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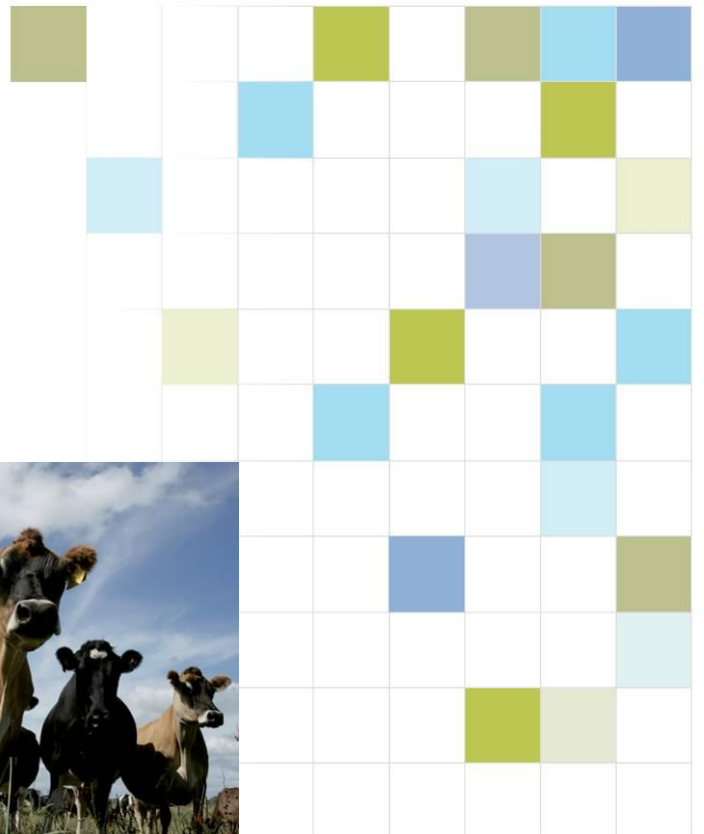
# Towards resilient farmer businesses

Sheep and beef farmers

September 2010



*New Zealand's science. New Zealand's future.*



# **Towards resilient farmer businesses: sheep and beef farmers**

**Report prepared for New Zealand Landcare Trust**

**September 2010**

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# 1. Executive Summary

The aim of this project was to understand and build farmer resilience and to examine possible decisions and actions that farmers thought might impact their farm systems resilience. Eight farmers, who were members of a wider discussion group, attended two workshops in April and May 2010. Farmax® was used to model the impact of six adverse weather scenarios and the results were used as the basis for workshop discussion.

Results from this research:

- Farmax® modelling showed that during a drought the only viable scenario was to destock early. Buying in supplements and/or grazing stock off-farm were not considered realistic options.
- Farmax® showed that a storm in February increased pasture growth and this exceeded any disadvantages.
- Farmax® showed that a price downturn had the largest overall financial impact on the farm.
- Farmers **felt** they had long term strategies to deal with adverse weather events based on their farm context.
- Farmers felt that they were better able to cope with adverse weather events if the economic return from sheep and beef farming was less volatile.
- Adverse weather events alongside economic volatility were a considerable worry for participants.
- There is a need for social support when farmers are under pressure due to adverse weather events. Participants felt this was often neglected.
- The infrequent exposure to adverse weather events was seen to create an environment whereby the risk is viewed as low and therefore not in the forefront of farmers' minds.
- Workshops provided a useful forum for farmers to share their experiences and listen to how other people cope with the same adverse situation.
- Providing a 'real life' example, and holding the workshops on-farm, was seen as valuable.
- Using Farmax® was considered valuable as it was a "visual tool".

Participants:

- Were eager to get the information they had learnt out to the wider farming community.
- Were keen to see a ten-point plan for drought proofing the farm developed and were interested in having input into this.
- Recognised that there is a political agenda that needs to be continually driven to ensure that the difficulties of severe climatic events and the economic, social and physical impacts were recognised in New Zealand's political arenas.
- Identified the need to achieve sound media coverage of the very real issues, and some of the strategies for addressing these that arose from their work in this area.

When designing future work in this area it would be useful to incorporate the following suggestions:

- Farmax® modelling needs to be extended to include multiple adverse events. For example a drought and a price downturn occurring in the same year.
- Farmax® needs to be extended to full farm budgets where the other costs are included such as fence repairs, slip damage and building.
- Participants clearly identified a 'social need' in times of adverse weather events and this needs further investigation.
- Participants expressed the need for government to see the plight of farmers in the sheep and beef sector.

## 2. Introduction

Northland, like many regions of New Zealand, is experiencing an increase in adverse weather events which is creating a challenging environment for agricultural production and business survival. The severe storms of 2007 and the recent drought of 2009/10 in Northland are two examples of such adverse events. Farmers are potentially exposed to high risk situations when these events are coupled with economic uncertainty.

Following their involvement with farmers post the 2007 storms, the New Zealand Landcare Trust sought SFF funding to carry out some work to develop:

- A better understanding of how landowners perceive risks around climate change implications, including the factors that influence their decision making.
- Increased ability to move the management behaviour culture of landowners towards more resilient business structures and farm systems.
- Incorporation of the implications of increased likelihood of adverse events into reviews of the farm systems – behaviour change on the ground.

The overarching objective of this research was to understand and build farmer resilience on-farm, by getting participants to work through some of the farm systems dynamics that could impact on their resilience. For example the timing of events, stock numbers and feed levels. Farmers will be better able to reduce their level of risk exposure from extreme climatic events on farm if they are able to better identify and understand the relationship between the social, economic and physical dynamics on farm and begin to build resilience into their farming system. We also wanted to capture the tacit knowledge farmers possess and the lessons learnt through their experiences, and pass this knowledge onto the wider farming community.

A resilient farm system is one that allows a farmer to ready their farm business to absorb the impact of sudden or unexpected adverse weather event, and maintain the ecological, social and economic functions that maintain their farms viability. White's (2009a) examination of the literature suggests that resilience building is highly contextual, with local knowledge systems and experiences interlinking with new information and/or technology to encourage decision making and action that strengthens resilience and decreases risk on farm. Resilience is *"the capacity of a system to absorb disturbance and reorganise while undergoing change so as to still retain essentially the same functions, structure, identity and feedbacks to the system"* (Walker et al., 2004).

### 3. Methods

In order to explore and understand the dynamic relationships involved in building resilience, sheep and beef farmers were used as a case study. Sheep and beef farmers were used for several key reasons. Firstly, results from the previous year of study highlighted the beef industry in Northland to be less intensively supported by their respective industry organisations in response to adverse weather events than both dairy and horticulture (White 2009a). Secondly, the researchers had access to a progressive group of dry stock farmers who were willing to participate and explore the dynamics of building resilience.

While the study consisted of eight participating farmers, these farmers were members of an existing and successful farm discussion group. As part of the exposure of the group to a wider discussion about historic, current and likely short and long term future weather trends, a seminar was incorporated into a pre-organised farm discussion day. This presentation was from a leading NIWA Senior Climate Scientist, Georgina Griffiths. Providing big picture information about weather trends for the area provided a base for farmers to consider the likely risks that adverse weather event trends has had or could have, in Northland and nationally.

Participating farmers were asked to complete a survey prior to the first workshop (appendix a). In this baseline survey information was sought to understand participants' current perceptions and responses to severe storms and droughts. Important focuses were their practices and decision making prior to, during and after an event. The impacts that farmers were asked to focus on in this survey were those that arose from the previous year's work in which farmers were interviewed about the impact of adverse weather events on farm (see White, 2009a). For this reason, farmers were also asked to consider their economic, social and physical strategies for coping with adverse weather events.

Two workshops were held in April and May with these eight farmers during one of the worst droughts Northland had experienced for 60 years. The workshops were organised and facilitated by local agricultural consultant Bob Thomson (AgFirst). The aim of the first workshop was to engage with farmers to identify weather events which they considered damaging to their property and that would likely impact them on farm and select and identify scenarios to examine possible decisions and actions that farmers may consider may impact their farm systems resilience. To focus discussions and

provide a realistic grounding for these scenarios, one of the participating farmers' property was used as an example. The group undertook a farm tour and were shown areas of the farm which had been damaged due to adverse weather events. At each stop discussion around the event which caused the damage, what the damage was, what the farmer has done to fix and/or reduce the problem and what other possible solutions occurred.

Participating farmers were asked as a group to discuss and identify key climatic events that could potentially, and may have historically, impacted within the farm gate. Storms and droughts were the two events identified. Farmers then identified likely scenarios that would show variation in impact of these events. Northland has experienced reasonably fierce storm events in February and July 2007, and the participants wanted to explore these further.

The chosen scenarios were modelled on Farmax® between the two workshops. The second workshop focused on the case study farm and the financial impact of adverse events as a result of participants' feedback given during the first workshop. During the second workshop participants were:

- shown the modelling results generated on Farmax®;
- asked to assess and itemise the amount of additional farm working expenses as a result of the scenarios.
- asked to discuss the personal impact on themselves and their family
- asked to consider the combination of adverse weather events. For example, a drought and a low product price and a storm followed by a drought in the same year.

In order to capture any changes in perception, decision making or actions by the farmers due to attending the two workshops, a post-workshop survey was also conducted (appendix b). Questions were the same as the first survey in order to capture changes in responses. Participants were also asked to fill in an evaluation form about the workshops (appendix c).

### 3.1 Farmax®

Farmax® was utilised to model the impact of different adverse weather scenarios. Farmax® enables a model to be set up of a farm that provides a range of “what if” scenarios to be considered (Farmax®, 2007). In this way, a farmer can benchmark their progress and plan for the future by considering changes to the system prior to implementation. For this study an average year scenario for an actual farm was modelled and this data became the ‘Base Farm’. Each adverse weather event scenario was then compared to the base farm. Like with any model, assumptions were made, including that the drought would break by end of April, where in actual fact the drought of 2009-2010 broke in mid – May. The assumptions made for each of the scenarios modelled using Farmax® are identified in Appendix D. The modelling for the storm assumed that when the covers dropped (200kgDM) that animal performance dropped until the animal intakes equated with the feed supply. In Farmax® this meant that the animal growth was reduced until the file became feasible. The Farmax® pricing model used was ‘Long Term March 2010’ and this is consistent with modelling of this type and at this time. The only exception was for the ‘Price Downturn’ scenario. The process used was to reduce the average price in the Farmax® schedules by the predetermined amount. The validity of the assumptions for the base farm were then checked against farm records, spanning 20 years. The practicality of the impact of these events was checked off by the workshop participants (Thomson 2010).

## 4. Findings

Participating farmers were located in the south-west region of Northland and had an average farm size of 391 hectares. The topography of these farms tended to be rolling through to steeper hill country. These farmers also had a range of years of farming experience on their current property. Several farmers had been on their current farm for less than 10 years, while at the other end of the experience spectrum; four farmers had 21+ years experience on their current property. This provided a good range of diversity within the group from which resilience could be explored.

### 4.1 Pre workshop survey

When participants were asked their level of agreement around adverse weather events, seven of the eight participants were concerned about extreme weather variability (table 1). Over half felt that the frequency of severe storm events and droughts would increase over the next ten years. Only three participants felt that their farm was able to cope with droughts or that they were comfortable with their current farm management practices to recover easily from a drought.

Table 1: Level of agreement around adverse weather events

	<i>Agree</i>	<i>Disagree</i>	<i>Neutral</i>
I am concerned about extreme weather variability	7	-	1
It is important to plan for droughts	7	-	1
It is important to plan for severe storm events	6	-	2
My farm is able to cope with severe storms	5	-	3
The frequency of droughts in my region will increase in the next 10 years	5	-	3
With my current farm management practices I am comfortable that we would easily recover from a severe storm	5	-	3
The frequency of severe storm events in my region will increase in the next 10 years	4	-	4
With my current farm management practices I am comfortable that we would easily recover from a drought	3	1	4
My farm is able to cope with droughts	3	2	3

Participants had adopted a number of strategies to reduce the impact of adverse weather events (table 2). Selling stock, when, and as, required was a key strategy for all participants. Other strategies which were noted by nearly all participants (6) included,

- running a low cost farming system,
- having a strategic approach to selling stock
- insuring farm infrastructure
- tightening the farm and family budgets

Table 2: Strategies to reduce the impact of adverse weather events

<b>Strategy</b>	<b>Yes</b>	<b>No</b>	<b>Not applicable</b>
Sold stock when, and as, required	8	-	-
Generally tighten the farm and family budgets	6	2	-
Run a low cost farming system	6	2	-
Strategic approach to selling stock on the market	6	-	-
Insure farm infrastructure	6	2	-
Maintain a good line of credit, so can increase debt levels if necessary	5	2	
Invested in off farm business	5	3	-
Insure farm stock	-	8	-
Maintain a case reserve in the farm accounts	2	5	-
Diversified income by partner working off farm	1	-	7
Diversified income by working off farm	1	6	-
Aligned other farm based income to farming	-	7	1
Other (secured off farm grazing and making silage)			

Figure 1 illustrates the perceived level of threat that adverse events posed to participants farming businesses. A low product price was seen as a significant threat to a farming business for nearly all participants. A low product price and a storm occurring in the same year was also seen as a significant threat to the farming business by nearly all participants. A storm event was seen as no threat by nearly half of all participants and only seen as a significant threat by only one. Having an adverse weather event hit in the same year as a low product price was perceived to pose a significant threat to a farming business than only an adverse weather event hitting alone.

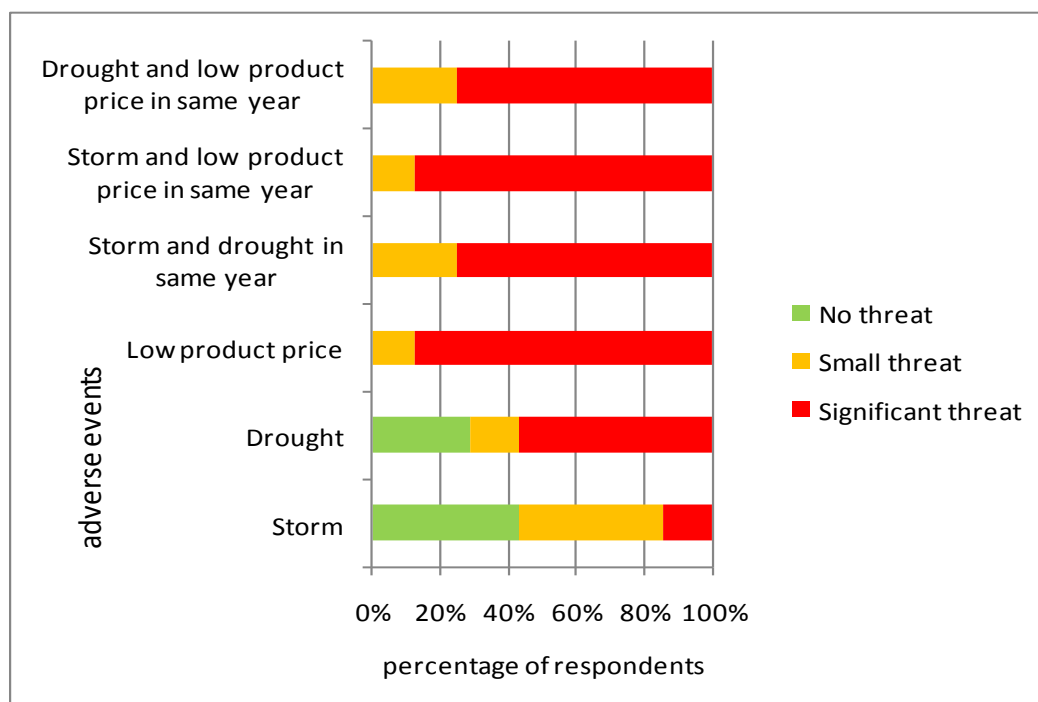


Figure 1: Perceived level of threat adverse events posed to participants farming business

## 4.2 Storms

Storms are associated with periods of strong often damaging winds, heavy flood-producing rainfall, thunder and lightning, heavy snowfall or blizzard conditions. They are classified by how strong the winds are or by how heavy the rainfall, lightning or snow are (NIWA, 2008).

Participants were given the opportunity to indicate how *they* defined a severe storm event. Definitions varied across participants, however common themes emerged including:

- high winds
- flooding
- erosion
- damage to trees
- damage to infrastructure
- farm access damaged
- loss of power

Figure 2 illustrates the damage participants had experienced due to a severe storm event. Increased soil and pasture damage from pugging was a problem for two thirds of all participants. Severe storms had caused damage to culverts and flooding to all participants.



Figure 2: Damage participants had experienced on farm due to a severe storm event

Strategies to deal with severe storm events were identified by beef and/or sheep farmers previously interviewed, and a list of possible actions that farmers may implement to reduce the damage caused by severe storm events were included in the pre-workshop survey. Participating farmers indicated that the majority of their short term responses were reactive in nature. The two key proactive activities that most participating farmers undertook was to maintain on-farm drainage and to move stock to higher ground prior to such wet weather events (Figure 3). Nearly all participants (seven) felt that even if they were absent from the property during a severe storm event, other people would be able to put these short term responses into practice.

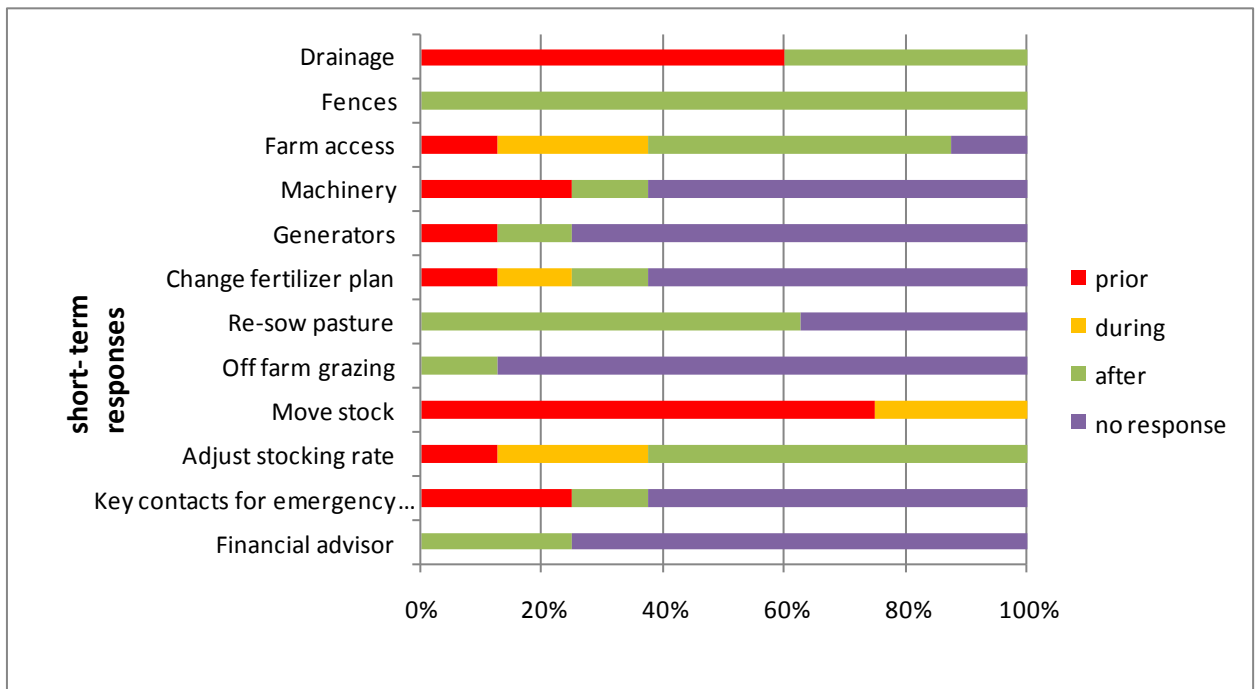


Figure 3: Short term responses adopted to reduce the impact of a severe storm.

Participating farmers were also asked about the long term changes they have implemented to mitigate the effects of severe storms. The measures that were favoured by this group were those practical on farm options such as changing drainage, fencing, and securing equipment. Some farmers also saw benefit in considering changes to their stocking policies (Figure 4). Five participants felt that these changes had improved their ability to cope with a severe storm event, with only one participant commenting that they did not feel that the changes they had made meant they coped better.

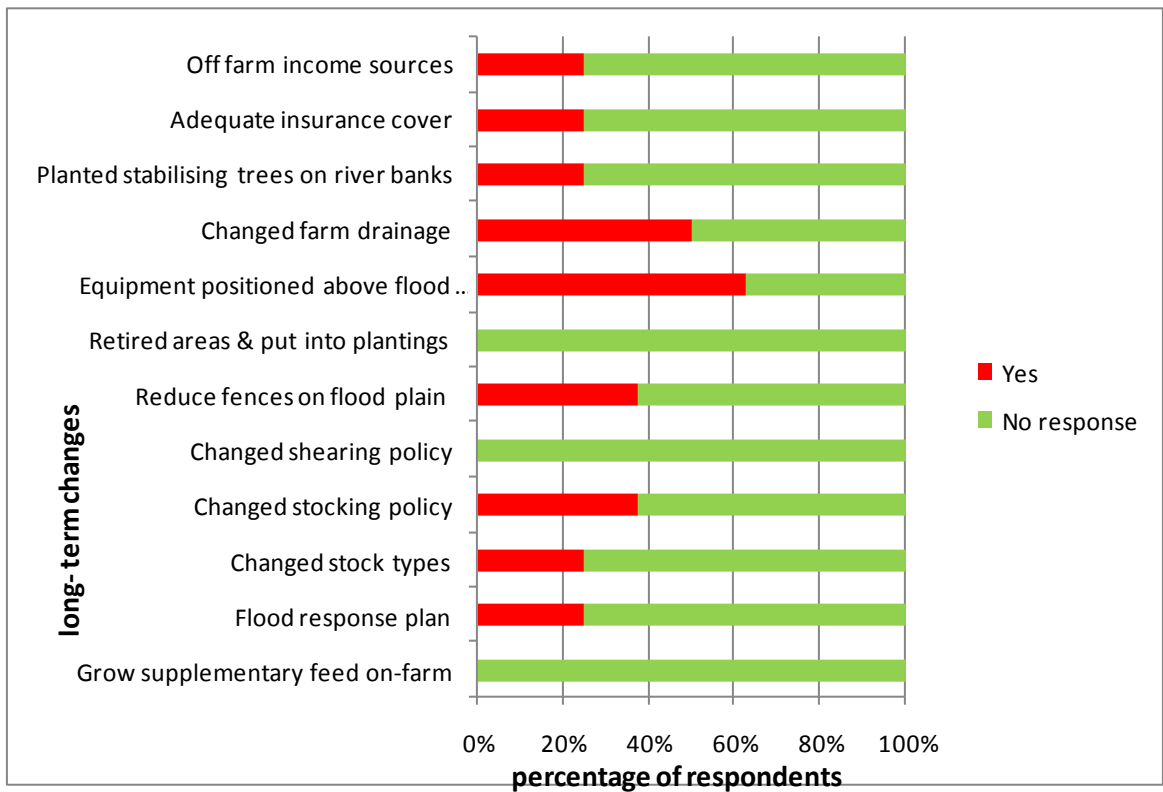


Figure 4: Long term changes made on-farm to reduce the impact of a severe storm

In the event of a severe storm participants noted that a high priority was to make sure their family was secure. Another high priority was to get their farm fully operational and maintain farm access. The need to re-grass and deal with silt on pastures was considered a low priority for all participants (Figure 5).

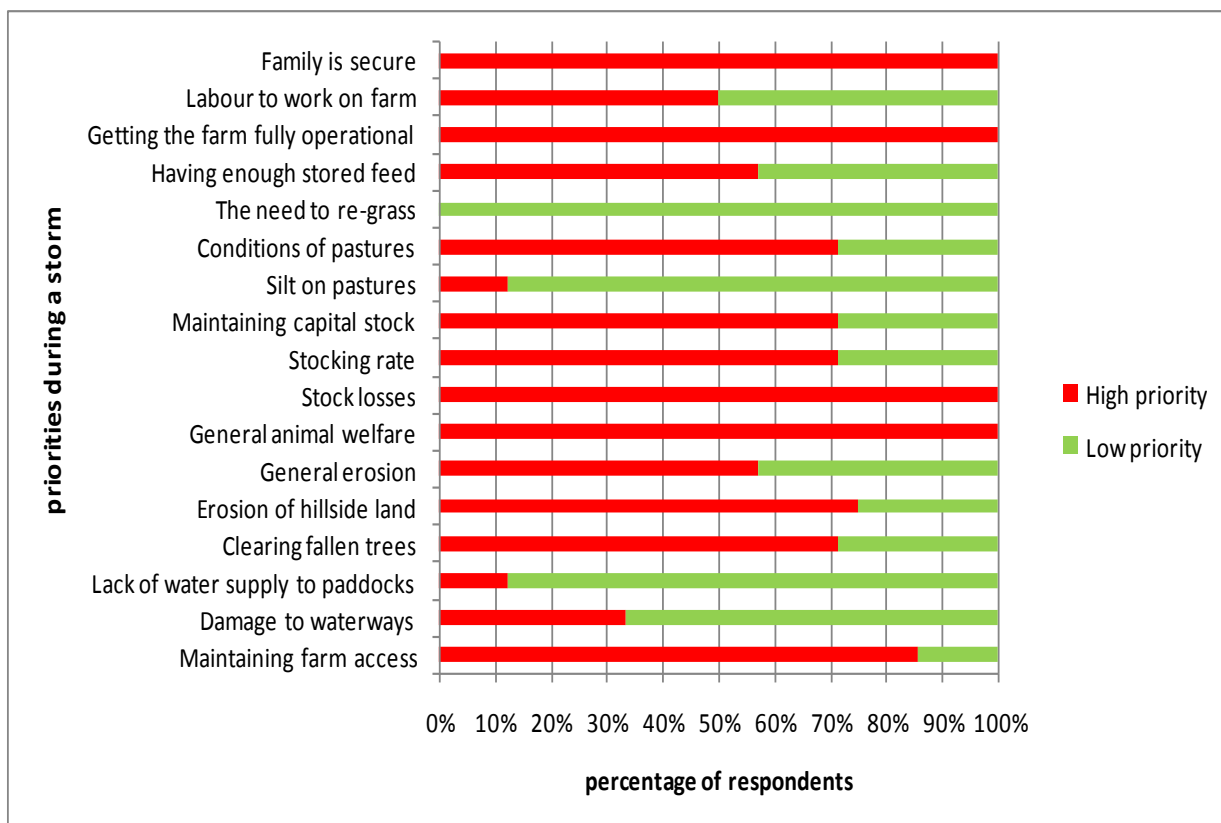


Figure 5: Priorities for participants in the event of a severe storm

The survey showed that in response to a severe storm, all participating farmers were most likely to contact family and friends, and their neighbours in the first instance. Typically, this was to offer assistance if required. Half of the group would also contact farm contractors, the power company or their farm consultant. Further contacts in response to a severe storm indicated by less (one to three) farmers were the phone company, Rural Support Trust, District Council and the Regional Council. Yet, when asked had they sought advice and/or support to prepare for future severe storm events, no one indicated that they had.

### 4.3 Droughts

A drought is a sustained period of low rainfall so that soil moisture is insufficient for plant growth. Depending on the time of the year, it can take from two weeks to three months with insufficient rainfall before this criterion is met (NIWA, 2008)

When asked to define a drought some participants were very specific, with comments such as *“three months of below 50% average rainfall”*, for others it was more general with definitions such as *“prolonged period of little or no rainfall”*. Other definitions included a farming system element; *“extended period without rain which affects production enough that you have to change farm policies”*. A lack of grass growth was a common theme.

All participants monitored droughts in some way, by keeping an eye on:

- feed levels (7),
- soil moisture (6);
- stock condition (6);
- stock growth rates (5) and
- measuring rainfall (4).

During a drought participants noted that a number of things were given high priority, these included number of stock the farm could carry, stock losses, general animal welfare and lack of water to paddocks. Having sufficient labour to work on-farm was a low priority for all participants (Figure 6).

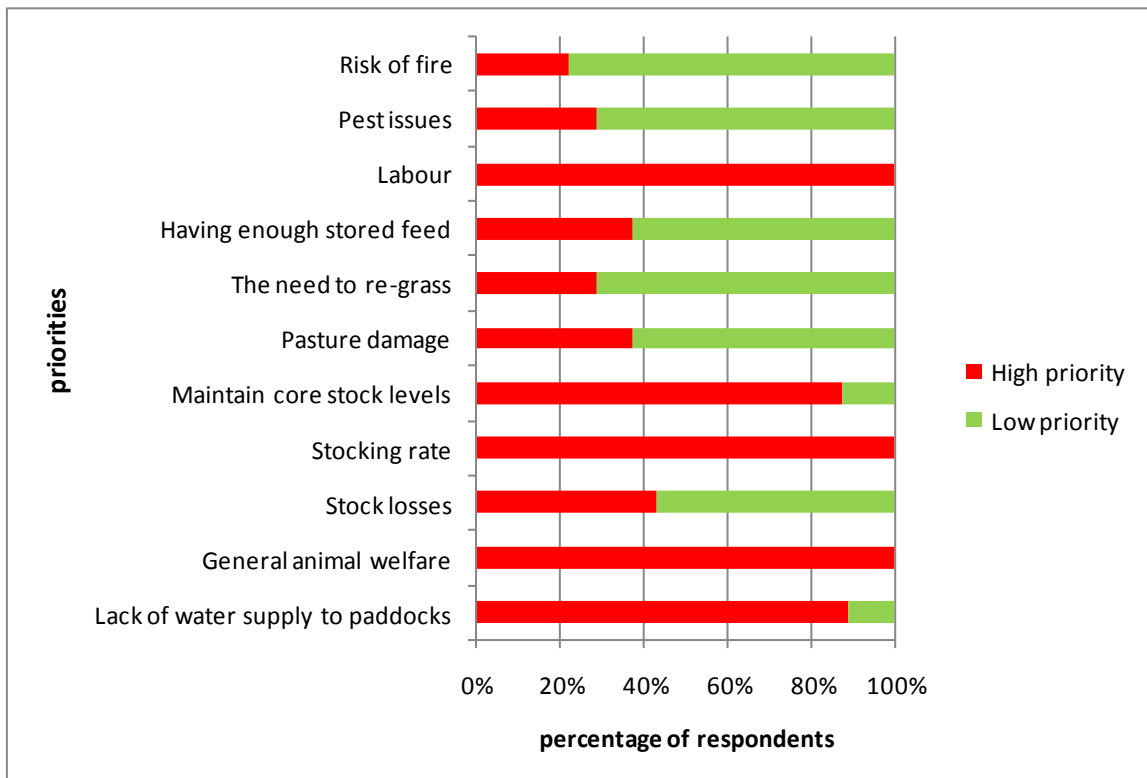


Figure 6: Priorities for participants during a drought.

Most participating farmers had experienced droughts on farm in the past, although half had experienced only one past drought event, and two farmers had farmed through two or more. Likely related to the current drought experienced in the north at the time of the survey, five of the group agreed to or strongly agreed that the frequency of droughts in the region would likely increase in the next 10 years, while three farmers took more neutral positions neither agreeing or disagreeing with this statement.

During our previous years work, sheep and beef farmers did not talk about droughts when asked to discuss adverse weather events. Therefore instead of creating a pre-determined list of the risk farms face in relation to droughts and strategies to reduce these risks, participants were instead asked to list their views. When asked to identify the specific risk that their property faces in relation to drought answers included:

- *“dam water drying up” and “lack of stock water”*
- *“stock health”*
- *“cricket damage”*
- *“unable to finish stock, affects performance of breeding animals”*
- *“feed levels”*

Again, like severe storm events, participants had strategies to reduce these risks, these included:

- *“made dams bigger” or “built more dams”*
- *“flexible stocking policy, destock in relation to pasture cover and moisture levels”*
- *“brought in silage”*

Six participants felt that the changes they had made to reduce the risks associated with drought had improved their ability to cope.

In Table 3 the ways in which participants responded to the growing possibility of a drought are outlined. All participants actively monitored pasture cover and reduced their stocking levels by selling surplus stock.

Table 3: Responses to the growing possibility of a drought

<b>Response</b>	<b>Number of participants</b>
Actively monitor pasture cover	8
Reduce stock levels by selling surplus stock	8
Actively monitor water supply	7
Reduce stock levels by moving stock off farm	7
Break feed the stock and conserve grass	5
Organise more feed to be stored on farm	4
Reduce stock levels by selling some of the farms capital stock	3

The survey showed that in response to droughts, the majority (6 or more) of participating farmers were most likely to contact family and friends, neighbours or their farm consultant for support and/or advice about a drought they were experiencing. Fewer farmers (4) would also contact contractors or the Rural Support Trust. Fewer still (2 or less) indicate that they would contact the power or phone company, district or regional council. Only two farmers had asked anyone for advice and/or support to prepare for future droughts.

#### **4.4 Lessons**

It is important to capture the lessons learnt from farmers past experiences so it can be shared amongst the wider farming community. Lessons learnt from participants experiences with droughts included:

- *"at the first signs of drought slow stock intake down to make existing pasture covers last as long as possible"*
- *"act early, be conservative"*
- *"destock earlier rather than later"*
- *"do budgets regularly"*
- *"go and have a beer with your neighbours"*
- *"develop and maintain reliable stock water supply"*
- *"have a monthly plan"*
- *"be proactive DO NOT put your head in the sand"*
- *"keep close relationship with stock agent"*

Lessons learnt from their experiences with severe storm events included:

- *"better safe than sorry approach when it comes to moving stock to higher ground"*
- *"have light easy to repair electric fences in flood/slip areas"*
- *"plant trees"*
- *"store hay and silage, [because] two weeks after a storm [there] is always a feed pinch"*
- *"do what you think is right for your own situation, which may not be exactly the same as your neighbours and friends"*
- *"keep chainsaws sharp and ready to go"*
- *"keep farm and house supply up as may not be able to get to town"*

## 4.5 The two workshops

### 4.5.1 What worries farmers?

Two main themes arose from farmer discussions regarding what worries them about adverse weather events that could impact themselves, their family and their property. The first touches on the idea of frequency and risk perception. Farmers indicated, particularly in regard to droughts, that infrequent exposure to such events creates an environment whereby the risk is viewed as small and is therefore not in the forefront of their minds. When talking about the number of droughts experienced in Northland over the last thirty years a comment from one farmer was *“isn’t that the reason that we suffer from these droughts – the fact that we don’t factor the possibility of drought into the farm psyche?”* and when discussing building and preparing financial reserves, one farmer said: *“if we had one [drought] on every year we would [be more prepared]”*.

The second theme was the impact of the economic climate for the sheep and/or beef industry. Participating farmers felt they were able to deal with the physical impacts of severe climatic events, but there was a direct impact to farm cash flows which could not be ignored. Farmers that had to destock, purchase feed or equipment or repair basic infrastructure for example were often worried about this challenge. This is expressed by three farmers:

- *“we are used to coping with the climate and although sometimes that can be tough by far the biggest challenge for us is around lack of income”*
- *“we can cope with droughts and floods OK but lack of income means we can’t do the things that we need to do on farm”*
- *“we could make our farms more resilient to storms and droughts if we had better returns”*

It was in consideration of these two worries that farmers voiced, that the scenarios within the workshop were constructed. Importantly, these included shorter timeframe events such as severe storms, as well as droughts which tend to evolve over longer time frames. Participants were also interested to link some of the economic ramifications of decisions that need to be made in response to such severe climatic events. Each individual scenario is discussed further in the following section.

## 4.6 Farmax® results

The scenarios were modelled according to the farmer requirements identified in workshop one. The chosen scenarios were as follows:

1. Drought: destock early
2. Drought: buy in supplements
3. Drought: graze stock off-farm
4. Storm in February
5. Storm in July
6. Price downturn

They were presented back to workshop participants in workshop two. Changes were made to the scenarios based on participant feedback. In regards to the options provided during a drought, participants believed that the most likely option for sheep and beef farmers during a drought was to destock. They were happy that the drought scenario represented what should happen in practice, which is destock early, but they acknowledged that most farmers, including themselves, destock too late. Feeding supplements and/or grazing off were second choice options during a drought and only likely to be taken up by farmers with valuable breeding stock. Therefore this was considered by the group to be a low priority option.

In terms of the severe storm scenarios, it was decided that no Farmax® modelling would occur for the February storm as the pasture growth boost from rain would exceed the disadvantages associated with possible flooding. It was also considered that summer storms did not have associated wind damage as was the case with winter storms. Participants agreed that the July storm scenario was realistic and supported the scenario and the subsequent results.

All participants agreed that while adverse weather events were challenging they were used to dealing with the climate. On the other hand, they claimed that price downturns were by far the most debilitating of the adverse events. In practice returns have plummeted to much lower levels than the values used. In 1997 beef dropped below \$2.00 c/kg and in 1989 lamb prices were so low many farmers chose not to put the ram out with their ewes. Table 4 outlines the financial analysis conducted using Farmax® for each scenario.

Table 4: Financial analysis for adverse events (Thomson 2010)

		Base	Drought			July Storm	Price Downturn		
			Year 1	Year 2	Combo		Moderate	Bad	
Revenue	Sheep	Sales –purchases	66921	93458	23573	58516	64158	63545	60169
		Wool	15774	16077	13498	14788	15943	15774	15774
		Total sheep	82695	109535	37071	73303	80101	79319	75943
Beef		Sales - purchases	189735	224256	97934	161095	187370	146309	112968
		Total beef	189735	22456	97934	161095	187370	146309	112968
Revenue	Total	272430	333791	135005	234398	267471	225628	188911	
	Differences to base		61361	-137425	-38032	-4959	-46802	-83519	
	Per hectare	757	927	375	651	743	627	525	
Expenditure									
Crop and Food	Hay and silage	5500	5500	5500	5500	5500	5500	5500	
	Nitrogen	5500	11100	11100	11100	5550	5550	5550	
Total crop & feed		11050	16600	16600	16600	11050	11050	11050	
Stock costs	Animal health	13206	12754	12563	12659	13415	13206	13206	
	Shearing	6097	6097	5787	5942	6097	6097	6097	
	Total stock costs	19303	18851	18350	18601	19512	19303	19303	
Interest on capital		36237	34483	31911	33197	35764	31435	27362	
Total expenditure		66590	69934	66861	68398	66326	61788	57715	
Revenue less expenditure	Total	205840	263857	68144	166001	201145	163840	131196	
	Per ha	572	733	189	461	559	455	364	
	Difference from base		58017	-137696	-39840	-4695	-42000	-74644	
Capital value changes	Sheep	-16	-43768	41860	-954	-1025	-15	-14	
	Cattle	-3	-80247	75761	-2243	-13736	-2	-2	
	Total	-19	-124015	117621	-3197	14761	-17	-16	
Gross margin		205822	139842	180266	160054	186383	163823	131180	
Gross margin/ha		572	388	501	445	518	455	364	

Note: It is important to remember that the results in the above table are reported in 'gross margin terms (sales; less purchases and less direct costs associated with the enterprise). A full farm budget would be necessary to more fully report the cash flow effect and also to incorporate other farm expenses that may occur. For example post storm there are fences to restore and trees to clean up and remove.

The changes in weight and number of stock between opening and closing for each year have been calculated and expressed as capital value changes. To help with the effect of capital gain changes as a result of drought a two year file in Farmax® short term mode was used. This was necessary because revenue stock was sold early, purchases were delayed and liveweight gains were suppressed in year one of the drought. In year two of the drought numbers were restored, there was catch-up on purchases and liveweight was restored, so that by the end of the second year almost all of the weight was regained and therefore the capital value of the stock restored to the level preceding the drought. Now, with the benefit of knowledge post-drought, it is evident that many farmers did not destock as the drought set in – in fact yardings of store stock in June were at record levels indicating that farmers held onto stock in the hope that the feed situation would improve only to discover that was not going to happen as winter set in.

In the drought scenario the supplementary feed, 100 big bales of hay, which had been reserved for May, June and July, was in fact fed out in April and May. To substitute for there being no supplementary feed available in June and July, twice the amount of nitrogen was applied. This occurred by applying 37 kgN/ha over 125ha in early June, one month earlier than usual, and then an additional application of nitrogen, at the same rate and area, was applied in early August. These are logical decisions when you have access to a powerful modelling tool like Farmax however in practice it is conceded that farmers may not be as proactive with their decision making.

Figure 7 illustrates the pasture cover for the case farm for the base year and each of the scenarios. While Figure 8 shows pasture cover for the first and second year of the drought.

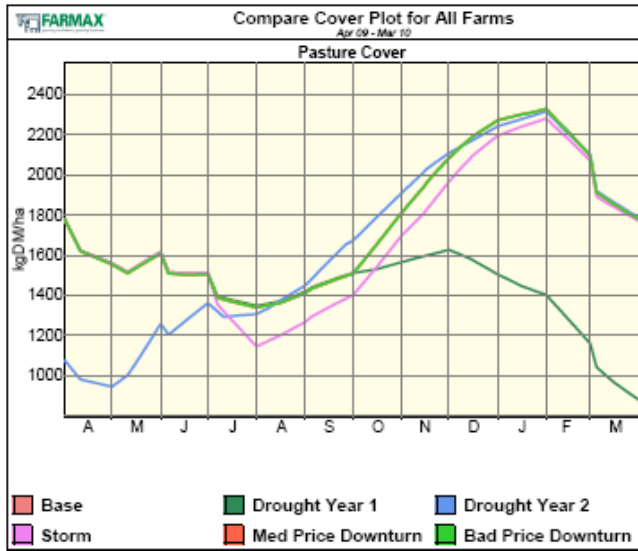


Figure 7: Pasture cover for each scenario

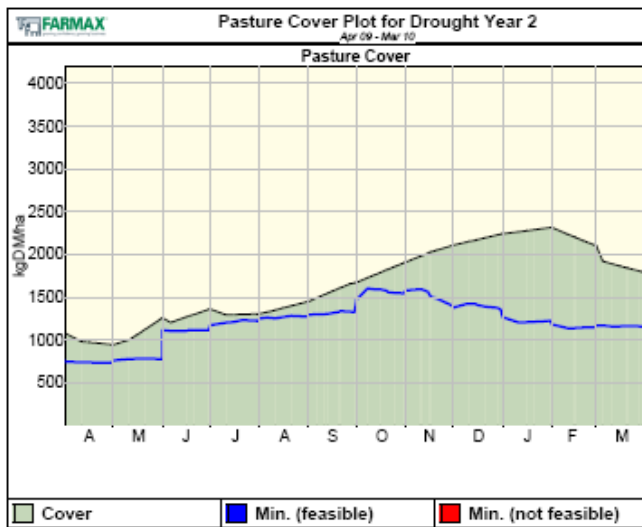
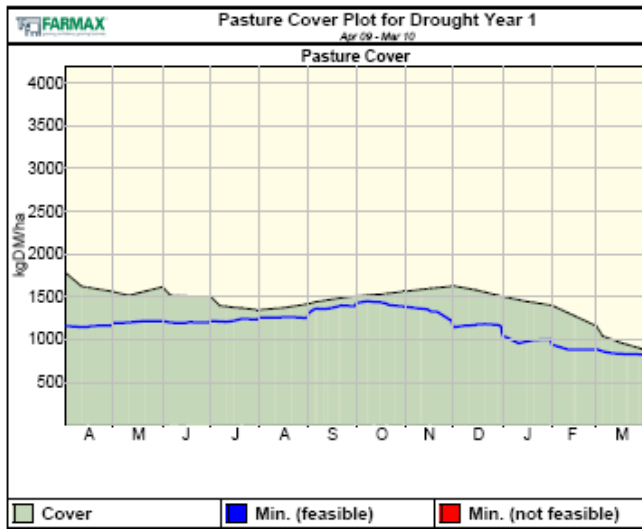


Figure 8: Pasture cover for drought scenario in year one and two

A bad price downturn had the largest overall financial impact on the farm with a loss of approx. \$75 000 compared to the base farm data. The drought had the largest individual year impact with a financial loss of approx. \$135 000 which occurred in the year following the drought. However, the impact in year two was cushioned with the extra income in year, due to more stock sales and less stock purchases, to average a loss of some \$40 000 in total. In gross margin terms a storm in July had the least effect with a reduction of less than \$20 000 although the farmers considered the cost of storm damage to farm infrastructure to be more than the cost of lost production. All things considered, it is interesting to observe that the cost of a storm may be less than the impact of just a medium price downturn.

Farm working expenses for the base farm and the Northland Region MAF Monitor farm show that farm working expenses are approximately \$400 per hectare. These expenses include animal health and feed costs which are included in the gross margin reported. If the direct cost items, crops and feed, animal health and shearing, which totals \$84 per hectare for the base farm, are removed, then the total figure for tax, mortgage and capital expenditure is \$316 per hectare.

The farmers agreed that they were accustomed to dealing with the climate and that price downturns had the most negative effect on their farm income and their morale. They further indicated that with good returns they were more able to withstand climatic challenges.

For each of scenarios modelled on Farmax® participants comments were recorded to try and gauge an understanding of their initial thoughts.

#### **4.6.1.1 Storm in July**

Farmers commented that it was important to note the emotional cost of a storm in July as it is *“often overlooked”*. They did not believe that Farmax® had *“captured the emotional cost of this event”*. After seeing the results of this scenario one participant summed up the general feeling by noting *“pretty bloody depressing”*. The cost associated with getting a farm back to optimum condition was seen as hard to define *“how long is a piece of string?”* especially because of the *“hidden costs”* and the indirect costs associated with this.

Participants all agreed that Farmax® modelled a feasible scenario for this type of event. However it was seen as *“close to the bone”* because if anything else (adverse weather event or low product price) came along it would *“tip things over”*. This scenario generated a lot of discussion of interesting aspects around the results. It got one participant commenting that they *“should buy a generator”*. Although it confirmed what many farmers said they ‘already knew’, some noted that *“analysing forward is a whole new concept, putting numbers around it good but still based on assumption”*. The pasture cover figures were considered useful. Participants liked that it was a visual tool.

#### **4.6.1.2 Drought; so destock early**

This scenario generated a lot of discussion, perhaps because the region was experiencing a drought at the time of the workshops. Participants struggled with this policy as they noted it was *“hard to sell capital stock”*. This scenario was seen as *“fantastic, if you had a crystal ball”*. To implement this policy meant that *“hard nose decisions had to be made in December”* and that *“nothing in December could have stopped us buying calves”*.

There was discussion around farmers in Northland not *“picking up on NIWA’s predication of drought back in December”*. A key question raised was *“what price to buy stock back in?”* and *“how do we use buffer created by destocking?”* This generated a lot of discussion. Participants disagreed that you can buy back stock at an average price.

#### **4.6.1.3 Other scenarios**

Although the scenarios below were not considered as realistic options, farmers still made comments about a severe storm hitting in February; as well as ‘a drought so buy in supplements’ and ‘a drought so graze animals off farm’. If a severe storm occurs in February farmers see benefits in terms of pasture growth rates. They also noted that it was easier to fix a lot of the damage which occurs as *“you don’t need to wait as long for land to dry out”*. Buying in supplements during a drought was not considered an option because *“if you don’t sell stock and just buy in feed would go broke”*. Grazing animals off farm during a drought was not considered a realistic option for a number of reasons:

- *“why would you pay someone else to starve them (stock)”*
- *“where would you send them?”*
- *“competing against dairy grazers – expensive”*

- “expensive to send them far away”

#### 4.7 How have farmers ideas on adverse weather events changed?

To capture how participants understanding of adverse weather events had changed since attending the two workshops, a postal survey of 14 questions was sent out a week after the second workshop (appendix d). Figure 9 and 10 show the change in thinking around threats posed to participants farming business since attending the workshops. The biggest change in perception was around a storm hitting in July. After attending the workshops nearly all the participants saw it as a significant threat, whereas before nearly half of all participants considered a storm ‘no threat’.

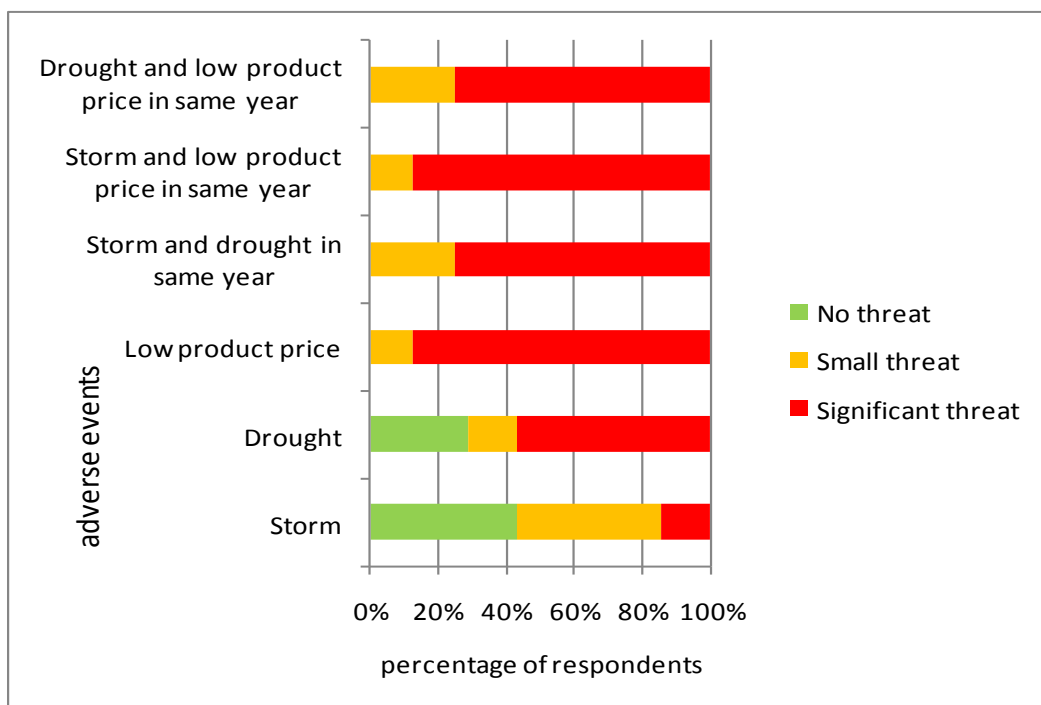


Figure 9: Perceived level of threat posed to participants farming business (before attending the workshop)

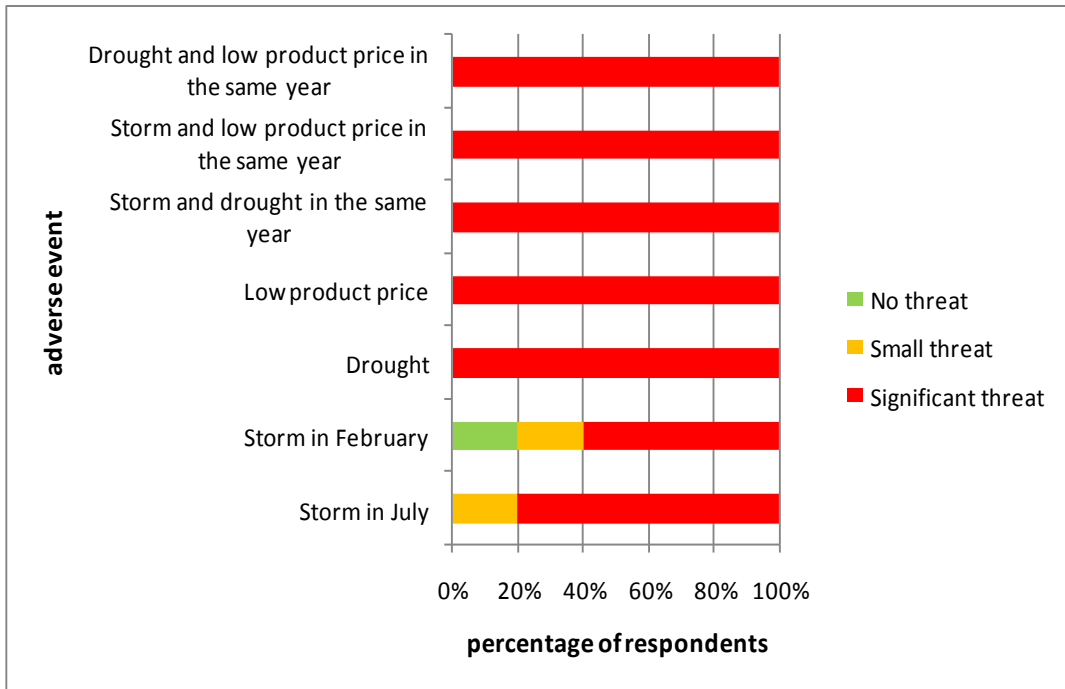


Figure 10: Perceived level of threat posed to participants farming business (after attending the workshop)

#### 4.7.1 Severe storm events

Participants were asked to identify the specific risks that their property faced in relation to severe storms since attending the workshops. The financial costs associated with repairing infrastructure and replacing stock losses was the most commonly mentioned risks. Figure11 identifies the short term responses participants intend to make to reduce the impact of a severe storm since attending the workshops.

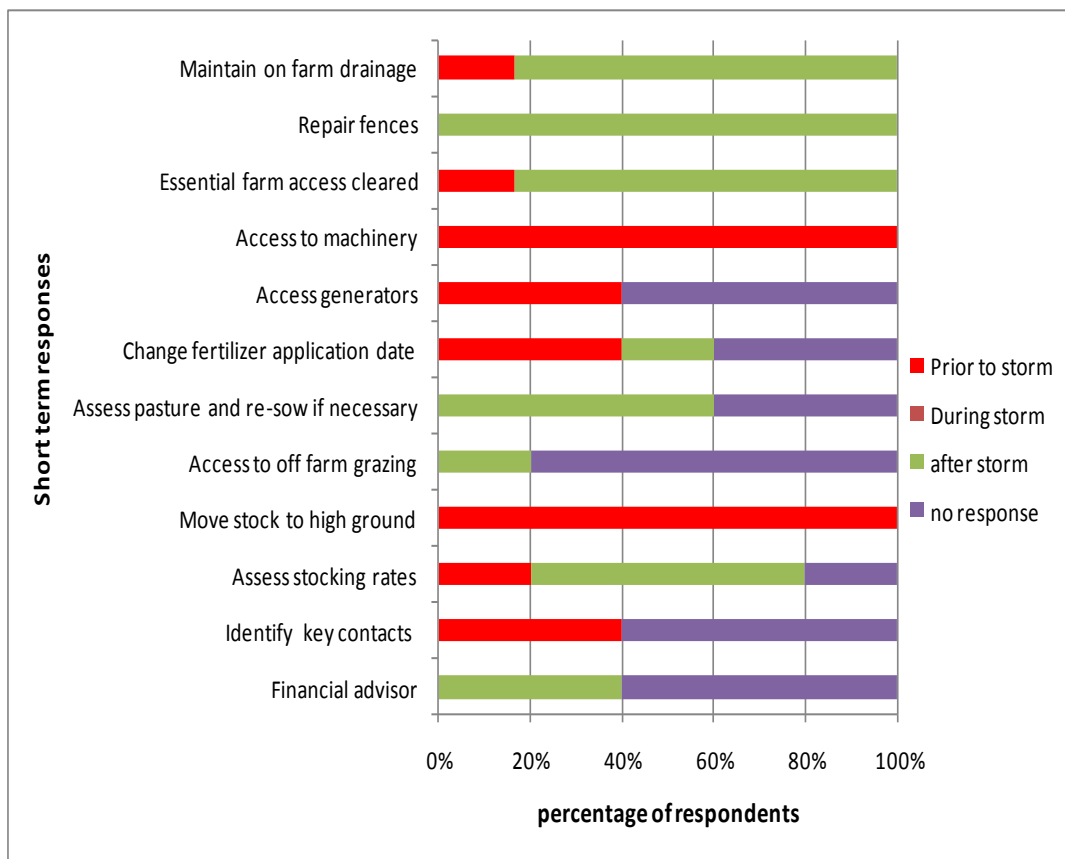


Figure 11: Short term responses that participants intend to make to reduce the impact of a severe storm (since attending the workshops)

Long term changes which participants will make due to attending the workshops include:

- growing supplementary feed on-farm
- having a flood response plan
- Equipment positioned above possible flood levels
- Change farm drainage
- Plant stabilising trees on river banks
- Adequate insurance cover

#### 4.7.2 Droughts

As noted earlier, Northland was in the middle of a drought during the months when the workshops were being held. All participants had been receiving information from the Drought Response Committee regarding actions they could take to mitigate the impact of the drought. This may have influenced the following results. When participants were

asked to identify the specific risks that their property faced in relation to droughts, results were similar to those identified before attending the workshops. Participants did not mention any new ways they would reduce the risk of droughts since attending the workshops.

#### **4.8 How participants viewed the methodology**

It is important to understand how participants viewed the workshops so when researchers and extension people are developing ways to build and understand on-farm resilience they choose the appropriate mechanism. Participants enjoyed the drive around the case study farm. It created a lot of very useful discussion about potential solutions for each stop and what they had done on their farm in similar situations.

Using Farmax® to model a case study farm was considered extremely useful by the group. Their enthusiasm was evident in that they asked lots of questions about the model and how it worked and it created a lot of discussion amongst the group. One participant noted that the *“exercise showed the impact of relatively small fluctuations in price costs the same in dollar terms as a drought”*. One of the limitations noted was that the scenarios were separated. Participants would have liked to have seen combination of adverse weather events and low product price modelled using Farmax®. The example they gave was *“this year have had a price downturn and a drought”*.

When asked how valuable the workshops were in improving farmers' preparedness for adverse weather events, only one person answered the question; their response was neutral. Yet when asked what the value of attending the workshops were for them, answers included, *“good to know that everyone has the same problems”* and *“confirmed that we are on the right track in terms of our farm strategy”*. Participants commented that the workshops made them *“more aware of the problem [adverse weather events]”*. One noted that *“the greatest challenge for most farms is financial viability and that costs limit opportunities to reduce the risk of weather events”*. The most common lesson learnt from the workshop was that they (as farmers) had a good knowledge of drought and storm mitigation strategies but they argued they did not have the required cash flow to *“climate proof their income”*. The workshops reinforced to farmers, the importance of having a farm strategy about adverse weather events.

Participants enjoyed Bob Thomson's explanation of Farmax® and the results of the modelling for the case farm, especially the results which showed *"that the biggest threat to our business is product price"* and that *"confirmation that financial sustainability of sheep and beef farming is questionable"*. Participants enjoyed the opportunity to interact with other farmers and hearing how others deal with adverse weather events as *"feedback seemed similar from all those present"*. Two participants felt that the same outcome could have been achieved in one day, as they felt it was *"time consuming"* – but these farmers may not have appreciated the value of the process to get to the final point.

## **5. What does this mean for building on-farm resilience?**

Although there were not as many radical changes in perception noted by participants, the workshops were seen as valuable by all of the participants. The workshops provided a forum for farmers to share their experiences and to listen to how other people cope with the same adverse situation. Farming can tend to be quite an isolating job and providing forums such as workshops where farmers can learn from one another is essential, especially if adverse weather events, coupled with low product prices continue. Furthermore, providing a 'real life' example and holding the workshops on farm gave the workshops more of a practical feel and meant that participants could relate to the findings and recommendations. If such a process was to occur again, then holding them on-farm is essential.

The use of Farmax® to model a case farm and to see the financial and physical impacts on farm was also valuable as it was a 'visual tool'. However, such a model cannot capture the emotional impact of adverse weather events. Many of the participants noted that the emotional impact of adverse weather events is forgotten but that this was a problem which needed addressing. This is an area which needs to be taken into account.

During the time of the workshops (2010) drought was the adverse weather event which was at the forefront of their minds. However, last year (2008/09) when farmers were interviewed they tended to focus on severe storms. Thus when focusing extension programmes around building resilience it is important to get the timing right. Perhaps, focus on an adverse event during or after they have happened so as to better prepare farmers for next time.

Adverse weather events alongside economic volatility were a considerable worry for participants. They felt that with a more stable product price return they could deal with adverse weather events. For example, they would have the money to employ people to bring their farming system back up to speed and to build resilience into their farming system so adverse weather events do not create as much damage as what they currently do.

Another interesting finding from this work was that some 'adverse' weather events were considered to have advantages to a farm system. Storms which occur in summer were seen to have benefits, such as increased pasture growth and providing dams with water.

Farmers involved in this study were eager to get the information they had learnt out to the wider farming community. In the first instance, the group felt that there were some actions they could undertake on their own properties that would buffer themselves against adverse weather events. They were also keen to see a ten point plan for drought proofing the farm developed and were interested in having input into this.

The farmers recognised that there is a political agenda that needs to be continually driven to ensure that the difficulties of severe climatic events and the consequences of economic, social and physical impacts were recognised in New Zealand's political arenas. The group identified the need to achieve sound media coverage of the very real issues, and some of the strategies for addressing these that arose from their work in this area.

One should be wary of making recommendations based on this scoping project due to the small number of participants in this study. However, when designing future work in this area it would be useful to incorporate the following suggestions:

- Farmax® modelling needs to be extended to include multiple adverse events. For example a drought and a price downturn occurring in the same year
- Farmax® needs to be extended to full farm budgets where the other costs of fence repairs, slip damage and building damage are detailed
- Participants clearly identified a 'social need' in times of adverse weather events and this needs further investigation.

- Participants expressed the need for government to see the plight of farmers in the sheep and beef sector.

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- White, T. (2009b) Northland beef/sheep farmers: how resilient are they to adverse weather events? Client report prepared for MAF Sustainable Farming Fund, Hamilton, AgResearch.

## 7. Appendices

### 7.1 Appendix a: Pre workshop farmer survey

#### Understanding farmer responses to adverse weather events in Northland

##### Farm Details

1. Where is your farm located? \_\_\_\_\_

2. What is the effective size of your property?

Freehold area: \_\_\_\_\_ hectares or \_\_\_\_\_ acres

Leasehold area: \_\_\_\_\_ hectares or \_\_\_\_\_ acres

3. Please indicate the number of years farming your property

1-5 years  6-10  11-15  16-20  21+

4. Please give an indication of your normal stocking rates:

Stock class	Summer	Autumn	Winter	Spring
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

5. Please indicate the percentage (%) of each of the following on your property

Flat land	Rolling land	Hill country	Steep hill country	Other
_____	_____	_____	_____	_____

##### General

6. Please indicate whether you agree or disagree to the following statements:

	Strongly disagree				Strongly agree	N/A
It is important to plan for severe storm events	1	2	3	4	5	6
It is important to plan for droughts	1	2	3	4	5	6
My farm is able to cope with severe storms	1	2	3	4	5	6
My farm is able to cope with droughts	1	2	3	4	5	6
With my current farm management practices I am comfortable that we would easily recover from a severe storm	1	2	3	4	5	6
With my current farm management practices I am comfortable that we would easily recover from a drought	1	2	3	4	5	6
The frequency of severe storm events in	1	2	3	4	5	6

my region will increase in the next 10 years

The frequency of droughts in my region will increase in the next 10 years.      1      2      3      4      5      6

I am concerned about extreme weather variability      1      2      3      4      5      6

7. To reduce the impact of an adverse weather event I have:

	Yes	No	Not applicable
Maintained a cash reserve in the farm accounts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Run a low cost farming system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Maintained a good line of credit in case I need to increase debt levels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Diversified income by my partner working off farm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Diversified income by working off farm myself	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aligned other farm based income to farming e.g. tourism	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Invested in off farm businesses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sold stock when, and as, required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have a strategic approach to selling stock on the market	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Insure farm infrastructure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Insure farm stock	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Generally tightening the farm and family budgets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8. What do you feel is the level of threat posed to your farm business by a:

	No threat at all	Small threat		Significant threat	
	1	2	3	4	5
Storm event	1	2	3	4	5
Drought	1	2	3	4	5
Low product price	1	2	3	4	5
A storm event and a drought in the same year	1	2	3	4	5
A storm event and low product price in the same year	1	2	3	4	5
A drought and low product price in the same year	1	2	3	4	5

**Severe storm events**

9. How do you define a severe storm event?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

10. How many severe storm events have you experienced on this farm? \_\_\_\_\_

11. The type of damage I have experienced on farm caused by a severe storm event:

	Minor	Severe	None
Flooding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Silt on flooded areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Debris collection in flooded areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Damage to fences	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Damage to pasture	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Erosion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Collapsed tracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Increased soil and pasture damage from pugging	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Loss of stock	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Damage to culverts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

12. What are the specific risks that your property faces in relation to severe storm events?

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13. What short term responses do you make on farm to reduce the impact a severe storm has on your property:

	Prior to storm	During storm	After storm
Talk to financial advisor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Identify list of key contacts for emergency resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Assess whether stocking rate needs to be reduced.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Move stock to higher ground	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Access to off-farm grazing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Assess pasture and re-sow when necessary	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Change fertilizer application date	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Access generators	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Access to machinery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ensure essential farm access is cleared	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Repair fences	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Maintain on-farm drainage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

14. If you were absent from the property during a severe storm event would other people be able to put these responses into practice?  Yes  No

15. What long term changes have you made on farm to reduce the impact a severe storm has on your property:

Grow supplementary feed on-farm	<input type="checkbox"/>
Have a flood response plan	<input type="checkbox"/>
Changed stock types	<input type="checkbox"/>
Change stocking policy	<input type="checkbox"/>
Change shearing polices	<input type="checkbox"/>
Reduce fences on flood plain with 1-2 wire electric	<input type="checkbox"/>
Retired areas from grazing and put into plantings	<input type="checkbox"/>
Equipment is positioned above possible flood levels	<input type="checkbox"/>
Changed farm drainage	<input type="checkbox"/>
Planted stabilizing trees on river banks	<input type="checkbox"/>
Adequate insurance cover	<input type="checkbox"/>
Off farm income sources	<input type="checkbox"/>
Other (please specify) _____	<input type="checkbox"/>
Other (please specify) _____	<input type="checkbox"/>
Other (please specify) _____	<input type="checkbox"/>

16. Have the above changes improved your ability to cope with a severe storm event?   
 Yes  No

17. In the event of a severe storm, I would be thinking about:

	Low priority	High priority	Don't know
Maintaining farm access	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Damage to waterways	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of water supply to paddocks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clearing fallen trees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Erosion of hillside land	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
General erosion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
General animal welfare	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stock losses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Number of stock the farm can carry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Maintaining capital stock	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Silt on pastures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Conditions of pastures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The need to re-grass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Having enough stored feed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Getting the farm fully operational	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Labour to work on farm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Family is secure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

18. Who would you contact for support and/or advice if you experienced a severe storm on your property:

	During the storm	After the storm
Family and friends	<input type="checkbox"/>	<input type="checkbox"/>
Contractors	<input type="checkbox"/>	<input type="checkbox"/>
Power company	<input type="checkbox"/>	<input type="checkbox"/>

Regional Council	<input type="checkbox"/>	<input type="checkbox"/>
Neighbours	<input type="checkbox"/>	<input type="checkbox"/>
Phone company	<input type="checkbox"/>	<input type="checkbox"/>
District Council	<input type="checkbox"/>	<input type="checkbox"/>
Rural Support Trust	<input type="checkbox"/>	<input type="checkbox"/>
Farm consultant	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>

19. Who would be the first person/organisation you would contact? \_\_\_\_\_

20. Why would you contact this person/organisation in the first instance?

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21. Have you asked anyone for advice and support to prepare for future severe storm events?

Yes       No

If yes, please identify the person/organisation: \_\_\_\_\_

22. In the next 10 years how many severe storms do you expect to experience? \_\_\_\_

Why do you think this?

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### Droughts

23. How would you define a drought?

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24. How many droughts have you experienced on this property? \_\_\_\_\_

25. How do you monitor droughts?

Measure rainfall	<input type="checkbox"/>
Keep an eye on soil moisture	<input type="checkbox"/>
Keep an eye on feed levels	<input type="checkbox"/>
Stock condition	<input type="checkbox"/>
Stock growth rates	<input type="checkbox"/>
Other _____	<input type="checkbox"/>
Other _____	<input type="checkbox"/>
Other _____	<input type="checkbox"/>

26. What are the specific risks that your property faces in relation to droughts?

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27. What responses have you made to reduce these risks?

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28. Have these changes improved your ability to cope with a drought?  Yes  No

29. In the event of a drought, I would be thinking about:

	Low priority	High priority	Don't know
Lack of water supply to paddocks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
General animal welfare	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stock losses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Number of stock the farm can carry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Maintain core stock levels on farm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pasture damage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The need to re-grass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Having enough stored feed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Labour to work on farm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pest issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The risk of fire	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

30. How do you respond to the growing possibility of a drought?

	Yes	No	N/A
Actively monitor water supply	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Actively monitor pasture cover	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Organise more feed to be stored on farm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Break feed the stock and conserve grass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reduce stock levels by selling surplus stock	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reduce stock levels by selling some of the farms capital stock	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reduce stock levels by moving stock off farm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Make no changes to my usual stocking levels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

31. Who would you contact for support and/or advice if you were experiencing a drought on your property:

	During the drought	After the drought
Family and friends	<input type="checkbox"/>	<input type="checkbox"/>
Contractors	<input type="checkbox"/>	<input type="checkbox"/>
Power company	<input type="checkbox"/>	<input type="checkbox"/>
Regional Council	<input type="checkbox"/>	<input type="checkbox"/>
Neighbours	<input type="checkbox"/>	<input type="checkbox"/>
Phone company	<input type="checkbox"/>	<input type="checkbox"/>
District Council	<input type="checkbox"/>	<input type="checkbox"/>
Rural Support Trust	<input type="checkbox"/>	<input type="checkbox"/>
Farm consultant	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>

32. Who would be the first person/organisation you would contact? \_\_\_\_\_

33. Why would you contact this person/organisation in the first instance?

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34. Have you asked anyone for advice and support to prepare for future droughts?

Yes       No

If yes, please identify the person/organisation: \_\_\_\_\_

35. In the next 10 years how often do you expect to have to deal with a drought? \_\_\_\_

Please explain:

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36. What lessons have you learnt from your experiences with droughts which could be passed onto other farmers?

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A storm and low product price in the same year	1	2	3	4	5
A drought and low product price in the same year	1	2	3	4	5

### Severe storm events

5. As a result of attending the workshops what would you now say are the specific risks that your property faces in relation to severe storm events?

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6. Since attending the workshops what short term responses do you intend to make on farm to reduce the impact a severe storm has on your property:

	Prior to storm	During storm	After storm
Talk to farm consultant	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Talk to financial advisor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Identify list of key contacts for emergency resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Assess whether stocking rate needs to be reduced.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Move stock to higher ground	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Access to off-farm grazing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Assess pasture and re-sow when necessary	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Change fertilizer application date	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Access generators	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Access to machinery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ensure essential farm access is cleared	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Repair fences	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Maintain on-farm drainage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7. Since attending the workshops what long term changes do you intend to make on farm to reduce the impact a severe storm has on your property:

Grow supplementary feed on-farm	<input type="checkbox"/>
Have a flood response plan	<input type="checkbox"/>
Changed stock types	<input type="checkbox"/>
Change stocking policy	<input type="checkbox"/>
Change shearing polices	<input type="checkbox"/>
Reduce fences on flood plain with 1-2 wire electric	<input type="checkbox"/>
Retired areas from grazing and put into plantings	<input type="checkbox"/>
Equipment is positioned above possible flood levels	<input type="checkbox"/>
Changed farm drainage	<input type="checkbox"/>
Planted stabilizing trees on river banks	<input type="checkbox"/>
Adequate insurance cover	<input type="checkbox"/>
Off farm income sources	<input type="checkbox"/>
Other (please specify) _____	<input type="checkbox"/>

8. In the event of a severe storm, I would be thinking about:

	Low priority	High priority
Maintaining farm access	<input type="checkbox"/>	<input type="checkbox"/>
Damage to waterways	<input type="checkbox"/>	<input type="checkbox"/>
Lack of water supply to paddocks	<input type="checkbox"/>	<input type="checkbox"/>
Clearing fallen trees	<input type="checkbox"/>	<input type="checkbox"/>
Erosion of hillside land	<input type="checkbox"/>	<input type="checkbox"/>
General erosion	<input type="checkbox"/>	<input type="checkbox"/>
General animal welfare	<input type="checkbox"/>	<input type="checkbox"/>
Stock losses	<input type="checkbox"/>	<input type="checkbox"/>
Number of stock the farm can carry	<input type="checkbox"/>	<input type="checkbox"/>
Maintaining capital stock	<input type="checkbox"/>	<input type="checkbox"/>
Silt on pastures	<input type="checkbox"/>	<input type="checkbox"/>
Conditions of pastures	<input type="checkbox"/>	<input type="checkbox"/>
The need to re-grass	<input type="checkbox"/>	<input type="checkbox"/>
Having enough stored feed	<input type="checkbox"/>	<input type="checkbox"/>
Getting the farm fully operational	<input type="checkbox"/>	<input type="checkbox"/>
Labour to work on farm	<input type="checkbox"/>	<input type="checkbox"/>
Family is secure	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>

9. Do you intend asking anyone for advice and support to prepare for future severe storm events?  Yes  No

If yes, please identify the person/organisation: \_\_\_\_\_

### Droughts

10. What are the specific risks that your property faces in relation to droughts?

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11. What responses do you intend to make to reduce these risks?

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12. In the event of a drought, I would be thinking about:

	Low priority	High priority
Lack of water supply to paddocks	<input type="checkbox"/>	<input type="checkbox"/>
General animal welfare	<input type="checkbox"/>	<input type="checkbox"/>
Stock losses	<input type="checkbox"/>	<input type="checkbox"/>
Number of stock the farm can carry	<input type="checkbox"/>	<input type="checkbox"/>

Maintain core stock levels on farm	<input type="checkbox"/>	<input type="checkbox"/>
Pasture damage	<input type="checkbox"/>	<input type="checkbox"/>
The need to re-grass	<input type="checkbox"/>	<input type="checkbox"/>
Having enough stored feed	<input type="checkbox"/>	<input type="checkbox"/>
Labour to work on farm	<input type="checkbox"/>	<input type="checkbox"/>
Pest issues	<input type="checkbox"/>	<input type="checkbox"/>
The risk of fire	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>

13. Since attending the workshops how do you intend to respond to the growing possibility of a drought?

	Yes	No
Actively monitor water supply	<input type="checkbox"/>	<input type="checkbox"/>
Actively monitor pasture cover	<input type="checkbox"/>	<input type="checkbox"/>
Organise more feed to be stored on farm	<input type="checkbox"/>	<input type="checkbox"/>
Break feed the stock and conserve grass	<input type="checkbox"/>	<input type="checkbox"/>
Reduce stock levels by selling surplus stock	<input type="checkbox"/>	<input type="checkbox"/>
Reduce stock levels by selling some of the farms capital stock	<input type="checkbox"/>	<input type="checkbox"/>
Reduce stock levels by moving stock off farm	<input type="checkbox"/>	<input type="checkbox"/>
Make no changes to my usual stocking levels	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>

14. Do you intend to ask anyone for advice and support to prepare for future droughts?

Yes                       No

If yes, please identify the person/organisation: \_\_\_\_\_

**Thank you for taking time to complete this survey, your time and effort is much appreciated.**

### 7.3 Appendix c: Post workshop farmer evaluation



#### Understanding farmer responses to adverse weather events in Northland

Thank you very much for taking time out of your busy lives to attend the two workshops. We'd like to hear your thoughts on how you found the workshops. Please return the survey in the pre-paid envelope along with the other survey.

#### Evaluation questions

1. What did you learn from your involvement with the two workshops?

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2. What did you learn that surprised you?

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3. For you, what was the value of attending these workshops?

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4. What were the drawbacks or frustrations with the two workshops?

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**Thank you for taking time to complete this survey, your time and effort is much appreciated.**

If you have any queries please contact:  
Tracy Payne  
AgResearch Ltd  
07 838 5116 or [tracy.payne@agresearch.co.nz](mailto:tracy.payne@agresearch.co.nz)

## 7.4 Appendix d: Farmax® assumptions (Thomson 2010)

### Scenario 1: Base Farm

this was the status-quo farm model for a 'normal' year and was used as the benchmark for comparing the adverse weather event scenarios

### Scenario 2: Drought (destock early)

it was assumed that the drought started in October and finished in late April. Non-breeding stock were sold, planned purchases delayed and liveweight gain reduced. The farm was restocked by financial year end and this is considered normal practice for farmers as the cost of grazing-off and/or purchasing supplements is generally cost prohibitive.

### Scenario 3: Drought (graze-off stock)

the farm was destocked early by purchasing off-farm grazing. This was a low priority option.

### Scenario 4: Drought (supplements)

Palm kernel was purchased to meet animal feed requirements as this is the most cost effective supplementary feed. However, anecdotal information would suggest that if supplements were purchased then hay was probable the supplement used by farmers in the most recent drought

### Scenario 5: Storm in February

This was considered but abandoned as the advantages were found to exceed disadvantages as this was checked off with the workshop participants.

### Scenario 6: Storm in July

Pervious modelling work done for MAF (and presented at farmer meetings post-storm in 2007) indicated that post-storm pasture covers were slashed by some 200kgDM per hectare. This came about through loss of control of animal intakes – mostly through broken fences (trees fallen over internal and external fences), loss of current in electric fences (power off for two to three days) coupled with some extra pugging damage.

### Scenario 7: Price downturn

Beef schedules were reduced by 60c/kg CW (\$3.60 to \$3.00 for bulls and \$3.80 to \$3.20 for steers) and sheep meat reduced by 25c/kg CW (\$5.25 to \$5.00).