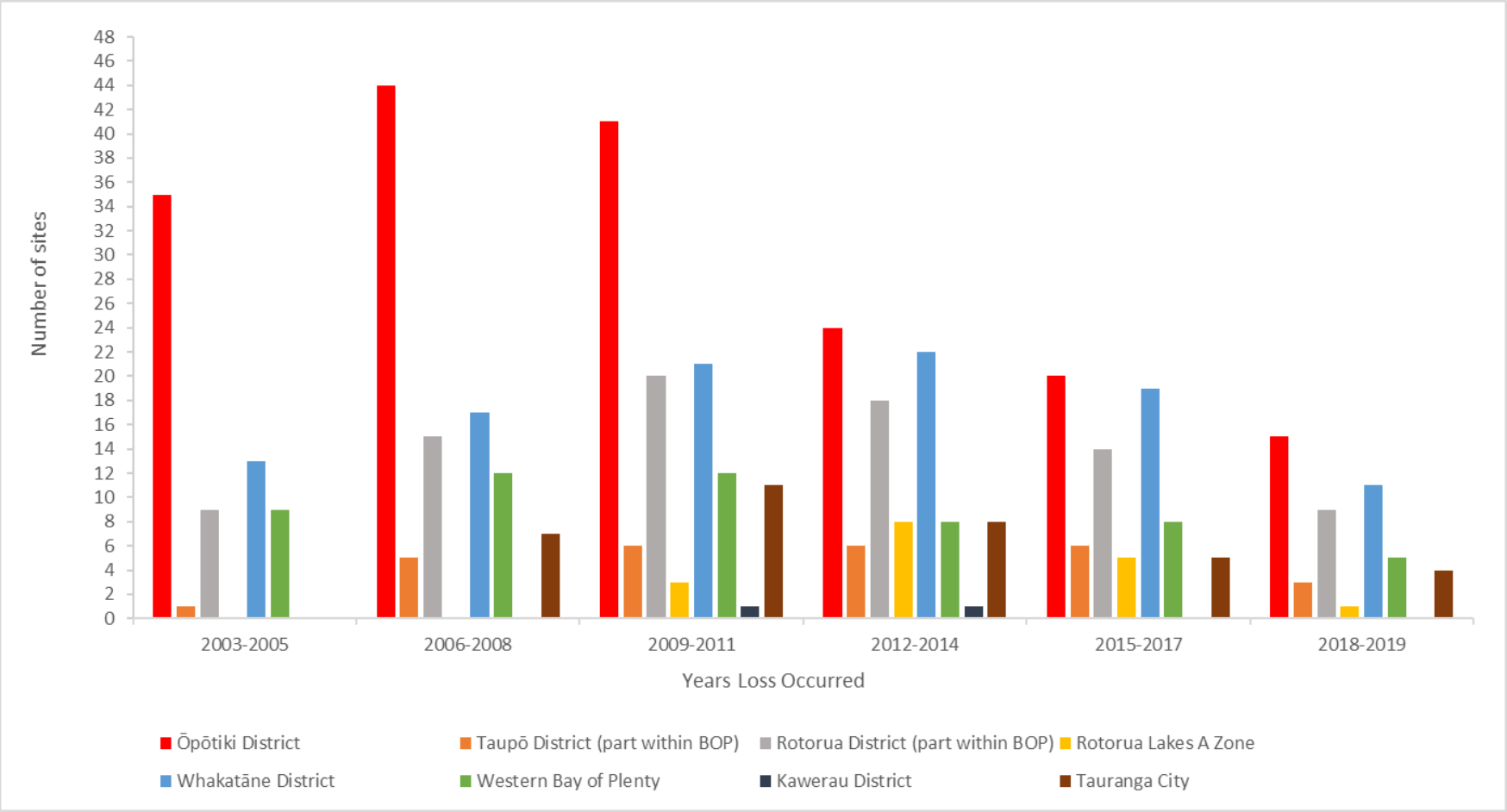

Figure 5: Number of sites of significant indigenous vegetation and habitats where real loss occurred in each year bracket[1], in each district in the Bay of Plenty.

[1] Note: Each site is recorded as a site of real loss for every year bracket that loss was observed in at that site. Therefore, each site may be recorded in multiple year brackets.

In Taupō District, the year brackets with the highest number of sites with real losses were 2009-2011, 2012-2014, and 2015-2017 (each with six of the 39 SNAs included in the assessment showing real losses).

In Rotorua District, the year bracket with the highest number of sites with real losses was 2009-2011 (with 20 of the 137 SNAs in the Rotorua District included in the assessment showing real losses).

In Rotorua Lakes A Zone and Whakatāne District, the year bracket with the highest number of polygons/sites with real losses was 2012-2014 (8 of the 801 polygons included in the Lakes A Zone assessment, and 22 of the 280 SIBSs (Significant Indigenous Biodiversity Sites) included in the Whakatāne District assessment showing real losses).

In Western Bay of Plenty District, the year brackets with the highest number of sites with real losses were 2006-2008 and 2009-2011 (each with 12 of the 206 SEFs (Significant Ecological Features) included in the assessment showing real losses).

In Tauranga City, the year bracket with the highest number of sites with real losses was 2009-2011 (11 of the 42 SEAs (Special Ecological Areas) included in the assessment showing real losses).

4. FINDINGS - REAL GAIN

4.1 Overview of total extent of gain

Real gain in extent of sites of significant indigenous vegetation and habitats was assessed in each of the following districts in the Bay of Plenty Region: Taupō District, Whakatāne District, Western Bay of Plenty District, Kawerau District, and Tauranga City. Overall, in the Bay of Plenty Region there was a total real gain of extent of approximately 336 hectares of sites of significant indigenous vegetation and habitats between 2003 and 2019 (see Table 3). Most of this real gain (*c.*145 hectares, or 43% of the total real gain in the Bay of Plenty Region) occurred in the coastal bioclimatic zone. Most of the real gain was spread relatively evenly across the Underprotected (*c.*96 hectares, or 28% of the total real gain in the Bay of Plenty Region), Acutely Threatened (*c.*74 hectares, or 22% of the total real gain in the Bay of Plenty Region), and Chronically Threatened (*c.*72 hectares, or 21% of the total real gain in the Bay of Plenty Region) Land Environments (see Table 4).

Almost half (*c.*163 hectares, or 48%) of the total real gain of extent of sites of significant indigenous vegetation and habitats in the Bay of Plenty Region between 2003 and 2019, was gain of lowland indigenous broadleaved species scrub (see Table 5). About 18% (or *c.*63 hectares) of the total real gain in the Bay of Plenty Region was gain of estuarine wetland. About 11-12% (or *c.*37-40 hectares) of the total real gain in the Bay of Plenty Region was gain of each of mangrove and freshwater wetland ecosystems. The remaining real gain of extent of sites of significant indigenous vegetation and habitats in the Bay of Plenty Region was gain of indigenous forest, early successional ecosystems, mānuka and/or kānuka scrub, frost

flats, and sand dunes. Each of these ecosystems accounted for between 0.2%-2.8% (*c.*0.7 hectares - 9.6 hectares) of the total real gain in the Bay of Plenty Region.

When considered irrespective of the previous mapped extent of sites, the largest total extent of real gain of sites of indigenous vegetation and habitats occurred in Western Bay of Plenty District (*c.*139.4 ha, or 41% of the total real gain in the Bay of Plenty Region), followed by Tauranga City (*c.*111.4 ha, or 33% of the total real gain in the Bay of Plenty Region). The district with the smallest total extent of real gain of sites of indigenous vegetation and habitats was Kawerau District (*c.*1.7 ha, or 0.5% of the total real gain in the Bay of Plenty Region), followed by Whakatāne District (*c.*26.9 ha, or 8% of the total real gain in the Bay of Plenty Region), and Taupō District (*c.*55.7 ha, or 16% of the total real gain in the Bay of Plenty Region) (see Appendix 2).

When considered relative to the previously mapped extent of sites of indigenous vegetation and habitats within each district, Tauranga City (12.7% of the previous mapped extent of sites was gained, *c.*111 hectares) experienced a substantially higher percent of real gain than the other districts that were assessed (see Figures 6a-b). A similar percentage of real gain relative to the previously mapped extent was recorded in both Western Bay of Plenty (0.76% of the previous mapped extent of sites was gained, *c.*139 hectares) and Kawerau Districts (0.61% of the previous mapped extent of sites was gained, *c.*1.7 hectares). Approximately 0.36% of the previous mapped extent of sites in Taupō District was gained (*c.*55.7 hectares). Whakatāne District had the lowest recorded percent gain, of *c.*0.01% of the previous mapped extent of sites (*c.*26.9 hectares).

4.2 Reasons for gain

There was a total real gain of extent of *c.*268.6 hectares due to natural regeneration in the Bay of Plenty Region. Natural regeneration was the main cause of gain of extent of sites of significant indigenous vegetation and habitats in all of the districts assessed, except for Kawerau District (see Figures 6a-b and Appendices 3 and 4). Natural regeneration was the cause of real gain of *c.*8.0% of the previously mapped extent of sites in Tauranga City; *c.*0.7% of the previously mapped extent of sites in Western Bay of Plenty District; *c.*0.4% of the previously mapped extent of sites in Taupō District; and *c.*0.01% of the previously mapped extent of sites in Whakatāne District.

Approximately half (*c.*4.3%, *c.*37.8 hectares) of the natural regeneration in Tauranga City was due to regeneration or expansion of mangroves (across nine sites). Expansion of other estuarine vegetation (at SEA 1 Wairoa River) contributed a further *c.*2.3% (*c.*19.7 hectares) of the real gain of extent of sites of significant indigenous vegetation and habitats in Tauranga City. The remaining *c.*1.5% (*c.*12.9 hectares) of real gain as a result of natural regeneration was regeneration from exotic grassland and early successional vegetation (at seven sites).

Natural regeneration in Taupō, Whakatāne, and Western Bay of Plenty Districts comprised varying combinations of regeneration following harvest of exotic plantation forest, and regeneration from exotic grassland and early successional vegetation.

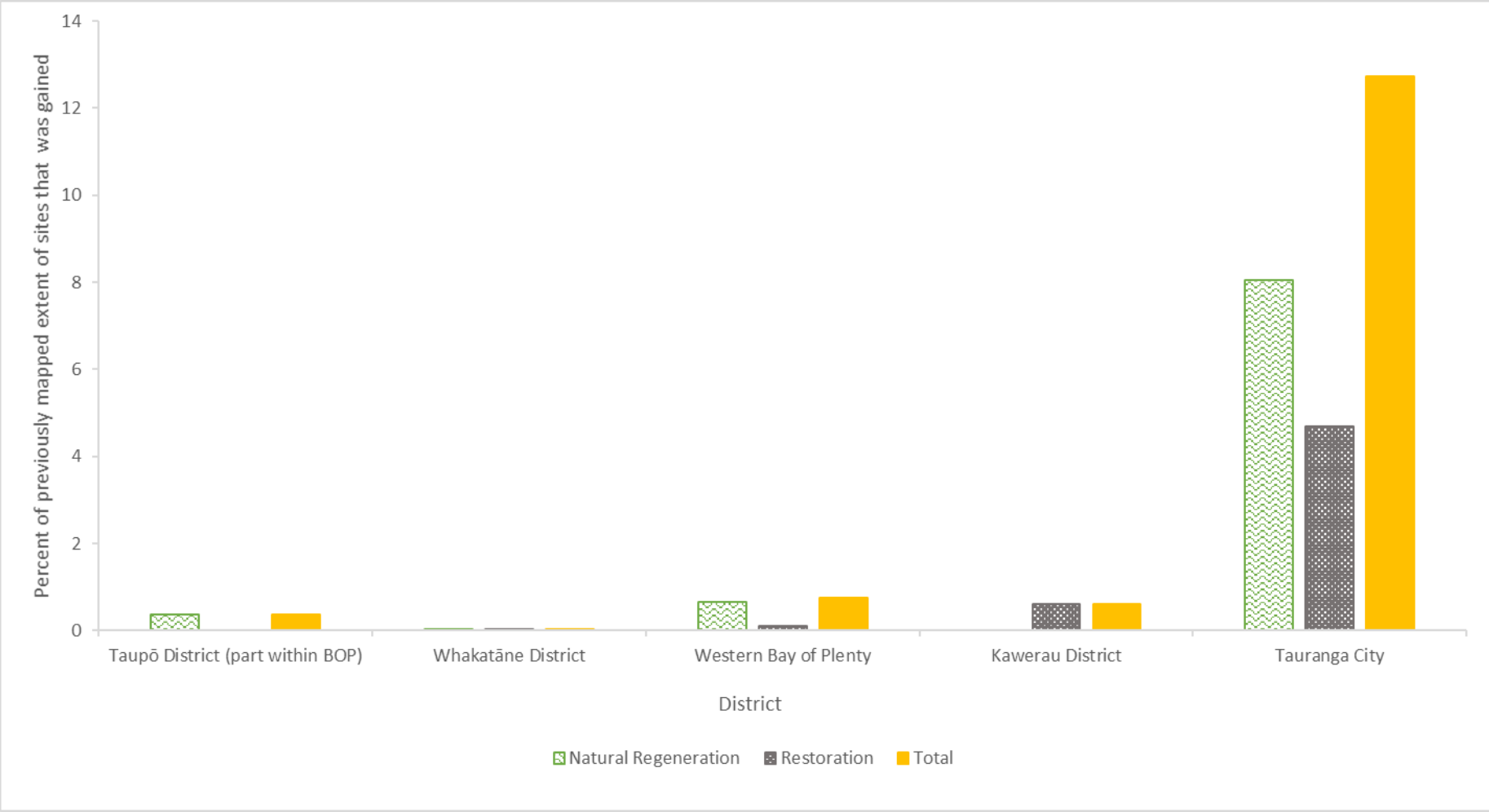

Figure 6a: Percent of mapped extent of sites of significant indigenous vegetation and habitats in each district in the Bay of Plenty Region that was gained for each reason and in total.

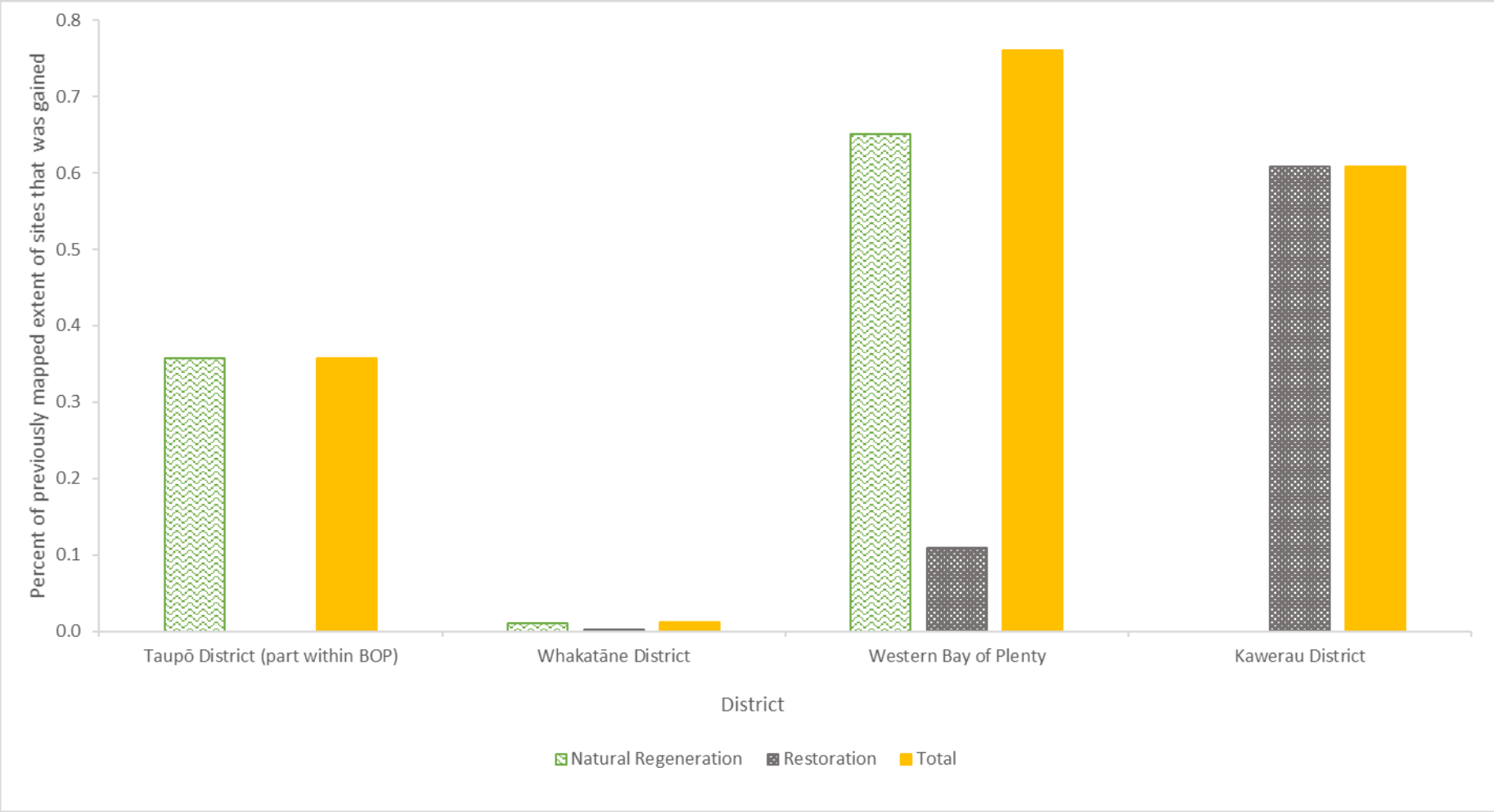

Figure 6b: Percent of mapped extent of sites of significant indigenous vegetation and habitats in each district in the Bay of Plenty Region (except Tauranga City) that was gained for each reason and in total.

There was a total real gain of extent of *c.*66.4 hectares due to ecological restoration in the Bay of Plenty Region. Real gain of extent of sites of significant indigenous vegetation and habitats occurred as a result of restoration in all of the districts assessed, except for Taupō District. The highest percent of real gain in extent due to restoration occurred in Tauranga City (*c.*4.7% of the previously mapped extent of sites, across seven sites). This real gain includes a gain of *c.*0.40% of the previously mapped extent of sites as a result of gradual development and ecological enhancement of wetlands [1](at SEA 43 Kaituna Back Dune Wetlands). Although notably lower, the second highest percent of real gain in extent due to restoration occurred as a result of restoration planting (at Site 2 Parimahāna Scenic Reserve) in Kawerau District (*c.*0.6% of the previously mapped extent of sites in Kawerau District). Restoration planting at nine sites in Western Bay of Plenty District contributed to a real gain of *c.*0.11% of previously mapped sites in Western Bay of Plenty District. The lowest percent of real gain in extent due to restoration occurred in Whakatāne District (*c.*0.002% of the previously mapped extent of sites, *c.*3.72 hectares of real gain across three sites).

4.3 Gain per bioclimatic zone and land environment

Overall, in the Bay of Plenty, real gain was most extensive in the coastal bioclimatic zone (*c.*145 hectares, or 43% of the total real gain in the Bay of Plenty Region), followed by the lowland bioclimatic zone (*c.*81 hectares, or 24% of the total real gain in the Bay of Plenty Region) (see Table 3). Real gain in the coastal and semi-coastal bioclimatic zones was recorded in all of the districts where each of these zones occur (the coastal bioclimatic zone occurs in all districts assessed except for Taupō and Kawerau Districts, and the semi-coastal bioclimatic zone occurs in all districts assessed except for Taupō District) (see Figure 7). Real gain in the lowland bioclimatic zone was recorded in Whakatāne District and Western Bay of Plenty District. Real gains in Taupō District were only recorded in the submontane and montane bioclimatic zones. Parts of the Whakatāne and Western Bay of Plenty Districts occur in the submontane bioclimatic zone, and parts of the Whakatāne District occur in the montane bioclimatic zone, however no real gains were recorded in the submontane or montane bioclimatic zones in these districts which reflects the fact that much of the indigenous vegetation within these bioclimatic zones is legally protected.

Most of the real gain of sites of significant indigenous vegetation and habitats in the Bay of Plenty Region was spread relatively evenly across the Underprotected (*c.*96 hectares, or 28% of the total real gain in the Bay of Plenty Region), Acutely Threatened (*c.*74 hectares, or 22% of the total real gain in the Bay of Plenty Region), and Chronically Threatened (*c.*72 hectares, or 21% of the total real gain in the Bay of Plenty Region) Land Environments (see Table 4). In four of the five districts assessed (all except for Kawerau District), real gain was recorded in both of the two most threatened land environments (Acutely Threatened and Chronically Threatened Land Environments) (see Figure 8). More than 45% of the total real gain in Taupō District (47% of the total real gain in Taupō District) was recorded within Chronically

[1] This increase in extent of freshwater wetlands includes, in some cases (e.g. SEA 2 Matua Estuary - York Park), areas that have been created as stormwater retention ponds.

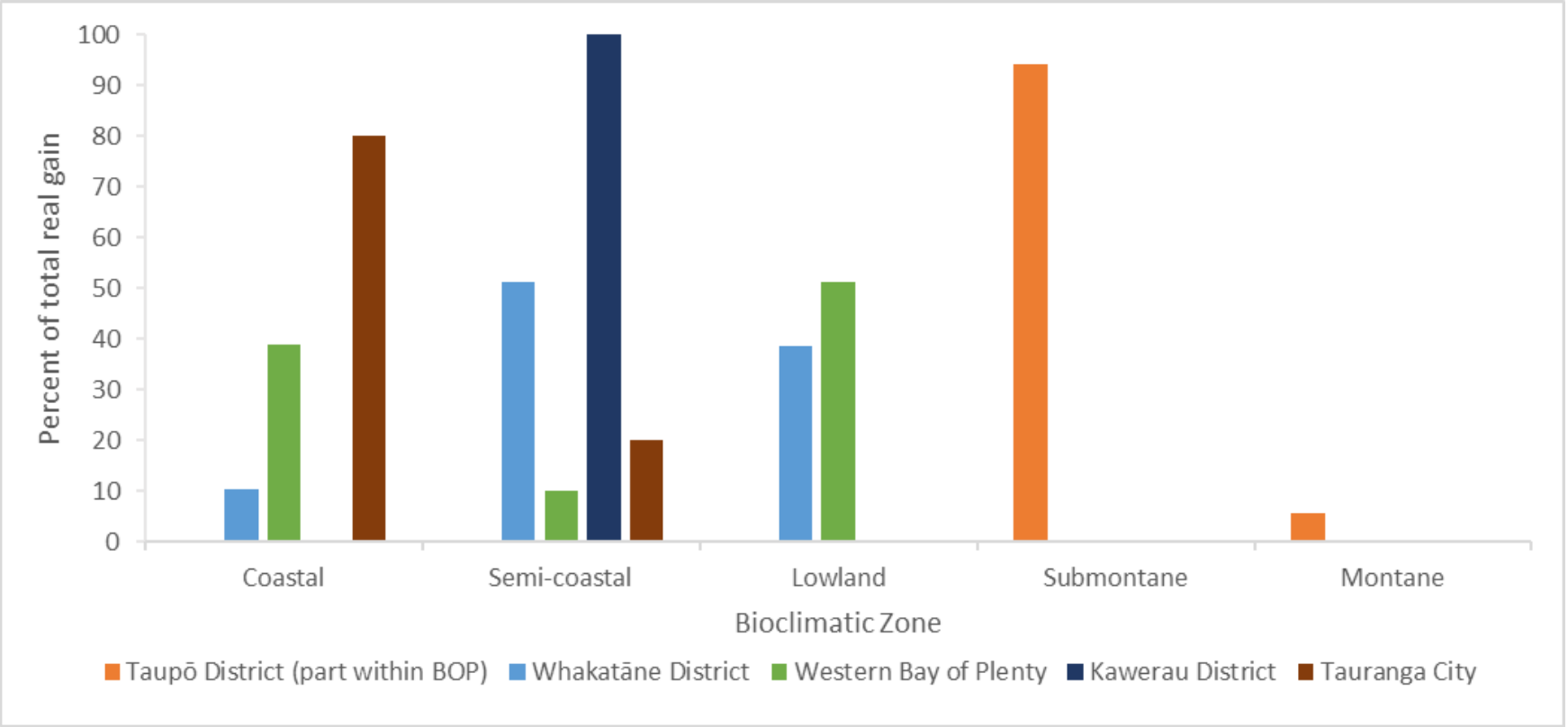

Figure 7: Percent of total real gain in each district in the Bay of Plenty that occurred within each bioclimatic zone.

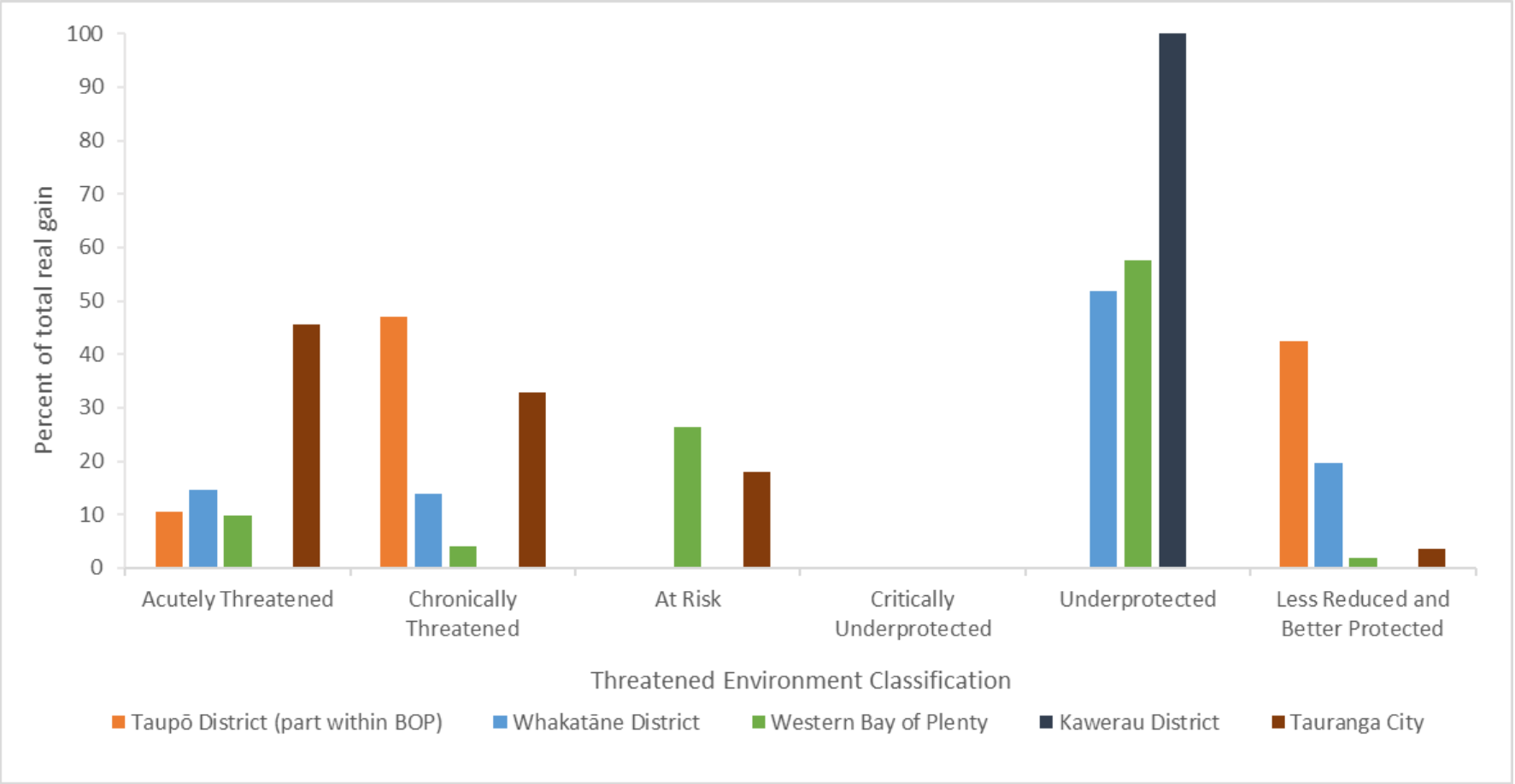

Figure 8: Percent of total real gain in each district in the Bay of Plenty that occurred within each Threatened Land Environment.

Threatened Land Environments. More than 45% of the total real gain in Tauranga City (45.5% of the total real gain in Tauranga City) was recorded within Acutely Threatened Land Environments. Real gain in At Risk Land Environments was only recorded in Western Bay of Plenty District (26% of the total real gain in Western Bay of Plenty District) and Tauranga City (18% of the total real gain in Tauranga City). In Whakatāne (51.8% of the total real gain in Whakatāne District), Western Bay of Plenty (57.6% of the total real gain in Western Bay of Plenty District), and Kawerau Districts (100% of the total real gain in Kawerau District) most of the real gain was recorded in Underprotected Land Environments.

4.4 Gain per ecosystem

Lowland indigenous broadleaved species scrub was the ecosystem where gain occurred in the highest number of Districts in the Bay of Plenty Region (see Figure 9). Lowland indigenous broadleaved species scrub also covered the largest extent of real gain in the Bay of Plenty Region. Almost half (*c.*163 hectares, or 48%) of the total real gain of sites of significant indigenous vegetation and habitats in the Bay of Plenty Region between 2003 and 2019, was gain of lowland indigenous broadleaved species scrub (see Table 5). Gain of this ecosystem occurred in four of the five districts assessed (all except for Kawerau District). The highest percent gain of lowland indigenous broadleaved species scrub relative to other ecosystems was recorded in Taupō District (*c.*83% of the total real gain in Taupō District, *c.*47 hectares), followed closely by Whakatāne (*c.*75% of the total real gain in Whakatāne District, *c.*20.3 hectares) and Western Bay of Plenty (*c.*68% of the total real gain in Western Bay of Plenty District, *c.*94.3 hectares) Districts.

About 18% (or *c.*63 hectares) of the total real gain in the Bay of Plenty Region was gain of estuarine wetland (other than mangroves). This occurred in Western Bay of Plenty District and Tauranga City (*c.*28% or *c.*39.6 hectares of the total real gain in Western Bay of Plenty, and *c.*21% or *c.*23.7 hectares of the total real gain in Tauranga City was gain of estuarine wetland). No real gain in extent of estuarine wetland was recorded in Whakatāne District.

About 11-12% (or *c.*37-40 hectares) of the total real gain in the Bay of Plenty Region was gain of each of mangrove and freshwater wetland ecosystems. Gain of mangroves was only recorded in Tauranga City, where it contributed to *c.*34% of the total real gain (*c.*37.8 hectares). No real gain in extent of mangroves was recorded in Whakatāne or Western Bay of Plenty Districts. Gain of freshwater wetland occurred within two of the five districts. Approximately 32% of the total real gain in Tauranga City (*c.*35.7 hectares) was gain of freshwater wetland, and approximately 3.6% of the total real gain in Western Bay of Plenty (*c.*5 hectares) was gain of freshwater wetland.

The remaining real gain of extent of sites of significant indigenous vegetation and habitats in the Bay of Plenty Region was gain of indigenous forest, early successional ecosystems, mānuka and/or kānuka scrub, frost flats, and sand dunes. Each of these ecosystems accounted for between 0.2%-2.8% (*c.*0.7 hectares - 9.6 hectares) of the total real gain in the Bay of Plenty Region. A very small percent of real gain of indigenous forest occurred in Western Bay of Plenty District and Taupō District (*c.*0.3% of the total real gain in each district, *c.*0.48 hectares in Western Bay of Plenty

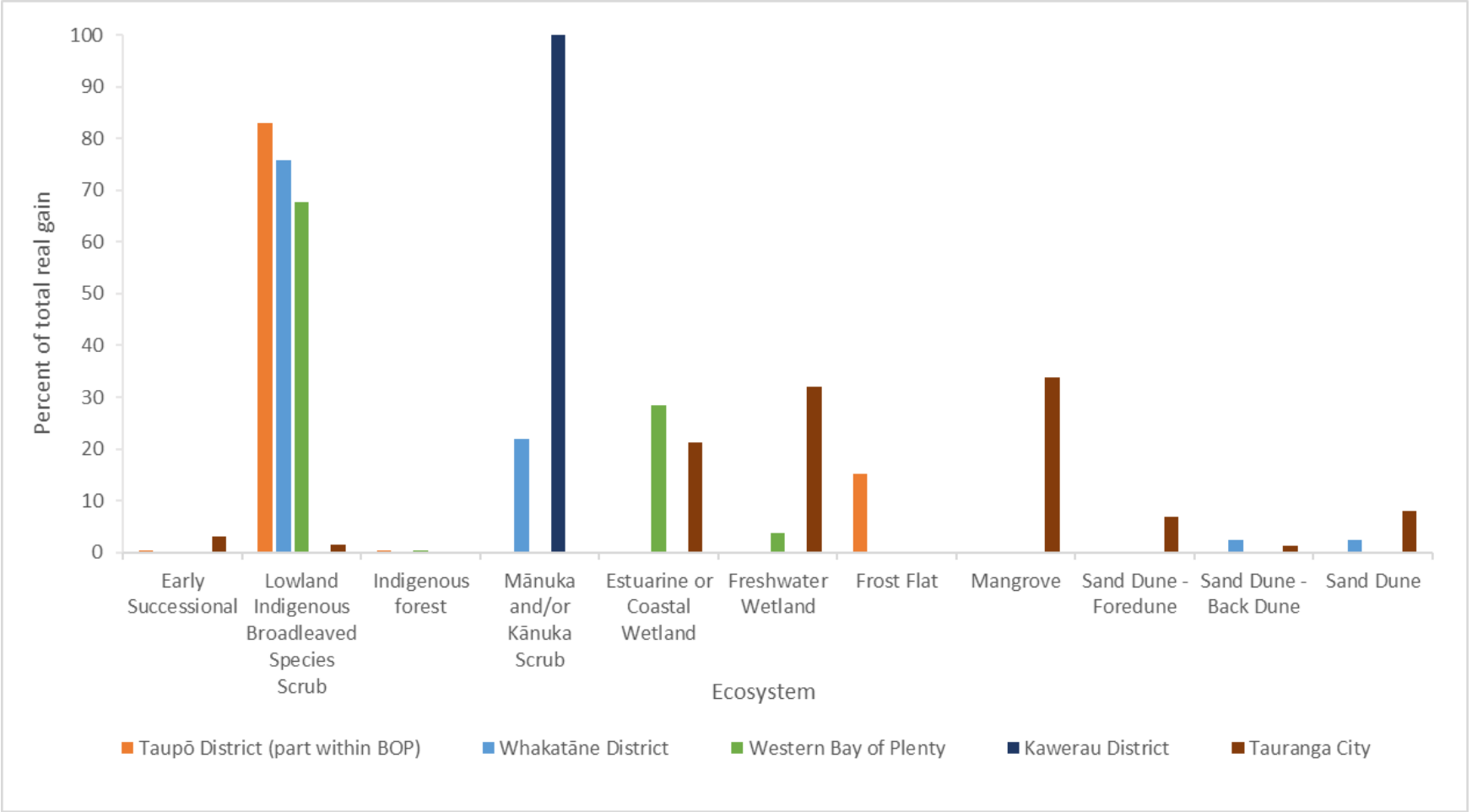

Figure 9: Percent of total real gain in each district in the Bay of Plenty that was gain of each ecosystem.

District and *c.*0.19 hectares in Taupō District). There was a small percent of real gain of early successional ecosystems in Tauranga City (*c.*3% of the total real gain, *c.*3.4 hectares) and a very small percent of real gain of early successional ecosystems in Taupō District (*c.*0.3% of the total real gain, *c.*0.17 hectares). All of the real gain in Kawerau District (*c.*1.7 hectares) was due to an increase in the extent of mānuka and/or kānuka scrub. In Whakatāne District, approximately 22% of the total real gain (*c.*5.9 hectares) was gain of mānuka and/or kānuka scrub. Approximately 15% of the total real gain in Taupō District (*c.*8.7 hectares) was gain of frost flat ecosystems. Most of this was associated with areas in the upper Rangitāiki River catchment. Gain of sand dune ecosystems was only recorded in two of the three districts where this ecosystem is present. Gain of sand dunes contributed to *c.*8% of the total real gain in Tauranga City (*c.*9 hectares), and *c.*2.4% of the total real gain in Whakatāne District (*c.*0.6 hectares).

4.5 Timing of real gains

Real gains in Whakatāne District and Western Bay of Plenty District were recorded between 2003 and 2019[1] (or 2020 as in Western Bay of Plenty) (see Figure 10). Real gains in Kawerau District were recorded at one site between 2004-2018. Real gains in Taupō District and Tauranga District were recorded between 2006 (as in Taupō) or 2007 (as in Tauranga) and 2019. Real gains in Kawerau District were recorded at one site between 2004-2018.

In Taupō District, the year brackets with the highest number of sites with real gains were 2009-2011, 2012-2014, 2015-2017, and 2018-2019 (each with four of the 39 SNAs (Significant Natural Areas) included in the assessment showing real gains).

In Whakatāne District, the year brackets with the highest number of sites with real gains were 2006-2008 and 2009-2011 (each with 10 of the 304 SNAs included in the assessment showing real gains).

In Western Bay of Plenty, the year bracket with the highest number of sites with real gains was 2015-2017 (with 22 of the 206 SEFs (Significant Ecological Features) included in the assessment showing real gains).

In Tauranga City, the year brackets with the highest number of sites with real gains were 2012-2014, 2015-2017, and 2018-2019 (each with 19 of the 42 SEAs (Special Ecological Areas) included in the assessment showing real gains).

[1] The most recent aerial photographs which were available on GoogleEarth at the time of the assessment, were typically from 2019 or 2020. Therefore, in some cases, where 2019 or 2020 is the latest year that real gain ended, there may be ongoing real gains.

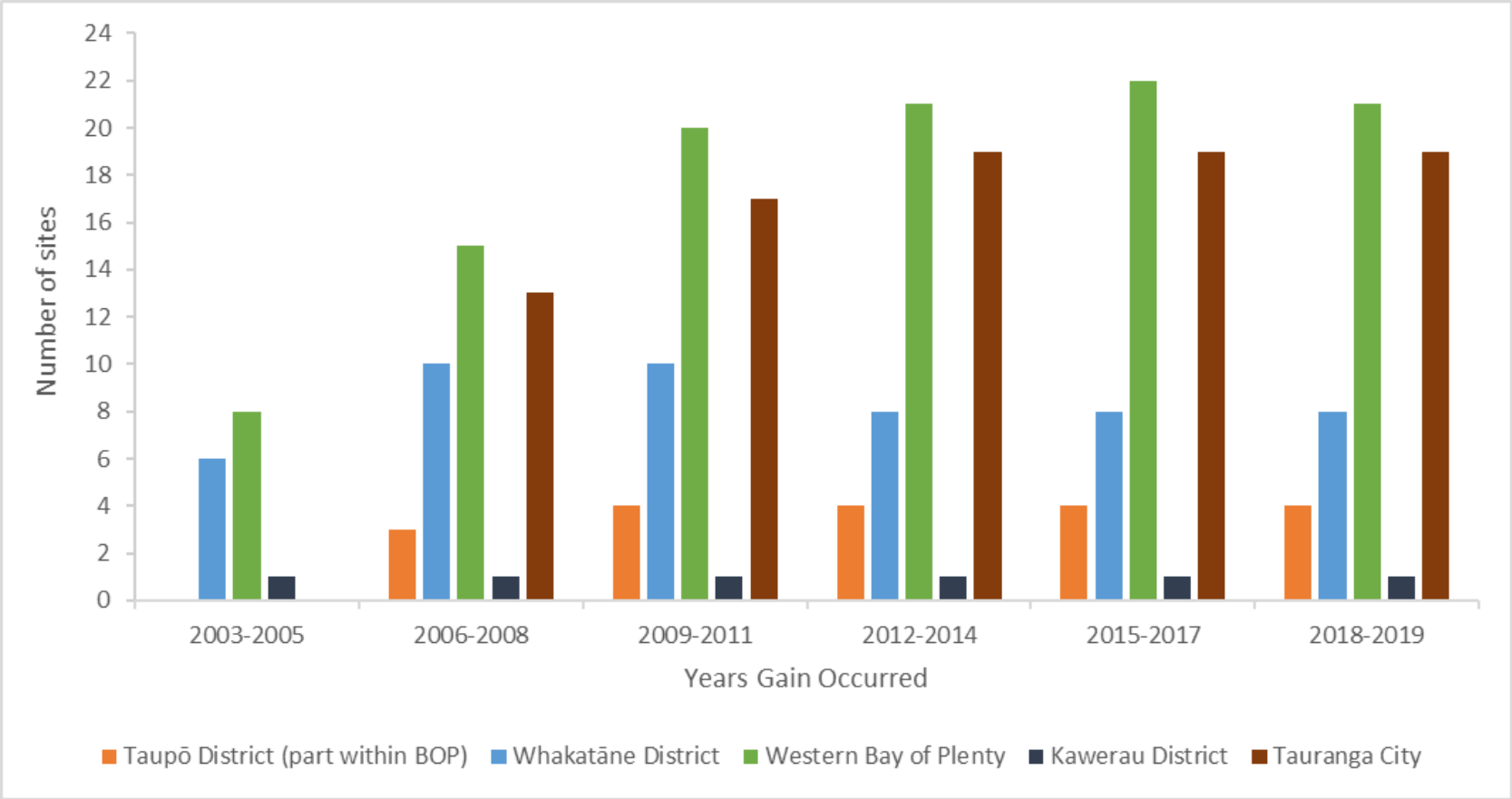

Figure 10: Number of sites of significant indigenous vegetation and habitats where real gain occurred in each year bracket[1], in each district in the Bay of Plenty.

[1] Note: Each site is recorded as a site of real gain for every year bracket that gain was observed in at that site. Therefore, each site may be recorded in multiple year brackets.

5. SUMMARY OF FINDINGS

5.1 Real losses

In the Bay of Plenty Region there was a total extent of real loss of approximately 624 hectares from sites of significant indigenous vegetation and habitat between 2003 and 2019. The district with the largest total extent of real loss of sites of indigenous vegetation and habitats was Whakatāne District (*c.*187.4 ha, or 30% of the total real loss in the Bay of Plenty Region), which is also the largest district in the Bay of Plenty Region (covering *c.*445,009 ha or 36% of the Bay of Plenty Region). When compared relative to the previously mapped extent of sites, a notably higher percent of real loss was recorded in Tauranga City (3.6% of the previous mapped extent of sites of significant indigenous vegetation and habitats was lost) than all other districts in the Bay of Plenty. The district with the second highest percent of real loss relative to previously mapped extent was Taupō District (0.65% of the previous mapped extent of sites was lost), with more than five times less loss relative to the previously mapped extent in Taupō District than in Tauranga City. A similar percent loss of sites of indigenous vegetation and habitats was recorded in Rotorua (0.25% of the previous mapped extent of sites was lost), Western Bay of Plenty (0.23% of the previous mapped extent of sites was lost), and Kawerau (0.21% of the previous mapped extent of sites was lost) Districts. A comparatively low percent loss was recorded in each of the three remaining districts (Ōpōtiki (0.08% of the previous mapped extent of sites was lost), Whakatāne District (0.09% of the previous mapped extent of sites was lost), and Rotorua Lakes A Zone (0.03% of the previous mapped extent of sites was lost)).

Vegetation clearance was the main cause of loss of extent of sites of significant indigenous vegetation and habitats in all districts in the Bay of Plenty Region (87% of the total real loss in the Bay of Plenty Region), accounting for a total of *c.*529 hectares of real loss of extent. Vegetation clearance in Tauranga City was due to mangrove clearance; conversion to pasture; conversion to managed lawn; for construction of access tracks; and for residential development. Most of the vegetation clearance in Taupō District was attributed to conversion to exotic plantation forest and spray damage of indigenous vegetation during wilding pine control. There was a selection of seven reasons for vegetation clearance in Rotorua, Western Bay of Plenty, and Ōpōtiki Districts; and eight reasons in Whakatāne District. Vegetation clearance in the Rotorua Lakes A Zone was attributed to conversion to exotic plantation forest, management of contiguous plantation forest, and residential development. Vegetation clearance in Kawerau District was a result of development of a site for a geothermal power station.

Real loss occurred as a result of erosion in half of the districts (Ōpōtiki, Whakatāne, Western Bay of Plenty, and Tauranga City), and erosion accounted for 6.7% (or *c.*30.5 hectares) of the total real loss in the Bay of Plenty Region. Coastal erosion occurred in all four of these districts. Erosion due to changes in river course and landslips also occurred in Ōpōtiki District within Mōtū Ecological District.

Real loss occurred as a result of decline in condition in half of the districts (Ōpōtiki, Taupō, Rotorua, and Whakatāne Districts), and decline in condition accounted for 5.7% (or *c.*64 hectares) of the total real loss in the Bay of Plenty Region . In Taupō, Rotorua, and Whakatāne Districts, decline in condition was caused by invasion of pest

plants. In Rotorua District there was also some decline in condition due to management of lawns and in Whakatāne District there was also some decline in condition due to excavation of wetlands to create ponds. In Ōpōtiki District decline in condition was due to the development of vehicle tracks.

Most of the total extent of real loss in the Bay of Plenty Region (*c.*254 hectares, or 41% of the total real loss in the Bay of Plenty Region) occurred in the semi-coastal bioclimatic zone, followed by the lowland bioclimatic zone (*c.*158 hectares, or 25% of the total real loss in the Bay of Plenty Region). Real loss occurred in one or both of these bioclimatic zones in every district. Real loss in the coastal bioclimatic zone (*c.*111 hectares, 18% of the total real loss in the Bay of Plenty Region) was recorded in all of the four districts where this bioclimatic zone is present (Ōpōtiki District, Whakatāne District, Western Bay of Plenty District, and Tauranga City). Real loss in the submontane bioclimatic zone was only recorded in Taupō District (*c.*100 hectares, 16% of the total real loss in the Bay of Plenty Region), despite the submontane bioclimatic zone also occurring in Ōpōtiki District, Rotorua District, Rotorua Lakes A Zone, Whakatāne District, and Western Bay of Plenty District. No real loss was recorded in the montane or subalpine bioclimatic zones (parts of the Ōpōtiki District, Taupō District, Rotorua District, and Whakatāne District occur in the montane bioclimatic zone, and parts of the Ōpōtiki District and Whakatāne District occur in the subalpine bioclimatic zone) which reflects the fact that much of the indigenous vegetation within these bioclimatic zones is legally protected.

The majority of real loss in the Bay of Plenty Region occurred in the Acutely Threatened (*c.*238 hectares, or 38% of the total real loss in the Bay of Plenty Region) and Underprotected (*c.*210 hectares, or 33% of the total real loss in the Bay of Plenty Region) Land Environments. Real loss was recorded in at least one of the three most threatened land environments (Acutely Threatened, Chronically Threatened, and At Risk Land Environments) in every district in the Bay of Plenty Region. More than about 35% of the total real loss in each of Ōpōtiki District, Tauranga City, Taupō District, and Kawerau District occurred within Acutely Threatened Land Environments. More than about 45% of the total real loss in each of Rotorua District, Whakatāne District, Western Bay of Plenty District, and Rotorua Lakes A Zone occurred within Underprotected Land Environments.

Real loss occurred across ten ecosystems in the Bay of Plenty Region. Compared to other ecosystems, indigenous forest and lowland indigenous broadleaved species scrub were the ecosystems where loss occurred in the highest number of districts in the Bay of Plenty (loss of these ecosystems occurred in all of the districts in the Bay of Plenty Region except for Tauranga City). This is likely linked to the widespread occurrence of these ecosystems across the Bay of Plenty Region compared to the other ecosystems that were assessed (for example geothermal, frost flat, and sand dune ecosystems are restricted to a relatively small areas of the Bay of Plenty Region). About 20% (or *c.*135 hectares) of the total real loss in the Bay of Plenty Region was loss of lowland indigenous broadleaved species scrub. About 13% (or *c.*81 hectares) of the total real loss in the Bay of Plenty Region was loss of indigenous forest. All of the real loss in Kawerau District (*c.*0.6 hectares) was loss of indigenous forest (kānuka forest). Approximately 40% of the total real loss in Rotorua District was loss of indigenous forest. A further *c.*20% of the total real loss in Rotorua District was loss of lowland indigenous broadleaved species scrub. Lowland

indigenous broadleaved species scrub was the most commonly lost ecosystem in Rotorua Lakes A Zone (*c.*73% of the total real loss in Rotorua Lakes A Zone) and Ōpōtiki District (*c.*43% of the total real loss in Ōpōtiki District).

About 10-15% (or *c.*70-100 hectares) of the total real loss in the Bay of Plenty Region was loss of each of the following ecosystems: mānuka and/or kānuka scrub, early successional ecosystems, and frost flats. Loss of mānuka and/or kānuka scrub occurred in Ōpōtiki (*c.*23% of the total real loss in Ōpōtiki District), Rotorua (*c.*13% of the total real loss in Rotorua District), and Whakatāne Districts (*c.*11% of the total real loss in Whakatāne District). Early successional ecosystems were the main ecosystems lost in both Whakatāne District (*c.*29% of the total real loss in Whakatāne District) and Western Bay of Plenty District (*c.*74% of the total real loss in Western Bay of Plenty). Almost all of the real loss in Taupō District was loss of frost flat ecosystems (*c.*98.5% of the total real loss in Taupō District). Most of this loss was associated with areas in the upper Rangitāiki River catchment.

About 10% (or *c.*68 hectares) of the total real loss in the Bay of Plenty Region was loss of sand dune ecosystems, and about 7% (or *c.*42 hectares) of the total real loss in the Bay of Plenty Region was loss of freshwater wetlands. Loss of sand dune ecosystems occurred in all of the districts where this ecosystem is present (Ōpōtiki District, Whakatāne District, Western Bay of Plenty District, and Tauranga City). Tauranga City was the district with the highest percent of loss of sand dunes (*c.*37% of the total real loss in Tauranga City) relative to loss of other ecosystems. Loss of freshwater wetland occurred within five of the eight districts (Western Bay of Plenty District, Rotorua District, and Ōpōtiki District). Whakatāne District and Tauranga City[1] (both *c.*14% of the total real loss) were the districts with the highest percent loss of freshwater wetland relative to other ecosystems.

Loss of fernland, geothermal ground and/or water, and mangroves each accounted for less than five percent of the total real loss in the Bay of Plenty Region. Loss of fernland occurred in Rotorua District (*c.*12% of the total real loss in Rotorua District) and Whakatāne District (*c.*6% of the total real loss in Whakatāne District). Loss of geothermal ground and/or water was only recorded in Rotorua District (*c.*8.5% of the total real loss in Rotorua District). Loss of mangroves was only recorded in Tauranga City, where it contributed to *c.*49% of the total real loss.

Real losses in Ōpōtiki District, Taupō District, Rotorua District, Whakatāne District, and Western Bay of Plenty District were recorded between 2003 and 2019[2]. Real losses in Rotorua Lakes A Zone were recorded between 2011 and 2018. Real losses

[1] Real loss of freshwater wetland in Tauranga City is likely to be slightly under delineated. This is because at SEA 14 Kopurererua Stream Wetland only the larger and more compact areas of vegetation clearance for track development and managed lawn were identified. Additional small and spread-out areas were also cleared for track development and managed lawn at SEA 14, but these were beyond the level of detail for mapping in this project and they are still integral parts of this site. The largest extent of real loss of freshwater wetland in Tauranga City occurred at SEA 14 (*c.*3.2 hectares). The remaining real loss of freshwater wetland in Tauranga City occurred at SEA 1 Wairoa River (*c.*1.3 hectares).

[2] The most recent aerial photographs which were available on GoogleEarth at the time of the assessment, were typically from 2019. Therefore, in some cases, where 2019 is the latest year that real loss ended, there may be ongoing real losses.

in Tauranga City were recorded between 2007 and 2019. Real losses in Kawerau District were recorded at one site between 2011-2012.

5.2 Real gains

Real gains in extent of sites of significant indigenous vegetation and habitats were assessed in five of the districts within the Bay of Plenty Region (excluding Ōpōtiki District, Rotorua District, and Rotorua Lakes A Zone). In the Bay of Plenty Region, there was a total real gain of extent of approximately 336 hectares of sites of significant indigenous vegetation and habitats between 2003 and 2019. The district with the largest total extent of real gain of sites of indigenous vegetation and habitats was Western Bay of Plenty District (*c.*139.4 ha, or 41% of the total real gain in the Bay of Plenty Region). The highest percent of real gain in extent relative to the previously mapped extent of sites of significant indigenous vegetation and habitats was recorded in Tauranga City (12.7% of the previous mapped extent of sites was gained). A notably higher percent of real gain relative to the previously mapped extent of sites was recorded in Tauranga City than in the other districts that were assessed. A similar percentage of real gain relative to the previously mapped extent was recorded in both Western Bay of Plenty (0.76% of the previous mapped extent of sites was gained) and Kawerau Districts (0.61% of the previous mapped extent of sites was gained). Approximately 0.36% of the previous mapped extent of sites in Taupō District was gained. Whakatāne District had the lowest recorded percent gain, of *c.*0.01% of the previous mapped extent of sites.

Natural regeneration was the main cause for gain of extent in all of the districts assessed, except for Kawerau District. Natural regeneration accounted for a total of *c.*268.6 hectares of real gain of extent in the Bay of Plenty Region. Approximately half (*c.*4.3%) of the natural regeneration in Tauranga City was due to regeneration or expansion of mangroves. Expansion of other estuarine vegetation contributed a further *c.*2.3% of the total real gain of extent of sites of significant indigenous vegetation and habitats in Tauranga City. The remaining *c.*1.5% of total real gain as a result of natural regeneration was regeneration from exotic grassland and early successional vegetation.

Natural regeneration in Taupō, Whakatāne, and Western Bay of Plenty Districts comprised varying combinations of regeneration following harvest of exotic plantation forest, and regeneration from exotic grassland and early successional vegetation.

Real gain of extent of sites of significant indigenous vegetation and habitats occurred as a result of ecological restoration in all of the districts assessed, except for Taupō District. There was a total real gain of extent of *c.*66.4 hectares due to ecological restoration in the Bay of Plenty Region. The highest percent of real gain in extent due to restoration occurred in Tauranga City (*c.*4.7% of the previously mapped extent of sites). This real gain includes a gain of *c.*0.40% of the previously mapped extent of sites as a result of gradual development and ecological enhancement of wetlands[1].

[1] This increase in extent of freshwater wetlands includes, in some cases (e.g. SEA 2 Matua Estuary - York Park), areas that have been created as stormwater retention ponds.

Although notably lower, the second highest percent of real gain in extent due to restoration occurred as a result of restoration planting in Kawerau District (*c.*0.6% of the previously mapped extent of sites). Restoration planting at nine sites in Western Bay of Plenty District contributed to a real gain of *c.*0.11% of previously mapped sites in that district. The smallest real gain in extent due to restoration occurred in Whakatāne District (*c.*0.002% of the previously mapped extent of sites, *c.*3.72 hectares of real gain).

Overall, in the Bay of Plenty, real gain was most extensive in the coastal bioclimatic zone, followed by the lowland bioclimatic zone. Real gain in the coastal and semi-coastal bioclimatic zones occurred in all of the districts where these zones occur (all except for Taupō District). Real gain in the lowland bioclimatic zone was recorded in Whakatāne District and Western Bay of Plenty District. Real gains in Taupō District were only recorded in the submontane and montane bioclimatic zones. No real gain was recorded in the submontane or montane bioclimatic zones where they occur in Whakatāne and Western Bay of Plenty Districts, which reflects the fact that much of the indigenous vegetation within these bioclimatic zones is legally protected.

In four of the five districts assessed (all except for Kawerau District), real gain was recorded in both of the two most threatened land environments (Acutely Threatened and Chronically Threatened Land Environments). More than 45% of the total real gain in Taupō District was recorded within Chronically Threatened Land Environments. More than 45% of the total real gain in Tauranga City was recorded within Acutely Threatened Land Environments. Real gain in At Risk Land Environments (the third most threatened land environment) was only recorded in Western Bay of Plenty District (26% of the total real gain in Western Bay of Plenty District) and Tauranga City (18% of the total real gain in Tauranga City). In Whakatāne (51.8% of the total real gain in Whakatāne District), Western Bay of Plenty (57.6% of the total real gain in Western Bay of Plenty District), and Kawerau Districts (all of the total real gain in Kawerau District) most of the real gain was recorded in Underprotected Land Environments (the second most protected land environments).

Real gain of nine ecosystems occurred in the Bay of Plenty Region. Lowland indigenous broadleaved species scrub was the ecosystem where gain occurred in the highest number of Districts in the Bay of Plenty, accounting for almost half (48%, or *c.*163 hectares) of the total extent of real gain of sites of significant indigenous vegetation and habitats in the Bay of Plenty Region. Gain of this ecosystem occurred in all of the districts assessed, except for Kawerau District. This is likely linked to the widespread occurrence of indigenous broadleaved species scrub across the Bay of Plenty Region compared to the other ecosystems that were assessed (for example frost flat and sand dune ecosystems are restricted to a relatively small areas of the Bay of Plenty Region). The highest percent gain of lowland indigenous broadleaved species scrub relative to other ecosystems was recorded in Taupō District (*c.*83% of the total real gain in Taupō District), followed closely by Whakatāne (*c.*75% of the total real gain in Whakatāne District) and Western Bay of Plenty (*c.*68% of the total real gain in Western Bay of Plenty District) Districts.

About 18% of the total real gain in the Bay of Plenty Region was gain of estuarine wetland (other than mangroves). This occurred in Western Bay of Plenty District and

Tauranga City (*c.*28% of the total real gain in Western Bay of Plenty and *c.*21% of the total real gain in Tauranga City). No real gain in extent of estuarine wetland was recorded in Whakatāne District.

About 11-12% of the total real gain in the Bay of Plenty Region was gain of each of mangrove and freshwater wetland ecosystems. Gain of mangroves was only recorded in Tauranga City, where it contributed to *c.*34% of the total real gain in Tauranga City. Gain of freshwater wetland occurred within two of the five districts assessed. Approximately 32% of the total real gain in Tauranga City was gain of freshwater wetland, and approximately 3.6% of the total real gain in Western Bay of Plenty was gain of freshwater wetland.

Indigenous forest, early successional ecosystems, mānuka and/or kānuka scrub, frost flats, and sand dunes each accounted for between 0.2%-2.8% of the total real gain in the Bay of Plenty Region. There was a very small total real gain of indigenous forest in Western Bay of Plenty and Taupō Districts (*c.*0.3% of the total real gain in each) and a small percent of real gain of early successional ecosystems in Tauranga City (*c.*3% of the total real gain). All of the total real gain in Kawerau District was due to an increase in the extent of mānuka and/or kānuka scrub. In Whakatāne District, approximately 22% of the total real gain was gain of mānuka and/or kānuka scrub. Approximately 15% of the total real gain in Taupō District was gain of frost flat ecosystems. Most of this was associated with areas in the upper Rangitāiki River catchment. Gain of sand dune ecosystems was only recorded in two of the three districts where this ecosystem is present. Gain of sand dunes contributed to *c.*8% of the total real gain in Tauranga City, and *c.*2.4% of the total real gain in Whakatāne District.

Real gains in Whakatāne District and Western Bay of Plenty District were recorded between 2003 and 2019[1] (or 2020 as in Western Bay of Plenty). Real gains in Kawerau District were recorded at one site between 2004-2018. Real gains in Taupō District and Tauranga District were recorded between 2006 (as in Taupō) or 2007 (as in Tauranga) and 2019. Real gains in Kawerau District were recorded at one site between 2004-2018.

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[1] The most recent aerial photographs which were available on GoogleEarth at the time of the assessment, were typically from 2019 or 2020. Therefore, in some cases, where 2019 or 2020 is the latest year that real gain ended, there may be ongoing real gains.

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TOTAL EXTENT OF REAL LOSSES FOR EACH REASON IN EACH DISTRICT

Type of Change	Reason for Loss of Site Extent	Ōpōtiki District Total	Taupō District (part within the Bay of Plenty Region)	Rotorua District (part within the Bay of Plenty Region)	Rotorua Lakes A Zone	Whakatāne District	Western Bay of Plenty	Kawerau District	Tauranga City	Total in the Bay of Plenty Region
		Area (ha)	Area (ha)	Area (ha)	Area (ha)	Area (ha)	Area (ha)	Area (ha)	Area (ha)	Area (ha)
Vegetation clearance	Conversion to pasture	138.3	0	50.48	0	72.26	34.70	0	8.02	303.76
	Clearance due to management of contiguous plantation forest[1]	13.1	0	0.36	0.52	54.05	0	0	0	68.03
	Indigenous vegetation sprayed during wilding pine control	0	5.69	0	0	0	0	0	0	5.69
	For residential development	12.4	0	0.07	0.30	0.72	0.71	0	1.30	15.50
	For commercial development	0	0	5.86	0	1.68	0	0.59[2]	0	8.13
	Conversion to managed lawn	1.0	0	0.30	0	6.47	1.04	0	2.18	10.99
	Conversion to exotic plantation forest	2.0	48.09	9.77	6.46	5.24	0	0	0	71.56
	Conversion to area of horticultural crops	0.8	0	0	0	0	1.41[3]	0	0	2.21
	For construction or maintenance of vehicle tracks, access tracks, or roads	7.2	0	0.77	0	3.41	0.57	0	1.81	13.76
	For construction of carparking	0	0	0	0	0	0.13	0	0	0.13
	For a quarry	0	0	0	0	10.06	1.69	0	0	11.75
	Mangrove clearance	0	NA	NA	NA	0	0	NA	15.43	15.43
	Other	0	2.77	0	0	0	0	0	0	2.77
Subtotal: Vegetation clearance		**174.8**	**56.67**	**67.61**	**7.28**	**153.90**	**40.24**	**0.59**	**28.74**	**529.24**
Erosion	Coastal erosion	4.6[4]	0	0	0	17.53[5]	1.74[6]	0	2.83[5]	26.70
	Erosion due to changes in river course	3.0	0	0	0	0	0	0	0	3.00
	Landslip	0.8	0	0	0	0	0	0	0	0.80
Subtotal: Erosion		**8.4**	**0**	**0**	**0**	**17.53**	**1.74**	**0**	**2.83**	**30.50**
Decline in condition	Vehicle tracks now present	3.7	0	0	0	0	0	0	0	3.70
	Invasion of pest plants	0	44.31[7]	0.40	0	6.26	0	0	0	50.97
	Wetland modification	0	0	0	0	9.67	0	0	0	9.67
	Due to management of lawns	0	0	0.06	0	0	0	0	0	0.06
Subtotal: Decline in condition		**3.7**	**44.31**	**0.46**	**0**	**15.93**	**0**	**0**	**0**	**64.40**
Total		**186.8**	**100.86**	**68.08**	**7.28**	**187.36**	**41.98**	**0.59**	**31.57**	**624.52**
Percent of total real loss in the Bay of Plenty Region		**29.9**	**16.2**	**10.9**	**1.2**	**30.0**	**6.7**	**0.1**	**5.1**	**100%**

[1] Where activity such as harvest of an adjoining area of exotic plantation forest, causes loss of indigenous vegetation and habitats along the margin of an Identified Natural Area. This reason does not include replacement of the indigenous vegetation and habitat by exotic plantation forest.

[2] In this case, real loss occurred due to vegetation clearance for expansion of facilities associated with a geothermal power station.

[3] In this case, real loss occurred due to conversion to orchard.

[4] In this case, real loss occurred due to erosion of sand from island in Ōhiwa Harbour.

[5] In this case, real loss occurred due to erosion of sand dune foredunes.

[6] In this case, real loss occurred due to erosion of sand dune foredunes and a coastal cliff face.

[7] In this case, the areas have become dominated by wilding pines.

PERCENT OF PREVIOUSLY MAPPED SITES THAT WAS LOST FOR EACH REASON IN EACH DISTRICT

Values presented are percent of total real loss per reason in each district.
Area (hectares) of real loss per reason for change in each district is provided in brackets.

Type of Change	Ōpōtiki District	Taupō District (part within the Bay of Plenty Region)	Rotorua District (part within the Bay of Plenty Region)	Rotorua Lakes A Zone	Whakatāne District	Western Bay of Plenty	Kawerau District	Tauranga City
Vegetation clearance	0.078 (174.8 ha)	0.364 (56.7 ha)	0.246 (67.6 ha)	0.028 (7.3 ha)	0.070 (153.9 ha)	0.219 (40.2 ha)	0.206 (0.6 ha)	3.285 (28.7 ha)
Erosion	0.004 (8.4 ha)	0.000	0.000	0.000	0.008 (17.5 ha)	0.009 (1.7 ha)	0.000	0.323 (2.8 ha)
Decline in condition	0.002 (3.7 ha)	0.285 (44.3 ha)	0.002 (0.5 ha)	0.000	0.007 (15.9 ha)	0.000	0.000	0.000
Total	**0.083 (186.8)**	**0.649 (100.9 ha)**	**0.248 (68.1 ha)**	**0.028 (7.3 ha)**	**0.085 (187.4 ha)**	**0.229 (42.0 ha)**	**0.206 (0.6 ha)**	**3.608 (31.6 ha)**

PERCENT OF TOTAL REAL LOSS IN EACH DISTRICT, PER BIOCLIMATIC ZONE

Values presented are percent of total real loss per bioclimatic zone in each district.
Area (hectares) of real loss per bioclimatic zone in each district is provided in brackets.
NA = Bioclimatic zone not present within given district.

Bioclimatic Zone	Ōpōtiki District	Taupō District (part within the Bay of Plenty Region)	Rotorua District (part within the Bay of Plenty Region)	Rotorua Lakes A Zone	Whakatāne District	Western Bay of Plenty	Kawerau District	Tauranga City
Coastal	23.95 (44.7 ha)	NA	NA	NA	17.27 (32.4 ha)	13.55 (5.7 ha)	NA	89.90 (28.4 ha)
Semi-coastal	67.99 (127.0 ha)	NA	6.14 (4.2 ha)	0	47.66 (89.3 ha)	72.15 (30.3 ha)	100 (0.6 ha)	10.10 (3.2 ha)
Lowland	8.07 (15.1 ha)	0.61 (0.6 ha)	93.85 (63.9 ha)	100 (7.3 ha)	35.07 (65.7 ha)	14.32 (6.0 ha)	NA	NA
Submontane	0	99.39 (100.3 ha)	0	0	0	0	NA	NA
Montane	0	0	0	NA	0	NA	NA	NA
Subalpine	0	NA	NA	NA	0	NA	NA	NA
Total	**100% (186.8 ha)**	**100% (100.9)**	**100% (68.1 ha)**	**100% (7.3 ha)**	**100% (187.4 ha)**	**100% (42.0 ha)**	**100% (0.6 ha)**	**100% (31.6 ha)**

PERCENT OF TOTAL REAL LOSS IN EACH DISTRICT, PER THREATENED LAND ENVIRONMENT

Values presented are percent of total real loss per Threatened Land Environment in each district.
Area (hectares) of real loss per Threatened Land Environment in each district is provided in brackets.
NA = Threatened Land Environment not present within given district.

Threatened Land Environment	Ōpōtiki District	Taupō District (part within the Bay of Plenty Region)	Rotorua District (part within the Bay of Plenty Region)	Rotorua Lakes A Zone	Whakatāne District	Western Bay of Plenty	Kawerau District	Tauranga City
Acutely Threatened	37.47 (70.0 ha)	91.32 (92.1 ha)	1.58 (1.1 ha)	0.00	25.20 (47.2 ha)	10.36 (4.4 ha)	100.00 (0.6 ha)	73.20 (23.1 ha)
Chronically Threatened	5.25 (9.8 ha)	8.63 (8.7 ha)	8.54 (5.8 ha)	0.00	18.03 (33.8 ha)	0.00	0.00	19.60 (6.2 ha)
At Risk	0.00	0.00	0.35 (0.2 ha)	11.20 (0.8 ha)	0.47 (0.9 ha)	1.36 (0.6 ha)	NA	7.20 (2.3 ha)
Critically Underprotected	0.01 (0.01 ha)	NA	NA	NA	NA	4.19 (1.8 ha)	NA	0.00
Underprotected	27.88 (52.1 ha)	NA	48.01 (32.7 ha)	88.80 (6.5 ha)	52.21 (97.8 ha)	52.02 (21.8 ha)	0.00	0.00
Less Reduced and Better Protected	29.39 (54.9 ha)	0.04 (0.04ha)	41.52 (28.3 ha)	0.00	4.10 (7.7 ha)	32.06 (13.5 ha)	0.00	0.00
Total	**100% (186.8 ha)**	**100% (100.9 ha)**	**100% (68.1 ha)**	**100% (7.3 ha)**	**100% (187.4 ha)**	**100% (42.0 ha)**	**100% (0.6 ha)**	**100% (31.6 ha)**

PERCENT OF TOTAL REAL LOSS IN EACH DISTRICT, PER ECOSYSTEM

Values presented are percent of total real loss per ecosystem in each district.
Area (hectares) of real loss per ecosystem in each district is provided in brackets.
NA = Ecosystem is not present within given district.

Ecosystem Lost	Ōpōtiki District	Taupō District (part within the Bay of Plenty Region)	Rotorua District (part within the Bay of Plenty Region)	Rotorua Lakes A Zone	Whakatāne District	Western Bay of Plenty	Kawerau District	Tauranga City
Early Successional	0.0	0.0	0.0	0.0	28.6 (53.5 ha)	73.7 (30.9)	0.0	0.0
Lowland Indigenous Broadleaved Species Scrub	42.6 (79.6 ha)	1.5 (1.5 ha)	20.3 (13.8 ha)	73.2 (5.3 ha)	16.8 (31.4 ha)	9.5 (4.0 ha)	0.0	0.0
Freshwater Wetland	2.1 (4.0 ha)	0.0	5.4 (3.7 ha)	0.0	14.6 (27.3 ha)	7.5 (3.2 ha)	0.0	14.2 (4.5 ha)
Fernland	0.0	0.0	12.0 (8.2 ha)	0.0	6.3 (11.8 ha)	0.0	0.0	0.0
Indigenous Forest	17.2 (32.1 ha)	0.0	40.7 (27.7 ha)	26.7 (2.0 ha)	9.3 (17.4 ha)	4.0 (1.7 ha)	100.0 (0.6 ha)	0.0
Geothermal ground / water	NA	NA	8.5 (5.8 ha)	NA	NA	NA	0.0	NA
Frost Flat	NA	98.5 (99.4 ha)	NA	NA	0.0	NA	NA	NA
Mangrove	0.0	NA	NA	NA	0.0	0.0	NA	48.9 (15.4 ha)
Mānuka and/or Kānuka Scrub	22.7 (42.4 ha)	0.0	13.1 (8.9 ha)	0.0	10.8 (20.2 ha)	0.0	0.0	0.0
Sand Dune - Foredune	2.5 (4.6 ha)	NA	NA	NA	9.2 (17.1 ha)	3.2 (1.3 ha)	NA	9.0 (2.8 ha)
Sand Dune - Back Dune	12.9 (24.1 ha)	NA	NA	NA	4.6 (8.7 ha)	2.1 (0.9 ha)	NA	28.0 (8.8 ha)
Sand Dune - Subtotal	15.4 (28.7 ha)	NA	NA	NA	13.8 (25.8 ha)	5.2 (2.2 ha)	NA	37.0 (11.7 ha)
Total	**100% (186.8 ha)**	**100% (100.9 ha)**	**100% (68.1 ha)**	**100% (7.3 ha)**	**100% (187.4 ha)**	**100% (42.0 ha)**	**100% (0.6 ha)**	**100% (31.6 ha)**

TOTAL EXTENT OF REAL GAINS FOR EACH REASON IN EACH DISTRICT

Reason for Gain of Site Extent	Taupō District (part within the Bay of Plenty Region)	Whakatāne District	Western Bay of Plenty	Kawerau District	Tauranga City	Total
	Area (ha)	Area (ha)	Area (ha)	Area (ha)	Area (ha)	Area (ha)
Natural regeneration of retired area of exotic plantation forest	0.94	4.05	66.48	0	0	71.47
Naturally regeneration from exotic grassland and early successional vegetation[1]	55.73	19.11	52.93	0	12.89	140.66
Expansion of estuarine vegetation (excluding mangroves)	NA	0	0	NA	19.74	19.74
Regeneration/expansion of mangroves	NA	0	0	NA	37.79	37.79
Subtotal: Natural Regeneration	**55.67**	**23.16**	**119.41**	**0**	**70.41**	**268.65**
Restoration planting	0	3.72	19.99	1.74	37.48	62.93
Restoration planting and construction of wetlands	0	0	0	0	3.47	3.47
Subtotal: Restoration	**0**	**3.72**	**19.99**	**1.74**	**40.95**	**66.4**
Total	**55.67**	**26.88**	**139.40**	**1.74**	**111.37**	**335.06**
Percent of total real gain in the Bay of Plenty Region	**16.6**	**8.0**	**41.6**	**0.5**	**33.2**	**100%**

[1] Includes regeneration from managed lawn, unmanaged exotic grassland, and pasture.

PERCENT OF PREVIOUSLY MAPPED SITES THAT WAS GAINED FOR EACH REASON IN EACH DISTRICT

Values presented are percent of total real gain per reason in each district.
Area (hectares) of real gain per reason for change in each district is provided in brackets.

Type of Change	Taupō District (part within the Bay of Plenty Region)	Whakatāne District	Western Bay of Plenty	Kawerau District	Tauranga City
Natural Regeneration	0.358 (55.7 ha)	0.011 (23.2 ha)	0.651 (119.4 ha)	0	8.047 (70.4 ha)
Ecological Restoration	0	0.002 (3.7 ha)	0.109 (20.0 ha)	0.609 (1.7 ha)	4.680 (41.0 ha)
Total	**0.358 (55.7 ha)**	**0.012 (26.9 ha)**	**0.760 (139.4 ha)**	**0.609 (1.7 ha)**	**12.728 (111.4 ha)**

PERCENT OF TOTAL REAL GAIN IN EACH DISTRICT, PER BIOCLIMATIC ZONE

Values presented are percent of total real gain per bioclimatic zone in each district.
Area (hectares) of real gain per bioclimatic zone in each district is provided in brackets.
NA = Bioclimatic zone not present within given district.

Bioclimatic Zone	Taupō District (part within the Bay of Plenty Region)	Whakatāne District	Western Bay of Plenty	Kawerau District	Tauranga City
Coastal	NA	10.23 (2.8 ha)	38.77 (54.0 ha)	NA	80.02 (89.1 ha)
Semi-coastal	NA	51.26 (13.8 ha)	10.09 (14.1 ha)	100 (1.7 ha)	19.98 (22.3 ha)
Lowland	0	38.5 (10.4 ha)	51.14 (71.3 ha)	NA	NA
Submontane	94.37 (53.5 ha)	0	0	NA	NA
Montane	5.65 (3.2 ha)	0	NA	NA	NA
Subalpine	NA	0	NA	NA	NA
Total	**100% (56.7 ha)**	**100% (26.9 ha)**	**100% (139.4 ha)**	**100% (1.7 ha)**	**100% (111.4 h)**

PERCENT OF TOTAL REAL GAIN IN EACH DISTRICT, PER THREATENED LAND ENVIRONMENT

Values presented are percent of total real gain per Threatened Land Environment in each district.
Area (hectares) of real gain per Threatened Land Environment in each district is provided in brackets.
NA = Threatened Land Environment not present within given district.

Threatened Land Environment	Taupō District (part within the Bay of Plenty Region)	Whakatāne District	Western Bay of Plenty	Kawerau District	Tauranga City
Acutely Threatened	10.5 (5.9 ha)	14.7 (3.9 ha)	9.9 (13.8 ha)	0.0	45.5 (50.7 ha)
Chronically Threatened	47.0 (26.6 ha)	13.9 (3.8 ha)	4.1 (5.7 ha)	0.0	32.9 (36.6 ha)
At Risk	0.0	0.0	26.4 (36.8 ha)	NA	18.0 (20.1 ha)
Critically Underprotected	NA	NA	0.0	NA	0.0
Underprotected	NA	51.8 (13.9 ha)	57.6 (80.4 ha)	100.0 (1.7 ha)	0.0
Less Reduced and Better Protected	42.6 (24.1 ha)	19.6 (5.3 ha)	2.0 (2.7 ha)	0.0	3.6 (4.0 h)
Total	**100% (56.7 ha)**	**100% (26.9 ha)**	**100% (139.4 ha)**	**100% (1.7 ha)**	**100% (111.4 ha)**

PERCENT OF TOTAL REAL GAIN IN EACH DISTRICT, OF EACH ECOSYSTEM

Values presented are percent of total real gain per ecosystem in each district.
Area (hectares) of real gain per ecosystem in each district is provided in brackets.
NA = Ecosystem is not present within given district.

Ecosystem Gained	Taupō District (part within the Bay of Plenty Region)	Whakatāne District	Western Bay of Plenty	Kawerau District	Tauranga City
Early Successional	0.30 (0.17 ha)	0	0	0	3.0 (3.4 ha)
Lowland Indigenous Broadleaved Species Scrub	82.92 (46.99 ha)	75.71 (20.3 ha)	67.66 (94.32 ha)	0	1.5 (1.7 ha)
Indigenous forest	0.34 (0.19 ha)	0	0.34 (0.48 ha)	0	0
Mānuka and/or Kānuka Scrub	0	21.88 (5.9 ha)	0	100 (1.74 ha)	0
Estuarine Wetland	NA	0	28.38 (39.56 ha)	NA	21.3 (23.7 ha)
Freshwater Wetland	0	0	3.62 (5.04 ha)	0	32.1 (35.7 h)
Frost Flat	15.28 (8.66 ha)	0	NA	NA	NA
Mangrove	NA	0	0	NA	33.9 (37.8 ha)
Sand Dune - Foredune	NA	0	0	NA	6.9 (7.7 ha)
Sand Dune - Back Dune	NA	2.41 (0.6 ha)	0	NA	1.2 (1.3 ha)
Sand Dune -Subtotal	NA	2.41 (0.6 ha)	0	NA	8.1 (9.0 ha)
Total	**100%[1] (56.6 ha)**	**100% (26.9 ha)**	**100% (139.4 ha)**	**100% (1.74 ha)**	**100% (111.4 ha)**

[1] Includes 1.16% of total real gains for which the polygons of loss were too small to classify the ecosystem gained.

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