INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

WMO UNEP

IPCC WGII
Fourth Assessment Report
Climate Change Impacts, Adaptation and Vulnerability

Expert Review of First Order Draft

Specific Comments

Chapter 11

December 5, 2005

Discussion of expert review comments and record keeping

IT IS RECOMMENDED THAT:

- AUTHORS BEGIN WORK ON THE COMMENTS IMMEDIATELY. SUBSTANTIVE COMMENTS NEED TO BE SEPARATED FROM NON-SUBSTANTIVE, AND THE TWO SHOULD BE TREATED DIFFERENTLY
- CONTACT IS MADE BETWEEN AUTHORS AND THEIR REVIEW EDITORS IN DECEMBER

Substantive comments

- The chapter writing team should discuss all substantive expert review comments, by email and/or at Merida.
- Substantive comments require full and proper consideration. The *Principles Governing IPCC Work* state that:
  - genuine controversies should be reflected adequately in the text of the Report and
  - it is the role of the Review Editors to advise the lead authors on how to handle contentious/controversial issues
- You must record the outcome of these discussions in this document, under the column 'Notes of the Writing Team'.

Non-substantive comments

- For non-substantive comments, a very brief entry should be made in the column 'Notes of the Writing Team'. The following terms are acceptable:
  - Addressed
  - Not applicable
  - Text removed
  - A tick to denote a comment has been addressed (somewhere on the document this should be stated)

General

- The record can be kept electronically, or with pen-and-paper.
- The document becomes part of the traceable account of the Working Group II Fourth Assessment. When completed to the satisfaction of the Review Editors, a copy should be returned to the TSU by the **28th February 2006**.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
11-0	A	0				**Co-chair and TSU comments** You follow the recommended headings. Thanks. Balance between the sections seems right. Summary of results in a) table of residual risk, and map of key hotspots is v. informative ES makes clear the main conclusions. Would be useful to make clear which of these points are new to TAR, or which re-affirm TAR In general: a chapter that could be a model to others. Below are M. Parry's comments on ZERO-ORDER DRAFT in January 2005, [with notes on how FOD has responded, in square brackets}: AUSTRALIA/NEW ZEALAND General comments: 1) Max length in this ZoD format (equiv to 25 pp in printed vol) should be xx pp It is important the whole volume be concise and we urge you to keep within max page length. [now within 2 pp of max length] 2) Suggest achieve this reduction by : a) condense text on each main point across the board; b) prioritise to select the main **policy-relevant** issues; c) refer readers to TAR for any material already included in that assessment, and avoid repeating here **except**	BF: Rewrite of Section 11.1 now does this BF: Useful advice that we should be able to follow so as to reduce size of chapter to meet our quota of pages. BF: Accepted. Useful advice that we should

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						where central to conclusions; c) concentrate on asessment that confirms or revises TAR; e) use tables to summarise instead of text. [done everything asked] 3) Balance between sections looks good (we support your decision to give over half the text space to section 4, which should be the core of the assessment); and provisional conclusions already identified. 4) Is there material that can be added regarding: a) effects under stabilisation scenarios?, and b) different development pathways (eg SRES scenarios)? [SRES now included; but are there no assessments of impact under some stabilisation (or other mitigation) scenarios? NB see Sawart et at GEC 2002: you can infer ppm stabilisation from some of the SRES because the forcing pathways are similar: A1B=750, B1=550,B2=650] 5) suggest conclusions emphasise where the new assessment a) confirms conclusions of TAR; or, b) revises them. [could make clearer how TAR assessment has been revised] 6) Would there be value in presenting updates/revisions (in condensed form) of TAR summary tables such as T 12.1 and 12.2 ? [done in FOD] **(Martin Parry)** Length: The chapter is currently a bit long, needs to be shortened in about 3.6 pages. The balance among the Section is correct. The ES is well organized. The number of Contributing Authors seems about right, can be increased in the future though. The section: Summary of Knowledge assessed in the TAR , is missing, but the text from the introduction can be used to build this sectrion. **(Carla Encinas)**	be able to follow so as to reduce size of chapter to meet our quota of pages. BF: Noted. We need to consider this point, but little material available. BF: Accepted KH: Agree, but will be difficult, especially since many comments request extra info BF: we can ask Reviewers who make substantial points to contribute - they then become Contributing Authors KH: Disagree. The TAR summary is included in 11.1 “Introduction”. A sub-heading 11.1.1 “Summary of knowledge assessed in the TAR”

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							could be inserted to clarify.
11-1	A	0				All the table numbering needs to be re-done (Rod Anderson, Department of Sustainability & Environment)	KH: Done
11-2	A	0				Overall, I believe this is a pretty comprehensive and well written draft.Most of my concerns relate to structure and logical flow rather than content, though I do have a number of specific comments relating to content. I struggled with the flow of the first few sections of the chapter, which I believe is in part due to the prescribed headings but also to the way the authors have put these sections together. Section 11.2.1 opens with a few paragraphs on economic sensitivity to climate and weather and rather than have these as introductory parargrphs it could be better to have them as their own headed section titled "Economic vulnerability". I'm not sure that Section 11.2.1.1 on Climate Trends belongs in this part of the chapter, especially as it it just confined to climate change trends. I think this whole section (11.2.1) would flow better if you had a starting section 11.2.1.1 on Inherent Sensitivity to Climate and Weather and Climate Trends i.e. Australia is over much of the continent hot and dry with extremely variable rainfall, with a more mesic less variable strip around much of the coast, the same brief description for NZ and then briefly describe the temperature and rainfall trends over recent decades. This would then lead better into Section 11.2.1.2 on Economic Sensitivity to Climate and Weather and then Section 11.2.1.3 on Natural Systems Vulnerability to Climate Trends. I'm not sure why only Natural Systems are dealt with in terms of current sensitivities. I would have thought that there have also been some observable changes in say agricultural vulnerability. This also raises a broader issue of Detection and Attribution. I know this is dealt with in another Chapter but I would have thought it may have been worth making the point that in Australia and NZ there are relatively few published studies (largely reflecting little effort to date) on detection and attribution. This could come at the start of Section 11.2.1.3. The table headings did not match the table numbering in the text which made things a little diificult to follow. (Andrew Ash, CSIRO)	KH, JS: Need the brief trends section, but re-order as suggested .Consider moving first para of 11.1 here. KH: Agree. Section 11.2.1.1 Climate variability and 20th century trends (needs preamble about CV, mention attribution), section 11.2.1.2 Natural systems sensitivity to weather and climate (1 extra sentence in preamble), section 11.2.1.3 Economic systems sensitivity to weather and climate (specify agricultural impacts) KH: Agree, all table numbers will be fixed
11-3	A	0				In general I found the review to be well-written and informative. My comments are mainly editorial in nature. 1. In a number of cases it was not clear whether a paragraph referred to Australia, or New Zealand, or both. Sometimes the results for the two countries are mixed within paragraphs, sometimes they are separated. When they are mixed within one paragraph it can be very difficult to work out to which country a particular sentence refers.	KH: Agree, the writing team will clarify

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						2. The references to Figure and Table numbers in the text are completely different than the actual Figure numbers. I have noted this on a few occasions but have not noted every time it occurs. 3. There are numerous references for which the full citation is missing in the reference list. 4. I started out noting that the form of citation such as Chiew; McMahon should be Chiew and McMahon. After a while I realized that it was so prevalent that perhaps that was the intention. (Tom Beer, CSIRO)	KH: Agree, all table numbers have been fixed KH: Agree, references will be updated KH: Noted, but this is the standard format generated by EndNote
11-4	A	0				My general assessement is positive: The chapter covers a large spectrum of topics and it is generally well written. In general I have found the writting quite pessimistic: more emphasis is put on negative issues than on positive ones.Increase in temperature might be beneficial if associated to a conjunct psitive or negative effects on precipation. Although but increase or decrease in precipitaions are predicted the authors tend to select the worst scenario when they discuss possible impacts. (Yves Bergeron, université du québec en Abitibi-Témiscamingue)	JS: We need to reconsider the pitching of our key messages, although I am quite happy with the emphasis. KH: Noted. We have identified both positive and negative impacts, based upon availablew literature. Decreased rainfall and increased potential evaporation is likely in most regions, but we will carefuly check for instances where the possibility of increased rainfall has been ignored. Will recheck for potential opportunities and create a table in the Synthesis (11.4.11) and/or Conclusions (11.7)
11-5	A	0				This chapter represents a comprehensive summary of climate change studies and science. Very little content to add from a land use planning stance as there is still a dearth of information in this area. (Sharon Boyle , Planning Institute of Australia)	KH: Noted
11-6	A	0				Author names. Full names are given for lead authors and review editors but only initials for contributing authors. (Lynda Chambers, Bureau of Meteorology Research Centre)	KH: Noted
11-7	A	0				I am happy with the overall content. (Susan Churchman, Department for Environment and Heritage,South Australia)	KH: Noted
11-8	A	0				Currently there is very limited mention of hail storms as there has been little research published to date on this even though it is the cause of 50% of the 20 highest insurance payouts in Australia. Once again it is worth noting in the report that it is not mentioned due to lack of research available to date but is of considerable importance. Also worth noting that we are hoping a paper by Leslie, Leplastrier and Buckley on hailstorms in Sydney will be submitted to a research journal by the end of 2005 so hopefully this can be included.	KH: Agree, can note the importance of hail and the dearth of climate change impact studies. I have a copy of the paper by Leslie et al (submitted).

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						We recognise that currently there is a lot of grey literature included that is not identifiable within the main passage of text and only by looking at references. We believe this is acceptable due to the lack of available peer-reviewed scientific journals articles on important topics. However we would suggest that the following grey literature may also be of interest - 1. NZ report to Environment Waikato and Thames / Coromandel district council on potential future flooding scenarios under climate change (IAG) 2. Lance M Leslie, DJ Karoly and M Leplastrier 2005 Tropical Cyclone Characteristics in a Future Climate Scenario over the Australian Region: a High Resolution Coupled Ocean Atmosphere Climate Model Study abstract - http://ams.confex.com/ams/26HURR/techprogram/paper_75518.htm Other papers that may be of interest include 1. Impacts of landcover on rainfall trends in Western Australia and 2 severe storms in Sydney Basin (both available from contacting Professor Pitman at Macquarie University) There is a lot of overlap between sections 11.3 and 11.4 (repetition of key facts e.g sensitivity / vulnerability to other stresses repeated elsewhere.) Not sure whether it is possible to avoid due to the interactions of the various headings. However if short of room may be best to try and cover these issues in only one place. Paper currently reads very much like a collection of scientific points. It is not always the easiest to read and does not necessarily emphasise what the key points are and the implications of those points and their limitations. It may be difficult for policymakers and industry to interpret and should be in more simple and straightforward language. Currently paper looks like it has been built up from the research material available rather than mapping out the important issues to Australia & NZ and then filling it in with available research material (in proportion to importance) and pointing out where there are gaps in current understanding. It also in some areas does not indicate the scale of the problem in terms of number of jobs affected, % of Australian gross domestic product, % of agricultural land available. (Tony Coleman, Insurance Australia Group)	JS: Need to acknowledge it's presence, though the work is not peer reviewed – rather an insurance industry report and analysis is not that robust. KH: Noted: 11.3 is about future trends in climate and non-climate drivers while 11.4 is about future impacts on various natural and human systems (without adaptation). This structure is mandated by the IPCC so we have no flexibility to combine this info in one section. KH: Noted. In a scientific assessment, it's difficult to avoid using scientific language, but we aim to minimise jargon. The key points in the Exec Summary perhaps need to be presented with a clearer context of importance. Simpler language for policymakers will be used in the SPM. KH: This has indeed been a bottom-up assessment of the available science, rather than a top-down assessment of the "most important issues". Need to identify gaps in knowledge in each sector of 11.4, and synthesize in 11.8. Need to discuss adaptive capacity & resilience in 11.2.3. Throughout the chapter, we will assess the most important

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							issues for ANZ and gaps in understanding.
11-9	A	0				Table numbers in text and captions don't correspond. (Dean Collins, Bureau of Meteorology)	KH: Agree, all table numbers will be fixed
11-10	A	0				I am a social scientist, not a physical scientist. I believe the only way we will make progress on climate change and sustainability issues is for more dialogue between scientists and society. I commend the authors of this chapter for their success in presenting fairly dense scientific information in a readable fashion. The logic and rationale were easy to follow - well done. (Eva Collins, University of Waikato)	KH: Noted. It seems not all readers found this chapter hard to interpret
11-11	A	0				The chapter is good in that it has focussed on the assessment of new knowledge to build on the previous IPCC Assessment reports, and has paid attention to covering both negative and positive effects of climate change. In some areas though, in terms of being valuable to regional decision making, it suffers from being too broad brush - ie it does make sufficient distinction between the sensitivities and vulnerabilities of systems in different climatic regimes of the region (eg from the tropical monsoon regions reliant on summer rainfall - to the midlatitude winter rainfall regions). This may be because insufficient vulnerability studies have been done to date to provide a satisfactory coverage across Australia and New Zealand. Another significant omission in the conlcusion of the chapter, is that while different SRES scenarios have been used to show the range in possible outcomes by 2030, 2050, 2070 etc, there has been no attempt to show the range in possible outcomes due to the scientific uncertainity and which global climate model and which regional downscaling technique is used. In terms of adaptation, I think there is great potential to build on existing climate risk management approaches - but I dont think these have not been highlighted sufficiently. (Elizabeth CURRAN, Bureau of Meteorology)	KH: Noted. Need to clarify where info was unavailable KH: Noted, but detailed climate change scenario information is available in the Working Group 1 report and in the cited references. The focus of this chapter is impacts, adaptation and vulnerability KH: Noted: Existing adaptation strategies are outlined in 11.2.3 and future adaptation strategies are outlined in 11.5. The links between 11.2.3 and 11.5 will be strengthened.
11-12	A	0				Overall very comprehensive and informative, good coverage and synthesis of recent literature I'm somewhat uncomfortable about repeated listing of SW WAust as particularly vulnerable on the basis of bioclimatic envelope studies of heath spp. They MAY be vulnerable but I understand they have survived considerable past climate changes despite narrow ranges - basically we really do not know they are highly sensitive. I suggest placing less emphasis on sw WA or moderating the description of its vulnerability. This is a concern shared by others including, I believe, some in	LH: agree, we could get rid of this example

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						CALM. (Michael Dunlop, CSIRO)	
11-13	A	0				Throughout the chapter there is the assumption that Australia will dry out in many areas, although suddenly, in places, the text jumps to increase flooding. The discussion of rainfall, evaporative demand, and soil water content is extremely weak. And often wrong I suspect. I urge the authors to examine for example Fig 19 in Efficacy of climate forcings, by Hansen et al., (2005) JOURNAL OF GEOPHYSICAL RESEARCH, VOL. 110, D18104, doi:10.1029/2005JD005776, 2005, and particularly that part due solely to GHG forcing. There only SW Australia is getting less precipitation, and the rest of the country is receiving more rain. The major drying effect in the study is from land clearing. discussion of evaporation is confusing (and wrong) in some places, including unfortunately, even the Working Group 1 draft report. Why is there no discussion of trends in evaporative demand in this chapter? (Graham Farquhar, Australian National University)	KH: Discussion of observed and projected climate trends was limited by space. Nothing we have stated is wrong. Discussion of observed evaporation trends can be inserted in 11.2. Discussion of rainfall and potential evaporation projections could be strengthened in 11.3, but discussion of run-off projections in 11.4 is already strong.
11-14	A	0				Refence to Tables in the text is consistently incorrect. E.g p7,line 10 ref is Table 11.2.1.1 rather than Table 11.1. As this occurs throughout the chapter, I can only assume that this occurred in formatting. (John Garnham, Department of Primary Industries)	KH: Agree, all table numbers will be fixed
11-15	A	0				Overal the information in the chapter is very informative and will be very useful for Government agencies considering future directions in responding to climate change. The authors have done a good job. (John Garnham, Department of Primary Industries)	KH: Noted
11-16	A	0				Formatting for citing of more than one reference is inconsistent. E.g comma, semi-colon and colon have all been used for separating references, brackets are used inconsistently, 'et al' is not consistently italicised. (John Garnham, Department of Primary Industries)	KH: Noted, referencing will be consistent in SOD
11-17	A	0				Table numbering system seems to differ in the text and in the Table legends. (Roger Gifford, CSIRO)	KH: Agree, all table numbers will be fixed
11-18	A	0				Biosecurity, particularly in New Zealand, deserves more emphasis. New Zealand is isolated geographically from the rest of the world, and with increasing world-wide travel (particularly tourism), the likelihood of new pests or diseases being introduced is rising all the time. The likelihood that a new pest or disease will become established is expected to rise with Climate Change. The discovery of Painted Apple Moth in Auckland in 1999 provides an example of the potential cost of control measures. In 2001 MAF conservatively estimated the	JS: A very good point and needs inclusion. Suggest drafting something in. It is unique to both Australia and New Zealand. Jim and Leslie to find relevant supporting literature for a new Box on climate & biosecurity

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						potential cost of this pest (present net value) as $58 million to $356 million over the next twenty years [reference: Painted Apple Moth Teia anartoides (Lepidoptera: Lymantriidae) Eradication Programme Operational Plan, Ministry of Agriculture and Forestry, November 2001. 31 pp.]. In response to this threat, over $52m has been spent on an eradication programme which has included aerial spraying of insecticides over urban Auckland, with consequential controversy over the impact on human health. (Alistair Hall, HortResearch)	
11-19	A	0				Chapters 11 and 13: style and subjects should be more in line and comparable. I tried to compare specific information between chapters and this was not possible. For example, Chapter 13 doesn't mention confidence levels and uncertainty, and Chapter 11 doesn't cover the same statistics. the whole chapter sugests an increase in dry conditions in Australia. Precipitation trends for most of Australia (excluding SW Australia and Tasmania) show a marked increase over the last century (www.grida.no/climate/ipcc_tar) chapter starts affirming that NZ has lost a quarter of glacial mass, yet predicts a likely increase in river flow. Although this is likely as a temporary effect of continued melting, it should be noted that eventually there should be a reduction of river flow. idem for p25 l44. (Stephan Halloy, Instituto de Ecología, Universidad Mayor de San Andrés)	KH: A confusing statement. Compares observed rainfall trends with future rainfall projections, and gets both wrong. In Aus rainfall has increased in the NW and decreased in the south and east since 1950, and the projections indicate more of the same in future. In NZ, the loss of glacier mass is correct and the increase in future river flow is due to increased rainfall in the west not increased glacier melt.
11-20	A	0				General comment: The chapter is shpaing up quite well, although some refinement is needed in a couple of areas (noted below). Ocean acidification has emerged in recent months as a potentially significant effect on, for example, coral reefs and southern ocean food webs. Given the importance of these systems for Australia, some discussion in the chapter seems appropriate. (John Higgins, Australian Greenhouse Office)	LH: it is mentioned in the GBR box but the box has now been extensively revised and specifically mentions ocean acidification
11-21	A	0				A general question: should the dollar values all refer to a particular year , e.g., in 2004 US dollar values? Generally, in terms of some of the NZ data, e.g., p6, line 10 (also line 31), I am very disappointee with time series shown. Surely we can go more recent that 1998? I think this is really important given that there may well be an increasing rate of change? There were a few places in the text that talked about the 1m sea level rise yet in others it was generally lower levels referred to. I think some more consistency is required here. (Ken Hughey, Lincoln University)	KH: Good point, need clarification from TSU. We've assumed 2004 US dollars KH: Noted, Blair will check whether more recent natural disaster data are available. Jim will update temperature trends to 2004/5 KH: Noted, Dick and Nick to check.

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11-22	A	0				General comment: In quite a number of places, virtually certain consequences of climate change are unnecessarily treated as simply possible or probable. An example Page 3, Line 23... "Composition of many natural ecosystems are very likely to alter" - it is inevitable that they will change (if for no other reason that differing CO2 fertilisation rates and already occurred climate changes) have altered the relative competitive advantage of species and also altered the frequency of extreme events (such as fire) which have not yet run there course. Perhaps the authors needs guidance as to the probability level at which language switches from being probabilistic to categorical. General comment: Authors should always define base period against which change is being measured. General comment: Authors should use to look simpler language and words. In numerous places technical words with rather ambiguous and escoteric meanings are used when much simple words are avaliable. Given that the chapter is mult-disciplinary the language should be as simple and precise as it reasonably possible. General comment: The authors have not mentioned the obvious equity and legal liability issues associated with climate change, and the costs of adapting. I appreciate that this is politically sensitive but will become increasingly important as individuals and industries are forced to undergo massive and increasingly costly adaptation as a result of climate changes imposed on them without consent. Some of these issues are discussed in New Scientist, 2519, 2005 (article avaliable at http://www.newscientist.com/channel/opinion/mg18825192.000.html). General comment: The chapter is almost devoid of discussions of the cost and complexity of adapating to a moving climate target. There are two somewhat seperate components to the climate impacts/adaptation issue, being the need to transition to a new base climate (covered well by the chapter) and the need to adapt in the face of a climate which is non-stationary and presenting a continuously moving target. The cost of adaptation will critically depend on the miss-match between typical depreciation/turn over time scales. (David Jones, Australian Bureau of Meteorology)	KH: Disagree, the authors are well aware of the appropriate uncertainty language. In this particular case, we might change “very likely” to “almost certain”. KH: Agree, the base period is almost always 1990. This will be stated up-front in 11.3. KH: Noted. Simpler words will be used where possible, but this is a scientific assessment. Equity and legal liability issues are mentioned in 11.4.7 and 11.5.2. Costs and benefits of adaptation have not been studied, and this is identified as a research priority in 11.8.2. BF: good points here. We would like to do this, but need to find cost-benefit publications that we can quote. Need a clear statement at the start of 11.4 saying there are few reports on costs & benefits of climate change impacts and adaptation, and that hampers planning. Little progress since TAR Will consider approaching CAs with expertise in economics, e.g Caroline Saunders, Tony Coleman, Adolf Stroomberger, Suzie Kerr, ABARE, Rohan Nelson, etc.

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11-23	A	0				general comment on coastal area and coral reefs. In general, many examples for non-climate stresses (in the case of coastal area and coral reefs, artificial construction, over-fishing, nutrient input, increasing (by agriculture) or decreasing (by dams) sediment supply, pollutants.. are shown. I understand these non-climate factors put cumulative stresses to coastal areas and coral reefs. However, the scope of IPCC is not for environmental issues in general, but for global climate change, and the readers want to know how these local stresses act to degrade the coastal area and coral reefs in combination with global environmental changes. (Hajime Kayanne, University of Tokyo)	KH: Disagree. The IPCC has asked us to consider climatic and non-climatic stresses. We have noted that climate change is one of many stresses on coasts and reefs, and that building resilience to all stresses will be an important adaptation strategy. Lesley Hughes to address. LH: GBR Box mentions synergistic stresses
11-24	A	0				A general comment is that the language in the chapter in places is unnecessarily inflammatory: the words collapse, extinction, loss, etc used when tempered language may in fact be more powerful in effect. Clearly some opf these words are unavoidable.However, I detect more extreme adjectives and emotive verbs in this first order draft than struck me in previous IPCC reports, and I wonder if this is a real trend. I worry overall that use of emotive language will facilitate sidelining of the IPCC reports by sceptical policy makers, who will more easily be able to claim that the reports are written by scare-mongers, rather than careful analysts. Just a thought. Following up on my comments on unsupported comments in WG2 Chapter 11 on indigenous peoples and adaptation to change, here are a couple of references that may help in terms of including a better expression of this issue: Kimmerer, R. W. 2002. Weaving Traditional Ecological Knowledge into Biological Education: A Call to Action. Bioscience 52:432. Krupnik, Igor, Dyanna Jolly, and Arctic Studies Center (National Museum of Natural History). 2002. The earth is faster now : indigenous observations of Arctic environment change, Frontiers in polar social science. Fairbanks, Alaska: Arctic Research Consortium of the United States. Snively, Gloria, and John Corsiglia. 1997. Knowing home: NisGa'a traditional knowledge and wisdom improve environmental decision making. Alternatives Journal 23 (3):22. Berkes, Fikret. 1999. Sacred ecology : traditional ecological knowledge and resource management. Philadelphia, PA: Taylor & Francis. (Wendy Lawson, University of Canterbury)	KH: All authors will identify where emotive words occur and consider whether the language can be justified scientifically. DG – yes some of these refs can be used
11-25	A	0				Overall the authors have done a good job in bringing together new and relevant literature in this FOD. I consider that more work needs to be done to "value add" in this assessment. Often, paragraphs are just lists of numbers and/or findings from the literature. I often found the general conclusions to be drawn hard to follow as	KH : This comment has some overlap with the sentiments of 11-8 regarding context and importance. The writing team will consider

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						to what changes (eg from what period) were being referred to. Often there is no context for the numbers eg an absolute change in $ value or change in x Gl of water requirement - there is no indication of how significant these changes might be in relation to, for example, GDP or current water requirements. Given the strong links between high natural rainfall variability, especially across eastern Australia and ENSO events, I think that this needs to be mentioned in more detail. I checked in a few other regional chapters, and they have substantially more emphasis on the role of ENSO. Similarly, with the modulation of ENSO teleconnections by the PDO. A key question (which I don't believe is resolved as yet) for the Australian region, is what will happen to the frequency and/or intensity of the El Nino and La Nina phases of ENSO. Both have significant impacts in the current climate and also modulate the occurrense of tropical cyclones. This also relates to the level of adaptation of natural ecosystems to high levels of natural inter-annual climate variability. I found it hard to clearly identify what can and cannot be said, at present, about projected changes in precipitation with any degree of confidence. This confusion often made it hard to follow discussions of potential impacts as there are mention of increasing drought intensity and/or frequency, increasing floods etc and regional differences. I appreciate that the confidence in projecting precipitation changes is much lower than temperature but I think, somehow, this needs to be made clearer. In some instances it may be better to say that we don't know and that this is a key uncertainty in assessing potential impacts. (Janice Lough, Australian Institute of Marine Science)	ways in which the significance of impacts can be better explained JS: We had done this in more in the ZOD, and, given the strength of the ENSO and IPO/PDO signal in ANZ suggest including ENSO/IPO slightly more BF: Issue here is to find appropriate publications that we can quote. KH: Rainfall and temperature changes in 11.3.1 are expressed as a range rather than a mid-case, median or average. Rainfall could increase or decrease, so it is understandable that this might be interpreted as low confidence in the direction of rainfall change. However, the mean rainfall changes are rarely centred on zero – this is not tabulated, but it should.
11-26	A	0				The authors need to be congratulated on and excellent first draft. This is a very difficult task, given that the wide range of climatic forcing, their interactions and the complexity of the human and biological systems impacted. I worry a little about the rigour applied to drawing some of the connections between forcing factors and effects, and the general lack of any sense of probability ranges associated with some things that are clearly more likely to occur than others. But an excellent first go. I have some concerns that even at a first draft stage, some basic thinking such as consistency and the handling of Standard units could not have been cleared up. I have appended a short list of some of the things to consider before the next draft. General comment: Consistency of use of: Punctuation in references, Smith 2000, or Smith, 2000 Abbreviation in references such as ABS versus, Statistics New Zealand. Why not SNZ to be consistent?	KH: Noted, formatting will be fixed for SOD. Will clarify assumptions behind ranges of uncertainty and lack of info on probability

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						Punctuation between references in a list, period,)(, comma, colon or semi colon Punctuation in headings. See e.g. 11.4.4. Note that there should always be a period after "al." in references. Note that international convention requires a space after numerals and before units, e.g. 550 ppm, or 630 MW. Also 18M ha should be 18 Mha. You may wish to consult with WG1 concerning the abbreviation, ppm. It is more usual to use the convention ppmv, to distinguish between a volume (or mole) mixing ratio and a mass mixing ratio. Where a specific section of the document is referred to, this is a proper noun and should be capitalized, as with Table X and Figure Y. See e.g., Section 11.5.2, second paragraph. Avoid the use of acronyms, particularly where the acronym is use once or a few times without repetition e.g. SOI on p.20. Table captions should be sufficiently explanatory that the Table stands alone. (Greame Pearman, Monash University Sustainability Centre)	
11-27	A	0				I believe it would be useful to add a local government perspective to the contributing author team, at least for New Zealand where most resource and hazard management is carried out by local government. I'd suggest Blair Dickie from Environment Waikato. The local government perspective on adaptation barriers and issues, and lessons learnt, would be extremely useful and valuable addition, especially for readers from outside the region.	JS: Agree – in section 11.2 note that much of the decision-making at regional level is done by local government. Local government representatives were involved in scoping workshops in Christchurch and Canberra in 2005, and some were invited to be Expert Reviewers. Nick to approach ALGA for material in Australia. Mention Australian CMAs' role in regional planning. Dick to approach Gavin Kenny and Blair Dickie.
						I'm missing a little bit a high-level take-home message of what the key pressure points on sustainable development for the regions might be. This of course requires some judgement calls by the authors, and I'm not sure how comfortable you would be highlighting some specific issues (in the executive summary, and in 11.7). As an example (not necessarily a suggestion that I would expect the authors to follow), I would say that "water resources", "extreme events (floods, droughts, storm	KH: Noted, the take home messages will be clarified in the Executive Summary and Conclusions (11.7) by Blair and Kevin.

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						surges)", "biodiversity loss" are the key pressure points that require more attention and planning in the near future. I know that you have to follow the criteria derived from the UNFCCC ultimate objective definition, but a more practical, real-world focus would be useful. This is a very robust and useful first order draft, well done. My only overall criticism would be that I believe too much emphasis is given on impacts without adaptation, and too little space devoted to adaptation (autonomous and proactive/planned). Most interest by stakeholders inside and outside government lies in adaptation issues and options, to which impacts form only one input. In particular an assessment of likely autonomous adaptation appears to be almost entirely absent in this draft - yet unspoken views by people about the degree of autonomous adaptation often influences their perceptions about the actual risks posed by climate change. Impacts in the absence of any adaptation are useful benchmarks, but are not necessarily realistic projections of future conditions under climate change especially for human systems. (Andy Reisinger, Ministry for the Environment)	KH: Agree. Space devoted to impacts with/without adaptation reflects availability of literature rather than relevance for decision-making. The writing team will consider ways in which adaptation can be better presented. BF: Agree with this, especially considering that we argue that ANZ have high adaptive capacity
11-28	A	0				There is some duplication of findings;in that the improvement in understanding from that given in the Introduction 11.1 is not great. It would make easier reading if some statement about the new work's contribution to refining either precision or scale, confirmation or contradiction of previous conclusions were made. I think the climate change projections, particularly for rainfall, are very uncertain. This makes extrapolation of outcomes difficult. (Kim Ritman, Bureau of Rural Sciences)	KH: Linked to comments 11-0, 11-8, 11-25.
11-29	A	0				Need for clearer identification whether statements relate to New Zealand or Australia in some instances. When looking at changes over time always put "to" rather than "-" between the two dates ie 1984-2003 change to 1984 to 2003. Some of the references need to be fully quoted. (Gerald Rys, Ministry of Agriculture and Forestry)	BF: OK, but we try to avoid discussing Aus then NZ in every instance. In many cases the issues are common to both countries.
11-30	A	0				This is an excellent summary of diverse impacts of climate change on Australia and New Zealand. The authors have covered a lot of ground, particularly in the areas of climate, industry, and infrastructure. However, as a limnologist/ecologist, I can't help but feel that the impacts on ecosystems have not been addressed thoroughly enough. This may reflect the real paucity of good ecological studies focusing on climate change issues, but it may also reflect that none of the authors are ecologists, and, therefore, do not have specific expertise in that area. So, my main criticism is that ecosystems and the complex interactions between	KH: Lesley Hughes to address, but we have limited space and need to crop 3.6 pages from the report somehow LH: The ecosystems sections have all been expanded (probably too much, considering space problem). I will shortly send these sections to a couple of NZ ecologists for more feedback

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						climate change, human behaviour, and ecosystem sustainability could have been addressed in more depth. I foresee that environmental managers, planners, science funders, public health officials, and governments will rely heavily upon this report for direction and guidance on climate change issues. Therefore, I would like to see more discussion on ecosystem impacts and their interactions with human behaviour in response to climate change. I will give some examples below of how this could be better achieved. (Marc Schallenberg, University of Otago)	BF: Could invite Marc to make a contribution on this point
11-31	A	0				A very good first draft. (David Shearman, Univeristy of Adelaide)	KH; Noted
11-32	A	0				Given that there is a limited amount of new material since the TAR, the assessment has been well prepared and is clearly written, not withstanding the minor caveats that are needed to protect against critics. (Robert Sutherst, CSIRO)	KH: Noted
11-33	A	0				In general I have some concerns in that the report appears to be too subjective. References are often not used when attributing impacts. There is also a sense of pessimissim throughout, and a feeling of downplaying of anything that does not present the impacts in a bad light. Although i do believe the outcomes are likely to be unfavourable, the current format, and in particular the places where it almost reads like it is lecturing rather than making objective statements, could see it critisised by some commentators. The comments about "disadvantaged people" and particularly Maori populations were condescending. This chapter could undergo considerable shortening. Terms such as "likely etc used in this chapter. Are they formal terms, ie defined as 60-90% likilhood of occurance. Sometimes the term "likely", "very likely" etc are used somwhat haphazardly (Andrew Watkins, Australian Bureau of Meteorology)	KH: See comment 11-4 BF: We have carefully reviewed our language with respect to these points. The Maori issue is particularly sensitive. See the new section on Indigenous Issues in 11.4.7
11-34	A	0				In Ch 11 I mainly concentrated on text relating to New Zealand.Overall this chapter is satisfactory, relevant recent papers are referenced etc. I have one very specific comment on two lines in the Executive Summary. (John Robert Waugh, Opus International Consultants Ltd.)	KH: Noted
11-35	A	0				In general there is room for a clearer link between global and regional climate change phenomena and associated threats (i.e. at least a statement acknowledging this). This is particularly relevant to feedbacks in the global climate system that several models signal as policy-relevant vulnerability data (e.g. warming induced forest fires in El Nino years, methane emissions from permafrost and seabed	KH: Disagree, this is WG1 material.

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						deposits, potential shifts in convergence zones, and threats associated with changes in North Atlantic Deep Water formation and its linkages with regional and global abrupt changes). There is also room for signalling the need to integrate an analysis of climate change vulnerability and impact with other related phenomena such as energy cost increases (e.g. oil and natural gas prices) that, together with climate change impacts, present a significant suit of challenges to the global and therefore regional economy. (Sean Weaver, Victoria University of Wellington)	KH: Disagree, we can't speculate about energy cost increases beyond incremental inflation
11-36	A	0				The balance of this chapter is significantly improved over the previous draft, including between the two countries and between the various sectors. Most of what is included below now are simply suggestions. (David White, ASIT Consulting)	KH: Noted
11-37	A	0				The topics covered are comprehensive. However, there is a wide variation in quantitative detail. Many of the comments on likely effects are backed up by quantitative assessment of probability or uncertainty, but many others are poorly defined. It wouild be much more helpful if comments on likelihood of impacts were consistent across the chapter. Care is needed to ensure that all abbreviations are explained when they are first used. At present many abbreviations for organsiations and documents are not defined. (David Whitehead, Landcare Research)	KH: the IPCC definitions of likelihood and confidence are used consistently within the chapter, although confidence statements are rarely made. KH: Noted, abbreviations will be checked
11-38	A	0				I wondered whether the comments throughout the chapter on sea level rise need to be reviewed on the basis of the very recent publications on the topic of accelerating ice-cap melt and the flow on impacts to more rapid sea level rise. I am not an expert on this topic but it seems that there has been quite a bit of very new evidence that suggest that the sea level rise might be much more significant than the estimate contained in this chapter. The Wet Tropics World Heritage area is identified as a high vulnerability ecosystem wit hthe potential for many extinctions etc. This is obviously my personal area of research and wish to bring to the authors notice a couple of papers that have come from my group recently. These papers demonstrate that population sizes will decline even faster than the original distribution models suggested and show how the declines can be related to commonly used vulnerability assessment schemes like the IUCN. The analyses also have important implications for monitoring the impacts of climate change shifts in populations. I have included the references below.	KH: Agree, need consistency between WG1 and WG2 estimates of sea level rise. Dick Warrick to check LH: some of these references have now been incorporated in Table 11.4

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						Shoo L.P., Williams S.E. & Hero J-M. 2005. Decoupling of trends in distribution area and population size of species' with climate change. Global Change Biology 11: 1469-1476. Shoo L.P., Williams S.E & Hero J-M. 2005. Climate change and the rainforest birds of the Australian Wet Tropics: using total population size as a sensitive predictor of the impacts of increasing temperature. Biological Conservation 125: 335-343. Shoo L.P., Williams S.E. & Hero J-M. in press. Detecting climate change induced range shifts: where and how should we be looking? Austral Ecology (Stephen E Williams, James Cook University)	
11-39	A	0				Chapter 11: A general observation from a policy perspective. One of the lingering communication challenges is that many non-scientists struggle to understand why apparently small temperature increase can have large effects. I recommended a para somewhere explicitly explaining the significance of 'average' temperature' - perhaps relating degrees of temp to degrees of latitude or m or altitude for example. (Oliver Woldring, NSW Government)	KH: Agree. Will insert a comment about small changes in average temp having a large impact on extreme temperature in 11.3
11-40	A	0				Chapter 11 is progressing well but currently has the feel of jumping from one summary of recent research to the next. Linking sentences are needed to fill the gaps and to tell more of a "story" by discussing in more detail what isn't known and where further research is required. Chapter 11: Regarding the use of confidence descriptors in parentheses eg "(very high confidence)". Even if these are used throughout the AR4 report perhaps these should be defined in each chapter since many will be read on there own. Also, in the current draft they are used extensively in the exec summary but I think only once in the body of the text (page 22 line21). (Oliver Woldring, NSW Government)	KH: Unfortunately, the IPCC-prescribed structure and page-limits don't allow us to tell a flowing story. BF: Suggest we review writing style of N American chapter for guidance as to how we can better do this. We are constrained by the proscribed IPCC template, however. KH: see comment 11-37
11-41	A	0				You have asked me (as one of the reviewers of the ZOD) to first comment on the progress made since the ZOD, and the extent to which my comments on the ZOD were taken on board. I have done this in my first few comments below. Progress made since the ZOD: The FOD is a substantial improvement over the ZOD. Many of the sections wich were to long have been shortened and tightened up, gaps have been addressed, and a substantial effort has been made to address the uncertainty /degree of confidence of many statements (following the Uncertainy Guidance Paper) Extent to which my comments on the ZOD have been taken up: Mixed - but this is in part because some of the issues I raised have little or no literature available for assessment. I've made some more specific comments about this at the end of the	KH: Noted

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						spreadsheet. (David Wratt, NIWA)	
11-42	A	0				More about the extent to which my comments on the ZOD have been taken up: see the next 7 items. ZOD comment takeup - Abrupt changes or high impact / low probablity events: Still very little coverage (only lines 35-37, page 36). Important enough to get more attention in the report provided there is literature to quote. ZOD comment takeup - Impacts beyond 2100, including impacts under stabilization scenarios: Apart from one place (line 32 of page 36) the time horizon considered in the report still seems to end around 2100. But climate will not stop changing then. ZOD comment takeup - Impacts / adaptation for indigenous people. Material has been added since the ZOD, but as I comment specifically (for Page 23) there are almost no references given to support the added material. ZOD comment takeup - Outlying tropical, mid latitude and sub-Antarctic Islands: This draft now includes material on sub-Antarctic islands (Macquarrie, Campbell) in various places - But what about islands further north e.g. Chathams, Norfolk Island, Raoul Island, … Brett Mullan has done an impacts report for MFE on the Chatham Islands which I think is public domain - you may like to contact him to request a copy. ZOD comment takeup - Deep ocean & coastal shelves: Still not much information in the FOD - perhaps due to lack of literature? If so, pick up in uncertainties listed on Page 36 ? ZOD comment takeup - Replace categorical statements with statements indicating levels of confidence: Substantial improvements have been made in the FOD ZOD comment takeup - Consistency with WGI: Appears to have been addressed. ZOD comment takeup - Australia / NZ balance (in ZOD some sections contained largely New Zealand information, others were largely about Australia): This is much improved in the FOD. (David Wratt, NIWA)	KH: Agree. Writing team will seek further literature about abrupt changes and beyond 2100 DG: Yes will hope to have 3 or 4 new refs to back this section up by April KH: Report on Maori by Darren King will address this issue. JS: Important point and see if we can address. I will bring the Chatham Islands report for inclusion. KH: Agree. Literature is lacking NH: will note in section 11.8 KH: Noted
11-43	A	0				None of the table references in the text match the table captions, please revise all. The reference list seems like work in progress; there are SEVERAL reference lists that are not completed yet, only the author and the year of publication is listed. The chapter is well written, it seems to adhere to the page limitation (25 pages), it also complies with the reduced title headings as specified in the guidance notes. I can not identify any major gaps that should be included in this chapter. (Peyman Zawar-Reza, University of Canterbury)	KH: Noted

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11-44	A	1	34	1	35	Formating (alignment) needs to be fixed (Julia Becker, Institute of Geological and Nuclear Sciences)	KH: Don't understand what alignment problems exist
11-45	A	1	46	1	47	Would suggest adaptation also involves 'considered land-use planning' (Julia Becker, Institute of Geological and Nuclear Sciences)	KH: Noted.
11-46	A	2	3	3	10	Terms such as "about" - is there a definition of this? (Andrew Watkins, Australian Bureau of Meteorology)	KH: Agree: the word "about" can be deleted
11-47	A	3	0			Exec Summary…… Suggestion that adaptation to these climate changes may be achievable may be far-fetched – this needs more substantiation to qualify for inclusion here. Potential benefits : appeared to be overly biased towards New Zealand and Tasmania. (Roger Stone, Department of Natural Resources)	BF: There are sound arguments as to why adaptive capacity is high for ANZ, which we make in the text. Perhaps need to strengthen these. JS: Agree – need to be more balanced for New Zealand and Tasmania.
11-48	A	3	0			In the Executive Summary the terms 'very high confidence' or 'medium confidence' are used several times. But how are these defined - some quantitative estimate of the degree of confidence is needed (David Whitehead, Landcare Research)	KH: These definitions will appear in the Introduction of the WG2 SPM, TS and full report. No point duplicating them for every chapter, but will be a cross-reference to the location of the definitions
11-49	A	3	1	4	23	This section may benefit from including a summary of projected impacts on human health. (Steven Crimp, Queensland Department of Natural Resources and Mines)	JS: Agree – and will draft words in preparation of the SOD KH: Health impacts should be enhanced, e.g. include heat/storm-related deaths and injuries
11-50	A	3	1			Claim on fewer frosts. On page 6 line 40, supporting references are provided for NZ but not for Australia. It is clear that fewer frosts are part of the projections and associated with the measured change in minimum temperatures, however across southern grain belt there have been significant and damaging frosts in recent years, hence this comment will be carefully read. (Peter Hayman, South Australian Research and Development Institute)	KH: Agree, a comment on frosts trends in Aus will be included on page 6
11-51	A	3	1			Section: Executive Summary: There is no mention of increased bushfire risk (other than line 45 and there in regard to major cities only). Also human health impacts are hidden in the critical infrastructure paragraph. Also non-critical infrastructure is missed - eg hail/storm damage (Oliver Woldring, NSW Government)	JS: See Steven Crimp comment KH: Need to include fire & more health impacts in the TAR summary (lines 14-18)
11-52	A	3	3	3	6	Does "very high confidence" apply to sea-level rise only or all changes mentioned?	KH: Applies to whole sentence

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						(Dean Collins, Bureau of Meteorology)	
11-53	A	3	3	3	5	NZ glaciers have actually gained mass since the early 1980s, following a precipitation increase in the late 1970s now associated with the IPO. The glaciers have indeed suffered a net loss of mass since 1950, but you can hardly claim this trend "has become clearer" since the TAR. [REPEAT OF FIRST LINE WHICH SEEMS TO HAVE A PROBLEM] (A. Brett Mullan, National Institute of Water & Atmospheric Research Ltd)	JS: Need to change wording to clarify period of 25% glacier ice mass loss BF: Need to distinguish between mass balance and mass loss. Not the same.
11-54	A	3	3	3	5	NZ glaciers have actually gained mass since the early 1980s, following a precipitation increase in the late 1970s now associated with the IPO. The glaciers have indeed suffered a net loss of mass since 1950, but you can hardly claim this trend "has become clearer" since the TAR. (A. Brett Mullan, National Institute of Water & Atmospheric Research Ltd)	KH: ditto
11-55	A	3	3			Change 'clearer' to 'more certain' (Gerald Rys, Ministry of Agriculture and Forestry)	KH: Writing team will consider wording
11-56	A	3	3	3	3	unequivocal should read "widespread". (Andrew Watkins, Australian Bureau of Meteorology)	KH: Agree
11-57	A	3	4	3	4	How are the changes in rainfall in Australia evidence for climate change becoming clearer. The Bureau of Meteorology describes the variations since 1950 as interdecadal variation. (Graham Farquhar, Australian National University)	KH: Disagree. The Bureau of Met (Nicholls and Collins in press) says "Liepert et al (2004) found rainfall changes in climate models simulations forced with anthropogenic factors that closely resemble the patterns observed over Australia since 1950, namely decreases in the southern fringes of the continent and increased precipitation in the north".
11-58	A	3	5	3	5	What is the evidence that there has been any increased in the intensity of Australian droughts? (Graham Farquhar, Australian National University)	KH: See Nicholls (2004: The changing nature of Australian droughts, Climatic Change, 63, 323-336).This is cited on page 6 line 46.
11-59	A	3	6	3	14	need consistency in units for SL rise. Personally I favour mm in this context, as used in hardware shops. (Barrie Pittock, CSIRO)	BF: Suggest we get TSU guidance on units. KH: We must use SI units
11-60	A	3	7	3	8	Could add insurance sector. (Dean Collins, Bureau of Meteorology)	BF: OK. KH: Writing team will seek advice from Tony Coleman (IAG)
11-61	A	3	7			"… commenced, although far from complete, in such …" (Barrie Pittock, CSIRO)	BF: OK. KH: noted, but "commenced" is sufficient – it doesn't imply that adaptation is complete
11-62	A	3	10	3	14	Need to clearly identify the baseline for these changes. Are they increases from now or 1950 or 1990	BF: OK. KH: Agree, changes are relative to 1990

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						(Rod Anderson, Department of Sustainability & Environment)	
11-63	A	3	10	3	11	This sentence contains two measures of uncertainty. Very likely indicates >90% probability, while high confidence indicates about 8 out of 10 chance. The authors should choose the measure they mean. (Lenny Bernstein, IPIECA)	BF:KH: Noted. Confidence and likelihood are two distinct metrics. This is explained in the IPCC Uncertainty Guidance material, which will be in the Introduction of the WG2 report.
11-64	A	3	10	3	13	The basis for the finding that temperature rise in 2050 will be greater in inland Australia is unclear. Table 11.5 splits Australia into north and south, but neither the table nor the text split the country into coastal and inland regions. The basis for including New Zealand in a conclusion that temperature will rise by 1-3 C by 2050 is unclear. The only temperature projections for New Zealand are in Table 11.6, which shows the bottom end of the range for temperature projections as 0.2-0.5 C in the 2080s. The basis for the finding that by 2050 large areas of mainland Australia and eastern New Zealand are likely to become substantially drier is also unclear. Except for North Australia, the data in Table 11.5 tend to distribute around zero. The text presents a different set of data for 2030 and 2070, some, but not all, of which indicates drier conditions. The authors need to explain how they reached these conclusions and the basis for their assignment of confidence levels (Lenny Bernstein, IPIECA)	KH: Agree: The writing team will clarify the scenarios presented in 11.3. Table 11.5 has been deleted and will be replaced by a Table for Australia that distinguished inland from coastal changes.
11-65	A	3	10	3	13	Pg. 4, lines 40-43, discuss the possibility of a shift to more El Nino-like conditions, which would lead to drier conditions in most of Australia. However, since the shift to more El Nino-like conditions is considered only a possibility, it seems inconsistent to assign >66% probability to its impact. The authors need to explain how they reached this conclusion, and the basis for their assignment of confidence levels. (Lenny Bernstein, IPIECA)	BF: need to address this issue KH: Noted. This is a summary of conclusions from the TAR, which found "possible changes toward a more El Nino-like mean state". The word "possible" has no formal probability. In the AR4, WG1 says that there is a tendency toward more El Ninos in models that simulate ENSO well under current climate conditions, but there is still wide variation on potential change in ENSO between the full range of models, i.e. not much progress since the TAR
11-66	A	3	10	3	11	1-3degC warming relative to when? (Dean Collins, Bureau of Meteorology)	BF: need to address this issue KH: Noted, see comment 11-62
11-67	A	3	10	3	14	The title of this paragraph is at odds with the content, as no reference has been made to observed climate trends. Some linkage between observational trends and projections needs to be made in the discussion. (Steven Crimp, Queensland Department of Natural Resources and Mines)	KH: Recent trends are described in the preceding paragraph. Perhaps change the title of this paragraph to "These recent climate trends are likely to continue"
11-68	A	3	10			The authors need to be careful about over emphasising rainfall declines for Australia. While it is true that most models and associated publications favour a	KH: Disagree. The rainfall scenarios on page 11 indicate decreases of up to 20% by 2030

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						drier future climate, the changes predicted are rather small typically around -5% from 1971-1990 to time of doubling of CO2. (David Jones, Australian Bureau of Meteorology)	and 60% by 2070.
11-69	A	3	10			Authors need to be clear what "recent trends" are likely to continue (start of paragraph) - ie the warming trend. (David Jones, Australian Bureau of Meteorology)	BF:KH: Noted. May need to address/change the title of this issue/paragraph. See comment 11-67
11-70	A	3	10		13	The context and timing of western NZ becoming 40% wetter by 2050 is not very clear. The research this relates to (Wratt et al 2004) shows that by the "2030s" (2020-2049) – ie, a period which ends by 2050 – the western South Island rainfall increase of about 40% is only for the winter season (annually the increase is a more modest 14%). By the 2080s (2070-2099), ending by 1200, the 40% increase applies to annual change. Hence the paragraph as currently stated gives the impression of a more extreme increase than the underlying research suggests. (A. Brett Mullan, National Institute of Water & Atmospheric Research Ltd)	JS: Reword from "up to 40%" to "wetter".
11-71	A	3	10	3	14	Im somwhat concerned that we have the data to say clearly that Australia is likely to become considerably drier. My understanding was that, at the very least, NW Australia may in fact be wetter (Andrew Watkins, Australian Bureau of Meteorology)	KH: Need to clarify that this statement refers to the combined effect of changes in rainfall AND potential evaporation
11-72	A	3	10	3	14	This para seems overly qualified - perhaps just say "By 2050…." Also the use of the phrase "even more inland" seems emotive. (Oliver Woldring, NSW Government)	KH: Agree
11-73	A	3	10	3	11	"By about 2050, the entire region is likely to warm by 1-3°C". This conflicts with Table 11.6 which suggests that parts of NZ might rise in temperature by only a few tenths of a degree by 2030. (David Wratt, NIWA)	JS: Change to 0.5-3.0 C BF: Need to better relate Table to other scenario results for ANZ
11-74	A	3	11	3	12	"Large areas of mainland Australia…to become substantially drier" does not match data presented in Table 11.5 nor the CSIRO (2001) scenarios. Latter, for example, concludes that annual rainfall will decrease in SW & parts of SE Queensland but eastern and tropical north Australia show no clear changes from current conditions, though there are seasonal differences. This needs to be clarified, highlighting the range of projections against a background of high natural rainfall variability for much of Australia. (Janice Lough, Australian Institute of Marine Science)	KH: Noted. See comment 11-64
11-75	A	3	12	3	13	Medium (or low) confidence should be included at the end of the sentence on rainfall projections (Andrew Ash, CSIRO)	KH: Need a to address confidence in regional rainfall projections separately, through consultation with WG1 LAs
11-76	A	3	12	3	12	I think there is little evidence that large areas of mainland Australia are likely to	KH: Noted. See comment 11-64 & 11-75

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						become substantially drier. In the Hansen et al (2005) study in note 1 above, the effects of GHGs in Australia are for increase in rainfall. It may not be the case, but the chapter says far too little about the uncertainty about rainfall predictions, and how it must be a scientific priority to reduce that uncertainty. (Graham Farquhar, Australian National University)	
11-77	A	3	12	3	13	"… western New Zealand is likely to become up to 40% wetter". Again this appears to conflict with Table 11.6, in which 40% is the extreme upper end of the range quoted for the South Island West Coast in the 2080s. So one would expect the number to be less "by about 2050". Also, I think that quoting just the extreme upper end of a range is potentially misleading and leaves the chapter authors open to the charge of being alarmist - it would be better to quote a range, ie "the western South Island of New Zealand is likely to become x to y% wetter by the 2050s". (David Wratt, NIWA)	JS: Change. See 11-70
11-78	A	3	13	3	14	you should also mention here large regional variability. As written one will conclude all of theses will ocuur everywhere (Yves Bergeron, université du québec en Abitibi-Témiscamingue)	KH: Noted
11-79	A	3	14	3	14	It would help if the Executive Summary were more specific with respect to sea level rise. While the issue will be discussed at greater length below, I would suggest that this last sentence be replaced with the following; "Relative sea-level rise is likely to fall within the limits of 0.06-0.36 m, where the lower limit is well defined and the upper limit is more speculative." (John Hannah, University of Otago)	KH: Dick Warrick to cross-check with WG1 and recompute data in CLIMPACTS
11-80	A	3	14			The authors' use of "confidence" levels in brackets is inconsistent through the chapter (David Jones, Australian Bureau of Meteorology)	BF: need to address this issue KH: Disagree. The Uncertainty Guidelines clearly define likelihood and confidence language, and we have applied these definitions consistently. However, we have not used confidence statements much beyond the Executive Summary.
11-81	A	3	14	3	40	Line 14 states that the authors have only a "medium confidence" that the frequencies of major floods [etc] are likely to rise, but line 40 states that there is "very high confidence" that the EFFECTS of these activities will cause social and economic trauma, etc. The idea of a "confidence level" rather than a spurious probability figure is good and I strongly support it, but there needs to be a rationalisation of the levels of confidence shown here. (Piers Maclaren, Private)	BF: need to address this issue, but the probability of an event and its impacts should it occur can well be different. KH: Agree, suggest revising line 40 to “high confidence”.
11-82	A	3	16	3	21	The first sentence seems to say that up to 2050, the beneficial effects of CO2	JS: Consider

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						fertilisation, extended growing season and reduced frost risk for agriculture will outweigh the risks from changes in drought risk, floods, biosecurity risks and enhanced pest survival rates. I am doubtful we can make such an overall judgement of the impacts of climate change on agriculture at this stage. If this is not what the authors intend to say, it might be better to say "Some aspects of climate change will have beneficial effects on particular sub-regions or sectors". On the other hand, if the authors do think this judgement is justified, it needs to be backed up by more than what is currently in the actual text of the chapter. (Andy Reisinger, Ministry for the Environment)	BF: need to address this issue KH: we don't wish to imply that the benefits will outweigh the risks up to 2050 for agriculture, horticulture and forestry in NZ and Tas. It is fair to say that "Some aspects of climate change will have beneficial effects on particular sub-regions or sectors". This change will be made.
11-83	A	3	16	3	21	Elsewhere there are comments about the potential from some crop expansion in area. Probably shold expand this paragraph in general (Andrew Watkins, Australian Bureau of Meteorology)	KH: Agree, if space permits, specific examples of potential crop expansion will be inserted
11-84	A	3	16	3	21	Paragraph refers exclusively to New Zealand and Tasmania. In this case I suggest that you add "No potential benefits over most of mainland Australia." (David White, ASIT Consulting)	BF: OK KH: Disagree. The sentence about reduced winter energy demand refers to all cities in ANZ. Perhaps this needs to be made clearer
11-85	A	3	16	3	18	An important qualification for the projected enhanced growing conditions etc is the presence of adequate water - which is by no means certain for eastern New Zealand. I suggest the statement should be qualified, ie "Up to about 2050, IN AREAS WHERE ADEQUATE WATER WATER IS AVAILABLE, enhanced growing conditions ..." (David Wratt, NIWA)	BF: OK KH: Agree, this change will be made
11-86	A	3	17	3	18	The general term agriculture is used, but then horticulture is then immediately used. Should the sentence read "…are likely generally for agriculture, and in particular horticulture and forestry…". Alternately, should the term agriculture be more specific - i.e. broad acre agriculture? The comment is restricted to New Zealand and Tasmania, but the observation could include south eastern Australia generally. (John Garnham, Department of Primary Industries)	KH: Mark Howden and Jim Salinger to address
11-87	A	3	17			The reference to "enhanced" growing conditions as it sits in the executive summary needs qualification that sits in the synthesis part of the chapter other wise it will be taken out of context. Enhanced growing conistions may well be cancelled out by other impacts. All influences on growing conditions need to be weighed up. (Judy Lawrence, PSConsulting)	KH: Mark Howden and Jim Salinger to address
11-88	A	3	17			Does longer growing seasons really refer to warmer temperatures for longer periods in the year? (David Whitehead, Landcare Research)	KH: Mark Howden and Jim Salinger to address
11-89	A	3	18	3	19	Does the reduced energy demand in cities refer only to New Zealand and	KH: See comment 11-84

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						Tasmania, right across Australia or southern Australia? It is not clar as this sentence follows on immediately form a reference to New Zealand and Tasmania only. (John Garnham, Department of Primary Industries)	
11-90	A	3	19			There is no mention in the executive summary of increased summer demand in electricity due to airconditioners to counterbalance decrease in winter electricity consumption comment. This will have significant impact on future greenhouse gases as well as electricity infrastructure adaptation. (Tony Coleman, Insurance Australia Group)	KH: Disagree. Higher peak energy demand is stated in line 45.
11-91	A	3	19			Currently executive summary does not necessarily capture full essence of report. There is no mention that the current conclusions are based on available literature and may change if all material hazards for a particular region were studied. It could also be interpreted as saying that mitigation is not needed before 2050 and that only adaption is needed until 2050 - this also assumes we are implementing adaptation strategies when we are not currently and may not be able to in all circumstances - either way it has a considerable cost e.g. reduced water available for electricity plants and industry. Will this executive summary help government and industry understand the full range of vulnerabilities and what needs to be done to reduce them? (Tony Coleman, Insurance Australia Group)	BF: Need to address this issue, as it is important. Perhaps add an additional para where the roles of adaptation and mitigation are evaluated as discussed at Merida. KH: Noted. Conclusions are based on available literature, and that the conclusions may change with more literature – this is why the IPCC assessments are revisited every 5-6 years. The paragraph on potential benefits in particular sub-regions and sectors up to 2050 is followed by other paragraphs on potential risks up to 2050, adaptive capacity and barriers to adaptation. We are not required to say anything about mitigation in this chapter, but our readers need to be reminded in the Executive Summary of the basic need to undertake both adaptation and mitigation immediately to manage the risks of climate change. This may be a bit policy-prescriptive, but it can be justified on scientific grounds. We'd love to provide more guidance on adaptation solutions but there's not much literature to support this. Perhaps the Executive Summary needs a concluding paragraph on uncertainties and risk management.
11-92	A	3	19			Make clear that winter energy demand decline is relative. (David Jones, Australian Bureau of Meteorology)	KH: Presumably relative to the increase in summer demand. See comment 11-90

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11-93	A	3	23	3	24	Has there been sufficient vulnerability studies to conclude that we know all of the places which are vulnerable? Could this section commence with ' The most vulnerable areas currently identified for a 1oC warming include… (Elizabeth CURRAN, Bureau of Meteorology)	KH: Agree, can insert "currently identified".
11-94	A	3	23	3	28	this section should also mention changes in fire risk (Andy Reisinger, Ministry for the Environment)	JS: Agree and include
11-95	A	3	24	3	24	Suggest starting the sentence with...."In the event of a 1C rise in average the temp, the most vulnerable areas would be.." (Oliver Woldring, NSW Government)	KH: Disagree, too wordy & no obvious advantage
11-96	A	3	25	3	26	I am uneasy with the report stating that "adaptation options are very likely to be limited". Although much work has been conducted in the area of adaptive capabilites for ecosystems, large unknowns remain for a variety of different ecosystems (for example, coral reefs) and I think "very likely" is too strong for what the science tells us. I would recommend deleting the word "very". (Ben McNeil, University of New South Wales)	LH: sentence deleted from SOD so not applicable
11-97	A	3	26			delete 'very likely to be' Under natural ecosystems, adaptation options will be limited. As soon as it is modified by man it is not a natural ecosystem. (Gerald Rys, Ministry of Agriculture and Forestry)	LH: not sure what this reviewer means here
11-98	A	3	26	3	28	"Virtually certain" seems incompatible with "(medium confidence)". (Oliver Woldring, NSW Government)	KH: Agree, will change to highly likely.
11-99	A	3	27	3	27	One of the most important stresses facing natural ecosystems remains invasive/incursive species. This has not been included in the list of existing stresses. (Steven Crimp, Queensland Department of Natural Resources and Mines)	JS, LH: Agree, invasive species now included in list
11-100	A	3	29			Insert line to commence new paragraph (Andrew Ash, CSIRO)	KH: Agree
11-101	A	3	29	3	33	No comment on water security problems for urban population and concentration of reliance in Sydney ie 80% of water comes from one major dam (Tony Coleman, Insurance Australia Group)	KH: Agree, good point. BB: Agree – should add.
11-102	A	3	29	3	29	"Projections of drier conditions" are not supported. (Graham Farquhar, Australian National University)	KH: Disagree. The net effect of projected changes in rainfall and increases in potential evaporation lead to drier conditions.
11-103	A	3	29			What is meant by 'water security problems'? This needs to be explained more carefully (David Whitehead, Landcare Research)	KH: Agree. For the layperson, we mean security of water supply. Perhaps replace with "water availability" BB: Agree – reword
11-104	A	3	30	3	30	"large areas" shoud possibly be changed to "heavily populated areas".	KH: Noted

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						(Andrew Watkins, Australian Bureau of Meteorology)	
11-105	A	3	30	3	30	water demand and competition [insert "combined with higher evaporation rates"] are very likely to adversely … (David White, ASIT Consulting)	BB: Disagree – projected drier conditions already noted.
11-106	A	3	32			Add "… adaptation at some expense, but …" (Barrie Pittock, CSIRO)	KH: Noted
11-107	A	3	35			For Australia the % of people living within 50km of the coast is 85% (ABS Census data 2001). Does the figure reduce to 80% with the inclusion of NZ? (Andrew Ash, CSIRO)	BF: change to "more than" KH: Blair, do we have a reference for the NZ pop'n within 50 km of the coast?
11-108	A	3	35	3	41	Throughout (e.g. page 3, lines 35-41) there are mentions of coastal vulnerability in terms of settlement, infrastructure etc but there is little to no mention of the impact on coastal ecosystems / species. These are likely to be highly vulnerable, not only to climate change and associated sea-level rise, but also to increased stressors, such as competing land-use (e.g. human settlement). (Lynda Chambers, Bureau of Meteorology Research Centre)	LH: agree, but there is very limited information. Coastal and estuarine impacts included in 11.4.1
11-109	A	3	35	3	36	Does statement refer to Aust, NZ or both? (Dean Collins, Bureau of Meteorology)	KH: Both
11-110	A	3	35			The use of the word "highly" seems a bit extreme if read in the broader context of islands being submerged in other geographic areas eg Pacific Islands. "Very" would be better in the Australian context as it is one of the greater Australian vulnerabilities. Alternatively the issue could be said to be "highly" in tropical areas where population numbers are smaller but ecological damage will be larger, and "very" in subtropical areas where the large population numbers reside. (Richard HOY, Energy Supply Association of Australia)	KH: delete "highly"
11-111	A	3	35	3	36	80% may well live within 50km of the coast, but in New Zealand and Australia many parts of major cities are well above sea level. Thus the 80% is misleading as indicator of population at risk. (Adolf Stroombergen, Infometrics)	JS: Important point BF, KH: Still critical for cyclones and knock-on effects to urban areas if important infrastructure is flooded
11-112	A	3	35	3	41	This para can be shortened and shold be made far more objective. Sentences such as "There are considerable barriers to implementation of adaptation strategies" should be dropped. (Andrew Watkins, Australian Bureau of Meteorology)	KH: Noted, but we want to make some statement about adaptation for each sector. Tony Coleman is now a Contributing Author, so he could help with this statement
11-113	A	3	35	3	35	The term "about" makes this sound unconvincing. (Andrew Watkins, Australian Bureau of Meteorology)	See comment 11-107
11-114	A	3	35	3	36	80% within 50Km of the coast doesn't seem like a useful statistic - can we find the percentage of people that live less than say 2m above current storm surge zones? (Value of property within that zone make interesting reading too). Seems like a	BF: See above KH: We can only cite published literature. The IPCC doesn't do research

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						straightforward GIS task. (Oliver Woldring, NSW Government)	
11-115	A	3	35	3	41	I suggest the executive summary includes a reference to population trends: in both countries the numbers of people living in coastal settlements is expected to rise at a greater rate than the population growth overall. Moreover these settlements will include a much higher proportion of older people, not just due to the ageing of the national populations, but also to patterns of internal migration. (Alistair Woodward, University of Auckland)	JS: Noted – see 11-49
11-116	A	3	36	33	36	Concept of coastal infrastructure missed in this sentence beginning, "Ongoing coastal…" should read "Ongoing coastal development is likey to exacertabate risk to lives, property and infrastructure systems from ….. (Sharon Boyle , Planning Institute of Australia)	KH: Agree
11-117	A	3	36	3	37	Remove the sentence starting "Ongoing coastal development…" as I would suspect future development would be beter than past development and actualy prtect people better from changes. Either way, it is too subjective. (Andrew Watkins, Australian Bureau of Meteorology)	KH: Noted, perhaps need to qualify the statement by saying "Unless revised planning guidelines and building codes are enforced, ongoing …."
11-118	A	3	37	3	37	insert "tropical" before "cyclones" (Janice Lough, Australian Institute of Marine Science)	KH: Agree
11-119	A	3	40			Currently stated there is high confidence on higher insurance costs. However although this may be true due to cyclone risk currently other risks like storm surge, and erosion are not always covered by insurance (Tony Coleman, Insurance Australia Group)	KH: Noted
11-120	A	3	40	3	47	Conflicting statements: On line 40, higher insurance costs are given a very high confidence while on line 47, price of insurance which is a direct measure of insurance costs are given medium confidence. (Tony Coleman, Insurance Australia Group)	KH: Noted
11-121	A	3	40			After "higher insurance costs" you need to add " or risk of no insurance being available" This would make the exec summary consistent with the text further on. Needs to be remembered that some readers will only read the exec summary so important qualifications need to be there as well as in the text (Judy Lawrence, PSConsulting)	BF: Need to resolve this and above comments by careful rewording of text
11-122	A	3	41	3	41	The type of barriers to adaptation should be qualified as they are in the body of the Chapter. Insert "conceptual and financial" immediately in front of barriers. (Sharon Boyle , Planning Institute of Australia)	KH: Agree
11-123	A	3	41	3	41	it would be very helpful for people who only read the executive summary to give some hint of what types of barriers to adaptation are most important (information, institutional priorities, mandates, public/private conflicts, whatever), and the extent	BF: Need to resolve this and above comments by careful rewording of text

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						and degree of barriers - do the barriers make adaptation impossible, inefficient, sub-optimal, less likely? (Andy Reisinger, Ministry for the Environment)	KH: Reinforces the need to say more about adaptation in the Exec Summary, constrained by available literature
11-124	A	3	42	3	43	I recommend deletion of "catastrophic failure of hydro dams" because it is speculative and I know of no supporting evidence. Extreme flood scenarios for all large dams NZ are regularly reviewed and updated under a programme promoted by the NZ Society for Large Dams, and upgrading measures undertaken as required. (Alistair McKerchar, National Institute of Water and Atmospheric Research Ltd)	JS: Consider in the context of no remedial action in case of Tasman Lake GLOF, but probably unlikely so delete. Use words from 11-131
11-125	A	3	43			"catastrophic failure of hydro dams in NZ" sounds pretty alarming in an Executive Summary, especially since the only mention of this is in Table 11.8 (page 23) and there is no discussion of it in the accompanying text of section 11.4.7. (A. Brett Mullan, National Institute of Water & Atmospheric Research Ltd)	JS: See 11-124
11-126	A	3	43	3	45	To remove ambiguity as to whether New Zealand applies to all items, put phrase re hydro dams at end of sentence. (Barrie Pittock, CSIRO)	JS: See 11-124
11-127	A	3	43		44	..catastrophic failure of hydro dams in New Zealand.' Is there a reference for this? (Alan Porteous, National Institute of Water & Atmospheric Research (NIWA))	JS: See 11-124
11-128	A	3	43			delete 'catastrophic' as it is unsure what the outcome of any failure would be, and failure conveys the issue. (Gerald Rys, Ministry of Agriculture and Forestry)	JS: See 11-124
11-129	A	3	43	3	47	Again, appears far too subjective. No evdidence is supplied anywhere I dopcument for catastrophic dam failure in new zealand, bushfire damage in major cities makes no sense (bushfires rarely occur in major cities), terns such as "expensive" are value judgements and should be left out, no mention made of cyclone possibiities (Andrew Watkins, Australian Bureau of Meteorology)	JS: See 11-124
11-130	A	3	43	3	44	the text states"these risks include catastrophic failure of hydro dams in New Zealand" In my opinion this rather overstates the situation. All hydro dams in NZ have had their flood spillway capacity and Probable Maximum Flood, PMF, reassessed in the past decade using an updated methodology. Given that the dams must be able to handle a PMF event, nominal return period around 10,000 years, it seems to me that larger floods arising from climate change could be accomodated. Human error by dam operators is always capable of causing catastrophic failures, however the Flood Rules for all larger dams are aimed at preserving the safety of the Dam structure above all else.In my view the statement in the Exec Summary would best be deleted. The statement could be replaced by"These risks include widespread inundation of	JS: See 11-124

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						floodplain areas, with damage to roads, bridges and infrastructure such as water supply schemes. This is likely to happen more frequently than in the past (high probability)" (John Robert Waugh, Opus International Consultants Ltd.)	
11-131	A	3	43	3	44	",,,These risks include catastrophic failure of hydro dams in New Zealand …". The only place I can see in the text which deals with hydro dam safety is Table 11.10 in which the bottom entry identifies "Over-topping of hydrodams" as a key vulnerability. "Catastrophic failure" sounds more extreme than "overtopping" - and is there really a published documented risk that dam spillways will be unable to cope with heavy rainfall ? I suggest a more cautious statement should be made in the Executrive Summary, in line with whatever justified statement is made in Table 11.10 (David Wratt, NIWA)	JS: Use this guidance BF: Need to resolve this and above comments by careful rewording of text
11-132	A	3	44	3	45	Increased bush fire damage is not at all clear. Relative humidity is the big driver. And relative humidity is likely to remain constant. See Soden et al SCIENCE VOL 310 4 NOVEMBER 2005 as it shows how RH has remained fairly constant. (Graham Farquhar, Australian National University)	KH: Disagree. Projected changes in temperature, humidity, wind and rainfall indicates increased fire danger. References are given on page 11 lines 37-45.
11-133	A	3	44	3	44	"and Tasmania"?? … after NZ ; also specifically mention "storm surge" ??? (David White, ASIT Consulting)	KH: Can mention storm surge, but there is no evidence for increasing risk to hydro dams in Tasmania.
11-134	A	3	44	3	44	urban drainage (and sewage) (Oliver Woldring, NSW Government)	KH: Agree
11-135	A	3	45			Not clearly stated that peak energy demand risk is due to not being able to meet peak energy demand causing blackouts - Need to make it clear so reader understands implications ie blackouts (Tony Coleman, Insurance Australia Group)	TC: Will address
11-136	A	3	46	3	47	Adaptation involves expensive retrofitting - is it always expensive? (see Cyclone Testing Station report on Cyclone Vance, Technical Report 48 and pers comm). Changes in price and availability of insurance? Perhaps change this to changes in and/or? (Tony Coleman, Insurance Australia Group)	TC: Will address.
11-137	A	3	46	3	46	the word "expensive" here sounds somewhat judgemental. If retrofitting is carried out when an overhaul is due anyway, it may not be much more expensive than a standard maintenance work. Perhaps this statement could be qualified accordingly. (Andy Reisinger, Ministry for the Environment)	KH: Agree. See comment 11-136
11-138	A	3	46			Retrofitting of what? (David Whitehead, Landcare Research)	BF: Need to resolve this and above comments by careful rewording of text

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11-139	A	3	47			Add changes in zoning for floods and setbacks from ocean (Barrie Pittock, CSIRO)	KH: Agree
11-140	A	3	50			"… leading to potential impacts …" (Barrie Pittock, CSIRO)	KH: Agree
11-141	A	3	50	3	50	this should say "potential impacts" rather than "impacts" on human health. The actual impacts will depend on the degree of adaptation and resilience of the health system over time. (Andy Reisinger, Ministry for the Environment)	KH: Agree, see Comment 11-140
11-142	A	4	0			'There is considerable scope etc – suggest this is an overstated remark.. Regional food security is very likely to remain robust – another overstated remark…needs considerable substantiation. (Roger Stone, Department of Natural Resources)	BF: Noted
11-143	A	4	1			This must be a high confidence statement. Because only robust and responsive health care systems can strongly modulate risks to people. If they would not be able to do so, they are - by definition - not robust and responsive. (Hans H.J. Labohm, Netherlands Institute of International Relations 'Clingendael')	KH: Agree
11-144	A	4	1	4	1	See comment on page 3 line 50 - the word "risk" here could also be replaced with "actual impacts" (Andy Reisinger, Ministry for the Environment)	KH: Replace with "residual risks"
11-145	A	4	2			add re quarantine for pests and diseases (Barrie Pittock, CSIRO)	KH: Noted
11-146	A	4	4	4	9	This paragraph should mention potential changes in ENSO. (Dean Collins, Bureau of Meteorology)	KH: Disagree. For ag & forestry, reductions in soil moisture (drier conditions) are more critical than changes in one of the many drivers that influence climate variability, such as ENSO
11-147	A	4	4	11	5	Disagree that there is evidence of drier conditions for the future. They COULD occur, but plenty of GCMs actually show rainfall increasing over Australia. Again there is far too much certainty given - it is labelled as medium confidence. Many recent model outputs have the OPPOSITE sign. (Graham Farquhar, Australian National University)	KH: Disagree. The latest AR4 climate simulations show an ensemble-mean decrease in annual rainfall over Australia. However, there IS an ensemble-mean increase in summer rain over NSW and southern Qld, and in increase in autumn rain over parts of central and northern Australia. The models also indicate an increase in potential evaporation over the whole of Australia. The, changes in rainfall and evaporation lead to a drier climate. Need to ensure that this is clearly

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
							explained in the SOD
11-148	A	4	4	4	9	The Executive Summary Section makes no mention of the potential bush fire risk or likely reduction in water availability with respect to agriculture anf forestry, though this is discussed within the chapter. (John Garnham, Department of Primary Industries)	KH: Noted. Fire should be mentioned. Reduction in water availability is already encapsulated in the word "drier"
11-149	A	4	4	4	4	The statement that " Production is likely to be vulnerable to projected drier conditions over much of Australia.." seems to be inconsistent with the presentation of the climate results in section 11.3.1 along with assertions among other sections of the report. From section 11.3.1, it seems only the south-west and some other parts of Queensland are projected to become drier. However from page 11, line 20, the report states that much of eastern Australia will experience more rainfall variability (ie wetter / drier) conditions. Stating that agriculture will experience drier conditions is a bit misleading / confusing for the reader considering these other assertions. This relates to the issue of consistency within the report. In section 11.4.10, rainfall is a key component of attributing changes to water-born diseases and their future distribution and growth. In that section rainfall variability is predicted to increase the intensity and frequency of water-borne diseases in Aus / NZ. So it is inconsistent to have "drier conditions over much of Australia" in the agriculture impacts and "increased rainfall variability" in the human health impacts. One of the difficulties I assume is adequately describing the regional variability and impacts associated with the projected changes in rainfall in a large continent such as Australia. To be consistent I think the initial statment could be "Production is likely to be vulnerable to projected drier conditions over some parts of Australia (south-west) while it is unclear what the impact of increased rainfall variability over much of Eastern Australia will be." (Ben McNeil, University of New South Wales)	See comment 11-147
11-150	A	4	5			change north-eastern to north and eastern to be consistent with predictions (Ken Hughey, Lincoln University)	KH: Agree
11-151	A	4	6			Rephrase reference to changes in variety as this is confusing. (David Jones, Australian Bureau of Meteorology)	KH: replace variety with cultivar
11-152	A	4	7	4	8	"placing additional stress on rurla economies and societies" is a subjective value judgement. Delete. (Andrew Watkins, Australian Bureau of Meteorology)	KH: Noted. Could use less emotive term such as "creating additional challenges for rural…"
11-153	A	4	8	4	9	surely food security for this region has high confidence? (Ken Hughey, Lincoln University)	KH: Roger Stone might disagree
11-154	A	4	8	4	8	"additional stress" is probably right in almost all cases but not all - perhaps qualify slightly - "additional stress on most rural communities"..	KH: see comment 11-152

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						(Oliver Woldring, NSW Government)	
11-155	A	4	9			Add "Some regional communities may be seriously affected by shifts in production, inclone and employment." (Barrie Pittock, CSIRO)	KH: See comment 11-152
11-156	A	4	11			In this summary section on the adaptive capacity for Australia - suggest a sentence about dealing with adaptive capacity is increased by agriculture, hydrology etc dealing with a high degree of climate variability (Peter Hayman, South Australian Research and Development Institute)	KH: Noted
11-157	A	4	11			Need to make it clear that the adaptive capacity is in the human sphere. I am also suprised that substantial infrastructure is interpreted as an aid in adaptation - it can also hinder as large amounts of capital will be required to turn over/update infrastructure to match an ever changing climate. (David Jones, Australian Bureau of Meteorology)	BF: Noted. Will delete “infrastructure”
11-158	A	4	11		11	Need to be very specific that the "high adaptative capacity" is limited to human activities only, and even in this sphere probably limited to a relatively narrow fraction of human activities. The authors also need to provide evidence to support this claim, as I am unaware of a single study which has done a comprehensive analysis of the capacity for full social/economic adaptation to climate change over the century time scale. (David Jones, Australian Bureau of Meteorology)	KH: Capacity doesn’t ensure implementation, as stated in lines 13-14
11-159	A	4	11	4	17	it would be very helpful if this paragraph could be fleshed out more and be more specific. "Institutional constraints" is not very clear in what it means, or how it could be addressed. Given the increasing focus and expectation for the report to provide information on adaptation, I think it would be well justified to expand this paragraph. (Andy Reisinger, Ministry for the Environment)	KH: Agree, will do.
11-160	A	4	14	4	17	Sentence starting "within both countries" is apalling. This may be handled by policy and is incredibly presumptuous. Delete (Andrew Watkins, Australian Bureau of Meteorology)	KH: it is a fact that there are disadvantaged groups in both countries. We need to clarify whether this makes them more vulnerable to climate change. See comment 11-226 DG: should be able to deal with this using new refs and a bit of a rewording
11-161	A	4	15		17	The point about indigenous peoples, and the issue of uneven impacts, in very important. However, that these peoples have less adaptive capacity was not demonstrated in the chapter, but is simply asserted e.g. p.34 line 23. If this comment is to be retained in this form, it needs greater development. This issue is part of a wider subset of issues around uneven impacts: it is not clear why race-	JS: Replace with edited wording of 11-1014 DG: Yep can be dealt with in rewrite

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						based issues has been simgled out for mention here (Wendy Lawson, University of Canterbury)	
11-162	A	4	17			Should there be a mention of fisheries and national security in the Executive Summary? (Greame Pearman, Monash University Sustainability Centre)	KH: Very little is known about potential impacts on fisheries, and nothing is known about impacts on national security
11-163	A	4	19	4	22	Not clear what is meant by 'sustainable development' here, 'sustainable development of what?' Is there a less ambiguous term that could be used? (Rod Anderson, Department of Sustainability & Environment)	KH: Noted. Perhaps replace "Sustainable development is likely" with "Residual vulnerability (assuming modest adaptation) is likely…"
11-164	A	4	19	4	22	Sustainable development. Using the projections from the CSIRO 2003 Report on Climate Change in South Australia, there is some concern over the sustainability of the marginal cropping areas in this state if winter and autumn rainfall were to decline as per the higher end of the range given for 2030 and 2070. (Elizabeth CURRAN, Bureau of Meteorology)	KH: Noted. Writing team to consider SA hotspots
11-165	A	4	19			explain this paragraph, it is unclear why sustainable development is threatened. (Stephan Halloy, Instituto de Ecología, Universidad Mayor de San Andrés)	KH: See comment 11-163
11-166	A	4	19	4	19	Implies that sustainable development occurs now. Many would argue this is not the case, and opens up a can of words. Suggest rewording to "ongoing development (Wendy Lawson, University of Canterbury)	KH: See comment 11-163
11-167	A	4	19	4	22	Some of these locations would have litle development planned. Kakadu, and sub-Antarctic islands, for instance. (Andrew Watkins, Australian Bureau of Meteorology)	KH: See comment 11-163
11-168	A	4	20			Think you need to be very careful here. Many of the M-D problems are not climate change initiated. They are problems of existing unsustainable development, e.g., over allocation of resources. Thus SD is already under major threat but may be further exacerbated by climate change - I would suggest this sort of wording. (Ken Hughey, Lincoln University)	BF: This and above points were addressed at Merida and in SOD BB: Agree - reword KH: See comment 11-163
11-169	A	4	20	4	20	On page 4, line 20 the Murray Darling Basin is identified as a "hotspot". I think there is a case for a case study bringing together points raised in various parts of the chapter. For example the points raised on page 8, lines 25 to 28, page 19, lines 1 - 6, page 20 lines 11 - 15. Although the effects of climate change has not been researched specifically the likely magnitude of the problem is apparent from the review by Cullen "In Search of Sustainability" Chapter 6, CISRO publishing (David Shearman, Univeristy of Adelaide)	KH: Noted. This point could be picked up in Section 11.8 BB: Consider, but within the context of space limitations
11-170	A	4	21			Similar to the above. The Parliamentary Commissioner for the Environment (2004) Growing for Good report indicates severe questions about existing sustainability of agriculture on much of the eastern plains of the SI. It depends of course on your	BF: see above BB: See above

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						definition of SD. I would do same as for M-D basin. (Ken Hughey, Lincoln University)	
11-171	A	4	21	4	21	Recommend deletion of "and sub-Antarctic Islands", since I'm not aware of any proposal for any development on any of these islands. In fact the island groups in the NZ zone (Campbell, Auckland, Bounty, Snares) are nature reserves. (Alistair McKerchar, National Institute of Water and Atmospheric Research Ltd)	JS: Agree – change KH: See comment 11-163
11-172	A	4	21			The sub antarctic islands should be excluded as these are conservation estate islands and no development will occur. (Gerald Rys, Ministry of Agriculture and Forestry)	JS: Agree – change KH: See comment 11-163
11-173	A	4	25	5	47	It is not clear that this is meant to be a summary of knowledge up to TAR only, as suggested in Appendic C outline. To me this is unnecessarily repetitive as not much has changed since then in many areas. This limitation should either be in the heading or insert in p.4 line 45 as "... Assessed in the TAR." In page 4 line 43 this is an issue as recent work shows that the westerlies not only strengthen but move further polewards, which has serious implications for rainfall and ocean circulation (Cai et al., 2005, Geophysical Research Letters, accepted). (Barrie Pittock, CSIRO)	KH: Noted. Section 1 of each regional chapter MUST be called "Introduction", and it should include a summary of the TAR. To make this clear, a sub-heading "11.1.1 Summary of the TAR" will be inserted
11-174	A	4	27			First paragraph of Section 11.1 outlines the physical landscape of the region, but not the human landscape: it just say they are similar. A sketch of the human landscape should also be included, something along the lines of "Both countries are relatively wealthy, and have economies largely based on..... They are populated mainly by the immigrants and their descendants as a result of immigration over the last 200 years, mainly from Eurpope but now aslo from Asia, and both coutnries have an ingigenous population who are generally disdavangted..... (Wendy Lawson, University of Canterbury)	BF: Sentence is added along lines suggested
11-175	A	4	27	4	36	This paragraph can be shortened considerably (Andrew Watkins, Australian Bureau of Meteorology)	KH: Agree, could delete the 3rd sentence. In the 4th and 5th sentences, many of the qualitative descriptions are vague, e.g. large, relatively flat, relatively nutrient-poor, very arid, marked season rainfall, smaller, mountainous, better watered. Some quantitative descriptions would be better, or perhaps a regional average-rainfall map. BF: Still provides general intro that is probably necessary.
11-176	A	4	28	4	29	The reference to the EEZ is significant yet there is very little material in the following text of Chapter 11 on impacts on the marine environment. The issue for	BF: need to do this

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						NZ is that there is a general lack of information about the marine biologocal environment and its interaction with the atmosphere and then climate. there should be some reference to the Oceans 20/20 work lead by LINZ to rectify this gap.Suggest it go in page 9 Table 11.3 or at least be noted in the text elsewhere. (Judy Lawrence, PSConsulting)	
11-177	A	4	29			Suggest avoid use of acronyms wherever possible given the broad audience for this report. Especially where there is not repeated use of the acronym such as with EEZ. (Greame Pearman, Monash University Sustainability Centre)	BF: EEZ retained for further use later in text
11-178	A	4	31	4	31	Australia is not especially large in comparison to other continents, in fact I think it is the smallest. (Rod Anderson, Department of Sustainability & Environment)	KH: See comment 11-175 BF: Accepted - text changed
11-179	A	4	32	4	32	suggested rewording" a very arid interior, marked seasonal rainfall, and very high inter-annual rainfall variability". (Michael Dunlop, CSIRO)	KH: See comment 11-163 BF: Accepted - text changed
11-180	A	4	32	4	32	"marked seasonal" should read "highly variable" (Andrew Watkins, Australian Bureau of Meteorology)	KH: See comment 11-163 BF: Accepted - text changed
11-181	A	4	33			What is meant by “better-watered”? does it relate to rainfall, seasonality, evaporation, runoff or some combination of these? Suggest alterative wording. (Greame Pearman, Monash University Sustainability Centre)	BF: now reworded KH: See comment 11-163
11-182	A	4	33	4	36	I query the statement re the similarities in social, cultural and economic aspects of Aust. and New Zealand. Major differences relevant to the report include the size, cultural and political influence of indigenous populations in the two countries (Australia's indigenous population is much smaller in percentage terms and more marginalised); and the two countries' relative economic dependence on primary industries (New Zealand is much more dependent on primary production as noted elsewhere in the chapter). A further important point of difference (as also noted elsewhere in the chapter), is sources of energy and dependence on fossil fuels (Australia being much more dependent on coal for energy production and being very dependent on an energy intensive long-distance road transport network). (Kim Ritman, Bureau of Rural Sciences)	BF: noted, but any changes will depend on space available KH: Noted. See comment 11-8 regarding GDP and see text in section 11.2.2 DG: yes indigenous issues can be dealt with in rewrite
11-183	A	4	37	4	37	Insert header "Summary of knowledge assessed in TAR" to make it clear what following refers to. (Janice Lough, Australian Institute of Marine Science)	BF: noted KH: See comment 11-173
11-184	A	4	41			specify if changes in extreme events are toward more extreme or less extreme (Stephan Halloy, Instituto de Ecología, Universidad Mayor de San Andrés)	BF: noted
11-185	A	4	41	4	41	Does the other parts of th report suggest a more El Nino like state? Papers I have read are inconclusive on this point. Delete if this is not the AR4 story.	BF: Reject. We are using the words of the TAR

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						(Andrew Watkins, Australian Bureau of Meteorology)	KH: See comment 11-65
11-186	A	4	42	4	42	How sound is this assertion. I am not convince increase in temperature always correlates with increase in the extreme (Yves Bergeron, université du québec en Abitibi-Témiscamingue)	BF: refer to WGI. KH: Disagree. The average warming in ANZ has been associated with an increase in extremely hot days and a decrease in extremely cold days. Projections indicate more of the same in future.
11-187	A	4	42	4	43	The "thus" makes no sense. Nor does it make sense to take the paper by Pittock & Wratt in 2001 and use it for the AR 4. I don't see why Australia will necessarily become drier. (Graham Farquhar, Australian National University)	KH: Delete “Thus”. See comments 11-147 and 11-173 BF: Reject his comment on use of Pittock and Wratt, as we are here reporting main findings of their Chapter in the TAR
11-188	A	4	42	4	43	Sentence "Thus, large areas of mainland Australia…" does not follow from previous statements. (Janice Lough, Australian Institute of Marine Science)	KH: Delete “Thus”
11-189	A	4	42			Delete "Thus" as logic does not necessarily follow. (Barrie Pittock, CSIRO)	KH: Delete “Thus”
11-190	A	4	42	4	43	In the entire report I have been unable to find a definition of extreme event. (have I overlooked it?) What is being described, Intensity? If so how is is measured. (David Shearman, Univeristy of Adelaide)	BF: depends on space available KH: Noted. Need to separate the statement about ENSO from the statement about extreme events. The former is specific while the latter is general.
11-191	A	4	43	4	45	The westerlies are likley to strengthen…' Is their climatological position also likely to change? (Elizabeth CURRAN, Bureau of Meteorology)	BF: accepted and now clarified in text
11-192	A	4	43		43	The westerlies are only liken to strengthen in part of the year. (David Jones, Australian Bureau of Meteorology)	BF: we merely report what the TAR says here
11-193	A	4	43	4	43	Insert "mid-latitude" before "westerlies". (Janice Lough, Australian Institute of Marine Science)	BF:accepted
11-194	A	4	43	4	43	Is "westerlies" overly colloquial? Perhaps use "the prevailing westerly winds" (Oliver Woldring, NSW Government)	KH: Agree
11-195	A	4	45			Two full stops. (Tom Beer, CSIRO)	KH: Noted
11-196	A	4	45			Page 4, line 45. Delete second ‘.’ (Lynda Chambers, Bureau of Meteorology Research Centre)	KH: Noted
11-197	A	4	45	4	45	Two full stops are used	KH: Noted

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						(John Garnham, Department of Primary Industries)	
11-198	A	4	45	4	45	please add "in the TAR" at the end to avoid misunderstandings. On first reading, I thought this was summarising the findings of the present report. (Andy Reisinger, Ministry for the Environment)	BF: accepted
11-199	A	4	47	5	26	Need to make it clearer (perhaps using some formatting device) that this section is quoting from the previous AR (Rod Anderson, Department of Sustainability & Environment)	KH: See comment 11-173
11-200	A	4	47			Are "[w]ater resources already stressed" in both countries or just in Australia? (Tom Beer, CSIRO)	BF: : Noted and text now clearer
11-201	A	4	47	4	49	The shift to drier conditions appears to be based on the "possible changes toward a more El Nino-like mean state." Since this shift is only a possibility, the statement "Climate change is very likely (>90% probability) to increase these pressures…" is unjustified. Either provide stronger evidence that climate change will lead to drier conditiosn in the region or delete the sentence. (Lenny Bernstein, IPIECA)	BF: need to clarify KH: Rainfall variability is not entirely dependent on ENSO, e.g. in northeast Australia, only 30% of annual rainfall variability is explained by ENSO, much less elsewhere. See comment 11-147
11-202	A	4	47	4	49	Do these comments apply equally to NZ and Australia; my guess is that water resources are much more an issue in Australia than NZ. (Chris Cocklin, Monash University)	BF: Noted and text now clearer, but this assertion that NZ does not have water shortages is misconceived.
11-203	A	4	47	4	49	This paragraph seems rather vague. The TAR provided much greater information about which regions and systems are already water stressed. Can some key regions/systems be mentioned? (Dean Collins, Bureau of Meteorology)	BF: noted, but lack of space to do this here. KH: Good suggestion
11-204	A	4	47			presumably the "already stresse" refers principally to Australia? (Stephan Halloy, Instituto de Ecología, Universidad Mayor de San Andrés)	BF: need to clarify, but this assertion that NZ does not have water shortages is misconceived
11-205	A	4	47	4	47	"Water resources are already stressed IN SOME AREAS OF THE REGION" - need to qualify statement by inserting in some areas (Wendy Lawson, University of Canterbury)	BF: noted, but lack of space to do this here.
11-206	A	4	47			It isn't true that water resources are stressed everywhere. Many parts of Australia, and some regions of New Zealand, are currently experiencing stresses on freshwater supplies, but in New Zealand especially, there are many parts of the country that still have access to plentiful amounts of high quality water. (Alistair Woodward, University of Auckland)	BF: need to clarify BB: Agree – need to be more specific about affected regions KH: Agree. Tropical Australia is not water stressed
11-207	A	4	48	4	49	Climate change could well reduce these pressures. We think that on average rainfall will increase (averaged globally), but we have little power to predict regionally what will happen in detail. (Graham Farquhar, Australian National University)	KH: Disagree. The climate models that indicate an increase in global average rainfall and evaporation also provide regional information. See comment 11-147

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11-208	A	4	49	4	49	just to note that this says that the TAR said that climate change would adversely affect agriculture. I don't think the TAR said this (at least not for New Zealand in such blanket form) - and if it did, it would be a major contrast with the current executive summary statement that up to 2050, agriculture benefits from climate change (see separate comment on page 3, lines 16-21. (Andy Reisinger, Ministry for the Environment)	BF: Noted and text now changed
11-209	A	5	0			the term 'inland Australia' is far too broad for inclusion here when put alongside a small region such as south-west Western Australia. Suggest a number of geographical regions be described… suggests that CO2 benefits have been overstated in terms of overall benefit to crops. (Final sentence is good). 'Settlements – …Human Health… Include a statement that mentions sun-belt migration or retirement migration or something similar (a geographer/demographer may help here). (Roger Stone, Department of Natural Resources)	KH: Agree. Mark Howden to extract regional info from TAR BF: noted, but insufficient space to do all this – here we just summarise briefly the main points of the TAR
11-210	A	5	1	5	5	It's not just the warming - would be good also add something like: "The expected drying trend will have significant implications for many species and ecosystems in the temperate regions particularly riverine and other wetland systems." (Rod Anderson, Department of Sustainability & Environment)	KH: Agree. Lesley Hughes to extract regional info from TAR LH: not sure if this is still necessary as this section has been extensively rewritten and cut downBF: noted, but insufficient space to do all this – here we just summarise briefly the main points of the TAR
11-211	A	5	1	11	5	The paragraph is correct as a generalization, but provides no information as to whether there are any species in the region that are living near the upper limit of their temperature range. There is some information in Table 11.7, but it is not clear whether this paragraph and that table are referring to the same changes in climate. Either provide more complete information about species that would actually be threatened by climate change or delete the paragraph. (Lenny Bernstein, IPIECA)	LH: TAR summary revised and shortened considerably so this comment no longer applicable BF: noted, but insufficient space to do all this – here we just summarise briefly the main points of the TAR
11-212	A	5	1	5	5	This paragraph indicates what will end, which is threatened and endangered by climate change. Presumably, some species will be advantaged, and some will come in to fill niches. It would be useful to at least point to some possible scenarios here. (Wendy Lawson, University of Canterbury)	KH: Agree. Mark Howden to extract regional info from TAR LH: TAR summary revised and shortened considerably so this comment no longer applicableBF: noted, but insufficient space to do all this – here we just summarise briefly the main points of the TAR
11-213	A	5	5			Mangroves should presumably be included here also as they have an important ecological role.	KH: Agree. Mark Howden to extract regional info from TAR

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						(Gerald Rys, Ministry of Agriculture and Forestry)	LH: TAR summary revised and shortened considerably so this comment no longer applicableBF: noted, but insufficient space to do all this – here we just summarise briefly the main points of the TAR
11-214	A	5	5	5	5	suggest deleting "in the coastal zone and inland" as unnecessary (Oliver Woldring, NSW Government)	KH: Agree
11-215	A	5	7	5	7	Their high adaptive capacity renders agricultural activities exposed but less vulnerable than is indicated here. Agriculture in Australia is resilient, having adapted to a highly variable climate. An example of a reference making this point is Allen Consulting Group (2005) or Jones & McInnes (2004) "A Scoping Study on Impact and Adaptation Strategies for Climate Change in Victoria" http://www.greenhouse.vic.gov.au/files/Vic_I_A_Report_final.pdf (Rod Anderson, Department of Sustainability & Environment)	MH: Noted, will address BF: noted, but insufficient space to do all this – here we just summarise briefly the main points of the TAR
11-216	A	5	7	5	12	With projected wetter trends for western NZ and drying only in the dry (non-productive) season for northern Australia a sentence could be included on potential net benefits for food and fibre. (Andrew Ash, CSIRO)	KH: Noted, but remember this section is about the TAR, so we can only refer to info from the TAR.
11-217	A	5	8			Not Eastern Australia as well? (Tony Coleman, Insurance Australia Group)	KH: Should include eastern Aus, especially if "rainfall" is replace by "soil moisture" BF: noted, but insufficient space to do all this – here we just summarise briefly the main points of the TAR
11-218	A	5	8	5	12	The statement made regarding the beneficial effects of enhanced CO2 must be qualified by including: in native pastures this effect may be offset by declines in rainfall greater than 10% and that in some instances growth occurs at the expense of quality (pastures and crops). (Steven Crimp, Queensland Department of Natural Resources and Mines)	KH: Noted BF: noted, but insufficient space to do all this – here we just summarise briefly the main points of the TAR
11-219	A	5	10		11	The drying is a largely a result of rainfall changes, and not "associated" with the warming. (David Jones, Australian Bureau of Meteorology)	KH: Agree. We do not assume the drying is proportional to the warming. It is computed independently. BF: section now rewritten
11-220	A	5	11			as above, specify the direction of change that is likely. Will commodity prices tend to increase or decrease? (Stephan Halloy, Instituto de Ecología, Universidad Mayor de San Andrés)	BF: noted, but insufficient space to do all this – here we just summarise briefly the main points of the TAR KH: "Sensitive" is the most appropriate word here. We don't know the direction of change

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							in commodity prices – they will be partly determined by the impacts of climate change on ag & forestry overseas
11-221	A	5	11		12	This statement is strongly supported. (Gerald Rys, Ministry of Agriculture and Forestry)	KH: Noted
11-222	A	5	14		18	What about risks of hailstorms and bushfires? (Tony Coleman, Insurance Australia Group)	KH: Noted. Bushfires should be mentioned. Hail risk was not assessed in the TAR BF: noted, but insufficient space to do all this – here we just summarise briefly the main points of the TAR
11-223	A	5	14	5	18	Changes in extreme temperature frequency will have a significant negative impact on Australian human health, as indicated by the case study in the new report entitled "Climate Change Futures: Health, Ecological and Economic Dimensions" by The Center for Health and the Global Environment Harvard Medical School (2005). This should be included in this section. (Steven Crimp, Queensland Department of Natural Resources and Mines)	KH: Agree BF: noted, but insufficient space to do all this – here we just summarise briefly the main points of the TAR
11-224	A	5	14	5	26	Need to include "Likely influx of environmental refugees from other nations" … in particular SE Asia and Pacific ?? (David White, ASIT Consulting)	BF: noted, but insufficient space to do all this – here we just summarise briefly the main points of the TAR KH: Disagree. There is no evidence to support the likelihood of an influx of environmental refugees. This will presumably depend on adaptive capacity and government policies, upon which we can't speculate
11-225	A	5	20			"existing stresses on achievement of sustainable land use and conservation of…". Awkward expression. I would suggest putting "conservation of …" first and changing "achievement of" to "achieving". (Tom Beer, CSIRO)	KH: Noted.
11-226	A	5	21	5	23	Following "…, especially indigenous peoples,…" (Line 22) I recommend adding "…who often face challenges distinct from mainstream groups in society. This would mean deleting the end of the existing sentence "...who are particularly vulnerable." (Line 23) (Darren NT King, National Institute of Water and Atmospheric Research Ltd)	KH: Agree BF: noted, but this text now removed
11-227	A	5	21	5	23	Again, this desciption and label of people as able or unable to adapt seems highly subjective and unsupported. It is particularly distasteful to me. (Andrew Watkins, Australian Bureau of Meteorology)	KH. Noted. See comment 11-226, written by a Maori person BF: noted, but this text now removed
11-228	A	5	22	5	23	I just want to question whether or not indigenous peoples are much more	DG: Noted, can deal with

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						vulnerable. In as much as they are less connected to white society they are less vulnerable to failings in infrastructure etc. Are they intrinsically less (or more) adaptable? This is not my areas - just questioning the "rhetoric(?)". (Michael Dunlop, CSIRO)	BF: noted, but this text now removed
11-229	A	5	24			inappropriate and add "inefficient" use of water (Gerald Rys, Ministry of Agriculture and Forestry)	BF: noted, but this text now removed
11-230	A	5	24	5	25	"inappropriate use of water" is not our call - too subjective. Unlcear what "complex institutional arrangements" means or alludes to. Delete. (Andrew Watkins, Australian Bureau of Meteorology)	BF: noted, but this text now removed BB: Replace "inappropriate use" with "over-allocation". Consider rewording of "complex institutional arrangements".
11-231	A	5	25			Using the phrase "complex institutional arrangements" is opaque to the reader. What does this mean and what is its significance? (Judy Lawrence, PSConsulting)	BF: noted, but this text now removed BB: See above
11-232	A	5	25	5	26	Where are "Options are identified for adaptation to climate change"? (Janice Lough, Australian Institute of Marine Science)	KH: Noted, deleted this text as part of a major pruning of section 11.1
11-233	A	5	25			"Options were identified …" if indeed this is reporting TAR. (Barrie Pittock, CSIRO)	BF: noted, but this text now removed
11-234	A	5	28			Is Australia not vulnerable in the next 50 years ie not just 50 - 100 in terms of water supply, ecosystem degradation and increasing likelihood of extreme weather events (Tony Coleman, Insurance Australia Group)	BF: noted, but this text now removed TC: will reword KH: Should give this final paragraph a sub-heading like "11.1.2 Aims of the Fourth Assessment"
11-235	A	5	28	5	48	Delete para and figure. Unneccessary when the document is far too long (Andrew Watkins, Australian Bureau of Meteorology)	KH: Disagree. It is essential to define the concepts of exposure, sensitivity, potential impacts, adaptive capacity and vulnerability BEFORE going further in the chapter. This prologue could also note that the scarcity of literature on impacts and adaptation in some regions and sectors means that many gaps in knowledge remain, especially socio-economic information.
11-236	A	5	29			add - few "largely eastern' areas (Gerald Rys, Ministry of Agriculture and Forestry)	BF: accepted KH: Agree
11-237	A	5	32	5	32	The sentence starting "Vulnerability…" could be deleted as the next sentence says almost exactly the same thing (Judy Lawrence, PSConsulting)	BF: accepted KH: Would rather delete sentence starting with "Systems". Blair to clarify vulnerability in this paragraph

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11-238	A	5	38	5	45	Figure 11.1 Relative to other diagrammatic representations of vulnerability, the Allen Group figure is fairly simplisitic. Is there a particular reason for using this one, as opposed one of the many others that have been presented in the international literature? (Chris Cocklin, Monash University)	BF: we will also consider figure from Jones KH: Noted, but wanted to keep it simple. See what Ch 19 is using.
11-239	A	5	47	5	47	There is a considerable literature now on vulnerability: it would be vastly preferable to cite a diagram from a more widely accessible piece on vulnerability, rather than a consulting report. (Wendy Lawson, University of Canterbury)	LH: Agree – I didn't like this report much KH: See what Ch 19 is using
11-240	A	6	0			Mention of hailstorms important but linkages to climate change issues needs to be placed here in order to have appropriate context and also increase impact of this statement… maintain consistency in use of term 'tropical cyclone' or 'cyclone' – suggest 'tropical cyclone' throughout if that is what is intended. needs a reference to 'Australia: State of the Environment Report 2001' (Dept of Environment and Heritage) in terms of rainfall shifts and trends observed over past 50 years and similar. This Report should be included as a useful reference in this report. (Roger Stone, Department of Natural Resources)	KH: Noted, but can't mention climate change here. This section is about CURRENT sensitivity. See section 11.3 for FUTURE trends. Agree that "tropical cyclone " should be used throughout. The SOE (2001) report is not the best reference for observed climate trends – better info is available in Collins and Della-Marta (2002) and Nicholls and Collins (2006).
11-241	A	6	1	6	27	It sis very confusing as costs are sometime givien per year and sometime in total (Yves Bergeron, université du québec en Abitibi-Témiscamingue)	KH: Disagree. Annual vs total costs are clearly articulated
11-242	A	6	1			Section 11.2.1: Given its importance to the region, this section needs to include at least one paragraph on vulnerabilities to ENSO, as well as discussion that the region is therefore particularly vulnerable to any changes in ENSO behaviour associated with climate change. (Dean Collins, Bureau of Meteorology)	KH, JS: done
11-243	A	6	1	6	18	Suggest better integrating the discussions of drought and natural disasters. One might contend that severe droughts (such as 2002/03) are the costliest natural disasters that Australia faces. (David Jones, Australian Bureau of Meteorology)	KH: Agree
11-244	A	6	1			Section 11.2.1: The context for sensitivity and vulnerability to climate and weather is somewhat partial to extreme events, and to the climate side only but less the human or natural systems side. Ie information about fraction of people living in coastal regions, number of biodiversity hotspots, number of people having long-distance freshwater supplies, may also be relevant. It is of course important not to overload this section with extraneous contextual information - so my suggestion is mainly for the authors to step back and look at the big picture of how they feel a	JS: Important points. Need to bring in how climate change impacts on extreme events. For some communities this is how it is first perceived.

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						sense of vulnerability (and resilience) is best painted before launching into details. The existing information is certainly relevant though (but see my detailed comments on the BTE flood cost estimates, which appear too low compared with other more comprehensive analyses). (Andy Reisinger, Ministry for the Environment)	
11-245	A	6	1			Section 11.2.1. Since the focus seems to be on economic cost perhaps the third para on drought impacts should come first - since this is most expensive.. (Oliver Woldring, NSW Government)	JS: Agree – we will re-order
11-246	A	6	2	8		Sec. 11.2 Current sensitivity/vulnerability: A discussion of sea level rise and its impact on coastal ecosystems and human well being is lacking from this section. The impacts on estuaries, coastal wetlands, lagoons, lakes and aquifers as well as on settlements and industry should not be overlooked in this section. (Marc Schallenberg, University of Otago)	KH: do we have data on costs of storm surges? NH: will address
11-247	A	6	4			why is BTE in bold? (Tom Beer, CSIRO)	KH: will fix EndNote references
11-248	A	6	4			Need to standardize on “million/year” or “million per year”. (Greame Pearman, Monash University Sustainability Centre)	KH: Noted
11-249	A	6	4	6	4	BTE 2001 - there are 2 BTE 2001 papers listed in the references, need to label a and b (Andrew Watkins, Australian Bureau of Meteorology)	KH: Noted. There are two BTE reports in the references, but they are the same. Repetition will be fixed.
11-250	A	6	5	6	5	insert "tropical" before "cyclones" (Janice Lough, Australian Institute of Marine Science)	KH: Agree
11-251	A	6	5	6	7	Too much details. Delete sentences staring "The cost of deaths..." and "The most costly…" (Andrew Watkins, Australian Bureau of Meteorology)	KH: Agree
11-252	A	6	6			Is this $US31 million per year? If so, add “per year”. If not, add “in toto from … to …”. (Tom Beer, CSIRO)	KH: Agree
11-253	A	6	6			The costs for the Sydney April 1999 hail storm is indicated as USD$ but we think it is really in Australian dollars. May also be worth reconsidering inflating to it to current $. (Tony Coleman, Insurance Australia Group)	KH: Disagree. The total cost was A$2.3b, of which A$1.7b was borne by the insurance industry
11-254	A	6	6	6	6	Change to "US$31 million per year" (Dean Collins, Bureau of Meteorology)	KH: Agree
11-255	A	6	6			Presumably “US$31 million per year”? (Greame Pearman, Monash University Sustainability Centre)	KH: Agree
11-256	A	6	6			after $US31million" reference.	KH: The reference is BTE (2001)

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Gerald Rys, Ministry of Agriculture and Forestry)	
11-257	A	6	8			Should there be more mention of the perceived increase of extreme storms by the insurance industry? (Greame Pearman, Monash University Sustainability Centre)	TC: Will seek references
11-258	A	6	10			why is BTE in bold? (Tom Beer, CSIRO)	KH: will fix EndNote references
11-259	A	6	10			"1962-98" should be 1962 to 1988 for consistency with the earlier style. (Tom Beer, CSIRO)	KH: Noted. Need style guidance from TSU
11-260	A	6	10	6	10	For consistency date range should be 1962-1998 not '1962-98'. (John Garnham, Department of Primary Industries)	KH: Noted. Need style guidance from TSU
11-261	A	6	10	6	16	The figure for natural disasters appears extremely low, due to the limited and partial data sources the BTE report draws on. The data limitations and gaps are acknowledged in the BTE report. A much more comprehensive and detailed study by Neil Ericksen in 1986 (Creating flood disasters?: New Zealand's need for a new approach to urban flood hazard) suggested that annual average flood costs alone were of the order of $90 million pa (in 1984 dollars). A recent study commissioned by the Ministry for the Environment confirms this estimate ($128 million pa in today's prices). Unfortunately this latter study hasn't been made public yet, but I could send it to the authors on a confidential basis for their information. I don't know when or whether it will be public and hence whether it could be actually cited in the IPCC report. In any case, I think there is sufficient NZ literature available to indicate that the BTE estimate is maybe as much as a factor of 5 too low, for reasons outlined both in the BTE report itself and other more comprehensive NZ-based studies. (Andy Reisinger, Ministry for the Environment)	JS: Revise and take up offer to include material. Very important points that should be included. BF: Will remove reference to BTE report. Andy has given me access to some internal reports related to this point that may be quotable by the TOD
11-262	A	6	11	6	13	again too much details. Delete from "…when several large events…." and "The 2002 Manawatu floods". (Andrew Watkins, Australian Bureau of Meteorology)	JS Disagree – require detail
11-263	A	6	12			"Manawatu" name is too limiting when other areas got hit - generally called "Lower North Island" floods (Robert Bell, National Institute of Water & Atmospheric Research (NIWA))	BF: need to clarify
11-264	A	6	13			NZ should be given in full (as in the reference list). (Tom Beer, CSIRO)	JS Agree
11-265	A	6	13	6	16	What is the source of these data? Is it all from the Insurance Council? (Chris Cocklin, Monash University)	JS: Noted
11-266	A	6	13			Need to define the criteria of a disaster ie greater than $10M economic cost - this may not reflect same intensity of storms going over unpopulated areas.	JS: Noted

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Tony Coleman, Insurance Australia Group)	
11-267	A	6	13	6	14	Provide reference for statement that "frequency of large natural disasters is increasing" (Janice Lough, Australian Institute of Marine Science)	JS: Sentence deleted
11-268	A	6	13			Should read "but the frequency". What is meant by "large". Money value of losses or something else? (Greame Pearman, Monash University Sustainability Centre)	JS: Sentence deleted
11-269	A	6	14	6	14	Change to "…the most costly natural disasters are .." (Dean Collins, Bureau of Meteorology)	JS: Done
11-270	A	6	14			the way this is written seems to imply earthquake frequency is also increasing (Stephan Halloy, Instituto de Ecología, Universidad Mayor de San Andrés)	JS: Sentence deleted
11-271	A	6	15			what about the cost of "fires" (Gerald Rys, Ministry of Agriculture and Forestry)	JS, KH: Noted
11-272	A	6	16	6	16	Reference needed at the end of sentence. (Sean Weaver, Victoria University of Wellington)	KH: See comment 11-267
11-273	A	6	18	6	19	I believe there maybe a more recent and appropriate reference on drought relief e.g. Botterrill (Andrew Ash, CSIRO)	KH: Noted. Will move this sentence to 11.2.3 on current adaptation
11-274	A	6	18	6	19	Eligibility criteria for drought relief have been tightened significantly through time, including over the period referred to. The average, therefore, probably understates impact, particularly in latter years. More recent data is probably available in any event. (Chris Cocklin, Monash University)	KH: Agree. Kevin to seek more recent data from BRS
11-275	A	6	18			"government annual drought" or "US$76 million per year from"? (Greame Pearman, Monash University Sustainability Centre)	KH: Agree. "annual"
11-276	A	6	19			Is this $US76 million per year? If so, add "per year". If not, add "in toto from … to …" (Tom Beer, CSIRO)	KH: Agree. "annual"
11-277	A	6	19			"averaged US$76 million per annum …"? (Barrie Pittock, CSIRO)	KH: Agree. "annual"
11-278	A	6	19			add "per annum" after US$76 million (Gerald Rys, Ministry of Agriculture and Forestry)	KH: Agree. "annual"
11-279	A	6	19	6	19	Presumably the $76m is an average per year? (Adolf Stroombergen, Infometrics)	KH: Agree. "annual"
11-280	A	6	19	6	20	delete sentence "Water shortages in Perth…" (Andrew Watkins, Australian Bureau of Meteorology)	KH: Done
11-281	A	6	19	6	19	O'Meagher (2005) cites Treasury report that "National government drought support	KH: Noted. Consistent with comment 11-273

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						expenditure for the 2002-03 drought is estimated at $1.2 billion (Treasury 2003, pp. 73-74)". [i.e. US$0.9 billion]. O'Meagher, B. (2005). Policy for agricultural drought in Australia: an economics perspective. In "From Disaster Response to Risk Management. Australia's National Drought Policy", edited by L.C. Botterill and D.A. Wilhite, Springer, Dordrecht, p. 139-155. Treasury (2003). Mid-Year Economic and Fiscal Outlook, Canberra. (David White, ASIT Consulting)	
11-282	A	6	19	6	19	add "per annum" after US 76 million.. (Oliver Woldring, NSW Government)	KH: Agree. "annual"
11-283	A	6	20			I suggest that a new paragraph start at: "The El Nino…" (Tom Beer, CSIRO)	KH: Unfortunately, we can't afford the space,
11-284	A	6	21			Reference to drought and job losses. I have not read the refereed article, however was surprised to read about the loss of 70,000 jobs. Currently the general call from rural Australia is a lack of workers and the desire to import workers on a short term basis. Maybe an additional reference is the 2004 Drought Review chaired by Beth Woods - this made reference to the impact of drought on skilled workers and communities. I will send a reference to lead author. (Peter Hayman, South Australian Research and Development Institute)	KH: Noted, reference to job losses removed
11-285	A	6	21	6	21	The meaning of 70,000 jobs lost is unclear. Does it mean that 70,000 people lost their job for a whole year, for a few months, permanently? (Adolf Stroombergen, Infometrics)	KH: see 11-284
11-286	A	6	22	6	23	The sentence starting 'Wildfires affected…' should be moved to after the next sentence.This would mean that the sentence on dam levels would come immediately after the discussion on drought. I believe this makes more sense. (John Garnham, Department of Primary Industries)	KH: Agree
11-287	A	6	22			"In 2003 wildfires …" (Barrie Pittock, CSIRO)	KH: Will be improved by implementing comment 11-286
11-288	A	6	23	6		It is not clear from the sentence beginning with "Dam levels were …" if this refers to Canberra? (Steven Crimp, Queensland Department of Natural Resources and Mines)	KH: Will be improved by implementing comment 11-286 BB: Agree – rewording required
11-289	A	6	23			Cost of wildfire over what period? (Greame Pearman, Monash University Sustainability Centre)	KH: Will be improved by implementing comment 11-286
11-290	A	6	24			Do you want to include more detail - Dam levels at lowest level in Sydney below 40% which has prompted discussion over desalination plant (Tony Coleman, Insurance Australia Group)	KH: Noted. This discussion was prompted by 2005 dam level, not 2002-03. The desal plant has been dropped
11-291	A	6	24	6	24	Where? Some geographic descriptor is required.	KH: The reference to dam levels has been

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Michael Dunlop, CSIRO)	deleted to save space
11-292	A	6	25	6	25	"1997/98 El Nino and 1998/99 La Nina droughts" - although both these years were big droughts in NZ with large economic losses it does seem a bit counter-intuitive reading this that both El Nino and La Nina events results in big droughts - a bit mor clarification might help.. (Andrew Ash, CSIRO)	JS: Noted for clarification and see following comments 11-293, 11-297-301.
11-293	A	6	25			La Nina droughts? I had not realized that La Nina can cause droughts in New Zealand – I thought that it only applied in the Eastern Pacific. Perhaps a word of explanation would help. (Tom Beer, CSIRO)	JS: See 11-292
11-294	A	6	25	6	27	What is the source of these data? (Chris Cocklin, Monash University)	JS: reference is Basher (1998)
11-295	A	6	25			Confusing using both phases of ENSO to explain the NZ droughts - is this correct? (Tony Coleman, Insurance Australia Group)	BF: need to clarify. See 11-92
11-296	A	6	25	6	25	For those not familiar with these droughts labelling one an El Nino and the other La Nina is a (curious) distraction, suggest dropping the names. (Michael Dunlop, CSIRO)	BF: need to clarify. See 11-292
11-297	A	6	25	6	26	Need to make it clearer that NZ has a complex response to ENSO and that droughts can occur in different regions in both El Nino and La Nina years. (Janice Lough, Australian Institute of Marine Science)	JS: See 11-292
11-298	A	6	25			A reference for US$800 million loss from 1997/98 & 1998/99 droughts should be added. (A. Brett Mullan, National Institute of Water & Atmospheric Research Ltd)	JS: reference is Basher (1998)
11-299	A	6	25			…droughts caused combined losses of US$800…' Insert word 'combined'. (Alan Porteous, National Institute of Water & Atmospheric Research (NIWA))	JS: See 11-299
11-300	A	6	25	6	28	Any references for the figures quoted for New Zealand in last sentence? (Andrew Watkins, Australian Bureau of Meteorology)	JS: See 11-299
11-301	A	6	25	6	25	Please provide a literature reference for the US$800K losses from drought . (David Wratt, NIWA)	JS: See 11-299
11-302	A	6	27	6	27	Reference needed at the end of sentence. (Sean Weaver, Victoria University of Wellington)	JS: See 11-299
11-303	A	6	29	6	29	Change sub-heading to "Climate trends and variability". This section also needs to discuss vulnerability to natural variability (eg. ENSO) as greatest threats are likely to come from interaction between natural variability and climate change. (Dean Collins, Bureau of Meteorology)	JS: Agree and need to discuss at Merida
11-304	A	6	29	7	6	The authors may wish to consider mentioning observed changes in ocean currents (eg strengthening of the East Australian Current).	BF: need to do this for all currents where info is available

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						(John Higgins, Australian Greenhouse Office)	
11-305	A	6	31	6	31	Update NZ trend to 1870-2004 period. (Dean Collins, Bureau of Meteorology)	JS: Will use NIWA web reference
11-306	A	6	31	6	32	The temperature rise of 0.7C is unclear from the Folland et al (2003) reference; cf NIWA http://www.niwasciece.co.nz/ncc/clivar/pastclimate#nzat which gives a warming of +1.1C between (1861-70) and (1981-90) and mean air temperatures increasing by 0.12C/decade; the site also provides a NZ annual temperature series for 1855-2004 which might provide a better estimate of observed temperature changes than is evident from the Folland et al (2003) reference. (Janice Lough, Australian Institute of Marine Science)	JS: See 11-305, and will revise.
11-307	A	6	31	6	31	Insert "air" before "temperatures". (Janice Lough, Australian Institute of Marine Science)	JS Agree
11-308	A	6	31	6	32	1870 should be 1871. (Janice Lough, Australian Institute of Marine Science)	JS – see 306
11-309	A	6	31		38	note statements 2 and 3 above (Gerald Rys, Ministry of Agriculture and Forestry)	JS Agree
11-310	A	6	33	6	33	Remove "statistically"; add "number of" before "hot days" (Janice Lough, Australian Institute of Marine Science)	JS Agree
11-311	A	6	35	6	35	Make it clearer which reference refers to the no trend in SW Pacific tropical cyclones. (Janice Lough, Australian Institute of Marine Science)	JS Agree
11-312	A	6	35	6	35	"strength" rather than "magnitude". (Janice Lough, Australian Institute of Marine Science)	JS Agree
11-313	A	6	36	6	36	Reword to make it clearer that the "significant increase to the south" is to the south of NZ. (Janice Lough, Australian Institute of Marine Science)	JS Agree
11-314	A	6	36	6	36	Change "magnitude" to "strength" and add "winds" after "easterly". (Janice Lough, Australian Institute of Marine Science)	JS Agree
11-315	A	6	36			“significant increase” What is that? (Greame Pearman, Monash University Sustainability Centre)	JS Agree
11-316	A	6	37	6	38	Given that this para is about change in climate related attributes, it would be worthwhile indicating here whether the rate of sea level rise has or is showing evidence of increasing over recent decades. Sea level has been increasing at about 1.5mm/yr for a very long time so climate chnage should refer to a chnage to this background rise. (Roger Gifford, CSIRO)	BF: need to clarify KH: Cite paper by Church and White (2006) on accelerating SLR
11-317	A	6	37			not clear where this refers to, south of the main islands of NZ, of south of NZ as a	BF: need to clarify

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						whole (i.e. southern ocean) (Stephan Halloy, Instituto de Ecología, Universidad Mayor de San Andrés)	
11-318	A	6	37			"south" of what? "sea-level" (Greame Pearman, Monash University Sustainability Centre)	BF: need to clarify
11-319	A	6	38			add in: " (Bell et al. 2001; Hannah, 2004). Ref: Hannah, J (2004). An updated analysis of long-term sea level change in New Zealand. Geophysical Research Letters, Vol 31, L03307, 4 p. (Robert Bell, National Institute of Water & Atmospheric Research (NIWA))	BF: need to include these
11-320	A	6	38	6	38	The most recent, definative study of sea-level rise in New Zealand is found in Hannah (2004). "An updated analysis of long-term sea level change in New Zealand", Geophysical Research Letters, (31), L03307. It concludes that relative sea level rise is 1.6 mm/yr with a standard deviation of +/- 0.2 mm/yr. (John Hannah, University of Otago)	JS: Agree. Will be included
11-321	A	6	38	6	38	Add "since 1900" after "year". (Janice Lough, Australian Institute of Marine Science)	JS Agree
11-322	A	6	38	6	38	Account for the difference in relative sea level between NZ and Australia for transparency and to enhance policy relevance. (Sean Weaver, Victoria University of Wellington)	KH: Seek advice of John Church. See 11-352
11-323	A	6	40	6	51	This is very information-rich and some of these trends would lend themselves very well to graphical representation, which would reveal absolute changes as well as rates. (Rod Anderson, Department of Sustainability & Environment)	KH: Noted. Nice idea if space is available
11-324	A	6	40			Rephrase temperature change to units of degreesC rather than than degree C/year. The latter, while statistically valid, is quite confusing and physically meaningless. (David Jones, Australian Bureau of Meteorology)	KH: Disagree. Would rather insert the total warming values than replace the annual trend values
11-325	A	6	40	6	51	Should the recent papers by Karoly & Braganza (2005) be referenced as they conclude that recent temperature changes in Australia can be atributed the enhanced Greenhouse? J Climate 18: 457-464 and Meteorol Atmos Phys 89: 57-67 (Janice Lough, Australian Institute of Marine Science)	KH: Noted. Probably need a paragraph on attribution since policy-relevant
11-326	A	6	40	6	51	Need update on continuing rainfall decline in the SW of WA (see Figure 11.4) (Barrie Pittock, CSIRO)	BB: will do
11-327	A	6	41	6	41	The Nicholls and Collins paper is yet to be accepted. An alternative reference is: Della-Marta, P.M., Collins, D.A., and Braganza, K. 2004. Updating Australia's high-quality annual temperature dataset. Aust. Met. Mag., 53, 75-93. (Dean Collins, Bureau of Meteorology)	KH: Noted, but the AMM paper doesn't have trends up to 2004. Neville Nicholls says the E&E paper has been accepted.
11-328	A	6	42	6	44	Change to "...an increase in the annual frequency of hot days/hot nights/cold days/cold nights". Or it might be better to talk about trends in numbers of daily	KH: Noted. Will read Griffiths et al (2005) and make a decision

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						temperature extremes in a qualitative sense and leave trend values out. The units for the trends are really days(or nights)/year/year which could confuse some readers. The trends are qualitatively consistent with those of Griffiths et al (2005) which covers both countries. [Griffiths, G.M., + 21 others. 2005. Change in mean temperature as a predictor of extreme temperature change in the Asia-Pacific region. Int. J. Climatology, 25, 1301-1330. (Dean Collins, Bureau of Meteorology)	
11-329	A	6	44	6	44	Alternative reference: Collins, D.A., Della-Marta, P.M., Plummer, N. and Trewin, B.C. 2000. Trends in annual frequencies of extreme temperature events in Australia. Aust. Met. Mag., 49, 277-292. (Dean Collins, Bureau of Meteorology)	KH: Noted but trends not updated to 2004
11-330	A	6	45	6	46	Change to "…and much of southern and eastern Australia has become drier…" (Dean Collins, Bureau of Meteorology)	KH: Agree
11-331	A	6	45	6	45	Change "North-eastern" to "North-western". (Dean Collins, Bureau of Meteorology)	KH: Agree
11-332	A	6	45	6	45	The text indicates that north-eastern Australia has become wetter. This is not an accurate statement. The Australian Bureau of Meteorology maps show that north-eastern Australia has become drier since 1950 with only the Cape York region demonstrating an increasing rainfall trend. (Steven Crimp, Queensland Department of Natural Resources and Mines)	KH: Agree
11-333	A	6	45	6	46	North western Australia, and a band through to the Great Australian Bight, has become wetter, while northeastern Australia and much of southern Australia has become drier since 1950. (BoM Trend maps) (Elizabeth CURRAN, Bureau of Meteorology)	KH: Agree
11-334	A	6	45	6	46	North-WESTERN Australia has become wetter since 1950. Note also that the 1950s were the wettest decade. Note that much of southern Australia has wetted since 1900. See note 3. Without such qualification the chapter continues to give the impression that climate change dries Australia and that this has been happening. (Graham Farquhar, Australian National University)	KH: Agree
11-335	A	6	45	6	46	Smith (2004) shows for the period 1901 to 2002 a trend towards wetter conditions for "all-Australian" rainfall and this is mostly due to increases in summer rainfall over western, northern and central Australia since 1952 rather than "North-eastern Australia". (Janice Lough, Australian Institute of Marine Science)	KH: Agree
11-336	A	6	45			Shouldn't this read "North-western"? (Greame Pearman, Monash University Sustainability Centre)	KH: Agree
11-337	A	6	45			"North-eastern" should be "North-western" surely?	KH: Agree

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Barrie Pittock, CSIRO)	
11-338	A	6	45	6	45	"North-eastern" should be "North-western". (Andrew Watkins, Australian Bureau of Meteorology)	KH: Agree
11-339	A	6	46	6	48	Are the examples given here selective? Are there examples of trends going in another direction - or with no trend at all? (Rod Anderson, Department of Sustainability & Environment)	KH: Significant trends in both directions are given. No point mentioning where there's no trend.
11-340	A	6	46			North-eastern should read north-western. More factually, the western 2/3rds of Australia have become wetter since 1950 (with the exception of a small coastal strip near Perth), while the eastern 1/3rd has become generally drier. (David Jones, Australian Bureau of Meteorology)	KH: Agree
11-341	A	6	46	6	46	I think that something like "the intensity of recent Australian droughts has increased due to warmer temperatures" is better than just "Doughts have become hotter". (Janice Lough, Australian Institute of Marine Science)	KH: Agree
11-342	A	6	46	6	46	What does the sentence "Droughts have become hotter" mean? (Paolo Reggiani, Delft Hydraulics)	KH: Noted. See comment 11-341
11-343	A	6	46	6	46	Rather bald statement by Nicholls (2004) that "Droughts have become hotter" - are there no data that they have already become more or less frequent, of shorter or longer duration, of greater or lesser intensity .. since records began? Ferguson (Geog, ANU) points to shifts in growing season across eastern Australia. There was a very significant climate shift in the late 1940s in eastern Australia in which annual median rainfall increased significantly. What is the effect of shifting temperatures on evaporation rates? (David White, ASIT Consulting)	KH: Noted. See comment 11-341. Trends in pan evaporation will be mentioned
11-344	A	6	46			Droughts have become hotter'. Should this be rewritten as 'droughts have become more prolonged and average temperatures have increased? (David Whitehead, Landcare Research)	KH: Noted. See comment 11-341
11-345	A	6	46	6	48	Can detail be added - eg how many degrees warmer have droughts become, how many % has rainfall decreased in the SW? (Oliver Woldring, NSW Government)	KH: Noted. See comment 11-341
11-346	A	6	47	6	48	Maybe add "intensity and frequency" before "extreme rainfall". (Janice Lough, Australian Institute of Marine Science)	KH: Agree
11-347	A	6	48	6	50	Could add that there has been little study of trends in storms and other weather phenomena due to the sparcity of suitable data. (Dean Collins, Bureau of Meteorology)	KH: Agree
11-348	A	6	48		50	Suggest not referencing TC activity for the 1967- present period as the data quality does not support statements about actual trends. The post-GMS satellite record	KH: Agree

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						(1981 onwards) shows a near zero trend, reflecting an increase in intense systems and a slight reduction in weak and moderate events. Yuriy Kuleshov (y.kuleshov@bom.gov.au has written two Australian Bureau of Meteorology reports which cover this issue). (David Jones, Australian Bureau of Meteorology)	
11-349	A	6	49	6	50	add "tropical" before "cyclone"; Should also refer Nicholls et al (1998) paper on tropical cyclone changes as both the Kuleshov and Hennessy papers referred to are only conference abstracts from which it is hard to glean the conclusions given here. (Janice Lough, Australian Institute of Marine Science)	KH: Noted. Will insert "tropical". The Nicholls et al (1998) paper is too old. The Hennessy paper is 8 pages long, not an abstract. The Kuleshov paper is 2 pages, but a more appropriate paper in AMM can be cited.
11-350	A	6	49	6	49	Is the decrese significant - suspect not. Should also say "teopical" cyclone rather tha just "cyclone". (Andrew Watkins, Australian Bureau of Meteorology)	KH: Agree
11-351	A	6	49	6	49	The use of an odd date like 1967 rings the cherry picked data alarm - can there be a few words on why this date was used. Also, if there isn't much confidence in the cyclone trends, which I suspect is the case - perhaps this should be stated more clearly here? (Oliver Woldring, NSW Government)	KH: Noted. See comment 11-348
11-352	A	6	50			In line 38 the sea level rise is given with uncertainty bounds. Here it is given as an exact 1.2 mm/year. This may be a typographical error and 1-2 mm/year may have been intended (as on line 6 of page 3) but if not then uncertainty bounds need to be given. (Tom Beer, CSIRO)	KH: Church et al (2004) state "about 1.2 mm/year" – they don't give uncertainty bounds. On page, we say 1-2 mm/year since the NZ estimate is 1.7±0.4 and the Aus estimate is 1.2.
11-353	A	6	50	6	50	The discussion regarding increases in cyclone intensity should be qualified by the measure of central tendency used i.e 970hPa. (Steven Crimp, Queensland Department of Natural Resources and Mines)	KH: Agree. Intensity is measures by central pressure
11-354	A	6	50	6	51	Given that this para is about change in climate related attributes, it would be worthwhile indicating here whether the rate of sea level rise has or is showing evidence of increasing over recent decades. (Roger Gifford, CSIRO)	KH. Noted. Comment 11-316
11-355	A	6	51			Church 2004 should be Church et al. 2004. (Tom Beer, CSIRO)	KH: Agree
11-356	A	6	51	6	51	The reference should be (Church et al, 2004) (John Hannah, University of Otago)	KH: Agree
11-357	A	6				the sensitivity section should mention the issue of health effects (Stephan Halloy, Instituto de Ecología, Universidad Mayor de San Andrés)	JS: Will do
11-358	A	7	0			Shouldn't there be a sub-heading "Australia" in the table at the top as there is for	KH: Agree

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						"New Zealand" further down? (Greame Pearman, Monash University Sustainability Centre)	
11-359	A	7	0			Need to mention the difference between observed changes and patterns of variability for these phenomena. (Sean Weaver, Victoria University of Wellington)	KH: Noted. Need to state whether changes are statistically significant.
11-360	A	7	2	7	4	The first sentence regarding observed sub-Antarctic climate change should be quantified in-keeping with the rest of the section. (Steven Crimp, Queensland Department of Natural Resources and Mines)	LH: I have inserted a new reference with a quantified temperature increase but no details available on the details of the other changes
11-361	A	7	2	7	4	The Frenot et al (2005) is not a very convincing reference for these conclusions. (Janice Lough, Australian Institute of Marine Science)	LH: I have checked Frenot et al 2005 and the statement is a fair reflection of the paper. I have added an additional reference, Tweedie and Bergstrom (2000) with some details of the temp increase
11-362	A	7	2	7	2	Add "air" before "temperature". (Janice Lough, Australian Institute of Marine Science)	LH: done
11-363	A	7	2	7	5	Need coordinates for islands as relevant to understanding. Could add that these trends are clearly not due to urban heat island effects! (Barrie Pittock, CSIRO)	JS Agree LH: Kevin, I could put these in but it would break up the para a lot – let me know
11-364	A	7	2	7	2	By what margin has Macquarie Island experienced increased temperature, wind speed, precipitation, and evapo-transpiration? (Sean Weaver, Victoria University of Wellington)	LH: see comment 11-360 above
11-365	A	7	3			Is there direct evidence that evaporation has increased? (David Whitehead, Landcare Research)	KH: Noted. Pan evap changes in ANZ will be mentioned
11-366	A	7	4	7	4	Add "air" before "temperatures". (Janice Lough, Australian Institute of Marine Science)	JS Agree
11-367	A	7	5	7	5	"loss of 'permanent'" should be changed to "reduced area of year round" (Andrew Watkins, Australian Bureau of Meteorology)	JS Agree
11-368	A	7	5	7	5	delete "," after Island (David White, ASIT Consulting)	JS Agree
11-369	A	7	7	7	7	Can anything be said about water temperature changes around Australian and NZ? Eg Lough, J.M., 2001. Climate variability and change on the Great Barrier Reef. In: Oceanographic processes of coral reefs: physical and biological links in the Great Barrier Reef, E. Wolanski (ed), CRC Press, Bocan Raton, Florida, pp.269-300 reports SST increases on GBR & I am sure there will be other published sources on SST changes around the 2 countries. (Janice Lough, Australian Institute of Marine Science)	JS: Good point – add in trends in surface ocean temperature around NZ from Folland et al 2003
11-370	A	7	10	7	10	Table numbering needs fixing.	KH: Noted

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						(Julia Becker, Institute of Geological and Nuclear Sciences)	
11-371	A	7	10			The table numbers are incorrect. (Tom Beer, CSIRO)	KH: Noted
11-372	A	7	10	7	11	Point should be made that to date there have been relatively few studies specifically aiming to detect climate change effects on biodiversity…(although this is certainly changing) (Oliver Woldring, NSW Government)	LH: have made this point re NZ, also true in Aust but there is more than inNZ
11-373	A	7	13			Table 11.1 Add Jones' work on western victorian lakes Modelling historical lake levels and recent climate change at three closed lakes, Western Victoria, Australia (c.1840-1990) Jones R.N; McMahon T.A.; Bowler J.M.Journal of Hydrology, Volume 246, Number 1, 1 June 2001, pp. 159-180(22) Elsevier Science (Rod Anderson, Department of Sustainability & Environment)	KH: Noted
11-374	A	7	13			Table 11.1 - I think some care needs to be exercised in making the link between observed changes in ecosystems and links to climate change based on published studies. For example, the semi-arid woodlands example the vegetation thickening can be explained by management (grazing, fire supression) and natural climate variability (thickening occurring during a wet period and linked to two large recruitment events Fensham 2005. While a link to CO2 increase has been made this was through a very synthetic modelling study looking at different leaf forms and their simulated photosynthetic response to CO2 (Berry and Roderick 2002). While I personally think CO2 is playing a role and results from a Savanna FACE experiment strongly support this the published evidence for Australia and NZ is currently weak. (Andrew Ash, CSIRO)	LH: agree but wording actually says" partially linked to increased CO2" Wording now reads "Increase in woody biomass ("vegetation thickening"), partially linked to increased atmospheric CO_2 although changes in fire regimes and management also implicated"
11-375	A	7	13			Table 11.1 – I was surprised to note that the reference for "flowering phenology" is a paper 'in review'. I thought that IPCC Assessment Reports reviewed only published literature. (Tom Beer, CSIRO)	LH: ref is actually an abstract plus conference presentation, if we can't cite this type of source I'll remove row
11-376	A	7	13	7		Table 11.1: all examples are negative ones . A fair assessement should also include positive effects (Yves Bergeron, université du québec en Abitibi-Témiscamingue)	LH: disagree, table makes no judgement as to whether trends are positive or negative, just reports trends
11-377	A	7	13	7		T 11.1 Are the first examples in the table for Australia? (Encinas Carla , IPCC WG2 TSU)	LH: Australia heading now added
11-378	A	7	13	8		Table 11.1, Need additional reference in the bird section as changes in arrival and departure dates of birds in semi-arid regions not covered by listed papers.	LH: now included

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						Reference to add: Chambers, L.E. 2005. Migration dates at Eyre Bird Observatory: links with climate change? Climate Research 29, 157-165. (Lynda Chambers, Bureau of Meteorology Research Centre)	
11-379	A	7	13	8	4	Tables 11.1 and 11.2 could be combined. (Dean Collins, Bureau of Meteorology)	LH: agree, have done
11-380	A	7	13			Table11.1 Suggest moving reference to rats on Macquarie Island to table 11.2 (unless for some strange reason MaqI s is not technically sub Antarctic?? (Michael Dunlop, CSIRO)	LH: agree, have done
11-381	A	7	13			Table 11.1, section on marine invertebrates. The observed change stated in the table is very much supposition. With respect to The range extension of Carcinus maenus, this was acknowledged as such in the Thresher paper in p8, column 2, first para. The Edgar book does not draw any conclusion re extension of the sea urchin. Therefore I do not believe the conclusions of the observed changes are valid w.r.t linking them to climate change, based on the references cited. (John Garnham, Department of Primary Industries)	LH: examples removed
11-382	A	7	13			Table 11.1: Insert Australia as first subtitle. For New Zealand, insert alpine vegetation (Mark, A.F. and Wilson, J.B., 2005. Tempo and mode of vegetation dynamics over 50 years in a New Zealand alpine cushion/tussock community. Journal of Vegetation Science, 16, 227-236.) Regarding treeline, see a different view in Cullen, L.E., Stewart, G.H., Duncan, R.P. and Palmer, J.G., 2001. Disturbance and climate warming influences on New Zealand Nothofagus tree-line population dynamics. Journal of Ecology, 89, 1061-1071. (Stephan Halloy, Instituto de Ecología, Universidad Mayor de San Andrés)	LH: Neither refs provide evidence of climate change-induced vegetation change. I have deleted row (see next comment)
11-383	A	7	13			Table 11.1. Under 'New Zealand Sub-alpine vegetation', the observed change seem to be "no change". Seems odd. (Wendy Lawson, University of Canterbury)	LH: point taken, row deleted
11-384	A	7	13			Table 11.1. It is not clear why this table focuses only on ecosystems and species. For example, there has been significant glacier change in New Zealand linked to climate change, an dit is not clear where this can be indicated in this Section, although it should be. (Wendy Lawson, University of Canterbury)	LH: Have changed title of table to remove "ecosystems" and replace with "natural systems". Now includes reference to glaciers and Victorian lakes
11-385	A	7	13	7	13	Need to make it clear that the first past of Table 11.1 refers to Australia. (Janice Lough, Australian Institute of Marine Science)	LH: done
11-386	A	7	13	7	14	Table 11.1. Second entry (rainforest), col.2. This is regional only. Fifth entry (coral reefs), col.2. State that unusually high SSTs are result of El Nino plus ongoing warming trend. (Barrie Pittock, CSIRO)	LH: relevant states where rainforest expansion has occurred now included in entry. Re corals: Ove H-G was happy with table entry but will recheck with him.

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11-387	A	7	13			Table 11.1: In the entry for sub-alpine vegetation, I don't understand the meaning of "but" - shouldn't this rather be "this is consistent with". However, re snow storage: I'm missing an entry about the 30% loss of ice and glacier mass in New Zealand alps (as per Salinger and Chinn studies); I'm also not sure how the statement about little seasonal trend in snow storage fits with this 30% loss of glacier mass. (Andy Reisinger, Ministry for the Environment)	LH: row on sub-alpine veg deleted (see response to comment 11-383). Row on glacier changes now included
11-388	A	7	13	8	11	Tables 11.1 and 11.2 present interesting observations attributed to changing climate. But the details in this Tables require more discussion - what is the significance of all these changes? The brief sentence on page 7 lines 10-11 is not enough. Also, the paragraph on page 8 lines 6-11 seems out of place as this does not follow on from the previous page (David Whitehead, Landcare Research)	LH: agree there should be more explanation but there is simply no space for a fuller explanation. It is hoped that readers will consult the rlevant references for further details. Details about trends in snow and ice now included in Table 11.1
11-389	A	7	13			Table 11.1 Regarding Insects. This is really a very interesting study. Would it be fair to say this is one of the few that set out specifically to detect climate change effects? This may be worth mentioning. Also, how many Km is 4 degrees? (Oliver Woldring, NSW Government)	LH & KH: 4 degrees is about 400 km, now included
11-390	A	7	13			Table 11.1 Regarding Hughes study of rainforest/woodland ecotone. Am surprised that an expansion of rainforest was observed. I have seen this in the Lamington Ranges but there it was thought to be driven by the land managers exclusion of fire. On the Atherton Tablelands its the opposite - again, driven by hotter unmanaged fires. (Oliver Woldring, NSW Government)	LH: Hughes cited as a review to save on ref space, not as originator of work. See response to comment 11-386 Interraction with fire regimes noted in table.
11-391	A	7	13			Table 11.1 Regarding Flowering phenology - can this be described more simply - eg what was the mean and standard deviation of the advancement (Oliver Woldring, NSW Government)	LH: Agree, will clarify, this ref may not be used due to its greyness
11-392	A	7	13			Table 11.1: I think there should be a heading "Australia"before the table row beginning "Semi-arid woodlands …" ? (David Wratt, NIWA)	LH: Agree, done
11-393	A	7	14	7	14	Add a subheading for "Australia" in the table (Julia Becker, Institute of Geological and Nuclear Sciences)	LH: Agree, done
11-394	A	7	14			Note that for all Table captions they should stand alone, having sufficient detail that the reader can understand the contents without reference to the text. This is not universally the case through this Chapter (Greame Pearman, Monash University Sustainability Centre)	BF: Noted
11-395	A	7	14			Add a heading of "Australia" at the top under Taxa column (Gerald Rys, Ministry of Agriculture and Forestry)	HLS: Agree, done
11-396	A	7	14	7	14	Table 11.1 Birds: I thought that a particularly vulnerable (and in part observed) area	LH: Agree that these areas will be vulnerable

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						was the breeding activity of colonial water birds in the Macquarie Marshes. E.g. Briggs, S.V. and Thornton, S.A. (~2000). Management of water regimes in River Red gum Eucalyptus camaldulensis wetlands for waterbird breeding. Australian Zoology ****. Kingsford, R.T. and Johnson, W. (1998). Impact of water diversions on colonially nesting water birds in the Macquarie Marshes in arid Australia. Colonial Waterbirds 21, 159-170. (David White, ASIT Consulting)	(as noted elsewhere in chapter) but this table is on observed changes associated with climate changes so the references suggested are not appropriate
11-397	A	7				Table 11.1 A sub-heading ('Australia') needs to be inserted immediately below the column headings. (Chris Cocklin, Monash University)	LH: Agree, done
11-398	A	8	2			Table 11.2 - I question the vertebrate example. Is this a result of climate change or a legacy and lag effect from no longer harvesting seals, or because fishing practices are providing additional food resources? I suspect some of the latter - there is some evidence for this in fur seals off the West Coast of the South Island of NZ with respect to the hoki fishery (you could ask DoC about this). (Ken Hughey, Lincoln University)	LH: I've expanded the entry slightly to indicate that the changes are linked to changes in food supply, oceanic circulation and warming
11-399	A	8	6			"Recent switches between glacial advance and retreat…" What does this mean? (Tom Beer, CSIRO)	KH: Blair to address
11-400	A	8	6	8	11	Green 2003 states that there has been a 30% in snow cover in the Snowy Mountains over the last 45 years and that there has been an observed earlier ice breakup at Blue Lake. Green, K. 2003. Impacts of global warming on the Snowy Mountains. Pp 35-36 in Climate change impacts on biodiversity in Australia. Outcomes of a workshop sponsored by the Biological Diversity Advisory Committee, 1-2 October 2002. (Lynda Chambers, Bureau of Meteorology Research Centre)	KH: Noted. Will cite along with snow paper by Nicholls (in press, AMM)
11-401	A	8	6			paragraph is unclear or misleading. P3 l5 says major decrease in glaciers. Although the statement here is not entirely contradictory, it should be placed in that context. (Stephan Halloy, Instituto de Ecología, Universidad Mayor de San Andrés)	BF: Noted
11-402	A	8	6	8	7	There has been some recent very imoprtant empirical work looking at glacier change and climate relationships in New Zealand that would be a more definitive source to support the comment about the link with precipitation, but also to indicate that the main cause of variation is temperature. Anderson, B.S. 2004 The response of Ko Roimate o Hine Hukatere Franz Josef GLacier to Climate Change:. PhD thesis, University of Canterbury, New Zealand. This reference is at least as accessible as some of the other sources cited, and papers from it are currently in review with international journals. (Wendy Lawson, University of Canterbury)	JS: Noted and will update

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11-403	A	8	7			Replace ENSO events with El Nino events. (David Jones, Australian Bureau of Meteorology)	KH: Agree
11-404	A	8	7	8	7	"increased ENSO events" - does this refer to frequency and/or intensity? Make clearer. (Janice Lough, Australian Institute of Marine Science)	KH: See comment 11-403
11-405	A	8	8	8	9	"…no discernible trend in seasonal snow in the Southern Alps since 1930"? This statement needs clarification given that an increase in snow west of the divide has led to glacial advances on the West Coast and shifts in ski season east of the divide… (Sean Weaver, Victoria University of Wellington)	JS: Clarify difference between seasonal snow and permanent snow and ice.
11-406	A	8	9	8	9	I understand that there has been a 30% loss of glacier and ice mass in the New Zealand alps (Salinger and Chinn studies). I'm not sure how this fits with the statement about no discernable trend in seasonal snow. Also the overall statement about the loss of glacier mass is important big-picture information that should be in this report, unless there are doubts about the validity of the findings. (Andy Reisinger, Ministry for the Environment)	JS: See 11-406
11-407	A	8	9	8	9	The southern alps is in NZ? (Oliver Woldring, NSW Government)	KH: Agree
11-408	A	8	11			…mainly due to higher temperatures…' Suggest use word 'higher' not 'warmer'. (Alan Porteous, National Institute of Water & Atmospheric Research (NIWA))	KH: Agree
11-409	A	8	16	8	16	Suggest adding "Human" population at beginning. (Michael Dunlop, CSIRO)	
11-410	A	8	16	8	20	This paragraph does not pass the "so what?" test. The significant demographic for NZ is not the growth numbers which are insignificant but the level of coastal development in some specific places that are vulnerable. MFE should be able to give you information on this. I suggest the whole para be re written and focus on what is significant for NZ and climate change impacts. (Judy Lawrence, PSConsulting)	BF: will clarify
11-411	A	8	18	8	19	this is ambiguous - it suggests the pop increase was concentrated in Syd, melb, bris … not the pop it self (Michael Dunlop, CSIRO)	
11-412	A	8	18	8	20	Include percentage of population growth in Australia between 1995 and 2004, like for NZ (Paolo Reggiani, Delft Hydraulics)	KH: will consult Bob Birrell
11-413	A	8	18	8	19	Perhaps describe the demographics with current population, current growth rate, and projected maximum. (Oliver Woldring, NSW Government)	KH: Projections given in 11.3

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11-414	A	8	22	8	29	Add daily per capita water consumption for New Zealand and Australia at it is very high with respect to OECD country average. (Paolo Reggiani, Delft Hydraulics)	BB & JS to find data
11-415	A	8	23	8	23	What are "environmental flows"? (Janice Lough, Australian Institute of Marine Science)	BB to define
11-416	A	8	24	8	25	"increased at around 55%.." does this mean an overall increase of >200% since 1960s? (Janice Lough, Australian Institute of Marine Science)	JS to clarify
11-417	A	8	25	8	27	"still pose major stresses" - stresses on what? Unclear. (Janice Lough, Australian Institute of Marine Science)	KH: Stresses on sustainable NRM
11-418	A	8	27			Suggest replacing "still pose" with "are a cause of" (Rod Anderson, Department of Sustainability & Environment)	KH: Agree
11-419	A	8	28	8	29	Can the 1996/7 be simply 1997. (In some countries financial years equal calendar years). (Oliver Woldring, NSW Government)	KH : Agree
11-420	A	8	31	9	2	The importance of including this info is not clear to me. We say earlier that there should be more water available for hydro power generation in NZ. (Rod Anderson, Department of Sustainability & Environment)	BF will clarify
11-421	A	8	31	8	32	Although it is clarified later in the chapter, it would be appropriate to indicate here that most of NZ's 'renewable' electricity is sourced from hydro. (Chris Cocklin, Monash University)	BF: will clarify
11-422	A	8	32			renewables: mostly hydroelectric (Stephan Halloy, Instituto de Ecología, Universidad Mayor de San Andrés)	BF: will clarify
11-423	A	8	32	9	1	The reference to consumtion is unclear whether this is primary energy demand or electricity. Also the NZ growth figure is a projection and the Australian figure is what has happened. It would be better to use projections or use both projections and past growth. (Judy Lawrence, PSConsulting)	BF: will clarify KH: Delete reference to projections (belongs in 11.3) and give estimate of observed trend - Jim
11-424	A	8	32	8	32	Replace "renewables" with "renewable energy sources" (Janice Lough, Australian Institute of Marine Science)	
11-425	A	8	32			add "ie hydro electric power" after renewables (Gerald Rys, Ministry of Agriculture and Forestry)	BF: Noted
11-426	A	8	32		33	The MED had numerous energy projections in the given publication. It would be useful to the reader to indicate whether the 1.2% pa is a above, below on a par with recent history. (Adolf Stroombergen, Infometrics)	BF: need to clarify
11-427	A	8	33			"Over 60%" is not incorrect but misleading. The number has been "about 85%"	KH: Noted

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						from black coal and brown coal generation for the last few years. Source the esaa publication "Electricity and Gas Australia 2005", available from esaa. Also about 7% from both gas generation and hydro generation. (Richard HOY, Energy Supply Association of Australia)	
11-428	A	8	33			Also see p12 at 43: electricity consumption figures need checking: 1.2% pa on p8 and 0.6% on p12. (Ken Hughey, Lincoln University)	BF: need to clarify KH: 1.2% for electricity and 0.6% for total energy – this is clear on page 12. See comment 11-423
11-429	A	8	33	8	33	Is the 60% figure correct? Seems very low - over 90% in NSW (Oliver Woldring, NSW Government)	KH: Noted. See comment 11-427
11-430	A	9	0			Tables 11.3 and 11.4: on Natural Systems: The NZ Resource Management Act amendment was passed in 2004, not 2003. The RMA amendment should also be noted under "adaptation in human systems" since it equally (if not more importantly) directs decsions with regard to coasts, settlements, infrastructure etc. Given its overarching role, it may be useful to add another separate row in this table entitled "cross-cutting actions". The purpose of the RMA amendment (and guidance material, training etc) is by its nature not focused on any one specific outcome or sector. (Andy Reisinger, Ministry for the Environment)	BF: will clarify LH: year of amendment corrected, will leave it for Dick or Blair to decide if it's now in the appropriate place
11-431	A	9	2			Actually these figure come from ABARE in the first instance I believe. At least ABARE states that we will need 2.1% growth per year every year through this and the next decade. (Greame Pearman, Monash University Sustainability Centre)	KH: Noted, but this section is dealing with current stresses / trends. Future trends are covered in section 11.3 (page 12 line 31)
11-432	A	9	2	9	2	May be worth making the point here about the reliance of many power stations river water for cooling.. Refer to recent AGO study - should be on their website. Otherwise speak to Chris Hepplethwaite at the AGO.. (Oliver Woldring, NSW Government)	KH: Agree
11-433	A	9	5	10		Section 11.2.3 - It is difficult to get a sense from this section for how comprehensive current adaptation programs are in NZ and Australia. The approach of using a table to list current activties is OK but I think there needs to be a bit more context provided in the introductory text in this section. For Australia, the National Climate Change Adapatation Programme needs to be included in one or both of the tables. There is also an issue about structure in whether this section should in fact be included as part of 11.5 on Adaptation (see comment below) (Andrew Ash, CSIRO)	BF: moving 11.5.1 here will address this issue KH: Agree with idea of setting the context better, especially the difference between legislation and implementation. Will mention the Adaptation Programme. Comment on adaptive capacity – provides some justification for faded rainbow diagram LH: 11.5 now brought into this section, National Climate Change Adaptation Program now in first para

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11-434	A	9	5	10		T 11.4 would be better in S 11.5 which is missing the part of practices and options. This table is very useful and clear. (Encinas Carla , IPCC WG2 TSU)	KH: See comment 11-433. This structure is prescribed by the IPCC LH: see previous comment re new structure
11-435	A	9	5	10	1	Some mention of the National Climate Change Adaptation Programme, which commenced in July 2004, would be appropriate in this section. (John Higgins, Australian Greenhouse Office)	LH: See comment 11-433
11-436	A	9	5	10	1	This section needs to at least mention questions of costs, adequacy, conflicts and co-benefits of adaptation. In Table 11.4, references to Harvey and Caton 2003 are wrongly punctuated. Also "BASIX Sustainability Index" needs explanation or reference, and entry re Agriculture should raise question as to whether the adaptation by drought-support programs is appropriate or making things worse if restructuring of industry is a better response to climate change. Last entry in this table (water) needs mention of desalinisation as this is proposed in Perth and Sydney. (Barrie Pittock, CSIRO)	KH: See comment 11-433. Will fix references. Will ask BRS if there are any references to cite about restructuring the agriculture industry. Will mention desalination.
11-437	A	9	6			Somewhere, and I think here is the spot, need to make the point that we are in the very early stages of dealing with adaptation to climate change. In most cases the first steps towards adaptation will simply be sector and regionally specific assessments of vulnerability. (Rod Anderson, Department of Sustainability & Environment)	KH, RW & LH: See comments 11-433 & 11-1166
11-438	A	9	7			There is no prior discussion of the interaction of natural variability and climate change. A few sentences are required, perhaps here. (Greame Pearman, Monash University Sustainability Centre)	KH, LH: Will do
11-439	A	9	7			Again, details are provided in Table 11.3 but more comment is needed to summarise the message from the Table contents (David Whitehead, Landcare Research)	KH: See comment 11-433
11-440	A	9	8	9	8	Table numbering needs fixing. (Julia Becker, Institute of Geological and Nuclear Sciences)	KH: Noted
11-441	A	9	8			The table numbers are incorrect. (Tom Beer, CSIRO)	KH: Noted
11-442	A	9	10			Table 11.3 6th Row - The National Action Plan on Biodiversity and Climate Change is a document that is reasonably comprehensive in scope. It is not restricted to increasing knowledge, but includes research, planning and management actions. (Rod Anderson, Department of Sustainability & Environment)	KH, LH: Noted, will add these words LH: done in relation to the action plans in general, not just the Biodiversity one
11-443	A	9	10	10	12	I am not comfortable with the tables being split into 'natural ecosystems' and 'human systems' as I feel there is a lot of cross over between the two (esp where	BF: need to address this valid point KH, LH: Can't fit a long table on one page, so

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						'legislaion' (a humen element') is protecting 'ecosystems' (natural)). Would suggest simply making it one table of 'current adaptation strategies'. (Julia Becker, Institute of Geological and Nuclear Sciences)	perhaps not this issue in the opening paragraph LH: tables now being incorporated in text
11-444	A	9	10			Table 11.3 – DPMC 2004 is not a relevant reference for the EPBC Act or the strategy of adaptation of natural ecosystems. In fact, it is wrong. I would have like to follow up on the Baker McKenzie 2004 reference under Settlements but note that there the reference list has no title for this. (Tom Beer, CSIRO)	LH: table now removed, EPBC Act now mentioned in text, no reference needed KH: Will get reference to Baker and McKenzie (2004)
11-445	A	9	10	9		table 11.3: In what respect having a representative reserve systems is an adaptation to climate change. One could say that the protection of small azonal ecosystems is a better way to cope with a changing climate (Yves Bergeron, université du québec en Abitibi-Témiscamingue)	LH: disagree, I think it's critical, can expand rationale if there's space
11-446	A	9	10			Tables 11.3 and 11.4, some inconsistencies in punctuation. (Lynda Chambers, Bureau of Meteorology Research Centre)	KH: Noted, will put full-stops at the end of each statement LH: tables removed
11-447	A	9	10			Table 11.3. This table is misleading, as it is not about the adaptation of natural ecosystems at all. It lists a selection of regulatory and management responses to the need for environmental protection - this is a human adaptation, not a natural one. Moreover, several of the legislative and policy responses are not actually responses to climate change, either directly or indirectly. Indeed, even the Australian EPBC does not list climate change as a nationally significant issue! (Chris Cocklin, Monash University)	LH: we could change the title to better reflect contents KH: See comment 11-444 LH: see 11-446. EPBC Act lists cliamte change as a Key Threatening Process – this is now in the text
11-448	A	9	10			Table 11.3. Suggest adding the Reef Water Quality Plan that is seeking to increase the quality of water (less sediment, nutrient, pollution) in the reef lagoon, which is believed will increase the resilience of the corals (greater recovery from bleaching). (Michael Dunlop, CSIRO)	KH: Agree LH: This plan is now mentioned in the GBR box
11-449	A	9	10			Table 11.3. Suggest adding that very broadscale connectivity objectives have been incorporated into conservation planning in several states (eg, NT, SA, check with WildCountry) (Michael Dunlop, CSIRO)	LH: done
11-450	A	9	10			Table 11.3. Suggest adding reference to the National Water Initiative that is confirming flow rights to the environment, and addressing over allocation in affected catchments. (Michael Dunlop, CSIRO)	KH: Agree BB: Agree LH: done
11-451	A	9	10	10	12	There should be reference in the coastal column, Settlements, tourism columns especially of the NZ MFE guides for local authorities for taking climate change into account. These are referenced in 11.4.5 Coasts line 42-44 and also in References	KH: Agree

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						page 45 line 5,10 and 13 (Judy Lawrence, PSConsulting)	
11-452	A	9	10			The last sentence in the last cell of Table 11.3 needs amending as follows " Amendments in 2004 require local and regional councils to have particular regard to the effects of climate change as they exercise their powers under the Act" (Judy Lawrence, PSConsulting)	KH: Agree, will do LH: table removed
11-453	A	9	10	9	11	I think the introduction and Title for this Table needs to be reconsidered. The implication is that these are all adaptation measures to current climate variability, extremes etc but this is not necessarily the case. Many of these actions will help to increase the resilience of, for example, natural ecosystems to climate change but this is often incidental to the main purpose of the "adaptation strategies". I think this needs to be made clearer. Under the GBR should include 30% No-Take declaration and also the Reef Water Quality Protection Plan - see www.gbrmpa.gov.au for more details. (Janice Lough, Australian Institute of Marine Science)	BF: need to clarify KH: See comment 11-433. LH: reef adaptation plans now in Box 11.1 with specific reference to improving resilienc
11-454	A	9	10			There needs to be literature citations for rows 1, 2, 6 and 7 of the Table. (Greame Pearman, Monash University Sustainability Centre)	LH: table removed
11-455	A	9	10			The Caption implies adaptations of natural ecosystems. How they influence their own resilience. Actually it is about human system adaptations and not with how ecosystems themselves adapt. Need rewording. (Greame Pearman, Monash University Sustainability Centre)	LH: table removed
11-456	A	9	10	10		I find Table 11.3 and its heading misleading. The content does not refer to 'adaptation in natural ecosystems' but to current government programs and strategies that may have some relevance in helping particular social sectors adapt to climate change. It is really a summary of government policy initiatives and part of human systems. Might be better to combine Tables 11.3 and 11.4 under this heading. If we are talking about adaptation in natural systems I would expect some synthesis of the kinds of changes mentioned in Table 11.1. In any case, I think the content of both tables is rather ad hoc, partial and unsystematic. (Kim Ritman, Bureau of Rural Sciences)	BF: need to consider this suggestion KH, LH: A table like this can never be comprehensive, so we shall state that the examples are selective. Table 11.3 will be converted to a paragraph. See also comment 11-433. Need to precede with context-setting text that clarifies the purpose and limitations of the material in Table 11.4. More examples are given in Allen Consulting Group (2005) LH: table now in text
11-457	A	9	10			Table 11.3 last box add "Conservation Act 1987 which adress New Zealands national parks and protected areas. (Gerald Rys, Ministry of Agriculture and Forestry)	LH: have added to text – but need to get a New Zealander to work on this section
11-458	A	9	10			Table 11.3, bottom panel; last sentence is not correct. In 2004 changes to the NZ Resource Management Act removed councils' ability to take climate change into account unless greenhouse gases are being reduced through the development of	BF: see earlier Reisinger comment on RMA KH: See comment 11-452

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						renewable energy. (Adolf Stroombergen, Infometrics)	
11-459	A	9	10			Table 11.3 - many items just name various policies without describing what they aim to achieve. (Oliver Woldring, NSW Government)	KH: We don't have space for this. Readers will need to acquire the cited reference material
11-460	A	9	12			Table 11.4 9th row. Replace "warming" with "warning" (Rod Anderson, Department of Sustainability & Environment)	KH. Noted, well spotted.
11-461	A	9	12			Table 11.4. Third box. If this is about coasts, should reword and include: "Coastal storm inundation and coastal erosion studies conducted for …" (Robert Bell, National Institute of Water & Atmospheric Research (NIWA))	KH: Agree
11-462	A	9	12			Table 11.4 Should be separate sector for Catchments, where flood hazard mitigation and catchment management are highlighted (Robert Bell, National Institute of Water & Atmospheric Research (NIWA))	KH: Agree
11-463	A	9	12			Table 11.4 - Coasts. The Bell et al. 2001 Ref is valid, but has been superseded in policy terms by a new Guidance Manual cited as: Ministry for the Environment (2004). Coastal Hazards and Climate Change: A Guidance Manual for Local Government in New Zealand. Prepared by Rob Bell, Terry Hume, Darren King and David Ray (NIWA), Don Lyon, Steven Taylor, David Papps, Amelia Linzey and Neil Beattie (Beca Consultants), Derek Todd (DTec Consultants), and Sally Marx (Tonkin and Taylor). Ministry for the Environment Report ME 512, Wellington, pp. 156. http://www.climatechange.govt.nz/resources/local-govt/coastal-hazards-may04/index.html (Robert Bell, National Institute of Water & Atmospheric Research (NIWA))	BF: need to add refs
11-464	A	9	12			Table 11.4 - Coasts. Should add in "… arrangements and policy/planning frameworks for coastal management .." (Robert Bell, National Institute of Water & Atmospheric Research (NIWA))	KH: Noted
11-465	A	9	12			Table 11.4 This table is (a) selective in terms of the limited examples of adaptation responses it lists, and (b) includes some activities that have not been instigated as a response to climate change (e.g., meningococcal vaccinations). It includes some response strategies that could just as easily have been put alongside those in Table 11.3. Both tables 11.3 and 11.4 need further thought. (Chris Cocklin, Monash University)	BF: need to consider this KH: See comments 11-456 & 11-466
11-466	A	9	12			Settlements - there is an impression that there is significant adaptation here which I think may be wrong. Need to have a heading above table 11.4 to say these are some examples but that it is far from being all encompassing. Explain what basix	BF: need to clarify KH: Agree TC: will help make corrections

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						sustainability in Sydney is. Under health what is the early warning system for extreme weather events? (Tony Coleman, Insurance Australia Group)	
11-467	A	9	12			Other potential adaptation strategies that could be included in Table 11.4 section on coasts and settlements for engineering purposes are already being considered by the Institute of Engineers Australia e.g. "Guidelines for Responding to the Effects of Climate Change in Coastal and Ocean Engineering - Engineers Australia 2004 Update. (Tony Coleman, Insurance Australia Group)	BF: need to clarify TC: will help make corrections KH: Important reference
11-468	A	9	12			Currently no mention of research into how infrastructure can cope with changing extreme weather events and how building codes could be changed e.g. cyclone testing station research (Tony Coleman, Insurance Australia Group)	KH: Presumably Engineers Australia (2004) provides this info TC: will help make corrections
11-469	A	9	12			Table 11.4 Health - early warMing systems!? (Michael Dunlop, CSIRO)	KH: Noted.
11-470	A	9	12			Table 11.4 - adaptation strategy for fisheries - are the authors saying that fisheries modelling is taking account of climate change, at least in New Zealand? If so it would be helpful for a reference to be cited to support this. (John Garnham, Department of Primary Industries)	JS: Modify
11-471	A	9	12			Table 11.4 Not sure that the reference to Govt drought support programs for farm households and farm enterprises constitutes an adaptation strategy. Some would argue aspects of this policy are maladaptation. Could this be better phased as Govt support for drought preparedness. Because actually there are many tax breaks and subsidies for training etc for drought preparedness. (Peter Hayman, South Australian Research and Development Institute)	KH: Noted. A touchy subject. Drought relief may be interpreted as maladaptation, but we need references to support this – perhaps McColl and Young (2005) http://ideas.repec.org/p/csi/report/06_005.html and http://www.abc.net.au/rural/content/2005/s1483952.htm and http://www.theage.com.au/news/National/Drought-aid-doing-farmers-harm-report/2005/10/17/1129401161189.html . Govt tax breaks and subsidies for training etc are indeed helping drought preparedness.
11-472	A	9	12			Table 11.4 mentions the Victorian requirement for energy efficiency of new buildings. Other jurisdictions either have or are introducing schemes with similar intent. The Australian Greenhouse Office can provide details. (John Higgins, Australian Greenhouse Office)	KH: will follow up with John Higgins

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11-473	A	9	12			Table 11.4 Energy line. There are a number of other programs here such as "Green Energy", subsidised solar hot water and PV installation programs for domestic customers. There is also the Australian Government MRET Program (Mandated Renewable Energy Program) which subsidses the installation of renewable generation plant, mainly wind. (Richard HOY, Energy Supply Association of Australia)	KH: Not clear how this reduces vulnerability to impacts. In this chapter, we are not concerned with reducing greenhouse gas emissions
11-474	A	9	12			Table 11.4 re coasts. I think this is exaggerated and as per p29, line 51, shows little actual implementation yet in NZ. (Ken Hughey, Lincoln University)	NH, BF: will clarify
11-475	A	9	12	10		Table 11.4 - final row: why not for NZ give the example of the Sustainable Development Programme of Action, and particularly with regard to the freshwater initiative here? (Ken Hughey, Lincoln University)	JS, BF: will clarify
11-476	A	9	12			The reference to the Resource Management Act applies to both Table 11.3 and 11.4 activities. It is misleading to have it only under ecosystems. (Judy Lawrence, PSConsulting)	BF, LH: need to clarify
11-477	A	9	12			There needs to be literature citations for rows. 2, 3, 5, 6-13, 15-18. (Greame Pearman, Monash University Sustainability Centre)	All LAs to provide relevant references
11-478	A	9	12			Table 11.4: Another important reference for adaptation strategies for costs is: Ministry for the Environment (2004), Coastal Hazards and Climate Change: A Guidance Manual for Local Government in New Zealand. Prepared by Rob Bell, Terry Hume, Darren King and David Ray (NIWA), Don Lyon, Steven Taylor, David Papps, Amelia Linzey and Neil Beattie (Beca Consultants), Derek Todd (Dtec Consultants), and Sally Marx (Tonkin and Taylor). Ministry for the Environment Report ME 512, Wellington, pp156. Table 11.4: for settlements, it may be worthwhile referring to the work by IAG with Environment Waikato to develop hazard mitigation options rather than just withdrawing insurance cover Tabe 11.4: the entry for energy seems oddly out of place, unless the 5-star rating is specifically also to reduce heat stress in buildings Table 11.4: I wasn't aware that there is a strong correlation between climate trends and meningococcal disease. If that's not the case, I don't think this table entry is appropriate. (Andy Reisinger, Ministry for the Environment)	BF: need to add refs
11-479	A	9	12			Table 11.4 Health last line delete "vaccination progrommes for meningoccal disease" (Gerald Rys, Ministry of Agriculture and Forestry)	JS: will do

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11-480	A	9	12			under the "energy" heading; have other states been surveyed? is victoria the only state to have introduced ratings? (Andrew Watkins, Australian Bureau of Meteorology)	See 11-472
11-481	A	9	12			table 11.4 rows 3, 5,7,8,9,10,11,12 – provide references to each to substantiate. (Sean Weaver, Victoria University of Wellington)	See 11-477
11-482	A	9	12	9	12	Table 11.4: Agriculture. Government drought-support programs for farm households and, in Australia, farm enterprises [insert "as part of its National Drought Policy (O'Meagher et al. 1999; Botterill and Wilhite 2005). which promotes drought being recognised as part of the natural climate cycle, increased self-reliance and protection of the natural resource base.] O'Meagher, B., Stafford Smith, M. and White, D.H. (1999). Approaches to integrated drought risk management: Australia's National Drought Policy. In Hazards and disasters: a series of definitive major works. Volume II. Drought, a global assessment, edited by D.A. Wilhite, Routledge Publishers, London, pp. 115-128. .. L.C. Botterill and D.A. Wilhite (2005) (editors). "From Disaster Response to Risk Management. Australia's National Drought Policy", Springer, Dordrecht, 209 pp. (David White, ASIT Consulting)	KH: Noted
11-483	A	9	12			Table 11.4 - similar to 11.3. Overall these tables creates a sense that there are many adaptation actions underway and that these are pretty successful (not actually stated but that is the impression). There ought to be an assessment of the extent to which these adaptation strategies are sufficient. In most cases they probably are not - this is a policy area that Cwth and State Governments are only now turning there attention to - and many local Govts are still climate change sceptics! (Oliver Woldring, NSW Government)	BF: need to clarify KH, RW: measuring success will be difficult unless documented. Need to distinguish between plans and implementation
11-484	A	9	12			In table 11.4, the adaptation strategies for health might be checked. There is no evidence, to my knowledge, that meningococcal disease is climate related. Other programmes that might be included are the New Zealand water supply grading and monitoring system (refer to NZ Ministry of Health documents) and vector control activities in northern Australia. (Alistair Woodward, University of Auckland)	JS: Noted for change. See 11-479
11-485	A	10	0	12		section 11.1: The table show very large variability in precipitations going in both directions (+ or -). It is very difficult to assess the dominant effects on drought and /or flood. It opens doors later on to always select the worst case scenario. I just wonder if adding a kind of average would help or alternatively to always assess the effects of two scenarios assuming an increase and a decrease in precipitation. I would be curious to see how the variance express for future scenarios compare with varaince in precipation in the past.	BF: need to clarify by reference to more detailed downscaling scenarios KH: Drought can be defined in many ways. Rainfall deficiency is one way, but inclusion of rainfall and evaporation effects on soil moisture is much better. See page 11 lines 29-

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						(Yves Bergeron, université du québec en Abitibi-Témiscamingue)	35.
11-486	A	10	0	10	0	Table 11.4. Water. Could include Water Proofing Adeliade (2005) (Reference: http://www.sawater.com.au/SAWater/Environment/WaterProofingAdelaide/) (Elizabeth CURRAN, Bureau of Meteorology)	KH: Noted
11-487	A	10	0			end of table 11.4: note the development of "new crops" programmes aimed at developing a capability to grow crops better adapted to changing conditions. Such programmes have developed for a number of years in Crop & Food Research, HortResearch, and closer to the implementation stage in various regional organizations such as Crops for Southland and Grow Otago. (Stephan Halloy, Instituto de Ecología, Universidad Mayor de San Andrés)	BF: need to add this
11-488	A	10	0			add New Zealands "Water Plan of Action". (Gerald Rys, Ministry of Agriculture and Forestry)	BF: need to add this
11-489	A	10	0			if project rainfall Ranges are to be used (e.g. -20 to +20) or similar then please also include the ensemble means. There is an enormous risk of causing confusion to policy groups and other users here as CSIRO are providing summaries that are somewhat more relevant now but which include ensemble means (that are mostly towards drier means). If we include ranges then please include other statistics. (Roger Stone, Department of Natural Resources)	BF: need to clarify KH: Agree, ensemble means are needed
11-490	A	10	1			table 11.4 It may be worth mentioning the sharp decline in new exotic forest plantings in the last few years. (Sean Weaver, Victoria University of Wellington)	JS: Noted in forestry text
11-491	A	10	1	10	1	Table 11.4: Water. Add "and legislating for transfer of water rights so that scarce water resources will be redirected to high value agricultural and horticultural industries." (David White, ASIT Consulting)	BB: Agree, but this process is also being driven by recognition of the over-allocation of resources
11-492	A	10	3	11	8	Is it possible to indicate and relate the projected temperature and precipitation changes in T 11.5 to the different SRES used? (Encinas Carla , IPCC WG2 TSU)	KH: full SRES range is used in table 11.5
11-493	A	10	3			I am not keen on use of word "assumption" in this title. It may be standard IPCC usage, I am not sure: but the information is much more definitive than an assumption, which to my mind means something taken to be true but about which we are making some leap of faith. Suggest title "projections for the future" (Wendy Lawson, University of Canterbury)	BF: need to clarify KH: this title is prescribed by IPCC
11-494	A	10	5			Section 11.3.1: Can anything be said about projected changes in ENSO? (Dean Collins, Bureau of Meteorology)	KH: See comment 11-65
11-495	A	10	5	11	27	This section of future climate trends needs to be rewritten and made clearer. Table 11.5 is presumably changes from the 1990s? These need to be meshed more	JS: Clarifications and consistency with ES required, with the inclusion of what

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						succinctly with Table 11.6 and also the reference P.11 line 3 to the CSIRO (2001) scenarios. Is there a Table missing here? The Australian projections do not, to me, agree with the statement in the Executive Summary about "large areas of mainland Australian "likely to become substantially drier" (see Comment No. 1). I think the greater range of uncertainity as regards precipitation compared with temperature needs to be stressed at the outset. I found statements that "ranges are -10 to +10%" hard to follow. Surely, this just means that there is not a clear consensus either way & maybe it would be easier to follow in more qualitative terms rather than listing the + and - ranges. Maybe consult the approaches in the other chapters (eg North America). Maybe it would be more helpful to reorganize the section into temperature & temperature-related variables (for which there is better agreement between model projections and therefore higher confidence) and then discuss the precipitation and precipitation-related variables (for which there is lower agreement and therefore less confidence). I would also have thought that it would be necessary to mention briefly what might or might not happen to the frequency and intensity of ENSO events as they have a major impact on inter-annual climate variability in the region. (Janice Lough, Australian Institute of Marine Science)	projections there are for ENSO KH: See comment 11-65 and highlight evaporation impact on soil moisture deficit. Delete Table 11.5 from Ruosteenoja et al (2003) and replace with CSIRO (2001). Explain that "drier" includes the effect of changes in evaporation. We also need ensemble-average projections, if available from WG1.
11-496	A	10	7	10	11	I am concerned that this paragraph as it stands could be taken out of context as a statement of fact that, for example, southern Australia and New Zealand will become drier, when I think we really mean that we expect it to be so. (Lynda Chambers, Bureau of Meteorology Research Centre)	KH: need to insert words 'are likely to"
11-497	A	10	7			Where do these projections come from? Needs to be referenced. Modules, intuition, IPCC, ?? (Greame Pearman, Monash University Sustainability Centre)	JS: Noted to attend to KH: 7 models, A2 and B2, with pattern scaling by global warming associated with A1FI and B1
11-498	A	10	8	10	8	"Table 11.3.1" but it seems to refer to Table 11.5. Check (Sean Weaver, Victoria University of Wellington)	KH: Noted
11-499	A	10	8	10	8	There is no Table 11.3.1. Should this reference be to Table 11.5 ? (David Wratt, NIWA)	KH: Noted
11-500	A	10	9	10	9	Suggest change "Ocean areas either become wetter or show little change" to "Rainfall over oceans either increases or shows little change" (Alistair McKerchar, National Institute of Water and Atmospheric Research Ltd)	KH: Agree
11-501	A	10	10	10	11	Some clarification for northern Australia is needed as the net effect of more pronounced wet and dry seasons is an increase in rainfall because 90% of the rain falls in the wet season. (Andrew Ash, CSIRO)	KH: Noted

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11-502	A	10	10	10	11	For rainfall this statement does not seem to reflect accurately Table 11.5 that clearly shows the models used show ranges from decreases to increases in rainfall for Australia and NZ. Given, I understand, that none of these models is seen as more credible than any other, any point in that range is equally likley. This means that we do not know in which direction changes in rainfall will occur. "On balance" is meaningless in this context - what is intended?. (Roger Gifford, CSIRO)	JS: Reword KH: Drop Table 11.5 KH: Oceanic areas and sub-Antarctic islands to be covered in text. A new table will show CSIRO projections for temp & rain.
11-503	A	10	10	10	11	Suggests 'New Zealand becoming drier, especially in winter.' (Alan Porteous, National Institute of Water & Atmospheric Research (NIWA))	
11-504	A	10	11	11	13	(includes Tables 11.5 and 11.6): There is an apparent contradiction here between NZ becoming “drier, especially in winter” on line 11 (referring to Table 11.5) and the ranges given in Table 11.6. The Ruosteenaja et al (2003) analysis lumps South Australia and New Zealand together as one unit, whereas the Wratt et al (2004) analysis breaks New Zealand down into 5 sub-regions. (A. Brett Mullan, National Institute of Water & Atmospheric Research Ltd)	JS: See 11-502 KH: Drop Table 11.5. See comment 11-495 JS Deleted table
11-505	A	10	11			Presumably excluding the west of New Zealand? (Greame Pearman, Monash University Sustainability Centre)	JS Deleted table
11-506	A	10	11	10	11	I'm nervous about the general statement made here that New Zealand on average will get drier, especially in winter. This will only confuse people when you tell them later than NZ gets drier in the east but wetter in the west. The "NZ average" approach simply doesn't work with regard to precip. It may help to replace this text with a qualifier that says "NZ precipitation trends are strongly dependent on geographical location relative to major mountain ranges." (Andy Reisinger, Ministry for the Environment)	JS: Reword KH: Drop Table 11.5. See comment 11-495
11-507	A	10	12			The last column "water" should have added to it a sentence about NZ's Sustainable Development programme of Action and specifically the water programme of action which was initiated in 2002/03? Check with MFE (Judy Lawrence, PSConsulting)	JS Deleted table
11-508	A	10	13	10	15	Table 11.5: Are changes relative to 1990? (Dean Collins, Bureau of Meteorology)	KH: Yes
11-509	A	10	13		16	The authors need to be precise about what baselines changes apply too. Is the 2020 warming relative to 1990? (I can answer this question by consulting the contained references, but shouldn't need to). Further, the authors needs to be clear that the projections for 2020 (for example) refer to some average (and indeed unobservable climate) centred on 2020. This issue is not clearly articulated in the captions for 11.5 and 11.6. (David Jones, Australian Bureau of Meteorology)	BF: need to clarify

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11-510	A	10	13		16	Suggest replacing the table with a figure. (David Jones, Australian Bureau of Meteorology)	KH: Disagree. Figure would be very complex.
11-511	A	10	13			Mention should be made that the sub-regions in Table 11.5 are too large to give realistic results for smaller sub-regions affected by topography etc. as large variations occur within the sub-regions. (Barrie Pittock, CSIRO)	KH: Deleted Table 11.5
11-512	A	10	13			Table 11.5: Shows NZ becoming drier, consistent with above (Alan Porteous, National Institute of Water & Atmospheric Research (NIWA))	JS Deleted table 11.5
11-513	A	10	13			Table 11.5: I find the arrows somewhat confusing: they simple indicate uncertainty ranges (I guess?), but the direction of the arrows would suggest a "from…to…" change, which is not what is intended? (Andy Reisinger, Ministry for the Environment)	BF: Deleted table 11.5
11-514	A	10	15			What is the rationale for using these projections and not others that are used later in the text? (Greame Pearman, Monash University Sustainability Centre)	BF: Deleted table 11.5
11-515	A	10	15			Does SRERS need defining at first use or is there an IPCC agreement that this is a universal acronym in the volume? (Greame Pearman, Monash University Sustainability Centre)	KH: Agree
11-516	A	10	15	10	15	Should the "main SRES emissio scenarios" be cross referenced? (Andrew Watkins, Australian Bureau of Meteorology)	KH: See comment 11-515
11-517	A	10	15			What is SRES? (David Whitehead, Landcare Research)	KH: See comment 11-515
11-518	A	10	16			Table 11.5 There is a strong spatial element to this information. Can it be mapped instead of tabulated? (Rod Anderson, Department of Sustainability & Environment)	KH: See comment 11-510
11-519	A	10	16	10	17	Table 11.5: What are definitions of wet/dry seasons? (Dean Collins, Bureau of Meteorology)	JS Deleted table 11.5
11-520	A	10	16	10	17	Table 11.5 I find the arrows confusing, arrows imply, to me, a change from one level to another, not a range. Agreed dashes can be confusing with minus signs but the arrows don't work! (Michael Dunlop, CSIRO)	BF: Deleted Table 11.5
11-521	A	10	16	10	17	Changes in soil moisture and run-off are of more interest than changes in precipitation. While estimates are not available on a regional scale, the authors may wish to consider providing estimates of changes in atmospheric moisture demand, if these are available. (John Higgins, Australian Greenhouse Office)	JS: Will check Mullan's drought report for PET KH: Strongly agree. Data are available for Australia
11-522	A	10	16			table 11.5 explain resolution in legend.	KH: Deleted table 11.5

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						(Sean Weaver, Victoria University of Wellington)	
11-523	A	11	0			probably should be mentioned at several points in chapter, p11 and 17 would be places: reduction in number of frost days and frost intensity has a direct effect on capability to move frost-sensitive crops southward; but also on the capability of pests and diseases of crops to move southward and decrease crop yields or increase their costs through the need for pest and disease control, adapting new varieties, etc. (Stephan Halloy, Instituto de Ecología, Universidad Mayor de San Andrés)	KH: This is not the place to discuss impacts on agriculture. See Section 11.4.2
11-524	A	11	2	11	2	Change this first sentence to "More detailed regional projections for Australia nd New Zealand have been developed by CSIRO (2001) and NIWA (Wratt et al. 2004), respectively. (Andrew Ash, CSIRO)	KH: Agree
11-525	A	11	2	11	21	This section presents somewhat dated scenarios of projected Australian temperature and rainfall change (i.e. released in 2001). Significant progress has been made since 2001 with regard to projected regional rainfall change (i.e. Hennessey et al., 2004 a,b; Cai et al., 2004 etc). It would be more appriopriate to use these projections in the context of this discussion. (Steven Crimp, Queensland Department of Natural Resources and Mines)	KH: Projections developed for each State used slightly different combinations of models, based on those the performed best in each region. This was recently documented in Whetton et al (2005) and updated scenarios for Australia will be published by Suppiah et al (2006)
11-526	A	11	2	11	3	See Hansen et al (2005) as in note 2. (Graham Farquhar, Australian National University)	
11-527	A	11	3			Should read “developed by CSIRO (CSIRO 2001) and NIWA (Wratt et al. 2004)” Shouldn’t CSIRO and NIWA be in full? They will not be known by many of the readers! (Greame Pearman, Monash University Sustainability Centre)	JS Disagree
11-528	A	11	4	11	4	Table numbering needs fixing. (Julia Becker, Institute of Geological and Nuclear Sciences)	KH: Noted
11-529	A	11	4			Table 11.6? (Barrie Pittock, CSIRO)	KH: Noted
11-530	A	11	4	11	4	“Table 11.3.2” Could not find any table with this number, should it be Table 11.6? (Sean Weaver, Victoria University of Wellington)	KH: Noted
11-531	A	11	4	11	4	"Table 11.3.2" should be "Table 11.6". (David Wratt, NIWA)	KH: Noted
11-532	A	11	7			I thought that the recurrance interval of high intensity rainfall would increase?. (Gerald Rys, Ministry of Agriculture and Forestry)	KH: in eastern Australia, the recurrence interval decreases. Jim to check for NZ. JS They are decreases
11-533	A	11	11		13	Make table consistent with 11.6.	KH: Meaning? Do you want CSIRO’s

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						(David Jones, Australian Bureau of Meteorology)	Australian scenarios in a table like 11.6? This is our intention
11-534	A	11	11		12	The caption of Table 11.6 should follow Table 11.5 by stating that: "Ranges of values encompass estimates from six (four) global climate models for the 2030s (2080s), scaled to the full range of SRES global temperature change." (A. Brett Mullan, National Institute of Water & Atmospheric Research Ltd)	JS: will clarify
11-535	A	11	11			Table 11.6: Shows much of NZ becoming wetter, inconsistent with above. There appears to be some inconsistency in the above references as to precip changes in New Zealand. (Alan Porteous, National Institute of Water & Atmospheric Research (NIWA))	JS: Table 11.5 deleted KH: Western NZ has a tendency for rainfall increase
11-536	A	11	15		21	The style of writing is extremely hard to follow, and the information is probably much better presented in a table. Note also that the percentage precipitation changes which encompass zero do not mesh well with previous statments about future rainfall declines (page 3, line 10) for example. The authors use of CSIRO authored reports which lack PDFs or maximum liklihood/ensemble mean change is problematic. (David Jones, Australian Bureau of Meteorology)	KH: Page 3 refers to drier conditions, based on changes in rainfall AND evaporation. This needs to be made clearer. We can only cite published literature, none of which have PDFs
11-537	A	11	22			Replace "increases" with "is expected to increase" (Rod Anderson, Department of Sustainability & Environment)	KH: Agree
11-538	A	11	22	11	22	What is meant by rainfall intensity? (Dean Collins, Bureau of Meteorology)	KH: Intensity is the magnitude of the 1-in20-year rainfall event. This should be obvious
11-539	A	11	25	11	27	The sentence starting 'Preliminary results…' doesn't really say much and you cannot conclude anything from it. Suggest it is removed. (John Garnham, Department of Primary Industries)	KH: Delete "preliminary". Add reference to Sydney hail paper by Lesley and Leplastrier (submitted)
11-540	A	11	25	11	27	"low confidence" in results that "are about as likely as not" - is not a very helpful statement - reword or remove. (Janice Lough, Australian Institute of Marine Science)	KH: Noted
11-541	A	11	25	11	27	The final sentence (starting "Preliminary results…") could be deleted (Andrew Watkins, Australian Bureau of Meteorology)	KH: See 11-539
11-542	A	11	25	11	27	The Naill and Walsh study doesn't seem to add much.. (Oliver Woldring, NSW Government)	KH: See 11-539
11-543	A	11	27			Rewording suggestion "about as likely as not" (Tony Coleman, Insurance Australia Group)	KH: Unfortunately, this is the wording mandated by the IPCC Uncertainty Guidelines for 33-66% chance
11-544	A	11	27			Preliminary results from one model (Nial and Walsh) suggest hail decreases in south-eastern Australia . Could south eastern Australia be interpreted as being a larger area e.g. how much larger than study region. We are hoping to supply results	KH: Results were actually for Melbourne and Mt Gambier only. See 11-539

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						that show increasing risk in Sydney see point 1. (Tony Coleman, Insurance Australia Group)	
11-545	A	11	27	11	27	Can "about as likely as not" be expressed more simply? (Dean Collins, Bureau of Meteorology)	KH: See comment 11-543
11-546	A	11	27			There should be a discussion of southward movement of westerlies due to both enhanced greenhouse and stratospheric ozone depletion, and its probable effects on rainfall distribution and ocean circulation. See Pittock (2003) and Cai et al. (2005) for relevant references and discussion. Cai et al. do not discuss the meteorological relevance of the observed and projected southward extension of the East Australian Current, but this can be legitimately discussed from current knowledge, e.g., enhancing formation of East Coast Lows, with effects on rainfall in SE Australia and on storm surges and riverine and flash floods. (Barrie Pittock, CSIRO)	BF: incorporate into text with references. Kevin to address.
11-547	A	11	29	11	30	I don't understand the text in parentheses - is this to define drought? (Rod Anderson, Department of Sustainability & Environment)	KH: Yes
11-548	A	11	29			Rewording suggestion: suggests that the lack of soil moisture is the cause of droughts - should it not be soil moisture is a measure of drought intensity or low rainfall/high temps cause low soil moisture etc (Tony Coleman, Insurance Australia Group)	KH: Agree
11-549	A	11	29	11	29	It is ridiculous to say that reduced soil moisture "is very likely". We have really very little idea, since we don't know what the rainfall will be, the trend in evaporative demand has recently been downward in Australia (Roderick & Farquhar 2004, Int J Climatology 24, 1077-1090) and in New Zealand (Roderick & Farquhar 2005, Int J Climatology, in press), and we don't know what demand will be in the future, and stomatal conductance is reduced at higher [CO2]. (Graham Farquhar, Australian National University)	JS: This issue, which has been brought up earlier will be addressed for the New Zealand part by work that models PET, rather than evaporation. KH: Change in PET has also been quantified for Australia and NZ. Will consult David Jones (BoM)
11-550	A	11	29	11	35	Given that the model predictions of rainfall in Table 11.5 range from increases to decreases in most places and seasons, it needs to be indicated how it comes about that these predictions of soil water are all decreases in this paragraph. Increased temperatures do not imply increased potential evaporation rates unless VPDs increase as a result. (Roger Gifford, CSIRO)	KH: Writing team will explain in more detail how projected rainfall and evaporation changes (based on VPD & radiation) have been applied in water balance models to estimate PET deficit. Need to consider practical importance of changes in PET
11-551	A	11	29	11	31	It is unclear how "reduced soil mositure" produces more droughts. Need to reword. Also what are the 20% and 80% more droughts with reference to? (Janice Lough, Australian Institute of Marine Science)	KH: See comment 11-550
11-552	A	11	29			How are droughts defined here? Lack of rain, soil moisture, evaporation, impacts? "Soil moisture in lowest" what?	KH: See comment 11-550

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						(Greame Pearman, Monash University Sustainability Centre)	
11-553	A	11	29			This is taken from a report not available to reviewer, who considers it highly uncertain given rainfall projections and lack of response in evaporation. It is taken forward to Table 11.10 and (Kim Ritman, Bureau of Rural Sciences)	KH: See comment 11-550
11-554	A	11	33	18	46	The discussion of carbon dioxide fertilisation and its implications requires some nuancing. Careful consideration should be given to the material found in 'Carbon Dioxide Fertilisation and Climate Change Policy' (Will Steffen and Pep Canadell 2005, published by the Australian Greenhouse Office). The current text does not adequately recognise uncertainty about the effects of fertilisation under Australian field conditions (water and nutrient limited) and the readiness of the current science for policy-making. Less emphasis on the results of exploratory modelling studies may be appropriate. (John Higgins, Australian Greenhouse Office)	KH: CO2 fertilisation effect on vegetation & water-use hasn't been included.
11-555	A	11	37			Delete the unnecessary left parenthesis before "Cary". (Tom Beer, CSIRO)	KH: Agree
11-556	A	11	37	11	37	"An increase in fire danger in Australia is likley …" Is this an Australia wide conclusion, and does it take into account all parameters (temperature, humidity, wind, etc)? (Elizabeth CURRAN, Bureau of Meteorology)	KH: Results apply to eastern Australia. Will explicitly state that it includes temp, humidity, rain and wind.
11-557	A	11	37	11	37	Many predictions falsely assume that environment will be drier. Why likely? (Graham Farquhar, Australian National University)	KH: See comment 11-550
11-558	A	11	37			There is no consideration here that the rate of ignition sources might change either through increased storminess and lightning strikes, or through human population growth? (Greame Pearman, Monash University Sustainability Centre)	KH: Agree
11-559	A	11	41	11	41	Change to "…6-18 more days per year…" (Dean Collins, Bureau of Meteorology)	KH: Agree
11-560	A	11	41	11	41	Can the Pearce study results be presented in % terms to match the Hennessy study (or visa-versa). (Oliver Woldring, NSW Government)	JS Done.
11-561	A	12	1	12	8	There is a tendency in the document to use the term "sea-level" rather than "relative sea-level". Given that vertical land movement is explicitly excluded from the sea-level rise figures given (see line 6), the later term is to be preferred. Thus the paragraph should begin, "Relative sea-levels in the region are likely ---". I disagree with the lower bound numbers given. We know that on average sea-level rise in New Zealand has been 1.6 mm/yr for the last 100 years and that it has been 1.2	Dick: We need to clarify where we're referring to eustatic and relative SLR. In this particular case, it's eustatic. Disagree that extrapolating the current mean relative SLR trend gives lower bound for projections. We must use WG1 projections. Dick will discuss

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						mm/yr in Australia. Relative to 1990, the minimum rise by 2020 should be 0.04 m (i.e., 1.2 x 30 mm), by 2050 it should be 0.07 (1.2 x 60) m and by 2080 0.11 (1.2 x 90) m. I would argue that this lower bound is well defined but that the upper bound is based upon a series of complex projections that give the upper bound number far greater uncertainty. This should be explained. I note that these numbers are being quoted from the WG1 report, to which I don't have access. However, I would be very happy for my comments to be passed on the the WG1 authors for their consideration. Note: Given that this section is specifically on Australia and New Zealand, to my mind local estimates of relative sea-level rise should take precedence over broader global estimates. As a second parenthetical note, I suspect that my expertise is far better suited to reviewing Chapter 5 of WG1 than to WG2! (John Hannah, University of Otago)	with John Hannah.
11-562	A	12	2	12	3	Sec. 11.3 Assumptions about future trends: The lower limits of the predicted range in sea level rise is about half the rate of sea level rise that has been documented around New Zealand in the past century. How can models predict a rate of sea level rise in the next century that will be lower than what we have experienced in the past century? This seems to suggest that reliable models predict a 95%CI which is lower than current sea level rise. This seems very unlikely and weakens the argument that climate change will result in accelerating rates of sea level rise in the next century. (Marc Schallenberg, University of Otago)	RW: Disagree. Will comment on consistency with past trends, and possible changes in processes that may lead to slower rate of SLR
11-563	A	12	6	12	8	It may be worthwhile adding specifically that tectonic land movements can be larger and more abrupt than sea-level changes in some regions of New Zealand (Andy Reisinger, Ministry for the Environment)	JS: See 11-561
11-564	A	12	8			It might be worth mentioning that Adelaide is an example of this already. Ground water pumping is causing sinking of the city at a rate similar to that of sea-level rise leading to double the rate of apparent sea-level rise and consequences for beach protection. (Greame Pearman, Monash University Sustainability Centre)	NH: Will address
11-565	A	12	13			What is meant by "medium"? (David Jones, Australian Bureau of Meteorology)	KH: no room to elaborate. Readers will need to acquire cited literature
11-566	A	12	13	12	27	This material could all be deleted as it is not relevant to what follows.Other alternative is to pick out a few key stats that are affected by climate change impacts but the first option would help you reduice the whole report to 25 ppages. (Judy Lawrence, PSConsulting)	KH: Noted, but population projections are relevant to risk exposure.
11-567	A	12	13			Are all of the statistics in this Paragraph from ABS? If so the citation needs to indicate this more clearly. It is also hard to see how this and the next Paragraph	KH: All info from ABS (2003). See comment 11-566. Certainly needs a linking sentence to

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						relate to climate change. Perhaps it needs a few words of connection? (Greame Pearman, Monash University Sustainability Centre)	establish connection between climate risk, exposure and demand. Perhaps the title of 11.3.2 should be Key non-climatic trends.
11-568	A	12	13	12	50	These paragraphs ap[pear to have far more detail than needed. Considerable shortening could be achieved here. (Andrew Watkins, Australian Bureau of Meteorology)	KH: Will consider shortening
11-569	A	12	15	12	15	Change "number of children per woman" to "fertility rate". (Janice Lough, Australian Institute of Marine Science)	KH: Disagree, fertility rate is misleading. Many fertile women chose not to have children. Need to replace “fertility rate” in line 24.
11-570	A	12	15			Is this the number of children per all women or the number of children being born per woman or the nukber of children per women of child bearing age? More specific details are needed (David Whitehead, Landcare Research)	KH: per all women.
11-571	A	12	16			On page 12 (line 16) there is mention that Australia would expect to have net overseas migration from 2011 onward. On page 23 (line 22 and later in the document) it mentions immigration to Australia is likely to rise by 2050’s. Are these two statements consistent? (Lynda Chambers, Bureau of Meteorology Research Centre)	KH: Bob Birrell to clarify
11-572	A	12	18	12	18	Is Adelaide a deliberate omission from this list of Australian cities? (Chris Cocklin, Monash University)	KH: will delete “the”
11-573	A	12	18			Replace towns with cities (David Jones, Australian Bureau of Meteorology)	KH: Agree
11-574	A	12	21			Would be worth emphasising the rather remarkable similarity in demographic trends between Australia and New Zealand. (Rod Anderson, Department of Sustainability & Environment)	KH: Noted, but little room. Section 11.3.2 needs to be shortened considerably
11-575	A	12	22			What are the 'medium assumptions'? (David Whitehead, Landcare Research)	KH: See 11-565
11-576	A	12	23			Why not SNZ 2005b, to be more consistent with ABS 2004 in the previous Paragraph? (Greame Pearman, Monash University Sustainability Centre)	KH: Agree
11-577	A	12	25	12	27	Life expectancy needs the units of years adding ed. 77 years, etc. (David Whitehead, Landcare Research)	KH: Agree
11-578	A	12	29		37	Can say more hard facts and more of an overall picture like our ghg emissions expected to be 120% or 130% (?) of 1990 levels by 2020 - to show we are a long way from reducing our emissions (Tony Coleman, Insurance Australia Group)	KH: This a Working Group 3 issue. Our chapter doesn’t deal with emission trends or emission reduction strategies – the focus is impacts and adaptation

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11-579	A	12	29			This Paragraph needs more work. It says nothing about carbon trading and potential trade restrictions that are real risks for the energy sector and with flow-ons to other sectors. Line 2, speaks of "foreseeable futures". It is not clear what this means. Needs to be more rigorous. In the list of technologies, there is no mentions of end-use energy efficiency, hybrid motor vehicle technology and the use of gas as options. In the list, hydrogen fuel cells is mentioned, yet hydrogen is only and energy carrier and not a replacement energy source. It may be that it has an important role in future energy systems, but it is not equivalent to the other members of this list. There is no mention of times-scales for technologies coming on line, the next most important factor after cost and before social acceptability. The relevance of this whole area to adaptation needs to be better developed. The point could be made, that in effect, the climate change issue is about energy futures, and thus issues scud as coal and aluminum exports. (Greame Pearman, Monash University Sustainability Centre)	BF: Focus on projected increases in energy demand, not sources of power. Blair and Kevin to refocus 11.3.2 to bring out trends in changing vulnerabilities (potential to be harmed), and technology (to manage risks – see North American chapter), including water demand & coastal development (with help from Nick and Dick). Remove stuff on fertility and age distribution. Extract material from 11.4.6. KH: See comment 11-578
11-580	A	12	29	12	30	Suggest replacing with "In Australia, coal is the dominant power generation fuel and existing coal-fired power stations are likely to provide most of Australia's electricity requirements for many years. The need to reduce greenhouse gas emissions has made the development of new coal power stations a contentious issue, however." Rationale: what is meant by foreseeable? Govts are thinking seriously about transitional pathways that go out at least 50 years - in the absence of clean coal technology it most likely that coal will be have been phased completely at by then.. (Oliver Woldring, NSW Government)	KH: See comment 11-578
11-581	A	12	32	12	32	"giving a total rise of 50%" from what baseline? (Janice Lough, Australian Institute of Marine Science)	KH: Delete text in brackets to save space
11-582	A	12	34			I suggest adding "biofuels" to the list. (Tom Beer, CSIRO)	KH: Agree
11-583	A	12	34			Hydrogen is an energy carrier not an energy source. The relevant thing is how the hydrogen is manufactured - from renewables or fossil fuel with or without carbon sequestration. (Barrie Pittock, CSIRO)	KH: Will delete hydrogen fuels cells
11-584	A	12	34	12	34	..emissions IS a major driver of RESEARCH INTO new energy tech (Oliver Woldring, NSW Government)	KH: Agree
11-585	A	12	35	12	35	The term - is it - should be 'it is'. (John Garnham, Department of Primary Industries)	KH: Agree
11-586	A	12	35			reference required for this statement. (Gerald Rys, Ministry of Agriculture and Forestry)	KH: Delete this sentence to save space

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11-587	A	12	36	12	36	What is LNG? (Dean Collins, Bureau of Meteorology)	KH: Agree
11-588	A	12	36	12	36	Spell out "LNG" (Janice Lough, Australian Institute of Marine Science)	KH: Agree
11-589	A	12	36			What is LNG? (David Whitehead, Landcare Research)	KH: Agree
11-590	A	12	36	12	36	First time LNG is mentioned, it should be expanded to Liquid Natural Gas. (Peyman Zawar-Reza, University of Canterbury)	KH: Agree
11-591	A	12	37	12	37	It is important to link fuel supply themes with likely changes in price and volumes of oil and natural gas in the first half of the century. (Sean Weaver, Victoria University of Wellington)	KH: Delete this sentence to save space
11-592	A	12	39	12	49	I think that this is an example of a paragraph where the authors can value add to the information obtained from the literature. Rather than just present a series of numbers (eg 890MW of hydro), it would provide more information to look at precentages of the total. It is also unclear how the new capacity (3355MW) compares with current capacity and by what date (2025?) this will be required. (Janice Lough, Australian Institute of Marine Science)	BF: see comment 11-579 KH: This whole section should be simplified to reduce contentious issues, especially since this section is rarely cross-referenced in the rest of the chapter
11-593	A	12	40			There is a gap in the discussion here relating to another challenge which is reducing demand through demand management. This is a significant part of the Sustainable Energy Framework of the NZ government issued in October 2004. The discussion of the section is all about meeting demand and is therefore one sided and incomplete. (Judy Lawrence, PSConsulting)	KH: see comment 11-592
11-594	A	12	41	12	41	Add "reducing" before "greenhouse gas emissions" (Janice Lough, Australian Institute of Marine Science)	KH: Agree
11-595	A	12	43			It would be very useful if the equivalent Australian figure could be given somewhere. (Tom Beer, CSIRO)	KH: see comment 11-592
11-596	A	12	43			as noted under p8 line 33 above (Ken Hughey, Lincoln University)	KH: see comment 11-592
11-597	A	12	43	12	43	Define "energy intensity" (Janice Lough, Australian Institute of Marine Science)	KH: see comment 11-592
11-598	A	12	44			You could also add here that energy efficiency is expected to grow at xx % Check with Robert Tromop at EECA for latest projections (Judy Lawrence, PSConsulting)	KH: see comment 11-592
11-599	A	12	45	12	49	This discussion implies that climate change only affects renewables. Climate change impacts will also affect the global movement of oil to NZ, coastal off	KH: see comment 11-592

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						loading sites and the offshore extraction of indigenous oil and gas. (Judy Lawrence, PSConsulting)	
11-600	A	12	45	12	45	Unclear what period this is in reference to. ie projections for which years? (Andrew Watkins, Australian Bureau of Meteorology)	KH: see comment 11-592
11-601	A	12	49			I do have some idea of potential here but explain how geothermal resources will be affected by climate change? Is it via change to water recharge? Perhaps also note there are likely to be +ve and -ve affects for all these renewables, perhaps with a net +ve for NZ? (Ken Hughey, Lincoln University)	JS: Noted KH: Energy impacts are discussed in section 11.4.9. See comment 11-579
11-602	A	12	49			How is geothermal power affected by cliamte change? (David Jones, Australian Bureau of Meteorology)	JS: See 11-601
11-603	A	13	0			Table 11.7 – The last column is not sufficiently wide. (Tom Beer, CSIRO)	LH: have widened slightly but too much will lose space
11-604	A	13	0			Table 11.7. There is no mention of the paper by Beaumont and Hughes on potential changes to Australian butterflies in response to climate change. Beaumont, L.J. and Hughes L. 2002. Potential changes in the distributions of latitudinally restricted Australian butterfly species in response to climate change. Global Change Biology 8(10): page 954. (Lynda Chambers, Bureau of Meteorology Research Centre)	LH: now included as we have more reference space
11-605	A	13	0			Is there anything from the Antartica CRC not included? E.g circulation patterns, thresholds (Tony Coleman, Insurance Australia Group)	LH: Antarctica outside our brief, though climate change and ecosystem trends on the sub-Antarctic islands included in various sections
11-606	A	13	0			It seems important to make reference to local responses to likely global phenomena such as acidification of the oceans and its effect locally on coral bleaching and marine food chains and consequential economic vulnerabilities. It is important also to find room to refer to the way in which a variety of different impacts can potentially have adverse synergistic effects – an integrated vulnerability evaluation would need to pay more attention to combined effects using a systems approach. For example, some of the climate related effects can combine synergistically with factors such as pollution or nutrient runoff to affect coastal ecosystems to a far greater degree in combination than climate effects on their own. One example would be the combined effects of coastal nutrient runoff in Queensland, with oceanic acidification as a consequence of elevated atmospheric CO2, in combination with elevated SST. (Sean Weaver, Victoria University of Wellington)	BF: will cite available literature on integrated assessment LH: these points are covered in the GBR box, but they are relevant to other issues, so have added a short sentence before Table to note synergistic effects with other stresses.
11-607	A	13	1	13	6	Are there trends about proportion of productivity from proportion of land, and the	MH, JS to address

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						relative proportion of different sectors that can be pointed to? Why so much more detail on energy than agriculture? Should also be covering other primary industries like forestry and fisheries here. (Rod Anderson, Department of Sustainability & Environment)	
11-608	A	13	1	13	6	Suggest adding that agriculture is generally very adaptable, but recent limitations on future increases in total land and water resources available to agriculture in southern Australia (no new land, tree clearing bans, limited new water, stronger water regulation) may reduce growth rate and adaptability. (Michael Dunlop, CSIRO)	MH, JS to address
11-609	A	13	1			The comment that there will be a decreasing proportion of GDP from Agriculture belies the significance of agriculture to the NZ economy. Even if there is a decline it will still be very significant for the NZ biological economy. Suggest you add a qualification here (Judy Lawrence, PSConsulting)	JS: Noted – will make a qualification
11-610	A	13	1	13	6	References needed for these statements (Janice Lough, Australian Institute of Marine Science)	MH, JS to address
11-611	A	13	1	13	2	Except for the last 3 years, agriculture has actually grown in its relative share of GDP in NZ. It is a bit of a myth to regard agriculture as an industry of declining importance - for the past 20 years, agriculture has tended to outperform growth of the rest of the economy in NZ. It would be helpful if this statement could be corrected accordingly. (1978-2005: NZ GDP growth 2.5% pa. NZ agriculture growth: 3.57%. Primary sector growth: 2.9% pa) (Andy Reisinger, Ministry for the Environment)	JS: See 11-609
11-612	A	13	1			agriculture is not decreasing as a proportion of GDP in New Zealand. (Gerald Rys, Ministry of Agriculture and Forestry)	JS: See 11-609
11-613	A	13	2		3	New Zealand's terms of trade have NOT been declining over the last few years. I suggest deleting the sentence. (Adolf Stroombergen, Infometrics)	JS: See 11-609
11-614	A	13	5	13	6	Decision-making by whom - farmers, government bureaucrats, agri-business organisations, corporations? (Chris Cocklin, Monash University)	KH: Noted, but we don't need to be specific. This general statement is valid.
11-615	A	13	16	15		Section 11.4.1 - This section uses a table to illustrate the impacts while the other sections in 11.4 rely on text, which I think works better than the table. Also presenting the impacts in a table and then having a Box on Climate Change and the GBR doesn't flow all that well. (Andrew Ash, CSIRO)	LH: table was designed to save space. Box 11.1 will be moved to section 11.6 (Case studies). Information on adaptation also included within GBR box
11-616	A	13	16	15	29	Sec. 11.4.1 Key Future Impacts and Vulnerabilities - Natural Ecosystems: This	LH: I agree that coverage is somewhat

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						section provides superficial coverage including only 1 paragraph of text, one table and one text box (Great Barrier Reef). There are only 4 references in this entire section on New Zealand ecosystems. While I agree that there many studies to date specifically addressing climate change impacts on New Zealand ecosystems (apart from some work on the alpine zone, forests, and my work on coastal freshwater-brackish ecosystems), what is needed here is some interpretation of studies that indicate that climate change is very likely to affect native species and ecosystems based on physiological studies or studies on community structure along environmental gradients that will be influenced by climate change. The physiological work on freeze tolerance of tussock grasses (Bannister 2005, Bannister et al. 2005) and the effects of temperature on reptile reproduction (Rock & Cree 2002) come to mind here as well as work on salinity tolerances of shellfish by Marsden (2004), zooplankton by Hall & Burns (2001, 2002, 2002), I also suggest looking at papers by Vandergoes et al. (1997) and Cullen et al. (2001) which specifically looked at climate variability and alpine vegetation in New Zealand. (Marc Schallenberg, University of Otago)	limited, but once again, space is the issue. I have added a few more NZ examples but good studies are very limited . I have added the Hall and Burns, and Bannister et al reference but none of the others are specifically about climate change. Vandergoes is too old and Cullen et al found no evidence for warming-related treeline shifts.
11-617	A	13	18	13	29	it may be useful to state that a summary of climate change and biodiversity issues for NZ was prepared by McGlone (2001). (Andy Reisinger, Ministry for the Environment)	LH: now referenced in preamble to Table (also appeared in Table already)
11-618	A	13	18	13	19	remove " have a high degree of endemisms (80-100% in many groups), and " (Andrew Watkins, Australian Bureau of Meteorology)	LH: grammar fixed, but phrase remains. The fact that many species in Aust and NZ are endemic and have small ranges is an improtant reason for tehir vulnerability
11-619	A	13	19			The term “groups” is not precise enough. It is not a biological term, say like, species, genera, families, orders or phyla. Without specifying what level of grouping you are talking about the statement may or may not be true. (Greame Pearman, Monash University Sustainability Centre)	LH: changed to taxa
11-620	A	13	19	13	21	Mention should be made that many Australian species are well-adapted to large short-term climate variability, but not to longer-term shifts in the mean. (Barrie Pittock, CSIRO)	LH: phrase included now
11-621	A	13	20	11	20	Replace "be predisposed" to "are predisposed" (Andrew Ash, CSIRO)	LH: done
11-622	A	13	20			add “may” between “and therefore”. (Tom Beer, CSIRO)	LH: see 11-621
11-623	A	13	20	13	20	Delete "…be.." and replace with "…are…" (Line 20) (Darren NT King, National Institute of Water and Atmospheric Research Ltd)	LH: see 11-621

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11-624	A	13	20			"are" not "be" (Barrie Pittock, CSIRO)	LH: see 11-621
11-625	A	13	21	13	21	and therefore "will" be predisposed. (David White, ASIT Consulting)	LH: see 11-621
11-626	A	13	21	13	21	..displacement under UNFAVOURABLE? climate change… (Oliver Woldring, NSW Government)	LH: I have included the word “rapid” now
11-627	A	13	25			What are 'ecosystem goods and services'? Does this include tourism? (David Whitehead, Landcare Research)	LH: I have added “including tourism”
11-628	A	13	25	13	27	One line summing up the Curtis study is too little - ecosystem valuation is fraught with assumptions. Really needs additional context. Also, is there any point in describing the total value of ecosystems services without also discussing what proportion of this may be lost? (Oliver Woldring, NSW Government)	LH: Space does not permit a fuller explanation. To my knowledge there are no formal estimates as to potential losses.
11-629	A	13	26			"is estimated to be US$..." (Barrie Pittock, CSIRO)	LH: done
11-630	A	13	26			Need to indicate that dollar value of ecosystem goods and services is an estimate, and note the very great difficulties of putting dollar values on these ecosystem attributes. (Kim Ritman, Bureau of Rural Sciences)	LH: done, see 11.629
11-631	A	13	28		29	This statement can be said for natural species generally and adds little to the chapter. There can be more research in a wide range of areas. (Gerald Rys, Ministry of Agriculture and Forestry)	LH: Disagree. This is meant to highlight fact that climate change studies on NZ species are particularly scarce compared to other countries. Other reviewers keen to highlight this, also foreshadows an improtant knowledge gap.
11-632	A	13	32			Table 11.7 Alpine Regions - can we add info from ITEX experiments "An Assessment of the Impacts of Climate Change on the Alpine Herbfields on the Bogong High Plains, Victoria" - Frith Jarrad at Greenhouse 2005 Conference. Changes in phenology and growth have been observed in a range of species. (Rod Anderson, Department of Sustainability & Environment)	LH: I don’t think we can reference abstracts and conference presentations? Kevin, could you clarify?
11-633	A	13	32	13		Table 11.7 - Rangelands section. If you go back through to the original references there is in fact no real argument provided for a link between climate change and woody weed encrochment. Pickup and Stafford Smith made reference to increased run-off (in a non-climate change context) leading to increased banding (a natural phenomenon) in arid landscapes but thgere was never any implication of woody weed encroachment. This does not mean that woody weed encroahcment won't occur as a result of climate chnage, it just needs to be more accurately referenced.	LH: will fix, space issue again. May includer NZ case if literature availableWIll email Mark H for a better ref

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						(Andrew Ash, CSIRO)	
11-634	A	13	32	13	1	Change 'Rangelands" to "Australian Rangelands" (Julia Becker, Institute of Geological and Nuclear Sciences)	LH: done
11-635	A	13	32	14		table 11.7: again all negative examples:see comments 5 (Yves Bergeron, université du québec en Abitibi-Témiscamingue)	LH: again, disagree, the trends are just reported, no value judgements made
11-636	A	13	32			Table 11.7 Forests: suggest adding reference to changes in fire frequencies - Geoff Cary: eg Cary, G.J. (2002). Importance of a changing climate for fire regimes in Australia. In Flammable Australia: The Fire Regimes and Biodiversity of a Continent. (Eds R.A. Bradstock, A.M. Gill, J.E. Williams). Cambridge University Press. (Michael Dunlop, CSIRO)	LH: Disagree that it is appropriate here. The reference suggested is a general one and is referenced elsewhere in the chapter,
11-637	A	13	32	14		table 11.7: regarding alpine areas, could also mention experimental work by Bannister, P. et al., 2005. Will loss of snow cover during climatic warming expose New Zealand alpine plants to increased frost damage? Oecologia, 144, 245-256. showing potential effect of reduction of snow cover through warming. (Stephan Halloy, Instituto de Ecología, Universidad Mayor de San Andrés)	LH: have added ref
11-638	A	13	32	14		Table 11.7 re alpine regions. I think you need to be very careful here. I have done some work re skifield management and I a couple of points: the area of ski field cf the total area similar basins in NZ is tiny; I am aware of no communities or species at risk from snow making; it is more likely that grooming of ski fields will put one or the other at risk - I would remove. (Ken Hughey, Lincoln University)	LH: the reference is to Australian, not NZ skifields
11-639	A	13	32	14		The Marine column needs NZ material added Check with DOC (Judy Lawrence, PSConsulting)	LH: will inlcude if there's anything new
11-640	A	13	32			Table 11.7, the 'potential impacts' information is inconsistent, for some incuding comments about general phsyical system, for others totally focused on species and ecosystems. For Alpine regions, mention should be made for NZ about 'Glaciers likely to reduce significantly in area, exposing fresh rock and sediment surfaces for colonisation' (Wendy Lawson, University of Canterbury)	LH: the first column heading now says System or taxa and the table legend now says natural systems instead of ecosystems. I will include something on glaciers in table (need Blair)
11-641	A	13	32	14		Table 11.7 Marine Species and Systems: The first 2 sentences "Phytoplankton…." and "ENSO…." do not make sense. Reword "Coral reefs such as…" sentence. We know that coral reefs ARE sensitive to rising temperatures as already observed; we also know that coral reefs can probably keep up with a gradual rise in sea level; and that the biological impacts of changing ocean chemistry are a big (though potentially highly significant) unknown and not just for coral reefs but other marine calcifying organisms. (see, for example, Buddemeier RW, JA Kleypas & RA	LH: para revised. Still need to get EAC ref

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						Aronson, 2004: Coral Reefs and Global Climate Change. Pew Center on Global Climate Change; and also Royal Society (2005) Ocean acidification due to increasing atmospheric carbon dioxide). Also, rather than just referring to "Ningaloo Reef" I would suggest referring to the significant coral reef ecosystems along the NW coast of Australia (from 10-28S). Evidence for extension of the East Australia Current southwards and "changes in species distributions have been observed across a wide range of taxa (including fish, crustaceans, marine pests, algae and phytoplankton) suggests the ecosystem changes are linked to changes in the physical environment. Many of the changes are consistent with the hypothesis that the EAC extension is carrying more subtropical water (and subtropical species) poleward along the south-east coast of Australia." is reported in a recent CSIRO Workshop Report (not sure whether this is too "grey" literature) Regional Impacts of Climate Change and Variability in SE Australia" V. Lyne, R. Thresher & S. Rintoul (April 2005). (Janice Lough, Australian Institute of Marine Science)	
11-642	A	13	32	13	32	Last two lines of Table 11.7: the presence of rats, mice and rabbits (& other introduced mammals) on sub-Antarctic Islands varies, so I suggest inserting after "likely" "on islands where they are present". Note that the cited reference (Frenot et al., 2005) deals only with Macquarie, Heard & McDonald Islands, and none of the NZ sub-Antarctic islands. (Alistair McKerchar, National Institute of Water and Atmospheric Research Ltd)	LH: done. Frenot et al left as the ref because to my knowledge there are no refs for the NZ islands. The points being made in the table are fairly general ones so I think this is OK
11-643	A	13	32			Table 11.7: under forests, it would be useful to add reference to the recent study on fire risk changes in NZ by Salinger et al (2005) Table 11.7: under alpine regions, it would be useful to add a statement about loss of glacier mass in NZ to provide context for the changing landscape and their potential impacts on ecosystems Table 11.7: under forests and rangelands, the recent study by Wratt et al on changes in drought risk in NZ may be relevant (Wratt et al 2005) (Andy Reisinger, Ministry for the Environment)	JS: will address LH: see comment 11-640 re glaciers
11-644	A	13	32	13	32	I have my doubts about the validity of some of the bioclimatic analyses from which the conclusions in Table 11.7 are drawn concerning potential impacts of climate change on species and ecosystems. A qualifying caveat on the methods is necessary. 'under rangelands' the term 'increased runoff distribution' is not clear. (Robert Sutherst, CSIRO)	LHBob Sutherst has well known reservations about modelling programs such as BIOCLIM. Space simply does not permit an analysis of all the uses and abuses of these types of models – whole reviews have been written on this topic. I think we just have to present the results is we think they are reasonable (I do) and readers can follow up the references for

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							more details as they wish. Rangeland section reworded to hopefully clarify
11-645	A	13	32			under the section "Alpine regions", might be worth quotign Nicholls 2005 as well as Hennessey et al 2003 (Andrew Watkins, Australian Bureau of Meteorology)	LH: OK
11-646	A	13	32			Table 11.7 Regarding rangelands. Most critical interaction may be with humans ie fire management and grazing regimes….. (Oliver Woldring, NSW Government)	LH: done
11-647	A	13	32			Table 11.7 Regarding forests. I don't have a reference but I thought that there had been work on Eucalypts as well - Lesley will know - seems too much focus on the Hilbert study (not that it wasn't excellent). (Oliver Woldring, NSW Government)	LH: work on eucs is mine actually, but it was published in 1996 so not included
11-648	A	13		14		T 11.7 Good summary on future impacts with changes in temperature and precipitation. Not clear what SRES are driving these changes. This comment can be applied to other tables or sections of this chapter. S 11.4.4 mentions these scenarios. This informtation in presented later on in S 11.7. (Encinas Carla , IPCC WG2 TSU)	BF: will clarify
11-649	A	13		28		Section 4 on impacts is 15.5 pages length which is balanced considering the total number of pages. We are suggesting all regional chapters to look at chapter 4 Figures 4.9 and 4.10. F 4.9 is a map of the location of major projected impacts. You have something similar in F 11.5 Key hotspots ... Figure 4.10 is a sectoral burning embers diagram on impacts, this concept could be applied at the regional scale, you have done this for adaptation in S 11.5.3. We want to include such material in the SPM and TS, but at this stage in not clear in the FOD and we need the underlying evidence from the chapters. (Encinas Carla , IPCC WG2 TSU)	BF: Noted
11-650	A	14	0	14		Table 11.7 - Wetlands and estuaries - It would be worth including the recent AGO report on the costs of preventing saltwater intrusuion in the Mary River floodplain. (Andrew Ash, CSIRO)	LH: OK
11-651	A	14	0			Table 11.7 Wetlands and Estuaries. ' An average of 7.4 lakes, wetlands and lagoons per 100km of coastline likely to be affected by salinization as a result of 1m rise in sea level.' This statement requires a confidence level for the likellihood of a 1metre rise in MSL, and the likely time frame should also be stated. Alternatively (preferred) , the impacts resulting from the most likley MSL rise expected by 2100 could be used. (Elizabeth CURRAN, Bureau of Meteorology)	KH: Need guidance from WG1 regarding SLR estimates. A rise of 1 m is unlikely before 2100.

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11-652	A	14	0			Reference to "artificial snow making likely to have negative impacts on alpine species" should be removed. These effects are much less significant that the clearing of slopes for lifts/runs. (David Jones, Australian Bureau of Meteorology)	LH: this cites AGO report
11-653	A	14	0			Table 11.7: There is an ambiguity at the end of the entry on Alpine regions - Is this a prediction that about 80% of alpine islands will disiappear due to submersion, or that 80% of taxa on such islands may eventually disappear. Also, the term "alpine islands" should be explained or to be changed - Does it means islands in alpine lakes , or offshore islands with elevated topography, or ... ? (David Wratt, NIWA)	LH: will clarify
11-654	A	14	0			Table 11.7: The "Wetlands and estuaries" entry in this table includes a discussion of the salination of NZ coastal lakes etc likely to be caused by "1 m rise in sea level". The other entries in this table are generally potential risks from changes likely to occur within the next 100 years, whereas the implication of the top two lines of page 12 is that 1 m rise in sea level is probably unlikely until sometime in the 21st century. Perhaps a qualification should be provided in the table. (David Wratt, NIWA)	LH: OK
11-655	A	14	2	15	30	This section should also refer to work undertaken by Done et al., that discusses the issue of structural shifts in coral species. These include: Done TJ, Berkelmans R and Skirving WJ (2001) Australian perspectives on global climate change and coral bleaching: the 1998 event on the Great Barrier Reef. pp. 230-235. In: Proceedings of JAMSTEC International Coral Reef Symposium: Coral Reef Biodiversity and Health as Indicators of Environmental Change. February 23-24, 2000, Nippon Kaiun Club, Tokyo, Japan. Science and Technology Agency, Japan Marine Science & Technology Center. Done TJ, Whetton P, Jones R, Berkelmans R, Lough JM, Skirving WJ and Wooldridge S (2003) Global Climate Change and Coral Bleaching on the Great Barrier Reef. Final Report to the State of Queensland Greenhouse Taskforce through the Department of Natural Resources and Mines. Australian Institute of Marine Science. 51 p. Wooldridge S, Done TJ, Berkelmans R, Jones R and Marshall PA (2005) Precursors for resilience in coral communities in a warming climate: a belief network approach. Marine Ecology Progress Series. 295: 157-169. (Steven Crimp, Queensland Department of Natural Resources and Mines)	LH: Done et al and Woolridge refs included in GBR Box
11-656	A	14	3	15	30	There is no mention in this section of the possible impacts of increasing ocean acidification and the threats that this may have on coral species in Australia. New	LHSee revised GBR Box

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						research has illustrated that atmospheric concentrations of CO2 of around 500ppm may increase ocean acidity to an extent that coral will no longer be able to survive in parts of the Great Barrier Reef. (Spencer Edwards, Department of Environment and Heritage)	
11-657	A	14	4			Box 11.1, Some inconsistency in the bracketing in references. (Lynda Chambers, Bureau of Meteorology Research Centre)	LH: Agreed, fixed
11-658	A	14	4			Box 1.1.. What is a natural feature? Is the Pacific Ocean not a natural feature? Perhaps say the GBR has the greatest biodiversity of any ecosystems (or any coral reef?) in the world.. (Oliver Woldring, NSW Government)	LH: agreed, box revised
11-659	A	14	4			Box 1.1. Last line. Re no similar data are yet available for the GBR..does this mean no studies have been undertaken or that studies have found no adaptive response? (Oliver Woldring, NSW Government)	LH: GBR Box now has mention of some adaptation measures
11-660	A	14	6	14	7	Avoid these world's largest claims. The first re the GBR is nonsense. My encylopedia lists 14 rivers greater than 4,000 km in length. Not sure about the second re marine protected areas, but it is suspect. (Barrie Pittock, CSIRO)	LH: phrase removed
11-661	A	14	9	14	9	"round" to "ground" (Dean Collins, Bureau of Meteorology)	LH: done
11-662	A	14	32			Table 11.7, second last entry re marine systems. Note actual and potential effects of more southerly extension of East Australian Current (Cai et al., 2005). (Barrie Pittock, CSIRO)	LH: will include, not ublished at time of draft
11-663	A	14	46			Suggest do not introduce the acronym GBR. And in line 11, it needs to read “billion in the 12-month period, 2004-2005”. (Greame Pearman, Monash University Sustainability Centre)	LH: done
11-664	A	15	0			benefits associated with increased CO2 very much likely to be outweighed by moisture/heat stress – e.g. there is a key issue of actually obtaining a planting rain or in maintaining water supply during crop growth stages that will likely override any potential benefits of CO2 inputs. (Roger Stone, Department of Natural Resources)	comment out of place? This is concerning agriculture, MH to address?
11-665	A	15	3	15	5	The issue of coral reef calcification impacts within the report has only considered the laboratory experiments related to CO2 changes and needs to include at least a statement on the potential changes induced by sea surface temperature. Lough and Barnes (1997 and 2000) measured 42 coral communties in the great Barrier Reef and South Pacific and found that calcification increased by 5% over the past 30 years and that a further warming will most likely increase coral calcification rates by enhancing the corals metabolic rates. This relationship has been shown	LH: Comment n. I have consulted extensively with Janice Lough and Ove Hoegh-Guldberg on this question. The McNeil study appears to have been comprehensively reviewed in a subsequent paper (Kleypas et al 2005) and some of its findings questioned. The GBR box has generally been extensively revised to

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						elsewhere in the Pacific and Atlantic Oceans. In an independent study Marshall and Clode (2004) showed an increase in the calcification rate of 2 scleractinian corals when sea surface temperatures were increased by 2-3degC in a laboratory. However, beyond a warming of 2-3degC the calcification rate declined. Considering that the rate of warming for Great Barrier Reef will be of the order of 2-3degC over the next centrury (from CSIRO model), the Marshall and Clode study also implies that calcification will increase over the coming decades until a threshold temperature is reached. The statement in the reportt that suggests calcification rates will fall by 40-60% does not take into account the ocean warming effect and should be omitted based on the new scientific evidence. McNeil et al (2004) show that the ocean warming effect onfuture coral calcification could easily outweigh the effects due to CO2 alone. This issue is definitely not resolved and should not be stated with such clarity. A statement which is consistent with the current scientific literature is: "Rising sea surface temperature and declining aragonite saturation (a measure of the availibility of ions required for corals to form calcium carbonate skeletons) will both effect future coral calcification and the coupled response is unclear." (Ben McNeil, University of New South Wales)	clarify potential role of ocean acidification and the references updatedNoted
11-666	A	15	5	15	5	Do you have hard data (ref) on this potential increase in cyclone intensity (Yves Bergeron, université du québec en Abitibi-Témiscamingue)	KH: Check with WG1
11-667	A	15	5	15	5	Add "tropical" before "cyclone" (Janice Lough, Australian Institute of Marine Science)	LH: done
11-668	A	15	9	15	29	coral bleaching is described in several chapters (chapters 1, 4, 6 and each regionel chapters (e.g. chapter 11, page 15, lines 9-29)), but seems not to be referred to with each other. I agree that bleaching is the most important signature of the global warming, and should be appeared in several chapters. However, within the limit of pages, they can be integrated in some parts, or at least referred to with each other. (Hajime Kayanne, University of Tokyo)	LH: Coral reef cross-cutting theme to be co-ordinated by Roger McClean and Colin Woodroffe once all SOD chapters are in
11-669	A	15	9	15	10	Change "rising" to "warmer"; also remove "is highly likely to" - there is now clear evidence that unusually warm SSTs during the summer warm season does cause stress and bleaching of corals. (Janice Lough, Australian Institute of Marine Science)	LH: done
11-670	A	15	9			The authors state that "OF GREATEST CONCERN is that rising sea temperatures increase coral stress". But my understanding is that temperature increases of 7 deg celsius occurred within a decade only 11,000 years ago [see http://www.agu.org/revgeophys/mayews01/node6.html]. If coral reefs were able to survive such a major temperature change within so short a period so recently, why	LH: I have checked this Paul Marshall, Janice Lough and Ove H-G. They are happy with the wording in the revised GBR Box and disagree with this reviewer

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						can't they do so again? On the other hand, the increasing concentration of dissolved CO2 is remarkable in recent millennia and surely should be cause for greater concern? (Piers Maclaren, Private)	
11-671	A	15	9			Suggest you do not introduce the acronym SST. (Greame Pearman, Monash University Sustainability Centre)	LH:acronym removed
11-672	A	15	11	15	12	This sentence does not read very well. Suggest it should be '…above long-term maxima occur, this could result in widespread mortality.' (John Garnham, Department of Primary Industries)	LH: whole Box revised
11-673	A	15	12			Line 12 - Delete "if". (Tom Beer, CSIRO)	LH: done
11-674	A	15	13	15	13	"over 60%" should be ~42% in 1998 and ~54% in 2002; see Berkelmans et al (2004) - this paper also gives projections of the extent of bleaching for given SST increases. See also Wooldridge, S and T Done (2004) Learning to predict large-scale coral bleaching from past events: A Bayesian approach using remotely sensed data, in-situ data, and environmental proxies. Coral Reefs 23: 96-108. Also Wooldridge, S., T Done, R Berkelmans, R Jones & P Marshall (2005) Precursors for resilience in coral communities in a warming climate: a belief network approach. Marine Ecology Progress Series 295: 157-169. (Janice Lough, Australian Institute of Marine Science)	LH: Box revised
11-675	A	15	24	15	24	I think that it is important to mention here the Reef Water Quality Protection Plan and the 30% no-take declaration for the GBRWHA - these actions increase the resilience of the GBR and reduce the likelihood of "reduced water quality" and "over-exploitation of key species". (Janice Lough, Australian Institute of Marine Science)	LH: done
11-676	A	15	25		26	Reference to possible adaptive responses to global warming need to be given more prominence. (David Jones, Australian Bureau of Meteorology)	LH: possibility of adaptation now addressed in box
11-677	A	15	27	15	27	How rapidly can coral reefs 'migrate south' to compensate for rising temperatures? (David White, ASIT Consulting)	LH : Ove H-G seems to think this unlikely
11-678	A	15	35			Section11.4.2.1 Cropping: No mention at all of weeds..perhaps not an issue for cropping? I note the discussion in the rangelands section.. (Oliver Woldring, NSW Government)	MH: now included.
11-679	A	15	37	15	38	Unclear what "adaptations" means in this context, please clarify. (Janice Lough, Australian Institute of Marine Science)	MH: Clarified
11-680	A	15	37	15	37	Reference needed for this statement (Janice Lough, Australian Institute of Marine Science)	MH: No longer relevant as the sentence removed.

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11-681	A	15	37	15	38	This is not new at all. Maybe it is better established now for Australia and NZ. (Barrie Pittock, CSIRO)	MH: Clarified
11-682	A	15	37			First sentence should be clarified; it is only true if horticulture is included; otherwise meat products have a higher GVP (Kim Ritman, Bureau of Rural Sciences)	MH: Crops include grapes, horticulture, vegetables etc as well as grains. In total they do outweigh livestock industries by a considerable margin. Nevertheless, the sentence has been removed as part of length reduction.
11-683	A	15	37	15	37	Why would you regard "that adaptations are likely to reduce vulnerability" a 'significant new finding'; this has always seemed self-evident. (David White, ASIT Consulting)	MH: Clarified
11-684	A	15	39	15	41	The distinction between C3 and C4 plants is important - is this covered in other parts of IPCC ? - as I understand it it is an important aspect of vulnerability in Africa where sorghum and maize are C4 plants at warmer end of adaptation - hence not likely to benefit from any aspect of climate change. In this section wheat is listed as C3 plant, later in the paragraph corn/maize is mentioned - should this be referred to as a C4 plant ? (Peter Hayman, South Australian Research and Development Institute)	MH: Accepted
11-685	A	15	39			This CO2 effect winning over warming is only true up to some limiting warming, and is coming under increasing doubt from free air trials. State the limits - up to what warming level? (Barrie Pittock, CSIRO)	MH: Referred to Chapter 5 (Food, Fibre etc) where there is a broader discussion of CO2 effects.
11-686	A	15	40	15	40	"Bright" to read "Bright & McIndoe". (Alistair McKerchar, National Institute of Water and Atmospheric Research Ltd)	MH: Corrected
11-687	A	15	40	15	40	The CO2 response will only compensate for higher temperatures where there is no other limiting factor such as nutrients, and more importantly water. This is especially relevant to water stressed wheat growing areas such as Canterbury, where availability of irrigation water may likely to decline in coming decades as a consequence of the over-production of fossil water in deep aquifers and reduced seasonal stream flows such as those experienced this spring and predicted for this summer. (Sean Weaver, Victoria University of Wellington)	MH: Not accepted. CO2 response is greater under water stress (provided it doesn't kill the plants – in which case there is no response to anything. Nutrition is now usually well managed but if it is not, then this will limit the response to CO2. Water Availability is dealt with in other sections.
11-688	A	15	41			Is this discussion about maize production about Australia or New Zealand. It is unclear when the discussion about NZ stops. (Tom Beer, CSIRO)	MH: Clarified
11-689	A	15	43	15	43	The comments on impacvts upon disease and pests is very important - has there really been no work done on this? Are there experts we can approach?	MH: There is no significant Australian work found yet that significantly clarifies this issue

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						(Andrew Watkins, Australian Bureau of Meteorology)	since the TAR apart from that referenced.
11-690	A	15	44	15	47	In what areas are water logging, soil acidification and dryland salinity likely to be exacerbated. (Unlikely to happen in marginal croppping areas.- see the Australian wheat industry box , p 16) (Elizabeth CURRAN, Bureau of Meteorology)	MH: The areas at risk are widespread across the cropping zones.
11-691	A	15	44	15	47	So much of the chapter suggests that there will be less rain, and that it will be drier. So it seems odd that when there is a factor that actually works to reduce evaporation it is interpreted as increasing deep drainage problems, salinity etc. This is really inconsistent. I am not saying that it won't happen. It is the context that really needs fixing. (Graham Farquhar, Australian National University)	KH: See comment 11-485 MH: That sentence refers to the CO2 effects alone – the following sentences include the more uncertain scenarios of temperature and rainfall changes. The driver for these three issues is seasonally too much water – reducing the evapotranspiration logically will make this situation slightly more problematic. Editorial changes made to help with clarity.
11-692	A	15	45			The word “past” is ambiguous. It is unclear whether “risk of water moving past” refers to water actually getting to the root zone and flowing around the roots or whether it refers to water moving beyond the root zone and causing waterlogging. (Tom Beer, CSIRO)	MH: Clarified
11-693	A	15	45		47	This does not accord with statement made on page 11, line 29 or page 16, line 10 (Kim Ritman, Bureau of Rural Sciences)	MH: The reduced soil moisture referred to earlier is a result of both reductions in rainfall and changes in temperature regimes. In this sentence we are only referring to a change in CO2 concentration. The following sentences are more comparable and consistent with the earlier statements about reuced soil moisture. Editorial changes made to try to clarify.
11-694	A	15	45			Reference is required to support the statement that elevated CO2 concentration reduces transpiration. What does 'slightly' mean? (David Whitehead, Landcare Research)	MH: Quantified on line 48 below
11-695	A	15	46			The link of lower transpiration and hence more drainage, erosion and aciditiy is valid. However it will only influence these factors where transpiration rate is an important variable - a lot of drainage, erosion and acidity occur in months of the year when there is no activly growing plant - or the potential evapotranspiration is so low that changing the amount of the potential that is transpired will make little difference. (Peter Hayman, South Australian Research and Development Institute)	MH: Agree. WA is such a place. No change.
11-696	A	15	46		47	Sentence is miss-leading, particularly when drying trends are likely to over	MH: This text deals with a combination of

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						compensate for the increased water use efficiency. (David Jones, Australian Bureau of Meteorology)	factors including reduced rainfall. Text modified to try to clarify.
11-697	A	15	51	16	28	Given that so much of Australian horticulture is irrigated and there are worrying projections for the MDB - maybe a sentence or two on the impact of climate change - especially on fixed horticulture as water suppy becomes more less reliable. (Peter Hayman, South Australian Research and Development Institute)	MH: Inserted
11-698	A	16	0			The tables in the Australian Wheat Industry example need titles - unless lines 32 to 34 are intended to be the title. If so this is not clear. If not then suggest to add a short title and add the followong to the start of line 32 - The tables above model the % change in national gross... Also should remove the '(%)' from line 32. (John Garnham, Department of Primary Industries)	MH: Changes made
11-699	A	16	2			Need to explain concepts such as win-win and win-lose. Perhaps delete. (Gerald Rys, Ministry of Agriculture and Forestry)	MH: Amended
11-700	A	16	4	16	47	Is Nicholls (1997) Increased Australian wheat yield due to recent climate trends. Nature 387: 484-485 relevant here? it was not mentioned in the TAR but provides evidence that increases in wheat yields with warmer temperatures are already being observed. Plot Figures a) and b) with the same x and y axes. (Janice Lough, Australian Institute of Marine Science)	MH: Amended
11-701	A	16	5		47	The risks to Australian wheat industry not really coming through in the executive summary. (Tony Coleman, Insurance Australia Group)	MH: Will need to address
11-702	A	16	5			Box on the Australian Wheat Industry (needs a number 11.2?) - can "unlikely" be defined - eg line 12. (Oliver Woldring, NSW Government)	MH: Number the box. The quantitative uncertainty levels are standard across the FAR – we are required to comply with these
11-703	A	16	9	16	9	how can the simulation about CO2 response be validated. Masle has shown genetic variation in the response of wheat varieties to increased CO2. presumably breeders will empirically choose appropriate new varieties from this genetic variability. Was this factored in? (Graham Farquhar, Australian National University)	MH: Comparison of independent actual yield data against simulation of the crop yield using appropriate environmental and management information in tandem with variety-specific phonological coefficients. The area of differential varietal response to CO2 is an emerging one – dealt with more appropriately in Chapter 5 (Food Fibre etc)
11-704	A	16	19	16	31	The figures comparing change in crop value (with and without adaptation) do not share the same scales. I recommend plotting the same scales on plot A and B to permit easier comparison. (Darren NT King, National Institute of Water and Atmospheric Research Ltd)	MH: Amended
11-705	A	16	20			Why are these figures not given a number? Other figures in boxes have numbers.	MH: Amended

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						(Tom Beer, CSIRO)	
11-706	A	16	20			Figure in the box: This graph needs a figure number and a caption. I recommend that the scales on the two figures should be similar. Therefore the rest of the figures need to be renumbered. (Peyman Zawar-Reza, University of Canterbury)	MH: Amended
11-707	A	16	32	16	34	This is a caption and should be in italics to distinguish it from the text. (Greame Pearman, Monash University Sustainability Centre)	MH: Amended
11-708	A	16	39			Replace "as rainfall declines" with "if rainfall declines as projected". (David Jones, Australian Bureau of Meteorology)	MH: Amended
11-709	A	17	0			It was at this stage of reading that I started to become overwhelmed by the complexity of linkages from the fundamental climatic forcing, through to broad environmental conditions, influences on ecosystems and then on human production systems, The connections become more complex and the attribution or projection of linkages, less certain. Yet in the text, the only word that is use consistently is "likely" as a measure of probability. Does this word have a specific meaning for the IPCC? Are there other words with prescribed meaning that can be used to make the connections more differentiated between those that are most likely and those that are very tenuous at least at this stage? It lead me to sketch out a diagram to try and express this hierarchy of linkages, and suggest that something like this might be used in a short piece of text that treats the issue generically, before you get into all of the examples. I have attached the draft diagram to give you a bit of a feel as to what I have in mind. What do you think? (Greame Pearman, Monash University Sustainability Centre)	BF: need to look at his draft diagram KH: Need to cross-reference the IPCC definitions of likelihood and confidence MH: Need to consider this diagram as a Chapter writing team
11-710	A	17	0			Issues of 'near El Niño mean state' (somewhat mentioned earlier in the text) now largely ignored, despite the potential impact this type of pattern may produce. There could be a substantial mixed or confusing message here. Mixed messages also appear on P17 regarding 'an average 10% reduction in rainfall' providing a mixed message compared to the Table describing the Ranges. Important issue again of mixed messages coming through this Chapter. (Roger Stone, Department of Natural Resources)	BF: need to clarify MH: Projections of El Nino are highly uncertain – need to be dealt with elsewhere (at the moment they are not in the Chapter Climate Projections section). There have been no impact and adaptation studies undertaken so far that we know of that include scenarios of increased El Nino frequency.
11-711	A	17	1	17	10	Is there any work showing benefits from reduction in frost losses? (Rod Anderson, Department of Sustainability & Environment)	KH: See comment 11-700 MH: Comment placed in Wheat Box
11-712	A	17	1			"likely to be affected" suggests it could be positive or negative - should the words not be more direct . Huge risk these will not be able to be grown? (Tony Coleman, Insurance Australia Group)	MH: Amended
11-713	A	17	1	17	20	Should there be a mention of frost here?	MH: Comment placed in wheat box

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						(Greame Pearman, Monash University Sustainability Centre)	
11-714	A	17	2		3	What is the link to "severe hail, wind, and rain damage"? (David Jones, Australian Bureau of Meteorology)	MH: There is demonstrated vulnerability to these factors – and earlier sections of the Chapter suggested some level of increased risk from these factors
11-715	A	17	8	17	10	What is the source of these data? (Chris Cocklin, Monash University)	MH: Amended
11-716	A	17	8	17	10	This sentence does not make sense; what are cost increases of "24-83% in the current quarantine zone"? Cost increases relative to what? (Janice Lough, Australian Institute of Marine Science)	MH: Clarified
11-717	A	17	9			"cost increases". It might be better to give the actual cost increase not a percentage as this allows the reader to get a feel for the magnitude and thus national significance. (Greame Pearman, Monash University Sustainability Centre)	MH: Quantified.
11-718	A	17	9			What costs are these, and why? Total production costs? Why so in endemic areas? (Barrie Pittock, CSIRO)	MH: Clarified
11-719	A	17	10	17	10	Possible addition: the likely response of fire ants to climate change. See (Sutherst and Maywald 2005). (Sean Weaver, Victoria University of Wellington)	MH: Probably better in the Settlements section.
11-720	A	17	12	17	20	Some mention needs to be made of biosecurity - the physiological effects of climate change on kiwifruit and apples referred to in this paragraph can be expected to be overcome by adaptive measures such as breeding of low-chill cultivars; the potential costs (in terms of both market access and direct control costs) of a new pest or disease are likely to be much higher. (Alistair Hall, HortResearch)	KH: Agree. This is mentioned in the Executive Summary
11-721	A	17	12	17	12	It needs to be made clear that the Richardson et al. paper is just about kiwifruit, specifically the 'Hayward' (or 'Green') variety. (Alistair Hall, HortResearch)	JS Amended
11-722	A	17	12	17	28	Another source of information for NZ here would be the outcomes of Frst funded research programmes that have been published. This needs checking further (Judy Lawrence, PSConsulting)	JS Noted
11-723	A	17	13			This seems like a very general/broad statement. I suspect that it really refers to stone fruit and not all fruit. Can the statement be quantified? (Greame Pearman, Monash University Sustainability Centre)	JS Amended
11-724	A	17	13			"gains decline" I presume that this is an outcome of a model or some other assessment. To me it is much too dogmatic. Are you really sure that this is the ultimate outcome?	JS Amended

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						(Greame Pearman, Monash University Sustainability Centre)	
11-725	A	17	15	17	15	Perhaps "Production of current varieties …" (Alistair Hall, HortResearch)	JS Amended
11-726	A	17	15			All production? To me this is ambiguous. Suggest slight re-wording. (Greame Pearman, Monash University Sustainability Centre)	JS Amended
11-727	A	17	15	17	15	please add "about" before "2050" (Andy Reisinger, Ministry for the Environment)	JS Amended
11-728	A	17	15			First word add "Kiwifruit" production. (Gerald Rys, Ministry of Agriculture and Forestry)	JS Amended
11-729	A	17	17	17	17	I suspect that it is not "dry matter production" that is meant here, but the "dry matter proportion", the proportion of dry matter in the fruit. A high proportion of dry matter means a better quality fruit. (Alistair Hall, HortResearch)	JS Amended
11-730	A	17	18			Need to change the context for apples given recent economic trends and a huge decline in orchards that is now occurring for economic reasons. Suggest you change to "Apples, another major …" (Ken Hughey, Lincoln University)	JS Amended
11-731	A	17	20			…also affect fruit size…' Does 'affect' mean increase, decrease, or create more variability in size? (Alan Porteous, National Institute of Water & Atmospheric Research (NIWA))	JS Amended
11-732	A	17	20	17	20	with respect to the impact of warmer summers on fruit size - not clear whether fruit gets bigger/smaller, and hence whether this is detrimental (Andrew Watkins, Australian Bureau of Meteorology)	JS Amended
11-733	A	17	22	17	28	ditto (Rod Anderson, Department of Sustainability & Environment)	MH: Probably will be less of an issue in the future. Little work done.
11-734	A	17	22	17	28	I would have thought that water availability would be a problem in relation to viticulture. Is it absence indicative that it is not a problem or that no-one has studied it? (Tom Beer, CSIRO)	MH: Amended
11-735	A	17	22	17	22	Remove second full stop on line. (John Garnham, Department of Primary Industries)	MH: Amended
11-736	A	17	30			Section 11.4.2.3: the authors may want to consult the report on agriculture impacts prepared for MfE to assess consistency and other relevant literature for NZ (see http://www.climatechange.govt.nz/resources/reports/impacts-agriculture-sep01.pdf) (Andy Reisinger, Ministry for the Environment)	BF: need to do this JS Checked
11-737	A	17	30			Section 11.4.2.3: I feel this section is struggling with how to combine the different, and sometimes conflicting, information about climate change impacts on	MH: This comment needs to be re-considered in the light of other editorial changes. Also

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						agriculture. Many changes in mean climate and CO2 tend to have beneficial effects, while most changes in extremes tend to have negative effects (changes in frost risk being one exception, but changes in pest survival are an example for the other side). It may be worthwhile to give a more generic introduction along the lines of "some aspects of climate change, mostly changes in mean climate, can have beneficial effects on agriculture, while many changes in extremes tend to have negative impacts. The overall impact of climate change on agriculture production is therefore difficult to evaluate and quantify, and depends critically on adaptation options (discussed later)." An assessment that tries to quantify impacts overall will be skewed towards the effects of changes in mean conditions. Also of course the executive summary will have to try and relate these issues and their uncertainties in a single statement. (Andy Reisinger, Ministry for the Environment)	refer to discussion on Graeme Pearmans diagram.
11-738	A	17	32		34	Here and in many other places in the document, the effects of CO2 fertilisation versus temperature versus precipitation are treated seperately which makes interpretation difficult. Suggest the authors look to better integrate this information. It is much better to provide the reader with an overview of the aggregate effect (as is done for New Zealand in the pervious paragraph). (David Jones, Australian Bureau of Meteorology)	KH: Noted, but need to use citable literature on current impacts studies MH: Ditto. The issue is that there is no aggregate effect and marked differences in the uncertainties of the projections of the individual components
11-739	A	17	34		35	Sentence "Increased drought risk is virtually certain to decrease...." makes no sense. (David Jones, Australian Bureau of Meteorology)	KH: Noted. See 11-740 MH: Text clarified
11-740	A	17	34	17	34	"Increased frequency of drought" rather than "drought risk" (Janice Lough, Australian Institute of Marine Science)	KH: Noted MH: Text amended
11-741	A	17	34			I don't think you can be so confident (ie, "virtually certain") of the link between drought and pasture growth. The NZ drought study referred to (Mullan et al, 2005) has high confidence in reduced soil moisture, but in transferring this to pasture growth there is the added complication of (possible) increased stomatal resistance and increased growth rates from higher CO2. (A. Brett Mullan, National Institute of Water & Atmospheric Research Ltd)	JS: Change confidence level
11-742	A	17	34		35	Increase drought occurrence is likely to decrease pasture growth.' Use 'occurrence' instead of 'risk'. (Alan Porteous, National Institute of Water & Atmospheric Research (NIWA))	KH: Noted. See 11-740 JS Amended
11-743	A	17	38	17	39	Is this entirely one-directional; might some pests and diseases become more limited in their range and incidence? (Chris Cocklin, Monash University)	JS Noted
11-744	A	17	41	18	3	Any work showing gains from reduction in frosts on Southern Australian pastures (Rod Anderson, Department of Sustainability & Environment)	KH: Check with Vic DPI MH: No work finalised on this. SA doing

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							some
11-745	A	17	41	17	51	Some of the literature on CO2 impacts on grasses (Oula Ghannoum et al.) could usefully be cited in this section. (Andrew Ash, CSIRO)	MH: Agree. Inserted.
11-746	A	17	41	17	42	It might be adding this sentence and reference. "Increased water use efficiency in response to elevated CO2 in native tropical tussock grasses is likely to buffer the impacts of drought in C4 dominant rangelands in northern Australia (Walker et al. 1999 - Int Rangeland Congress proceedings) (Andrew Ash, CSIRO)	MH: Inserted.
11-747	A	17	41			Don't understand how a rise in Co2 concentration is likely to increase pasture growth in Australia, particularly in water limited environments. (Tony Coleman, Insurance Australia Group)	MH: Increased transpiration efficiency via the stomatal response to elevated CO2 – also in some species increased efficiency of use of radiation. Referred to Chapter 5 where there is an overarching discussion.
11-748	A	17	41		42	I would expect increases in pasture growth (due to higher CO2) to be less likely, rather than more likely, in water-limited environments. (A. Brett Mullan, National Institute of Water & Atmospheric Research Ltd)	MH: There is a well-documented increase in *relative* growth under moisture stress in response to elevated CO2
11-749	A	17	41	17	45	Unclear whetehr these reductions in rainfall are even likely. Relate back to what the scenarios are suggesting. (Andrew Watkins, Australian Bureau of Meteorology)	MH: These studies are sensitivity analyses – drawing from a limited literature pool.
11-750	A	17	41			How do we know that the effects of elevated CO2 concentration on increasing pasture growth will match the decrease in growth resulting from a 10% decrease in rainfall? Care is needed when suggesting relative magnitudes of different effects (David Whitehead, Landcare Research)	MH: The statement summarises the results from that study – policy makers are asking questions about the trade-offs between the positive effects of CO2 and the offsetting effects of potential rainfall reuctions.
11-751	A	17	42			To what does “section 5.3.2” refer? (Tom Beer, CSIRO)	MH: Should refer to Chapter 5.3.2
11-752	A	17	42	17	42	The reference to section 5.3.2 is questioned (John Garnham, Department of Primary Industries)	MH: Should refer to Chapter 5.3.2
11-753	A	17	42			“counters this” again a very dogmatic statement. Are you really this sure? (Greame Pearman, Monash University Sustainability Centre)	MH: Amended
11-754	A	17	43	17	43	Remove additional bracket. (Julia Becker, Institute of Geological and Nuclear Sciences)	MH: Removed
11-755	A	17	45		46	Suggest deleting this "nothing sentence"... The nutritional value of pastures is likely to change". (David Jones, Australian Bureau of Meteorology)	MH: Amended
11-756	A	17	50	17	51	Having just indicated that elevated CO2 increases non-structural carbohydrate	MH: Amended

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						contents of pasture grasses, it is unclear in this sentence why increased CO2 concentration in rangelands would be expected to decrease nonstructural carbohydrates. There is no reference, or line of logic, to this statement. (Roger Gifford, CSIRO)	
11-757	A	18	5			It would be usefull to give a scale of how big the salinisation problem is i.e. projected unusable agricultural land to give reader the scale of the issue. (Tony Coleman, Insurance Australia Group)	MH: Not space for the discussion needed to do this – nor analyses of the areal response of the hazard to climate changes. Th dryland salinity risk is right across the wheat-sheep and high rainfall zones of southern Australia.
11-758	A	18	5	18	5	Insert "land" before "degradation". (Janice Lough, Australian Institute of Marine Science)	MH: Amended
11-759	A	18	10	18	10	Need bracket -(- before Howden reference. (John Garnham, Department of Primary Industries)	MH: Amended
11-760	A	18	12			Why “many livestock”? Either delete “many”, or add the word “species” after livestock. (Tom Beer, CSIRO)	MH: Amended
11-761	A	18	14	18	15	if there has been "little esearch on this topic" then don’t include it here. (Andrew Watkins, Australian Bureau of Meteorology)	MH: This was intended to flag a potential research area- possibly move to secion on ‘Research Needs’
11-762	A	18	15	18	18	Impacts of cattle tick are mostly conditional on failure of the Queensland - NSW border quarantine. This is likely to occur as a result of failure of chemical control due to resistance or from a policy change. (Robert Sutherst, CSIRO)	MH: Amended
11-763	A	18	17	18	18	Can this be expressed more simply? Something like - "Annual live weight gain is expected to drop by 20% by 2030 and 230% by 2100" (Rod Anderson, Department of Sustainability & Environment)	MH: Sentence re-structured
11-764	A	18	17	18	18	Are those loss just due to direct effects of temperature ? Could they be compensate by positive effects described before? (Yves Bergeron, université du québec en Abitibi-Témiscamingue)	MH: The effect was due to increased risk of tick infestation. Sentence clarified.
11-765	A	18	17	18	18	needs a reference. more explanation of why weight gain changes occur (Andrew Watkins, Australian Bureau of Meteorology)	MH: Clarified.
11-766	A	18	18			I am not comfortable with “losses in live weight gain are projected to increase by …230%”. The reason is that I am not comfortable with losses greater than 100% because then more than everything has been lost. If I thus correctly interpret the sentence, somewhere between 2030 and 2100 live weight gains will cease and be replaced by live weight losses. The sentence is clumsy and ambiguous and needs rewording.	MH: Sentence changed to clarify

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						(Tom Beer, CSIRO)	
11-767	A	18	18			The final 230% could be expressed better. Does this mean there will be a loss in liveweight of animal rather that any gain by 2100?? (Gerald Rys, Ministry of Agriculture and Forestry)	MH: Clarified.
11-768	A	18	21	18		section 11.4.3: this section is very short and considering the possible economical impacts for Australia and New Zealand it should be expanded (Yves Bergeron, université du québec en Abitibi-Témiscamingue)	MH: Agree, but space limitations apply. Furthermore, the new literature bases is minimal.
11-769	A	18	21			Section 11.4.3 There seems a glaring absence of any mention of native forests (managed for production). Perhaps at least mention that no work had focussed on this issue? (Oliver Woldring, NSW Government)	MH: Need to check
11-770	A	18	23	18	46	Can we find any research (maybe out of the CRC for Greenhouse Accounting) on implications of climate change for managed native forests? Growth Rates, regeneration, species changes? (Rod Anderson, Department of Sustainability & Environment)	MH: Need to check
11-771	A	18	23	18	25	This sentence is prospectively misleading, as it might be taken to suggest that the native forest estate is fixed at 18 millon ha. The reality is that it is a decreasing asset (recently at a rate of around 600,000 ha/annum - which is significantly greater than the rate of planting!); this deforestation is one of the major contributors to Australia's greenhouse footprint. The additional plantings for environmental reasons (erosion etc.) also pale in significance to the rate of deforestation - e.g., in Victoria, replanting of native forests equals about 50% of the annual clearing of native forests. (Chris Cocklin, Monash University)	MH: Clarified
11-772	A	18	23	18	25	After "salinisation" on line 25, I suggest adding the following: "In New Zealand, the current situation is different. New plantations have declined from a 1990-2005 average of 43,000 hectares per year to almost zero. Deforestation has recently become widespread, with forests being cleared for more profitable land uses such as dairying, so that there may well be a total decline in forested area." (Piers Maclaren, Private)	JS Amended
11-773	A	18	23	20	22	The authors may wish to include information contained in section 7.8 of Ferguson, I., Adams, M., Davey, S., McCormack, R., and Young, J. (2003) Calculating sustained yield for the Forest Management Plan 2004-2013. Stage 3 Report, Western Australian Conservation Commission, (June 2003). http://www.conservation.wa.gov.au/files/docs/125.pdf (Kim Ritman, Bureau of Rural Sciences)	MH: Not clear what this adds. Check reference.
11-774	A	18	29			Why are the references to Kirschbaum missing from the reference list?	MH: References need adding.

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						(Tom Beer, CSIRO)	
11-775	A	18	29	18	29	Refer to potential effects of a decline in water availability associated with regional drying as a limiting factor in forestry response to CO2 fertilisation. Furthermore, with CO2 fertilisation there is a reduction in stomatal conductance (reducing evapo-transpiration and hence conserving water) but as a consequence can alter sensible to latent heat ratios. Reduced latent heat production from reduced evapo-transpiration can lead to an increase in sensible heat which can increase the risk of fire in dry and seasonally water stressed regions. The same applies to lines 43 and 44. i.e. if CO2 fertilisation is associated with warming and water stress, the negative feedback associated water use efficiency needs to be evaluated against the positive feedbacks associated with drying and latent: sensible heat ratios. Insufficient mention of fire risk for the forest industry associated with warming and drying and feedbacks particularly for eastern regions in NZ. (Sean Weaver, Victoria University of Wellington)	MH: The risk is dealt with earlier in this chapter as well as in Chapter 5
11-776	A	18	32	18	32	Reference to section 11.3.1.2 should be 11.3.1 (John Garnham, Department of Primary Industries)	KH: Agree
11-777	A	18	39	18	42	The first sentence in line 39 needs careful qualification. Forestry prices are very depressed worldwide at present and current planting rates have reduced from averages of 40,000 hectares per annum to 10,000 hectares per annum. SO its not clear what this sentence is referring to. A 2001 report will very out dated. Check with Dan Bolger at MAF (Judy Lawrence, PSConsulting)	JS: Noted – will delete “is increasingly economically important”
11-778	A	18	39			The sentence reads "Plantation forestry (mainly P. radiata) is increasingly economically important". In fact, the future of the industry has never looked so bleak. Costs (especially land costs) are at an all-time high and revenues on a per hectare basis are at a record low. I suggest the word "increasingly" be omitted. There is still sufficient forestry resource, albeit with a low value, to merit the statement that it is economically important. (Piers Maclaren, Private)	JS: See 11-777
11-779	A	18	39	18	39	just to note that forestry plantations have declined to virtually zero over the last two years, so I'm not sure if the phrase "increasingly economically important" is fully justified. (Andy Reisinger, Ministry for the Environment)	JS: See 11-777
11-780	A	18	39			put " is of increasing economic importance." (Gerald Rys, Ministry of Agriculture and Forestry)	JS Noted
11-781	A	18	41	18	42	Add "growth" before "increases"; also clarify "very little response" to what? (Janice Lough, Australian Institute of Marine Science)	JS noted

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11-782	A	18	41	18	41	it might be worthwhile confirming the latest results from FACE and chamber experiments with relevant experts in NZ, eg Paul Newton, David Whitehead, people in SCION etc. The MfE report was mostly only summarising literature that would have already been assessed in the TAR. (Andy Reisinger, Ministry for the Environment)	JS: Revised
11-783	A	18	42			A better reference to the effects of elevated CO2 concentration on pine tree growth in the young stages is Atwell, B.J., Henery, M.L. and Whitehead, D. 2003. Sapwood development in Pinus radiata grown for three years at ambient and elevated carboon dioxide partial pressures. Tree Physiology 23:13-21. Growth was enhanced during the first two years but rates of growth in the elevated and ambient treatments were the same by the third year. This suggests that the effects of elevated CO2 concentration is likely to increase growth rate in the early years but the effects by the end of the rotation are likelyt to be insignificant. More important, however, this paper shows that elevated CO2 concentration did result in a 13% increase in lignin content in the earlywood and a 12% overall increase in wood density. This effect is likely to be far more important economically for the wood products industry than the effects on growth rate (David Whitehead, Landcare Research)	JS Revised
11-784	A	18	43	18	45	I'm not too fussed on the "likely as not" terminology but I guess that is just a personal preference. (Andrew Ash, CSIRO)	KH: We're stuck with the IPCC Guidelines for Uncertainty
11-785	A	18	43	18	44	"about as likely as not" to me reads the same as "may or may not happen", in which case there is no sense in including it in the discussion. If this is not what it means then I presume that it will be prominently defined somewhere. (Tom Beer, CSIRO)	KH: See 11-784 MH: I have difficulty with this terminology too – but we need to either comply with the Guidelines or change them
11-786	A	18	43	18	44	Don't like "about as likely as not". Do such statements provide any information? Perhaps leave out. (Dean Collins, Bureau of Meteorology)	KH: See 11-784 Ditto MH: Note that there is info here. If the baseline is no risk then a 50% chance of an impact is an increase. Think about it if you were driving to work. Your mode of transport may differ if on the toss of a coin you may not make it intact to the other end !
11-787	A	18	43	18	46	Please rewrite the two sentences that run from Line 43 to Line 46. These two sentences are muddled by the same expression (e.g "...this is about as likely as not to be …") which makes the intended meaning difficult to understand. In the first sentence (Line 43) does the author mean: "However, this may be offset by increased water use efficiency with elevated CO2"	KH: See 11-784 JS IPCC uncertainty language

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						(Darren NT King, National Institute of Water and Atmospheric Research Ltd)	
11-788	A	18	43	18	43	change "is about as likely as not" to "could" or "may" (Janice Lough, Australian Institute of Marine Science)	KH: See 11-784 MH: We are constrained to use IPCC uncertainty language
11-789	A	18	43	18	46	When we say "as likely as not" are we really adding anything to the undestanding? I suspect not, so delete. (Andrew Watkins, Australian Bureau of Meteorology)	KH: See 11-784 MH: We are constrained to use IPCC uncertainty language
11-790	A	18	44	18	44	change "are about as likely as not" to "could" or "may" (Janice Lough, Australian Institute of Marine Science)	KH: See 11-784 MH: We are constrained to use IPCC uncertainty language
11-791	A	18	47	18	48	The section to this point on sectors of landuse misses an important point about the dynamics of NZ landuse change. New Zealand landuse is changing rapidly in many areas. Two trends are significant for climate change impacts viz; total change from pastoral and cropping to viticulture with attendant reliance on irrigation water; conversion of forestry land to dairying with double effects on emissions ie, increase in methane and nitrous oxide from cows and reduction in carbon sequestration in trees. This volatile mix makes NZ lanuse activities either less vulnerrable because of diversity or more vulnerable because of reliance on competition for water. The structure of the Chapter doesn't lend itself to picking up on such points. These have been well documented in grey literature and government reports. MFE and MAF and need to be reflected especially since this report will not be out till 2007. (Judy Lawrence, PSConsulting)	JS: The dynamics of landuse require capturing in the revision KH: perhaps mention in 11.3.2 BF: need to clarify and also use as justification for arguing high adaptive capacity MH: Agree that some points such as landuse changes need to be dealt with in other sections
11-792	A	18	49			Section 11.4.4: This section is difficult to make sense of at the moment since it doesn't distinguish freshwater as a resource from freshwater as a hazard (flooding, sedimentation). It may be useful to have two subsections, one for water as resource (where hydroelectric supply, drought risk, river flows for shipping, salinisation, eutrophication, and changes in urban water demand and acquifer recharge can be discussed). The other section should discuss mostly flood risk (a lot of people still confuse changes in heavy rainfall with changes in mean rainfall!), and perhaps sedimentation issues arising from changing flow regimes. Such a distinction would also more readily click with the typical division of labour in government and industry (the person responsible for flood defences is not usually the same person that would worry about salinisation of drinking water supplies). For NZ, it may also be important to mention the current review of flood risk management, which will include an assessment of how climate change can be incorporated (see http://www.mfe.govt.nz/issues/land/natural-hazard-mgmt/flood-risk-review.html) (Andy Reisinger, Ministry for the Environment)	BB: Will split into 2 sections, and move before 11.4.1

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11-793	A	18	49	20	22	Sec. 11.4.4 Freshwater Resources: Some mention should be made here of the impact of increasing saline intrusions on the recreational potential of coastal water bodies. My research (Schallenberg et al. 2003) has shown that saline intrusions into freshwater-brackish lakes severely impacts the zooplankton community such that the capacity of the community to control algal blooms and maintain water clarity is greatly reduced. This may also have public health implications if toxic cyanobacterial result from these climate-induced changes. (Marc Schallenberg, University of Otago)	BF: need to address
11-794	A	18	49	21	25	Sec. 11.4.4 Freshwater Resources or Sec. 11.4.5 Coasts: Some mention should be made in either of these sections of the potential impacts of rising sea levels on coastal aquifers. The lower Taieri aquifer (Otago) has been identified as being under threat by rising sea levels and/or declining freshwater flows in the rivers that recharge the aquifer. (Marc Schallenberg, University of Otago)	BF: need to clarify
11-795	A	18	49			Section 11.4.4 In this section there is a tendency to jump from one summary of research to the next. As well there is an untidy mix of impacts and adaptation options - needs and edit to tell more of a story.. (Oliver Woldring, NSW Government)	BB: Agree – text will be revised
11-796	A	19	0			Confusing issue of CSIRO, 2001 model output on use of Ranges in output vs the value of supplying ensemble means (as well or instead of). (Roger Stone, Department of Natural Resources)	BB: Ranges rather than means and standard deviations are more commonly reported in the literature.
11-797	A	19	1		50	Would there be an inclusion in here on the effect of freshwater resources on human consumption, industry, electricity power stations? Potentially useful for policymakers and industry to understand potential economic impact? (Tony Coleman, Insurance Australia Group)	BB: This section focuses on the resource itself. Flow-on impacts are discussed elsewhere in the report KH: impact assessments for consumption, industry & power generation are very limited.
11-798	A	19	1		50	It would be good to bring out in each paragraph what the point of the research was , what it will affect, some conclusions of materiality etc - Currently hard to determine the conclusion (Tony Coleman, Insurance Australia Group)	JS: Information is summarised in other sections. KH: perhaps cross-reference other sections
11-799	A	19	1	19	1	I still have problems, given the range of rainfall scenarios presented in section 11.3.1, whether the statement "Drought frequency and intensity are likely to increase in Australian and New Zealand" is "likely". Is this based on rainfall projections or the, already observed increased intensity of drought (for a given rainfall deficit) due to warmer temperatures? (Janice Lough, Australian Institute of Marine Science)	JS: Clarify – NZ statement is based on actual PET drought modelling KH: See 11-550
11-800	A	19	5			Line 5. Suggest re-word “stream flow as modelled, declined” I assume that this	BB: Text will be modified

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						modeling was done with no intervention through river flow control for ether climate change reasons or other environmental or production reasons. (Greame Pearman, Monash University Sustainability Centre)	
11-801	A	19	6			Adelaide is notable by ommission - the implications of salinity in MDB on drinking water for 1 million people in Adelaide is worth a mention. (Peter Hayman, South Australian Research and Development Institute)	BB: Agreed – will add a statement if length of the FOD can be successfully reduced.
11-802	A	19	8	19	8	Burrendong is not really near Sydney, and it flows even further away (Michael Dunlop, CSIRO)	BB: Agreed – error has already been detected.
11-803	A	19	10	19	11	This reduction in stream flow is just as trees start to grow - once more mature this impact is less, or can even reverse. (Andrew Watkins, Australian Bureau of Meteorology)	BB: See below.
11-804	A	19	11	19	11	Are the reductions in dam inflows permanent or only significant during active tree growth? (Oliver Woldring, NSW Government)	BB: Revised text will clarify this situation.
11-805	A	19	14			(CSIRO 2001) should be CSIRO (2001) (Tom Beer, CSIRO)	BB: Agreed.
11-806	A	19	14	19	18	This paragraph needs rewriting to make it clearer what we are sure of and what we are not, rather than just listing a series of numbers. For example, it would be better to say that there is no clear agreement either way for northeast coast and Tasmania. (Janice Lough, Australian Institute of Marine Science)	BB: Disagree – giving the ranges for the east coast and Tasmania indicates the degree of uncertainty.
11-807	A	19	14			"scenarios". Is this really the word you wish to use, or should it be "projections" Isn't there an IPCC guideline for this?. Similarly for Line 22? (Greame Pearman, Monash University Sustainability Centre)	BB: Noted
11-808	A	19	16			My only query related to a reference on page 19 line 16 to the South Australian Gulf. We actually have more than one gulf in South Australia - is this a reference to Spencer Gulf? (Susan Churchman, Department for Environment and Heritage,South Australia)	BB: We used the same terminology as that in the paper. The single catchment involved is 20 km from Adelaide, near the Gulf Of St Vincent.
11-809	A	19	16	19	16	Is this Gulf St Vincent on the western side of the Mt Lofty Ranges, or Spencer Gulf, further to the west and with little river runoff? (Elizabeth CURRAN, Bureau of Meteorology)	BB: See above. Text will be modified.
11-810	A	19	17			Chiew; McMahon should be Chiew and McMahon (Tom Beer, CSIRO)	BB: Agree.
11-811	A	19	17	19	17	What is "system yield"? (Janice Lough, Australian Institute of Marine Science)	BB: A term well understood by water professionals.
11-812	A	19	17	19	18	Gettign down to the scale of Benalla is far far too detailed. Remove reference to this. Similarly, need to make a call on a number of other localised studys in this report.	BB: Disagree – such case studies are of interest to water planners.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Andrew Watkins, Australian Bureau of Meteorology)	
11-813	A	19	19			Would it be possible to add a summary of the Jones & Durack (2005) report on catchment yield in Victoria? "Estimating the Impacts of Climate Change on Victoria's Runoff using a Hydrological Sensitivity Model" http://www.greenhouse.vic.gov.au/CSIRO%20Report%20-%20Runoff.pdf (Rod Anderson, Department of Sustainability & Environment)	KH: Agree.
11-814	A	19	20		28	Too much detail is provided in the discussion of this study.The findings could be usefully summarised in 1-2 sentences. (David Jones, Australian Bureau of Meteorology)	BB, KH: will consider condensing, but info about input scenarios is important
11-815	A	19	20	19	28	This paragrapg is a very good example descibing the likely impacts quantitatively, giving percentage changes expected. More of this quantitative detail would be much more helpful to the reader (David Whitehead, Landcare Research)	KH: Noted
11-816	A	19	23	19	24	Is the "rainfall change" for 2050 a decrease of 13% to an increase of 1%? This is unclear. (Janice Lough, Australian Institute of Marine Science)	BB: Disagree – the meaning is very clear. This construct is used throughout the climate change literature. KH: Note the need to insert "and" before "a rainfall" at the end of line 23
11-817	A	19	28	19	28	minimal surcharging meaning???? (Michael Dunlop, CSIRO)	BB: See 11-811.
11-818	A	19	28			What is meant by surcharging? (David Jones, Australian Bureau of Meteorology)	BB: See 11-811.
11-819	A	19	30	19	39	I don't' think we should be talking about flood risk in the freshwater resources section. This information would be more appropriately placed in section 11.4.7 (Rod Anderson, Department of Sustainability & Environment)	BB: Agree. KH: Are we proposing to move all flood-text to 11.4.7? TO be discussed at Merida. If so, need to cross-reference 11.4.7
11-820	A	19	30	19	33	This starts to read as if Alberts-Logan Rivers are upstream of Syd-Canberra … suggest placing Abbs ref at start of sentence. (Michael Dunlop, CSIRO)	BB: Agree – text will be modified.
11-821	A	19	33			Three significant figures! Really? (Greame Pearman, Monash University Sustainability Centre)	BB: Agree – text will be changed.
11-822	A	19	35			Was an integrated atmospheric model used here or just historic rainfall observations? (Tony Coleman, Insurance Australia Group)	BB: This should be clear from the present text
11-823	A	19	37	19	37	Add year of "tropical" cyclone Wanda. (Janice Lough, Australian Institute of Marine Science)	BB: Agree.
11-824	A	19	39	19	39	Should "increses to 3-18%" read "increases by 3-18%"?	BB: Agree.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Andrew Ash, CSIRO)	
11-825	A	19	39			"increases to 3-18%" is not clear. I presume by 3-18% is meant. (Tom Beer, CSIRO)	BB: See above.
11-826	A	19	39			"by" rather than "to"? (Barrie Pittock, CSIRO)	BB: See above.
11-827	A	19	43	19	43	Delete "…proportions..." and replace with "…levels…" (Line 43) (Darren NT King, National Institute of Water and Atmospheric Research Ltd)	rdh Disagree – we mean proportion as there is relatively more water in floods. However there may be more water overall in some parts of the country
11-828	A	19	43	19	43	Alternative sentence structure suggested. Replace: "This results in greater…" (Line 43) with "This may result in greater erosion of land surfaces, the redistribution of river sediments, and a decrease in the protection afforded by stop banks". (Darren NT King, National Institute of Water and Atmospheric Research Ltd)	JS Agree – rdh actioned
11-829	A	19	44	19	45	A gap here is that there will also be a demand for further flood protection works evidenced by the response to flood events in the last two years. Refer to Review of the February 2004 Flood Event-Review Team Report Director of Civil Defence and Emergency Management NZ November 2004; Managing Flood Risk- the case for change, Centre for Advanced Engineering Christchurch NZ 2005. (Judy Lawrence, PSConsulting)	JS: Important point which will be included. Rdh actioned.
11-830	A	19	44	19	44	The reference is a bit old – is there not a more recent one? (Sean Weaver, Victoria University of Wellington)	Rdh - Now using Westport study – check details and ref before going to print.
11-831	A	19	45		49	The focus on a single industry (hydro-electricity) when discussing the reduction in water accumulated as snow is not particularly helpful. (David Jones, Australian Bureau of Meteorology)	Rdh extra words re other industry eg irrigation negative impact.
11-832	A	19	45	19	45	The second point to be made in the final paragraph of page 19 (Line 45) is not actually a flow regime change. Rather it states that a benefit will accrue to the hydro-electricty system, presumably from "more runoff" which follows in the next sentence. I suggest some merging of the two sentences "Secondly..."(Line 45) and "More ...(Line 45). It might read something like: "Secondly, increasing runoff during winter is likely to benefit the hydro-electricity system through higher generation capacity, when it is most needed for heating." (Darren NT King, National Institute of Water and Atmospheric Research Ltd)	Rdh – yes it is if there is a shift in the summer/winter ratio of liquid water delivery.
11-833	A	19	48	49		not sure why thi statement is here rather than in the agricultural section 11.4.3.2 (Gerald Rys, Ministry of Agriculture and Forestry)	JS Delete
11-834	A	19	49	19	49	Delete "(McKerchar and Henderson, 2003)" - they examine variability in flows due to the influence of the Interdecadal Pacific Oscillation, but do not deal with climate change.	JS & RDH: Delete

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Alistair McKerchar, National Institute of Water and Atmospheric Research Ltd)	
11-835	A	20	0			More information on fisheries needed (from somewhere!). (Roger Stone, Department of Natural Resources)	KH: Literature review by Matear and Hobday (2005) shows how little is available
11-836	A	20	1			Insert “that” between “indicate” and “only” (Tom Beer, CSIRO)	JS Agree
11-837	A	20	1	20	9	Page 20. Lines 1-9. Use of the word “scenarios”? In any case, how were these scenarios obtained? (Greame Pearman, Monash University Sustainability Centre)	JS Agree
11-838	A	20	1	20	9	the authors may also wish to consider the following case studies: http://www.climatechange.govt.nz/resources/local-govt/case-study-wairau-catchment-aug04/index.html, http://www.climatechange.govt.nz/resources/local-govt/timaru-flood-risk.pdf (Andy Reisinger, Ministry for the Environment)	JS: Noted for inclusion RDH: Timaru study is flawed and we believe contains selective data analysis. Buller study by NIWA is relevant and I would like to quote it. Have asked Howard Larsen for permission. Granted!.
11-839	A	20	1	20	3	for the study by Dayananda et al, it might be useful to state what specific scenarios were assumed, and to what extent they were based on changes in mean rainfall, or what methodology was used to model changes in heavy rainfall. Most studies that try to actually model changes in heavy rainfall, based on changes in temperature (since we don't have RCM studies that could indicate changes in weather patterns) suggest significant changes in heavy rainfall risk from extreme (up to 72 hour) events. Whether flood risk changes accordingly depends of course on the level of protection. If this is the reason why the Dayananda study finds little change in flood risk, this should be clearly stated to avoid misunderstandings. (Andy Reisinger, Ministry for the Environment)	BF: need to clarify 1-2°Cglobal warming using statistical downscaling
11-840	A	20	4			The Namjou reference is used which gives an odd impression that Auckland's water supply comes from underground sources. This is not the case and the more important issue is whether any changing climate affects to surface water retention in the water supply dams that are the primary source for NZ's largest city. Suggest Auckland Regional COuncil reports are used here. (Judy Lawrence, PSConsulting)	JS Section is on discharge and groundwater
11-841	A	20	5			Change to "unlikely to be compromised" (Gerald Rys, Ministry of Agriculture and Forestry)	JS IPCC language
11-842	A	20	6	20	8	Re: the sentence on managing stormwater - is it appropriate to inclued mitigation options in this section ? (Andrew Ash, CSIRO)	JS An adaptation section
11-843	A	20	7			Is “injecting” the right word here? (Greame Pearman, Monash University Sustainability Centre)	JS Yes

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
11-844	A	20	10			A gap is the effect of climate change on freshwater ecosystems ie temperature effects and flow effects and the relationship between those indicators and species diversity and also biosecurity risks. Suggest Clive Howard- Williams at NIWA be consulted or refer to the excellent publication Freshwater s of New Zealand 2004 Edited for NZ Hydrological Society and the NZ limnological Society ISBN 0-476-00708-9 Chapter 1 Advances in freshwater sciences and management Ross Woods and Clive Howard-Williamsand a paper by CLive Howard-Williams in the proceedings of a Royal Society Water conference entitled Freshwater NZ; problems processes and priorities New Zealand's Freshwater environments: science issues, limits and progress available at www.rsnz.org/topics/enviro/freshwater_conference/land water air (Judy Lawrence, PSConsulting)	JS: Include some material on freshwater ecosystems KH: Cross-reference wetland ecosystems in 11.4.1 LH: Lesley will follow up with Stuart Bunn and will look at suggested references
11-845	A	20	11		15	What is the source ? A statement is made and then seem to suggest the result is doubtful - (Tony Coleman, Insurance Australia Group)	KH: Bryson to address.
11-846	A	20	11		15	A source needs to be provided for this statement. It is my understanding that this result (>800EC) pressumed no efforts to mitigate salinty of which there are many. (David Jones, Australian Bureau of Meteorology)	KH: Bryson to address.
11-847	A	20	11	20	15	References needed for these statements (Janice Lough, Australian Institute of Marine Science)	KH: Bryson to address.
11-848	A	20	11	20	44	water supplies from short coastal streams (they are hardly rivers - a drive up to Araluen, Eurobodalla or Buckenbowra will demomstrate that) has always been and will aways be tenuous because of the local climate variation and the physiography of the limited catchments (David White, ASIT Consulting)	KH: Ignore, as requested below
11-849	A	20	11	20	44	Ignore above comment - could not clear cell; what I started to write (for sections 11.4.4 on Freshwater resourses and 111.4.5 Coasts) was that Water catchments on the east coast of Australia are often based on short coastal rivers with limited storages yet they service rapidly expanding 'Sea-change' communities. Frequent or extended droughts will cause these water resources to go critical at relatively short notice - the planning is not keeping pace with the real world. (David White, ASIT Consulting)	NH, BB, JS: to address
11-850	A	20	13	20	13	Sait interception (pumping saline groundwater to evaporation ponds prior to it reaching the river) is a very significant current and future management action, also energy intensive and "wasteful" of water - suggest adding it to list… "revegetation and salt-interception policies" (Michael Dunlop, CSIRO)	BB, JS: to address

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
11-851	A	20	14	20	15	"not yet carried out" should be "yet to be performed" (Andrew Watkins, Australian Bureau of Meteorology)	BB: Agree
11-852	A	20	17	20	22	could delete this, it stretches the climate change link (Michael Dunlop, CSIRO)	BB, KH: Disagree
11-853	A	20	17	20	22	Eutrophication depends on temperature, flow rates, and nutrient input and thus on flood runoff as well as farming practices. It may also depend on land cover reductions due to drought and fire, which allow greater soil erosion and increased carbon and nutrient loadings. What guarantee is there that increased flushing flows will be possible given changes in total water supply? Needs more careful discussion. (Barrie Pittock, CSIRO)	BB: To update with paper on climate change and eutrophication (Viney et al, submitted). Will also clarify drivers of eutrophication. Will consider moving adaptation sentence to section 11.5.
11-854	A	20	17	20	22	remove paragraph - appears to have little climate change relationship (Andrew Watkins, Australian Bureau of Meteorology)	BB: Disagree – paper by Viney et al
11-855	A	20	17	20	22	Make more explicit link to climate change rather than fertiliser management here. Possibly make the link by means of synergistic effects between fertiliser management and water availability and quality in relation to climate change. As it stands this paragraph seems out of place. (Sean Weaver, Victoria University of Wellington)	BB: to address
11-856	A	20	17			Eutrophication is an issue in New Zealand as well as Australia - as shown by the recent history of blooms in lakes around Rotorua (Alistair Woodward, University of Auckland)	BB: Will contact Alistair Woodward
11-857	A	20	25	20	25	The following report seems relevant to this section: Engineers Australia (2004) Guidelines for Responding to the Effects of Climate Change in Coastal and Ocean Engineering. Engineers Australia, 11 National Circuit, Barton ACT 2600, 58pp. (Janice Lough, Australian Institute of Marine Science)	NH, KH: Agree
11-858	A	20	25			Section 11.4.5 Coasts. General comment - in practice policy makers have tended to see storm surge as the main coastal threat, rather than the slower effects of beach erosion driven by sea-level rise, which as I understand it may be a greater problem for NSW. A clearer distinction between these effects where relevant may be useful. (Oliver Woldring, NSW Government)	NH, KH: Agree. This is where the writing team can add value
11-859	A	20	27	20	27	80% living within 50Km of the coast - this relates to an earlier comment about whether this is combined fro Australia and NZ. (Andrew Ash, CSIRO)	NH: Agree, needs clarifying
11-860	A	20	27			Is “the region” Australia or New Zealand or both? (Tom Beer, CSIRO)	NH: as above
11-861	A	20	27			It would be good to start this section with an overall picture of expected sea level rise, overall summary of whether there is a lot of information or scattered on the	NH, KH: Agree

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						subjet matter (Tony Coleman, Insurance Australia Group)	
11-862	A	20	27		44	For clarity it may be easier to try and keep the NZ information together in the same section unless there is a reason to split it - if so that reason should be clear (Tony Coleman, Insurance Australia Group)	NH: Agree
11-863	A	20	27	20	44	additional relevant references for this paragraph from NZ would be MfE 2004 (guidance on coastal hazard management) (http://www.climatechange.govt.nz/resources/local-govt/coastal-hazards-may04/index.html) in addition to the overview guidance "Preparing for climate change" which I guess is what is referenced here. The authors may also wish to consider the implications of a case study on Christchurch: http://www.climatechange.govt.nz/resources/local-govt/avon-river-floodplain.pdf (Andy Reisinger, Ministry for the Environment)	NH: yes 'preparing for climate change' was referenced – will check additional references
11-864	A	20	27		27	Same as No.1 above. (Adolf Stroombergen, Infometrics)	?
11-865	A	20	27	20	30	remove sentence starting "there has been a dramatic…" (Andrew Watkins, Australian Bureau of Meteorology)	NH: replace "dramatic" with a less emotive word
11-866	A	20	28		28	Clarify what is meant by "non-metropolitan"? (David Jones, Australian Bureau of Meteorology)	NH: disagree – general readers know the difference between metropolitan and non-metropolitan
11-867	A	20	29			Burnley; Murphy should be Burnley and Murphy (Tom Beer, CSIRO)	NH: agree
11-868	A	20	29	20	29	Reference should be Burnley and Murphy 2004. (John Garnham, Department of Primary Industries)	NH: agree
11-869	A	20	29			Typo in ref. (Barrie Pittock, CSIRO)	NH: agree
11-870	A	20	30		41	It makes no sense to describe "an average area innundated by a 1 in 100 year event" for a single time in the future. Rephrase to something like "The area at risk of innundation by a 1 in 100 year event is likely to double by 2050". I note that a similar illogical presentation of risk appears quite frequently through the document. (David Jones, Australian Bureau of Meteorology)	NH: direct quote from ref is "average area inundated by events with a return period greater than 100 yrs is found to double under enhanced greenhouse conditions"
11-871	A	20	32			use of word "prospect" is confusing - just say "The rise in sea level, and .." (Robert Bell, National Institute of Water & Atmospheric Research (NIWA))	NH: disagree – it is a potential for sea-level rise not a certainty
11-872	A	20	32	20	34	In what way are midlatitude low pressure systems and cold fronts likely to change? (Elizabeth CURRAN, Bureau of Meteorology)	JS: Will address
11-873	A	20	32			Low-latitude low pressure systems (TCs) also important here. (Barrie Pittock, CSIRO)	JS: Will address

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
11-874	A	20	34	20	37	The sentence "Between 1980-2030 .." is out of context and misquoted. This is about coastal erosion, while context is about storms etc. Suggest moving to line 42 prior to sentence "In New Zealand …". Change to read: "Future effects on coastal erosion are not simply related to sea-level rise, but also include climate-induced changes in coastal sediment supply and storminess. Example "what-if" numerical modelling shows that between 1980-2030 in Pegasus Bay (New Zealand), shoreline erosion of up to 50 m could occur near Waipara River if there were 50% less southerly waves, and erosion of 80 m near the Waimakariri River if there was 50% less river sand delivered to the coast (Bell et al. 2001). (Robert Bell, National Institute of Water & Atmospheric Research (NIWA))	NH: Agree
11-875	A	20	34	20	34	How much erosion was the btn 1980 and 2001 - and how much is projected by 2030? (Oliver Woldring, NSW Government)	NH: see above
11-876	A	20	36	20	36	Check spelling - think it should be 'Waimakariri' (Julia Becker, Institute of Geological and Nuclear Sciences)	NH: OK
11-877	A	20	39			Typo in ref. (Barrie Pittock, CSIRO)	NH: OK
11-878	A	20	42	20	44	This reads like political spin, rather than science. For example, planning has been approved for a new Pegasus Bay Township (see lines 34-36) to be built at sea level and within 100 metres of the coastline. So much for the statement that "recent emphasis has been placed…" I have no suggestions for how this statement should be modified, except perhaps to add a modifier such as: "but there are few signs that this initiative, devised at national level, is being heeded at the local level". (Piers Maclaren, Private)	JS, BF: need to clarify
11-879	A	20	43	20	44	Mention zoning and setbacks specifically (Barrie Pittock, CSIRO)	NH: OK
11-880	A	20	44			Replace Bell et al (2001) with Ministry for the Environment (2004) ref given above in row 6 (Robert Bell, National Institute of Water & Atmospheric Research (NIWA))	NH: OK
11-881	A	20	47			Delete comma after (MfE, 2002). Incidentally, the reference for MfE (2002) is missing from the reference list. (Tom Beer, CSIRO)	NH: OK
11-882	A	20	47	20	47	Reference to MfE is not included in the reference list. If MfE reports are able to be included in this review then it would be appropriate to refer to the 2005 MfE report conducted by NIWA entitled: “Changes in drought risk with climate change” and use information presented there in section 11.4.2.3. This report is available on the MfE website.	JS, BF: need to add ref

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Sean Weaver, Victoria University of Wellington)	
11-883	A	20	48	20	50	Sentence sarting "Links between the…." remove sentence- little relevance to clmate change (Andrew Watkins, Australian Bureau of Meteorology)	NH: disagree climate change impacts on ENSO intensity/frequency can be linked to beach erosion – unique long-term monitoring study
11-884	A	20	49			I think we should spell out Southern Oscillation Index - even explain it or footnote it (Rod Anderson, Department of Sustainability & Environment)	NH: OK perhaps in Section 11.3
11-885	A	20	49		49	Links between erosion and SOI have been demonstrated - To a lay person need to explain a bit more about what this actually means? Is it just saying its linked to more ENSO events - does that mean we can expect more if we're expectin more enso events but we're not saying that. Do we know any more about ENSO and Climate change - not much included? Since its such a big factor in our region we should at least comment whether we are any further forward in understanding the relationship. (Tony Coleman, Insurance Australia Group)	KH: Noted. Will be clarified in Section 11.3.
11-886	A	20	49	20	49	Should be '...Narabeen Beach (NSW), Australia…' (John Garnham, Department of Primary Industries)	NH: OK
11-887	A	20	49	20	49	Use "ENSO events" rather than "SOI". (Janice Lough, Australian Institute of Marine Science)	NH: OK
11-888	A	20	49			Suggest you do not introduce the acronym SOI. (Greame Pearman, Monash University Sustainability Centre)	NH: OK
11-889	A	20	50		51	What does " distributive process modelling has been used to assess sea level rise in South Australia" mean - no conclusion? (Tony Coleman, Insurance Australia Group)	NH: agree needs more explanation
11-890	A	20	51			You use the acronym “NSW”. Is this appropriate for an international publication. It raises the question: should the Chapter have a map that provide the locations of all of the major sites referred to in the two countries? States, rivers, regions, and cities? (Greame Pearman, Monash University Sustainability Centre)	NH: need to check with CLA’s and TSU guidelines
11-891	A	21	1		8	Some good costs in here - is it possible to do a table that brings together some of the costs known and puts question marks in areas unknown to indicate more work is needed ? (Tony Coleman, Insurance Australia Group)	NH: good idea but they are examples only – a table would need more data to be meaningful
11-892	A	21	2			The US$172 figure seems wrong. And it needs more explanation - what is the loss referring to? (Rod Anderson, Department of Sustainability & Environment)	KH: Agree
11-893	A	21	2			I presume that $172 should be $172 million.	KH: Agree

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(Tom Beer, CSIRO)	
11-894	A	21	2	21	2	Should it be '…loss of US$172 million…'? (John Garnham, Department of Primary Industries)	KH: Agree
11-895	A	21	2	21	2	The loss of US$172-----???? This number doesn't seem correct. I suspect that it is a few orders of magnitude out. (John Hannah, University of Otago)	KH: Agree
11-896	A	21	2		2	What does the US$172 refer to? (David Jones, Australian Bureau of Meteorology)	KH: Agree
11-897	A	21	2	21	2	Is the dollar figure US$172 million? (Darren NT King, National Institute of Water and Atmospheric Research Ltd)	KH: Agree
11-898	A	21	2	21	2	US$172 to read US$172 million? Suggest eliminate US$ & use AUD$ or NZ$ only in this chapter. (Alistair McKerchar, National Institute of Water and Atmospheric Research Ltd)	KH: Agree
11-899	A	21	2			Surely "a loss of US$172" can't be right? (Greame Pearman, Monash University Sustainability Centre)	KH: Agree
11-900	A	21	2	21	2	"US$172" - surely value is far higher. If not, delete. (Andrew Watkins, Australian Bureau of Meteorology)	KH: Agree
11-901	A	21	2	21	2	US$172 should be US$172 million. (Peyman Zawar-Reza, University of Canterbury)	KH: Agree
11-902	A	21	3			"increased cost". Can this be more quantitative? (Greame Pearman, Monash University Sustainability Centre)	NH: OK
11-903	A	21	5	21	5	Why cite a value in Austtralian dollars with US value in brackets, when elsewhere only US dallars ar used. Suggest remove reference to A$ and only use US$ figure. (John Garnham, Department of Primary Industries)	KH: Agree
11-904	A	21	5			I suggest that this might be referred to earlier. But I wonder if it should not also be mentioned that changes to coast lines is not just a physical effect, but have significant marine and littoral ecosystem consequences? (Greame Pearman, Monash University Sustainability Centre)	NH: agree
11-905	A	21	10	21	16	I don't understand the points being made here and I wonder if these are too complex to be making here given the limited space available - suggest leaving it out. (Rod Anderson, Department of Sustainability & Environment)	NH: the indigenous section will be re-written
11-906	A	21	10	21	15	It might be useful to include the AGO study on the Mary River Floodplain (Andrew Ash, CSIRO)	NH, KH: Agree
11-907	A	21	10	21	16	The second phrase of the opening sentence of this paragraph is a non-sequitor. Generally, the paragraph merits some re-writing to express the key points more cogently. (Chris Cocklin, Monash University)	NH: see above 11-905

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11-908	A	21	10		16	This whole paragraph should be removed. It appears out of place and could be interpreted as being political. (David Jones, Australian Bureau of Meteorology)	BF: need to clarify, but not remove, as it is an important issue under the Treaty of Waitangi. Importance of the issue justifies a new section on Indigenous issues (after 11.10 and before 11.11). Will remove sentence ending in (Ruru, 2004) on indigenous rights to the foreshore as this is irrelevant. Will try to have Aus and NZ Contributing Authors write this section, e.g. Darren King and Donna Green. An early version of the SOD extract will be sent to relevant experts for review. Jim to chase reference for Maori forum outcome. Dig out grey literature on IGCI Hui. Dig out Garth Harmsworth's co-management reports (Landcare Research) DG: yes will deal with Australia section
11-909	A	21	10	21	16	It is not clear to me that indigenous rights have much to do with it. If indigenous people live in such areas they are likely to be affected whether or not they own the rights to fish. It is confusing. Spell it out if it is an issue. (Barrie Pittock, CSIRO)	BF: see comment 11-908 DG – yes interesting issue just came up in TSI – where Australians ARE going for marine rights too – but still in courts so no answer
11-910	A	21	10	21	16	Paragraph irrelevant to objective appraisal of impacts. Strongly sugest removal. (Andrew Watkins, Australian Bureau of Meteorology)	KH: Disagree. See comment 11-908
11-911	A	21	10	21	16	There was a useful study on the Mary River Wetlands that may add to this para - available on the AGO website. Also links with fishing section below.. (Oliver Woldring, NSW Government)	KH: Noted. See 11-906
11-912	A	21	13	21	14	Might need to check and re-word - I think the legislation has been passed now. (Julia Becker, Institute of Geological and Nuclear Sciences)	NH: agree
11-913	A	21	13			The Foreshore and Seabed legislation has now been passed so you need to change to: "… the government has legislated to …" (Ken Hughey, Lincoln University)	NH: agree
11-914	A	21	13	21	16	Please find below an alternative paragraph ending from "In New Zealand, …" (Line 13 to Line 16). "In New Zealand, projections of coastal inundation, erosion and threats to coastal ecosystems are regarded as critical to the future well being of Maori coastal communities (Maori Climate Forum, 27/02/2003). Notwithstanding the recent government announcement that it will legislate to remove Maori customary title in the foreshore and seabed (Ruru 2004), the social, economic and cultural support that the coast and its waters provide to	BF: need to amend as indicated

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						Maori is unlikely to diminish. Nevertheless, in Australia and New Zealand the uncertainty of climate change impacts on coastal indigenous communities is partly related to issues of indigenous rights in the coastal zone (see section 11.4.1 on ecosystems and section 11.4.6 on fisheries) (Darren NT King, National Institute of Water and Atmospheric Research Ltd)	
11-915	A	21	13	21	14	Update: the Seabed & Foreshore legislation is now law. (Alistair McKerchar, National Institute of Water and Atmospheric Research Ltd)	NH: agree
11-916	A	21	13	21	16	The NZ government has actually passed the Foreshore and Seabed Act. Also the last sentence isn't entirely clear to me what it means to say that "uncertainty in climate change impacts is RELATED to indigenous rights" - it seems to me that one is a scientific question (especially if you are not referring to adaptive capacity but to impacts without adaptation), while the latter is a normative issue. Do climate change impacts affect indigenous rights (is this what you are saying - if so, how are they affecting them)? Does the legal situation affect the degree of climate change impacts? (Andy Reisinger, Ministry for the Environment)	JS, BF: need to clarify
11-917	A	21	13		14	This sentence is not correct, or at best misleading. The Foreshore and Seabed Act was passed in November 2004. It protects customary rights, albeit that ownership is vested in the Crown. (Adolf Stroombergen, Infometrics)	NH: this will be re-written
11-918	A	21	14	21	14	The legislation referred to has since been enacted. Update. (Sean Weaver, Victoria University of Wellington)	NH: agree
11-919	A	21	16	21	16	The sections refered to in the brackets make no sense re the previous sentence about indigenous rights as those sections do not talk about indigenous rights. The reference to sections 11.4.1 and 11.4.6 may make more sense if they are moved to the end of the sentence in line 12 of the same papragraph. To leave the reference re sections where it is whould require additional explanation. (John Garnham, Department of Primary Industries)	NH: this will be re-written DG: Will look at this
11-920	A	21	18		19	A lay person will not understand the point of this sentence with out further explanation e.g. what are the problems why is it being included? (Tony Coleman, Insurance Australia Group)	NH: agree – need to clarify
11-921	A	21	18	21	25	this section needs to be clearer about whether the lack of "globally applicable vulnerability assessment methods" is a problem. It also gives the reader a sense that very little work on coastal vulnerability is being done at all, which is not the case. A lot of coastal district councils and regional councils in NZ have undertaken coastal hazard assessments, including some consideration of climate change (though mostly firmly rooted in current vulnerabilities and more short-term issues).	NH: Will check suggested website and Chapter 6 material. JS: Will follow up with Blair Dickie and Mike Jacobson on local government material

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						Some examples of NZ studies can be found on the Ministry website: http://www.climatechange.govt.nz/resources/local-govt/initiatives.html). It might be useful to have an additional paragraph that gives an overview sense of the approaches, directions, and robustness of these studies driven by local government as part of their role as regulators and hazard managers. Input from a local government person (such as Blair Dickie) might be very useful here. Could also approach Mike Jacobsen. (Andy Reisinger, Ministry for the Environment)	
11-922	A	21	18	21	25	Meaning of para unclear - especially first line. (Oliver Woldring, NSW Government)	NH: agree need to clarify
11-923	A	21	22			What is "SURVAS"? (Greame Pearman, Monash University Sustainability Centre)	NH: Synthesis and Upscaling of Sea-Level Rise Vulnerability Assessment Studies
11-924	A	21	24	21	24	"tasmanian coast is at risk" at risk of what? (Andrew Watkins, Australian Bureau of Meteorology)	NH: erosion and/or coastal indundation
11-925	A	21	28			Section 11.4.6 Fisheries - provides no discussion about freshwater fisheries or aquaculture generally. This needs to be corrected. In particular there could be significant impacts to salmonid fisheries in south eastern Australia and also freshwater aquaculture. While salmonids are not native species they are extremely important for aquaculture, to recreational anglers and the local tourism industries. Suggest the authors contact Brett Ingram or Wayne Fulton of DPI PIRVics Marine and Freshwater Systems Platform - phone 03 5774-2208, email wayne.fulton@dpi.vic.gov.au to assist them re this. If there is no literature available re freshwater and/or aquaculture this should be stated. (John Garnham, Department of Primary Industries)	JS: Aquaculture information will be included in SOD. JS: Another draft was submitted of this section by A Hobday
11-926	A	21	28	22	13	Sec. 11.4.6 Fisheries: There should be some discussion here on the effects of increasing marine intrusions on coastal freshwater/brackish fisheries. My study (Schallenberg et al. 2003) clearly shows that zooplankton community structure is severely impacted by even relatively slight salinisation of a brackish lake, indicating that saline intrusions greatly reduce the availability of zooplankton, which are important food for many fish species. (Marc Schallenberg, University of Otago)	BF: need to add stuff here
11-927	A	21	28	22	13	Section 11.4.6. Comment: there is a recent report that I have seen on the effect of climate change on the fisheries of the Gult of St Vincent. I cannot find this reference but will continue to search for it. (David Shearman, Univeristy of Adelaide)	AH: Will follow up
11-928	A	21	28			Section 11.4.6 Fisheries: There is no discussion about the dependence of costal species on mangroves and coral reefs - both of which may be threatened in some	LH, JS: Pick this up in Coral Reef box??

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						areas. A presentation on mangrove decline was given at the recent "Greenhouse Gamble" conference in Sydney - available on the web. (Oliver Woldring, NSW Government)	
11-929	A	21	30			Replace "expect" with "expected" (Rod Anderson, Department of Sustainability & Environment)	BF: revised text will clarify this pointAH Agree
11-930	A	21	30	21	30	Replace "expect" with "expected" (Andrew Ash, CSIRO)	BF: revised text will clarify this pointAH Agree
11-931	A	21	30	21	39	What about potential impacts from sea level rise on intertidal and inshore subtidal breeding and nursery areas? This area seems to be ignored by the authors. A 0.2m sea level rise (described in section 11.4.5 by the authors is likely to have significant impacts on these habitats. (John Garnham, Department of Primary Industries)	AH Agree
11-932	A	21	30	21	30	Correction: "…expect…" (Line 30) replace "…expected…" (Darren NT King, National Institute of Water and Atmospheric Research Ltd)	BF: revised text will clarify this pointAH Agree
11-933	A	21	30	21	30	Given the global "fisheries crisis" due to over-exploitation of marine resources (eg Worm et al (2005) Science 309: 1365-1369; FAO (2004) The state of World Fisheries and Aquacuture 2004, FAO, Rome), is it possible to give some initial assessment of the health/sustainability of Australia & NZ's fishing industries & their economic significance? (Janice Lough, Australian Institute of Marine Science)	AH: The BRS 2005 status report for Australian fisheries showed that of 74 stocks considered, 17 were overfished, 17 were not overfished and 40 were of uncertain status. Australian fisheries were worth 1.5billion (2.2 when combined with aquaculture)
11-934	A	21	30			Should there be mention of fish nursery areas on the coast? (Greame Pearman, Monash University Sustainability Centre)	AH: Agree
11-935	A	21	30			"expected" (Greame Pearman, Monash University Sustainability Centre)	BF: revised text will clarify this pointAH: Agree
11-936	A	21	30	22	14	This whole Fisheries appears very weak.If it can be bolstered with research papers,do so, otherwise consider revising/removal (Andrew Watkins, Australian Bureau of Meteorology)	KH: Noted, but we can only cite available literature. We state this in lines 35-37
11-937	A	21	30	21	39	sentence mid paragraph says "this assessment mostly relies on extrapolation of observed relationships". this appears very dangerous, an leave open for critisism. I'd remove this para if it cannot be bolstered twith research. (Andrew Watkins, Australian Bureau of Meteorology)	KH: Disagree. See 11-936
11-938	A	21	30	21	30	"expect" – change to "expected" (Sean Weaver, Victoria University of Wellington)	BF: revised text will clarify this pointAH: Agree
11-939	A	21	31			Is acidity a factor as well? (Tony Coleman, Insurance Australia Group)	KH: Agree. See 11-942
11-940	A	21	31	2	32	No context is given - what are the "four biological attributes"? (Alistair Hall, HortResearch)	KH: All 4 are described in lines 33-35, but this can be made clearer. Jim and Alistair to

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							address
11-941	A	21	31	21	33	Reword sentence "Of the four biological attributes…" to something like "relationships between climate and hence potential climate change impacts are best understood for the distribution and abundance of exploited fish species". (Janice Lough, Australian Institute of Marine Science)	BF: revised text will clarify this point AH: The next sentence refers to the next three…phenology, community composition, structure and function
11-942	A	21	31	21	31	Acidification of the oceans needs to be included as a key variable expected to drive climate change impacts on fisheries. See: Christopher L. Sabine, Richard A. Feely, Nicolas Gruber, Robert M. Key, Kitack Lee, John L. Bullister, Rik Wanninkhof, C. S. Wong, Douglas W. R. Wallace, Bronte Tilbrook, Frank J. Millero, Tsung-Hung Peng, Alexander Kozyr, Tsueno Ono, Aida F. Rios 2004. The Oceanic Sink for Anthropogenic CO2. Science, Vol 305, Issue 5682, 367-371 , 16 July 2004. (Sean Weaver, Victoria University of Wellington)	KH: Agree. Alistair Hobday to address. Perhaps cross-reference Chapter 4 section on marine ecosystems
11-943	A	21	37			I do not like the use of the concept of "belief" in a scientific document. Perhaps reword to say something like "the work of several authors is highly suggestive that.." or something like that? (Greame Pearman, Monash University Sustainability Centre)	KH: delete "several authors believe" AH Reword
11-944	A	21	38	22	6	There are quite a few references prior to 1999 - is this OK or should only literature since the TAR be included? (Andrew Ash, CSIRO)	JS – if not used before then okay
11-945	A	21	38			Why is the reference in bold font? (Tom Beer, CSIRO)	BF: noted JS- Agree will change
11-946	A	21	43			Delete excess parentheses. (Tom Beer, CSIRO)	BF: noted AH Agree
11-947	A	21	44			"increase the availability" implies that this is only being looked at from a productivity point of view. (Greame Pearman, Monash University Sustainability Centre)	BF: noted AH Was increase or decrease, but yes, the dominant effects for fisheries will be on the capture…it is not a section on marine biodiversity…
11-948	A	21	49			Merge the two sets of references in parentheses into one. (Tom Beer, CSIRO)	BF: noted AH - Agree
11-949	A	22	3	22	4	It is unclear what relevance the "differences in allele frequencies…" have to climate change impacts; this needs to be explained better or removed. (Janice Lough, Australian Institute of Marine Science)	BF: noted AH clarify to show it indicates a capacity to adapt?
11-950	A	22	6			Isn't it simply that we do not know? (Greame Pearman, Monash University Sustainability Centre)	BF: revised text will clarify this point AH No, I support this, and could use literature for elsewhere in the world for several taxa

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							Hampe, A. and R. J. Petit (2005). Conserving biodiversity under climate change: the rear edge matters. Ecology Letters **8**(5): 461-467. Richardson, A. J. and D. S. Schoeman (2004). Climate Impact on Plankton Ecosystems in the Northeast Atlantic. Science **305**: 1609-1612.
11-951	A	22	8	22	9	"stock declines" - where? What species? The Lyne et al (2005) report (see Comment No 45) is relevant. (Janice Lough, Australian Institute of Marine Science)	BF: revised text will clarify this point AH Within years, strong wind events have been linked to larval growth rates and/or recruitment of juveniles in two fish species, one coastal rocky reef fish (*Heteroclinus sp*. Thresher et al 1989) and one commercially fished gadoid found on the outer shelf (*Macruronus novaezelandiae*, blue grenadier, Thresher et al 1992). More broadly, Harris et al (1988) reported quasi-decadal variability in the frequency each year of strong zonal west winds over SE Australia and related this variability statistically to catch rates and recruitment variability in a number of south-eastern fisheries, ranging from brown trout in an inland lake to rock lobster and bluefin tuna. Thresher (2002) subsequently extended the wind time series another decade, and showed, first, that the quasi-decadal cycle was also reflected in regional winter rainfall, and second, that it appeared to reflect variability in solar radiation (the sunspot cycle). A roughly ten-year cycle, in several cases directly linked to regional wind, has been reported in a range of south-eastern stocks, including year-class strength in scallops and abalone, recruitment in a number of shelf teleosts (Thresher, 2002; Jenkins et al 2005) and even in the stranding frequency in cetaceans (Evans et al 2005).

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							Thresher (1994) suggested that the collapse of the gemfish fishery off SE Australia was due to the combination of the periodic fall in recruitment due to declining winds, and the effects of over-fishing, which had depleted the spawning stock.
11-952	A	22	8	22	13	Where do these stock declines occur? How does it relate to the findings of Cai et al., 2005? (Barrie Pittock, CSIRO)	BF: revised text will clarify this point AH: SE and W coast around Tasmania, the wind and the SAM as in Cai et al are linked.
11-953	A	22	10	22	11	the term -as- should be 'if'. Also the statement that 'stocks are likely to increase if quota management regimes are in place' has a host of assumptions around it - mainly that quotas would have to stay the same during that time and that other variable do not change. (John Garnham, Department of Primary Industries)	BF: revised text will clarify this point AH: Yes, if we need those caveats, we could add them.
11-954	A	22	13	22	13	Is there any evidence or likelihood of a southward shift in the distribution of krill in the southern oceans and is this likely to have a detrimental effect on the breeding success of southern ocean sea birds? As I understand it, the Titi research project by Moller et al at Otago University has observed a decline in breeding success of titi that cannot be attributed to over-harvesting. This may also pose a problem for flightless seabirds (penguins) that have a more restricted feeding range. (Sean Weaver, Victoria University of Wellington)	JS: Interesting and important point for inclusion if any information as krill is critical for southern ocean biota. AH this is NZ-related….but off eastern Tasmania a decline in the abundance of krill in small pelagic diets has been noted and a link to seabirds…grey literature or unpublished data from the bird obs. here.
11-955	A	22	16	23	1	There is no explicit mention on the implications of building codes on potential damage and their adaptive capacity to minimise damage at an affordable cost. There were marked changes in the building codes in engineered structures in the 1970's and especially in residential construction in the late 1970's early 1980's. The pre-code structures are substantially more vulnerable and will be in decreasing numbers over the next few decades. This could offset any increases in damages caused by more frequent or intense events. It also highlights the capacity we have to adapt to change via building code changes. However on the other hand can we be sure of building code enforcement, also will buildings reduce their resilience due to exposure to many events , changing areas of cyclonic classifications (Tony Coleman, Insurance Australia Group)	KH: Tony is now a Contributing Author. TC: will check whether the report by BRANZ (2005: Climate and buildings) covers building codes
11-956	A	22	18			What does 'very likely' mean? What is the probability? (David Whitehead, Landcare Research)	KH: Need to cross-reference IPCC definitions
11-957	A	22	19			Sea-level rise. (Greame Pearman, Monash University Sustainability Centre)	BF: noted

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11-958	A	22	21	22	21	Table numbering needs fixing. (Julia Becker, Institute of Geological and Nuclear Sciences)	BF: noted
11-959	A	22	21			Reference to non-existant Table 11.4.1.7 should possibly be Table 11.8? (Tony Coleman, Insurance Australia Group)	BF: noted
11-960	A	22	21		23	Require a reference to support the stated refurbishment times of 10-30 years and 50-100 years. (David Jones, Australian Bureau of Meteorology)	KH: PIA (2004)
11-961	A	22	21			Table 11.8? (Barrie Pittock, CSIRO)	BF: noted
11-962	A	22	21	22	21	Table number is incorrect - though this happens several times through the document (Andrew Watkins, Australian Bureau of Meteorology)	BF: noted
11-963	A	22	21	22	21	This is the first time outside of the executive summary that a degree of confidence is expressed in this way.. (Oliver Woldring, NSW Government)	KH: Confidence statements are only required in the Executive Summary, so this instance wil be removed
11-964	A	22	21	11	23	Re planning horizons.. More important than planning horizons for home owners, businesses and investors are planning horizons for Govts. Once an area adjacent to coasts or estuaries is zoned for development - that is (well it's intended to be) a decision with permanent implications. Unwise zoning decisions continue to occur (probably globally) because of the short term political implications of adversely affecting long term coastal real estate values.. (Oliver Woldring, NSW Government)	TC: Need a report to support this statement
11-965	A	22	25	22	33	Can similar statements be made about the value of Australia's built environment? (Janice Lough, Australian Institute of Marine Science)	TC: Perhaps BRANZ (2006) report?
11-966	A	22	25	22	33	Is there an Australia equivalent to this piece of text? (Greame Pearman, Monash University Sustainability Centre)	KH: see 11-965
11-967	A	22	25		26	To say that the capital value of NZ's built environment is nearly 10% of GDP is absolute nonsense. Even an elementary calculation shows that this is far too low. Given the 1.4 million homes, at an average value of $300,000 gives a total value of $420 billion. GDP is about $140 billion, so even without counting office buildings it is clear that the 10% should be a at least 300%. (Adolf Stroombergen, Infometrics)	TC: need to clarify
11-968	A	22	25	22	33	with respect to building being retrofitted; this sounds very subjective. reword (Andrew Watkins, Australian Bureau of Meteorology)	TC: Noted
11-969	A	22	27	22	29	A bit more clarification on retrofitting of houses is required - is it improved ventilation or wind protection etc. (Andrew Ash, CSIRO)	TC: Noted

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11-970	A	22	27			Page 22, Line 27. 11th dot pint. Why reduced humidity? And where? (Greame Pearman, Monash University Sustainability Centre)	KH: Need to mention lower humidity scenario in BRANZ (2006). Capture this in section 3.1
11-971	A	22	29	22	33	Hamilton is a small inland city and hardly representative. Dangerous to generalise from this one example. (Barrie Pittock, CSIRO)	BF: need to use as a limited case study. KH: Agree, failure to include the effect of extreme events makes results from this report seem overly optimistic. This sentence will be removed.
11-972	A	22	30	22	33	I think this is a bit misleading. Hamilton is an inland city and thus unlikely to suffer many of the other impacts that the four other major, coastal, cities in NZ would - contextualise. (Ken Hughey, Lincoln University)	KH: see 11-971
11-973	A	22	32	22	33	it might be useful to have a statement on what the implications of this narrow focus on changes in mean climate conditions are, ie whether including changes in extremes might have altered the findings of the study in one direction or the other. (Andy Reisinger, Ministry for the Environment)	KH: see 11-971
11-974	A	22	33	22	33	While there may be few studies on the effects of climate change on urban communities in New Zealand, there is a wider information set from international studies that have relevance to the NZ and Australian contexts. For example, the impacts of urban heat island effects (e.g. localized warming) can intensify energy demand for air conditioning and thereby raise energy consumption and associated emissions, particularly for an economy like Australia that generates such a high proportion of its electricity from coal. Water shortages in summer are already problematic in Christchurch and can only intensify under a warmer and dryer east coast as predicted under future warming. (Sean Weaver, Victoria University of Wellington)	TC: Seek these international studies, perhaps from Chapter 7
11-975	A	22	36	22	37	Table 11.8: one could argue that less heating would decrease fire hasard to buildings (Yves Bergeron, université du québec en Abitibi-Témiscamingue)	TC: Noted
11-976	A	22	36	23		Table 11.8.Potential impacts of climate change on infrastructure and settlements. This table would be more useful if it contained more explanation, eg what is the casue of undermining and cracking of building foundations and footings, rising damp and associated health issues. What does 'suitability of ground services change in certain localities' relate to? (Elizabeth CURRAN, Bureau of Meteorology)	TC, KH: Cracking is due to drought in areas with clay soil. Rising damp may be incorrect given the likelihood of drier conditions
11-977	A	22	36			This table is weighted towards negative impacts, suggesting its focus is on issues requiring adaptive responses rather than being a true "summary of potential impacts". The title should be revised to reflect the adaptive focus of this summary.	KH: Disagree. This section does not address adaptation. See section 11.5

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						(David Jones, Australian Bureau of Meteorology)	
11-978	A	22	36			Table 11.8 needs some more explanation in places, eg., entries 8 (foundations) and 13 (rising damp) are not obvious ones. Also I would add drains to the entry re structures. (Barrie Pittock, CSIRO)	TC: see 11-976
11-979	A	22	36			Recent studies of insulation in homes in New Zealand has shown improvements in health associated with small increases in temperatures indoors. Would rising temperatures (particularly overnight) mimic the effects of insulation? If so, there may well be health gains, especially in colder parts of New Zealand and Australia. Why should climate change be associated with increased incidence of rising damp? (Alistair Woodward, University of Auckland)	RW, TC: need to note this KH: see 11-976
11-980	A	22	36			Table 11.8: Potential impacts of climate change on infrastructure and settlements. It would be very helpful to policy people if the entries in this table could be quantified in some way - e.g. in terms of the likelihood of them occuring and the likely magnitude of their impact ($$$). Whether you can do this of course depends on the extent of such information provided in the references. My concern is that all sorts of things are "possible" for the future - but policy advisors and decisionmakers have to focus in on those things most likely to happen and / or with the most significant potential impacts. Anything you as authors could do to help them with this would be useful. (David Wratt, NIWA)	TC: need to clarify if we can KH: Limited quantitative info is in the references
11-981	A	22	37			Table 11.8 Line 12 Reduced mould - lower humidity in what regions? This is not universal is it? (Rod Anderson, Department of Sustainability & Environment)	KH: Refer to humidity scenarios in BRANZ (2006)
11-982	A	22	37	22	37	dotpoint about lower humidity reducing mould seems inappropriate. It is likely that relative humidity will remain roughly constant. See note 7. Constant relative humidity under increasing greenhouse gases was taken as read by Arrhenius a century ago, then by Manabe & Wetherald in the 1960s, and again in Nov 2005 by Soden. Where does the idea of reduced humidity come from? (Graham Farquhar, Australian National University)	KH: Refer to humidity scenarios in BRANZ (2006)
11-983	A	23	0	35		It is questionable if Maori will have a differential capability to respond to climate change in the primary sector. Extreme event tend to affect all groups equally irrespective of ethnicity. (Gerald Rys, Ministry of Agriculture and Forestry)	DK: need to clarify
11-984	A	23	0			It is not proven that climate change will "significantltly" limit maori growth greater that other agricultural practitioners. Maori have proved resiliant in the past. Most Maori farms are run by incorporations and trusts and employ modern farming	DK: need to clarify

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						methods. Decision making processes may be slow but well within the timeframes of climate change. Maori with their respect for the land are more likely to recognise the impacts of climate change earlier and be more likely to take decisions to adapt. (Gerald Rys, Ministry of Agriculture and Forestry)	
11-985	A	23	0			In table 11.8 I suggest that one of the dot points under major infrastructure is the risk of contaminated water supplies - probably the most important outcome of storm water systems overwhelmed by heavy rainfall (Alistair Woodward, University of Auckland)	TC: Noted, but not mentioned in the literature
11-986	A	23	2	23	3	This statement should be reworded. There are a number of studies over the years that show that hazard disclosure has little or no effect on property values. Sometimes house prices may be temporarily affected after a large event, but soon return to normal and usually increase in value eventually. (I have some refs that show this effect). I'm not sure that we can definitely say that climate change will be likely to affect property values. (Julia Becker, Institute of Geological and Nuclear Sciences)	TC: need to get ref
11-987	A	23	2	23	6	"Climate Change is very likely to affect property values…. through disclosure of increasing hazards" - Yeo 2003 found in relation to flood that the view of disclosure is mixed e.g. in New Zealand it was shown not to affect property values http://www.riskfrontiers.com/publications/publicationgraphics/flood_liability_on_residential_property_values.pdf (Tony Coleman, Insurance Australia Group)	TC: need to note this
11-988	A	23	2		6	I am suprised that excessive summer time heat is not mentioned in discussing climate change impacts on property and investment. An example of where this is discussed is the recent Climate Change Risk and Vulnerability Report (Allen Consulting Group) 2005. Avaliable from http://www.greenhouse.gov.au/ . Many inland Australian locations experience temperatures in summer which are already extremely uncomfortable which contributes to the unattractiveness of living there. With a potential warming approaching 6C this century, these same places are going to bordering on uninhabitable with mean summer temperatures approach 45C!. (David Jones, Australian Bureau of Meteorology)	BF: revised text will clarify this point
11-989	A	23	2	23	6	Was the Yeo study based in NZ or Aust? (Needs reference) (Oliver Woldring, NSW Government)	TC: Noted
11-990	A	23	3			Affecting the price and availability of insurance is a separate point to points preceeding so should have a " as well as" breaking it up (Tony Coleman, Insurance Australia Group)	TC: Noted
11-991	A	23	3	23	6	This is the place where the reference to reports cited in comment 21 above could be mentioned	TC: Noted

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						(Judy Lawrence, PSConsulting)	
11-992	A	23	3			Perhaps there could be more on this as the insurance industry is perhaps the most proactive with respect to climate change. (Greame Pearman, Monash University Sustainability Centre)	TC: Noted
11-993	A	23	5			"In many jurisdictions flood hazard liability is not mandatory or is poorly determined (Yeo 2003)" - it is also just not available - what does poorly determined mean? (Tony Coleman, Insurance Australia Group)	KH: replace “determined” with “quantified”
11-994	A	23	8	23	13	Are increases in real terms?? If not, unconvincing and leave out. (Andrew Watkins, Australian Bureau of Meteorology)	TC: Noted
11-995	A	23	9	23	9	Adversely affected by which aspect of climate change? (Oliver Woldring, NSW Government)	BF: revised text will clarify this point
11-996	A	23	15	23	15	Either need to remove or be more specific about the word "economy" as it is way too motherhoodish and ststing the obvious in the way it is currently worded. (Andrew Ash, CSIRO)	BF: revised text will clarify this point
11-997	A	23	15	23	18	..costs, injury and trauma due to increased storm intensity,'. Is this tropical cyclone intensity in Queensland and other northern Australian regions, or severe thunderstorm intensity Australia wide? (Elizabeth CURRAN, Bureau of Meteorology)	KH: the tendency for increased extreme rainfall intensity over most of Australia implies increased storm intensity
11-998	A	23	15			In discussing broader social impacts, it would be appropriate to mention somewhere the likely increased demands on volunteer services, for example, volunteer firefighters and other emergency service volunteers. There is a very real risk that these kinds of volunteers will be unable to cope (as will government emergency services staff) with the increased frequency of 'natural' disasters. This points to the limitation of resources for emergency management and suggests that these kinds of systemic impacts need to be considered. (Kim Ritman, Bureau of Rural Sciences)	KH: Noted
11-999	A	23	16			Perhaps it might be appropriate here to mention the significance of the likely loss of culture and traditional knowledge in remote indigenous Australian societies due to increased heat related deaths of elders. Many of these communities currently suffer social and economic disadvantage and are highly reliant on the natural environment to support their cultural practices, as such, they are likely suffer disproportionately to non-indigenous Australians. (Donna Green, CISRO)	DG: will deal with
11-1000	A	23	20	23	24	I think this is a really key point and deserves some greater emphasis, maybe by incorporating it in the earlier section on p 22 lines 18-23 (Rod Anderson, Department of Sustainability & Environment)	KH: Noted, but current emphasis seems appropriate

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11-1001	A	23	20			Add "and increased likelihood and amplitude of storm surge" (Rod Anderson, Department of Sustainability & Environment)	
11-1002	A	23	20			Need to make it clear that the number of people exposed to innundation is from a risk/vulnerability perspective. Further, in arriving at such a figure, what allowances are made for predictable demographic changes not related to climate? (David Jones, Australian Bureau of Meteorology)	KH: Check whether population growth was included
11-1003	A	23	21			Is this due to population growth alone, or growth plus increasing SL rise? (Barrie Pittock, CSIRO)	KH: see 11-1002
11-1004	A	23	22	23	22	The phrase '…rise from an increase of 60,000 and 90,000 people a rear…' does not make sense. Should it be '…rise by 60,000 and 90,000 people year respectively…'? (John Garnham, Department of Primary Industries)	KH: Agree, needs rewording
11-1005	A	23	22			This should be reworded to read "There will be pressure for migration from the Pacific islands to NZ and Australia of 60,000-90,000 people per year. The point being that governments decide who immigrates into their country. (Judy Lawrence, PSConsulting)	BF: revised text will clarify this point
11-1006	A	23	22	23	23	Unclear what this sentence means - will there be increased immigration of 60-90,000 people per year or what? (Janice Lough, Australian Institute of Marine Science)	BF: revised text will clarify this point
11-1007	A	23	22		24	This sentence is very confusing. (A. Brett Mullan, National Institute of Water & Atmospheric Research Ltd)	KH: Agree, needs rewording
11-1008	A	23	22	23	24	This remark re immigration will, from my past experience, likely raise objections from the Australian government. Careful consideration is needed as to how to raise this valid point. Maybe it can be put in terms of numbers of displaced people in the region in need of resettlement? If SE Asia is included the numbers may be far larger. References which use the term "immigration" may be OK, as in Pittock (2003) or see my new book (ref. in last comment below). (Barrie Pittock, CSIRO)	BF: revised text will clarify this point
11-1009	A	23	22		24	Sentence beginning 'In addition, immigration….' - meaning is not clear. (Alan Porteous, National Institute of Water & Atmospheric Research (NIWA))	KH: Agree, needs rewording
11-1010	A	23	22		24	The meaning of the sentence about the 60,000 and the 90,000 is unclear. (Adolf Stroombergen, Infometrics)	KH: Agree, needs rewording
11-1011	A	23	23			"60,000 to 90,000"? Or is this an uncertainty range? (Barrie Pittock, CSIRO)	KH: Agree, needs rewording
11-1012	A	23	26	23	37	There seems to be a gap in that no indigenous Australian impacts are included in the Huam Health section. It could well be there are no recent published works to include but at the moment this section seems unbalanced and could be shortened. (Andrew Ash, CSIRO)	KH: Noted. See 11-1113, 11-1114

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11-1013	A	23	26		37	This whole paragraph appears to based on the value judgements of the authors, with no references provided to support it. Suggest deleting completely, or a subtantial rewrite. (David Jones, Australian Bureau of Meteorology)	DK, DG: text has been rewritten KH: See 11-1014
11-1014	A	23	26	23	37	Please consider the replacement of the exisitng information from Line 26 (Page 23) to Line 7 (Page 24) with the following: The projected impacts of climate change on Maori are likely to be variable within and across urban and rural geographies. Changes in New Zealand's climate over the next 50-100 years are likely to challenge the Maori economy and have a significant effect on the social and cultural landscapes of Maori people (Packman et al 2001). The Maori economy is largely based on primary industries and it is expected to be directly impacted by changes in regional climate. Collectively the Maori fishing industry represents some 37 % of the total sector in the NZ economy with significant investment in fishing fleets, processing and marketing (NZIER 2003). Changes in regional ocean temperature will likely alter fisheries production, fishing incomes and ocean-based investment. Climate change is also likely to limit Maori economic growth in agriculture to a greater extent than their non Maori counterparts, who suffer significantly less constraints in accessing key resources and who tend to have better quality and more resilient farm land. Maori also have substantial production forests and are becoming actively involved in integrated processing of wood products. This evolving ability to add value and generate business opportunities may be impacted as climate changes will effect production rates, wood quality, pest presence and fire-risk and to some extent, determine the scale and species-mix in future plantations (Cottrell et al 2004, MAF 2003). Not all impacts, however, from climate change will be disadvantageous. Maori are likely to find new opportunities connected with shifts in regional climatology such as diversification of agriculture practice, entering into carbon trading markets and cultural based eco-tourism, which has grown rapidly in the Maori economy in the last decade. The livelihoods of rural Maori are strongly linked to private and public use of land and coastal resources and these are expected to be impacted by climate change. The capacity of Maori to plan and respond to threats of climate change on land they own (farms, forests, native forest) is likely to be limited by access to funds, information and human capital, especially in Northland and on the East Coast where increased risks of extreme weather events and drier conditions are predicted (Mullan et al 2001b). There are also a range of other pressures that Maori face that are often quite distinct from other groups in New Zealand society such as multiple	JS: Important to include some of this text where possible. See also comment 11-908 KH: Darren King (DK) is now a Contributing Author

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						land-ownership and decision-making processes that can complicate implementation of costly or non-traditional adaptation measures. The marginal nature of many Maori land-blocks also makes them vulnerable to hazards associated with climate change impacts (landslides, erosion, flooding and drought) and the high spiritual and cultural value placed on Maori traditional lands and statutory sales restrictions related to land tenure often restricts or rules out adaptation options such as relocation. At the household level many rural Maori regularly utilise public land and coastal resources for hunting and fishing to supplement household food supplies, for recreation and the collection of cultural resources. The production and ecology of important flora and fauna, and coastal features that have cultural value, will likely be impacted by climate change and therefore affect the nature of such activities. These challenges compound the sensitivity of Maori to climate change. Little research has been done since the TAR on impacts for Australian indigenous people. New reference: Packman, D., Ponter, D., Tutua-Nathan, T. 2001. Climate Change Working Paper: Māori Issues. New Zealand Climate Change Office, Wellington N.B. This work will be further substantiated following the second Maori Climate Forum to be held in March 2006. (Darren NT King, National Institute of Water and Atmospheric Research Ltd)	
11-1015	A	23	26	24	4	This section need substantial rewriting. Overall it sounds patronising and has some errors of fact in it. Forexample line 33 the sentence reading "Their capacity to respond to thrests of climate change is l;ikely to be limited…..". And line 37 reference to access to reources is misleading. The NZ Maori people have received substanial Treaty settlements which are invested in very successful iwi organsations which are very much able to respond to market and environmental signals. There economic endeavours in the food industry for example is significant. The impression left that "their" complex decision-making impedes progress is not up to date or accurate. there was a NZ Climate Change Office report done with Maori representatives on climate change which is on the climate change website that might help. (Judy Lawrence, PSConsulting)	JS: See 11-1014 which has revised text for consideration for inclusion. See also comment 11-908
11-1016	A	23	26			Not sure about this statement. I suspect many Maori live in lowlying areas due to poverty, and are thus more exposed to flooding. This is likely true of Aborigines in Australia. Would be good to get statistics or ref. on this. (Barrie Pittock, CSIRO)	KH: See 11-1014

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11-1017	A	23	26	24	8	Very much dislike these paragraphs and strongly urge to remove. No references and highly subjective, and simply illogical in places. (Andrew Watkins, Australian Bureau of Meteorology)	KH: See 11-908 and 11-1014
11-1018	A	23	26	12	7	I appreciate that as suggested in my ZOD comments the authors have now provided more information about potential impacts on indigenous people. However, most of the material in these two paragraphs has not been backed up by literature references - so it is unclear to the reader whether these are findings drawn from published literature, or the opinions and judgements of the Lead Authors. As the AR4 is expected to be an assessment based on the literature I recommend that this section should only report or assess material which has been published (if necessary including publication in accessible grey literature). If such published material is not available that could be stated (as a knowledge gap). (David Wratt, NIWA)	KH: See 11-1014 DG: will deal with
11-1019	A	23	27	23	28	In order for these figures to make the point, what has to be stated is what proportion Maori represent of the total NZ population. (Chris Cocklin, Monash University)	BF: need to clarify
11-1020	A	23	27			Maori exist with a New Zealand economy and do not have an economy in their own right. (Gerald Rys, Ministry of Agriculture and Forestry)	BF: need to clarify
11-1021	A	23	27		28	The agriculture figure of 7.5% is less than the Maori share of the population, so one can hardly use that to imply that Maori are more exposed to climate change, which seems to be the implication of the "However." (Adolf Stroombergen, Infometrics)	BF: need to clarify
11-1022	A	23	29	23	29	"very likely to affect fishing incomes." Increase or decrease? Clarify. (Sean Weaver, Victoria University of Wellington)	BF: revised text will clarify this point
11-1023	A	23	30			Is it politically correct to refer to "rural Maori" or should it be "rural Maori people"? (Greame Pearman, Monash University Sustainability Centre)	
11-1024	A	23	31			Should this be 'Maori own substantial forests …'? (David Whitehead, Landcare Research)	BF: revised text will clarify this point
11-1025	A	23	33	23	33	Define whakapapa. (Chris Cocklin, Monash University)	BF: revised text will clarify this point
11-1026	A	23	33			Good to see a Maori word, but it will need a translation in parentheses for non-NZers. (Barrie Pittock, CSIRO)	BF: revised text will clarify this point
11-1027	A	23	35	23	35	The comment about the ability of Maori to respond is unsubstantiated and contestable. Either provide a source as to where this supposed differential in	BF: need to clarify KH: See 11-1014

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						adaptation capacity is demonstrated, or offer grounds for the comment. (Chris Cocklin, Monash University)	
11-1028	A	23	35	23	37	You are strongly underestimating the ability of Maori to adapt. Many Maori tribes now run enormous and very successful businesses. I believe the South Island's largest company is that now run and owned by Ngai Tahu - it is diverse and successful and includes fisheries, land development and tourism. It is also extremely quick to take advantage of changing opportunities, e.g., it is in the process of converting forestry to dairy farming in North Canterbury. (Ken Hughey, Lincoln University)	JS: See comments 11-1014 and 11-1015. The Maori section has to be carefully recrafted BF:agree!!!
11-1029	A	24	2			Is there a reference for the statement "water supply for rural Maori is often limited and likely to be threatened"? (The Ministry of Health reports on the grading of rural water supplies might be the best source.) (Alistair Woodward, University of Auckland)	BF: revised text will clarify this point
11-1030	A	24	3			A reference is made to "distortions generated as a result of climate change policcies.." It is very unclear what this means and where it comes from??? (Judy Lawrence, PSConsulting)	BF: revised text will clarify this point
11-1031	A	24	7			I would add "…. , although many of the same concerns apply (e.g., poverty, low adaptive capacity), with many living in lowlying coastal and island communities." (Barrie Pittock, CSIRO)	BF: revised text will clarify this point
11-1032	A	24	12	24	12	Add "in Australia and New Zealand" after "recreation" (Janice Lough, Australian Institute of Marine Science)	KH: agree
11-1033	A	24	12	25	5	The issue of tourism and transportation energy does not appear to have been covered. Both countries rely significanttly of movement of people vast distances to see the tourist attractions including the fact that we are relatively more remote from the main cntres of tourism ans air travel is important. (Gerald Rys, Ministry of Agriculture and Forestry)	BF: more a WGIII issue?
11-1034	A	24	12	24	25	These paragraphs appear quite subjective, and parts are nonsensical - eg some wetter areas may well have positive impacts - it simlpy isnt clear that wetter mkakes aeas worse for tourism, especially if there is a distinct wet and dry season. (Andrew Watkins, Australian Bureau of Meteorology)	BF: need to clarify and see points below about drying
11-1035	A	24	12	24	12	Tourism and recreation [IN AUSTRALIA AND NZ?] rely largely on the natural environment… (Oliver Woldring, NSW Government)	KH: agree
11-1036	A	24	14	24	17	This statement seems too simplistic: what if drier regions experience water supply problems and can no longer sustain tourist levels? If information is limited then it is probably better to point out knowledge gaps than make simplistic assumptions. (Dean Collins, Bureau of Meteorology)	KH: Susanne Becken to address

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11-1037	A	24	15			WTO? (Greame Pearman, Monash University Sustainability Centre)	
11-1038	A	24	15	24	17	Why would areas that become drier benefit? Please elaborate. What evidence supports this? Have drier days / seasons been found to have higher participation (if so, please cite this literature). If an area becomes drier, wouldn't that potentially threaten fishing through lower water levels or higher water temperatures? The literature cited doesn't seem to support these conclusions. (Daniel Scott, University of Waterloo)	KH: Susanne Becken to address
11-1039	A	24	16	24	17	I question the assumption that viewing wildlife and fishing activities will necessarily improve with drier conditions. Birdlife in wetlands are likely to be adversely impacted by drier conditions so viewing of wetland birds will be adversely impacted. Similarly drier conditions will not assist fishing for salmonids in southern Australia. While the statment may be true for northern hemisphere countries it cannot be generically interpreted for Australia. (John Garnham, Department of Primary Industries)	KH: Susanne Becken to address
11-1040	A	24	20			How extensively is tourism in the region affected by climate extremes now (in terms of visitor numbers, insurance costs, revenue loses) and are they meaningful to the industry? What is the recovery period and is there any lasting impact (i.e., have operators been put out of business)? (Daniel Scott, University of Waterloo)	KH: Susanne Becken to address
11-1041	A	24	26	24	30	Could reference the AGO cairns-GBR study (Crimp et al. 2004). (Andrew Ash, CSIRO)	KH: Agree
11-1042	A	24	26	24	26	…likely to be ADVERSELY affected… (Oliver Woldring, NSW Government)	KH: Agree
11-1043	A	24	29			A need for care here. Although not an expert on glaciers I was under the impression that NZ's two most famous glaciers, the Fox and the Franz, may well grow under most scenarios. This would benefit tourism. However, if there is 40% more rain on the West Coast then fewer tourists may want to go there, etc.? (Ken Hughey, Lincoln University)	JS: Need to clarify that for moderate temperature increases (>2 C) temperature dominates over precipitation increases.
11-1044	A	24	32	24	38	Region too small - leave out to save space (Andrew Watkins, Australian Bureau of Meteorology)	KH: Disagree. We're struggling for case studies.
11-1045	A	24	41			Would be good to give an indication of how many days of snow there is in order to give an indication of how big 5 - 40 fewer days is (Tony Coleman, Insurance Australia Group)	KH: Agree. Duration of snow cover is typically 70-130 days at most resorts
11-1046	A	24	43	24	43	again, worth quoting Nicholls 2005 a little more here. (Andrew Watkins, Australian Bureau of Meteorology)	KH: Agree
11-	A	24	46			replace "snow guns" with "artificial snow-making guns"	KH: Agree

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1047						(Rod Anderson, Department of Sustainability & Environment)	
11-1048	A	24	46		47	How much would the snow guns cost? Ie what is the cost of adaptation - is it reasonable? (Tony Coleman, Insurance Australia Group)	KH: Cost not assessed in literature
11-1049	A	24	46	14	46	Should be 'snow-gums' (John Garnham, Department of Primary Industries)	KH: Disagree. See 11-1047
11-1050	A	24	46			Perhaps reword "increasing the use of artificial snow making using snow-guns…" (Greame Pearman, Monash University Sustainability Centre)	KH: See 11-1047
11-1051	A	24	47		48	The claim that the low nordic resort of Lake Mt may maintain skiing surfaces through snowmaking is not credible. (David Jones, Australian Bureau of Meteorology)	KH: Agree. Revise wording
11-1052	A	24	47		49	No mention is made of the viability of alpine resorts post 2020? That this industry will cease to be viable by approximately 2050 (e.g., Climate change and snow cover duration in the Victorian Alps / report to the Environment Protection Authority by CSIRO Division of Atmospheric Research. Melbourne : Environment Protection Authority, 1994.) with no options for an adaptive response seems more important than an ability to adapt for a couple of decades! (David Jones, Australian Bureau of Meteorology)	KH: Disagree. CSIRO's (1994) report is over a decade old. The latest CSIRO report (Hennessy et al, 2003) showed potential impacts on snow cover to 2050, but only considered adaptation through snow-making to 2020. Speculation about adaptive capacity and viability beyond 2020 is inappropriate.
11-1053	A	24	47	24	47	"with slightly greater increases" increases in what? Snow guns? (Andrew Watkins, Australian Bureau of Meteorology)	KH: correct
11-1054	A	24	49			Include the word "economics" in the list? (Greame Pearman, Monash University Sustainability Centre)	KH: agree
11-1055	A	24	50			In NZ, West Coast glaciers are a significant toursist attraction. As they retreat, their aesthetic appeal is likely to decrease, they will be less visible from key accessible points, and also access onto the glaciers may become significantly more challenging and/or expensive. Projections for their retreat (Anderson 2004 - see comment 9 above) vary hugely. They also may be more dangerous environments, as the new-exposed valley slopes are subject to mass movements of various kinds (Wendy Lawson, University of Canterbury)	JS: See 11-1043.
11-1056	A	25	0			Through this part of the document I am aware that the issue of ENSO frequency appears to be absent? (Greame Pearman, Monash University Sustainability Centre)	KH, JS: Will check whether ENSO has a large impact on energy
11-1057	A	25	8			Section 11.4.9 Energy make no reference to impact with respect to solar power. Would be helpful if can say whether or not this will be impacted and to what extent. (John Garnham, Department of Primary Industries)	KH: Noted, solar radiation scenarios are provided in BRANZ (2006) MH: There are reasonably clear relationships between seasonal radiation and rainfall (esp

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							raindays) – this as a proxy for cloud cover. If rainfall across southern Aust reduces then I would expect solar rad to increase. But this is speculation not published or researched work.
11-1058	A	25	8			Section 11.4.9: of some interest to decision-makers is the question whether peak wind speeds could affect transmission lines, and whether peak rainfall poses a risk and requires consideration in dam design and operations. There may not be a lot of literature (though I believe there is some), but even just a qualitative assessment would be of high interest. (Andy Reisinger, Ministry for the Environment)	JS: need to clarify KH: Extreme wind-speed scenarios for Australia are given in BRANZ (2006) MH: this section needs some major re-structuring. I think we need to condense paragraphs 2 and 3 markedly, cross-referring to Chapter 7 where possible, clarify the growth assumptions in paragraph 1 (including making more clear that even the relatively small increases in proportional demand from climate change from Howden and Crimp could represent major proportions of the current capacity given the expected total demand increases). Lastly, I think we should consider expanding paragraph 4 which has some interesting issues. Overall I think we could save a quarter of a page. I have not seen the PB Associates report, so am not at the moment in a position to do this. I think an expanded fourth paragraph could cut/paste from an earlier version of the chapter.
11-1059	A	25	8			Section 11.4.9 Energy: Did PB make no mention of cooling water? Reduced supply from rivers and also warmer temperatures where taken from shallow coastal lagoons meaning more water required.. - eg Macquarie Lakes?. (Oliver Woldring, NSW Government)	KH: Noted. PB Associates (2005) found that reduced water supply for power generation was a moderate risk. MH: See above
11-1060	A	25	10	25	16	This is very confusing to me and needs to be clarified; there is no indication of what baseline the forecasts refer to; nor is it clear how climate change increases the forecasts; do the references to 10% and 10-50% of "exisiting asset levels" mean that energy production has to increase by these amounts? (Janice Lough, Australian Institute of Marine Science)	KH: Will clarify

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11-1061	A	25	10	25	15	I would question the realism of these projections, and at least add a caveat that this assumes no attempt to limit demand in response to international pressures to reduce emissions or to increasing energy costs and oil supply questions. (Barrie Pittock, CSIRO)	KH: Noted, but unsure about assumptions behind the projections to 2020
11-1062	A	25	10	25	16	Energy increases of 250 to 350% by 2070 must be an underestimate. With 3% pa growth of the economy, the economy doubles in 23 years and quadruples in 46 years (2051). Energy usage in 2051 wil be 400% increase minus the improvement in energy itensity which according to ABARE is reducing at 1.1% pa (it is unlikely that energy intensity will improve much more because most of the possible gains have been made). In the chapter you quote 3.6% growth so it is clear that by 2070, the energy consumption will have undergone most of another doubling time and will be nearer 800% taking into acount climate related increases in demand. Of course this is not possible and explains why the growth economy is not sustainable. (David Shearman, Univeristy of Adelaide)	KH: Seek clarification from PB Associates (2005)
11-1063	A	25	10	25	16	Consumption grow 50% from what??? How has extrapolation been done - this appears somewhat dbious in current form (Andrew Watkins, Australian Bureau of Meteorology)	KH: Seek clarification from PB Associates (2005)
11-1064	A	25	10	25	46	Section 11.4,9 (Energy): This entire section is very light on references - again leaving readers uncertain about whether it is based on published work or on views if the Lead Authors. As with the earlier material regarding Maori, I strongly suggest you base this section on published (including if necessary grey literature) material, and provide the references to back it up. (David Wratt, NIWA)	MH: I think we should cross-reference Chapter 7 instead if no more refs available. Note too that Howden and Crimp did relative seasonal changes, peak demand change as well as mean annual demand changes. KH: All available literature has been cited. It's essentially all from one report – PB Associates (2005). Citations will be inserted more frequently.
11-1065	A	25	14	25	16	Energy demand projections to 2030 are tenuous enough, but to push out to 2070 is not credible, particularly because there is already significant and increasing policy pressure to improve energy use efficiency. (Oliver Woldring, NSW Government)	KH: Agree. Will delete 2070 scenario.
11-1066	A	25	18	25	26	paragraph appears doubtful/dubious. Delete (Andrew Watkins, Australian Bureau of Meteorology)	KH: Disagree. Literature supports text, but will delete sentences on biomass fuel and coal combustion.
11-1067	A	25	21	25	21	Stronger storms are likely to reduce network reliability…..' Is this Australia wide? (Elizabeth CURRAN, Bureau of Meteorology)	KH: See page 11, lines 21-25
11-	A	25	23			"fuel shortages … crop failures" implies that there are large scale power generation	KH: Disagree. There is no implication about

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1068						plants in Australia and New Zealand using biofuel. There are not. The plants are very small scale and generally associated with an individual factory or mill. (Tom Beer, CSIRO)	the size of biomass-fuelled generation plants
11-1069	A	25	24	25	24	Franzi Poldy (franzi.poldy.csiro.au) has created wind energy supply curves based on such and other parameters - he may be able to inform whether or not this is a significant issue. (Michael Dunlop, CSIRO)	MH: will follow up
11-1070	A	25	25			Is this really a significant threat that the chances of coal stockpiles combusting spontaneously could increase? Surely, a increase in temperature of a few degrees is unlikely to increase the threat significantly? (David Whitehead, Landcare Research)	KH: Disagree. A small increase in mean temperature has a large effect on the frequency of extremely hot days. This will be made clearer in Section 3.1. See comment 11-1066
11-1071	A	25	26			Surely increasing potential fire damage to energy infrastructure, especially distribution networks which in Australia are dominated at the local level by wooden poles, must be considered. (Barrie Pittock, CSIRO)	KH: briefly mentioned in PB Associates (2005), but not considered a medium risk
11-1072	A	25	28	25	39	Please provide references for these statements. (Janice Lough, Australian Institute of Marine Science)	KH: Will cite PB Associates (2005)
11-1073	A	25	28	25	40	again, paragraph appears dubious in its claims in places. fior instance, in what way are timor sea platfroms "likely" to be affected?? References are clearly needed that have been peer reviewed - the single reference given looks like a consultants report and i would think most unscientific in appraoch if this text is anything to go by. I'd be substantially reducing the length of this entire section if no better references can be found. (Andrew Watkins, Australian Bureau of Meteorology)	KH: Disagree. The consultant's report (PB Associates 2005) was a scoping study, with relevant literature cited, and is one of only 2 studies of climate change and energy available (the other being Howden and Crimp, 2001). The lack of literature on energy will be stated up front in this section. Grey literature is valid.
11-1074	A	25	29	25	37	From "Any disruption…to ..insured against" doesn't seem overly important.. (Oliver Woldring, NSW Government)	
11-1075	A	25	37			I find the statement concerning "impact are typically insures against" a little strange. As if this means there are no impacts, e.g. on premiums? (Greame Pearman, Monash University Sustainability Centre)	KH: Agree
11-1076	A	25	37		37	Insurance does not reduce aggregate economic losses - it just distributes the loss more widely. Suggest removing the sentence. (Adolf Stroombergen, Infometrics)	KH: Agree
11-1077	A	25	41			There is an issue missing from this section regarding wind intensity. Impacts on transmission infratstructure are possible and have already occurred.There could be impacts on infrastructure installed on caosts as well or in the marine environment	JS: These points will be discussed.

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						like off shore structures for wave and current energy generation or for oil and gas. (Judy Lawrence, PSConsulting)	
11-1078	A	25	41	25	46	Please provide references for these statements. (Janice Lough, Australian Institute of Marine Science)	JS: Blair – do we have references for this??
11-1079	A	25	41	25	46	I feel this paragraph is too brief, and does not cover the key points. I would suggest the following to replace these lines entirely: "In New Zealand, increased westerly wind intensity is very likely to enhance wind generation and spill-over precipitation into major South Island hydro catchments, and give more rain in the main North Island hydro catchment - the Waikato river. Increased temperatures will lead to increased electricity demand in summer and decreased demand in winter, which will help even out annual demand peaks. In addition to this, less seasonal snow accumulation in winter will even out traditional inflow peaks, which are opposite to demand peaks. Increased snow and glacier melt will enhance river flows all year round. More storms and droughts will create some hydro management difficulties in New Zealand, and could result in more short term spill events. Increased storminess could also cause more outages in generation plant and transmission equipment. Similarly, more variability in wind intensity could lead to less efficiencies in wind generation. Waikato geothermal power station cooling will be aided by increased river flows in winter but hindered by increased water temperatures in summer. Sedimentation in hydro lakes, already a problem in the Clutha river catchment, will increase with snow and glacier recession and increased storminess. In the background of all this is the increased pressure on New Zealand, a Kyoto signatory, over Australia (who have not signed) to decrease carbon emissions despite a steadily rising energy demand." (Jennifer Purdie, University of Waikato)	BF: Can cite Fitzharris and Garr (1995), but this was already cited in the TAR. Blair will contact Jennifer Purdie for her PhD Thesis (submitted)
11-1080	A	25	41	25	46	Little discussion of the increased energy demand, , with th rospect of more coal fired generation and proportionally less hydro generation - limited potential to expant hydro Capability as well (Gerald Rys, Ministry of Agriculture and Forestry)	BF: More WG3 issues
11-1081	A	25	43			Reference to the "Waikato catchment" should add "(in the central North Island)" to help readers unfamiliar with details of local geography. (A. Brett Mullan, National Institute of Water & Atmospheric Research Ltd)	BF: revised text will clarify this point
11-1082	A	25	44			"increase melting of snow AND ICE" - insert and ice. Also, need to indicate that higher flows in winter due to warming of ice will only last as long as the glaciers continue to exist. If individual glaciers are removed completely due to melting, then	BF: need to clarify

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						this effect ceases. (Wendy Lawson, University of Canterbury)	
11-1083	A	25	49			Is the recent AMA and ACF results include in here? (Tony Coleman, Insurance Australia Group)	RW: Need to include the AMA/ACF results since analyses were different to those done by McMichael et al (2003), although methods and outcomes were similar. I updated the heat-related deaths text.
11-1084	A	26	1	26	10	These figures are somewhat useless. Deaths through heat will rise, but so will deaths through everythign with the the rapidly aging + increasing poplation. Everythign needs to be expressed in deaths per million people or deaths per head of population, otherwise it is meaningless. Also, little accountasbility tappears to be made for any adaptation, or is all this assuming no adaptation?? (ie we dont see a huge increase in deaths as soon as older people migrate from southern states to Qld, because they adapt) (Andrew Watkins, Australian Bureau of Meteorology)	RW: The increase in deaths was already reported without change in population size and structure. For clarity, I have inserted the rate per 100 000.
11-1085	A	26	4			Perhaps a note could be included that for Indigenous Australians, who have a life expectancy of 20 years less than non-indigenous Australians, an increase in days over 40 degrees C is likely to impact people living in remote areas (without access to air-conditioning) at a range lower than people aged over 65. (Donna Green, CISRO)	JS: For inclusion RW: Agree KH: Donna Green is now a CA. She will provide references.
11-1086	A	26	7			add "New Zealand" after Auckland. (Gerald Rys, Ministry of Agriculture and Forestry)	JS: Paper not accepted - delete
11-1087	A	26	7			The winter peak in deaths and hospital admissions is observed in almost all cities in New Zealand and Australia (Darwin perhaps being the only exception). In many cities,, but by no means all, this pattern will be reversed with greater heat-related deaths under the more aggressive climate change scenarios. I suggest more detail is provided here. (Alistair Woodward, University of Auckland)	KH: See 11-1083 RW: Clarify why that sentence on Auckland was removed. Yes, hospital admissions for respiratory infections in winter are likely to decrease. But this comment will be made in the health chapter, and there's not yet any ANZ-specific references – although some are in the pipeline from our end. What's the timeframe for papers to be published by? JS Text altered slightly to reference to winter peak in temperate cities.
11-1088	A	26	12	26	14	In September '05, a new report on climate change and susceptibility to disease in Australia was released jointly by the Australian Medical Association and the Australian Conservation Foundation. The authors should check this to see if it offers new information and insights. As I understand it, the report does emphasise	RW: See my comment 11-1083

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						the socially differentiated vulnerabilities (especially that Aborigines are more vulnerable). (Chris Cocklin, Monash University)	
11-1089	A	26	13			Table repeats much of the comments above it. (Gerald Rys, Ministry of Agriculture and Forestry)	KH: Agree. Delete table to save space RW: Agree
11-1090	A	26	16		17	I would question the statement "The first detectable changes in human health are likely to be alterations in the gropgrahic range and seasonality fo certain vector-borne infectious diseases". What evidence is avaliable to support this? (David Jones, Australian Bureau of Meteorology)	KH: Agree. Replace "The first detectable changes in human health are" with "There" RW: Agree
11-1091	A	26	20			"exposure, sensitivity…"? (Barrie Pittock, CSIRO)	RW: neither of these words make sense outside of the context of Sutherst's paper, as they can have so many different meanings. Suggest changing them to "climate" and "transmission rates".
11-1092	A	26	22	26	31	one could argue that increasing drought would decrease mosquito population (Yves Bergeron, université du québec en Abitibi-Témiscamingue)	RW: Agree. In arid and some temperate areas, outbreaks of some mosquito diseases are strongly correlated to patterns of rainfall (ie they occur far less frequently during drought periods). Examples in Aust would be MVE, RRv, and BFv in northern Victoria, western and southern NSW, SA, and southern WA. I added: "Fewer but heavier rainfall events will impact on mosquito breeding and increase variability in transmission rates of Ross River virus, particularly in temperate and arid areas". (added in Woodruff et al. in press)
11-1093	A	26	25	26	27	again, this needs to be relative. The risk does not increase if more people live in a region, the risk only increases if there is a greater liklihood of more people than normal contractign the disease. If this is because more people increase the possibility of it being transferred fr one operson to another, then this is not a climate chage impact and should be left out. (Andrew Watkins, Australian Bureau of Meteorology)	RW: Actually, both are true. The risk of contracting dengue is a function both of the availability of the mosquito vector and the population density of the host (humans). In this instance though, I agree we should add in the word "relative" to clarify the analyses that were done.
11-1094	A	26	30			Does this apply to both countries? Seems to be in contradiction for Australia with lines 24-25.	JS: Disagree – Dengue currently not in NZ RW: The issue is one of clarity, not fact.

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						(Barrie Pittock, CSIRO)	Suggested text ("in that country") is added.
11-1095	A	26	36	26	36	Suggest change poor to particular (Julia Becker, Institute of Geological and Nuclear Sciences)	JS: Agree RW: Agree
11-1096	A	26	37			A 10% change is small. How reliable is this estimate given its dependence on socio-economic development (e.g., secure water supplies) and health services in these Aboriginal communities over the next 45 years. (Barrie Pittock, CSIRO)	RW: Suggest adding text "assuming no change in other circumstances".
11-1097	A	26	38			I also wondered whether there is any more research on likely impacts on asthma in the community, apart from the reference to aeroallergens in line 38 page 26. (Susan Churchman, Department for Environment and Heritage,South Australia)	KH: No research evident, but check with Macquarie Uni RW: None that I'm aware of.
11-1098	A	26	38	26	39	There is research on the interaction between climate change and ozone and their impacts on human health in cities and I have intimated these references in my report on the Health Chapter. (David Shearman, Univeristy of Adelaide)	RW: Will seek references
11-1099	A	26	38	26	38	I wonder if anything can be added about risks associated with increased bush fire smoke - or even an observation about current affects with the comment that in some areas the risk of fire weather is projected to increase (Hennessey 2005). I believe Menzies School of Health at Charles Darwin university has done a fair bit of work on smoke and asthma.. (Oliver Woldring, NSW Government)	RW: Will seek references
11-1100	A	27	3	28		Section 11.4.11 - Synthesis. The concept of using a table to illustrate the six key vulnerabilities is a good one though I feel there is some inconsistency in the levels of the different vulnerabilities and that there are some overlaps e.g. some overlap between water security and fire and drought and between coastal communities and critical infrastructure. (Andrew Ash, CSIRO)	BF: noted, but overlap is inevitable
11-1101	A	27	7	27	7	Table numbering needs fixing. (Julia Becker, Institute of Geological and Nuclear Sciences)	BF: Accepted
11-1102	A	27	7			Table 11.4.11.1 ???? (Richard HOY, Energy Supply Association of Australia)	KH: Noted
11-1103	A	27	7	27	8	Is the 2C warming referred to the local warming or the global average temperature warming? (Janice Lough, Australian Institute of Marine Science)	BF: Accepted. Changed to local warming
11-1104	A	27	7			Should Table 11.4.11.1 be labelled as Table 11.10? (David Whitehead, Landcare Research)	BF: Accepted
11-1105	A	27	8			Exceeds 2 degrees from what baseline? I think the case for a 2 degree critical warming threshold here needs to be made more clearly.	BF: Accepted and now made relative to 1990

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						(Rod Anderson, Department of Sustainability & Environment)	
11-1106	A	27	8			Does this mean 2C above presebn or 2C above preindustrial level? (Roger Gifford, CSIRO)	BF: Accepted and now made relative to 1990
11-1107	A	27	8			After "critical" should it say ", in the absence of any adapations,"? What does critical mean here?. The sentence seems to imply some kind of threshold, something to which the prior discussion did not make reference. IPCC needs to tread carefully here to retain credibility. (Roger Gifford, CSIRO)	BF: Accepted in part. Absence of adaptation is in the Table caption already. "Critical" is now defined in text using principles and criteria of Ch 19
11-1108	A	27	8		8	The threshold of 2C is with-respect-to what based period (keeping in mind that many areas have already witnessed 1-1.5C of warming)? (David Jones, Australian Bureau of Meteorology)	KH: Accepted. Now made relative to 1990
11-1109	A	27	8			"warming exceeds 2oC". Is this meant to be locally, nationally or globally. Needs more rigour. (Greame Pearman, Monash University Sustainability Centre)	BF: Accepted. Changed to local warming
11-1110	A	27	10	27	10	..delay vulnerability [of some sectors]. (Oliver Woldring, NSW Government)	BF: notedAccepted. Change in text made
11-1111	A	27	14		15	The authors and the IPCC need to be very clear by what is meant by abrupt climate change and associated responses. The projected warming from 1900 to ~2100 of up to ~7C is about 50-100 times more rapid than that experienced at the end of the last glacial maximum and will greatly exceed the natural adaptive capacity of all systems (see Figure 11.3). It is about 1000 times more rapid than the natural climate changes over the last millenium. If this is not abrupt climate change, then what is it? (David Jones, Australian Bureau of Meteorology)	BF: revised text will clarify this pointBF: Accepted. Change in text made
11-1112	A	27	14	27	23	Several aspects of this paragraph appear to be conjecture and ot backed by the current science. Need to speak only of those things that are possible in the next 100 years. Catastrophic Greenland melt and WAIS collapse are highly unlikely according to the science at this stage (Andrew Watkins, Australian Bureau of Meteorology)	BF: revised text will clarify between events of next 100 years, and those on longer time frames.Noted. This text now omitted.
11-1113	A	27	16	27	17	Is there a liklihood of a reduction in bottom water formation occuring? If so this should be stated and references given. (Andrew Watkins, Australian Bureau of Meteorology)	BF: revised text will clarify this pointNoted. This text now omitted..
11-1114	A	27	19	27	23	Some qualification or an indication of the likelihood of these possibilities (ie faster melting of Greenland and West Antarctic ice sheets and a switch in ENSO and PDO regimes is requiresd. Eg 'In the event that a faster than …' (Elizabeth CURRAN, Bureau of Meteorology)	BF: revised text will clarify this pointNoted. This text now omitted.
11-	A	27	19		21	Why is 'Faster than expected…' important. Is it linked to a 'one metre' rise earlier	BF: revised text will clarify this pointNoted.

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1115						than expected? The reason for using the word 'Faster' is not clear. (Alan Porteous, National Institute of Water & Atmospheric Research (NIWA))	This text now omitted.
11-1116	A	27	20	27	20	"raise sea level by more than one metre" by what date? (Janice Lough, Australian Institute of Marine Science)	BF: revised text will clarify this pointNoted. This text now omitted.
11-1117	A	27	20			What does this sentence about "faster than expected melting" mean. Extra melting of Greenland will certainly raise sea level more than otherwise would be the case. However, any mention of a specific value (>1 meter) requires also specifying a time. (A. Brett Mullan, National Institute of Water & Atmospheric Research Ltd)	BF: revised text will clarify this pointNoted. This text now omitted.
11-1118	A	27	20			Use conditional tense "would likely raise…" and in line 22. Also, one metre by 2100? (Barrie Pittock, CSIRO)	BF: revised text will clarify this pointNoted. This text now omitted.
11-1119	A	27	21	27	21	Add "tropical" before "cyclones"; what is the basis for suggesting a "sudden increase"?; should it be tropical cyclone frequency and/or intensity?; provide reference that a regime shift in ENSO or PDO would cause a change in tropical cyclones. (Janice Lough, Australian Institute of Marine Science)	BF: revised text will clarify this pointNoted. This text now omitted.
11-1120	A	27	21		23	Changes in flooding and erosion subsequent to a regime switch of ENSO or PDO (IPO) could hardly be termed "unexpected". It is the regime shift that is not well-predicted at this point in time. (A. Brett Mullan, National Institute of Water & Atmospheric Research Ltd)	BF: revised text will clarify this pointNoted. This text now omitted..
11-1121	A	27	22			Has the acronym PDO been explained anywhere? (Tom Beer, CSIRO)	BF: revised text will clarify this pointNoted. This text now omitted..
11-1122	A	27	22			Define PDO? (Tony Coleman, Insurance Australia Group)	BF: revised text will clarify this pointNoted. This text now omitted.
11-1123	A	27	22	27	22	Need to spell out "PDO". (Alistair McKerchar, National Institute of Water and Atmospheric Research Ltd)	BF: revised text will clarify this pointNoted. This text now omitted.
11-1124	A	27	22	27	22	I would suggest leaving out the PDO comment - this is not yet accepted as a true, non-mathematical-artefact phenomemoa. Still not accepted by the full climate forecasting community, for instance. (Andrew Watkins, Australian Bureau of Meteorology)	KH: Agree BF: Noted. This text now omitted.
11-1125	A	27	23			I wonder why this particular subset of potential abrupt changes was chosen. It might include, for example, Tundra gas release with the demise of the permafrost, or the failure of the terrestrial biosphere to buffer the fossil-fuel effects by coming to equilibrium and ceasing to take up a net 2 Gt of carbon each year?? (Greame Pearman, Monash University Sustainability Centre)	BF: Noted. This text now omitted.
11-	A	27	25			Table 11.10 – The casual reader is going to find it hard to reconcile that "further	BB: Agree – need to be more specific.

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1126						declines in water supply are likely" with the inadequacy of dam storage given in Table 11.8. and the "over-topping of hydrodams" given in Table 11.10. I suggest some discussion of why it is that when considered as infrastructure the dams are not high enough but when considered as water security they are too big. (Tom Beer, CSIRO)	KH: More droughts and floods – need to clarify in section 3.1 BF: Noted. Text now rewritten to clarify this point
11-1127	A	27	25			Table 11.10 The impacts column for natural systems should include the coast. Also there is an inconsistency in the use of '.' Case study on water security in Perth. I am concerned about the average flow lines in this figure. Being involved in this project, I understand that these lines may be subjective rather than based on statistical analyses. I would be happier if either no mean lines were given or that only the lines breaking the data in 1974/75 are given (as this break is generally accepted, but the one in the late 1990s is still being debated). (Lynda Chambers, Bureau of Meteorology Research Centre)	BF: Accepted. Coasts now added. Use of full stops made consistent BB: Agree – final figure will have a different form.
11-1128	A	27	25			Under water security "impacts" include dam levels (Tony Coleman, Insurance Australia Group)	BF: Accepted
11-1129	A	27	25	28		Table 11.10. The second column seems to contain both 'climate impacts (eg less rainfall and higher evaporation, higher temperatures etc) and vulnerable/sensitive areas (coral reefs, wetlands, decreased river flows etc. May be better if an additional column was included to cover the vulnerable areas. (Elizabeth CURRAN, Bureau of Meteorology)	BF: Noted. This table deals with sectors - vulnerable areas are discussed under hotspots. Impacts and comment column items now swapped.
11-1130	A	27	25			Table 11.10 Water security / Description: Add: "Major reductions in water availability for irrigation are likely in many regions." (Michael Dunlop, CSIRO)	BF: Accepted.
11-1131	A	27	25			Table 11.10 Water security / Comment: "is already severe AND INCREASING" (Michael Dunlop, CSIRO)	BF: Accepted.
11-1132	A	27	25			Table 11.10 Natural Systems / Impacts: suggest replacing list of ecosystems with: "All Ecosystems: changed disturbances, inter-species interactions, species ranges, ecosystem composition structure and function, species extinction." (Michael Dunlop, CSIRO)	BF: Accepted for most part LH: Agree
11-1133	A	27	25			Table 11.10 Natural Systems / comment: These impacts mean changed ecosystems and some species extinctions, with many flow on effects via altered ecosystem services, eg impacts on hydrology and tourism (Michael Dunlop, CSIRO)	BF: Accepted. LH: Agree
11-1134	A	27	25	27	25	I don't see that we can say that water supply will be reduced. As noted above rainfall should increase on average over the globe. Evaporative demand has actually been going down in Australia. It may not continue, but how can we predict	BB: Disagree with several points in this comment. However, a fuller discussion of the material in the FOD is required

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						less water availability? Similarly why does the table say less rainfall and higher evaporation? That is virtually impossible in Australia, since nearly all rainfall evaporates anyway. Presumably the writer meant evaporative demand, or potential evaporation rate or something. But in any case we can hardly predict with confidence that demand will go up, since the sign has been opposite over the last few decades. (Graham Farquhar, Australian National University)	KH: Disagree. See comments 11-549 & 11-550 BF: Largely rejected. Models indicate likely decreases in rainfall over large areas. Evaporation changed to "potential evaporation"
11-1135	A	27	25			What is "exponential" glacier retreat. (David Jones, Australian Bureau of Meteorology)	BF: revised text will clarify this pointNoted. Word removed
11-1136	A	27	25			The last row of table 11.10 thrid column refers to urban infrastructure and energy demand. These impacts could also affect rural infratsructure and transmission of energy throughout the national network. (Judy Lawrence, PSConsulting)	BF: revised text will clarify this pointBF: Accepted.
11-1137	A	27	25			Table 11.10. Glaciers mentined under impacts, does not follow through under 'Decription/Criteria". Add "Glacier volume likely to reduce significantly, involving significant terminus retreat'. "Further expoential glacier retreat" not useful in "Ciritcal level column": not clear what it means, what "exponential glacier retreat" means, and it is imflammatory in tone. (Wendy Lawson, University of Canterbury)	BF: revised text will clarify this pointBF: Accepted. BF: Accepted.
11-1138	A	27	25	27	25	Table 11.10 Under Natural Systems: how will the "impacts" change "runoff"? (Janice Lough, Australian Institute of Marine Science)	BF: Accepted word now removed. LH: Agree
11-1139	A	27	25	27	25	Table 11.10 Under Fire and Drought: Is it only an increase in drought frequency or is it also intensity? Given the uncertainties regarding regional rainfall projections (see earlier comments) such changes are likely even without major changes in rainfall deficits because of the higher temperatures. (Janice Lough, Australian Institute of Marine Science)	KH: Drought frequency
11-1140	A	27	25			In Table 11.10, last row: suggest delete "glacial lake outburst flood". As written, this implies that such floods are a threat to hydroelectric dams, but the only potential hazard of this kind that I know of is the lake at the lower end of the Tasman Glacier. If this burst it would almost certainly be contained within Lake Pukaki and not cause downstream flooding. (Alistair McKerchar, National Institute of Water and Atmospheric Research Ltd)	BF: revised text will clarify this pointBF: Accepted.
11-1141	A	27	25			Table 11.10. Entry 1, col.3, "interact with, and …" Entry 3, col. 3. Add forests, as these are very vulnerable and repeated fires could turn them to savanna or at least change species composition. Entry 3, col.5. Add something like "… and carbon sequestration in soils and forests. Soil erosion by wind and water would increase due to reduced vegetation cover."	KH: Consider for section 11.4.3. Mark & Jim to address BF: Accepted.

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						(Barrie Pittock, CSIRO)	
11-1142	A	27	25			Table 11.10: under critical infrastructure: people will read a natural priority list within those items. I'm not sure that over-topping of hydro-dams necessarily is the highest priority - I would re-order it to place flood risk first. In the "critical level" cell, I don't think "not known" is a useful entry for infrastructure. It might be better to replace it with "depending on location and existing/required level of protection". Perhaps also a statement along the lines of "warming by more than 1 degree is likely to exceed natural variability in flood risk in most regions" (that's just an arbitrary figure as example - but something that gives people guidance as to how much they have to believe in climate change to take it seriously when doing flood risk assessment and infrastructure design would be helpful). (Andy Reisinger, Ministry for the Environment)	BF: revised text will clarify these points. Overtopping of hydro dams needs more discussion.BF: Accepted..
11-1143	A	27	25			table 11.10 Rire and drought section add higher temperature to Impacts column. (Gerald Rys, Ministry of Agriculture and Forestry)	BF: Accepted
11-1144	A	27	25			Table 11.10: Under "Natural Systems", I think that coastal wetlands/lakes/lagoons should be specified here because these "wetlands" have a very distinct and specific vulnerabilities compared to other "wetlands". Under "Water Security", salinisation of groundwater resources should be included as an "Impact". (Marc Schallenberg, University of Otago)	BF: Accepted – coasts now added
11-1145	A	27	25	27	25	table, against the heading "water security" - adelaide has had no water storage problems in recent several years. (Good water from the adelaide hills catchments) (Andrew Watkins, Australian Bureau of Meteorology)	BB: True, but table addresses what might happen in the future. Also, groundwater resources of the Clare Valley (north of Adelaide) are already stressed
11-1146	A	27	25	27	25	Water security: many southern regional centres [add "in NZ"} (David White, ASIT Consulting)	BF: Accepted
11-1147	A	27	25	27	25	Fire and drought - drought frequency, [add "duration"] and/or intensity …. It is the multi-year droughts that are causing real community concern! Add "Irrigated agriculture and horticulture also at significant risk" … as anyone talking to people in these high-value industries in the Murray-Darling would have realised over the past few years as water storages literally evaporated. (David White, ASIT Consulting)	KH: No literature to support conclusions about drought duration or intensity BF: Accepted Irrigation now added under water security
11-1148	A	27	25			Table 11.10. Water Security: Comment - Sydney desalination plant is still in planning phase.. (Oliver Woldring, NSW Government)	BF: Accepted
11-1149	A	27	25			Table 11.10. Critical infrastructure (page 28) no mention of cyclone or storm surge treats to infrastructure.. (Oliver Woldring, NSW Government)	BF: Accepted

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11-1150	A	27	25			There is no mention in Table 11.10, or elsewhere, of effects of prolonged and repeated droughts on mental health in rural communities. I am aware of some work done prior to the last assessment of depression and attempted suicide in drought affected populations in Australia. Have other studies been published since then? (Alistair Woodward, University of Auckland)	KH: Seek literature from Neville Nicholls BF: Accepted
11-1151	A	27	25			Table 11.10: Entry on Water Security. This entry is too general (are the "many southern regional centres referred to in both NZ and Australia, or just in NZ, and is the statement about them really true?). Also, I thought Auckland was out of the woods on water supply problems for the next few decades because of building a pipeline from the Waikato ? Back to the "Southern Centres": Earlier on you raised the possibility of increases in flows of South Island rivers rising in the Alps - so might not this assist with water supplies for some of these locations. Summary: I suggest you consider this entry carefully, and only make statements in it which are backed up by published material or are clearly implied by the climate scenarios you have described. (David Wratt, NIWA)	BF: will replace "Auckland" with "Christchurch" and generally reword. JS: cite Kenny et al (2001: CLIMPACTS)
11-1152	A	27		27		Table 11.10 - The key impacts in the Natural Systems section - it might be useful to cite the Allen report to the AGO, where the key vulnerabilities are broadly consistent. (Andrew Ash, CSIRO)	LH: Agree BF: References not given in this table Allen report already referenced earlier.
11-1153	A	28	0			Table 11.10, last entry, last col. Add "Highly nonlinear increases in impacts would occur as existing design and zoning limits are exceeded." (Barrie Pittock, CSIRO)	BF: revised text will clarify this pointAccepted
11-1154	A	28	1			Table 11.10: Coastal: "… increased storm surges, waves and rates of erosion." Also risk is to lives, property and infrastructure e.g. coatal roads/rail & utilities. (Robert Bell, National Institute of Water & Atmospheric Research (NIWA))	BF: revised text will clarify this pointAccepted
11-1155	A	28	1	28	1	Table 11.10 Biosecurity. Only heatloving invasive species will increase and temperate species, such as light brown apple moth will decline and benefit much of the viticulture industry for example. AS most animal and human disease vectors are tropical they will increase but plant disease vectors like aphids are likely to decrease. (Robert Sutherst, CSIRO)	LH: Cross-reference Box on Biosecurity, which will include potential benefits, e.g. apple moths in Aus and common wasps in NZ (Barlow et al 1996) BF: Accepted
11-1156	A	28	3	28	4	Is it also possible that a single extreme event (eg tropical cyclone, flood or drought) can lead to a drastic modification of a landscape/seascape/urban setting? There has not been much discussion of extreme events in the Chapter. (Janice Lough, Australian Institute of Marine Science)	KH: Extreme events are part of the climate continuum, as discussed in section 3.1, but this can be enhanced in Table 11.10 under critical infrastructure
11-	A	28	5		11	I find it difficult to rationalise the examples provided in the dot-points, and believe	BF: will revise with supporting literature, e.g.

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1157						they are not well thought out and lack any clear basis in the literature. For example, can one really expect a sudden change in land use as a result of better farming conditions (for example)? How possibly can the quoted (slow acting) CO2 increase trigger an abrupt change. Is it realistic to suggest the opportunities presented by climate change will lead to abrupt industry change, given that abrupt changes will often be indisinguishable from natural climate variability in their early stages This discussion also misses the important point that the impacts of anthropogenic climate change will often stay hidden until a (probably) natural extreme event is overlaid on the changed base state causing a crossing of critical climate thresholds. An obvious example of this happening in the Australian context is the potracted period of below average "winter" rainfall which has affected southeast Australia, but which only had abrupt consequences when overlaid with a "naturally" occuring El Nino drought (2002/03). This combination triggered rapid water reforms, the over night collapse of the turf industry, and large job losses in the nursery industry. (David Jones, Australian Bureau of Meteorology)	bleaching of coral (Box 1). Will consult Bob Sutherst regarding pests and vector-borne diseases. Some excellent points are made here and revised text will include some of this language. BF: Noted. Dot point examples now omitted.
11-1158	A	28	5	28	11	Is shift in snow line another factor that should be added here as it flows from the text earlier. (Judy Lawrence, PSConsulting)	BF: revised text willneed to clarify this point
11-1159	A	28	6	28	9	this second dot point is somewhat dubious. Reference? (Andrew Watkins, Australian Bureau of Meteorology)	BF: Noted. Dot point examples now omitted.
11-1160	A	28	8	28	8	What is the evidence that the frequency of bad years will increase? Unless this chapter is fixed we will have readers thinking that scientists can make such predictions for Australia, whereas those working in the area know that it is highly difficult to predict. (Graham Farquhar, Australian National University)	KH: See comment 11-550. A number of CSIRO reports have quantified changes in the frequency of low-rainfall years in various Australian regions. BF: Noted. Dot point examples now omitted.
11-1161	A	28	10			I am not sure what this means: the threshold nature of this scenario is not clear. Glaciers will continue to retreat, the effects on valley sides of their retreat will propagate upglacier as the termini do. Outburst floods and landslides are undoubtedly threshold processes in themselves, but there is no 'critical threshold' that I am aware of that is similar to, for example, the thermal threshold of vulnerability of the ice shelves in the Antarctic Peninsula. (Wendy Lawson, University of Canterbury)	BF: revised text will clarify this pointNoted. Dot point examples now omitted.
11-1162	A	28	10			Of course such impacts are already felt in the Peruvian Andes and the Tibetan Himalayas. (Greame Pearman, Monash University Sustainability Centre)	BF: notedNoted. Dot point examples now omitted.
11-1163	A	28	10			Is melting of alpine permafrost an issue in NZ, leading to land slides etc.? (Barrie Pittock, CSIRO)	BF: no one knows

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11-1164	A	28	11	28	11	another bullet or modify last…Ecosystem collapse caused by the loss of keystone species.. (Oliver Woldring, NSW Government)	BF: revised text will clarify this point LH: Noted. Dot point examples now omitted.
11-1165	A	28	12			Additional dot point: "exceedance of critical design limits and zoning provisions, threatening existing buildings and infrastructure." (Barrie Pittock, CSIRO)	BF: revised text will clarify this pointNoted. Dot point examples now omitted.
11-1166	A	28	14	31		Compared with the impacts section (11.4) which is comprehensive and well supported by publisehd studies I thought the Adaptation section (11.5) to be very general and principles driven with the only concrete examples provided in the two case studies (11.6) . Some of this comes about by having an earlier section on Adaptaion (11.2.3) which does list a number of the current adaptation programmes that are in place. So that adaptation does not appear in two sections in the Chapter it would be worth considering incorporating Section 11.2.3 into Section 11.5 to give it a bit more meat. Of course the other reason this section does not contain many specifics is that at least in Australia and NZ adaption programmes are in their infancy. It might be worth raising this at the start of 11.5. I know it is posed as a question on Lines 25 and 26 but I think ithe issue needs to come to the front of the section and be more prominent. (Andrew Ash, CSIRO)	Dick, Lesley: Section 11.5.1 will be moved under section 11.2.3 since it mostly deals with current adaptation. May be able to condense this text by cross-referencing Chapter 17. Find ANZ examples of adaptation of Fig 11.5.1, side by side. Cross reference Box 11.6.1. Merge info in Tables 11.3 and 11.4 into text from 11.5.1. RW: Agree that the split in the discussion of adaptation creates problems. The two sections will be rationalised to provide greater coherence and balance. RW: In terms of specific programmes, agree. But I think that the general conclusions that the overall capacity to adapt in both countries is strong. RW: OK, will pose issue initially and more prominently LH: have now moved all of 11.5.1 into 11.2.3 (now becomes 11.2.3.1. I have removed Fig 11.2 and tried to streamline the rest of the section. I have incorporated the former Table 11.3 as text into the section but have not attempted anything yet for Table 11.4 (hopefully Dick et al can do this).
11-1167	A	28	14			Adaptation practices: A feature of New Zealand growers (particularly in horticulture) is their willingness to make rapid changes in order to maximise profit margins in the future. This means that New Zealand horticulture is well prepared to adapt to climate change as it occurs, with rapid uptake of new technologies and	RW: valid, adaptation capacity is good, but depends on adequate perception of climate change and there are limits to adaptation, e.g water supply. Adaptation may not be optimal.

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						cultivars more suited to the new environment. (Alistair Hall, HortResearch)	There's typically a rapid response to potential benefits and a slow response to potential risks – cite McKeon et al (2003: Learning from history). RW: While growers are quite willing to make rapid changes, it does not necessarily mean that "NZ horticulture is well prepared to adapt to climate change as it occurs". The latter implies that the stimulus for response is a slow change in average conditions that is easily perceived and responded to. It is more likely that the stimulus is the climate variability, especially the extremes which, by definition, are infrequent. Perception of changes in the frequency of extremes is not easily made.
11-1168	A	28	17			Section 11.5.1: this section seems very focused on proactive/planned adaptation. there is also a lot of interest on the extent to which autonomous adaptation will cover some of the expected impacts, and whether autonomous adaptation is likely to be timely enough (or whether there are barriers to autonomous adaptation). (Andy Reisinger, Ministry for the Environment)	DW: Very good point. We will use a definition of autonomous consistent with Ch 17 (with examples for ag, water, energy) and recast as adaptation at different scales, e.g. individual, community, regional, government legislation – see Chapter 14 LH: one way to address this is to have separate sub-section on autonomous vs planned adaptation – I've put the headings in in my SOD version but haven't actually written anything under the autonomous one
11-1169	A	28	19	28	20	Suggest sentence be reworded '…practices or options that are automatic….and create opportunities are required.' (John Garnham, Department of Primary Industries)	RW: will consider wording change LH: have now reworded sentence: "Specific adaptation practices are planned activities that reduce adverse effects of climate change and create opportunities."
11-1170	A	28	20			opportunities are not created by adaptation: they are exploited or seized upon. (Barrie Pittock, CSIRO)	RW: Agree. Suggest delete "…and create opportunities". LH: done
11-1171	A	28	24			These are all NZ references; what is evidence for Australia? (Kim Ritman, Bureau of Rural Sciences)	RW: Noted. Will work with Australian LAs to document. LH: Australian examples now included

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11-1172	A	28	25	28	26	Sentence starting "How well are,.,," seems a strange introduction (Andrew Watkins, Australian Bureau of Meteorology)	RW: Will re-phrase to avoid question LH: removed sentence
11-1173	A	29	1	29	14	There should be a mention in the Caption to this Figure of the meaning of the dotted liens- that there are barriers to the linkages between the various components of this process, see Page 30, line 33. Further, I am a little concerned that the emphasis is too much on research concerning integrated assessment models. Actually this is OK, but there remains a huge amount of disciplinary and reductive science to be done. We should not leave the politicians to conclude that fundamental research is no longer needed. (Greame Pearman, Monash University Sustainability Centre)	RW: Precisely. This is a key idea that should be in caption. RW: Good point. The section did not intend to imply that disciplinary and reductive science and knowledge were not important. Will re-word to avoid this perception. LH: I have deleted figure as I think it's too general to be justified in a regional chapter
11-1174	A	29	19	29	29	Are there any useful indicators of the success of these investments in science or is it possible to say something about level of commitment by measuring investments in climate science and knowledge in relative terms? (Chris Cocklin, Monash University)	RW: Yes to both questions. Such indicators do exist. Will look for them and incorporate if chapter page limits not a constraint. KH: The outcomes of the ACCSP are documented in a report by AGO (2005). The NCCAP commenced only a year ago so it's too early to determine success. Australian Examples of adaptation to climate change include upgrading storm water pipes in Canberra, desalination in Perth (and Sydney), coastal planning rules in NZ and Aus.
11-1175	A	29	19	30	27	This section seems to overlook an important adaptation that is already occurring and will continue and that is up take of energy efficiency in homes and commercial buildings. While it is an abatement option as well there are strong adaptation activities with adjusting living behaviours taht give good information feedback for adaptation. Sugget you refer to NZ Energy Efficiency and Conservation Authority programms as well. Robert Tromop is the contact. (Judy Lawrence, PSConsulting)	RW: Agree with this comment. However, one might suggest adding real examples of adaptation that is occurring instead of mitigation-related behaviours. Will add if space can be made available from elsewhere.
11-1176	A	29	19	29	29	this paragraph should also mention government operational research funding that has driven a lot of more applied knowledge and reports (eg case studies for local government, and specific studies on changes in drought risk, fire risk, and summaries of existing literature) (Andy Reisinger, Ministry for the Environment)	RW: Good point. Will add.
11-1177	A	29	19	29	29	Section 11.5.1 Knowledge, Data and Tools: It should be stated that more research is needed on impacts of climate change on natural ecosystems. This Chapter highlights how little is known about these climate change impacts in Australia and New Zealand.	RW: Such statements about research needs should come under Section 11.8 LH: agree with Dick

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						(Marc Schallenberg, University of Otago)	
11-1178	A	29	20			While I agree with most of the sentiment re research the actual level of investment in NZ is pitifully low - around 1.4% of GDP I think. Underfunding needs to be acknowledged and was a big issue in the most recent PGSF round in 2005. (Ken Hughey, Lincoln University)	KH: Agree. The balance of investment in adaptation versus mitigation is biased against adaptation. This is a major constraint to progress in both Aus and NZ, but politically sensitive. Don't know the costs and benefits of impacts and adaptation, and hence the importance of developing knowledge in this area. Cross-reference research priorities (11.8). See comment 11-1201 RW: While some statements can be made regarding research gaps related to climate change impacts and adaptation, value judgements regarding "adequacy" and funding levels should be avoided in the IPCC Chapter 11.
11-1179	A	29	25			I find the positiveness concerning the AGO program a bit much. There are real risks that this funding will either be decreased, of that it will become highly politicized in terms of the directions of the research it will sponsor. This is a threat. (Greame Pearman, Monash University Sustainability Centre)	KH: See 11-1178 RW: The only "positiveness" I see is the ending sentence beginning "Great strides…". Will re-word. LH: have "deleted great strides sentence"
11-1180	A	29	27			Allen Consulting Group is the wrong reference here - should be Commonwealth of Australia (1998) (Rod Anderson, Department of Sustainability & Environment)	KH: Need to reword as "The National Greenhouse Strategy is partly addressed by these programs (Allen Consulting Group, 2005)" or simply delete the sentence – see comment 11-1181 LH: see next commentRW: Noted. Will check for correct reference
11-1181	A	29	28			Add "Since the Third Assessment Report, there has been increasing acknowledgement of the need to take action on adaptation. States and Territories in Australia have significant responsibilities in this area and have developed strategies and begun community awareness raising and consultation. Some have developed strategic response plans. (Rod Anderson, Department of Sustainability & Environment)	KH: This sentence is probably more valuable than that in comment 11-1180 LH: have added the first suggested sentence but not the next as the new version gives more detail on the specific programs in later parasRW: Adds length, but also adds clarity. Will consult with CLAs and, if added, will contact reviewer for references
11-	A	29	28			Great strides' is not the right term. Maybe 'Advances'?	RW: Noted. Will change

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1182						(David Whitehead, Landcare Research)	LH: deleted
11-1183	A	29	29			It might be worth adding here a reminder of the links to climate variability in which knowledge and risk assessment is also important. (Greame Pearman, Monash University Sustainability Centre)	RW: This comment is very important. Has Chapter 11 made it sufficiently clear that, for Oz and NZ, climate change will largely affect people through exacerbating risks arising from climate variability and extremes? Will review text to see if this theme is clearly stated.
11-1184	A	29	31	29	40	Risk assessments: The NZ Ministry for the Environment Guidance Manual (referred to as Wratt et al 2004 in your references) advocates and outlines a risk management approach for local government to use in identifying and adapting to climate change. This has also been picked up in the "Quality management" guidelines referring to actions under the NZ Resource Management Act on the MFE Website (I don't have the URL for them here with me- I am responding from a meeting in Beijing - but Andy Reisinger or Howard Larsen of MFE could provide them for you). I suggest you refer to the guidance manual and related MFE material in this section. (David Wratt, NIWA)	RW: Good advice. Will do as suggested LH: will leave for Dick to do as I don't think I'll get the wording right
11-1185	A	29	33			I find the text very much focused on economic risk. This is politically correct, but not necessarily wise. It is inconsistent with the growing ethos of sustainability in which risk is simultaneous assessed for economic, social, environmental and equity outcomes. (Greame Pearman, Monash University Sustainability Centre)	DW: disagree, we've addressed the triple bottom line. This section does not limit itself to economics.
11-1186	A	29	34	29	37	Should also reference the MFE(2004) publications - i.e. same as Wratt et al 2004 and one above as they are both founded on AS/NZS 4360 to provide a risk-assessment framework for assessing priorities for mitigating climate-change impacts.. (Robert Bell, National Institute of Water & Atmospheric Research (NIWA))	RW: Point taken – will do LH: see 11-1184
11-1187	A	29	39	29	39	Delete sentence starting "At the regional and local scale…." (Andrew Watkins, Australian Bureau of Meteorology)	RW: Why delete? Is it because it is not true, or just because the reviewer thinks it is a "throw-away" statement, or?
11-1188	A	29	40			Regional adaptation studies have been done in the eastern parts of the North Island of New Zealand by Gavin Kenny http://www.maf.govt.nz/sff/about-projects/decision-management-and-learning/02049finalreport.htm (Gerald Rys, Ministry of Agriculture and Forestry)	RW: Will cite this study
11-1189	A	29	42	30	4	Is there a suggestion that we have it all sorted may need to indicate theres a lot more to do on the adaptation side. May be able to reduce this generic information if required.	RW: Point taken. Will indicate that actions taken reflect only a recent start on "mainstreaming".

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						(Tony Coleman, Insurance Australia Group)	LH: have reduced generic information
11-1190	A	29	42	30	4	this paragraph should also mention the specific guidance material produced by MfE to help local government and others interpret the RMA mandate. This is mostly the material contained on the website http://www.climatechange.govt.nz/resources/local-govt/guidance.html. Another issue is the need, and barriers encountered, to integrate climate change considerations into standards and methods by professional bodies such as engineering, planning and building associations. Ie the shift from considering climate change as a "special project" towards something that is part of a professional approach whenever a project with a lifetime of more than 30 years is undertaken. It may also be useful to link this section, and barriers to implementation, with issues raised below about monitoring (including limited understanding of climate change impacts), and about awareness (limited awareness of climate change impacts at the local scale at which actual decisions would apply). (Andy Reisinger, Ministry for the Environment)	RW: Excellent advice. Will follow suggestions.
11-1191	A	29	42	30	4	For NZ, it may also be important to mention the current review of flood risk management, which will include an assessment of how climate change can be incorporated (see http://www.mfe.govt.nz/issues/land/natural-hazard-mgmt/flood-risk-review.html). (Andy Reisinger, Ministry for the Environment)	RW: Again, excellent suggestion. Will refer to URL and authors if required.
11-1192	A	29	43			What is meant by "mainstream"? Sounds a bit jargonistic to me. (Greame Pearman, Monash University Sustainability Centre)	RW: the term has gained considerable currency in the international arena and has become part of the lexicon. One might say that the term "mainstreaming" has become mainstreamed… LH: I agree with Graeme Pearman – my edited version doesn't mention it. International jargon is still jargon
11-1193	A	29	44			Should be a citation for this. (Greame Pearman, Monash University Sustainability Centre)	RW: the citation is noted as DoC, 1994.
11-1194	A	29	48			Citation?. There are also issue relating to differences at the state and Federal levels. (Greame Pearman, Monash University Sustainability Centre)	RW: will find reference and cite. The State-Federal differences refer to Australia – will mention.
11-1195	A	29	48		51	See No. 5 above. Section 7 of the 2004 Amendment limits the relevance of climate change to situations where GHG emissions are to be reduced through renewable energy. In other respects councils are no longer allowed to consider the discharge	RW: not certain of the veracity of this comment. Will contact NZCCO for clarification and implications.

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						of GHG gases with respect to their impact on climate change. Such issues are now under central government policy. (Adolf Stroombergen, Infometrics)	
11-1196	A	29	49	29	49	There is no need to repeat RMA after the words, "Section 7". (John Hannah, University of Otago)	RW: In the conventions of planning and policy, I believe there is a need to repeat RMA. However, I shall verify and change if required.
11-1197	A	30	1	30	1	If you want to say that NZ local government "are still grappling with the implications for their roles and functions …" you might also like to mention here the impacts/adaptation guidance material from MFE (see my previous comment, plus there is also the coastal guidance manual) as science-based material that has been developed to assist them. (David Wratt, NIWA)	RW: Point taken – will refer to guidance material.
11-1198	A	30	2	30	4	Some of these Australian programmes have nothing to do with climate change per se. Thus, I don't see how they could be described as 'mainstreaming'. (Chris Cocklin, Monash University)	KH: If climate change is mentioned in these plans, that would be considered mainstreaming. Climate change need not be the focus. RW: Authors will filter these Australian examples to ensure that they are climate-change-specific. LH: I think most are OK but need to check the Drought plan
11-1199	A	30	2			"Mainstreaming"? (Greame Pearman, Monash University Sustainability Centre)	RW: will try to avoid overuse of the term, and particularly this form of the verb, notwithstanding my earlier comment on 11-1192 LH: see response to 11.1192
11-1200	A	30	3	30	3	Insert "National Drought Policy" after 'National Water Initiative,' … this is a vital policy given the implications of climate change. (David White, ASIT Consulting)	KH: Is climate change mentioned in the NDP? LH: I have checked the AFFA website but can find only a one pager on this policy. Most of my subsequent searches on google just came up with ministerial press releases. The objectives mention climatic stress but not climate change specifically RW: Will seek LAs' views on this suggestion, in light of comment 1198

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11-1201	A	30	6	30	8	I note that "monitoring and evaluation' implies monitoring environment in some way, whereas the comment is about monitoring the state of knowledge. Monitoring the environment is vital for understanding impacts, and the issue is tricky especially in output-oriented science funding environments in which funding for important environmental monitoring has been marginalised over the last 2 decades. The importance of ongoing funding for monitoring should be indiacted somewhere in the chapter (Wendy Lawson, University of Canterbury)	RW: This is a very important point (for both Australia and NZ). Needs elaboration and visibility in Chapter. Authors will agree on a suitable statement. Will mention State of Environment reports.
11-1202	A	30	6	30	16	there is also a strong role for central government. Central government monitors the performance of loca government in meeting its obligations under the RMA, which (in theory - it is not currently done) would also allow an assessment of how well local government considers climate change. Also there is currently a climate change research strategy developed by the now disestablished National Science Strategy Committee for Climate Change (see http://www.climatechange.govt.nz/resources/reports/nssccc-strategy-2002.pdf), and updates to this strategy on the basis of monitoring and advice from government and external organisations could also play an important role. (Andy Reisinger, Ministry for the Environment)	RW: Points to be incorporated, although prudent to avoid any highly prescriptive statements.
11-1203	A	30	6	30	7	The "New Zealand Climate Change Committee" is the wrong name - it is actually the New Zealand Climate Committee (ie the word CHANGE is not in the title), (David Wratt, NIWA)	LH: done
11-1204	A	30	7			This committee is actually called the “New Zealand Climate Committee” of the Royal Society of New Zealand; ie, not the Climate Change committee. (A. Brett Mullan, National Institute of Water & Atmospheric Research Ltd)	LH: done
11-1205	A	30	11			Suggest AGO in full. Remember this is an international document. (Greame Pearman, Monash University Sustainability Centre)	LH: have spelt it out
11-1206	A	30	14			at end of line add "in both countries" (Gerald Rys, Ministry of Agriculture and Forestry)	LH: have added “in either country”
11-1207	A	30	14	30	16	Delete sentence stating "At the regional and ocal levels…" (Andrew Watkins, Australian Bureau of Meteorology)	KH: Disagree, but sentence will be clarified. Replace “not yet well developed” with “in an embryonic stage” RW: will seek clarification on why this clause should be removed.
11-1208	A	30	15			Support for ecosystem monitoring of change and impacts is very weak. (Greame Pearman, Monash University Sustainability Centre)	LH: address in 11.8?
11-1209	A	30	18	30	27	I'm not convinced of the "capacity to adapt is low" assessment. Awareness, yes, but capacity to adapt is very strongly linked to capacity to deal with climate in the first	RW: Need to distinguish between level of awareness and adaptive capacity, since the

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						place. This capacity seems relatively high in at least some areas. It depends whether you assume that climate change impacts assessments and adaptation steps have to occur via complex and integrated assessments, or whether climate change can be integrated on a case by case basis into standard practices. A quantitative screening analysis for stormwater risk and design can be done by any qualified stormwater engineer on the basis of the material and guidance provided by MfE (as per http://www.climatechange.govt.nz/resources/local-govt/preparing-for-climate-change-jul04/index.html). The key point is that doing such a simple, quantitative screening analysis is better than NOT doing a complex and integrated impacts assessment because of capacity constraints for large projects. My personal sense is that there is little evidence that integated assessments necessarily lead to a more robust adaptation outcome. (Andy Reisinger, Ministry for the Environment)	latter varies between sectors and scales (i.e. individual, regional, government). Heading to be made consistent with Fig 11.2. Integrated assessment and case by case studies are BOTH needed at different scales RW: Agree. The issue is rather complex and difficult to sum up in a sentence. But the notion and practice of "incremental" risk and adaptation analysis on a case-by-case basis is extremely important. This is really for another section. The initial statement reading "capacity to adapt is low" is out of place, probably due to last minute editing on FOD.
11-1210	A	30	18	30	27	Capacity building and awareness raising: I suggest you refer here to Gavin Kenny's work with farmer groups in eastern New Zealand. There are two publications you could quote: Kenny, G.and Fisher, M., 2003: The View from the Ground - A farmer perspective on climate change and adaptation. Earthwise Consulting Ltd, Hastings. (You can view this at http://www.climatechange.govt.nz/resources/local-govt/view-from-the-ground-jul03/index.html); Kenny, G., 2005: Adapting to climate change in Eastern New Zealand - A farmer Perspective. Earthwise Consulting Ltd, Hastings. (You can obtain this through http://www.earthlimited.org/resources.html). Both of these items are published books with ISBN numbers - not grey literature reports. (David Wratt, NIWA)	RW: will cite, as this is a unique publication for New Zealand.
11-1211	A	30	20			I find the discussion here a but short. It fails to recognize separate State, City, regional, and other activities. Some if these are mentioned later in the Chapter, Why not here? (Greame Pearman, Monash University Sustainability Centre)	RW: Agree. Will cover individual, community, regional and government adaptation. Will attempt to elaborate and expand under word constraints of Chapter.
11-1212	A	30	23			At the end of sentence add "In New Zealand the MFE has run a national climate change awareness programme called "Four Million Careful Owners" that has raised awareness of climate change in New Zealand. http://www.4million.org.nz/ (Gerald Rys, Ministry of Agriculture and Forestry)	RW: Agree. Adds balance to next sentence which is about awareness-raising in Australia
11-1213	A	30	25	30	25	The efforts of State and Federal agencies in raising awareness should also be recognised, given many of these agencies have formal communication/awareness programs. (Steven Crimp, Queensland Department of Natural Resources and Mines)	KH: Noted. This is already stated, but perhaps insert "communication programs" after "developing" RW: Already mentioned (lines 23-24). However, will change wording to make

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							explicit.
11-1214	A	30	25			Bureau of Meteorology and CSIRO awareness raising investment is incredibly low, given the challenge at hand, and there are signs of it decreasing. Should there be some references to the sort of stuff that is done?, rather than just an assertion. (Greame Pearman, Monash University Sustainability Centre)	KH: Noted – "modest awareness raising activities" RW: if actually incredibly low, suggest deletion.
11-1215	A	30	26	30	27	The establishment of Natural Resource Management areas and Boards on a national basis provides a framework for local awareness raising and the integration of climate change planning into wider natural resource management strategies. (see AFFA website) (Elizabeth CURRAN, Bureau of Meteorology)	RW: Good point. This new NRM framework and integration of climate change into it should be mentioned under "mainstreaming" discussion.
11-1216	A	30	26			Is there evidence for this or just absence of evidence? (Kim Ritman, Bureau of Rural Sciences)	KH: Need to clarify. See comment 11-1209 RW: The statement referred to is contentious statement and needs modification.
11-1217	A	30	27	30	27	there is an important alternative approach to capacity building, explored by Kenny (2005) see http://www.earthlimited.org/adapt.html. This bottom-up approach very strongly builds on local and traditional experience and knowledge of farmers, and basically uses their intrinsic "integrated" approach to farming, rather than superimposing a top-down integrated "model" of climate change. This study is worth highlighting in my opinion not because of its scientific merits but because it very effectively managed a social and psychological engagement of an industry group that has been very opposed to considering climate change in any form. It holds important lessons for getting practical engagement on adaptation that are well worth drawing out. In fact, I think it would be well worthwhile to ask Gavin Kenny to write a concise paragraph about the approach and lessons. (Andy Reisinger, Ministry for the Environment)	RW: Will ask Kenny to contribute and suggest that he be included as a CA. KH: Good point. Links to the UNDP Climate Adaptation Policy Framework
11-1218	A	30	27	30	27	better to say "… are highly variable between different districts but generally relatively low." (Andy Reisinger, Ministry for the Environment)	RW: will consider this wording and change if appropriate.
11-1219	A	30	27	30	27	It may be worth mentioning the activities of the Communities for Climate Change Protection and their work with local authorities. (Sean Weaver, Victoria University of Wellington)	RW: LAs will consider a generic statement under which such organisations like this one can be cited.
11-1220	A	30	28			Do we not need to talk about implementation of adaptation measures and what we are doing there? (Tony Coleman, Insurance Australia Group)	RW: Important point. Ideally, the answer is "yes". Practically speaking, we may run into page length problems, so will formulate statements on implementation and then see if they warrant deletion of other material of lesser importance. Will consult with other

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							LAs as to best strategy.
11-1221	A	30	30	31	3	This section has not dealt with the issue of legislative barriers to adaptation. In some cases these barriers will need to be addressed before specific adaptation actions can occur e.g. translocation of species. This issue is briefly discussed in the report entitled Climate Change Impacts on biodiversity in Australia (2002). (Steven Crimp, Queensland Department of Natural Resources and Mines)	RW: True, nor has it addressed perceptual, attitudinal, cultural, social, technological or financial barriers. Legislative barriers are tip of iceberg. KH: Agree. Will include legislative in sentence. Lesley: Will extract relevant info from reference and will modify lines 35-40. Will provide clear examples of each type of constraint (dot points)
11-1222	A	30	30	30	51	It may be worth mentioning that one of the constraints to adaptation is the low level of understanding of the climate change phenomenon by the New Zealand political and business community (as well as the general public) which means that any investments in adaptation infrastructures are difficult to get through the political process as they represent a cost associated with the precautionary measures for a phenomenon that many decision makers still do not understand. In New Zealand there are schemes funded by EECA designed to assist (i.e. subsidize) low income households to retrofit with insulation (e.g. the Warm Homes Project in Porirua). (Sean Weaver, Victoria University of Wellington)	RW: See notes on comment 1221 above. Will consider how to mention the issues of barriers and constraints without opening up a Pandora's box of page-length problems. KH: Good example of informational barrier. Perhaps it's more about communication and awareness, the mixed signals sent by the media and the disproportionate space/time given to sceptics
11-1223	A	30	32	30	32	It might be useful to word this sentence as '…implementing adaptation options as part of a systematic process..'. Adaptation will happen quite independently of the ideal process that is described. (Chris Cocklin, Monash University)	RW: Agree, will change.
11-1224	A	30	33	30	33	Reference to Figure 11.1 - should it be to Figure 11.2? (John Garnham, Department of Primary Industries)	RW: Yes, will change.
11-1225	A	30	33			There is only one arrow in Fig.11.1 and it does not suggest this to me. (Barrie Pittock, CSIRO)	RW: wrong figure number, will change.
11-1226	A	30	39	30	39	adaptive should be "adaptation" or deleted (Michael Dunlop, CSIRO)	RW: Agree
11-1227	A	30	42	31	3	It would be worth referring to the AGO-CSIRO study on economic approaches to costing climate change somewhere in this section. (Andrew Ash, CSIRO)	KH: This hasn't been published. However there is a report by Marsden-Jacob for the AGO on *Economic Issues Relevant to Costing Climate Change Impacts* www.greenhouse.gov.au/science/impacts/publications/costing.html RW: will follow up on study and consider

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							inclusion.
11-1228	A	30	42	31	3	I would add two other key issues to barriers. The first is the lack of quantitative probability distributions for changes in extreme events that would fit with decision-making criteria employed by governments and industry. The second is the conflict between existing uses rights and evolving risks, ie lack of a framework to deal with intergenerational conflicts. I personally disagree that the lack of integrated regional assessment methods is the most important key barrier. I have seen no evidence that a more comprehensive and integrated regional climate change impacts assessment would actually encourage better adaptation behaviour because the capacity to deal with integrated information isn't there. This is not a capacity issue related to climate change, it is much more general. For this reason, I think more progress would be made by stepping back from the integrated approach and at least make progress in integrating specific climate change issues into simple projects. This is not ideal, but the alternative would be nothing at all (or only academic reports that are not actively influencing council decisions.) (Andy Reisinger, Ministry for the Environment)	RW: this is a very important and valid comment. Based in the New Zealand experience, I would favour changing the existing text as suggested.
11-1229	A	30	43	30	44	Beg to differ. I think knowledge of specific climate sensitivities is more critical, at least for ecosystems. Cant use integrated assessment w/out faintest idea what is going to happen! "Especially for ecosystems, more knowledge is needed about specific climate sensitivities and actual impacts. Targeted monitoring, active adaptive management, and managing for climate variability would help fill key knowledge gaps and aid model development." (Michael Dunlop, CSIRO)	RW: see comment 1128 above.
11-1230	A	30	44	30	47	This sentence starting "While sector-specific…interconnected" is very hard to understand what is being said. It appears to have several different ideas in it. Can it be clarified. (Judy Lawrence, PSConsulting)	RW: Yes. And will action – see comments 1228 and 1229 above.
11-1231	A	30	44			Again I stress the need to keep a broad view on the need for integrated assessment research and disciplinary-based reductive research. It is not about one or the other. (Greame Pearman, Monash University Sustainability Centre)	RW: Yes. And will action – see comments 1228, 1229 and 1230 above
11-1232	A	30	49	30	49	Adaptation options are discussed only at a personal or family unit level. The financial implications for various levels of government are also very significant. Infrastructure systems are very costly as they usually involve a treatment or generation component and a reticulation (or delivery network) component. Our, PIA 2004, Issues Paper did not emphasise this and I do not have another reference for this. I am sure any reasonable case study of New Orleans Post Katrina and their infrastructure desicions would reveal these barriers to adaptation.	RW: Disagree. Actually, the text is not particularly directed at personal or family unit level. Agree that financial constraints are very important and are missing from Chapter KH: We discuss mainstreaming in policies, plans and development strategies. However, we need to ensure that we cover various levels

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						(Sharon Boyle , Planning Institute of Australia)	of adaptation: individual, community, regional, sectoral, governmental. See North American Chapter 14
11-1233	A	30	50			Delete comma between "impact" and "are". (Tom Beer, CSIRO)	RW: will do
11-1234	A	30	50			See comment 1 about the issue of uneven impacts: (Wendy Lawson, University of Canterbury)	BF: revised text will clarify this point
11-1235	A	31	0			I find this age highly qualitative, devoid of citation and perhaps presumptuously assertive. Needs more thought. (Greame Pearman, Monash University Sustainability Centre)	KH: Noted. Each bar will ranked according to residual risk and will have a cross-reference to the relevant text, perhaps with regional qualifiers. This will require clear statements about coping ranges and adaptive capacity for each sector in section 11.2. Will use Ch 19 criteria for key vulnerability. A similar methodology was used by TAR authors in developing the burning embers diagram in the TAR. Will adjust width and formatting of bars based upon further consultation. This diagram is designed to integrate info and stimulate debate amongst stakeholders as part of the adaptation process. Replace "biosecurity" with "health", and "drought & fire" with "tourism". These sectors naturally flow from sub-headings in 11.4.
11-1236	A	31	3			Add: "Foresight and early action during the R&D and design stages of new projects are needed, but costs and uncertainties, and even the level of belief in climate change, are critical to achieving optimal adaptation." (Barrie Pittock, CSIRO)	BF: revised text will clarify this point
11-1237	A	31	3	31	3	Add "Linkages between climate variability and climate change need to be better understood." (David White, ASIT Consulting)	BF: revised text will clarify this point
11-1238	A	31	4			Add "In Australia there is a lack of clear, agreed intergovernmental roles and responsibilities for action on adaptation. However steps are being taken to develop more coordinated and collaborative responses through the Council of Australian Governments." (Rod Anderson, Department of Sustainability & Environment)	KH: Noted
11-	A	31	8			Where did this figure come from? What is the basis of its synthesis? Expert	KH: Noted, see comment 11-1235

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1239						opinion? (Kim Ritman, Bureau of Rural Sciences)	
11-1240	A	31	10			Delete "broad coping" (I think!) (Wendy Lawson, University of Canterbury)	KH: Agree
11-1241	A	31	10			Delete "broad coping"? (Barrie Pittock, CSIRO)	KH: Agree
11-1242	A	31	10	31	10	"Sectors with a narrow coping broad coping…" Edit to remove incorrect wording. (Sean Weaver, Victoria University of Wellington)	KH: Agree
11-1243	A	31	10	31	10	narrow coping broad coping range', should be 'narrow coping range'. (Peyman Zawar-Reza, University of Canterbury)	KH: Agree
11-1244	A	31	14		35	What is the basis for the figure. It appears to be very subjective. It also requires considerable further explanation as its meaning will be lost on many readers. Also capping warming at 4C is not appopriate given that high-end projections exceed 6C. (David Jones, Australian Bureau of Meteorology)	KH: Noted, see comment 11-1235
11-1245	A	31	21	13	22	Perhaps provide citations of bioclimatic modelling research. (Oliver Woldring, NSW Government)	LH: Agree
11-1246	A	31	28			I don't understand the significance of "UNFCC" at this point. (Greame Pearman, Monash University Sustainability Centre)	KH: UNFCCC has 3 criteria: see Section 11.7 page 33 lines 39-44. Need to provide a cross-reference from 11.5.3.
11-1247	A	31	34			Figure 11.3 is not as clear as the authors think it to be. It needs a legend to explain the colour or shading. It needs far more text for the reader to understand it. I suggest additional text that explains at least one of the horizontal bars. Further, there is a discrepancy between the text and Figure caption both of which claim the figure shows "residual risk" whereas the text in the figure itself claims that the right side shading is "Risk (without mitigation)". Residual risk is the risk that remains after risk treatment measures (such as mitigation) are applied. (Tom Beer, CSIRO)	KH: Noted, see comment 11-1235. Will change "residual risk" to "vulnerability", and explain that this doesn't include mitigation (emission reductions)
11-1248	A	31	34	31		Figure 11.3 may require some editing in order to clear up the confusion between yellow and orange colours. Do both these colours represent adaptive capacity or does orange indicate the beginings of risk? (Steven Crimp, Queensland Department of Natural Resources and Mines)	KH: Noted, see comment 11-1235
11-1249	A	31	34	31	34	I question whether or not this figure is mature enough to be included. It begs comparisons between the sectors and I don't know they are all warranted. Regional food security has higher adaptive capacity. I think natural ecosystems have higher coping and much less adaptive capacity; Drought and fire have less coping. Biosecurity must have less adaptation potential than critical infrastructure.	KH: Noted, see comment 11-1235

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						(Michael Dunlop, CSIRO)	
11-1250	A	31	34			Is Figure 11.3 specific for Australia and New Zealand? It is assumed that it is not and is a more generic representation. If so this should be stated in the first papra of Section 11.5.3 (John Garnham, Department of Primary Industries)	KH: Noted, see comment 11-1235
11-1251	A	31	34			Figure 11.13 seems to be more reflection of hunches and artistry than information. What does it actually mean? Does it have any planning or policy value? I think not. How were the widths of the colour bands determined? Surely adaptationn is something that is going on all the time not only to climate change but to everything else that is changing. And risks are going on all the time. It is especially perplexing as the units of coping, adaptation and redisual risk are shown as degC. While some kind of synthesis is commendable does this figure really achieve anything? It is perplexing. (Roger Gifford, CSIRO)	KH: Noted, see comment 11-1235
11-1252	A	31	34			Figure 11.3: for the sustainable development bar, I would greatly extend the "adaptive capacity" area towards the low end of warming, and reduce the "coping range" area accordingly. The reason for this is that in some areas, recent flood and coastal erosion events have highlighted the vulnerability of some communities even just to current climate variability - ie some communities are already under stress in their sustainable development. This stress is mostly not from climate change, but it means that the coping capacity can be quite low - but there is nothing to indicate that the "adaptive capacity" couldn't be built up to avoid risks up to much higher degrees of warming. Also, if drought risk affects agricultural production, this would have quite serious impacts on economic development of NZ. There's plenty of evidence that droughts can trigger recessions, even if they are not solely responsible for them. (Andy Reisinger, Ministry for the Environment)	KH: Noted, see comment 11-1235
11-1253	A	31	34			More explanation is needed for Figure 11.3. How does the shading relate to the global warming on the x axis? (David Whitehead, Landcare Research)	BF: need to discuss all of these comments on Fig 3 in Merida
11-1254	A	31	34			Figure 11.3 Why global warming from 1980 - seems like an odd baseline date.. (Oliver Woldring, NSW Government)	BF: revised text will clarify this point
11-1255	A	31	37		46	Not clear what the main point is - although we may be advancing in understanding I do not think we can say that our communities industries and infrastructure have been adapted nor is there any plan for when that adaptation will be implemented (Tony Coleman, Insurance Australia Group)	BF: Will make this dot point clearer. Not true for all States, e.g. water resource planning includes consideration of climate change in Sydney, Perth, Melbourne, Aus National Action Plan for Climate Change and

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							Biodiversity. Will replace “adaptive capacity” with “the potential to adapt”.
11-1256	A	31	37		46	Point needs to be made that Australia's very hot and arid climate makes it extremely vulnerable to global warming and any shift towards a drier climate. (David Jones, Australian Bureau of Meteorology)	
11-1257	A	31	37	31	46	Insert another dot point highlighting the limited adaptive capacity and high residual risk of many natural ecosystems. (Stephen E Williams, James Cook University)	LH: agree
11-1258	A	31	38	31	40	What is the basis for this statement? I would say that compared to UK and Canada we are not well advanced (Rod Anderson, Department of Sustainability & Environment)	KH: Agree, will remove “in comparison to most other countries” and “relatively”
11-1259	A	31	39			I just think this is a highly contentious statement. On what basis is such a statement made. (Greame Pearman, Monash University Sustainability Centre)	KH: Agree, will remove “in comparison to most other countries and “relatively”
11-1260	A	31	39			No evidence provided for "in comparison to most other countries". Is this meant to apply conditions to base statement? Do these conclusions apply to 11.5.3 or to 11.5 as a whole? (Kim Ritman, Bureau of Rural Sciences)	KH: Agree, will remove “in comparison to most other countries and “relatively”
11-1261	A	31	43	31	44	One key barrier is the lack of quantitative probability information about changes, in particular for extreme events. This should be explicitly mentioned (perhaps even as a separate bullet point). (Andy Reisinger, Ministry for the Environment)	KH: Agree
11-1262	A	31	47			Add two additional dot points: costs of adaptation in some cases will be large; adaptation has limits beyond which damages will occur. (Barrie Pittock, CSIRO)	KH: Agree
11-1263	A	32	0			Case Studies. Would like to see a case study on the Melbourne Flood event of 2-3 February 2005. Record rain intensity event - good example of extreme event requiring a range of emergency responses in a major city. See http://www.bom.gov.au/announcements/sevwx/vic/2005feb/index.shtml (Rod Anderson, Department of Sustainability & Environment)	KH: We had a box on extreme events, including the Melbourne flood but had to remove it to space limitations. It will be inserted if space can be created by deleting text elsewhere.
11-1264	A	32	1	33	35	To save space, consider deleting case studies. Hard to see how these substantially improve the document. (Andrew Watkins, Australian Bureau of Meteorology)	KH: Disagree. The section on Case Studies is mandatory.
11-1265	A	32	1			Section 11.6: I found the case studies interesting, but the number is rather limited (just two). However, this is understandable due to lack of space. Maybe another short case study could be added (medium insistence from my part). (Peyman Zawar-Reza, University of Canterbury)	KH: See comments 11-1263 and 11-1264

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11-1266	A	32	2	33	34	The two case studies should be better integrated in the chapter. (Chris Cocklin, Monash University)	KH: They are cross referenced elsewhere
11-1267	A	32	5	32		The water security case study would be better served by widening the examples to include not just Perth's activities but Melbourne's, Sydney's and Brisbane's as well. This would provide a more comprehensive account of current adaptation initiatives. (Steven Crimp, Queensland Department of Natural Resources and Mines)	BB: Good suggestion, will do. Since space is limited we may need to remove the diagram of Perth water supply. Retitle as "Climate change & adaptation of water supply in cities"
11-1268	A	32	8	32	8	Change "mid-20th century" to "1970s". (Dean Collins, Bureau of Meteorology)	BB: This assessment is dependent upon whether you inspect station records individually or take regional averages.
11-1269	A	32	9		9	The effects on runoff have been "severe" not "potentially serious".... (David Jones, Australian Bureau of Meteorology)	BB: Water planners would vehemently disagree.
11-1270	A	32	9			Change "potentially" to "already" (Barrie Pittock, CSIRO)	BF: accepted
11-1271	A	32	31			The source of the material needs to be more clear stated. It is also neglectful of the fact that it is not definitely know if this change was climate change or climate variability or both. Need more care. (Greame Pearman, Monash University Sustainability Centre)	BB: Disagree – (1) source of material already given as IOCI (2002); reviewer's second point is already covered in the last sentence.
11-1272	A	32	35	32	36	What proportion of the required water usage is 45Gl of water? (Janice Lough, Australian Institute of Marine Science)	BB: This proportion varies with population growth and other factors – there is insufficient space to go in detail.
11-1273	A	32	37			"… that at least some of the …" (Barrie Pittock, CSIRO)	BB: Agree.
11-1274	A	32	44			very long coastlines' is not exact - the two countries are vastly different in area. Would it be helpful to present the length of coastline as a fraction of land area? (David Whitehead, Landcare Research)	BF: revised text will clarify this point
11-1275	A	33	2			Should this be "western Bay"? (Greame Pearman, Monash University Sustainability Centre)	
11-1276	A	33	4			This would be better in numeral value for comparison with other impacts. (Greame Pearman, Monash University Sustainability Centre)	BF: revised text will clarify this point
11-1277	A	33	15			Add: "The level of certainty and credibility of projections are critical to acceptance of the need to adapt." (Barrie Pittock, CSIRO)	BF: revised text will clarify this point
11-1278	A	33	19			What is meant by the "Wide Bay-Burnett population"? (Greame Pearman, Monash University Sustainability Centre)	BF: revised text will clarify this point
11-1279	A	33	24	33	28	Similar to earlier comment - is beach erosion driven by sea-level rise at greater threat that storm surge effects in some areas? Apparently the case for much of NSW. Expert is Doug Lord, NSW Department of Natural Resource, based in	KH: Need to also consult Peter Cowell (Sydney Uni)

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						Newcastle. (Oliver Woldring, NSW Government)	
11-1280	A	33	30			What is the "Sea-Change Taskforce"? Citation? (Greame Pearman, Monash University Sustainability Centre)	
11-1281	A	33	33			Add: "However, acceptance by developers and property owners remains a key issue." (Barrie Pittock, CSIRO)	BF: revised text will clarify this point
11-1282	A	33	37	37	27	These concluding sections are very good. (Rod Anderson, Department of Sustainability & Environment)	
11-1283	A	33	37			Section 11.7: I know the authors are specifically required to comment on eocystems, food production, and economic development, but somehow this doesn't really give me enough of a flavour of how climate change impacts could influence sustainable development. If I had to summarise my perspective, I'd highlight issues around water resources, and lock-in of infrastructure and high-value developments in coastal or flood prone regions, and the question of resilience of systems in the face of change (ie adaptive farming vs high-intensity farming, changing economic fortunes on the back of international markets). It goes back to the concept that climate change impacts in developed economies largely don't happen because of climate change per se (with the exception of impacts on natural ecosystems), but rather because a change in climate runs up against a fixed performance expectation of an economic sector or a piece of infrastructure or urban development. (Andy Reisinger, Ministry for the Environment)	KH: Agree. Fig 11.3 (faded rainbow) plus relevant text will be moved to 11.7. This will address Andy's comment. BF: Accepted. Key vulnerabilities from Table 11.10 now included and text added.
11-1284	A	33	46			Why these headings. Would it be better if these aligned with the "key vulnerabilities"? (Greame Pearman, Monash University Sustainability Centre)	KH: Agree, see comment 11-1283 BF: Accepted. Key vulnerabilities from Table 11.10 now included
11-1285	A	34	4	34	11	Biosecurity deserves a mention in this paragraph, as a risk to regional food security. (Alistair Hall, HortResearch)	BF: Accepted. Biosecurity now identifed
11-1286	A	34	4			In terms of shifts in agricultural regions - is it worth mentioning that this will be easier with say grazing moving into dryland farming than th enormous development of agriculture, infrastructure and communities associated with irrigation in the Murray Darling Basin (Peter Hayman, South Australian Research and Development Institute)	BF: revisedAccepted. Revised text will clarifyclarifies this point
11-1287	A	34	4	34	12	This understates the problem of impact on agricultural communities. Suggest add: "Water supply will be limiting, especially for large warmings, for agricultural production in many areas of Australia where drying will occur." (Barrie Pittock, CSIRO)	KH: Noted. Will add a section on water. See 11-1283 BF: Accepted. Revised text clarifies this point
11-	A	34	6	34	6	However, there is large capacity for adaptation.' Does this capacity extend to those	KH: Agree. Large capacity for adaptation in

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1288						areas already in low rainfall cropping areaswhere projections are for reduced growing season rainfall? (Elizabeth CURRAN, Bureau of Meteorology)	some areas, but other areas have limited scope. Need to talk about implications for marginal lands, threats and opportunities. Mark and Jim to revise text. BF: Accepted. Revised text clarifies this point
11-1289	A	34	6	34	6	The statement "However, there is large capacity for adaptation" does not seem to fit the description of the risks and threats, particularly when taken in their aggregate, and in many ways signals (in terms of its policy relevance) that little needs to be done to mitigate or adapt to climate change. While there is capacity for adaptation in some regions, other regions may find this far more difficult. For example, many regions that are currently water stressed will likely be even more water stressed in coming decades and this will challenge their capacity to adapt if agricultural systems are intended for these regions. (Sean Weaver, Victoria University of Wellington)	BF: see 11-1288 BF: Accepted. Revised text clarifies this point
11-1290	A	34	7		9	forced changes of crop types and crop management can also create major stresses in the socio-economic system. Whole regions are geared in their infrastructure to process particular crops (e.g. kiwifruit, apple, wheat). A change in the type of crops has major costs and needs major behavioural changes in the farming community. (Stephan Halloy, Instituto de Ecología, Universidad Mayor de San Andrés)	BF: Accepted - revised text will clarifyclarifies this point
11-1291	A	34	9	34	11	I agree that neither NZ nor Australia are likely to run out of food, but that is not really the point. Agriculture in both countries is vulnerable to major impacts, and while the sector has declined in its economic importance over time, it still constitutes a mainstay of the national economies of both countries. So, food security is not really particularly relevant, but prospective declines in agricultural productivity certainly are. With respect to Australia at least, this paragraph and other comments in the chapter seem to anethetize what I understand to be the relatively significant impacts on agricultural production, for example that have been predicted by CSIRO. (Chris Cocklin, Monash University)	BF: Noted. Need to emphasise that we are discussing UNFCCC Article 2 here, but revised text clarifies this point KH: Agree, see comments 11-1283 and 11-1288.
11-1292	A	34	9			Add "The need for shifts in the location of primary sector infrastructure ie processing plants, cool storage, has not been assessed, but could be considerable. (Gerald Rys, Ministry of Agriculture and Forestry)	BF: revisedAccepted. Revised text will clarifyclarifies this point
11-1293	A	34	10			Already noted (p4, l8) - surely high? (Ken Hughey, Lincoln University)	BF: revisedAccepted. Revised text will clarifyclarifies this point
11-1294	A	34	11	34	11	food security is actually as much an economic as physical thing. Suggest adding "and high capacity to import food." (Michael Dunlop, CSIRO)	BF: revised text will clarify this pointBF: Noted, but the point is that the population of ANZ can be fed from internal production

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11-1295	A	34	13	34	13	Table numbering needs fixing. (Julia Becker, Institute of Geological and Nuclear Sciences)	BF: noted
11-1296	A	34	13			Table 11.10? (Barrie Pittock, CSIRO)	BF: noted
11-1297	A	34	13			Should Table 11.4.11.1 be Table 11.11? (David Whitehead, Landcare Research)	BF: noted
11-1298	A	34	13	34	18	I am disappointed that the section on potential impacts of climate change on trade and economic development is so brief without clear conclusions. This is clearly one of the most important effects of changing climate and more details and scenarios and would be much more helpful. This should include synthesis of the points listed in Table 11.11 (David Whitehead, Landcare Research)	BF: Noted and need to find more refs, if available, e.g. Caroline Saunders (Lincoln Uni) has published material on trade. Otherwise little published work available. KH: Reinforces the need to state the obvious up-front, perhaps in the Exec Summary, i.e. this assessment is based on available literature. Many gaps in knowledge remain, especially in socio-economic impacts and adaptation strategies. ANZ research investment needs to be boosted in these areas.
11-1299	A	34	15			"certain limits" What does this mean? Seems too imprecise. Is there really a sound basis for this conclusion. (Greame Pearman, Monash University Sustainability Centre)	BF: Noted. Text revised text will clarify this point
11-1300	A	34	15			Again understates problem for high warmings. Need to state what range of warmings give little effect if adaptation works. Beyond that there is a problem. (Barrie Pittock, CSIRO)	BF: Noted. Text revised text will clarify this point
11-1301	A	34	21			"Loss of life is not precluded". Loss of life due to what? (Tom Beer, CSIRO)	BF: Noted. Text revised text will clarify this point
11-1302	A	34	21	34	22	Loss of life is not precluded, but is unlikely to exceed a few hundreds per decade, due mainly to….' (Elizabeth CURRAN, Bureau of Meteorology)	BF: Noted. Text revised text will clarify this point
11-1303	A	34	21	34	22	What does the figure of "a few hundreds per decade" refer to? It seems inconsistent with the earlier claim that more heat related deaths will reverse the winter - summer difference. (Alistair Woodward, University of Auckland)	BF: Noted. Text revised text will clarify this point
11-1304	A	34	22			"few hundreds" should be 'few hundred'. I at first found this hard to reconcile with the vast numbers at risk from dengue as given in Table 11.11 – 0.3 million. Presumably this means that the expected death rate is 1 in 1,000. (Tom Beer, CSIRO)	BF: Noted. Text revised text will clarify this point

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11-1305	A	34	22	34	24	Delete sentence starting "Within both countries…" as it is highly subjective (Andrew Watkins, Australian Bureau of Meteorology)	DG: Noted. Donna Green and Darren King to address BF: Noted, but largely rejected as indigenous peoples are an important concern
11-1306	A	34	23	34	23	Please add extra word: "…disadvantaged groups, especially SOME indigenous peoples, …" (Line 23). (Darren NT King, National Institute of Water and Atmospheric Research Ltd)	DG: Agree. Donna Green and Darren King to address BF: Noted. Text revised
11-1307	A	34	23			See comment 1: this is simply an assertion, not an argument supported by evidence. Uneven impacts is imortant: it deserves better coverage. (Wendy Lawson, University of Canterbury)	DG: Noted. Donna Green and Darren King to address BF: Noted. Earlier text upgraded
11-1308	A	34	26			Suddenly the reference to Table 11.11 is correct. All previous Table references have been incorrect. (Tom Beer, CSIRO)	BF: Noted. Text revised
11-1309	A	34	26			Why is this here, it would make more continuity if included in section 11.5.3 (Kim Ritman, Bureau of Rural Sciences)	KH: Fair point. Move to 11.5.3?
11-1310	A	34	28	35		Table 11.11. Ideally these perecentage changes should be given as a range - to show the scientific uncertainty, and differences in output from different GCM and downscaling methods. Alternatively should specify the GCM and downscaling technique used to derive the changes shown. SRES A1F1 for 2020 - shows increases in crop yields...This is overall but will there be some regional and sub-sectoral variations? . (Elizabeth CURRAN, Bureau of Meteorology)	KH: Disagree. Too complex for a table
11-1311	A	34	28			Use simple language... What is "residual risk"? (David Jones, Australian Bureau of Meteorology)	KH: As stated in the table caption, residual risk is the risk remaining after adaptation
11-1312	A	34	28			Table 11.11 does nto mnention galcier change: is this a deliberate omission? Also, source of this information is not clear. (Wendy Lawson, University of Canterbury)	BF: revisedAccepted. Revised text will clarifyclarifies this point
11-1313	A	34	28			Table 11.11. Entry 2, cols. 2 and 3. numbers for heat wave deaths are presumably per annum? (Barrie Pittock, CSIRO)	KH: Agree BF: Accepted. Revised text clarifies this point
11-1314	A	34	28			Table 11.11: near-term impacts: are changes in ice/snow mass in southern alps significant and worth mentioning here as ecosystem change (certainly relevant and already highly noticeable for mountaineers). Also changes in fire risk relevant for NZ, not just Australia (see http://www.climatechange.govt.nz/resources/local-govt/long-term-fire-danger-may05/index.html). For the mid-term slice, I'd add drought risk under both scenarios for eastern NZ. For the long-term slice, a comment on any remaining snow/mountain areas in Australia would be useful. I'm	BF: Accepted. Revised text addresses these points

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						also wondering whether the complete omission of flood risk/extreme rainfall events under the B1 scenario is intentional - I would have thought that changes in flood risk even under B1 can well be significant? (Andy Reisinger, Ministry for the Environment)	
11-1315	A	34	28			Table 11.11: This gives "increases in crop yields" as a mid-term impact (2050s) for the SRES B1 scenario. I'm not sure this is true for dryland cropping in eastern New Zealand, since the Mullan et al work on drought suggested increasing dryness / drought risk even for a low-medium scenario in the 2050s. I suggest this entry should at least be modified to "increases in crop yieds for areas where water resources remain adequate". (David Wratt, NIWA)	BF: Accepted. Revised text clarifies this point KH: Mark and Jim to address
11-1316	A	34	29			Can we state in table 11.11 we are discussing a high emission scenario compared to a low emissions scenario ? (Tony Coleman, Insurance Australia Group)	KH: Agree. The Introduction to the WG2 report will have descriptions of all SRES and stabilisation scenarios, which will be cross-referenced BF: Noted. Text revised
11-1317	A	34	29	35	1	The relative sea-level rise figures given in Table 11.11 seem to have minor inconsistencies with those given on p.12. (John Hannah, University of Otago)	RW: Agree, will address
11-1318	A	34	29			All quoted sea level rise figures under SRES B1 seem very low (particularly given current rate of rise of 2.9mm/pa (http://sealevel.colorado.edu/) . Why are temperature changes not included in this table? Why is this table not placed earlier in the chapter? (David Jones, Australian Bureau of Meteorology)	RW: Changes in climate and sea level in table 11.11 will be moved a new table in Section 11.3, which will be cross-references..
11-1319	A	34	29			Suggest “Australia” in full in this Table. (Greame Pearman, Monash University Sustainability Centre)	BF: Accepted. Revised text clarifies this point
11-1320	A	34	29			In table across from heading Mid-term impacts "3300 more heat wave deaths" - again this is irrelevant out of population increase context. (Andrew Watkins, Australian Bureau of Meteorology)	KH: Disagree. It includes population growth.
11-1321	A	34	29			What are SRES B1 and SRES A1F1 - these should be explained clearly including the climate scenarios on which they are based (David Whitehead, Landcare Research)	BF: Noted. Text revised
11-1322	A	35	0			Table 11.11: coral reef and snowline rise are related to predicted large scale extinctions of native species. (Stephan Halloy, Instituto de Ecología, Universidad Mayor de San Andrés)	BF, LH: Accepted. Revised text clarifies this point
11-1323	A	35	0			Strongly suggest ‘key hot spots’ needs to include Central Queensland where substantial drying has been taking place over recent decades with associated major	BF: Noted. Inclusion of an areas as a hotspot depends on meeting criteria

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						issues already apparent for agriculture, pastoral industry, and water resources (see Australia: State of the Environment Report 2001 for just one example of a reference for this. Bureau of Meteorology (web site) must have other references. (Roger Stone, Department of Natural Resources)	
11-1324	A	35	0			The key hot spots map needs to include regions within New Zealand that are vulnerable to drought (eastern regions) and flooding (western regions near high mountains). (Sean Weaver, Victoria University of Wellington)	BF: Noted – western regions are not likely to be hotspots because of insufficient population and infrastructure. Will consider identifying eastern lowlands
11-1325	A	35	0			Table 11.11: I suggest the issue of surprises and / or longer term risks should be addressed in this table, and also isomewhere earlier in the chapter. In particular, I suggest New Zealand (and also Australia) is very vulnerable to sea level changes of several metres if the Greenland Ice Cap and / or the West Antarctic Ice Sheet eventually melt as a consequence of climate change, and I think you should be able to find references in Australian and NZ reports etc making this point. The only place this issue is mantioned in the whole chapter is at the very end of the list of critical uncertainties in the penultimate section (11.8.1). I suggets this issue is sufficiently important to be brought up earlier in the report (and to be mentioned in the Executive Summary). (David Wratt, NIWA)	BF: Noted. Abrupt climate change is discussed on page 28 and a summary is needed here. Will also summarise ANZ implications of ice-sheet melting (4-6 m SLR from Greenland melting, 7 m SLR from WAIS melting) and THC slow-down (Matear & Hirst, 2003; England, ????) beyond 2100 discussed in Chapter 6. Sudden change in IPO affecting ENSO.
11-1326	A	35	2			Is “loosely based” good enough? (Greame Pearman, Monash University Sustainability Centre)	BF: revisedNoted. Revised text will clarifyclarifies this point
11-1327	A	35	2	35	7	Are these dot points supposed to be attched to the points in the previous table? Little unclear what these notes are in reference to (Andrew Watkins, Australian Bureau of Meteorology)	BF: revisedNoted. Revised text will clarifyclarifies this point
11-1328	A	35	3			“based on interpretations”? Not literature? Is this an IPCC role? (Greame Pearman, Monash University Sustainability Centre)	BF: Rejected: IPCC is entitled to make “assessments”
11-1329	A	35	7			Add note as follows: "no account is taken of impacts on or due to mitigation measures in Australia or overseas, e.g. on biomass production, renewable energy or terms of trade." (Barrie Pittock, CSIRO)	BF: revised text will consider this pointAccepted
11-1330	A	35	10	35	30	I find it surprising that the Murray-Darling 'hotspot' does not refer to agricultural production issues. Following from my comment above, it is my understanding that current predictions suggest significant losses of agricultural production, particularly in this very important region. At the very least, the anticipated water shortages in the MDB would impact on the country's major concentration of irrigated agriculture. (Chris Cocklin, Monash University)	MH: Noted. Will address

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11-1331	A	35	13			In this key hotspots figure (11.5) perhaps a pointer to the Torres Strait region could highlight the fact that there are several low lying islands with vulnerable populations (low social and economic indicators) which have no emergency management plan or adaptation strategy in place. (Donna Green, CISRO)	DG: Need to cite literature to support this BF: Noted – this area is not likely to be a hotspot because of insufficient population and infrastructure
11-1332	A	35	31			This figure incorporates expected changes in Kakadu. I do not recall this being discussed anywhere else in the document. It should be, and appropriate references should be given. (Tom Beer, CSIRO)	KH: Disagree. Kakadu discussed on page 14
11-1333	A	35	31			Fig.11.5. Suggest split lower RH box re alpine zones into two, for Australia and New Zealand separately, to avoid confusion. Suggest two new boxes: 1. "North-West Coast: Increased tropical cyclone threat to coastal settlements and off-shore installations." 2. "Torres Strait Islands: Sea-level rise and storm surges increase erosion and loss of fresh groundwater in lowlying islands." (Barrie Pittock, CSIRO)	BF: Noted, but want to have less than 10 hotspots. Too messy to split alpine box. Will add eastern lowlands (NZ) box. Not keen on northwest Aus coast box or Torres Strait Island box since little population and infrastructure exposed. need to clarify our hotspot definition so as to include reference to substantial impacts on property, people and major biomes, or similar
11-1334	A	35	31			Figure 11.5: I think it is important to add "drought risk" for eastern NZ, especially Canterbury, Marlborough, and Wairarapa. Under mid-to-upper projections, this could fundamentally alter the feasibility of dryland pastoral agriculture, but also any alternative land uses. (Andy Reisinger, Ministry for the Environment)	BF: Accepted. Will add eastern lowlands (NZ) box.
11-1335	A	35	31			Fig. 11.5: The entire coasts of both Australia and New Zealand should be highlighted here as being "key hotspots" for erosion, aggradation, innundation, salinisation and ecological perturbation due to sea level rise and, in many areas, decreasing freshwater flows. (Marc Schallenberg, University of Otago)	BF: Not a hot spot – too diffuse
11-1336	A	35	41			Projected change "will" rather than "are virtually certain to exert"... (David Jones, Australian Bureau of Meteorology)	
11-1337	A	35	42			"… unless strong mitigation and adaptation measures …" (Barrie Pittock, CSIRO)	BF: revised text will clarify this point
11-1338	A	36	3	36	38	Should impact on forestry be added as a critical system ? (Yves Bergeron, université du québec en Abitibi-Témiscamingue)	BF: revised text will clarify this point
11-1339	A	36	3		37	Should extreme weather events be included as further uncertainty (Tony Coleman, Insurance Australia Group)	BF: revised text will clarify this point
11-	A	36	3			Section 11.8.1: I think one of the key research priorities are to develop pdfs of	KH: Agree, will add this.

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1340						changes in extreme events that allow these projected changes to be integrated into standard risk assessment methodologies. In the absence of anything resembling a pdf, many concrete decisions ignore climate change because it is seen as a fundamental leap of faith rather than simply a shift of an existing pdf for a risk function with another risk function. The research itself is of course on that belongs in WG1, but it is important from an adaptation perspective to realise that the way impacts information can or can't be represented affects people's ability to respond to the information. (Andy Reisinger, Ministry for the Environment)	
11-1341	A	36	3	36	37	Sec. 11.8.1: Impacts and vulnerability for critical systems: Coastal freshwaters/brackish systems (including estuaries) and aquifers should be mentioned here as critical systems. (Marc Schallenberg, University of Otago)	LH: Disagree. These issues are discussed earlier, but inappropriate for the high-level priorities here.
11-1342	A	36	3			Section 11.8.1: I suggest that the economic impact of climate change and the economic costs and benefits of adaptation are important uncertainties, at least for New Zealand, which should be added to the list in this section with a suggestion that more research is needed. (David Wratt, NIWA)	KH: Agree
11-1343	A	36	5			Why are they critical? Do you mean least understood? Who derived these priorities? (Kim Ritman, Bureau of Rural Sciences)	KH: Some priorities come from Allen Consulting Group (2005). Need to be more rigorous or transparent in how the priorities were derived. Will more clearly state that these priorities come from text in preceding sections. Can save space by introducing the dot points with the words “are critical, so the following research is needed:” NH: will further refine text, clarifying uncertainties and research priorities. Will remove sub-headings, but introduce them in the opening paragraph.
11-1344	A	36	7	36	7	suggest replace "threshold" with "sensitivity" (Michael Dunlop, CSIRO)	BF, LH: revised text will clarify this point
11-1345	A	36	7	36	13	There are unlikely to be identifiable critical thresholds for many ecosystem processes, with invasive species for example becoming progressively worse as the systems are stressed by climatic and non-climatic drivers. There are so many different invasive species across so many different regions that it is not possible to generalise on a given climatic threshold.	BF, LH: revised text will clarify this point

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						(Robert Sutherst, CSIRO)	
11-1346	A	36	8	36	8	Suggest starting with even more basic info: "There are critical uncertainties about the key processes that affect specific species and ecosystem distributions (direct climate sensitivity - which factors?, disturbances, interspecies interactions) and how these processes will be affected by changes in temperature, rainfall and CO2 regimes. " (Michael Dunlop, CSIRO)	BF, LH: revised text will clarify this point
11-1347	A	36	15	36	15	Water availability is already under stress from increasing demand, drives to increase water use efficiency (from plant to paddock to scheme to landscape), and limited resources. The interaction between climate change and all of these factors is poorly understood. (Michael Dunlop, CSIRO)	BF: revised text will clarify this point
11-1348	A	36	15	36	15	drought frequency, [add "duration"] and/or intensity (David White, ASIT Consulting)	BF: revised text will clarify this point
11-1349	A	36	17			Mention riverine and dryland salinisation explicitly as it is complex and not well simulated. (Barrie Pittock, CSIRO)	BF: revised text will clarify this point
11-1350	A	36	22			A point here is also the role of planted forests in protecting watersheds from severe events on the one hand but also limiting the throught flow of water to rivers systems thereby limiting the availability of watre fro irrigationuse. (Gerald Rys, Ministry of Agriculture and Forestry)	BF: revised text will clarify this point
11-1351	A	36	23			Insert after "ENSO," "and in ocean gyres due to a southward movement of the westerlies (Cai et al., 2005), " (Barrie Pittock, CSIRO)	BF: revised text will clarify this point
11-1352	A	36	23	36	26	Similar to earlier comment - there is no discussion about the dependence of costal spp on or mangroves and coral reefs - both of which may be threatened in some areas. (Oliver Woldring, NSW Government)	BF, LH: revised text will clarify this point
11-1353	A	36	26	36	26	add "and monitored" after "modelled". (Janice Lough, Australian Institute of Marine Science)	BF: revised text will clarify this point
11-1354	A	36	36			Research needs are mentioned for this subh (Greame Pearman, Monash University Sustainability Centre)	
11-1355	A	36	37			Add: "Although these may be low probability outcomes, their possible catastrophic impacts globally and regionally require that they be considered in any risk management strategy." (Barrie Pittock, CSIRO)	BF: revised text will clarify this point
11-	A	36	38			Abrupt climate change and the impacts on release of stored carbon from frorests	BF: revised text will clarify this point

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1356						and soil is also an issue. (Gerald Rys, Ministry of Agriculture and Forestry)	
11-1357	A	36	40			Section 11.8.2: I wouldn't disagree with the desirability of integrated sub-regional assessments, but as with my other comments on this issue, I'm highly sceptical about the extent to which such assessments actually change adaptation behaviour at the community level if they are not backed up by a large raft of other changes in how councils focus, operate and prioritise. The first bullet point sort of flags this, but it may be useful if this aspect could be extended more. Basically my sense is that it is not just more information that is needed, but mechanisms that link readily with existing decision-making structures. These structures may be sub-optimal, but they are the only ones we have access to. An integrated assessment that says "there are better structures, here's how you should do it" would not be effective, even if it is correct in principle. (Andy Reisinger, Ministry for the Environment)	BF: Will delete "integrated" from first sentence and use some of Andy's words, e.g. it is not just more information that is needed, mechanisms that link readily with existing decision-making structures
11-1358	A	36	44	36	45	Delete sentence starting "Adaptation options for…" (Andrew Watkins, Australian Bureau of Meteorology)	BF: noted: E will review this sentence
11-1359	A	37	2			Add: "Due to long lead times necessary for much adaptation, longer time frames need to be injected into design and planning for investments and infrastructure." (Barrie Pittock, CSIRO)	BF: accepted
11-1360	A	37	3	37	3	ADD . Further development of climate risk management decision tools building on current climate risk management approaches. (Elizabeth CURRAN, Bureau of Meteorology)	BF: revised text will clarify this point
11-1361	A	37	7		17	I am suprised that this section and sections 11.4-11.5 do not cite more research on the economic impacts of climate change. An example for New Zealand which looks at the imapct on milk production is: Tait, A.B, J.A. Renwick and A.H. Stroombergen (2005). "The economic implications of climate induced variations in milk production", New Zealand Journal of Agricultural Research, 2005, Vol. 48: 213–225. (Adolf Stroombergen, Infometrics)	BF: need to add this material KH: Need to state up-front that few assessments have considered socio-economic impacts
11-1362	A	37	20			Section 11.8.4: I think this section could be expanded slightly - additional reference to social and cultural trauma in Pacific (or other regions) after extreme weather events, and also the potential for disruption of global finance and goods flows from specific extreme events, not just gradual changes (witness oil price shocks after hurricane Katrina - gradual changes could be much more easily absorbed by a flexible economy). (Andy Reisinger, Ministry for the Environment)	KH: Noted, these ideas will be acknowledged if space permits
11-	A	37	23	37	24	"However there is a low confidence in potential outcomes". What does potential	BF: revised text will clarify this point

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1363						outcomes refer to? (Andrew Watkins, Australian Bureau of Meteorology)	
11-1364	A	37	26	37	27	Add after "regional population growth" ", culture" then continue. (Judy Lawrence, PSConsulting)	BF: Accepted
11-1365	A	37	26	37	27	Again, this may present problems for the Australian government. I suggest something like: "… are very likely to lead to large numbers of environmentally displaced people in the wider region of the South Pacific and South-east Asia. Thier needs will pose a humanitarian challenge for Australia and New Zealand." See discussion and endnotes in my new book "Climate Change: Turning Up the Heat" (CSIRO Pub. and Earthscan), especially pp. 208, 230, 258, 297 and 304. Endnotes are at www.publish.csiro.au/pid/4992.htm. (Barrie Pittock, CSIRO)	BF: noted and something like this may be included
11-1366	A	37	28	37	28	Regional tensions are likely to increase as population trends, human activities and climate change place increasing demands on limited land and water resources. Or as Australia's PM would say "Be alert but not alarmed" (David White, ASIT Consulting)	BF: Noted
11-1367	A	37	37			What about coal sales- biggest export market for Australia. What about threats for the identification and charging for embedded energy? (Greame Pearman, Monash University Sustainability Centre)	KH: Not relevant to WG2
11-1368	A	38	0			Page 38 onward The references need a lot of work done on them. Many citations are missing. A number are duplicated. (Tom Beer, CSIRO)	KH: Noted
11-1369	A	38	0			A number of the references are duplicated. (Alistair McKerchar, National Institute of Water and Atmospheric Research Ltd)	BF: Noted
11-1370	A	38	0			References Bannister P, Maegli T, Dickinson KJM, Halloy SRP, Knight A, Lord JM, Mark AF, Spencer KL. Will loss of snow cover during climatic warming expose New Zealand alpine plants to increased frost damage? Oecologia 144, 245-256 (2005). Bannister P. Frost resistance of the New Zealand narrow-leaved snow tussock grass, Chionochloa rigida. New Zealand Journal of Botany 43, 425-430 (2005). Cullen, LE, Stewart, GH, Duncan, RP, Palmer, JG. 2001. Disturbance and climate warming influences on New Zealand Nothofagus tree-line population dynamics. J. Ecol. 89:1061-1071. Hall, C.J. and Burns, C.W. Mortality and growth responses of Daphnia carinata to increases in temperature and salinity. Freshwater Biology 47: 451-458 (2002) Hall, C.J. and Burns, C.W. Effects of temperature and salinity on the survival and egg production of Gladioferens pectinatus Brady (Copepoda: Calanoida).	LH, BF: these refs will be reviewed and included as appropriate

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						Estuarine, Coastal and Shelf Science 55: 557-564 (2002) Hall, C.J. and Burns, C.W. Effects of salinity and temperature on survival and reproduction of Boeckella hamata (Copepoda: Calanoida) from a periodically brackish lake. Journal of Plankton Research 23: 97-103 (2001) Marsden, ID 2004. Effects of salinity and seston on growth of Austrovenus stutchburyi. Mar. Ecol. Prog. Ser. 266: 157-171. Rock, J. and Cree, A. 2002. Intra-specific variation in the effect of temperature on pregnancy and offspring in the viviparous gecko, Hoplodactylus aculatus. Herpetologica Rock, J., Cree, A. and Andrews, R.M. 2002. The effect of reproductive condition on thermoregulation in a viviparous gecko from a cool climate. Journal of Thermal Biology 27: 17-27. Vandergoes, MJ, Fitzsimons, SJ, Newnham, RM 1997. Late glacial to Holocene vegetation and climate change in the eastern Takitimu Mountains, western Southland, New Zealand. J. Roy. Soc. N.Z. 27: 53-66. (Marc Schallenberg, University of Otago)	
11-1371	A	39	6			References. There are some inconsistencies in reference formatting. Eg. Initials occurring both before and after surname (further example, Page 39, line 6 contrasting with line 33). (Lynda Chambers, Bureau of Meteorology Research Centre)	KH: Noted. Will fix
11-1372	A	39	43	39	43	Refernce needs filling in as do a variety of other refs in the list. (Julia Becker, Institute of Geological and Nuclear Sciences)	KH: Noted. Will fix
11-1373	A	43	45			Double period. (Greame Pearman, Monash University Sustainability Centre)	KH: Noted. Will fix
11-1374	A	45	35	45	35	Good chapter. One comment only: the reference Niall and Walsh in now in press with IJC (Kevin Walsh, University of Melbourne)	KH: Noted. Will fix
11-1375	A	46	31			The full reference is Richardson, S.J., Allen, R.B., Whitehead, D., Carswell, F.E., Ruscoe, W.A. and Platt, K.H. 2005. Climate and net carbon availability determine temporal patterns of seed production by Nothofagus. Ecology 86:972-981. (David Whitehead, Landcare Research)	LH: Agree
11-1376	A	49	16	49	16	Beynon [not Benyon] (David White, ASIT Consulting)	KH: Noted. Will fix