

Natural Hazard Research

THE NEW ZEALAND EARTHQUAKE AND WAR
DAMAGE COMMISSION - A STUDY OF A
NATIONAL NATURAL HAZARD INSURANCE SCHEME

by

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PREFACE

This paper is one in a series on research in progress in the field of human adjustments to natural hazards. It is intended that these papers will be used as working documents by the group of scholars directly involved in hazard research as well as inform a larger circle of interested persons. The series is now being supported mainly from funds granted by the U.S. National Science Foundation to the University of Colorado, Clark University and the University of Toronto.

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Amongst the objectives of the Natural Hazards Research Programme are the investigation of national policies aimed at abating the losses resulting from the impact of natural hazards and the evaluation of the performance of such policies.¹ It is therefore the purpose of this contribution to the Working Paper Series to investigate and evaluate the natural hazard insurance scheme which has been operating in New Zealand for the past quarter century.

NATURAL HAZARDS IN NEW ZEALAND

New Zealand is a particularly hazard prone country. Situated on the southern extremity of the Pacific 'ring of fire' it is subject to quite considerable geothermal activity, particularly vulcanism and earthquakes. The central area of North Island is still a very active volcanic area. Though the two active volcanoes, Ruapehu and Ngauruhoe, are normally quiescent, the danger of eruption is never far away. For example, in June 1969 lava spilled from Ruapehu caused damage costing over N.Z. \$39,000.² Thermal springs, colourful mud pools

¹Natural Hazard Research, 1969. Collaborative Research on Natural Hazards. Progress Report. Toronto, Department of Geography, University of Toronto.

²Earthquake and War Damage Commission, 1970. Annual Report for the Year Ending 1969. Wellington, Government Printer, p.3. N.B. All dollars used in this report are New Zealand dollars. The New Zealand dollar is worth approximately U.S. \$1.20. The New Zealand currency became decimal in 1967.

and magnificent geysers in the vicinity of Rotorua area attract many tourists annually but attest to the ever-present geothermal activity of the region.

The danger from earthquake is more severe, however. The multiplicity and widespread occurrence of active faults in New Zealand are depicted in Figure 1. Eiby³ has documented the incidence of major earthquakes in New Zealand between 1460 and 1965 and his information is mapped in Figure 2. Within this period no less than 175 earthquakes have been recorded with intensities greater than 5 on the Modified Mercalli scale.⁴ All but six of these have been recorded since 1826. Though the epicentres of the major earthquakes (i.e. earthquakes with a recorded intensity of more than 7 on the modified Mercalli scale) appear to fall within a fairly distinguishable zone corresponding to the greatest density of faults depicted in Figure 1, Power⁵ comments that it would be dangerous to assume that any part of New Zealand is completely free from the danger of severe earthquake. It is difficult to calculate the dollar value of earthquake loss in New Zealand since no formal records were kept prior to 1943, but as an indication of the potential effect of earthquakes in urban areas in New Zealand damage resulting from the Napier earthquake (1931), the Murchison earthquake

³Eiby, G. A. 1968. An Annotated List of New Zealand Earthquakes 1460-1965. New Zealand Journal of Geology and Geophysics, 11, 630-647.

⁴New Zealand adopted the Modified Mercalli Scale as a basis for measuring the intensity of earthquakes in 1965. This scale is adapted from the more familiar Richter scale but the two are essentially interchangeable. See Eiby, G. A. 1966. The Modified Mercalli Scale of Earthquake Intensity and its use in New Zealand. New Zealand Journal of Geology and Geophysics, 9, 122-129.

⁵Power emphasises that New Zealand is subject to all three types of earthquake defined by Tazieff, namely the island arc type, the alpine thrust fault type and the undersea mountain ridge type. See Tazieff, H, 1964. When the Earth Trembles. N.Y., Harcourt Brace & World; Power, C.A. 1968. Earthquake Insurance in New Zealand and the Problem of Reconstruction. New Zealand Engineering 34, 23-28, p.23.

NEW ZEALAND

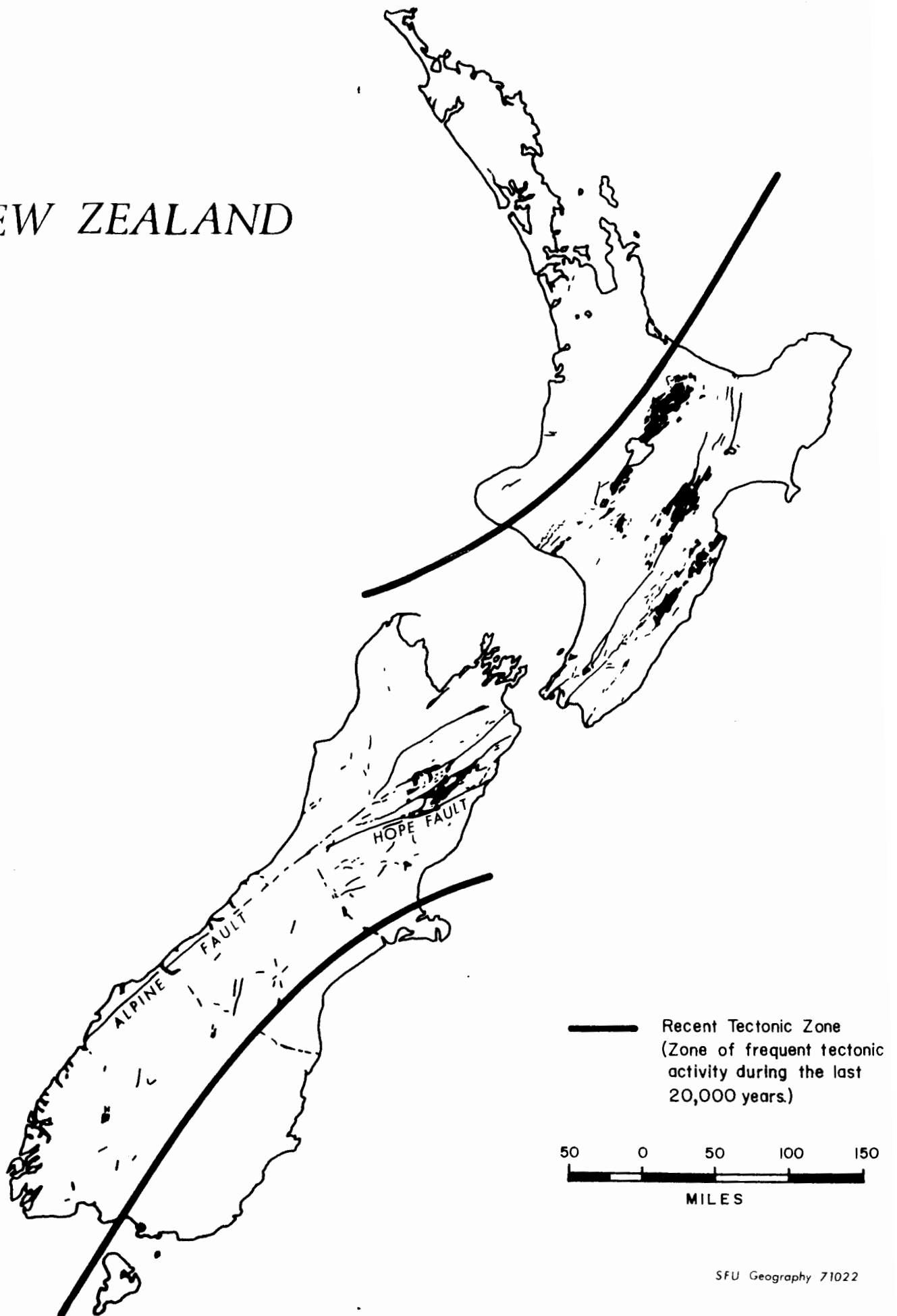


Figure 1. Active earthquake faults in New Zealand. (After Eiby, 1970).



Fig. 1. Locations of major earthquakes in New Zealand. (After Eiby, 1970).

(1942) and the Inangahua earthquake (1968) was reported to be \$10 million, \$5 million and \$2.5 million respectively. As a further indication, earthquake damage claims paid out by the New Zealand government have amounted to \$3.7 million since 1943.⁶ However, Power⁷ has estimated that should an earthquake strike Wellington with an intensity similar to one which struck the new settlement in 1855, damage could amount to \$600 million. Power believes that the resulting cost of reconstruction would set back the New Zealand economy for a decade.

In addition to the effects of geotectonic hazards, New Zealand also suffers extensively from damage caused by floods and windstorms. The mountainous west coast of South Island and the central areas of North Island intercept the prevailing rain bearing winds of the roaring forties, with the result that short lived but intense flash floods and widespread wind storms are not uncommon. Ericksen⁸ has noted that two thirds of all towns and cities with populations exceeding 1000 have experienced damaging floods. He has also calculated that during the period 1955-1969 although the total cost of flood control (as measured by river control works, soil conservation measures and other miscellaneous costs) has risen steadily, flood damage losses (as recorded by Roads and Railway Department estimates of repair and maintenance costs, government insurance payments and other private costs) also increased. Figure 3 records Ericksen's findings and reveals a familiar picture to students of natural hazard - that of increasing damage despite more costly efforts at hazard control.

⁶Earthquake and War Damage Commission Annual Reports 1943-1970. Wellington, Government Printer.

⁷Power, 1968, op.cit. p. 25-26.

⁸Ericksen, N. J. 1971. Human Adjustment to Floods in New Zealand. New Zealand Geographer, 27.

THE EARTHQUAKE AND WAR DAMAGE ACT 1944

A) History and Philosophy of the Act

Curiously, however, New Zealand established its natural hazard insurance programme not so much because of the uncertain danger from natural catastrophe as because of what appeared to be a much more certain anthropogenic threat of war damage resulting from enemy action. Nor was this policy indigenous to New Zealand, but originated in Britain where in view of the extensive bombing of London and other major ports, the War Damage Act was passed in 1941. This Act established a War Damage Commission which was empowered to levy a charge against the assessed value of all property in England and Wales at the rate of 2s. in the pound in the case of buildings and 6d. in the pound for all open land and agricultural property. The resulting revenue was used to replace or repair any property that was damaged by enemy action.

In the same year New Zealand also passed a War Damage Act based essentially on the same principles as the British model, though there were some important differences in its operation. Because New Zealand's property tax laws differ from those of Britain, the basis for the levy by the New Zealand War Damage Commission was not the assessed property value but the value of property as identified through its fire insurance policy. This meant that while the British scheme was compulsory and covered all assessed property, the New Zealand version was only compulsory where a property owner had insured his property against fire, and cover was extended only to buildings, not to land or other property such as fences or walls. The New Zealand levy was 5s. per one hundred pounds (25¢ per \$100) of fire insurance cover.⁹ The War Damage Fund was supported by the New Zealand Consolidated Fund, (i.e.

⁹This very high premium was set initially to build up a large revenue quickly as the likelihood of bombing appeared imminent at the time.

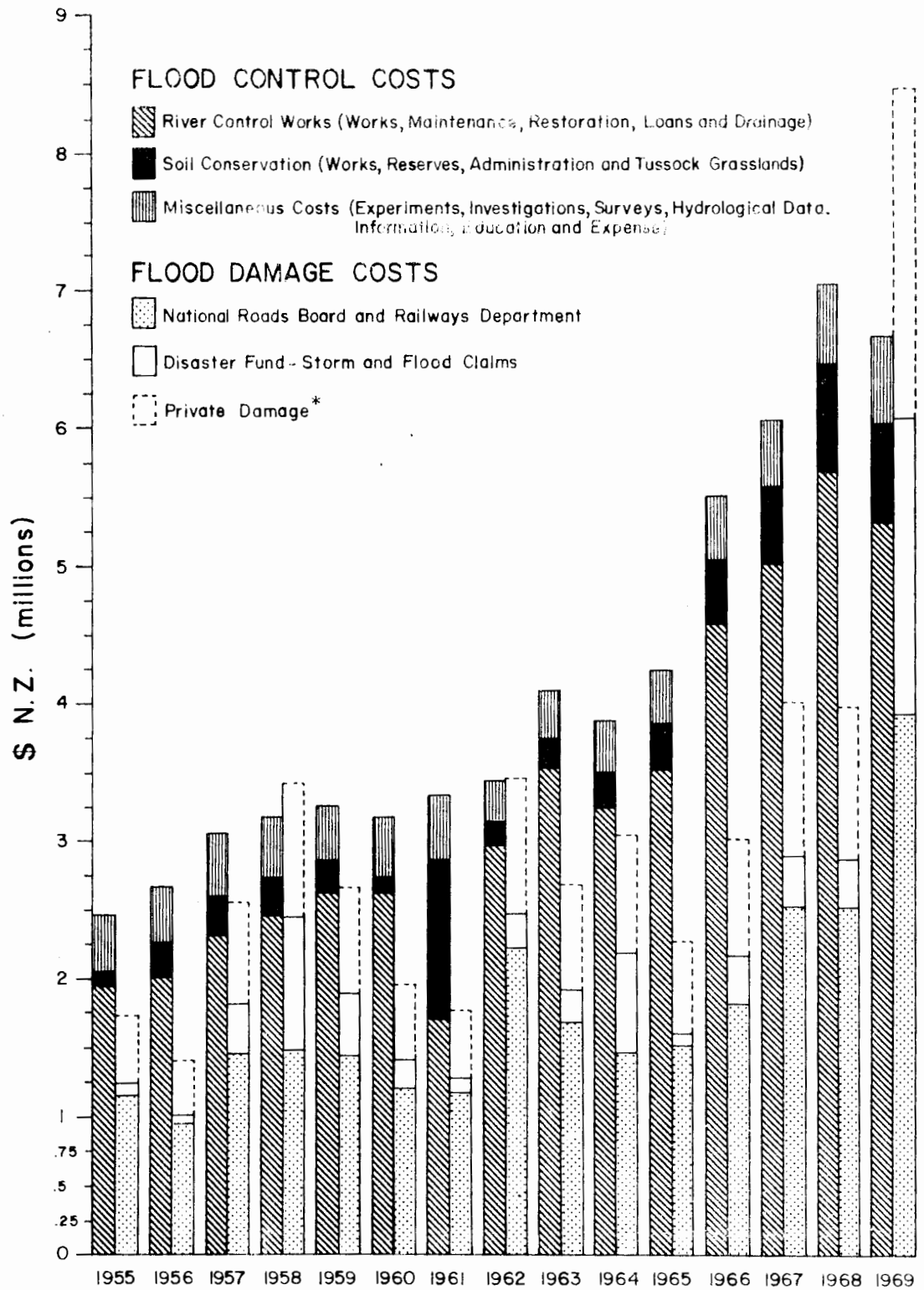


Figure 3.

Flood control costs and flood damage losses in New Zealand, 1955-1969. (After Ericksen, 1971).

*This figure represents damage sustained by the individual which is not eligible for refund. This would include loss of stock, damage to fences and walls and loss of business. Ericksen estimated on an empirical basis that about 40% of total flood damage was of this nature.

the New Zealand Treasury) and the Commission was empowered to meet replacement costs on any property which was partially damaged, and the indemnity value of the building up to the value of the insurance in the event of its destruction. It is worth noting that, while in the British case damage had already occurred prior to the Act and payments from the Fund were proceeding, New Zealand acted in the threat of Japanese bombing and thus promulgated legislation in anticipation of a potential hazard.

The principles guiding both schemes were based on the premise that war damage could afflict any property owner and hence that there were no areas of special risk (though presumably urban areas were more prone than rural). Therefore, on the assumption that the incidence of damage was random and unpredictable, the rate of levy was similar for all property throughout the country. It was also believed to be in the national interest that all owners of insurable property be included so that the unfortunate who might suffer property loss from enemy action and who otherwise would not be compensated by private insurance cover would receive compensation.

By 1944 revenue from over 500 million pounds (\$1 billion) worth of insured property exceeded 4 million pounds (\$8 million) and the War Damage Fund was increasing at the rate of 1.5 million pounds (\$3 million) per year. But with the war rapidly coming to a close it was embarrassingly obvious that the Fund would never have to be used for its intended purpose, so the government searched for alternative means of spending this money. By a quirk of circumstance an earthquake had struck the town of Masterton some fifty miles to the north east of Wellington in 1942 resulting in widespread disruption of services and over \$5 million worth of damage to local communities. Many of the damaged homes had not been rebuilt as existing homeowners' insurance

policies did not cover such Acts of God. In addition, the government had not forgotten the disastrous earthquake of 3rd February, 1931, in Napier which was followed by a fire and resulted in the greatest property damage and loss of life in New Zealand's history. Since few properties were insured against such an event the government had been forced to make special finance available. The public reaction was marked. Newspapers throughout the country advocated some form of national earthquake insurance scheme and, with another earthquake in the same area in the following year, the Associated Chambers of Commerce of New Zealand also endorsed such an idea.

The government was also encouraged to underwrite earthquake insurance by the private insurance companies. The unpredictable and potentially very damaging effects of earthquakes make it difficult for private insurance companies to provide cover. Unless the incidence of earthquake is well known (which is unlikely) only property owners who are located on determinable areas of risk will seek cover. The companies are thus faced with risks aggregated into higher risk localities with few if any premiums stemming from low risk areas. Accordingly insurance premiums are very high and the likelihood of reinsurance to spread the risk is limited. Furthermore, earthquakes being random and highly variable in nature, the companies might be faced with short periods of very high claims and, during quiescent times long periods of revenue which would be subject to high taxation thereby limiting the buildup of necessary reserves.¹⁰

In view of these circumstances and doubtless not uninfluenced by the fact that Masterton was very close to Wellington which had a history of earthquake activity, the Earthquake and War Damage Act was

¹⁰For a more detailed discussion of these points see Freeman, V. R. 1932 Earthquake Damage and Earthquake Insurance. New York, McGraw Hill. Also Steinbrugge, K. V. 1968. Earthquake Hazard in the San Francisco Bay Area: A Continuing Problem in Public Policy. Berkeley, University of California, Institute of Governmental Societies.

passed in 1944. The Act established an Earthquake and War Damage Commission (chaired by the Minister of Finance) which was responsible for administering the Earthquake and War Damage Fund. This Fund incorporated the revenue from the War Damage Act and was applied in exactly the same basis, though the levy was reduced from 5/- to 1/- per one hundred pounds (25¢ to 5¢ per \$100) of fire insurance cover. The Commission was empowered to meet the costs of replacement, or the indemnity value of the property in the case of total destruction in the event of any damage caused by war or by earthquake provided, a) that the property was insured against fire; b) that the property was in a reasonable state of repair; c) that the property owner made sure that any damage caused by earthquake prior to the establishment of the Fund was made good; and d) that the Commission could cancel or reduce its insurance cover if the property was excessively insured against fire. The Act also included a provision whereby any property owner could take out a voluntary insurance policy with the Commission if he had no fire insurance cover, or if he desired increased earthquake insurance. In such cases the rates and conditions (e.g. deductible first payment) would be established by the Commission after inspection of the structural condition of the property and analysis of earthquake risk. This provision applied particularly to structures which were not eligible for fire cover such as hydro power dams and swimming pools.

The philosophy behind the Earthquake and War Damage Act extended the principles underlying the War Damage Act. Damage from earthquake was considered unpredictable and widespread. Since up until this time there had been little analysis of earthquake risk in New Zealand (continuous seismological observations only began in 1940¹¹),

¹¹Eiby, G. A. 1966. A Descriptive Catalogue of New Zealand Earthquakes Part I. Shocks Felt Before the End of 1845. New Zealand Journal of Geology and Geophysics, 11, 16-40, p.16.

earthquake risk was considered ubiquitous and earthquake incidence random. For the reasons cited earlier, private insurance companies were unwilling to provide cover for the homeowner in view of the uncertain but potentially catastrophic nature of the hazard, so that the homeowner was completely unprotected against earthquake, and, in the event of such a disaster, there was little to mitigate considerable hardship. One of the principal reasons for the Fund, therefore, was to provide a considerable source of revenue to offset the tremendous costs to the nation in the event of a major earthquake striking a large settlement.

In essence then, the Earthquake and War Damage Fund was originally established to provide a means whereby the unfortunate who suffered property loss through no fault of their own would be compensated by the fortunate who were considered equally liable to misfortune. The Act therefore reflected the compassion felt by all nations during the aftermath of a natural disaster, but attempted to offset the common practice of rather ad hoc arrangements where relief funds were established only after severe disasters and where few formal institutional arrangements existed to ensure that compensation related to the degree of the loss. The Earthquake and War Damage Fund is thus an important institutional means of anticipating disaster, of providing a formal means of aiding the otherwise helpless and of ensuring that wherever possible all reasonable means to mitigate the effects of natural disaster are undertaken.

B) Procedures and Safeguards of the Act.

This last point is fundamental to the philosophy of the New Zealand programme. The Commission is empowered by the Act to require that local building codes meet acceptable standards of earthquake protection.

Under Section 21(3) of the Earthquake and War Damage Regulations,

1956, the Commission may classify any property into any of three classes upon determination of the resistance to earthquake shock:

Class A - Property with a good measure of earthquake resistance.

Class B - Property with a fair measure of earthquake resistance.

Class C - Property with little resistance to earthquake shock.

These categories would incorporate such items as the type and structural nature of the dwelling, the nature of the foundations and the general susceptibility of the locality to earthquake shock. Until surveys of such factors have been undertaken, all property is classified in Class A. Special rates and conditions (including non-insurance) would apply to Classes B and C depending upon the circumstances. The establishment and enforcement of local building codes are the responsibility of municipalities, but broad guidelines for seismic design are laid down by the Standards Association of New Zealand (S.A.N.Z.). In 1965 the S.A.N.Z. established a set of seismic co-efficients based upon three zones of earthquake risk drawn from the data presented in Figures 1 and 2. The zones are presented in Figure 4 and their rationale for their existence is provided in the Association's report as follows:-

'Zone A has been delineated to comfortably include all regions known to have suffered more than minor damage, all known epicentres of "normal" earthquakes of magnitude greater than 6 (on the Modified Mercalli Scale) and all known surface indications of earth disturbances likely to be of earthquake origin within, say, the last 10,000 years.

'Zone B is a buffer zone in which history indicates that moderate damage may result from earthquakes of intermediate magnitude within the lifetime of a building or from the distant effects of major earthquakes in Zone A.

'Zone C has been conservatively shown to include those regions

which have suffered at the most trifling damage to the poorest class of non-earthquake resistant buildings and are free of epicentres of other than minor magnitude and of known reasonably recent ground disturbance.'¹²

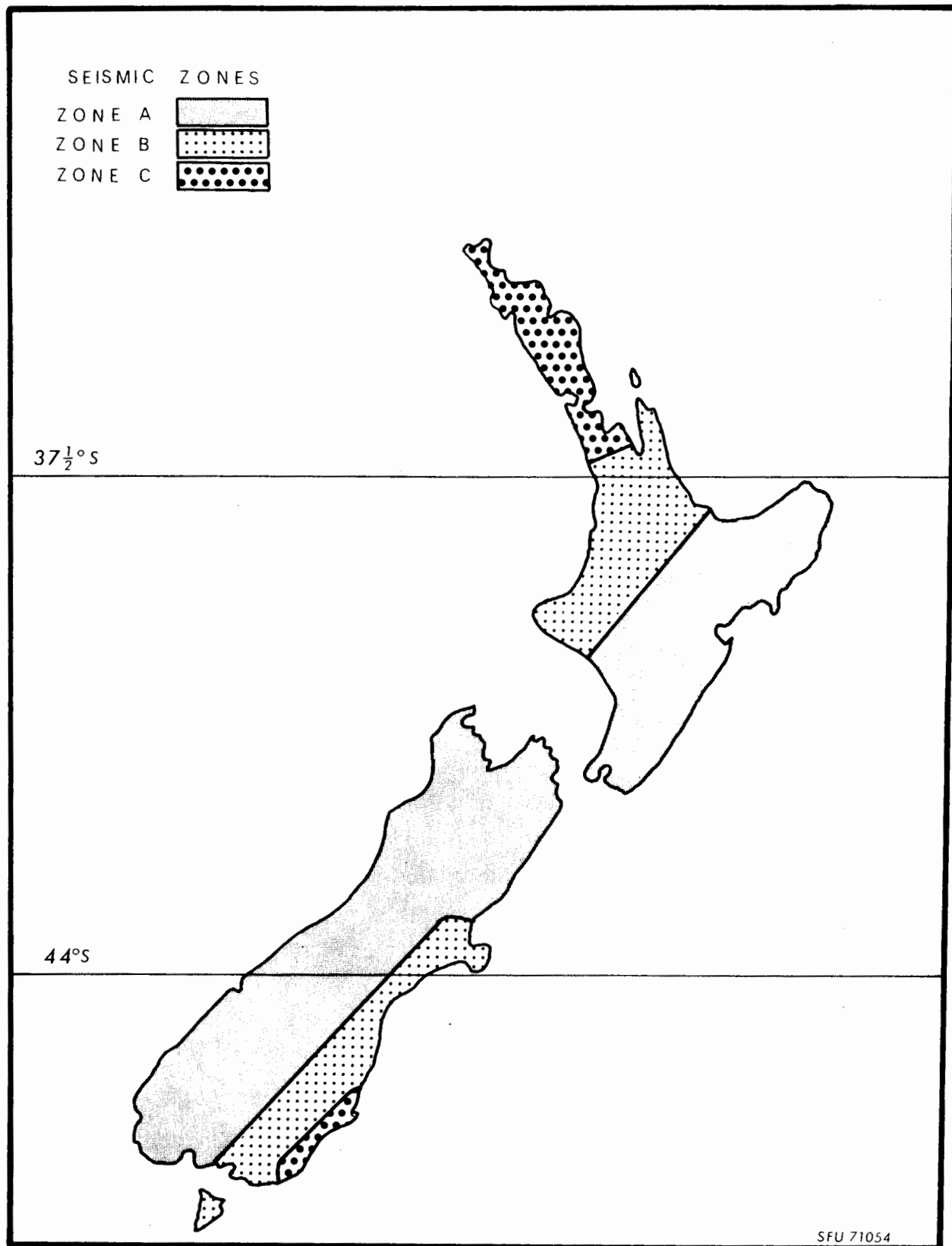
The report notes that many buildings are not presently designed to withstand a modified Mercalli rating of 6 to 7 which 'may be experienced anywhere in the country',¹³ but that if the stress co-efficients established for each of the three zones are met resulting damage should be minimised within reasonable cost. The recommended stress co-efficients were based on U.S. data transferred empirically to New Zealand geological and soil conditions and were designed to protect buildings from earthquakes of a modified Mercalli rating of 9, 8-1/2 and 8 for Zone A, B and C respectively.

In addition, private insurance companies are now providing cover for damage from earthquake on the basis of structural reliability and earthquake risk. Earthquake risk is only very broadly related to the zones established by the Standards Association of New Zealand. The companies simply increase their coverage by 33-1/3% for all buildings situated in the region lying between 37-1/2°S. and 44°S. (See Figure 5). The rates per \$100 of cover for various kinds of buildings are reproduced in Table 1. It will be noted that these rates are between three and ten times as high as the 0.5¢ per \$100 levy provided by the Commission.

Both the Earthquake and War Damage Commission and the private insurance companies are endeavouring to establish earthquake risk on a

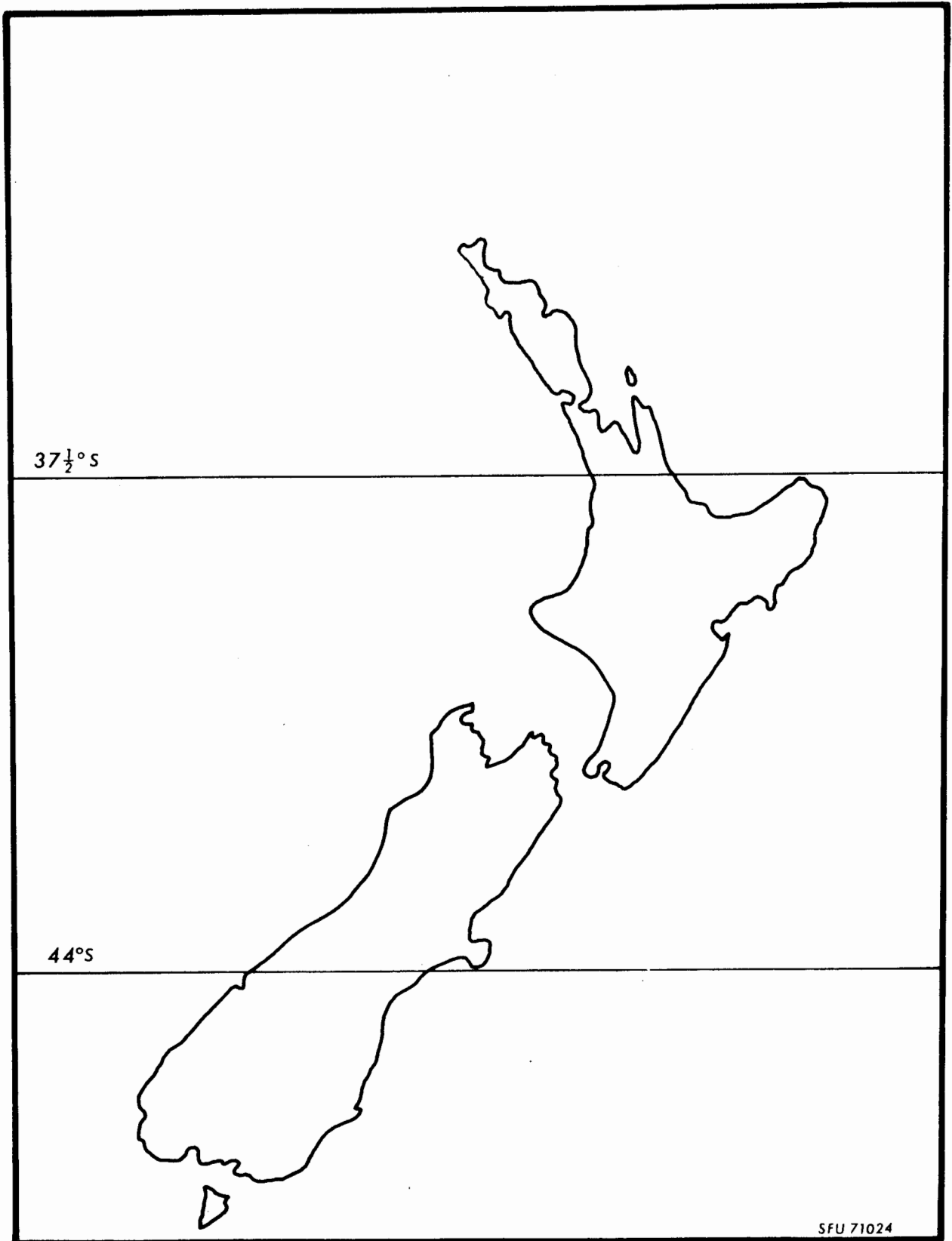
¹²Standards Association of New Zealand, 1965. Commentary on Chapter 8 of N.Z.S.S. 1900. Wellington, Government Printer, p.11.

¹³Ibid, p.11



New Zealand

Figure 4. Earthquake intensity zones established by the Standards Association of New Zealand as a guide to building code practice. (Source: Standards Association of New Zealand. See footnote 12).



New Zealand

Figure 5. Map showing area of higher earthquake insurance cover recommended by New Zealand insurance companies. (See also Table 1). (Source: Earthquake and War Damage Commission Files).

TABLE 1
 INSURANCE PREMIUMS FOR VARIOUS CLASSES OF
 EARTHQUAKE RISK IN NEW ZEALAND (cents per NZ \$100)

	Area lying between 37-1/2°S and 44°S		Rest of New Zealand	
	<u>firm ground</u>	<u>filled or reclaimed</u>	<u>firm ground</u>	<u>filled or reclaimed</u>
Wood and/or iron frame	.15	.20	.125	.15
Structural steel frame with reinforced concrete throughout	.20	.25	.15	.20
Reinforced concrete throughout)				
Structural steel frame or rein- forced concrete frame with brick, stone or tile walls	.30	.375	.20	.25
Brick, stone or tile walls without structural frame	.425	.50	.25	.375

Source: Earthquake and War Damage Commission

spatial basis. However, there is presently considerable debate over the reliability and sensibility of defining zones of differential earthquake hazard. To illustrate this point, the number of claims and the total amount paid out by the Commission resulting from the Inangahua earthquake is portrayed spatially in Figure 6. It will be observed that claims were recorded from all over the country, even from the so-called 'safe' zone. This debate has reached sufficient intensity that the S.A.N.Z. in co-operation with the New Zealand Society for Earthquake Engineering and the Building Research Association is presently reviewing its entire policy regarding the structural design for earthquake protection, particularly the question of local ground conditions which are not included in the present code.¹⁴ In addition, since 1969 the Commission has allocated an annual payment of \$10,000 to the N.Z. Society for Earthquake Engineering to undertake research and disseminate information regarding earthquake hazard to the general public.

Despite the fact that the Commission may withhold payment should a damaged property retrospectively be proven structurally unsound, in practical administrative terms this requirement is very difficult for the Commission to enforce. According to a recent survey by the S.A.N.Z. over 80% of the New Zealand population reside in local government authorities that have adopted building bylaws in accordance with the Association's recommendations. However, only the national government can ensure that local authorities actually observe such bylaws and to date this has not been done. Nor has any building inspector entered a private home (though they have assessed a number of public buildings) to check its structural reliability, despite the fact that

¹⁴Power, 1968, *op.cit.* p.26. However, according to a personal communication from a S.A.N.Z. official, it seems doubtful that the concept of zoning on the basis of differential earthquake risk will be abandoned.

he is legally empowered to do so if he has reasonable grounds for believing that the property is structurally unsound. However, inspectors have condemned a number of public buildings in New Zealand on these grounds.

Obviously these legal provisions have considerable practical and political importance and are clearly designed to safeguard the Commission from claims for earthquake damage that could reasonably have been prevented by the individual homeowner. But in real life they are difficult to implement: for example, many of the homes damaged by the Inangahua earthquake which occurred in an economically depressed area where the standard of structural maintenance was understandably low were in very poor condition prior to the earthquake. But for the Commission to differentiate between claims on the basis of structural soundness would have guaranteed a very bad public image. Another example of this problem can be found following the Gisborne earthquake of 5 March, 1966 where damage due to the collapse of 4000 faulty chimneys was paid out by the Commission. Most of the claims were paid out on old buildings while modern buildings withstood the shock well. Indeed, most structures built prior to the advent of seismic regulations (1932) are structurally unable to withstand a major earthquake.

THE EXTRAORDINARY DISASTER FUND 1949

Although the Earthquake and War Damage Act was designed to anticipate an unpredictable earthquake hazard over a long time period, the average human being has a shorter time horizon and more selfish perspective. By 1948, with no major earthquakes having been recorded and the Fund rising steadily, there were signs of unrest. Criticisms came particularly from the farming community in Zone C in Figure 4 where property (especially barns and other outbuildings) were insured against fire and thus paid the earthquake premium. The chief complaints were either that the Fund be stopped or that the money be made available to

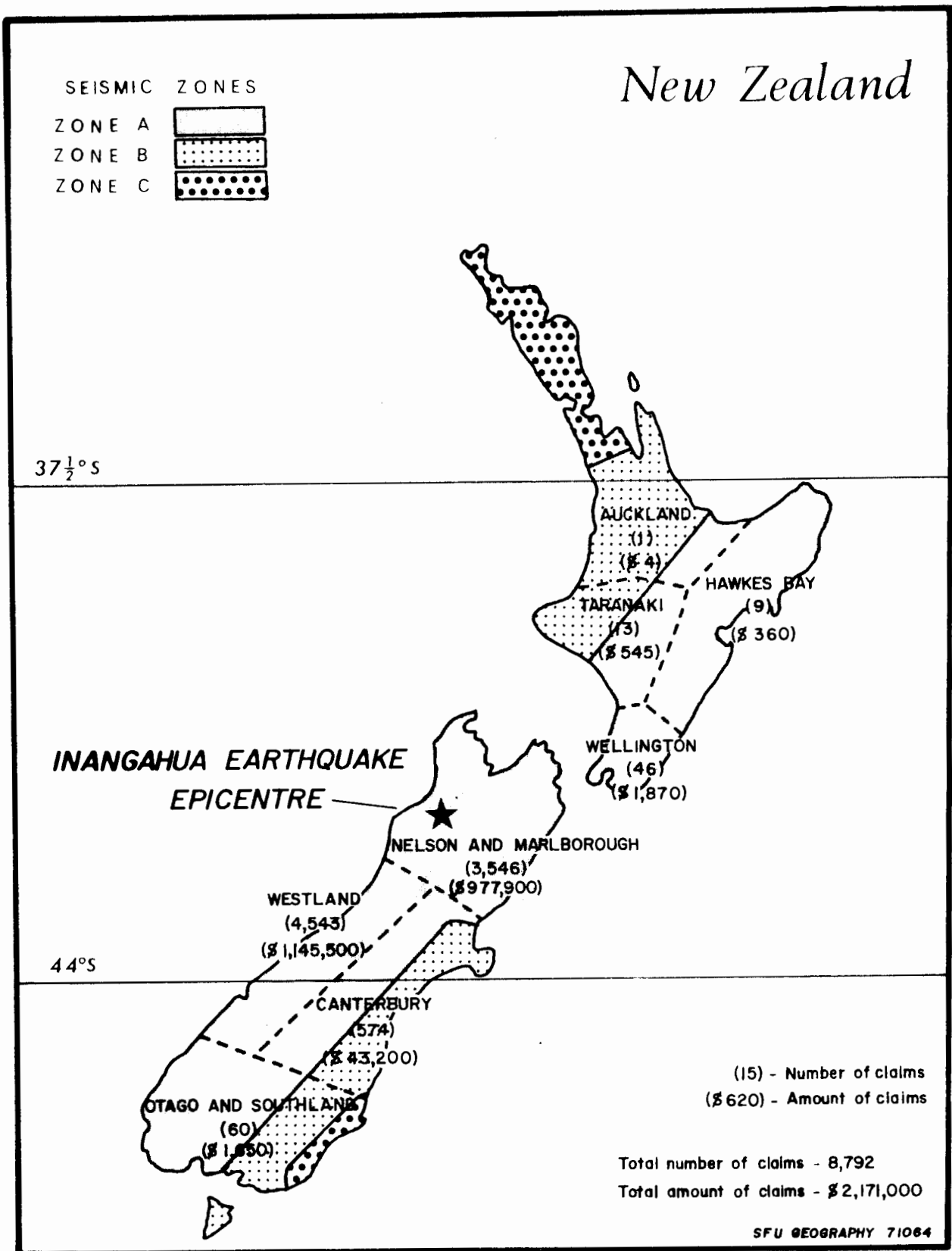


Figure 6. Map showing the location and number of claims paid out by the Earthquake and War Damage Commission following the Inangahua earthquake of 24 May, 1968. (Force 7 on the Richter scale). (Source: Earthquake and War Damage Commission Files).

meet damage caused by other kinds of natural disaster. To quote two extracts from Hansard:

"A farmer who erected a shed to house machinery had to contribute towards the fund although such machinery was never likely to warrant the payment of a claim for earthquake damage. The fund should not be allowed to go on increasing year after year as it was."¹⁶

"The North Auckland area as far as one could learn was fault free and never likely to have an earthquake, and while the people there did not object to paying the premiums they felt that they should be able to derive some benefit when damage or loss occurred through Acts of God other than earthquakes."¹⁷

It is doubtful whether the government could have resisted such pressure for very long despite the warnings by the Commission that in the event of a major city being struck the drain on the fund would be overwhelming. However, again policy was precipitated by natural disaster. In September 1949 a suburb of Hamilton called Frankton was struck by a tornado that caused damage amounting to over 500,000 pounds (\$1 million). As in the case of the Masterton earthquake, householders were afflicted by a phenomenon that was largely beyond their control and against which no private insurance cover was available.

Accordingly, the Act was amended to include a special account called the Extraordinary Disaster Fund. No additional premium was levied, but ten percent of the Earthquake and War Damage Fund was simply transferred annually to the Extraordinary Disaster Fund. This Fund was used to defray the costs of repairing any property damaged or providing the indemnity value of any property destroyed by natural

¹⁶Hansard, 1949, VOL. 287, p.2249.

¹⁷Hansard, 1948, VOL. 283, p.2565.

events such as floods, storms, volcanic activity or tsunamis which were 'of an abnormal and unforeseen nature and of extraordinary and widespread effect.'

The Earthquake and War Damage legislation as amended formed the basis of a national natural hazard insurance scheme. The Act recognised that certain events were quite unforeseen, and that, provided reasonable precautions were taken to mitigate damage, it was not unreasonable to compensate property owners out of a national fund for financial loss that otherwise would have fallen on the owners themselves. Again the principle of the legislation was to help the unfortunate who took all reasonable precautions to protect themselves from natural disaster but who suffered through Acts of God beyond their control. Hence the definition of disaster as 'abnormal and unforeseen and of extraordinary and widespread effect'.

The normal (and implicitly) predictable hazard should in the Commission's view result in no special loss if the property owner adequately protects himself against reasonably expected risk. Hence the Commission sends out appraisers to every claimant to ensure that the property was, so far as the appraisers could determine, in a reasonable state of repair and maintenance before the disaster occurred. Should the appraisers, who are trained to look for signs of structural instability, report that the property would not have been damaged had adequate maintenance been carried out, the claim is rejected. In addition, once a property owner has entertained a claim against the Commission he is required to ensure that his property is maintained in a reasonable state of repair, otherwise a second occurrence might not be treated as 'unforeseen'. The Act further safeguards the Commission against small scale claims by establishing a franchise (deductible clause) amounting to 5% of the insured value for property valued at \$6000 or less and 10%

of the insured value where property value exceeded \$6000. The one hazard that was omitted under the 1949 legislation was landslip since the Commission did not regard landslip as 'abnormal and unforeseen'. (The question of landslip will be discussed in detail in the following section).

As a further safeguard against potential abuse the Commission is empowered to establish conditions relating to hazard risk on its cover of any property. Based on evidence of susceptibility to hazard, the Commission can classify any property in to three classes:

Class A - Property not particularly susceptible to damage from storm, flood, volcanic eruption or landslip.

Class B - Property fairly susceptible to damage from storm, flood, volcanic eruption or landslip.

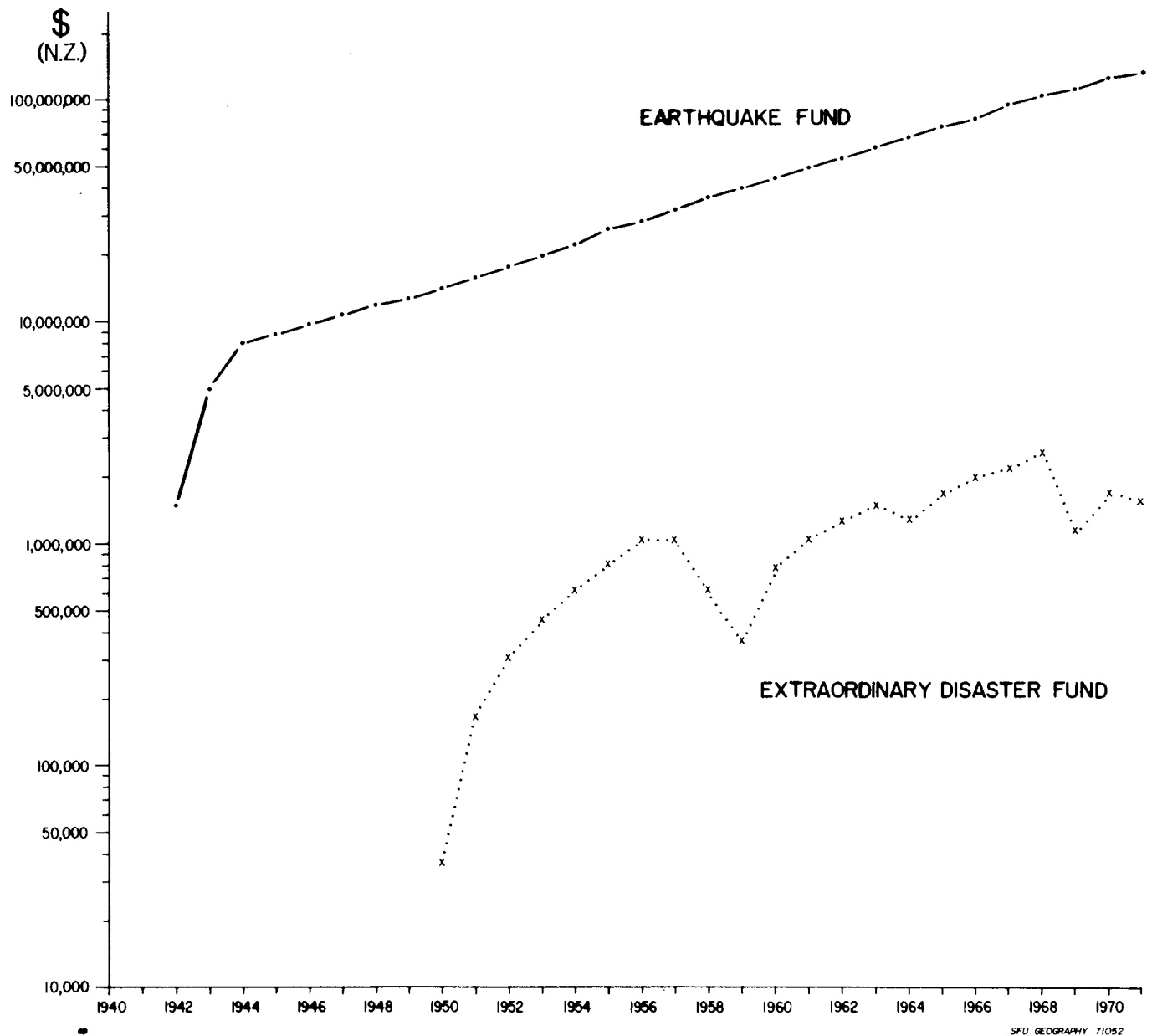
Class C - Property very susceptible to damage from storm, flood, volcanic eruption or landslip.

Unfortunately, no criteria are supplied to enable the Commission to distinguish between these three classes of risk susceptibility, and unless and until a costly survey is undertaken, all property is regarded as Class A. Such a survey would only be undertaken if an area showed an obvious hazard risk (as measured by frequent recurrence of claims). Should a property be classified as B or C, the Commission can set rates and conditions commensurate with the structural quality of the property and the nature of the risk. The franchise could rise as high as 25% of the insured value.

These safeguards should have provided a reasonable amount of protection for the Commission. However, as both Funds continued to grow into the fifties the Commission was under increasing pressure to make

'better' use of its revenue. In 1956 the amount of deductible was reduced to 1% of the amount of insured loss or damage for properties valued at less than \$10,000 and a maximum of \$100 for any property exceeding \$10,000, and the regulations were altered to omit the word 'widespread' from the definition of a disaster. This latter provision permitted the successful application of claims made in cases of very local windstorms or floods. As a result, damage from relatively minor hazards to farm outbuildings and other structurally dubious properties such as grandstands were covered by the legislation and it became increasingly difficult for the Commission to argue that in most cases the damage was not extraordinary. This problem was compounded by the fact that private insurance cover was extended to cover relatively minor damage from storm and water and that by the mid sixties about 90% of all private dwellings had taken advantage of such policies.

Despite the provisions for a detailed assessment of structural soundness, it is very difficult for the Commission to refuse claims especially where a number of properties, no matter how poorly constructed, are damaged in the same locality. As a consequence it is increasingly obvious that a large proportion of this account (which fluctuates wildly from year to year but the payments from which are not inconsiderable, as shown in Figures 7 and 8) is being paid out to structurally substandard buildings or to industrial or commercial properties which cannot get (or are not prepared to investigate) adequate insurance coverage from private sources (see Table 2). What this means is that the Commission is subsidising properties against natural disasters out of public money at a rate of 0.5 cents per \$100 of cover (i.e. one tenth of the premium of 5¢ per \$100) when typical private insurance rates are 25-30 cents per \$100. Such a practice is contrary to the philosophy of the Act, for as the Commission pointed out:



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Figure 7. The Earthquake Fund and the Extraordinary Disaster Fund 1943-1971. (Source: Earthquake and War Damage Commission Annual Reports).

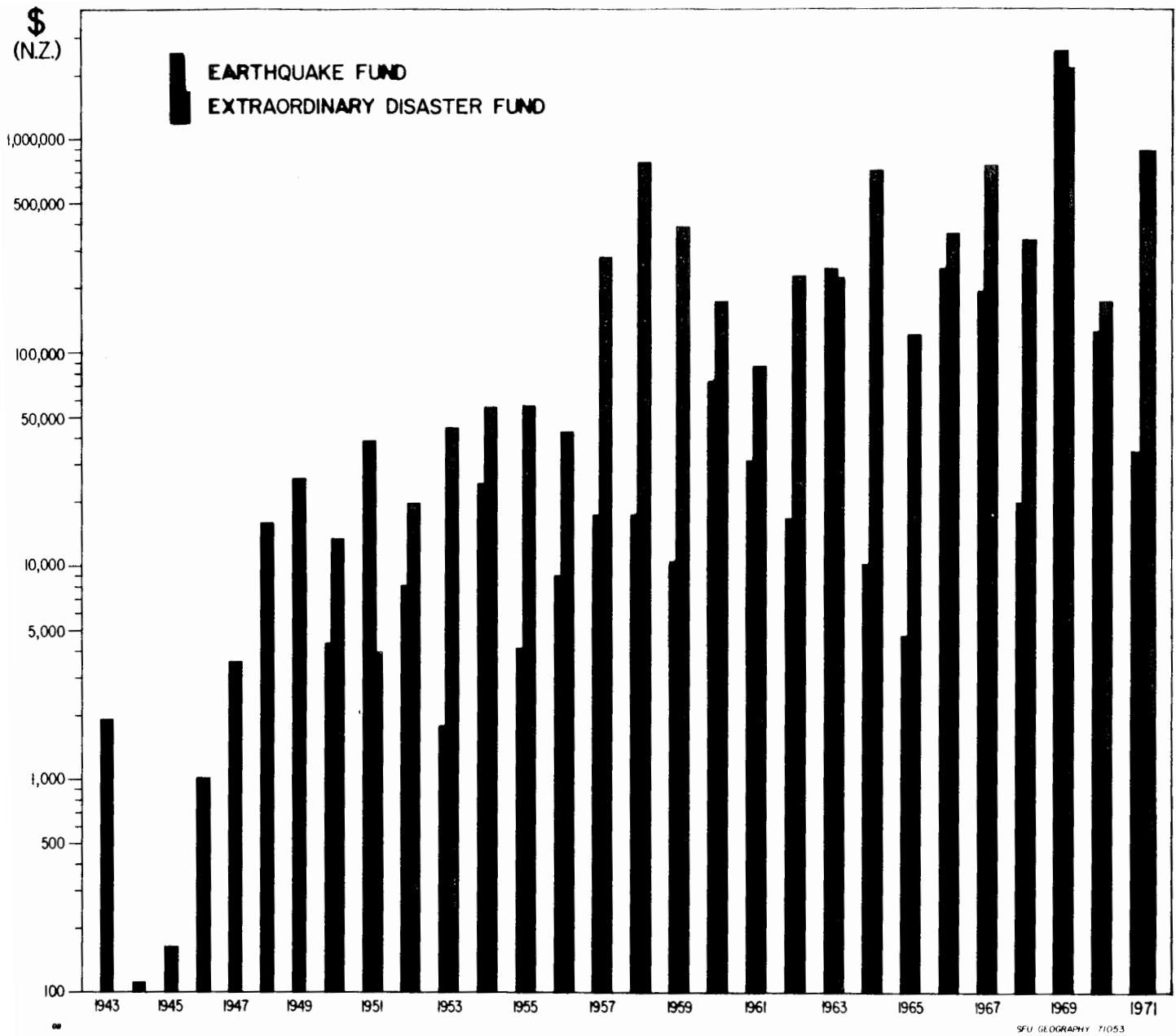


Figure 8. Amount paid out by the Earthquake and War Damage Commission on claims laid against the Earthquake Fund and Extraordinary Disaster Fund 1943-1971. (Source: Earthquake and War Damage Commission Annual Reports).

TABLE 2

COST OF CLAIMS ON THE EXTRAORDINARY
DISASTER FUND 1966

	<u>Domestic</u>	<u>Commercial/ Industrial</u>	<u>Farm Outbuildings</u>
% of total claims	7.7	7.7	84.6
Amount paid (\$)	\$2,850	\$76,178	\$52,204

Source: Earthquake and War Damage Commission

"Where cover for various contingencies is available from the insurance industry, it should be obtained there, and if the risk is not a desirable one from the industry's standpoint, then it is wrong that such cover can be obtained automatically from the Commission at a nominal rate because the property happens to qualify as being acceptable for a cover against fire."¹⁸

Nevertheless, the Commission still rejects a substantial number of claims. Table 3 shows that about 30% of the extraordinary disaster claims and 17% of the earthquake damage claims made against the Commission in the year 1968/69 were rejected. In the case of the disaster claims it is interesting to note that about 10% of the claims rejected were due to the fact that no natural event had been recorded on the day the claim was made - implying that the owner 'discovered' damage and 'invented' a disaster to suit - and that 15% of these claims were rejected because the events which were supposed to have inflicted the damage were not considered extraordinary. Of the rejected earthquake damage claims 31% were turned down because the damage was attributed to causes other than earthquake (e.g. minor land slippage, damage from clay shrinkage attributed to earthquake). The distribution of claims following the Inangahua earthquake probably reflects this practice (Figure 6).

The Commission would appear to be fighting somewhat of a losing battle. While it is doing its best to safeguard itself against the more obvious abuse especially of the Extraordinary Disaster Fund, nevertheless the facts presented in Tables 2 and 3 attest to the difficulties it faces. The temptation to dip into the communal pot of gold is frequently too great, especially as it is rising at the rate of \$12 million annually (Figure 7) and it appears from Figure 8 that the steady rise in claim

¹⁸Earthquake and War Damage Commission 1969. Annual Report for the Year Ending 1969. Wellington, Government Printer, p.4.

payments especially on the Extraordinary Disaster Fund is somewhat independent of the incidence of natural hazard. The generally rising trend in total claims paid out by the Commission from the Extraordinary Disaster Fund probably can be explained by a general increase in public knowledge of the hazard insurance scheme and by inadequate coverage by the private insurance companies against the 'normal' risk. In his analysis of human adjustment to flood in Opotiki, Ericksen¹⁹ found that many residents in the flood plain only became aware of the Earthquake and War Damage Commission after the flood. He also found that in previous floods remarkably few property owners had presented claims to the Commission; for example, in the 1958 flood, although 290 houses and 84 businesses lay within the flooded area, only 26 claims were paid out by the Commission, while following a similar flood in 1964, 614 claims were successful.

Nevertheless, for a claimant to be successful, he must exhaust all other insurance cover before applying to the Commission. The Commission attempts to ensure that property owners do attempt to get private coverage before turning to the Commission but it is obvious from Table 2 that not all property owners do this. Yet it would appear that it is this kind of property that is most liable to damage either because it is structurally unsound or because it is located in a high risk area. Private insurance companies tend to avoid providing cover in such instances or at least will establish high premiums and stiff conditional clauses. Frequently after damage has been substantial (and hence risk proven) private companies will revoke the hazard clause from existing policies and may only reinstate such clauses after protective measures have been established. Ericksen found this practice after the

¹⁹Ericksen, N. J. 1967. Perception and Adoption of Alternative Measures for Reducing Flood Damage in Opotiki. Unpublished Masters Thesis, Department of Geography, University of Canterbury, Christchurch.

TABLE 3
CLAIMS NOT MET BY THE EARTHQUAKE AND
WAR DAMAGE COMMISSION 1968/69

	<u>Extraordinary Disaster Fund</u>		<u>Earthquake Fund</u>	
Out of time	386	9.7%	432	17.5%
Not extraordinary				
- building	296	7.3%		
- event	314	8.0%		
Not earthquake damage			761	30.6%
Below franchise	765	18.8%	599	24.6%
Excluded under Act e.g. fences, walls	484	11.9%	35	1.4%
Already insured	990	24.6%		
Uninsured	330	8.2%	36	1.4%
Other reasons (double claims, etc.)	<u>417</u>	<u>11.5%</u>	<u>593</u>	<u>24.5%</u>
	<u>3,982</u>	<u>100%</u>	<u>2,456</u>	<u>100%</u>
Total number of claims	13,224		13,005	
% of claims referred	30.4%		17.3%	

Source: Earthquake and War Damage Commission

1964 flood in Opotiki.²⁰ Furthermore, though the Commission is supposed to provide cover up to the indemnity value of a destroyed property in contrast to private insurance companies who meet the replacement value of totally damaged property, in practice the Commission frequently provides the replacement value. Hence there is little incentive for the high risk liability to seek private insurance cover against damage caused by natural hazard. It would appear that as long as the private insurance companies avoid high risk liabilities and the Commission fails to ensure reasonable safeguards against the 'normally' expected hazard, claims on the Extraordinary Disaster Fund will continue to rise.

LANDSLIP COVER 1970

One of the more contentious kinds of natural disaster facing the Commission is landslip. In the 1949 amendment landslip was specifically excluded from the definition of extraordinary disaster for a number of reasons. Firstly, landslip was not a widespread occurrence so there was a danger of the account being used as a subsidy for the imprudent who constructed property on unstable slopes. Secondly, it was felt that landslip risk was not entirely 'abnormal and unforeseen' in occurrence since it might equally be due to the peculiarities of the site, the nature of the soil, or the predictable vagaries of sub-slope drainage. Thirdly, many incidences of landslip are man-made due to construction or unsuitable sites, poor excavation, inadequate or no retaining walls to protect property from local slumps, poor foundations, inadequate storm drainage to prevent subsurface slippage and interference with natural drainage. Fourthly, the Act permitted the inclusion of landslip cover on a voluntary basis, the rates and conditions being determined commensurate with the risk. In the period 1949-70, despite

²⁰Ericksen, 1967, op.cit.

the fact that landslip occurred quite frequently in New Zealand, only 300 property owners took advantage of this provision.²¹ Naturally, landslips continued to occur. In its 1962 Annual Report the Commission noted that 'it is disturbing to report that permits to build in areas with a known history of soil instability continue to be given.'²²

Nevertheless, as has already been noted, it is difficult politically for the Commission to withstand pressures for widening the basis of claim, particularly where damage no matter how foreseen is widespread, and the Fund continues to grow. In 1966 the government was approached by a deputation of builders, engineers, architects and local authority officials to incorporate landslip within the Extraordinary Disaster Fund. In 1968, following the notorious storm of April 10th, 200 claims for landslip damage were received from many parts of the country and pressure on the government increased. To quote again from Hansard:

"Many did not know that they were subject to slips and it wasn't their fault that slip occurred. People were often forced to build on sloping sections yet the rates were paid by all... Was the whole country to be fragmented into different areas?"²³

One M.P. noted that;

"There was plenty in the fund, more than would be required to pay out claims if there were a big earthquake in the city area. Surely there was enough money available to give landslip cover."²⁴

²¹Personal communication, Mr. Osborne, Earthquake and War Damage Commission.

²²Earthquake and War Damage Commission, 1962. Annual Report for the Year Ending 1962. Wellington, Government Printer, p.2.

²³Hansard, 1968, VOL. 357, p.3234.

²⁴Hansard, 1969, VOL. 362, p.2449.

The Commission attempted to adhere to its policy of not extending the nature of the cover for disaster in view of the heavy demands made upon the Extraordinary Disaster Fund in 1968 for windstorm and flood (a total of \$2,165,962). If landslip cover were to be included under the Act, the Commission felt that there should be an increase in the premium and the introduction of a substantial franchise plus the strengthening of local bylaws regarding construction on unstable slopes.

Initially the Commission was forced to compromise and devised a scheme whereby landslip was included under the Act in cases where it could reasonably be considered unforeseen. Its proposal was that landslip would be included where property was situated on natural land with a history of five or more years of stability. Where the land had been excavated or filled property damage would only be covered when ten or more years of stability had been recorded in the area. However, in June, 1970, under increased pressure to include landslip as an extraordinary disaster as defined in the Act, the government rejected this sensible scheme in favour of broad inclusion of landslip within the Act. As was the case with other classes of disaster, the franchise in the event of landslip would be established on the basis of three classes of property:

Class A - Property not particularly susceptible to damage from landslip.

Class B - Property fairly susceptible to damage from landslip.

Class C - Property very susceptible to damage from landslip.

For Class A property the franchise is 1% of the amount of the insured loss or damage (up to the total insured amount) and not less than \$200. For Class B and C property the franchise is to be set at the direction of the Commission on the basis of all available evidence but could rise

to 25% of the insured loss. However, as in other classes of disaster, the basis of distinction between each class is not made clear in quantitative terms, and until the history of landslip in a given area is determined all property remains as Class A. Although the amendment for landslip inclusion was only ratified in June 1970, by March 31, 1971 the Commission were processing 137 claims and had already paid out over \$100,000 in landslip damage.

The landslip issue epitomises the nature of the problem that the Commission is now facing. The Act is designed to safeguard the Commission by enabling it to reject claims where the disaster is 'normal' or 'expected', where there is inadequate structural standard or maintenance and where no other kind of insurance cover can reasonably be granted. Landslip is rarely an unforeseen event; many property owners who claimed on the Fund in 1970 were situated in areas with a record of slope instability. Indeed, none of the claims received to date can be regarded in the purest sense as completely unforeseen. For example, of the 137 claims laid against the Commission 63 came from the City of Nelson. On one slope in this city 17 claims were recorded; the same slope slipped in 1962 damaging 23 homes, yet no major action was taken to reduce this instability.²⁵

Once a slip has started the owner is expected to take all reasonable precautions against further damage and failure to do so could result in rejection of any subsequent claim. In any event, no damage

²⁵This particular incident illuminates clearly the powerlessness of the Commission in terms of policy making. For in its Annual Report for the Year Ending 1963 the Commission refers to this incident in the following careful but vacant terms;

'The Commission feels that as urban development is intensified local authorities will need to exercise increasing care in the approval of subdivisions and in the issue of building permits.' (p.5).

recorded more than 48 hours after slippage has first occurred is eligible. Yet individual precautions to stop further slippage may be very expensive or time consuming to undertake; in either case the slip could worsen, but obviously further damage would no longer be 'unforeseen'. To make matters more difficult, landslip control may require such communal efforts as adequate storm drainage, large scale soil stabilisation measures and retaining walls. The Act is supposed to cover this latter eventuality by permitting the Commission to reject claims where improper land stabilisation is recognised. But this becomes a matter for municipal bylaws and few municipalities in New Zealand have building codes which deal satisfactorily with the question of land stability. The Commission is presently endeavouring to assess the extent and reliability of such codes but is meeting considerable resistance at the local level. Typical reactions by the municipalities are either a) that the Commission should pay up on landslip claims as identified in the Act; or b) that the costs of slope stabilisation should be met by a contribution from the Commission which otherwise would have to meet claims at some time in the future. Both reactions are contrary to the intent of the Act but indicate the nature of local government reaction to the spirit of the legislation.

APPRAISAL

For the student interested in institutional arrangements to combat natural hazards the New Zealand Earthquake and War Damage Commission bears fruitful investigation. In theory the policy described here has a number of advantages.

The Commission is able to identify the nature of the hazard risk and establish an insurance policy accordingly. Thus in the case of floods it has the power to calculate and map areas of varying flood

potential and ensure that local building codes and zoning laws incorporate a certain degree of flood proofing and flood plain zoning where applicable. In particular, the Commission should be able to recommend zoning and/or structural proofing guidelines before any new structures are built in flood prone areas. For local governments to continue to build in recognisable flood hazard areas would mean that any resulting flood damage be considered 'foreseen' and hence technically ineligible for claim. At the very least any property constructed in such hazard prone areas would be categorised as Class B or C with a premium and franchise assessed to be commensurate with the hazard risk. Similarly, in the case of landslip the Commission could enforce local building codes so as to discourage local governments from building on unstable slopes unless reasonable measures to maintain soil stability were undertaken or at least it could establish higher premiums and franchise conditions where such precautions were not followed. So the Commission does have potentially broad powers to incorporate various management measures in an effort to minimise the losses resulting from natural hazards, a situation which in theory is considered highly desirable by students of natural hazard management.²⁶

To establish appropriate structural standards and zoning codes, the Commission first needs to know risk susceptibility. Normally this information is difficult to obtain, as not all damage is recorded following a disaster. In New Zealand this problem can be overcome. At present all claims laid against the Commission are on file. These records include precise information as to the location, nature and amount of damage for every important natural event. This material provides a tremendous body of data with which to analyse hazard

²⁶ According to the model developed by Kates, New Zealand in theory could enter the post industrial multiple means, multiple adjustment stage of natural hazard management. See Kates, R. W. 1971. Natural Hazard in Human Ecological Perspective: Hypotheses and Models. Economic Geography, 47(3), 438-451.

risk. For example, in the case of floods, precise estimates of flooded area for various storms could be derived from damage estimates based on the claims so that in a relatively short time a reasonably accurate synthetic flood stage-damage curve could be derived for every major stream in the nation. Similarly, damage probability curves could be derived for windstorms. The idea of calculating risk potential and linking structural proofing to such 'hazardness' is not new but it has not elsewhere been embodied specifically in any national policy. The New Zealand scheme permits such an assessment and with it some better indication of the gains and losses involved.

However, the New Zealand experience also provides a number of sobering lessons. A major problem facing the Commission is to resist demands for greater use of the Fund, particularly the Extraordinary Disaster Fund. As already noted, in Figure 8, claims for disaster are increasing over time and the Extraordinary Disaster Fund has suffered a net annual loss on five occasions.²⁷ Apart from the obvious temptation to claim for anything remotely resembling hazard damage when one is paying regularly into a communal fund, one of the main reasons why payments are increasing is that local authorities are not attempting seriously to ensure minimum protection of property against the 'normal' event. The Commission has no powers to enforce such bylaws and indeed is receiving little co-operation even when it is simply trying to establish whether such bylaws exist. Thus on no occasion has the Commission been able to ensure any degree of flood plain zoning or flood proofing and though it might be able to reject individual claims on the basis of improper safeguards against the 'expected' event, it is unable to do so when a large number of claims are sustained. This is

²⁷In 1958 the loss was \$222,949; in 1959 \$25,914; in 1964 \$107,854, in 1968 \$1,413,358, and in 1970 \$72,824.

particularly the case in the event of a landslip. No matter how unstable the slope, it would be difficult for the Commission to discriminate between claims where say 20 homes were seriously damaged by a slip. As a result, there is little incentive for the individual homeowner to upgrade his property or insure that damage emanating from his property does not detrimentally affect his next door neighbour's landslip risk.

Part of the problem here lies in clarifying the aims of the scheme both to the politicians and the public but equally the solution lies in strengthening considerably the technical aspects of the Commission's work. A corps of assessors permanently on staff might help to reduce much of the load on the small number of administrators. In addition, qualified technical personnel who could evaluate the nature of hazard using the data already available could be employed to establish guidelines for structural proofing and town planning to minimise hazard losses. Finally, and perhaps this is the most difficult aspect of all, it would seem desirable that the Commission seek powers to enforce such guidelines on the local authorities, particularly in the case of high flood and landslip risk, or establish much stiffer insurance premiums and franchise clauses as laid down in the Act.

It would appear legitimate that part of the Fund be used to pay the salaries of such full time hazard analysts who would be employed to estimate the 'hazardability' of flood plains, unstable slopes and wind-prone locations. One of the faults of the New Zealand scheme is the egalitarian nature of the fire insurance cover as the basis of the hazard insurance premium. Fire insurance risk really has nothing to do with the natural hazard potential of the site, nor does it fully reflect the structural soundness of the property. It is based on the construction of the property, the proximity and efficiency of fire fighting sources and the potential likelihood of fire. The only means whereby hazard

insurance as an extension of fire insurance could be made commensurate with the risk is to calculate the three classes of hazard susceptibility for each kind of hazard and to levy additional premiums and franchises as the nature of the site and the structural soundness of the property warrants. Thus it would appear desirable that assessors also embark on extensive survey of structures not covered by private insurance before any further damage has been recorded to appraise their structural reliability. Such an action would further safeguard the Commission against invalid claims and preserve the principles embodied in the legislation. Furthermore, it would obviate the need to increase the premiums as warned by the Commission in its 1970 Annual Report.²⁸ In any event, it is doubtful that the Commission will solve these difficulties by raising its rates, for this will tend to encourage more people to make use of the Funds and to discourage them from providing preventative measures in anticipation of the 'normal' event.

But, first and foremost, the Commission would benefit from public recognition of the intent of the legislation. This will not be easy so long as losses, no matter how foreseen, continue to occur and the Fund continues to flow, but a vigorous public information campaign is urgently required, particularly in areas that are known to be susceptible to hazard.

The New Zealand policy is a rare attempt at coping nationally and rationally with an anticipatory programme of natural disaster loss mitigation. In terms of earthquake protection the scheme is undoubtedly succeeding, albeit slowly, and has much which is applicable to other countries. For example, earthquake damage is not insured in California.

²⁸Earthquake and War Damage Commission, 1970. Annual Report for the Year Ending 1970. Wellington, Government Printer, p.3.

except under exceptional circumstances. The Los Angeles earthquake of February 1971 resulted in an estimated U.S. \$437 million of taxpayers' money being spent in restoration of damaged property,²⁹ yet private insurance companies paid out only U.S. \$31 million in claims.³⁰

Building codes are well established in principle in California as is an earthquake zoning scheme so the New Zealand scheme could be transferred in broad principle to that state. Alaska is another state which might benefit from a careful study of the New Zealand scheme.

With regard to extraordinary disaster the programme is presently facing considerable difficulties, largely because of the practical problems of institutionalising human nature to cope with natural hazards. So long as the natural event is always seen as unexpected and abnormal, and so long as man permits himself to forget the impact of a disaster soon after it occurs, it will prove difficult to optimise hazard adjustment in terms of reducing unnecessary losses.

However, it is possible to learn from the New Zealand experience and modify the scheme to suit other countries rather than reject it. Though total hazard insurance might be difficult to establish initially in North America, the broad principles of the New Zealand scheme could be applied to specific hazards in specific areas where such hazards were relatively ubiquitous yet random in occurrence. Tornadoes in most mid-western states fall into this category and an insurance scheme (based on assessed property value rather than fire insurance) could be established on a state basis. A similar scheme could be prepared by the Atlantic coastal states to offset damage caused by hurricanes. In both cases

²⁹Vancouver Sun, March 25, 1971.

³⁰Personal communication, Mr. H. Fraser, McCauley, Nicholls and Maitland, Vancouver.

zoning codes and structural controls could be provided to minimise damage yet to maximise the utilisation of hazard prone areas. The nationalised insurance scheme offers advantages in that it provides coverage for all classes of risk, is supported by the necessary reinsurance safeguards and yet has the power to establish appropriate building and zoning codes. At present neither the insurance coverage nor the powers to enforce reasonable hazard management measures for a variety of natural hazards is available in North America with the possible exception of earthquake and flood.³¹

³¹For an excellent analysis of earthquake insurance in the United States and in other countries see Steinbrugge, K. V. et al. 1969. Studies in Seismicity and Earthquake Damage Statistics. Appendix A. Washington, Government Printing Office.

Steinbrugge points out the many difficulties of providing earthquake insurance including:

a) lack of adequately enforced building codes. Even if enforced, the codes are concerned more with loss of life than with the control of structural damage.

b) difficulties and expense of estimating risk. Essentially this is based on experienced professional guesswork and is usually only available for high value buildings because of the costs involved.

c) difficulties of obtaining revenue from low risk buildings. The ratio of earthquake insurance to fire insurance even in high risk areas rarely exceeds 6% and is usually less than 0.1%. It should be pointed out, however, that private companies rarely insure low value dwellings in areas of high risk. (See (b) above).

For an analysis of U.S. flood insurance policy, see Clawson, M. Insurance and other Programs for Financial Assistance to Flood Victims. Washington, Department of Housing and Urban Development.

Whether any American state or Canadian province would establish such a scheme even for a single class of hazard will ultimately depend upon the degree to which it is willing to institute a collective scheme of hazard insurance. This involves the recognition of another person's misfortune as being beyond his reasonable ability to safeguard himself and that anyone in the area is likely to suffer misfortune from an unforeseen and abnormal event. It also involves the anticipation of hazard damage over a long time perspective and the institutionalisation of reasonable safeguards against normally expected hazard risk on all public and private property. Whether the recognition of these fundamental principles will be adopted in North America remains to be seen, for, ultimately, as in the New Zealand case, the problem lies more in the practice than in the theory, and the practice depends ultimately upon the values, motivations, perceptions and understanding of man.