REPORT

Tonkin+Taylor

Claims and Consent Data Report for 2016 Kaikoura/Hurunui Earthquake Claims Settlement Research

Prepared for
Toka Tū Ake EQC
Prepared by
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Toka Tū Ake EQC

Tonkin & Taylor Ltd (FILE)

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1 Applicability

This report has been prepared for the exclusive use of our client Toka Tū Ake EQC, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

This report was written in conjunction with other reports, in particular "2016 KAIKŌURA/HURUNUI EARTHQUAKE CLAIMS SETTLEMENT RESEARCH: CLAIMANT SURVEY - Survey Analysis on Housing Quality" and hence should not be read in isolation.

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2 Introduction

This report describes the methodology used for the analysis of Kaikoura Building Consents. It covers the process used to spatially locate building consent data and match this data with EQC building claims, as well as outlining the analysis carried out on the matched claims-to-consents dataset.

Consent data was obtained from Hurunui District Council (HDC), Marlborough District Council (MDC), and Kaikoura District Council (KDC) from 2016 – present. The purpose of this analysis was to analyse whether insurance claims translate to repairs that have a building consent.

3 Step 1 – Consent data cleaninbg and address location finding

3.1 Consent data

Building Consent datasets were provided by all three councils. MDC did not provide any exemption data as they did not process any earthquake-related exemptions. HDC provided exemption data in picture format (of a table). This was converted using image recognition software and appended to the consent data (and henceforth is included in HDC's consent totals). KDC provided the total number of exemptions (a total of 79) that related to earthquake repair work but could not supply property specific data, so this data could not be incorporated into this analysis.

The quality of consent data provided by the three councils was somewhat variable. For example, some address data contained town names, whereas some did not. The data was cleaned to ensure consistent formatting, and where data such as town names were missing, these were added.

3.2 Address location finding

The number of consents for each council is found in Table 2.1 below:

Table 2.1: Number of consents in each council (including exemptions for HDC)

HDC	MDC	KDC
2,488	7,825	1,043

Using addresses in each consent, the locations were found by effectively 'searching' the address in maps and outputting the longitude and latitude as a point. The 'searching' algorithm consisted of geocoding addresses through Google Maps.

The addresses were searched using two approaches:

1 The address was searched as is (after it had been cleaned up, by reformatting addresses, adding town names, etc)

2 If step pone yielded no result, the address suburb was removed and a search attempt was made in this way.

Using these two methods, addresses were found for the following number of consents:

Table 2.2: Number of consents with correct geocoding

HDC	MDC	KDC
2,423 (97.4%)	7,740 (98.9%)	991 (95.0%)

- HDC consents yielded locations for 97.4% of consents (2,423 / 2,488)

- MDC consents yielded locations for 98.9% of consents (7,740 / 7,825)
- MDC consents yielded locations for 95.0% of consents (991 / 1,043)

Consent locations were identified as either being in the respective region or not. The region boundary is defined as the district boundary of the Hurunui District, Marlborough District, and Kaikoura District.

The number of consents that were within their respective regions were:

Table 2.3: Number of consents within respective region

HDC	MDC	KDC
2,323 (93.4%)	7,434 (95.0%)	991 (95.0%)

- HDC consents yielded locations within Hurunui for 93.4% of consents (2,323 / 2,378)
- MDC consents yielded locations within Marlborough for 95.0% of consents (7,434 / 7,825)
- KDC consents yielded locations within Marlborough for 95.0% of consents (991 / 1,043)

Finally, all consents that did not have a geocoding that reflected residential use were removed. Namely, any consent that was within a parcel whose intent was "Road" were removed, as clearly this signified that the geocoding did not work properly, as the address was imprecise and resulted in the claim being located in a roadway.

Table 2.4: Number of consents within respective region and correct geocoding

HDC	MDC	KDC
2,077 (87.3%)	7,000 (89.5%)	850 (81.5%)

Further analysis was only completed on consent that were within their respective regions.

4 Step 2 – Create QPID datasets

EQC provided a national dataset of residential housing as at 2016 compiled by CoreLogic. This dataset contained a unique identifier (referred to as QPID), and location and attribute data for each house, such as floor area, age, number of storeys. The 2016 QPID dataset was used to match insurance claims to consents. QPID also helps to filter out non-residential consents since the national QPID data used is only for residential properties.

The NZ QPID dataset was filtered to each specific region boundary; only QPIDs within each region boundary were considered. The number of QPIDs in each region can be found below.

Table 3.1: Number of consents with correct geocoding

HDC	MDC	KDC
5,714	20,619	1,971

5 Step 3 – Create land parcel datasets

Primary land parcels were obtained from the LINZ website:

NZ Primary Parcels - Survey & Title | | GIS Data Map Mapping | LINZ Data Service[1]

Primary parcels were used to match QPIDs to Consents. We limited the match between the two to only allow matching when they were located in the same parcel. This helped ensure that the Consents are residential and that the match between QPID and consent is accurate.

6 Step 4 – Assigning QPID's to consents

For each of the regions, using the matching in Step 3 above, QPIDs were assigned to Consents. Assignment was based on both the QPID and Consent having a location within the same primary parcel. However, other situations arise due to having multiple QPIDs/Consents in one primary parcel.

QPIDs were assigned according to the rules on the following page. Some joins are of higher quality than others. The short names (x – to – y) refer to x QPIDs joined onto y Consents.

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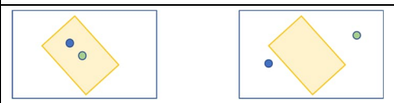
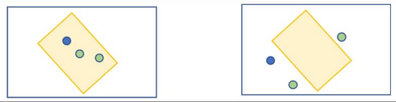
[1] Accessed 9 May 2022

Short Name	Number of QPIDs in Parcel	Number of Consents in Parcel	Further Qualification	Example Illustrations (Orange polygon = parcel, Green dot = Consent point, Blue dot = QPID point)	Number of Consents (Hurunui)	Number of Consents (Marlborough)	Number of Consents (Kaikoura)	How to assign QPID to Consent?	Join Quality
One-to-one	1	1			802 (34.5%)	2,913 (39.2%)	311 (31.4%)	Pair off the footprint with the QPID.	High
One-to-many	1	2+	QPIDs that have multiple consents assigned to them will take the sum of the value of those consents.		544 (23.4%)	1,696 (22.8%)	195 (19.7%)	Assign the one QPID to all consents. This can happen when one address has multiple consents (potentially consent variations as multiple records exist in council datasets).	Medium - High
Many-to-one	2+	1	QPIDs that are equidistant to the consent will both be assigned the consent.		23 (1.0%)	182 (2.4%)	15 (1.5%)	Assign the closest QPID to the consent. This happens when multiple QPIDs land in one parcel for various reasons.	Low
Many-to-many	2+	2+	Same qualifications as both one-to-many and many-to-many.		18 (0.8%)	112 (1.5%)	15 (1.5%)	Assign the closest QPID to each consent.	Low
No assignment	0	1+			690 (40.3%)	2,097 (34.0%)	314 (45.9%)	Do not assign QPID to consent. These are properties where a consent does not exist.	None
				Total	2,077	7,000	850		
				Total consents with associated QPID	1,387	4,903	536		

6.1 Further comments on joins

The many-to-one and many-to-many joins may result in poor quality joins.

Firstly, consider a many-to-one join where the QPIDs are in the same location. This would mean they are both assigned to the consent. In other words, the consent appears for two different QPIDs, when clearly it should only appear once.

Next, consider a many-to-many join where there are multiple QPIDs in the same location, and multiple Consents also in the same location (this may be different to the QPID location but should be the same between consents). In this scenario, all QPIDs will be assigned all Consents, and vice-versa. This will ultimately result in every consent appearing multiple times, which again should not happen. However, we are unable to distinguish which consents should go to which QPID. Ultimately, we have adopted a conservative approach, matching both QPIDs to a consent, thereby overestimating the number of claims that have consent. If we chose an erroneous QPID to assign the consents to, then that QPID may not show up in the insurance claim dataset, while the QPID that should have had consents and had an insurance claim would show a consent value of $0 (when in reality it should have reflected the consent value).

The QPID and parcel datasets are reasonably robust for the most part and the occurrences of these types of joins result in a total of <5% of all joins completed. Because of duplication of consents, this may result in a slight over-estimation of claims with consents, and therefore consent-to-claim value, however the proportion will not be significant.

The one-to-one and one-to-many joins are significantly higher quality as each of these suggest a single QPID in each parcel. Consents will never be duplicated using this method.

6.2 Understanding the no -QPID-case

Some consents did not have a corresponding QPID. Heuristics were developed to try to help identify the causes for these no-QPID-cases, as well as manually going through some of the datapoints using GIS software to understand the causes.

There were two primary causes:

1 The consent was no residential; or

2 The consent was for a new-build (one that didn't exist during the 2016 earthquake and is therefore not in the 2016 QPID database)

It was estimated that the no-QPID-cases causes were proportioned by the estimates in Table 5.1 below.

Table 5.1: Estimates of reasons causing no-QPID-cases

Commercial	New-build	Other reason
80%	10%	10%

6.2.1 Non-residential

Non-residential consents were identified and excluded from further analysis using the following approaches:

1 Any Consent Within the Consent Project Description, a search for non-residential keywords was carried out. These keywords were: Commercial, facility, industrial, factory, office, retire, plant, research, process, showroom, reservoir, hotel, warehouse, retail, school, hangar,

culvert, tower, station. These keywords generally suggest non-residential consents. We also assessed the consent description for words from list of residential keywords: Dwelling, house, unit, residential.

2 project value >$3 million was considered non-residential.

3 Any geocoded location that did not have a number (or number with letter e.g. 3A) as the first element was considered non-residential. Likely this heuristic signalled a commercial building, or that the geocoding was not done properly.

Consents were labelled as non-residential based on two criteria:

1 Project description contains any commercial keyword (note this includes any occurrence of the string, so since we have “office”, we would also consider “offices”); and

2 Project description does not contain any residential keyword.

Finally, the data was visually observed using GIS software. It was evident that the majority of no-QPID-cases were commercial consents. Figure 5.1 below shows a portion of commercial consents (green dots) in Blenheim, illustrating that there are no corresponding QPIDs (purple dots) for these.

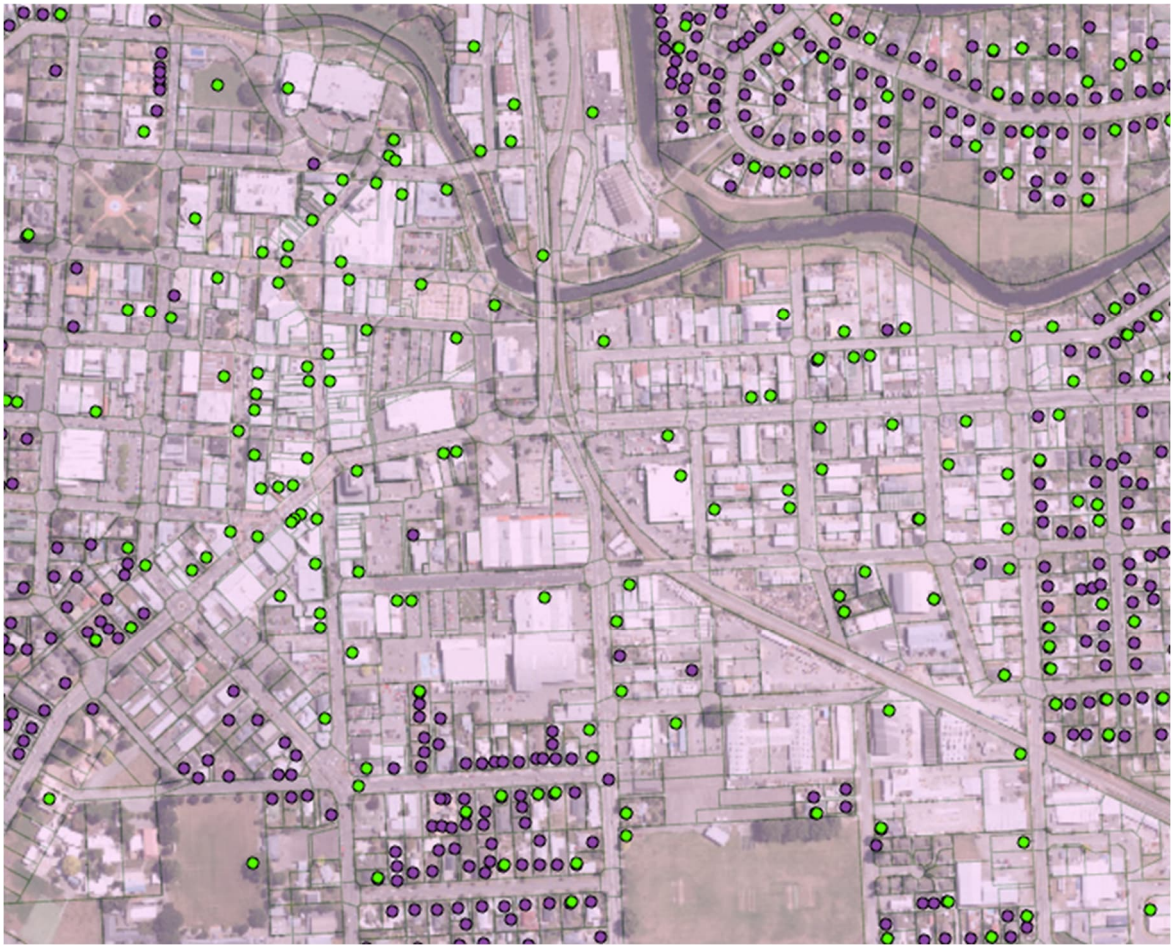


Figure 5.1: Example of commerical consents in Blenheim, Marlborough. Purple dots represent QPIDs, green dots represent consents.

6.2.2 New-builds

The number of no-QPID-cases was compared with the original analysis to an analysis using the 2020 QPID dataset. This provided some indication on new-builds that were added to the QPID dataset between 2016 and 2020. The number of new builds in each region can be found in Table 5.2 below. This number was confirmed by manually looking through the datapoints using GIS software. Table 5.2 below shows an example of a section of new-builds.

Table 5.2: Number of new-builds

HDC	MDC	KDC
90 (4.3%)	507 (7.2%)	44 (5.2%)

Figure 5.2: Example of new-builds in Marlborough region. Purple dots represent QPIDs, green dots represent consents.

7 Step 5 – Join insurance claims to consents

The EQC claim dataset contained QPID as an identifier, and following the process outlined above, the consent dataset had QPID addded. This enabled the two datasets to be combined by matching QPIDs.

Joining the datasets resulted in the following data, shown below in Table 6.1.

Table 6.1: Resulting data from join of claim data and consent data

Analysis	Hurunui	Marlborough	Kaikoura
Total claims	1,623	2,907	1,226
Claims with consents	312	693	287
Percentage of claims with consents	19.2%	23.8%	23.4%
Claims without consents	1,311	2,214	939

Overall, a significant proportion of the consent data ended up being usable (80-90%). Joining this to the QPID dataset resulted in approximately 50% of consents successfully being assigned a QPID. The remaining consents that were not assigned a QPID have been identified primarily as a mix of non-residential or new-builds.

The resulting matched dataset was then used for analysis.

8 Claims to consents analysis

The combined dataset has Insurance Claims for each region and any associated Consents for each claim. Effectively, individual properties were classified as either having an insurance claim, a consent, or both.

9 Comparison to survey data

A survey was completed by Resilient Organisations that collected data from claimants by asking various questions about their claims. Some key comparisons are made in Error! Reference source n ot found. below between the Survey data and the Claims/Consents data to cross-validate some data outputs. Comments are made as to possible reasons for any discrepancies. The discrepancies aren't large in any case, but it is important to understand if the survey results were biased towards certain respondents.

The survey data indicates a higher proportion of claims with values greater than $100,000 indicating that the sample of claimants who responded were biased toward higher claim values. A similar trend exists for rebuilds.

A higher proportion of survey respondents indicated they obtained consents for repair work compared to the claims-to-consents data, indicating that the survey data is biased in favour of having a building consent.

Table 8.1: Survey data compared to key claims/consents data

	Survey Data	Claims/Consents Data	Comment
Percent Claims > $100,000	31%	15.1%	
Percent Rebuild	6.8%	2.2%	Considers only claim data that has consents. There may be other houses deemed rebuild through the insurance process , but these are unable to be identified in the claims dataset
Percent that obtained a building consent	16%	Upper bound: 8.6% (10.1% incl KDC exemptions) Lower bound: 2.2% (3.6% incl KDC exemptions)	Upper bound is based on consent descriptions that clearly indicate EQ repair work being carried out. Lower bound estimate is based on consent descriptions where it is likely (but not definite) that EQ repair was carried out.

10 Analysis

10.1 Claims/consents that were earthquake, overcap, rebuild or fireplace related.

During the data matching process, consents were matched to claims. This matching process picked up all consents for a property, so may include earthquake work or other work unrelated to earthquake repairs. It is important therefore to identify earthquake repair work from the description of work in the consents dataset. Two categories have been defined: where work is possibly related to earthquake repair work it has been classed as 'potential earthquake', and where the consent description is clearly earthquake related these have been classed as 'definite earthquake'.

There are some limitations with this methodology, namely that it is difficult to accurately identify all earthquake related consents. A consent may be earthquake related but not have any reference to an earthquake or any damage. That is why a lower bound/upper bound approach has been taken. Most of the analysis uses the "Potential Earthquake" categorisation as we did not want to exclude consents that may have been earthquake related.

10.1.1 "Potential earthquake'

Consents that were earthquake related were categorised conservatively; that is, if a consent description was ambiguous, it was classed as earthquake related. This leads to an exaggerated number of earthquake claims, whilst excluding other consents which are clearly not earthquake related.

The following steps were taken to determine if a consent was earthquake related:

1 If there was no description in the consent data, categorise as 'Potential EQ'.

2 If the description contains any of the keywords listed in Earthquake keywords ('replac', 'clad', 'level', 'repair') categorise as 'Potential EQ'.

3 If the description does not contain any of the keywords in Non-earthquake keywords ('additiona', 'exten', 'renovat', 'instal', 'alter', 'kitchen', 'bathroom') and woodburner

keywords ('wood', 'burner', 'log', 'fire', 'sfh', 'jayline', 'osburn', 'masport', 'yunca', 'metrio', 'ravelli', solid fuel heat'), categorise as 'Potential EQ'.

4 Finally, if none of the above criteria are satisfied, categorise as Non-EQ.

10.1.2 'Definite earthquake'

'Definite earthquake' was used to identify consents that specifically reference earthquake related terms, rather than the broader earthquake category initially identified which captures anything that may be an earthquake related consent.

The following test was applied:

> If the description contained any of the keywords 'eq', 'quake', 'damag', 'repair', 'rebuild', categorise as 'Definite EQ'.

10.1.3 Rebuild

Rebuilds were categorised from the consent data.

The following steps were taken to determine if a consent was Rebuild related:

1 If there was no description, categorise as Non-rebuild.

2 If the description contained the keyword "rebuild", categorise as Rebuild.

3 Finally, if none of the above criteria were satisfied, categorise as Non-rebuild.

10.1.4 Overcap

Overcap claims are any insurance claims that have a value of $100,000 excluding GST or $115,000 including GST i.e. the EQC cap at the time of the Kaikoura earthquake. This value is reduced by $1,000 for every 1m^2 below 100m^2. For example, a 90m^2 building will have an Overcap value of $90,000 excluding GST.

The dataset shows claim values inclusive of GST. There are a significant number of claims with claim values ranging from $110,000 - $115,000 (just under the cap value). This range of claim values is the result of the way in which private insurers calculated and deducted fees and excesses from the EQC cap. As a result, claims over $110,000 have been considered Overcap.

10.1.5 Log burner replacement

There were a large number of consents that only relate to the replacement of existing log burners. This is due to requirements from around 2010 to replace older log burners with clean-air approved log burners across the three districts. Therefore, categorisation was used to identify consents that were related to installing log burners or fireplaces. This represented a significant portion of the consent data in all regions as consents are required for any work related to replacing a log burner. Including these consents in the analysis would impact the accuracy of the average value of consented earthquake work, as the value of log burner replacement consents is typically around $3,000 – 5,000 (i.e. lower than most earthquake repair work).

The following steps were taken to determine if a consent was Fireplace related:

1 If there was no description, categorise as Non-fireplace.

2 If the description contained any of the keywords listed in Fireplace keywords ('wood', 'burner', 'log', 'fire', 'sfh', 'jayline', 'osburn', 'masport', 'yunca', 'metro', 'ravelli', 'solid fuel heat'), categorise as Fireplace related.

3 Finally, if none of the above criteria were satisfied, categorise as Non-fireplace.

10.2 Overcall data

The following tables provide data breakdowns by district. These do not include the exemptions from KDC as these were not able to be matched with claims.

Table 9.1: Total claims and consents by district

Analysis	Hurunui	Marlborough	Kaikoura
Total claims	1623	2907	1226
Claims with consents	308	689	280
Percentage of claims with consents	19.00%	23.70%	22.80%
Median consent value to claim value (given that a claim has an associated consent)	70.70%	65.40%	26.30%

Table 9.2: Total earthquake related ('potential EQ') claims and consents by district

Analysis	Hurunui	Marlborough	Kaikoura
Claims with consents	169	212	112
Percentage of claims with consents	10.40%	7.30%	9.10%
Median consent value to claim value (given that a claim has an associated consent)	68.50%	112.30%	63.20%

Table 9.3: Total overcap claims and consents by district

Analysis	Hurunui	Marlborough	Kaikoura
Total claims	251	142	406
Claims with consents	106	70	116
Percentage of claims with consents	42.20%	49.30%	28.60%
Median consent value to claim value (given that a claim has an associated consent)	53.30%	35.60%	30.20%

Table 9.4: Under cap claims and consents by district

Analysis	Hurunui	Marlborough	Kaikoura
Total claims	1372	2765	820
Claims with consents	202	619	164
Percentage of claims with consents	14.70%	22.40%	20.00%
Median consent value to claim value (given that a claim has an associated consent)	90.40%	73.10%	19.70%

11 Graphs

Graphs were generated primarily using the "Potential Earthquake" dataset. This is so as not to include consents that are clearly not earthquake related. This category will still include some consents that are not related to earthquake repair work, so potentially exaggerates the number of claims that have consents for earthquake repair work.

Table 10.1 below briefly describes the key graphical outputs that have been used for data exploration and validation. These graphs look at the data from different aspects in an attempt to identify trends and differences between regions.

Table 10.1: Brief description of graph outputs for Section 5

Section	Graph Name	Description
Error! Reference source not found.	Error! Reference source not found.	Looking at individual Consent Values vs Claim Values.
Error! Reference source not found.	Error! Reference source not found.	Comparing the underlying distribution of claims values, consent values, and consent values for earthquake related consents.
Error! Reference source not found.	Error! Reference source not found.	Comparing the proportion of property owners that got consents for their claim across different claim value bands. Also compares the median usage of claims towards consents.
Error! Reference source not found.	Error! Reference source not found.	Comparing Overcap to under cap claims in terms of number of consents and value of consents.

11.1 Claim value vs Consent value

Graphs were generated separately for each region:

1 Scatter plot of Claim value vs Consent value. A blue dotted line is added to represent the 1:1 line (i.e. $1,000 of claim value to $1,000 of consent value).

2 Histogram of the distribution of "Proportion Claim value to Consent value". For example, a claim/consent pair with a $5,000 consent and a $20,000 claim would have a "Proportion Claim value to Consent value" of 0.25. These proportions are cut off at 3 in the graphs, when in reality they reach much higher values (in the 100's). The reason for these high values is justified by small claims that had large consents for their homes that likely weren't relevant to the claim. For example, where a homeowner chose to rebuild, but only had light damage and a small claim value.

Figure 5.1 through Figure 10.6 below show the above plots for each region, and Figure 10.7 and Figure 10.8 show these for all regions combined onto one plot.

Hurunui and Marlborough have largely similar distributions. Kaikoura has a distribution with more proportions of consent value to claim value closer to 0, bringing the median of this value down. This can be seen in Figure 10.6 and Figure 10.8. Kaikoura is likely to be lower because their 79 exemptions are not included in this analysis.

Additionally, because claim data is only available up to the EQC cap threshold, the proportions in the graphs below would be smaller in reality than what is shown (since the denominator is capped at a smaller number). Moreover, neither Claim Value nor Consent Value have been adjusted for inflation since this would likely have little impact and not add value to the analysis.

11.1.1 Hurunui

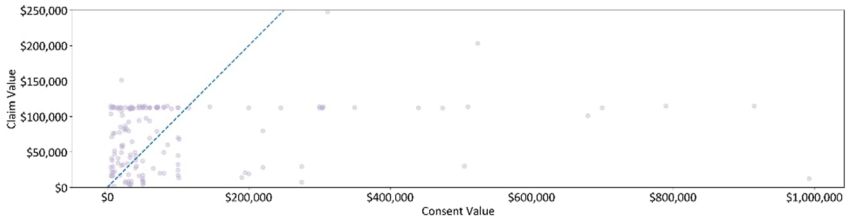


Figure 10.1: Claim value against consent value for Hurunui

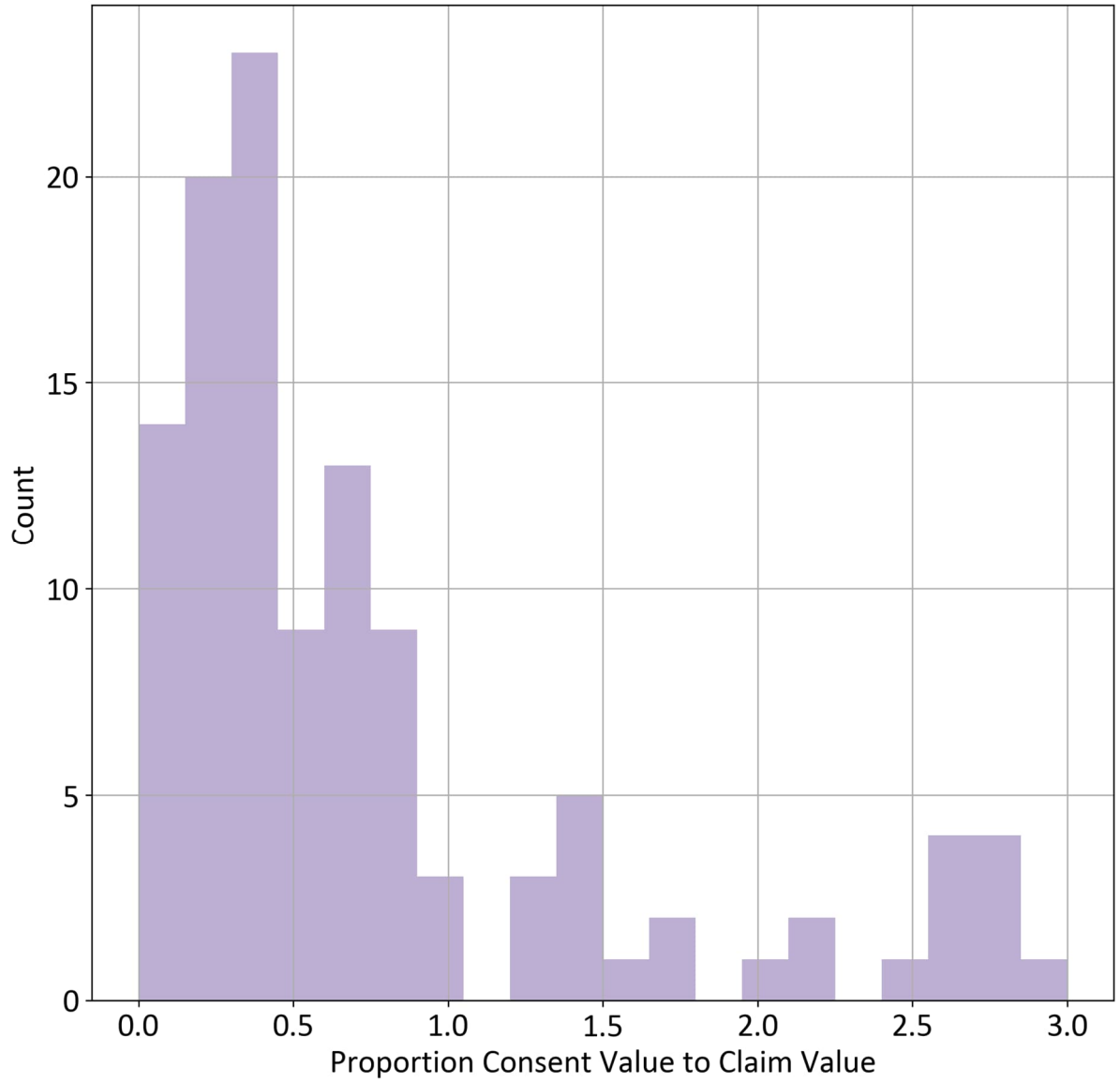


Figure 10.2: Distruction of "Proportion consent vlaue to claim vlaue" for Hurunui (cut-off at 3.0)

11.1.2 Marlborough

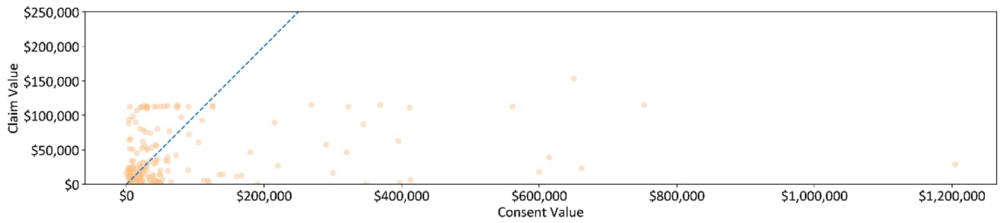


Figure 10.3: Claim value against consent vlaue for Marlborough

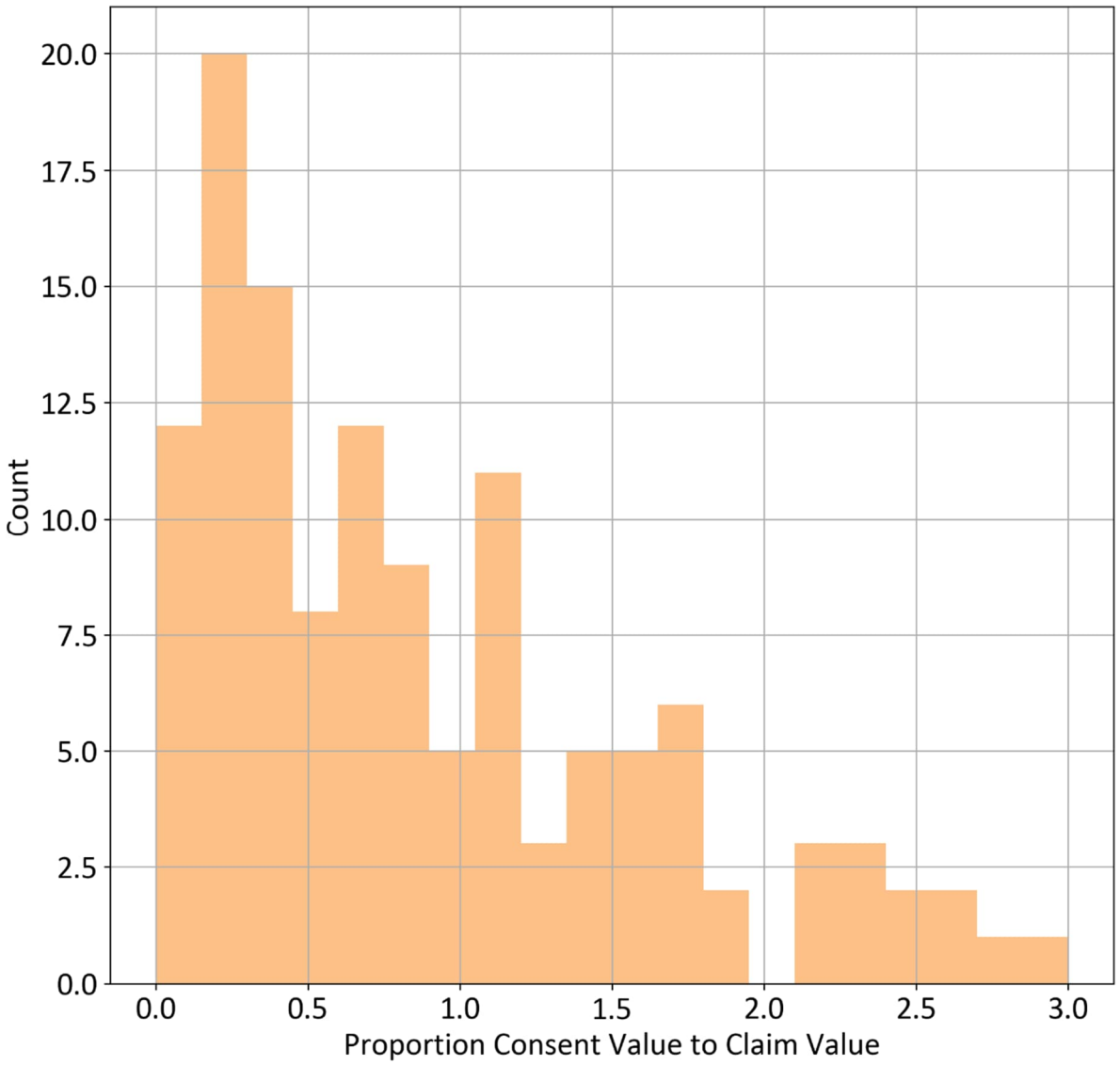


Figure 10.4: Distribution of "Proportion consent vlaue to claim value: for Marlborough (cut-off at 3.0)

11.1.3 Kaikoura

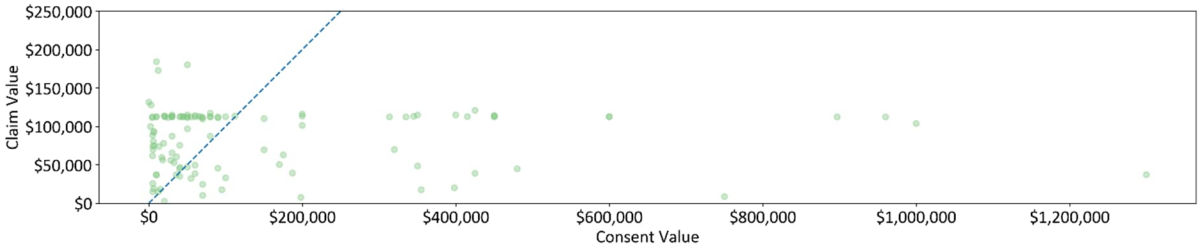


Figure 10.5: Claim value against consent value for Kaikoura

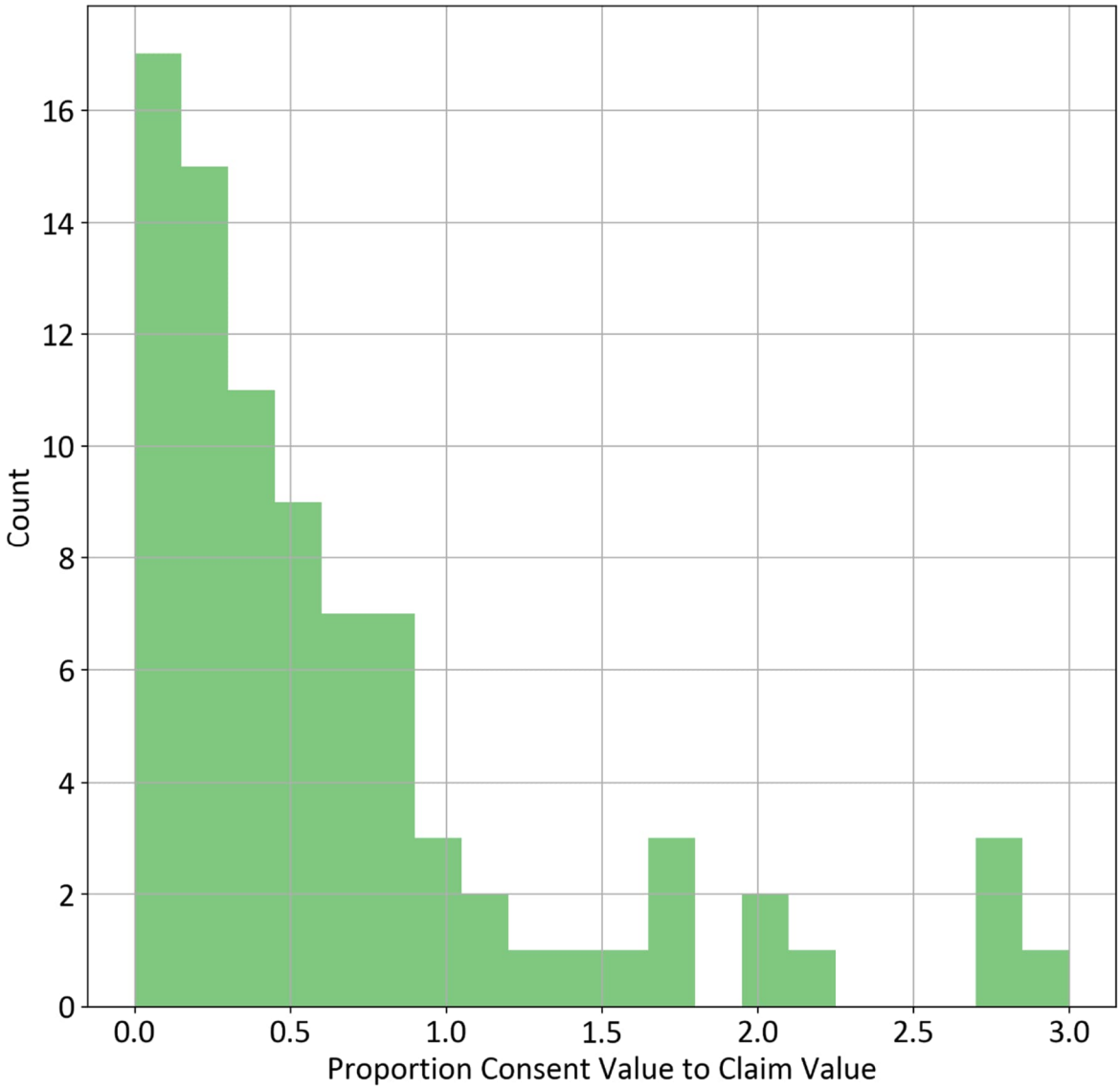


Figure 10.6: Distribution of "Proportion consent value to claim value" for Kaikoura (cut-off at 3.0)

11.2 Claim and consent value distributions

The following graphs compare claim values for all claims with the claim and consent values for those claims that id obtain consent. These are shown by district.

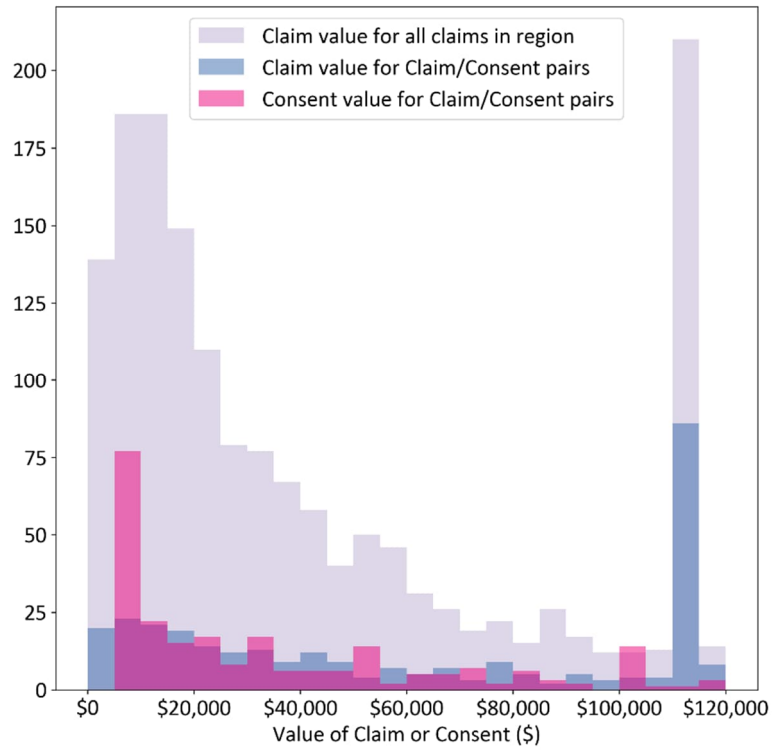


Figure 10.7: Distribution of claim and consent vlaues in Hurunui

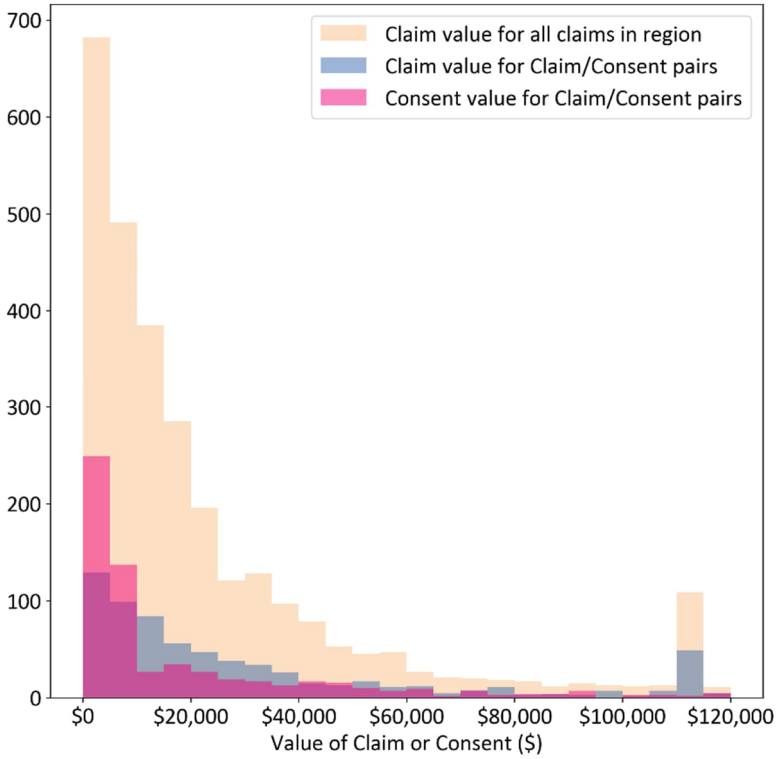


Figure 10.8: Distribution of claim and consent values in Marlborough

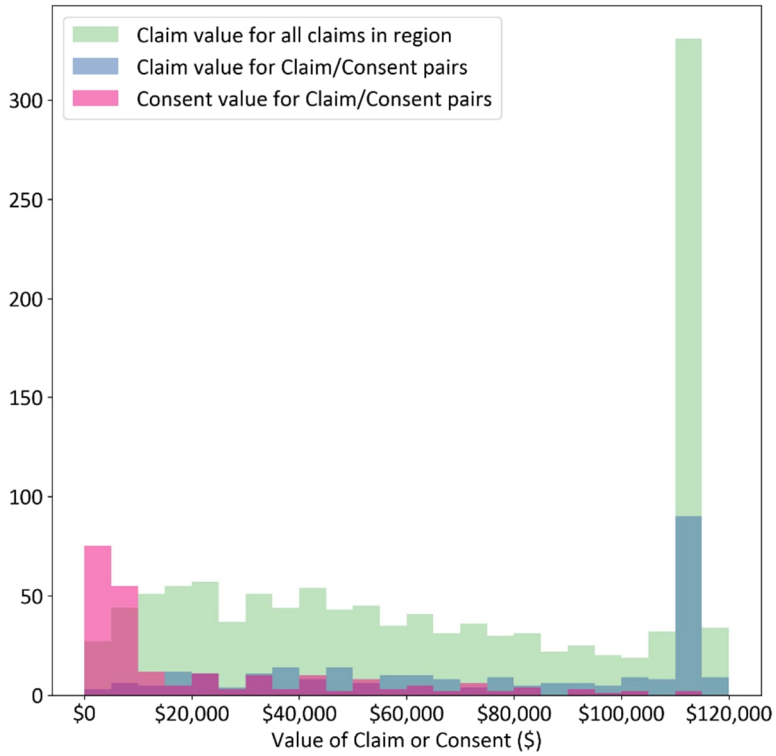


Figure 10.9: Districtuion of claim and consent vlaues in Kaikoura

11.3 Proportion of claims with consents for various claim values

The graphs below show the proportion of claims that obtained consent, broken down by the total value of the claim, and by district. Kaikoura is markedly lower due the exemption data not being included in this analysis.

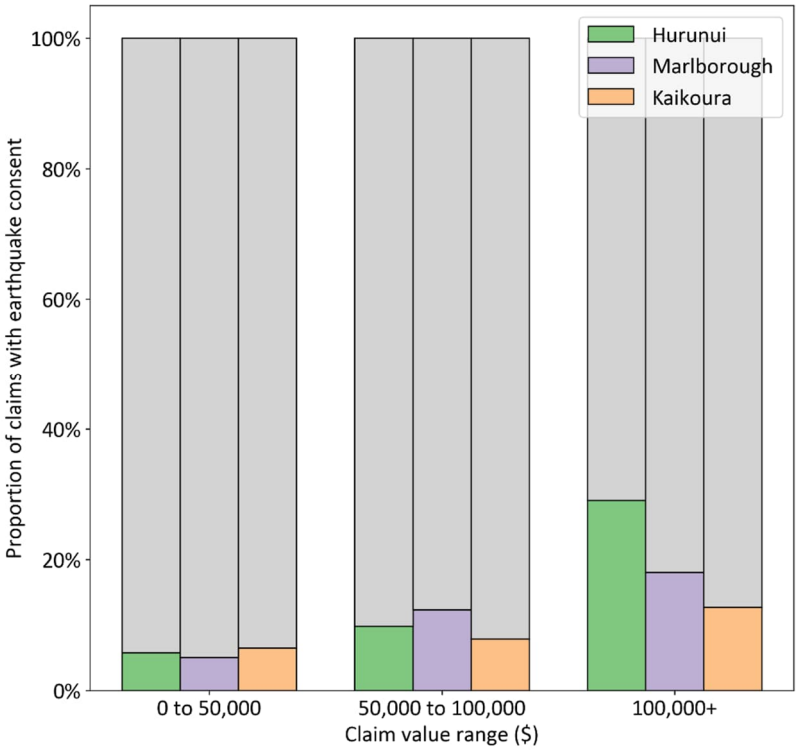


Figure 10.10: Proportion of claims that have an earthquake related consent, for various ranges of claim values

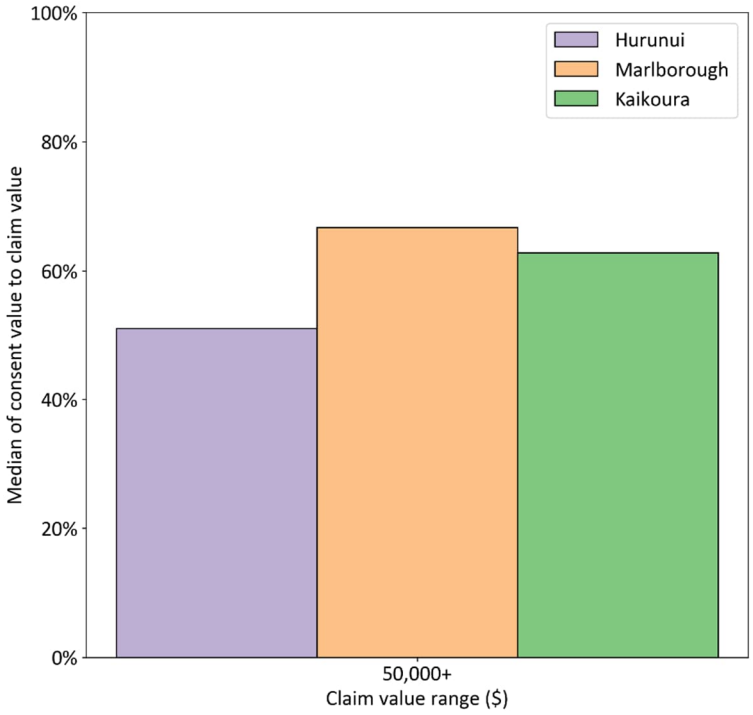


Figure 10.11: Median of consent value to claim value for claim/consent matches that have a definite earthquake claim

11.4 Overcap vs Non-Overcap comparisons

It is important to note that the median value for Overcap claims is lower in reality than the graphs below show. This is because Overcap claims will have been paid out more by private insurers, meaning the "Proportion Consent value to Claim value" will be lower.

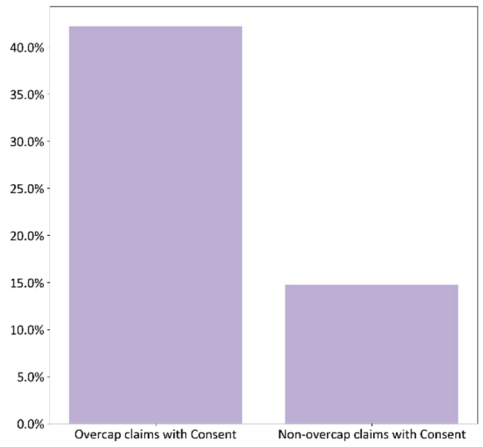
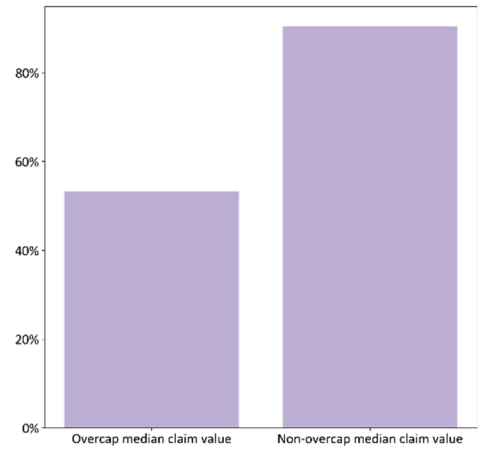
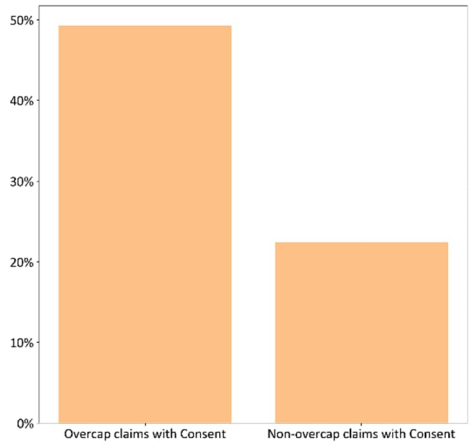
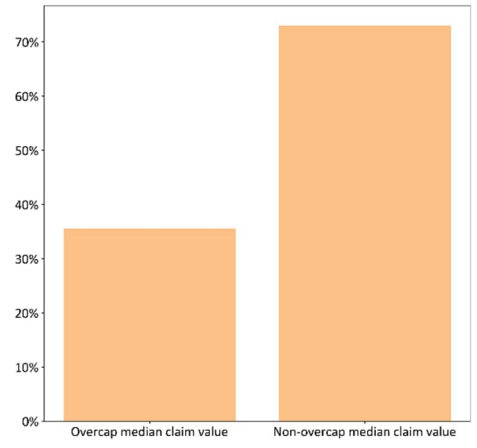
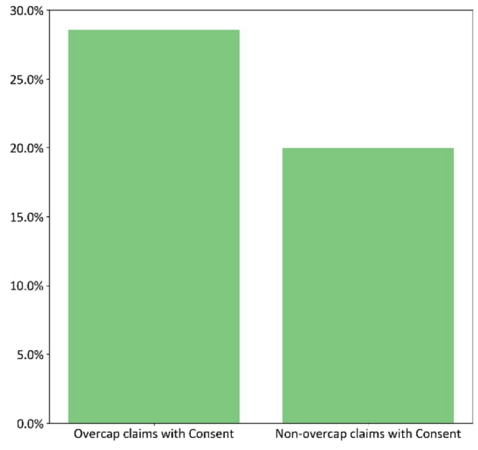
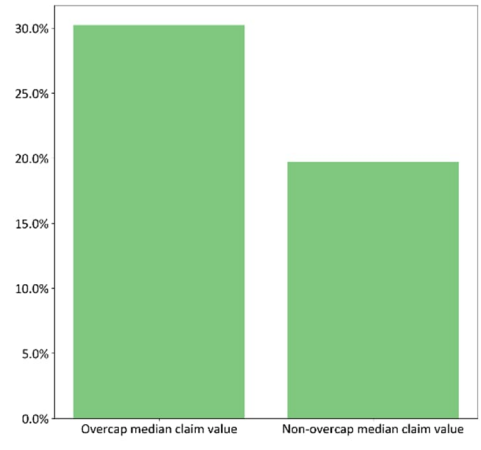
Region	*Proportion of claims with consents*	*Median value of consents-to-claims proportion*
Hurunui – 308 claims with consents		
Marlborough - 689 claims with consents		
Kaikoura - 280 claims with consents (excludes 79 exemptions)		

Figure 10.122: Proportion of claims with consents and median value of consents-to-claims proportion broken down by the three district councils.