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

Government and Expert Review of Second Order Draft

Specific Comments

EXPERT REVIEW COMMENTS

Chapter 11

August 2006

Organization of the review comments file

Comments are organized as follows:

(a) First are the comments from the Co-Chairs and TSU. These:
  (i) track the development of the ZOD and FOD, and your responses to review comments on each of these drafts, and then
  (ii) present comments on the Second-Order Draft

(b) Second are the comments from the Expert Reviewers, organized in the same format as your FOD comments file.

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 AUGUST

Substantive comments

- The chapter writing team should discuss all substantive expert review comments, by email and/or at Cape Town.
- 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 should be kept in this document, ideally electronically.
- 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 **8th December 2006**.

Chapter 11:

Comments from the Co-Chairs/TSU are laid out as follows: first we comment on whether the SOD addresses the comments we made on the ZOD; second we comment on whether the SOD addresses the comments we made on the FOD; our concluding comments on the Second-Order Draft are at the end

	Chapter 11 ZOD comments Co-Chairs and TSU	Has this been addressed in the SOD?	Author response
11.Z1	Overall, this is a good ZOD, but needs focussing down – it's too extensive. There is a lot of qualitative text which attempts to add value but which could be removed given page constraints. In general, the text could be tightened up. To add value, the authors could usefully attempt to map impacts onto the standard set of scenario periods and development pathways set out in the Timeslice Framework shown in the Blue Book Doc 6	The number of pages has been reduced considerably since the ZOD. Impacts have been mapped onto the timeslices identified in the blue book.	KH Noted – no further action (NFA)
11.Z2	The chapter is substantially too long. If you look at Doc 3 of the Blue Book, you will see that it needs to be shortened by around 30 text pages.	The SOD has been shortened considerably to around 34 pages (still 3 pages over)	KH Noted, have made further reduction in page length
11.Z3	Section 11.2 is too long, even without the largely missing Section 11.2.4. Section 11.2.2, on the climate system, is more appropriate in its level of detail for WGI. Length could be saved in this section by referring to Chapter 2.	The length of Section 11.2 seems reasonable ~5 pages	KH Noted NFA
11.Z4	Section 11.4 should be the core of the assessment. It doesn't start until page 18, which is too late given length constraints. However, you have rightly devoted a large number of pages to this section – around 22. We recommend around half the chapter is devoted to Section 11.4.	Section 11.4 now starts at page 13 and makes up ~half the chapter	KH Noted NFA
11.Z5	We suggest that you achieve significant length reduction by, for example: i. Identifying and focussing on the main, policy-relevant issues. ii. Referring readers to the TAR wherever possible, in order to avoid repeats here. iii. Concentrating on conclusions that confirm or contradict what was said in the TAR. iv. Using tables and figure to summarise instead of text.	Tables and figures have been used to good effect and contain a large amount of information	KH Noted NFA
11.Z6	You have used the structure set out in the Plenary-agreed Outline (Doc 3 of the Green Book).		KH Noted NFA
11.Z7	Your boxes are generally good and useful additions, providing relevant case studies.		KH Noted NFA
11.Z8	You include a significant amount of Working Group I -type material. Cut this out to reduce the overall length.	References are made to WG1 where appropriate	KH Noted NFA

11.Z9	We appreciate that you have already made provisional conclusions. However, there may be material that can be added regarding: a) effects under stabilisation scenarios b) effects under different development pathways (e.g. SRES scenarios). You need to ensure that your identified impacts are related to the time when they are expected to occur.	Information on SRES summarised in Table 11.1 as well as timing of impacts. Nothing for stabilisation pathways other than the mention of SRES B1 being surrogate for 550 ppm, B2 for 650 and A1B for 750 in section 11.4	KH Noted NFA
11.Z10	Would there be value in presenting updates/revisions (in condensed form) of the TAR summary tables for your chapter - Tables 12.1 and 12.2?	Summaries of impacts are provided in T11.4; 11.5 and 11.6	KH Noted NFA
11.Z11	Section 11.2.1: Much space could be saved here by including a map of the region. The extent to which the regional chapters can, as a group, use a world map, referred to by each chapter, needs discussion. It might also be possible to develop table of statistics on populations, % urban population etc., which would cover the needs of all regional chapters in one place.	No map has been included	KH: Noted, but need to shorten the chapter by 3 pages, so we don't have space for a map
11.Z12	Section 11.2.4 (Current Adaptation) is largely absent.	Current adaptation (11.2.5) is now quite substantial	KH Noted NFA
11.Z13	Section 11.4 is comprehensive and unusually includes several real-world examples (e.g. in 11.4.7). Also, it uses tables and figures well. However, it will need trimming to remove extraneous text.	11.4 reads well. Superfluous text has been trimmed	KH Noted NFA
11.Z14	Section 11.5 is relatively weak in comparison to the remainder of the chapter, apart from the sub-section on Agriculture, Forests and Water. It contains a lot of general material and background which is inappropriate for a regional chapter – it would be more appropriate in Chapter 17. The whole of Section 11.5 contains very few references. The extent to which it (especially Section 11.5.1) relies on one reference (PIA, 2004) needs to be recognized and addressed.	Section has been rewritten. It is now much shorter than in the ZOD (from 5.5 pages in the ZOD to 2 in the SOD) Still low on references - only 6 in SOD section 11.5	RW inserted more references in section 11.5
11.Z15	The section on sustainable development is very vague and needs focussing.	11.7 is titled 'Conclusions' not 'Conclusions: implications for Sustainable development' as specified in PAO headings but it does cover issues of sustainable development. More focussed in the SOD than the ZOD.	KH: title for 11.7 has been fixed

	Chapter 11 FOD comments by Co-Chairs and TSU	Has this been addressed in the SOD?	Author response
11.F1	You follow the recommended headings. Thanks.	This is still largely the case in the SOD	KH Noted NFA
11.F2	Balance between the sections seems right.		KH Noted NFA
11.F3	Summary of results in a) table of residual risk, and map of key hotspots is v. informative		KH Noted NFA
11.F4	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	The authors have not highlighted in the ES which conclusions are new and which reaffirm TAR. Section 11.1.2 outlines the new findings of the AR4. This is quite brief	KH: In ES, we have highlighted which conclusions are new and which reaffirm TAR.
11.F5	In general: a chapter that could be a model to others.		KH Noted NFA
	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** 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 Swart 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]	General comments made by Martin Parry and Carla Encinas on ZOD [response in square brackets]. Addressed in Z1-Z15	KH Noted NFA

	(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 section. **(Carla Encinas)**		
	Chapter 11 SOD comments by Co-Chairs and TSU		**Author response**
11.S1	**LENGTH:**	34.3 pages (~3 pages over length)	KH: Chapter has been shortened
11.S2	**ARE PAO HEADINGS PRESENT?**	Almost, but not quite. Please make these exactly as the PAO (so that readers can move between chapters easily).	KH: correct title now given section 11.7
11.S3	**HAVE MOST GENERAL COMMENTS OF ERs FROM ZOD AND FOD BEEN COVERED?**	Pretty much. Mostly editorial changes suggested. Where more specific changes have been suggested the authors have incorporated them into the chapter, with only very few exceptions.	KH Noted NFA
11.S4	**ARE REFERENCES BROADLY COMPLETE?**	Yes, a few incomplete references appear but most of these have been addressed during the gathering of grey literature. Note that citing of references in text does not follow IPCC format.	KH: Noted, fixed
11.S5	**IS THERE LINE-OF-SIGHT TEXT ➔ ES AND TEXT+ES ➔ TS+SPM?**	Yes, good line-of-sight in all cases	KH Noted NFA
11.S6	Overall the chapter is well written with good use of tables and figures and boxes. The ES covers the main conclusions of the report. Sections are of appropriate length. Citing of references in chapter doesn't follow the IPCC format. In general, the balance between Aus and NZ is fairly even with the exception of the health section (11.4.11) where Aus takes up 33 of the 38 lines of text. Line by line comments are made in the spreadsheet. This chapter is in good shape and is almost (but not quite) ready to go.		KH Noted, fixed references and health section
11.S7	**IN SUMMARY WE RECOMMEND**: • Stabilization be covered more fully, if the literature allows.		JS – a bit more has been added on NZ health impacts in 11.4.11

	• Follow the PAO subheadings exactly • Clearly state the new or reaffirmed conclusions since TAR in the ES • 11.4.11 needs better balance between Australia and New Zealand • Chapter needs shortening (slightly)	

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
E-11-1	A	0				What are the implications of a slowing of the Trade Winds - refer article in Nature? It may mean lower sea levels in many years at least, El Ninos become the norm, cooler sea temperatures along the East coast of Aus etc. In the eminent science journal, Nature (3 May 2006) (Weakening of tropical Pacific atmospheric circulation due to anthropogenic forcing, by Gabriel A. Vecchi, Brian J. Soden, Andrew T. Wittenberg, Isaac M. Held, Ants Leetmaa, Matthew J. Harrison. Nature 441, 73-76 (04 May 2006)), Gabriel Vecchi and his team of climate modelers report that the Walker Circulation has weakened by more than 3% since the mid-19th Century, and that the cause of this is increasing levels of greenhouse gases. With emissions still rising, they predict that the Trade winds in the tropical Pacific could potentially decline by more than 10% by the end of the century. Obviously this could have quite significant implications, including for Australia, New Zealand and Indonesia, in terms of the El Nino-Southern Oscillation ... the pessimists refer to the possibility of permanent El Ninos, which would be catastrophic for southern Africa, Australia and the Indonesian archipelago; but an optimist might at least see a reduction in the rate of rising sea level across the western Pacific. At least it warrants due consideration and inclusion at various points in the IPCC report. Most of Chapter 11 is in good shape, apart from slips in grammar etc (above). But then I think this is the 3rd time it has crossed my desk. Technical content mostly sound, as best as I can judge. (David White, ASIT Consulting)	JS: The TAR projected more ENSO-like conditions; the climate models for NZ predict increased westerlies, drier in the east amd wetter in the west. More ENSO's would certainly lower sea levels in NZ. I have added some text at the end of 11.3.1 for consideration.
E-11-2	A	0				Very little mention is made of recent trends regarding monsoon rainfall. The word "monsoon" only appears once in this chapter, in the context of monsoons becoming drier in the Top End (false!). The nature of the monsoon is critical to north Australian ecosystems and the changing nature of the monsoon should be raised in this chapter, if only as an area of uncertainty. Recent hypotheses on this matter suggesting this is as a result of increased northern hemisphere aerosol concentrations, allows the opportunity to highlight "Climate Change" results from a multitude of factors, not just enhanced greenhouse. It also is one of the hints we have of circulation change. (Sam Cleland, Bureau of Meteorology)	KH: Noted, text inserted about monsoon. Now mentioned 5 times.
E-11-3	A	0				Tourism is substantially dealt with in CH 1,4,6,7,91112,13,14,16 . This is a significant change compared to TAR. Overall this is done in a satisfactory manner , in particular since the regional chapters do focus on regional issues without losing space on general aspects. What is missing though, is a critical assessment of the literature quoted (even though this literature is peer reviewed),	SB : to address this point a bullet point is now added to 11.8 'Key uncertainties and research' so as to cover tourism

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						not an individual assessment of papers but a critical overview of the mainstreams of methods that have been used these last years (though it must be recognised that these works have shed some light on what is a very important issue). This concerns both qualitative and speculative approaches and quantitative research. As regards the former, these confront current tourism behaviour and requirements regarding climate to the futures envisaged by scenarios. What is the degree of reliability of this kind of work knowing that the expectations of tourists regarding climates can evolve significantly, as they already have done in the past? There is at least a need for research to explore the range of possible evolutions in behaviours and introduce that into the analyses. Also, to what extent are econometric analyses concerning modifications in tourist flows (the more seducing as they yield figures…) robust and reliable? Is it, for example, acceptable to use a unique climate for the US as it is done in a paper quoted in several chapters? If it is, the coarseness of the results should be mentioned. In short, I believe that there should be in some place in the report, a caveat on the difficulties research on this topic encounters (uncertainties on future behaviours, shortcomings regarding statistics etc.) and their consequences on the results. (Jean-Paul Ceron, CRIDEAU (Université de Limoges-CNRS-INRA))	
E-11-4	A	0				This is a further improvement over the first draft - the langauge is tighter and more concise, most statements are backed up from the available literature, and I think policy advisors will be interested in the table of key impacts and the "burning-embers" figure. (David Wratt, National Institute of Water and Atmospheric Research)	KH Noted NFA
E-11-5	A	0				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) (Stephan Halloy, Instituto de Ecología, Universidad Mayor de San Andrés)	KH: Noted. We state on page 5 “The north-western two-thirds of Australia has become wetter since 1950, while southern and eastern Australia has become drier (Smith 2004b)”. The projections for 2020 etc indicate a bias toward decreasing rainfall and increasing evaporative demand. This is why we say Australia is likely to become drier in future.
E-11-6	A	0				The authors have done an excellent job in producing the draft chapter, which is substantially improved on earlier versions. A job well done. I have one general concern with the paper. The relates to the authors tendency to mix scientific study of adaption with actual adaptation - clearly scientific understanding is a prerequisite for sound action, but it is not adaptation. For	RW: We agree with this distinction and this has already been taken into account, as shown in Figure 11.2 (now Fig 11.1) and Section 11.2.5, in which we provide examples of adaptation. Section 11.5 is about “constraints

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						example, under 11.5 the authors note that "Australia and New Zealand have taken notable steps in the process of adaption"... In reality, the examples given are largely "studies of vulnerability and adaption", "attempts to increase resilience through activies which don't really have much relationship to the climate change problem (for example reducing fishing pressures on coral reefs)", and attempts to include climate change in planning instruments. I sense, the issue is that most adaptation to date is autonomous and quite limited, and being undertaken without the knowledge of whether the adaptation is in response to climate variability or climate change. The authors do provide an excellent example of planned adaption in water. I bit of minor rewording in the report would probably be sufficient to address this concern. For example, the adaption discussions could more consistently reflect the Page 3 line 7 summary that "There is evidence that some adaptation to observed climate changes has occurred". I am not across the IPCCs perferred definition (if there is one) of risk, but am not entirely happy with the way this is discussed in the chapter. For example, Fig 11.1 defines vulnerability as being a function of exposure. A more classical definition of risk defines it to be vulnerability multiplied by exposure where exposure defines the liklihood of the hazard. The authors might considering taking some care to ensure that words such as exposure, risk, and vulnerability are used consistently through the report. (David Jones, Australian Bureau of Meteorology)	and opportunities, not about providing examples of adaptation. In linking to opportunities and constraints, we are referring back to Figure 11.2 (now Fig 11.1) and addressing the pre-requesites for adaptation implementation, not providing examples of adaptation. RW & NH: Disagree. Definition refers to IPCC TSU definition and Figure 11.1 is being included as an overaraching Figure 1.1 in the Introduction chapter.
E-11-7	A	0				Table numbers are not consistent between text and table headings, throughout chapter (Stephan Halloy, Instituto de Ecología, Universidad Mayor de San Andrés)	KH: Diagree. Is Stephan reading the FOD rather than the SOD? None of his comments correspond with line numbers in the SOD
E-11-8	A	0				Some of the conclusions in the Executive Summary mixes the two systems of characterizing uncertainty used by WG II in an inconsistent fashion. For example, very likely is defined as 90 - 99% probability, while medium confidence is defined as 5 chances out of 10 of being correct. Applying both measures to a single sentence is confusing -- which level of confidence is the reader supposed to assume. Some, but not all, of the specific examples of this inconsistency are cited in subsequent comments. (Lenny Bernstein, L.S. Bernstein & Associate, L.L.C.)	KH: Noted. It is assumed that Readers are aware of the definitions of confidence and likelihood in the Introduction of the WGII report. Confidence levels are only applied to statements in the ES.
E-11-9	A	0				Some of my review relates to the references to insurance losses. Insurance redistributes losses. Risks to infrastructure and transport etc are spread by insurance. Thus to count insurance losses is effectively to double count losses. If an extreme weather event washes away a	TC: Agreed. References to insurance have been modified to avoid double counting

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						bridge, the value of the bridge is lost. An insurance company will probably have to pay out on that loss (and may itself make a financial loss if it hasn't set its premiums correctly) but it is the same loss. The confusion could be avoided by removing all references to insurance, but I can see the desirability of readers getting the idea that insurance premiums are likely to rise. My changes are given in sequence with other comments. (Adolf Stroombergen, Infometrics)	
E-11-10	A	0				References: These are generally in very poor shape. I appreciate that this is a draft, but at this stage, it is distracting and sometimes misleading for the reviewer to have to deal with such roughness. Need a lot of work to get all of the information needed. So much so I will not go through line by line. The some of things that need addressing are: a. I have serious concerns about the degree to which some of the documents have been refereed. I thought that this was a strict condition for citation in an IPCC Chapter. Such reports are those that are attributed to State and Commonwealth Departments, where the nature of the refereeing process is unclear. I am, perhaps more concerned about references to papers presented to conferences. In many cases, I am aware that these have not undergone proper peer review. This applies also to some but not all consultancy reports. Related to this is the question of quoting "submitted" papers. Is this acceptable? Especially where, say for example Green (2006) there is not even an indication to whom the paper has been submitted. b. In may case, there is insufficient information to really enable the reader to follow up and obtain copies of the reference for reading. After all, this is what the list of references is about. To do so requires that the reference not only contains the title and authors, but the publisher, the city of publication, volume and the page numbers. These are missing in many case. c. There are numerous cases where punctuation is missing and where spaces between words are missing. d. There are many inconsistencies including for example: Page 40, Line 12 "modeling" and Line 49 "modelling" In these cases this might be strict adherence to the spelling in the publication??e. Rarely are total page numbers of the publication given although in several cases the curious notation "ppp ppp" appears? f. It is usual practice to capitalise publications, That is, Journal or book names. It is not normal practice to capitalise the name of articles within journals. It is usual to italised these names, and not the titles of the journal article. There are many inconsistencies in this. g. I have difficulty with the ordering of the references. The more accepted practice	KH: Noted. Web addresses, PDFs and Word docs were supplied to the TSU. The web addresses will be added to the TOD bibliography. Grey literature, such as consultancy reports and government reports, are acceptable according to the TSU. Papers must be accepted or in press by Nov 2006. Punctuation and formatting will be fixed. Since the AR4 updates the TAR, we refrain from citing pre-2000 material.

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						is to list the article by a particular author in chronological order, followed by his/her articles that have joint authorship, also chronologically. It appears that here it has been decided to order the joint authored papers alphabetically but second author name. This is hard to read, because the reader has three prices of information the authors name, whether the paper is solo or joint authored and the year of publication. This does not allow the reader to go directly to a reference depending on the second author's name, which he does not know I think this need redoing. h. Should "CO2" appear as CO2"? i. There are inconsistencies in the use of one or two initials for authors. j. It is general practice to punctuate the authors' names as follows: Smith, A., Jones, B. and Bloggs, C. This is inconsistent through the listing. k. There are a number of specific references that need attention: i. Beentjes and Renwick (2001), Hall and Burns (2002), Kritcos et al. (22003b), Lilley et al. (2001), Pryede et al. (2005), Thresher et al. (1989), Waugh et al. (1999), but there may be others in which biological species names are referred to. International nomenclature requires that these be italicised, as they have been in other cases. ii. Chen and McAneney (2006). Why bold "submitted" here only? iii. Kirshbaum (1999a). Something wrong with this reference? iv. Nichols et al. (2005). Volume numner? Why bold the date? v. O'Hara. Needs information. vi. Shoo et al. (2005). "rainfoirest" spelling. vii. Woodruff et al (2002). Why "e.al. "? l. It is a bit surprising to find no references to Greenhouse 87, 94 publications. Yes quite old, but still surprising nonetheless. (Graeme Pearman, Monash University)	
E-11-11	A	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)	JS Text in 11.3.1 changed to quantify frost days for NZ. In 11.4.3 kiwifruit vernalisation acknowledged with frosts. MH: changes made
E-11-12	A	0				Overall the chapter is very good and much tighter than the previous version. (Adolf Stroombergen, Infometrics)	KH Noted NFA
E-11-13	A	0				many references in text are given as "surname1; surname2". Should be "surname1 and surname2". I will not note each one.	KH: fixed

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						(Barrie Pittock, CSIRO)	
E-11-14	A	0				I think the chapter is an excellent overall summary and I have very few comments or suggestions. Congratulations on the authors for pulling together such a comprehensive but readable review. My two comments below are obviously linked to impacts in an area that I work in and, as such, I hesitated to add them. However, at the risk of being parochial, I think the potential impacts in the Wet Tropics rainforests easily equal the impacts on the barrier reef and it would be nice to see them highlighted a little more. Again, well-done to the group of authors. (Stephen E. Williams, James Cook University)	LH: potential for extinctions of endemic Wet Tropics vertebrates to occur now used as an example in Table 11.5. Implications for these species also appears in Table 11.4.
E-11-15	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. (Stephan Halloy, Instituto de Ecología, Universidad Mayor de San Andrés)	BF, KH: Noted, but writing teams operate indepentently within IPCC agreed template. Different chapter writing teams have authority to emphasisedetail and issues most relevant to their IPCC regions. Ch 11 gives confidence and likelihood statements in the ES,and likelihood statements throughout the Chapter, as requested by the IPCC TSU. Ch 13 should comply. Difficult to have comparable statistics in all chapters, but we cite OECD stats in a few places, which should be comparable across chapters,
E-11-16	A	0				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)	JS – Disagree – increase in some rivers will result because of increases in rainfall with strengthening of westerly circulation. This will be the case for manty glacier fed rivers.
E-11-17	A	0				As with an earlier version of this Chapter, I am impressed by the considerable work involved in putting this assessment together, to say nothing of the advancements that have occurred since the TAR. The authors deserve congratulations for their efforts. Nonetheless, there are a number of suggestions that can be made that I believe will further improve the document. These are in some cases reasonably significant (I bolded in the list below) and in other cases, little more than picky issues of consistency, punctuation and convention. I have not separated the comments below on the level of importance, but left them in order as one works through the paper, on the basis that the authors may find this easier to deal with. I sincerely hope that this assists the authors produce and even better product for publication.	KH noted

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						(Graeme Pearman, Monash University)	
E-11-18	A	0				A map of Australia and New Zealand showing place names used in the text would be very informative. (Ken Hughey, Lincoln University)	KH: no space for a new map in a chapter that is already 3 pages too long, Readers should consult their own map.
E-11-19	A	1	1	55	50	A general comment - this chapter has improved significantly in comparrison with the first order draft. I wish to congratulate the authors. (Sean Weaver, Victoria University of Wellington)	KH Noted NFA
E-11-20	A	1	28	1	28	change "fro" to "from" (Vincent Lyne, CSIRO)	KH Noted, fixed.
E-11-21	A	1	28			fro should be from (David Jones, Australian Bureau of Meteorology)	KH Noted, fixed
E-11-22	A	1	31	1	31	add "and adaption" to section title. It's a bit late for this but "adaption" deserves a separate section especially considering that section 11.5 does discuss furture adaptions. (Vincent Lyne, CSIRO)	KH: Disagree, can't change prescribed section headings. Adaptation is part of vulnerability. While 11.5 could have covered both current and future adaptation, we felt it was better to address current adaptation in the section on current sensitivity & vulnerability – current adaptation affects current vulnerability
E-11-23	A	1	42	1	42	change title to "Key future vulnerabilities and impacts" based on the reasoning that you have to be vulnerable first before experiencing an impact. (Vincent Lyne, CSIRO)	KH: No, can't change prescribed section headings
E-11-24	A	3	1			COMMENT EXECUTIVE SUMMARY: The content of the ES could be improved by restructuring to put categories of impacts together, including temperature related assessment when feasible, and adding more specific information on risk to biodiversity and ecosystems. The section on benefits at the beginning should be dissolved and its elements moved into each bullet point relevant (eg tourism, water). As it is written at present it creates the impression of substantial benefits which are not consistent with the overall findings of the Chapter. (William Hare, Potsdam Institute for Climate Impact Research (PIK))	KH: Noted, benefits emphasized in a separate dot point. Can't give more detail in the ES. Readers should go to the numbered sections of text indicated.
E-11-25	A	3	5	3	5	add "snow cover" to the list of impacts. Also add, "[11.2.3] confident" to the end of the sentence. (Vincent Lyne, CSIRO)	KH: Agree. Snow cover added
E-11-26	A	3	8	3	8	Impacts on sectors are mentioned but mention should also be made of the ecological impacts as well (e.g. birds, vegetation, coral reefs, mammals, insects, fish, etc…) (Vincent Lyne, CSIRO)	LH: natural ecosystems now added to list of sectors in whiich examples of adaptation now observed.
E-11-	A	3	12	3	14	This statement lacks logical structure: less runoff could be a function of factors	KH Disagree. Runoff not simply a function of

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27						other than just reduced rainfall (eg. Changes in vegetation or water use; changes in rainfall intensity etc). Hence the use of 'although' to connect runoff with rainfall might not be appropriate. (Holger Meinke, Department of Primary Industries and Fisheries, Qld, Australia)	raifall. Also dependent on evaporation in assessment of soil moisture and run0ff in 11.3. Wording revised to "Large areas of mainland Australia and eastern New Zealand are likely to have less soil moisture, although western New Zealand is likely to receive more rain"
E-11-28	A	3	12	3	12	The definition of "accelerate" implies a trend that is quadratically increasing; change "accelerate" to "continue". (Vincent Lyne, CSIRO)	KH: Noted, revised to "The climate of the 21st century is very likely to be warmer with changes in extreme events"
E-11-29	A	3	12	3	14	More emphasis needs to be given to attribution of observed trends, ie what can be attributed to human induced climate change , and what contribution is made by climate variability. (Elizabeth Curran, Bureau of Meteorology)	KH: Noted. Attribution covered in 11.3,
E-11-30	A	3	12			The dot point heading does not really match the contents of the paragraph. (David Jones, Australian Bureau of Meteorology)	KH: Noted, Wording revised to "The climate of the 21st century is very likely to be warmer with changes in extreme events"
E-11-31	A	3	14	3	16	This statement mixes the two systems of characterizing uncertainty used by WG II in an inconsistent fashion. Very likely is defined as 90 - 99% probability, while medium confidence is defined as 5 chances out of 10 of being correct. The authors need to decide what level of certainty they are applying to this statement. (Lenny Bernstein, L.S. Bernstein & Associate, L.L.C.)	KH: see E11-8
E-11-32	A	3	17	3	18	Change to (… Wratt 2001) assessed the following impacts as important: (Ken Hughey, Lincoln University)	KH: Disagree. No references should be cited in the ES
E-11-33	A	3	18	3	18	Is this sentence correct as an over arching header for the following bullet points? A number of the impacts listed are evaluated with adaptation options. It would seem more accurate to delete this line. (William Hare, Potsdam Institute for Climate Impact Research (PIK))	KH: Disagree, all dot points exclude adaptation except for "Substantial shifts in agriculture are likely". The agricultural dot point has been revised to *Substantial impacts on agriculture and forestry are very likely*
E-11-34	A	3	19	3	27	The contents of this para should be included into each of the relevant bullet points in the ES as a whole rather than appearing as a separate "benefits" para as it cannot give an overall perspective on each sector (William Hare, Potsdam Institute for Climate Impact Research (PIK))	JS – Noted. Dot point about benefits kept up front but moved above headline about "without further adaptation" KH: Agree. See E11-24
E-11-35	A	3	24	3	24	Change "Tourism benefits" to "Tourism will benefit" (Vincent Lyne, CSIRO)	KH, SB: done, but see comment below
E-11-36	A	3	24			It seems speculative to suggest that tourism might benefit from drier warmer weather, as this weather will lead to a loss of eco-system services meaning that tourism values are reduced. Further, many of these areas will experience	SB : Reject - it is appropriate to say the warmer climate benefits tourism – we add the word "directly"; what DJ is referring to are

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						accelerating coastal erosion which could reasonably be expected to offset improvements in "weather". (David Jones, Australian Bureau of Meteorology)	indirect effects, which are in fact mentioned in 11,4,9 under ecosystem changes
E-11-37	A	3	25	3	27	If the phase of the IPO changes for the next few decades, then that could have an opposite effect on the flows in New Zealand's largest rivers from that of anthropogenic climate change. I suggest this should be mentioned here - I am not so sure that if BOTH anthropogenic and natural changes are considered it is fair to say the flows are "very likely" to increase throughout the period up to 2050. (David Wratt, National Institute of Water and Atmospheric Research)	JS – Agree – downgraded 'very likely' to 'likely'
E-11-38	A	3	32	3	35	This para needs to be supplemented by some more specific information on biodiversity risks, which are quite extensive. Could split into two, one on ecosystems and one risks to species. Language like "alter" does not convey the sign of effects to policy makers. My reading of the chapter and the literature is that the projected effects justify the use of a more directional term eg "degraded". In reference to species diversity the kind of conclusion that seems justified is that a large number of species are threatened by climate change in Australia and in NZ a large fraction of the entire endemic Alpine flora is a risk. (William Hare, Potsdam Institute for Climate Impact Research (PIK))	LH: following text added "increase the probability of species extinctions, degrade many natural systems"
E-11-39	A	3	33	3	35	This statement mixes the two systems of characterizing uncertainty used by WG II in an inconsistent fashion. Virtually certain is defined > 99% probability, while high confidence is defined as 8 chances out of 10 of being correct. The authors need to decide what level of certainty they are applying to this statement. (Lenny Bernstein, L.S. Bernstein & Associate, L.L.C.)	KH: see E11-8
E-11-40	A	3	37	3	37	Is this statement about ongoing development exacerbating risk too general given that significant parts of the coast line may in fact not experience significant risks to lives and property. (Graeme Pearman, Monash University)	NH & RW: Disagree, statement is not too general because it refers specifically to coastal settlements and ongoing development
E-11-41	A	3	38			I think also deterioration of the rail system, especially in the eastern South Island where it is often closer to the sea than is the road network, e.g., in the Kaikoura-Marlborough region (Ken Hughey, Lincoln University)	JS Agree, but no literature available to support this
E-11-42	A	3	39		40	suggest saying ".. and accompanying higher insurance costs." (Adolf Stroombergen, Infometrics)	TC: Agree KH: deleted "and higher insurance costs"
E-11-43	A	3	41	3	49	These statements mix the two systems of characterizing uncertainty used by WG II in an inconsistent fashion. Very likely is defined as 90 - 99% probability, while high confidence is defined as 8 chances out of 10 of being correct. The authors need to decide what level of certainty they are applying to these statements.	KH: see E11-8

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						(Lenny Bernstein, L.S. Bernstein & Associate, L.L.C.)	
E-11-44	A	3	42	3	43	Does a likely increased frequency of heavy rain / floods really put New Zealand hydro dams at risk ? Or can the water just be safely sent down the spillways? Is there any published material on this ? (I asked this with regards to a similar statement in the FOD). (David Wratt, National Institute of Water and Atmospheric Research)	JS BF. Rejected. Increase in amount of extreme rainfall will change probable maximum flood and mean that design criteria are no longer valid. Wording changed to make a little clearer.
E-11-45	A	3	44	3	44	"fire damage in major cities" should probably be "fire damage on the edge of major cities" (Barrie Pittock, CSIRO)	KH: Disagree. Some inner Sydney suburbs have bushfires.
E-11-46	A	3	52			I would question the "high confidence" attached to the statement about water. Do we really have this confidence? (David Jones, Australian Bureau of Meteorology)	Text modified – now more regionally specific .
E-11-47	A	4	1	4	1	"robust due to existing large surpluses presently exported" (Barrie Pittock, CSIRO)	KH, done.
E-11-48	A	4	5	4	5	Is this statement about ongoing development exacerbating risk too general given that significant parts of the coast line may in fact not experience significant risks to lives and property. With regard to this current line, the comment about evolutionary adaptation in many species needs to be considered in light of the use of the word “adaptation” later in the document. On Page 6 the Allen Consulting diagram is used to highlight the role of “adaptive capacity” in the minimisation of vulnerability. Presumably this includes “genetic” or “evolutionary” adaptation” of species, although this is not clear. This might include actual mutations and natural selection or the exchange of genes in a gene pool up and down clinal distributions. But presumably it also includes “behavioural” adaptation in both natural and human systems, migration, changes to breeding seasons, etc. However the following text indicates that in addition to this “natural” or “spontaneous” adaptive capacity there is “managed” or “planned” adaptation. I agree, and would suggest that at least the diagram be upgraded (an example of where this has been attempted, not as well as could be done here, is in Dupont and Pearman, 2006) to show this, and that “spontaneous” and “planned” adaptation be defined more precisely. This becomes particularly important when you get to the latter stages of the Chapter where the adaptation that is being spoken about is mainly “managed” adaptation, things that humans do to enhance adaptive capacity for themselves and for natural and production systems. Throughout the document particularly in the latter stages there is confusion between what is meant by the word “adaptation”. Whether it is the inbuilt capacity of systems to respond and change in biological systems (genetically as with Drosophila and presumably many species we don’t know about, and	BF: Useage of term “adaptation” is now made clearer throughout the text. Executive summary is not the place to explain the different meanings of the term. Also, adaptation is defined and discussed at length in Chapter 17.KH, BF, RW & LH text now distinguishes more clearly between planned and autonomous adaptation. The Allen Consulting diagram has been removed since it is now presented in the Introduction chapter.

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						behaviourally with phenological responses) and in humans systems where the life time of say built environment is sufficiently short that corrective responses take place subconsciously during rebuilds- for example, the changing frequency of extreme high water levels in Fremantle and Sydney, went unnoticed as normal development hid the changing level of vulnerability (see Point 125 below). Or where it is the planned interaction of humans to enhance adaptive capacity? Without some description of the complexity of the adaptive process, what is brushed over in the Alan Consulting diagram, I find that the discussion somewhat loose for an IPCC report. Perhaps this is handled elsewhere in the 4AR, but it certainly distracted me in my reading of this Chapter. (Graeme Pearman, Monash University)	
E-11-49	A	4	5			What is meant by evolutionary adaptation? (David Jones, Australian Bureau of Meteorology)	JS This is obvious LH: agree
E-11-50	A	4	8	4	8	Suggest "Most human systems in this region are likely to be responsive to managed adaptation and the economies have the capacity to carry this out". Or something like this. There are two ideas here- the responsiveness of the systems and the economic/technical capacity to do it. I note that there is no discussion of impacts, vulnerability or adaptation related to the issue of national security in the summary. Nor is there any reference to fisheries. Is this desirable? (Graeme Pearman, Monash University)	KH: Disagree. Current wording is OK. At the time of writing the SOD, there was no literature about impacts on national security and little literature about impacts on fisheries – see Section 11.4.6. Implications for national security are now mentioned in Section 11.4.7
E-11-51	A	4	8			I would question whether the authors actually mean resilience rather than adaptive capacity. For example, most urban water supplies consist of extremely large and buffering dams and well established planning processes which engender considerable reslience, but when this buffer is consumed the adaptive responses are both very painful (for example the near collapse of the nursery industry in Victoria) and very expensive (for example the plans for a desalination plant in Sydney). (David Jones, Australian Bureau of Meteorology)	KH: Disagree. Resilience is the opposite of vulnerability, which in turn is influenced by exposure, sensitivity and adaptive capacity/action (Fig 11.1). See Fig 4.1 in DuPont & Pearman (2006)
E-11-52	A	4	12		12	remove reference to insurance (Adolf Stroombergen, Infometrics)	JS, TC Agree. "and insurance" deleted
E-11-53	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: This comment doesn't seem relevant to line 19
E-11-54	A	4	22	4	23	The language of the last sentence of the Executive Summary ("... are both necessary to manage ...") could be criticied as being rather "policy-prescriptive". Can it be reworded into "policy-relevant but not policy-prescriptive" laguage, e.g. "Both adaptation and mitigation can contribute to management of regional vulnerability ..." (David Wratt, National Institute of Water and Atmospheric Research)	KH JS Agree, sentence deleted

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E-11-55	A	4	23	4	23	Add at end "but adaptation will become more difficult and expensive under high emission scenarios." (Barrie Pittock, CSIRO)	KH JS Agree, but sentence deleted
E-11-56	A	4	23			Vulnerability should be exposure. (David Jones, Australian Bureau of Meteorology)	RW: See comment 11-6 above.
E-11-57	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)	KH: This comment doesn't seem relevant since there are only 23 lines on page 4
E-11-58	A	4	47			presumably the "already stresse" refers principally to Australia? (Stephan Halloy, Instituto de Ecología, Universidad Mayor de San Andrés)	KH: This comment doesn't seem relevant since there are only 23 lines on page 4
E-11-59	A	5	0			How about some attention in this chapter to influence of early aborigines on climate of Australia; last 60,000 years? (David White, ASIT Consulting)	KH, DG: Disagree since marginally relevant.
E-11-60	A	5	10	5	10	Suggest hyphenate "export-based". (Graeme Pearman, Monash University)	KH: done
E-11-61	A	5	10			export based -> export-based (David White, ASIT Consulting)	KH: done
E-11-62	A	5	11			fro -> from (David White, ASIT Consulting)	KH: done (on page 1 line 28) – typo introduced by TSU
E-11-63	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)	KH: This comment doesn't seem relevant to line 11
E-11-64	A	5	17	5	17	Here and throughout the text I am puzzled by what seems to me very non-conventional way of citation of publications. The semi-colon rather than "and" between two authors' names, the use of a colon between successive references without spaces. This may be required by the IPCC but seems very strange and unnecessarily non-conventional to me. (Graeme Pearman, Monash University)	KH: error in EndNote reference software fixed
E-11-65	A	5	17			These first two sentences should be combined to 'In the IPCC TAR for Australia and New Zealand, the following impacts were assessed as important: (Clair Hanson, IPCC TSU)	KH: done
E-11-66	A	5	39	5	40	Change the sentence to: The considerable literature published since the TAR was reviewed and the new information, incorporated in this AR4 chapter, supports the TAR findings. (Vincent Lyne, CSIRO)	KH: Agree, with "supports" replaced by "strengthens".
E-11-67	A	5	39			Suggest changing "strengthen" to "extends" . (David Jones, Australian Bureau of Meteorology)	KH: see E11-66
E-11-	A	5	47			Suggest changing "product" to "function", as product has a precise mathematical	KH: "function" also has a mathematical

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68						definition. (David Jones, Australian Bureau of Meteorology)	definition. Changed “a product of” to “dependent on”,
E-11-69	A	5	49	5	52	This is where you might tighten the issue of what is really meant by “adaptive capacity”. (Graeme Pearman, Monash University)	RW: reduced to one sentence with a cross-reference to Introduction Figure I.1 (since Fig 11.1 deleted)
E-11-70	A	5	50	5	51	The sentence appears to imply that systems/populations become vulnerable once adaptive capacity is exceeded. However, in Chapter 2, page 8, line 43: Vulnerability is defined as "the extent to which a person or group is susceptible to harm or loss from exposure". These two definitions (the former implied rather than explicit) are incompatible. Surely, once adaptive capacity is exceeded there is an impact (i.e., there is destruction/injury/death because adaption capacity/capability is exceeded). There needs to be consistency in these definitions. The flip side of vulnerability is that some systems/populations may gain a competitive advantage - this is also an "impact" that should be discussed. (Vincent Lyne, CSIRO)	KH: there is an IPCC definition of vulnerability in the glossary. Fig 11.1 has been deleted since it appears as Fig I.1 in the Introduction chapter. RW: see comment 11-6 above
E-11-71	A	6	3	6	12	I'm not sure how this slipped through but the diagram is, in my opinion, incorrect especially in its treatment of "adaptive capacity". It is well accepted for example in the literature on automatic control theory (which spans many decades) that adaption is a feedback response that is used to control inputs (and mechanisms controlled by the inputs) in order to limit the output response. Adaption can affect both exposure and sensitivity or either one. For example, a person exposed to strong winds can adapt and hide behind an object in order to reduce their exposure. Alternately, a person exposed to the summer sun can adapt by increasing their production of darker pigments in order to reduce their sensitvity to the sun, or wear a hat, cover up and increase pigmentation in order to reduce exposure and sensitivity. Unfortunately this spreadsheet prevents me from drawing so my proposed replacement of the diagram is (using ASCII graphics): exposure ---- sensitivity ----------> potential impacts/vulnerability ^ ^ | : : v ---------- adaptive capacity ---------- So here, adaption occurs as a feedback that affects the inputs (exposure) and the underlying mechanism (sensitivity) in order to affect the output (potential impacts). Note also that if we look at situations where exposure and sensitivity confer competitive advantages then the feedback (adaption) becomes a positive feedback situation which is well known to lead to singular and unstable outcomes. This for example is the situation with respect to invasive species. At this late stage, it may	KH: : Disagree. We have considered alternative diagrams that include feedback loops, but our simple diagram fits nicely with the IPCC definition of vulnerability and the structure of the chapter. Fig 11.1 has been deleted since it appears as Fig I.1 in the Introduction chapter. RW: see comment 11-6 above.

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						be advisable to simply delete Fig. 11.1 but I'm happy to have my revised diagram replace it if the authors think the revision clarifies the situation. The notion that vulnerability and potential impacts are related is picked up in Fig 2.3 in Chapter 2, page 17 (see "Vulnerability assessment"). See also definition of adaption in Chapter 11, page 9, line 14. (Vincent Lyne, CSIRO)	
E-11-72	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)	KH: comment is irrelevant to this line.
E-11-73	A	6	17	6	17	Should it read "..and 20th-century trends"? That is hyphenated? (Graeme Pearman, Monash University)	KH: Disagree, common usage is "20th century"
E-11-74	A	6	19	6	25	This is not very clear. It might be best to say what happens under La Nina in NZ, rather than just saying 'Reverse patterns' occur. (John Zeldis, National Institute of Water and Atmosphere)	JS No space for extra text. We have replaced "reverse" with "converse"
E-11-75	A	6	19	6	37	Suggest you start these next two paragraphs with a minor heading "For New Zealand", (Graeme Pearman, Monash University)	KH: Disagree. The last 2 sentences in the first paragraph refer to Australia.
E-11-76	A	6	27	6	37	You may also wish to pick up some material from the paper "Changes in New Zealand daily rainfall extremes 1930-2004" by Georgina Griffiths which I understand has been accepted by "Weather and Climate" (David Wratt, National Institute of Water and Atmospheric Research)	JS 'with extremes showing similar trends' Griffiths 2007. Changes in New Zealand daily rainfall extremes 1930 – 2004 Weather & Climate
E-11-77	A	6	27	6	28	I question the statement that New Zealand temperatures have risen only 0.3°C since 1950. Eyeballing the plot at http://www.niwascience.co.nz/ncc/clivar/pastclimate which is based on Jim Salingers' data, it looks more like 0.5°C to me? The reference here (NIWA, 2005) is not helpful - it is not specified adequately in the reference list (P49 line 33). (David Wratt, National Institute of Water and Atmospheric Research)	JS – Agree 0.5 NIWA 2005 Past climate variations over New Zealand http://www.niwascience.co.nz/ncc/clivar/pastclimate
E-11-78	A	6	29	6	29	Change units: 10-20 days/year (Dean Collins, Bureau of Meteorology)	JS Agree
E-11-79	A	6	30	6	31	Maybe there is no trend in cyclone frequency, but what about intensity? Need to be explicit. (Holger Meinke, Department of Primary Industries and Fisheries, Qld, Australia)	JS There is no trend in intensity either – text added
E-11-80	A	6	31	6	31	Should the increased frequency of extreme events be added here immediately and not latter? (Graeme Pearman, Monash University)	JS – See E 79
E-11-81	A	6	31			frequency and strength … has -> have (David White, ASIT Consulting)	JS Agree

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E-11-82	A	6	33	6	33	Hyphenate “sea-level”. (Graeme Pearman, Monash University)	JS Agree
E-11-83	A	6	35	6	36	The Roderick and Farquhar results are, to my knowledge, still controversial. (Holger Meinke, Department of Primary Industries and Fisheries, Qld, Australia)	JS Text changed – see G45
E-11-84	A	6	35			offer explanation for pan evaporation declining in 6 out of 19 sites (David White, ASIT Consulting)	JS Text changed – see G45
E-11-85	A	6	35			"Pan evaporation has declined significantly at 6 out of 19 sites" - What has happened at the other 13 sites ? (David Wratt, National Institute of Water and Atmospheric Research)	JS Text changed – see G45
E-11-86	A	6	36	6	36	After “snow” there should be the words “amount”, “fall’, “areal extent”, “persistence”, “melt” or something that tells you more precisely what the trend is really measuring. (Graeme Pearman, Monash University)	JS Agree – text modified
E-11-87	A	6	37			not clear where this refers to, south of the main islands of NZ, of south of NZ as a whole (i.e. southern ocean) (Stephan Halloy, Instituto de Ecología, Universidad Mayor de San Andrés)	KH: comment irrelevant to this line
E-11-88	A	6	39	6	39	and then at Line 39, “For Australia” so the reader realises that the two regions are to be taken in turn. (Graeme Pearman, Monash University)	KH: Agree
E-11-89	A	6	41	6	41	Is this appropriate in this Chapter? Surely well covered with references in other parts of the AR4 and reference can be just to that Chapter? (Graeme Pearman, Monash University)	KH: Disagree. We need to deal with ANZ climate change attribution in this chapter.
E-11-90	A	6	42			Australian-average -> Australian average (David White, ASIT Consulting)	
E-11-91	A	6	43	6	45	increasing frequencies might be easier to comprehend expressed as days per decade. (Barrie Pittock, CSIRO)	KH: disagree. All other trends are expressed as changes per year
E-11-92	A	6	45	5	46	The statement that “…the northwest two-thirds of the country has become wetter since 1950…”should point out that this increase comes from an increase in the summer monsoon rainfall. (Sam Cleland, Bureau of Meteorology)	KH: Agree. Text modified
E-11-93	A	6	46			While 1950 is a convenient starting point for looking at trends the 1950s were wetter than average and this has the effect of accentuating the drying trend. (Andrew Ash, CSIRO Sustainable Ecosystems)	KH: Noted, but trends starting in 1940 or 1960 show the same general pattern. Trends since 1970 further exacerbate the drying in the east. Trends since 1900, 1910, 1920 or 1930 show increases over most of Australia, except the SW, NE Vic and Tas. We use 1950 as the

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							baseline since it is also used for temperature
E-11-94	A	6	47	6	48	The use of linear trends with respect to changes in rainfall pattern seems problematic as they generally oversimplify the situation in a way that is often misleading, as well as not sufficiently taking into account multi-decadal variability. The linear trend rainfall for SE Australia from 1950 - 2000 shows a decline , while the linear trend from 1900 - 2000 shows an increase, but when you study the data in detail there is little trend from 1900-1946 (apart from significant inter-annual variability but with little change in the mean over this period) and little trend from 1950-2000 (though again with significant inter-annual variability though about a higher mean) while there is a sharp transition between these two "regimes" around 1947. This change in rainfall may be better represented as a change between two "states" - a dry period and a wet period - rather than by a linear trend. Also the relative shortness of the record and the occurrence of multi-decadal shifts means that any linear trends are very sensitive to your starting point (in or out of a "dry period"), and also makes it difficult to discern a climate change signal from a "natural" multi-decadal cycle (the "noise vs signal" problem). In summary, the use of linear trends here and elsewhere in the report fro rainfall could be misleading in not sufficiently acknowledging that the response of rainfall in a location to global warming may not be a linear one. (Perry Wiles, Australian Bureau of Meteorology)	KH: Agree, but this is the only place in the chapter where observed rainfall trends are mentioned. See E11-93
E-11-95	A	6	47	6	47	suggest replace "have risen" with "are now warmer". (Janice Lough, Australian Institute of Marine Science)	KH: we now say “are higher”
E-11-96	A	6	47			I do not believe that one can say that droughts have become more severe, simply because temperatures have increased. The pan evaporation data, our only real observational estimate of evaporative demand, suggests that droughts are not experiencing increased evaporative demand. Suggest changing this to simply say that "droughts have become hotter". (David Jones, Australian Bureau of Meteorology)	KH: Agree.
E-11-97	A	6	49			NSW isn't explained before it is used here (Clair Hanson, IPCC TSU)	KH: Agree, NSW now explained in full
E-11-98	A	6	50	6	50	suggest replace "Most extreme events are changing" with "The frequency of extreme events is increasing". (Janice Lough, Australian Institute of Marine Science)	KH: Done
E-11-99	A	6	52	7	1	A recently submitted paper by Jovanovich et al (2006) suggests no trend in pan evaporation over the period 1970-2005. It is likely that the decline described by Roderick and Faquhar 2004 is partially due to instrumental changes during the early part of the record.	KH: Noted, this paper has been cited

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						(Dean Collins, Bureau of Meteorology)	
E-11-100	A	6				the sensitivity section should mention the issue of health effects (Stephan Halloy, Instituto de Ecología, Universidad Mayor de San Andrés)	KH: this comment is irrelant to page 6
E-11-101	A	7	1			Pan evaporation down while potential evapo'n up .. explain (David White, ASIT Consulting)	KH: Noted. Reference to potential evaporation is unnecessary and has been removed
E-11-102	A	7	7	7	13	Beginning this paragraph with the phrase "New Zealand's offshore islands …" may give the reader the impression all of the islands referred to in this paragraph are NZ territory. However Macquarie and Heard Islands are Australian. Rephrase ? (David Wratt, National Institute of Water and Atmospheric Research)	JS Agree – Australia/New Zealand added in text
E-11-103	A	7	8	7	12	coordinates of islands would help readers (Barrie Pittock, CSIRO)	JS.: Agree – Coordinates added
E-11-104	A	7	10	7	10	Should there be some comment of the somewhat counter intuitive observation of lower air moisture? (Graeme Pearman, Monash University)	JS Wind speeds have increased
E-11-105	A	7	12	7	12	Is the citation to the Heard Island observations the same as for Campbell Island? If not there needs to be a citation for the latter. If so, then it is ambiguous. (Graeme Pearman, Monash University)	JS Reference is to both
E-11-106	A	7	13			Table 11.1: . Reference is made to Winn et al, 2006, which partly attributes wetland changes of the Top End to "drier monsoonal conditions". This claim of "drier monsoonal conditions" contradicts observed trends and the earlier staement of northwest of country getting wetter (Sam Cleland, Bureau of Meteorology)	LH: Agreed - Text changed to take this point into account. Reference checked and wording in table modified
E-11-107	A	7	20			How does one exclude drought? I pressume this is an exclusion of the slow onset losses associated with agricultural, hydrological drought, and not the rapid losses assocated with rapid drought associated events such as wildfires. (David Jones, Australian Bureau of Meteorology)	KH: Good point. Removed "excluding droughts".
E-11-108	A	7	21	7	22	Its said that droughts are more costly than floods and as these are weather related, maybe they should be costed here. (John Zeldis, National Institute of Water and Atmosphere)	JS Droughts in NZ are costed – see lines 30-32
E-11-109	A	7	22	7	23	"… and flood damage [for New Zealand] averaged about US$85 million per year from 1968 - 1998 ". This US$85M number sounds too high, given that in the following box (11.1) the costs of even the February 2004 North Island floods, which were one of the most damaging events over this 1968-98 period, were quoted at less than this (US$78M). Or is the $85M number an estimate of the total (insured + uninsured) annual damage with the Box 11.1 figures being only insured damage ? (David Wratt, National Institute of Water and Atmospheric Research)	JS: From NZIER Report on 'Economic Impact of Climate Change related extreme events: Focus on Freshwater floods' they quote: Ericksen's annual cost estimate is equivalent to around $128 million in today's prices. http://www.climatechange.govt.nz/resources/reports/economic-impacts-extreme-events-jul04/economic-impacts-extreme-events-

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							jul04.pdf. This is a total cost, rather than insured value only,
E-11-110	A	7	25	7	51	Box 11.1: I suggest you clarify whether (a) the $$ values quoted in this box are all adjusted to some particular year, and (b) for each of the items where a $$ cost is given clarified whether this is just the insured cost or is an estimate of the total cost. (David Wratt, National Institute of Water and Atmospheric Research)	JS – All costs are adjusted to 2002-2006. Drought is uninsurable, all other losses are insured values.
E-11-111	A	7	27			Cost of drought in 2002-03 US$7.6b *** (David White, ASIT Consulting)	KH: meaning? Cost was 1% of GDP according to ABARE or 1.6% of GDP according to Adams et al (2002)
E-11-112	A	7	28	7	30	More recent information on govt assistance could be ised. For example, "The Australian Government spent $AUD 411M between 2001 and 2004 on welfare and business related drought assistance as part of the Exceptional Circumstances policy (Drought Review Panel 2004). Drought Review Panel (2004) 'Consultations on National Drought Policy – Preparing for the Future.' Australian Government Department of Agriculture, Fisheries and Forestry, Canberra. (Andrew Ash, CSIRO Sustainable Ecosystems)	KH: Noted. Not cited in Box, but cited as an example of current adaptation in 11.2.5
E-11-113	A	7	28	7	28	Is the BoM reference about droughts? Not at all obvious from the title to the article. (Graeme Pearman, Monash University)	KH: This should be BoM 2006: Living with drought. Australian Bureau of Meteorology. http://www.bom.gov.au/climate/drought/livedrought.shtml accessed 14 April 2006.
E-11-114	A	7	32			In Box 11.1 to remain consistent change 1,700 million and 1,300 million to 1.7 and 1.3 billion (Clair Hanson, IPCC TSU)	KH: done
E-11-115	A	7	32			Change 1,700 million to 1.7 billion (David Jones, Australian Bureau of Meteorology)	KH: done
E-11-116	A	7	38	7	38	Can't find Steffen 2004 in references. (Graeme Pearman, Monash University)	KH: It's Lavorel and Steffen 2004. Reference formatting fixed
E-11-117	A	7	40			Change "rendered useless" to "contaminated by" (David Jones, Australian Bureau of Meteorology)	KH: Agree
E-11-118	A	7	44	7	44	I find the statistics on numbers "without power" pretty meaningless without some indication of time or the outage. Would it be a big problem if the outage was say, for 10 minutes? (Graeme Pearman, Monash University)	KH: Agree. Text revised
E-11-119	A	7	46	7	46	Wikipedia is probably not the most robust reference to use here and is best deleted and not used anywhere in the document if this document wishes to remain credible to a wide (particularly scientific or policy) audience. (Sean Weaver, Victoria University of Wellington)	KH: done

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E-11-120	A	7	46	11	46	find a better reference, or at least give date when looked up, as site changes (Barrie Pittock, CSIRO)	KH: done
E-11-121	A	7				Box 11.1, are there any other examples of extreme events for New Zealand. The box is dominated by Australia (Clair Hanson, IPCC TSU)	JS the balance is OK since Australia is exposed to more storms
E-11-122	A	8	5			Change "are poorly understood" to "not well understood" (David Jones, Australian Bureau of Meteorology)	KH: done
E-11-123	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)	KH: comment is irrelevant to this line
E-11-124	A	8	7			Table 11.11. Entry under “glaciers”. I suggest that the words “Franz Josef Glacier” need to appear before “Ice volume…”. There might be confusion that this is somehow a national number rather than that for a specific glacier that has been properly studied. (Graeme Pearman, Monash University)	JS No – it is Southern Alps
E-11-125	A	8	7			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: Australia already is a subtitle in the Table, refernces checked but not included in interests of space as not directly relevant
E-11-126	A	8	8	8	9	Table 11.1: please check that the first statement in Table 11.1 is correct - I was unaware that rainforest in Australia is actually expanding. (Holger Meinke, Department of Primary Industries and Fisheries, Qld, Australia)	LH: Yes rainforest is expanding in some areas – details are in the refs cited in the Table
E-11-127	A	8	8	8	9	Table 11.1 Coral Reefs: The 1998, 2002 and 2006 coral bleaching events on the GBR are the only ones we can say with confidence were "mass bleaching events", due to good observations and reporting. All we know about the events in 1980, 1982, 1987, 1992 and 1994 is that there were some reports, confined to the central section of the GBR, of bleaching of varying intensity. I am uncomfortable with these years being lumped in with the 1998, 2002 & 2006 events. Also, the references given only remark on the 1998 & 2002 events; Description of the 2006 event has not, as far as I know, reached the literature as yet - suggest maybe refer to a URL (eg NOAA/NESDIS "bleaching hotspots" or Great Barrier Marine Park Authority "Bleaching Watch"). Berkelmans, R and JK Oliver (1999) Large-scale bleaching of corals on the Great Barrier Reef, Coral Reefs 18: 55-60 make	OHG: The reviewer does have a point that the earlier mass bleaching events appear in the literature but that the geographic extent and damage was undocumented. Replace text in Table 11,1 with: “Eight mass bleaching events on the Great Barrier Reef since 1979 and no serious events known prior to 1979 (see Section 11.6). Events are triggered by unusually high sea surface temperatures. Most widespread events appear to have occurred in 1998 and 2002, affecting over

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						references to the earlier events. The Done et al 2003b should be Done et al 2003 - see comment on Page 41 (Janice Lough, Australian Institute of Marine Science)	60% of reefs within the GBRMPA. Reporting on severe bleaching on the southern Great Barrier Reef in 2006 is still being compiled."
E-11-128	A	8	8			What is meant by "at least a quarter of glacier mass since 1950" Does this mean that the current glacial mass is 75% of what existed in 1950? (David Jones, Australian Bureau of Meteorology)	JS Yes
E-11-129	A	8	8			Tale 11.1: The details provided in the reference list for Anderson 2004 (the glacier reference) are inadequate - Is this a PhD thesis, or some other sort of report ? (David Wratt, National Institute of Water and Atmospheric Research)	JS Yes 'Unpublished PhD thesis, University of Canterbury
E-11-130	A	8	8			I find the Winn et al. 2006 reference to "drier monsoonal conditions" difficult to believe as the northern wet season shows a dramatic increase in recent decades. (David Jones, Australian Bureau of Meteorology)	LH Noted: text now changed
E-11-131	A	8	13	8	13	As this Chapter deals with human, animal and plant populations, I suggest the Line should read, "Human population growth places….resources. Growing human energy demand …" (Graeme Pearman, Monash University)	KH done
E-11-132	A	8	13	9	9	This is an example where the reports 'jumps' from one issue to the next without any (logical?) connection, making it sometimes difficult to follow. This also contains the danger of future misinterpretations of the findings. I already alerted to a similar issue in my first comment (page 3, lines 12-14). The paragraph starts off OK by talking about resource use in general. The second sentence then talks about energy demand, followed by water demand in the third sentence. So the question is: which demand are the authors referring to on page 9, lines 1-2 when they talk about agricultural intensification in NZ? Natural resources in general, energy or water? (Holger Meinke, Department of Primary Industries and Fisheries, Qld, Australia)	KH: added linking sentence ." Human and natural systems are sensitive to a variety of stresses independent of climate and weather". We clearly state that "Increased demand since the 1980s in New Zealand has been due to agricultural intensification".
E-11-133	A	8	32			renewables: mostly hydroelectric (Stephan Halloy, Instituto de Ecología, Universidad Mayor de San Andrés)	KH: comment is irrelevant to this line
E-11-134	A	9	4			Make clear that the per capita water use is household water use (it clearly does not include agriculture, for example). Further, the 180-300 range provided for NZ needs to be narrowed. Surely the per capita use is know to a greater accuraccy than this. (David Jones, Australian Bureau of Meteorology)	JS The water use is per capita and reference does not make clear that it is household. NZ reference only gives the braod range.
E-11-135	A	9	7			1985-1996/7 ,,, 11 or 12 years for 65% in water demand? (David White, ASIT Consulting)	BB: Source checked and confirmed 1985-1996/7. To be conservative, we've changed 1996/7 to 1996.
E-11-136	A	9	8		9	The last sentence starting 'Invasive species…' seems to be tacked on the end of a paragraph giving a lot of information about energy, water and agriculture. Can any	MH: text added "particularly for agriculture and forestry (MfE, 2001; SOE, 2001), for

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						examples be provided for invasive species and the environmental problems they pose? (Clair Hanson, IPCC TSU)	example *Cryptostegia grandiflora*; (Kriticos *et al.*, 2003b; Kriticos *et al*., 2003a)"
E-11-137	A	9	11	9	11	Autonomous' adaptation is fine, but I would stay away from the term 'spontaneous'. Although it is fine in the strict sense of the meaning 'spontaneous', it sends an unintended message of 'quick, fast, rapid response etc'. Some of the so-called spontaneous adaptations I have come across happened very slowly at decadal or even generational time scales. Proactive adaptation aims to speed up this process. (Holger Meinke, Department of Primary Industries and Fisheries, Qld, Australia)	RW: Disagree, as the word "spontaneous" was taken directly from the IPCC glossary
E-11-138	A	9	12			Section 11.2.5 does not clearly distinguish between the very different issues of natural adaptation and human adapation. This distinction is probably more important than the distinction between autonomous and planned adaptation, as in the early stages of climate change almost all natural adaptation will be autonomous, while most human adaptation will be a mix of planned and autonomous. (David Jones, Australian Bureau of Meteorology)	RW & NH: Agree. Rewording to make clear that planned adjustments are made by humans in natural systems.
E-11-139	A	9	20	9	20	Throughout the Chapter, when specific sections of the text are referred to, in my view this means "Section" is a proper noun and should be capitalised. This is what you do when referring to "Figure 11.2", "Table 11.2" or "Chapter 17" for example. My personal preference, one shared by some journals and not others, is that "Figure" should be spelt out in full, again consistent with the way these other components of the text are referred to. (Graeme Pearman, Monash University)	KH: Agree, done
E-11-140	A	9	42	9	42	Should be the word "the" before "region". I am not sure that this assertion about growing support can be substantiated at least in Australia. Setting ARC priorities is not the same as the flow of research funding into the area. Indeed from a research point of view, at least for some institutions, the level of support has decreased. At least the rationale for this argument should do provided. (Graeme Pearman, Monash University)	KH, BF & RW. Accepted. First sentence deleted. RW & NH: Agree. Leading sentence modified slightly.
E-11-141	A	9	42	9	42	"growing support for this in the region" - please state what "this" is. (Janice Lough, Australian Institute of Marine Science)	KH: See E11-142
E-11-142	A	9	42			Reword the first sentence. This sentence says nothing... (David Jones, Australian Bureau of Meteorology)	KH: Agree, sentence deleted
E-11-143	A	9	42			Poor sentence: change to something like: "There has been growing support for the provisions of knowledge, data and tools in the region". (Ken Hughey, Lincoln University)	KH: See E11-142
E-11-144	A	9	45			Operational research and development … has -> have (David White, ASIT Consulting)	KH: Done

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E-11-145	A	9	46	9	48	My understanding is that Australia's National Research Priorities are a Federal Government inititiative under the Dep. Education, Science & Training (see http://www.dest.gov.au/sectors/research_sector/policies_issues_reviews/key_issues/national_research_priorities/default.htm) rather than just an Australian Research Council program. (Janice Lough, Australian Institute of Marine Science)	KH: Noted, text revised
E-11-146	A	10	2	10	7	The NZ Local Government Guidance Manual (Wratt et al 2004 in your reference list) strongly advocates a risk management approach to climate change adaptation, and includes chapters on risk assessment and on integrating climate change risk assessment into council decisions. I suggest this Guidance Manual be referred to in this "Risk assessment" paragraph. (David Wratt, National Institute of Water and Atmospheric Research)	RW: Agree to include reference
E-11-147	A	10	3	10	3	There is something wrong with the citation “AS NZS 4360:1999”? I am not sure that the AGO assessment would be seen by all parts of Government as a “national assessment”. (Graeme Pearman, Monash University)	KH: Agree. Replaced with AGO Risk Guide for business & government (2006) & equivalent report (Wratt et al, 2004) for NZ councils.
E-11-148	A	10	5	10	5	Is this Warrick Kenny and Harman (2001), or Warrick (2000)? Need to check. (Graeme Pearman, Monash University)	RW: have checked and clarified ref entry
E-11-149	A	10	6	10	6	I am not sure that reference to one example constitutes support for this broader assertion. It is important also to note that most assessments are really sectoral and regional assessments- that is, what happens to this industry in this locale. These are not necessarily the kinds of national or regional assessments that are important. (Graeme Pearman, Monash University)	KH, RW, BF: Noted, Wording revised as “Regionally-relevant guidelines are available for use in risk assessments (Wratt *et al.*, 2004; AGO, 2006).”
E-11-150	A	10	12	11	10	A critical element that appears to be overlooked is the need for the development and application of tools that allow comparative scenario planning. Given that the future is uncertain and non-deterministic, scenario planning allows the evaluation of alternative, possible futures in response to action. This, in turn allows the prevention of undesirable outcomes. In other words, to prevent such undesired outcomes requires the integration of mitigation AND adaptation actions into comparative scenario analyses. Operational models are required to conduct such scenario analyses in close collaboration with practitioners. This requires ‘science at the boundaries’, ie. an investment in truly interdisciplinary science. Hence, a discussion on the state of play of such boundary science as well as a recognition that adaptation and mitigation are intrinsically linked would greatly enhance the value of this chapter. Treating ‘mitigation’ in isolation from ‘adaptation’ probably misses the most important point: the need and the capacity to prevent undesirable outcomes.	RW & NH: Agree to the need to integrate mitigation and adaptation, KH, BF: mitigation is not the focus of this Working Group, but mitigation is briefly mentioned in 11.2.5, 11.4.12 and 11.7

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						(Holger Meinke, Department of Primary Industries and Fisheries, Qld, Australia)	
E-11-151	A	10	13	10	13	Why define at acronym "LGAs" when it is not used again? (Graeme Pearman, Monash University)	KH: diasagree; LGA is used 4 times in lines 46-48
E-11-152	A	10	17	10	21	The Australian Government will shortly (due July 2006) be releasing a new report titled 'National Agriculture and Climate Change Action Plan 2006-2009'. Can this be added to the list of action plans in this section? (John Garnham, Department of Primary Industries)	MH report cited
E-11-153	A	10	20	10	21	The Representative Areas Program Zoning Plan does not explicitly include climate change. However, the Great Barrier Reef Climate Change Action Plan should be referred to here, instead. (Paul Marshall, Great Barrier Reef Marine Park Authority)	.OHG: Disagree. In the submissions to the Science behind the rezoning plan, climate change was indicated as one of the key reason for expanding no-take areas within the Park from 4.6% to over 33%. This is argued in the Hughes et al. (2003) Science paper and the associated Townsville Declaration.
E-11-154	A	10	20	10	21	My understanding is that the Representative Areas Program for the GBRMP was designed to "protect biodiversity" and does not explicitly include climate change as part of its action plan, as suggested in this sentence. The GBRMPA did, however, establish a "Climate Change Response Program" in association with the Australian Greenhouse Office (see http://www.gbrmpa.gov.au/corp_site/info_services/science/climate_change/) - this might be a better action to refer to in this context. (Janice Lough, Australian Institute of Marine Science)	OHG see above
E-11-155	A	10	21	10	21	Capitalise "Section". (Graeme Pearman, Monash University)	KH: done
E-11-156	A	10	32	10	42	While it may well be the remit does the Committee have an agreed set of indicators against which to measure, across the country? I think it is important to expand. (Ken Hughey, Lincoln University)	RW: good point. The answer to the query is "no" – no criteria, so cannot expand.
E-11-157	A	10	33	10	37	Is it desirable to spell out the relationship between State Committees, the AGO and governments, perhaps with web addresses for each? Such a complex set of arrangements will be confusing for those who do not understand the Australian Federal structure. (Graeme Pearman, Monash University)	BF & KH: Lines 33-37 are about NZ. The detailed institutional arrangements between governments and committees in Australia are not necessary for this chapter.
E-11-158	A	10	37	10	37	Suggest write "AGO" out in full for the international reader, perhaps with a web site they can follow (Graeme Pearman, Monash University)	KH: Disagree. AGO is defined on page 9 line 50
E-11-159	A	10	39	10	39	Suggest "….(for example, Allen Consulting Group….". (Graeme Pearman, Monash University)	KH: Done

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E-11-160	A	10	41		42	Suggest mentioning that the capacity for climate monitoring is threatened by ongoing declines in the meteorological and related networks in Australia and the introduction of automated technologies without suitable maintenance support. An example is shown in Jones and Trewin (1996) for rainfall. Similar trends are shown in the ground based radiation network. Jones DA and Weymouth G 1997. An Australian monthly rainfall data set. Technical Report No. 70, Bureau of Meteorology, Melbourne, Australia, 19pp. (David Jones, Australian Bureau of Meteorology)	KH: Agree, but section 1.2.5 is about climate change adaptation, not about observation of climate change. References to monitoring climate variables has been removed.
E-11-161	A	10	44	10	49	Worth noting that in 2004 MfE ran a public awareness campaign re climate change. Awareness of this campaign was assessed by Hughey, et al. (2004): The 2004 survey respondents were asked "Are you aware of the Ministry for the Environment's Climate Change Programme?". Participants could check one of three boxes; "Yes", "No", or "Don't know". Of 800 participants who responded to this question around 29% were aware of the programme while the majority (61%) were not aware and 10% responded "Don't know". NZ Europeans and those over 40 years of age were more likely to be aware of the Climate Change Programme. (HUGHEY, K.F.D., KERR, G.N. CULLEN, R. Public Perceptions of New Zealand's Environment: 2004. EOS Ecology, Christchurch. 2004.) (Ken Hughey, Lincoln University)	RW Agree that it is important reference. However, given the severe page restrictions for Ch 11 and the fact that this finding refers to awareness of MfE's programme rather than to climate change per se, we cannot include it in the chapter in this instance.
E-11-162	A	10	46	10	46	spell out acronym LGA (Barrie Pittock, CSIRO)	KH: Disagree. Already spelt out in line 13
E-11-163	A	10	46	10	49	rewrite – does not make sense – missing words? (David White, ASIT Consulting)	KH: Done, inserted a comma before "supported"
E-11-164	A	10	49	10	50	Is it OK to refer to the acronym "CSIRO" in an international document, or should it be written out in full? Similarly, is reference to the State and Territory Governments, something that will be understood by the international reader without explanation? Indicating that there is support for the Australian Climate Change Science Program and the National Climate Change Adaptation Program is true and should be mentioned. But it does not necessarily indicate a "growth" in support. I suggest this Section needs a little bit more work. It is true on the one hand there is support, but is their growth and where is the evidence for growth? This Section also omits reference to the Climate Change Committees in each State and the State of the Environment Reports of each State in which there is coverage of climate change. (Graeme Pearman, Monash University)	KH: Noted. CSIRO now defined. New text inserted on Ministerial Councils and COAG Climate Change Group. Growth in funding is real, but relative to a low base when compared with other countries. This might be considered a political statement, but it is a fact. We now state "However, progress has been slow and intermittent, often in response to disasters like droughts, fires and floods"
E-11-	A	11	1			There is no equivalent funding mechanism in New Zealand thus potentially limiting	RW: there is not a comparable program in

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165						the bottom-up response? (Ken Hughey, Lincoln University)	New Zeaaland
E-11-166	A	11	3	11	3	This focus is not my impression. Mitigation policy has been highly contentious, but most research at least has been on impacts and adaptation, and actual mitigation policy research and implementation has been minimal (no sectoral targets, all voluntary, reducing land clearing the only major effort). (Barrie Pittock, CSIRO)	KH: Disagree. SA and NSW have set emission reduction targets pf 60% by 2050. The are renewable energy targets: Aus has the MRET and Vic has the VRET. NSW has GGAP, BASIX and a host of other programs to reduce emissions. In Australia, DEH and all State and Territory governments have greenhouse action plans that focus more resources on mitigation than adaptation. Implementation may have been minimal but it is not for this chapter to comment on this. See comment 150
E-11-167	A	11	3	11	3	Should this read “In general, the focus of the governments of both countries has…”. I think this is true, but not true of the wider view of “countries”, viz. companies and the wider population. (Graeme Pearman, Monash University)	KH: Agree
E-11-168	A	11	5	11	5	Maybe change "status of adaptation" to "recognition of the necessity for adaptation" (Janice Lough, Australian Institute of Marine Science)	KH: Done
E-11-169	A	11	7	11	7	You need a citation where the reader can follow up on what the Australia-New Zealand Bilateral Climate Change Partnership really is. (Graeme Pearman, Monash University)	RW we now cite AGO (2003) http://www.greenhouse.gov.au/international/partnerships/index.html#newzealand
E-11-170	A	11	9	11	10	It would be useful to say why, e.g., due to short-term thinking, scepticism re impacts, denigration of the science, vested interests (Barrie Pittock, CSIRO)	RW: have reworded text to reflect potential, rather than lack of action
E-11-171	A	11	9	11	9	I am not sure: how confident that one can be with this assertion. Is there citeable evidence. (Graeme Pearman, Monash University)	KH: See also E11-170
E-11-172	A	11	15	11	15	Given that ENSO is described as "the strongest regional driver of regional variability" in 11.2.1, it should also be mentioned in 11.3.1. What are the asumptions about how ENSO will change in future? (Dean Collins, Bureau of Meteorology)	JS ENSO projection added
E-11-173	A	11	17	11	17	The term “scenarios” is used here. Is this is the best term? Might these be regarded as projections? Is there a clear definition somewhere in the wider document that makes clear the difference between “predictions” (see later use in the Chapter),	JS – Consistent with glossary

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						"projections" and "scenarios"? Without this clarity, the text can lack rigour. (Graeme Pearman, Monash University)	
E-11-174	A	11	17			Remove the word "very" (David Jones, Australian Bureau of Meteorology)	KH: deleted "with very coarse resolution" and add the following at the end of the sentence "but results for Australia and New Zealand are limited to averages over two regions: northern Australia and Southern Australia (including New Zealand)"
E-11-175	A	11	19	11	19	Would it be better to refer to the authors of the "CSIRO" document? In any case, don't bold "CSIRO". (Graeme Pearman, Monash University)	KH: Noted CSIRO un-bolded
E-11-176	A	11	19	11	19	CSIRO should not be in bold. (John Zeldis, National Institute of Water and Atmosphere)	See comment 175
E-11-177	A	11	19	11	19	change bold font for "CSIRO" to normal font. (Vincent Lyne, CSIRO)	See comment 175
E-11-178	A	11	19			(CSIRO 2001) -> CSIRO (2001) (David White, ASIT Consulting)	KH: agree
E-11-179	A	11	20	11	20	Would it be better to include, "…respectively, and utilising the range of emissions scenarios and model responses as indicated in Tables 11.2 and 11.3." (Graeme Pearman, Monash University)	KH: done
E-11-180	A	11	20		21	The references to CSIRO and NIWA are inconsistent. (David Jones, Australian Bureau of Meteorology)	See comment 178
E-11-181	A	11	22	11	30	I suggest it would be useful to also say something here about possible changes in rainfall associated with IPO changes - especially when considering the 2030s. (See my comment regarding Page 3 lines 25 - 27). The reference to a "60% increase in the annual mean westerly winds" is potentially misleading. The mid-range projection of Wratt et al 2004 is for "a 60% increase in the mean westerly component of the flow". Also there are two references in this paragraph to "MFE 2004b", whereas this reference is listed in the reference list as Wratt et al 2004. (David Wratt, National Institute of Water and Atmospheric Research)	JS: Agree – added 'projected changes will be superimposed on natural variability including ENSO and the IPO' and replaced 'wind' with 'component of wind speed' Increased westerlies are important to mention because the South Island will become windier
E-11-182	A	11	24	11	24	change "to be biased toward increase" to increase" , or "to be biased towards an increase". Or, change the sentence to: "Consequently, precipitation is more likely to increase than decrease, except…." (Vincent Lyne, CSIRO)	KH: changed to "a tendency for increased precipitation is likely". This is consistent with the wording used for Australian rainfall in line 26.
E-11-183	A	11	28	11	29	Is this by 2030, 2080, or otherwise? Needs clarity. (Graeme Pearman, Monash University)	JS By 2100 added.
E-11-	A	11	28			I am not entirely happy with the idea of representing changes in threshold events	JS percentages converted to days/yr

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184						such as days about 30 as percentages This will inevitably mean that some places which rarely exceed thresholds seen enormous changes in the percentage frequency. (David Jones, Australian Bureau of Meteorology)	
E-11-185	A	11	32	11	35	Re Table 11.2 - I think it would be more readible if the heading for the 2nd and 4th columns was change to (% precipitation) because without context % means nothing (Ken Hughey, Lincoln University)	KH: Agree. Table 11.2 reformatted like Table 11.3 for consistency
E-11-186	A	11	32	11	34	Caption for Table 11.2: The ranges shown in this Table are not just uncertainty ranges. It appears you have prepared it by drawing together numbers from various locations listed in Tables 2.2 - 2.5 of Wratt et al 2004. Thus part of the range you quote for (e.g.) Western North Island reflects real spatial differences in the projections between (say) Paraparaumu and New Plymouth. The caption needs some modification to reflect this. (David Wratt, National Institute of Water and Atmospheric Research)	JS Table 11.2 reformatted with new caption KH: See also comment 185
E-11-187	A	11	40	11	40	An example of the neglect that observed trend of increased monsoon rainfall in northwest of Aus continent gets throughout this chapter. (Sam Cleland, Bureau of Meteorology)	KH: Disagree. These are projections for the future, not observed trends
E-11-188	A	11	40			No indication of magnitude of rainfall decrease in Australia pre- and post-2020, 2050 .. (David White, ASIT Consulting)	KH: Noted. Can't provide pre-2020 projections due to dominance of annual-decadal variability. Projections for pre and post 2050 are already given in Table 11.3
E-11-189	A	11	41	11	41	I am still a bit uncomfortable with statements such as "decreased rainfall is likely over most of Australia". My understanding of recent projections for Australia is that the risk of drought is likely to increase (with reasonable confidence) in southern Australia but that there is very little confidence/consenus about projected rainfall changes, especially in eastern and northern tropical Australia. I think there should be greater mention of this uncertainity, particularly given the high inter-annual rainfall variability and modulation of rainfall by ENSO and PDO - for which projections are not very robust at present. (Janice Lough, Australian Institute of Marine Science)	KH: Noted. A surprising comment given the detail in Table 11.3. Ranges don't seem to be the best way to communicate uncertainty, but we don't have probabilities yet. Suppiah et al (2006) also reported results for the 15-model average changes in temperature and rainfall over Australia, which clearly showed decreased rainfall over the whole continent. This is now mentioned.
E-11-190	A	11	41	11	41	Capitalise Section. (Graeme Pearman, Monash University)	KH: OK
E-11-191	A	11	43	11	43	consistency re base year is critical. SPM says "all relative to pre-industrial", yet most impacts studies and projections in chapters are relative to 1990. This is confusing and needs a more explicit discussion of the difference, probably in each chapter as readers often will only read selected chapters. (Barrie Pittock, CSIRO)	KH: This is more of an issue for the SPM than this chapter.

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E-11-192	A	11	43	11	43	"to shrink by…" (Barrie Pittock, CSIRO)	KH: Done
E-11-193	A	11	43			insert 'to' between 'likely' and 'shrink' (David White, ASIT Consulting)	KH: Done
E-11-194	A	11	43			Insert "to' after 'likely' (Ken Hughey, Lincoln University)	KH: Done
E-11-195	A	11	43			In refering to snow cover, there is a need to be precise about what is meant. This is presumably area cover by "continous snow for a period of time"... (David Jones, Australian Bureau of Meteorology)	KH: Done, cover for at least 1 day.
E-11-196	A	11	44			where average rainfall 'either' increases or decreases slightly (David White, ASIT Consulting)	KH: Done
E-11-197	A	11	45			replace 'increases' with 'is expected to increase' by up to 10% … (David White, ASIT Consulting)	KH: Done "is likely to"
E-11-198	A	12	0			Is there a need to comment on the relative levels of confidence, for example, temperature versus precipitation, tropics versus western frontal, etc? (Graeme Pearman, Monash University)	KH: Noted. Confidence levels are only mandatory for the ES, but it might be worth making some overview comments (see Dupont & Pearman, 2006)
E-11-199	A	12	2	12	2	"Under 3 x CO2 conditions". This is jargon. Will be understood by many readers, but not the less informed. Suggest spell out. (Graeme Pearman, Monash University)	KH: Done
E-11-200	A	12	6	12	6	Should this read "..(greater than 2 cm diameter ….". (Graeme Pearman, Monash University)	KH: Done
E-11-201	A	12	8			Table 11.3 Insert + in front of all temperature changes, e.g. +0.1 to 1.0 [2020] (David White, ASIT Consulting)	KH: Done
E-11-202	A	12	9	12	12	The format for the header rows for "Temperature change" and "Rainfall change" need to be distinguished somehow in order not to confuse the reader into thinking it is all about temperature change. (Vincent Lyne, CSIRO)	KH: Disagree. This is obvious, based on the different coloured rows for temp & rain
E-11-203	A	12	16			moisture and runoff are [not is] (David White, ASIT Consulting)	KH: Done
E-11-204	A	12	18			lowest 10% of what? (Clair Hanson, IPCC TSU)	KH: Done "defined as the 1-in-10 year soil moisture deficit from 1974-2003"
E-11-205	A	12	20			change one-in-twenty to 1-in-20 to be consistent with the rest of the chapter (Clair Hanson, IPCC TSU)	JS Agree KH Done
E-11-206	A	12	21			at least two to four times [not twice; = twice times] (David White, ASIT Consulting)	KH Done
E-11-	A	12	30			Confusing: 10-50% (6-18) more days. If 6 is 10% then 50% should be 30. Use one	JS Converted numbers to %

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207						or the other to quantify the increase in frequency, not both. (Clair Hanson, IPCC TSU)	
E-11-208	A	12	36	13	2	How about adding something about possible longer term changes in sea level (e.g. over 100s of years if Greenland ice cap melts) ? (David Wratt, National Institute of Water and Atmospheric Research)	JS Agree – text added
E-11-209	A	12	36		39	The low end of the sea level rises seem unrealisticly low. Are these based on the very most recent projections described by WG1 (I do not have access to these)? (David Jones, Australian Bureau of Meteorology)	RW and NH: have replaced paragraph to reflect working group 1's latest projections.
E-11-210	A	13	0	14		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: ref checked and included in Table 11.1
E-11-211	A	13	1		2	Land movement changes are likely to be rather small across most of Australia. This sentence could easily give the reader the mistaken impression that these local land movements are a significant factor in sea level rise, when infact they are not. (David Jones, Australian Bureau of Meteorology)	RW: see comment 11-209 above.
E-11-212	A	13	2	13	2	Add at end: "nor recent indications of accelerated outflow of ice from Greenland and Antarctica (with references - see e.g. in my EOS Forum article, Pittock, July 2006)." (Barrie Pittock, CSIRO)	RW and NH: disagree. Appropriate place for this discussion is Chapter 6, WG 1.
E-11-213	A	13	7	13	8	Suggest reword something like " in Australia the population is likely to grow from 20 million to 26.4 million in 2050 and then stabilise (ABS 2003b; with assumptions for medium growth). Such assumptions include ….". (Graeme Pearman, Monash University)	KH: Done
E-11-214	A	13	7	13	17	It is note particularly clear what medium assumptions really are (Andrew Ash, CSIRO Sustainable Ecosystems)	KH: Can't provide all details in this chapter. Readers should seek details from the cited literature
E-11-215	A	13	9	13	10	Change to net immigration (Ken Hughey, Lincoln University)	JS: Presumably refers to line 13, not 9-10. Changed to net immigration
E-11-216	A	13	14	13	14	2.1% per year growth in energy consumption is the result of ABARE modelling for the Securing Australia's Future document several years back. Thus I suggest that you refer directly to the actual source and not a consultant's quotation. I note that the anticipated growth in energy use in New Zealand, Line 22, is less than a third of Australia's. This is very surprising?? (Graeme Pearman, Monash University)	KH: Inserted ABARE reference. MH: NZ energy growth corrected to 2.4% per year
E-11-	A	13	19			NZ might be requested to take in more environmental refugees from the Pacific	JS: NZ policy on immigration is very

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217						Islands; i.e. > 10,000 pa. (David White, ASIT Consulting)	dynamic. However environmental refugees from the Pacific are not expected to rise rapidly.
E-11-218	A	13	28	13	28	Suggest captilaise “Section”. (Graeme Pearman, Monash University)	KH OK
E-11-219	A	13	30	13	30	Is there a timeframe which is associated with the phrase "those required to achieve stabilization at 550 ppm"? Also, who are the people referred to as "those". (Vincent Lyne, CSIRO)	KH: Relevant CO2 stabilisation timelines now mentioend at the start of 11.3
E-11-220	A	13	32			Further details … are (David White, ASIT Consulting)	KH Done
E-11-221	A	13	40	13	46	It is hard to follow all the impacts which may be better presented in a table? (Vincent Lyne, CSIRO)	KH: text in first 3 paragraphs replaced with a Table
E-11-222	A	13	46	13	46	Are these estimated losses below what is currently being produced, or below anticipated growth? (Graeme Pearman, Monash University)	KH: Noted: Losses are relative to the Reference Scenario – a 100-year simulation under constant climatic conditions, but the baseline year is not specified by Beare and Heaney.Anticipated non-climatic changes in production have not been included. No revision of text seem necessary.
E-11-223	A	13	49	13	50	Quoting probabilities of these occurrences depends on assumptions concerning the probabilities attributed to specific scenarios within the IPPC framework, or indeed, those that fall outside of those considerations, say related to potential non-linearities of climatic change. I am familiar with the Jones approach. Before using these probabilities, the reader needs to know that there is no magical method of providing probabilities without these assumptions, and the reader needs to know what they are. (Graeme Pearman, Monash University)	BB: Disagree – probabilities refer to portion of emission scenario-GCM combinations considered. Text has been modified to better reflect this.
E-11-224	A	13	49	13	49	need to explain term "all possible outcomes". (Janice Lough, Australian Institute of Marine Science)	BB: See response to E-11-223.
E-11-225	A	13	49	13	50	‘range’ rather than ‘interval’ ? (David White, ASIT Consulting)	BB: Agree – text modified
E-11-226	A	14	2	14	2	This "additional" amount is confusing. Additional to what: the non-reafforestation case, or the reafforestation case or both? (Barrie Pittock, CSIRO)	BB: Text modified to improve clarity.
E-11-227	A	14	2			5% ‘reduction in inflows’. (David White, ASIT Consulting)	KH Done
E-11-	A	14	4	14	4	Now there is a different set of assumptions and we are talking about “projections”	: Noted. Text altered, we consistently use the

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228						rather than “scenarios”. This needs clarification. (Graeme Pearman, Monash University)	word “projections”, based on the IPCC glossary.
E-11-229	A	14	7	14	7	Change "second" to "later" (Barrie Pittock, CSIRO)	KH “A second” changed to “Another”
E-11-230	A	14	8	14	8	“ensemble of five transient runs” This is extreme jargon. Needs rewording for even the general climate scientist, let alone the wider reader. (Graeme Pearman, Monash University)	KH Done – “five climate simulations”
E-11-231	A	14	9			It may help to define in brackets the A2 scenario as it isn't included in the background at the start of the section. (Andrew Ash, CSIRO Sustainable Ecosystems)	KH: No point describing the SRES scenarios at the beginning of each chapter. The SRES scenarios are described in Chapter 2, as stated at the start of 11.3
E-11-232	A	14	12	14	12	I have problems with this. See earlier point on Page 13. Needs more explanation to be of value to the wider reader (Graeme Pearman, Monash University)	The term “probabilistic risk” has been deleted.
E-11-233	A	14	18			hydro-electric [insert -] (David White, ASIT Consulting)	KH Done
E-11-234	A	14	19			hydro-storage (David White, ASIT Consulting)	KH done
E-11-235	A	14	24	14	24	Suggest “..suppressed respectively by…”. Suggest write “IPO” in full. (Graeme Pearman, Monash University)	KH Disagree with adding “respectively”. The IPO is defined on page 6 line 24
E-11-236	A	14	25	14	25	Capitalise “Section”. (Graeme Pearman, Monash University)	KH OK
E-11-237	A	14	27	14	27	Change "very unlikely be" to "very unlikely to be" (Vincent Lyne, CSIRO)	KH Done
E-11-238	A	14	27			unlikely ‘to’ be compromised (David White, ASIT Consulting)	KH Done
E-11-239	A	14	27			Insert 'to' after 'unlikely' (Ken Hughey, Lincoln University)	KH Done
E-11-240	A	14	36	14	36	“doubled CO2 conditions”. This is jargon and needs more explanatory wording. (Graeme Pearman, Monash University)	BB: Accepted - this whole sentence has been removed
E-11-241	A	14	40	14	40	Suggest “that” not “which”. (Graeme Pearman, Monash University)	KH Disagree
E-11-242	A	14	43			occurred ‘concurrently; with (David White, ASIT Consulting)	KH Done
E-11-243	A	14	49	14	49	“stop-banks” This is a local term. Need more universal term such as “levee”? (Graeme Pearman, Monash University)	JS Agree KH Done
E-11-	A	15	11		12	I understand there are considerable concerns with the analysis by MDBC 1999. I	BB. Noted - Subtle it may well be, but prefer

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244						am not a salinity expert that note that obsevations of salinity in the lower Murray have significantly reduced since this report was written. http://www.jennifermarohasy.com/blog/archives/001387.html . (David Jones, Australian Bureau of Meteorology)	to cite the reviewer's concern is already covered by the second sentence in: "By 2020, there is1999 report rather than a 50% chance that the average salinity of the lower Murray River in Australia is likely to exceed the 800 EC threshold set for desirable drinking and irrigation water (MDBMC 1999). However, integrated assessments of the impacts of climate change on runoff quantity and quality, salt interception and revegetation policies for ameliorating salinity, and water pricing and trading policies have not been carried out." The observed salinity reduction has been caused by the salt interception schemes that have been implemented over a number of years and the current drought (the driest 5- to 6-year period on record).weblog
E-11-245	A	15	13		14	replace with: salt interception and revegetation policies for ameliorating salinity (Clair Hanson, IPCC TSU)	KH Done
E-11-246	A	15	32	15	32	maybe add "and increased frequency or intensity of extreme events" after "in mean climate". It is often extreme events (eg tropical cyclone, flood, drought) etc which are major shapers of natural land and seascapes. (Janice Lough, Australian Institute of Marine Science)	KH Done
E-11-247	A	15	34			Add a full stop after 'ranges' (Ken Hughey, Lincoln University)	KH Done
E-11-248	A	16	1			Table 11.4. Under: Marine species and systems. State: "Changes in prevalence of westerlies will affect New Zealand North Island northeast and South Island west coast upwelling." References are Zeldis et al. 2004; Grieve et al 2006. (John Zeldis, National Institute of Water and Atmosphere)	LH Agree – change made, but “will affect” isn’t useful. Table 11.4 has been completely reformatted, so marine species and ecosystems are now addressed by the statement “Increased ocean acidification is likely to decrease productivity and diversity of plankton communities around Australia, while warmer oceans will lead to further southward movement of fish and kelp communities (Poloczanska *et al*., 2007),” The last paragraph of 11.4.6 now mentions the potential effects of shifts in westerly winds.

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E-11-249	A	16	1			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)	KH: Disagree. This table is about natural ecosystems
E-11-250	A	16	3	16	4	Under "Marine species…" change "Warming oceans and" to "Warming oceans, decadal oscillations and" (Vincent Lyne, CSIRO)	LH: done
E-11-251	A	16	3	16	4	Marine species and systems: Suggest changes "Ningaloo Reef" to "coral reefs of western and northern Australia". Gradual sea-level rise may not be a problem for some coral reefs which have been at same level for several thousand years; Done et al 2003b should be Done et al 2003 - see comment on Page 41. (Janice Lough, Australian Institute of Marine Science)	LH, OHG: Agree -done
E-11-252	A	16	3	16	4	Forests: Is the work of Wlliams et al (2003) relevant here? - in relation to lifting of cloud base with global warming & impacts on tropical rainforests (Janice Lough, Australian Institute of Marine Science)	LH: The Williams et al work is on endemic vertebrates. The row in the table refers to rainforest vegetation only
E-11-253	A	16	3	16	4	change "effects on marine food chains" to "effects on marine food chains, toxic algal blooms, fish recruitment and the spread of invasive species". Also, change "in southern Australia" to "in southern Australia, and 10% of inshore fish families,". This latter aspect is documented in Lyne et al. 2005. (Vincent Lyne, CSIRO)	LH: done
E-11-254	A	16				Table 11.4 Forests. Line 6. “vulnerable” provides no insight as to why- is it the fires, or water, or temperature? Alpine regions, Line 1. Captialise “Species” to be consistent. Narrow-ranged…, Line 3. “e.g.”, and Line 6. End paragraph with a period for consistency. Marine. Suggest replace “&” with “and”. Line 5, hyphenate “sea-level”. End paragraph with period for consistency. (Graeme Pearman, Monash University)	LH: line edited to “likely to be most vulnerable due to increased water stress and more frequent dry westerly winds”. Table 11.4 has been completely reformatted
E-11-255	A	16				Natural Ecosystems section - I'm not quite sure why this section is presented largely as a table rather than as text such as agriculture (11.4.3). It may simply represent space constraints but it does have the effect of I think under-representing this area. (Andrew Ash, CSIRO Sustainable Ecosystems)	LH: Disagree. The table format is considered clearer, with information on particular ecosystems and species easier to find than it would be in text.
E-11-256	A	17	6	17	6	Does this mean in both Australia and New Zealand? (Graeme Pearman, Monash University)	MH: Text amended to address this comment
E-11-257	A	17	13	17	13	I do not understand what this is saying. (Barrie Pittock, CSIRO)	MH: Text amended to clarify its intent according to this comment
E-11-	A	17	14	17	15	Some preliminary work on the impact of climate change on plant biosecurity has	MH: The material in the unpublished papers is

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258						been done. Suggested wording is:- A recent literature review looking at impacts of climate change on plant biosecurity (Aurambout et al, 2006 unpublished) identified that modelling suggests a reduced incidence of the wheat stripe rust pathogen (Puccinia striiformis Westend f.sp tritici (Pst)) in future climates for some regions and cultivars of wheat and a trend towards lower disease levels in El Nino years (Chakraborty et al 2002). The full citation for these references are - Aurambout, J., F. Constable, J. Luck, V. Sposito, 2006: The Impacts of Climate Change on Plant Biosecurity – Literature Review. Unpublished. Chakraborty, S., G, Murray, N. White, 2002: Impact of climate change on important plant diseases in Australia. RIRDC Publication No W02/010. It is anticipated that Aurambout et al will be published shortly and I am happy to provide those details when they are available as well as a copy of the draft report. (John Garnham, Department of Primary Industries)	not able to be referred to in the AR4. If the reviewer can provide appropriate documentation before the cut-off date, then it can be considered for inclusion. The Chakraborty reference is now cited.
E-11-259	A	17	19	17	19	"APSIM" is meaningless to the general reader. Spell out and explain. (Graeme Pearman, Monash University)	MH: Text amended to address this comment –
E-11-260	A	17	30	17	45	These figures are difficult to interpret. Try and put both axes, i.e., X and Y onto the equivalent scales. (Ken Hughey, Lincoln University)	MH: Axes fixed
E-11-261	A	17	30	17	43	Figure 11.3 I have the same problem with this kind of probability assertion as earlier. It is based on undefined assumptions. It is OK as long as these are made clear. (Graeme Pearman, Monash University)	MH: The descriptions and assumptions are provided and defined in the paper referenced.
E-11-262	A	17	47	17	50	The assertion that drying will lead to loss of cropping areas that are currently at the margins is correct but interestingly in SW WA a 15-20% drying in the last 30 years has occurred but wheat yields have increased substantially. This is because the decrease in rainfall has been mainly in June and July when the soil profile is already full and technology advances can explain the increase in yield. Also for SW WA it would be useful to reference the recent bpaper by Fulco Ludwig as it provides a comprehensive analysis of climate change on wheat for that region. Climate change impacts on wheat production in a Mediterranean environment in Western Australia Agricultural Systems Volume: 90, Issue: 1-3, October, 2006, pp. 159-179 Ludwig, Fulco; Asseng, Senthold (Andrew Ash, CSIRO Sustainable Ecosystems)	MH: A good comment. In addition to the specific rainfall changes noted there, there has been a major change in crop management, including through the introduction of stubble retention. The reference mentioned has been included..
E-11-	A	17	47	18	7	There is increasing evidence that climate change might already have resulted in	MH: Text amended to address this comment

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263						more frequent El Nino-like conditions. This was, in fact, already discussed in TAR. As far as I am aware, the studies by Howden do not take such ENSO impacts into account. Given that most crops in Nth Australia are grown under rainfed conditions, the statement about possible expansion might be misleading. If the climatic conditions over the last 15 years are at least partly a manifestation of a changing climate, large parts of the Nth Australian cropping belt could in fact become unviable due to reduced rainfall and increased frequency of drought. (Holger Meinke, Department of Primary Industries and Fisheries, Qld, Australia)	
E-11-264	A	17	47			Change 'unviable' to 'nonviable' (Ken Hughey, Lincoln University)	MH: Text amended to address this comment
E-11-265	A	17	49			offsets -> offset (David White, ASIT Consulting)	KH:Text changed
E-11-266	A	17				Figure 11.3 - problem with axis labelling (Clair Hanson, IPCC TSU)	MH: Axes fixed: see comment 260
E-11-267	A	18	3	18	3	Sutherst (2000) is not in the references. (Graeme Pearman, Monash University)	MH: Referencec changed to Sutherst et al. (2000) as per reference list)
E-11-268	A	18	3	18	4	'requiring' -> ; significant increases …. 'are therefore required' (David White, ASIT Consulting)	MH: Text amended to address this comment
E-11-269	A	18	4		7	Heat shock proteins already occur in Australia. It is difficult to understand how these will only be a problem at temperatures increases of greater than 4C. (David Jones, Australian Bureau of Meteorology)	MH: The risk analysis refereed to there included the effects of temperature on phenology – which bring flowering into earlier, cooler parts of the year. This effectively offsets the effects of increased temperature until a temperature rise of about 4 degrees is experienced
E-11-270	A	18	10			concentrations slightly reduce [not reduces] (David White, ASIT Consulting)	MH: Text amended to address this comment
E-11-271	A	18	14	18	14	Space between "550" and "ppm" following ISU rules. Has IPCC standardised on "ppm" rather than the more precise "ppmv"? (Graeme Pearman, Monash University)	MH: Text amended to address this comment
E-11-272	A	18	21			Section 11.4.3.2 Horticulture. Some preliminary work on the impact of climate change on plant biosecurity has been done in the horticulture area. Suggested wording is:- A recent literature review looking at impacts of climate change on plant biosecurity (Aurambout et al, 2006 unpublished) identified that small changes to various climate factors could affect the biology and distribution of silverleaf whitefly (Bemisia tabaci) and that with increasing temperatures more southerly coastal and	MH: The material in the unpublished papers is not able to be referred to in the AR4. If the reviewer can provide appropriate documentation before the cut-off date, then it can be considered for inclusion..

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						inland Australian regions, including the Riverland, Riverina and Sunraysia districts, would become favourable for the survival and development of citrus canker. The full citation for this reference is - Aurambout, J., F. Constable, J. Luck, V. Sposito, 2006: The Impacts of Climate Change on Plant Biosecurity – Literature Review. Unpublished. It is anticipated that Aurambout et al will be published shortly and I am happy to provide those details when they are available as well as a copy of the draft report. (John Garnham, Department of Primary Industries)	
E-11-273	A	18	34			I suggest a new comment and reference based on recent work (however this has just been submitted, so may I guess be too late for this report): "New Zealand is likely to be more susceptible to the establishment of new horticultural pests. For example, under current climate only small areas in the north of New Zealand are seen as suitable for oriental fruit fly, but by the 2080s it is expected that much of the North Island will be suitable (Stephens et al., 2006)" Reference: Stephens, A.E.A., Kriticos, D.J., Leriche, A. 2006. The current and future distribution of the Oriental fruit fly, Bactrocera dorsalis, (Diptera: Tephritidae). (submitted) (Alistair Hall, HortResearch)	JS Text amended and reference added
E-11-274	A	18	35	18	35	Space between "quality" and (Richardson". (Graeme Pearman, Monash University)	MH: Text amended to address this comment
E-11-275	A	18	44			Replace "is rapidly expanding" with "has expanded rapidly". In Australia, at least, there is considerable concerns about the future of the industry, and the potential for contraction due to oversupply. (David Jones, Australian Bureau of Meteorology)	MH: Text amended to address this comment
E-11-276	A	18	48			Clarify as red wine production is already south, i.e., around Queenstown for Pino Noir. Do you want to say the proportion of red wine production in this area, or quantity, etc? (Ken Hughey, Lincoln University)	MH: Text restructured to include this comment
E-11-277	A	18	49	18	49	Is this the right reference? Title of article cited suggests not. (Graeme Pearman, Monash University)	JS Reference changed to Salinger et al (1990)
E-11-278	A	18	49	18	49	Be more specific - "higher CO2 levels increase vine vegetative growth" (Alistair Hall, HortResearch)	MH: Text amended to address this comment
E-11-279	A	18	49			Insert 'subsequent' after 'and' (Ken Hughey, Lincoln University)	MH: Text amended to address this comment
E-11-280	A	19	1	19	42	There is increasing evidence that the increase in rainfall in NW Australia in the last 30 years is leading to intensification of grazing in the rangelands of NW Australia as people look to exploit more reliable and better pasture growth. Ash, A., Hunt, L.	KH: Noted, new text included in 1st paragraph of 11.2.5

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						Petty, C., Cowley, R., Fisher, A, MacDonald, N. and Stokes, C. (2006) Intensification of pastoral lands in northern Australia. Proceedings of the 14th Biennial Conference of the Australian Rangeland Society (in press). (Andrew Ash, CSIRO Sustainable Ecosystems)	
E-11-281	A	19	1	19	42	It may be useful to refer to these two papers that look at CO2 responses in native C4 grasses in northern Australia.Stokes, C. and Ash, A. (2006). Impacts of climate change om marginal tropical production systems. In : Eds (P. Newton, A. Carran, G. Edwards, Agroecosystems in a Changing Climate pp. 181-188. taylor and Francis, Florida. WALKER, L.P., ASH, A.J. and BROWN, J.R. (1999) Response of C4 perennial pasture grasses to elevated CO2 and clipping. In: People and Rangelands, Building the Future: Proceedings of the 6th International Rangeland Congress, 19-23 July 1999, Townsville, Qld. (Eds D. Eldridge and D. Freudenberger), Vol. 1, pp.262-63. (6th International Rangeland Congress Inc.: Aitkenvale, Qld). (Andrew Ash, CSIRO Sustainable Ecosystems)	MH: Reference included
E-11-282	A	19	1	19	40	enough consideration re temperate grasses … higher temperatures would probably have a big effect on stomatal closures, reduced transpiration and therefore reduced growth, plus increased demand for supplements or lower stocking rates. Also bound to be significant effects on hay production and quality. (David White, ASIT Consulting)	MH : We reported what was assessed, taking into account strict length limitations in the AR4
E-11-283	A	19	4	19	4	Suggest "…gains may decline…". (Graeme Pearman, Monash University)	MH: Text amended to address this comment KH Done
E-11-284	A	19	5			I am not aware of published or gray literature information that shows (for NZ) that "Increased frequency of drought has already decreased pasture growth for dryland farms". If you have such material, please provide it in the reference list (and also please state where in New Zealand this is occuring). If not, you may wish to delete this sentence ? (David Wratt, National Institute of Water and Atmospheric Research)	JS Agree – sentence deleted
E-11-285	A	19	12	19	12	Ghannpoun et al. Not in rtefrneces. (Graeme Pearman, Monash University)	MH: Reference included
E-11-286	A	19	23			5.4.2 is now 5.4.3 in chapter 5 (Clair Hanson, IPCC TSU)	MH: Text amended to address this comment
E-11-287	A	19	24	19	24	Does this study warrant such a universal assertion? (Graeme Pearman, Monash University)	MH: Text amended to address this comment
E-11-288	A	19	27	19	27	Capitalise "Section". (Graeme Pearman, Monash University)	KH: Text amended to address this comment
E-11-	A	19	28	19	29	Are double parentheses necessary rather than say a semi-colon between the species	KH: Text amended to address this comment

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289						and the citation? (Graeme Pearman, Monash University)	
E-11-290	A	19	35	19	35	Capitalise “Section”. (Graeme Pearman, Monash University)	KH: Text amended to address this comment
E-11-291	A	19	50	19	50	Space between “18” and “Mha”, no space between “M” and “ha” following ISU rules. (Graeme Pearman, Monash University)	KH: Text deleted so no longer there
E-11-292	A	20	5	20	5	I thought that earlier studies showed that many existing plantations may be marginal in terms of temperature preferences? (Graeme Pearman, Monash University)	MH: Text amended to address this comment
E-11-293	A	20	8	20	10	Capitalise “Section”. (Graeme Pearman, Monash University)	MH: Text amended to address this comment
E-11-294	A	20	8			5.4.4 is now 5.6.5 (Clair Hanson, IPCC TSU)	MH: Text amended to address this comment
E-11-295	A	20	29	20	29	This 6 m sea level rise comes out of the blue. It needs some explanation, like that it is what might happen if the Greenland Ice Sheet, or WAIS were to disintegrate, either of which is presently thought not to happen under several centuries. While I am one who thinks it might happen faster, that is not the concensus at present. It is at best a"worst case" scenario. Needs to be stated cautiously. (Barrie Pittock, CSIRO)	NH and RW: Agree. Have revised text accordingly.
E-11-296	A	20	29	20	30	The discussion here about the impacts from a 6m sea level rise could give the impression that you (the authors) expect such a rise within the coming 100 years or so (the timescales discussed in much of the rest of the chapter). I think if you are going to mention this here, you also need to give some idea of the timescales over which such a change might happen, and its likelihood. This could be done by adding a sentence or two on sea level change beyond 2100 (including possibilities of losing substantial parts of the Greenland ice cap and time scales for this) in the discussion of future sea levels at the end of Section 11.3 (see my comments on Page 12 line 36 to Page 13 line 2), and referring to that from here. (David Wratt, National Institute of Water and Atmospheric Research)	NH: See comment 295
E-11-297	A	20	29	20	29	The "Harvey and Caton" reference appears to be missing in the reference list. (Vincent Lyne, CSIRO)	KH: Now linked to EndNote database
E-11-298	A	20	29	20	29	Harvey and Caton (2003) not in references. Why choose “6 m”?? (Graeme Pearman, Monash University)	KH See comments 295 & 297
E-11-299	A	20	29			Surely the '6 m' is a mistake? (Ken Hughey, Lincoln University)	KH: No mistake,. See comment 295
E-11-	A	20	30	20	30	Space between “3” and “km” following ISU rules.	KH Done

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300						(Graeme Pearman, Monash University)	
E-11-301	A	20	32	20	32	Why choose "30 km"? This paragraph needs rewording. Do you need some words that say that impact results from by both exposure to climate risk and investment in infrastructure? (Graeme Pearman, Monash University)	KH, BF: Sentence deleted since WRI (2005) report couldn't be sourced
E-11-302	A	20	36	20	36	No need to hyphenate "sea level", it is not used as a complex adjective here. (Graeme Pearman, Monash University)	NH: Have corrected
E-11-303	A	20	39	20	42	Capitalise "Section". (Graeme Pearman, Monash University)	KH OK
E-11-304	A	20	45	20	47	I think this needs checking, i.e., if main river flows are going to increase because of more westerly rains then it follows that sand supplies will also increase, so why would there be 50% less river sand as quoted? (Ken Hughey, Lincoln University)	NH: have clarified in text
E-11-305	A	20	45			Change to 'Pegasus Bay, Canterbury (New …" (Ken Hughey, Lincoln University)	NH:agree
E-11-306	A	20	46	20	47	Space between "50" and "m", and "80" and "m" following ISU rules. (Graeme Pearman, Monash University)	KH Done
E-11-307	A	20	50	20	50	Suggest IPO in full for the non expert. (Graeme Pearman, Monash University)	KH Disagree. See comment 235
E-11-308	A	21	4	21	4	Suggest "MfE 2004b and Section 11.4.1)" (Graeme Pearman, Monash University)	KH Done
E-11-309	A	21	5	21	7	What is "distributive process modeling?". What are the "coastal impacts of sea-level rise" referred to? (Janice Lough, Australian Institute of Marine Science)	NH and RW: changed text to address issues raised.
E-11-310	A	21	7	21	8	Space between "0.2" and "m", and "110" and "m" following ISU rules. (Graeme Pearman, Monash University)	KH Done
E-11-311	A	21	18	21	20	The authors must at least briefly outline why this common methodology is not suitable. Sole reliance on references renders this statement meaningless. (Holger Meinke, Department of Primary Industries and Fisheries, Qld, Australia)	NH and RW: changed text to address issues raised.
E-11-312	A	21	31	21	33	I think there is a mistake here re the GDP proportions re fisheries but I do not have the data to check. I am guessing, on a population basis, that Australia's GDP is at least 5 times bigger than NZ's. On that basis alone it makes the proportion figures look doubtful. (Ken Hughey, Lincoln University)	JS NZ figures are fine. AH: GDP data deleted
E-11-313	A	21	33			The percentate of GDP (1%) is inconsistent with that quoted for Australian two lines previously (this comparison suggests, wrongly, that the Australian economy is just twice the size of that in NZ).	AH: GDP data deleted

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						(David Jones, Australian Bureau of Meteorology)	
E-11-314	A	21	33			Change "commercial catch" to "commercial wild catch". (David Jones, Australian Bureau of Meteorology)	JS: Disagree. Commercial catch is wild
E-11-315	A	21	36	21	49	If it is important to have the Australian sustainability figures here then why not use NZ's as well. These have been calculated for many fish stocks and are available from Mfish or Statistics NZ. (Ken Hughey, Lincoln University)	JS Agree – figures added
E-11-316	A	21	38	21	38	Is there a need to refer to the Millennium Assessment which covers changes to fish stocks? Surely we do not depend on ABARE to provide these data. Reference to the original source would be preferable. (Graeme Pearman, Monash University)	AH: ABARE provide the summary recognized by Australian Fisheries managers, AFMA is most comprehensive overview.
E-11-317	A	21	42	21	43	In the discussion of the effects of climate change on "four biological attributes": "community composition" is not the primary impact, nor is "community structure and dynamics (including productivity)", nor is "distribution and abundance of exploited species" - also, what about all the other non-exploited species, do we not care about them, especially since "by-catch" is now a major issue along with habitat destruction?. I would interpret primary impacts as the adaptive responses of individuals or species to climate change. The potential impacts here include changes to: reproductive capacity/capability, recruitment success, availability of food sources, predatory pressures, exceedance of physiological limits, the timing of seasonal biological cycles (which I'm assuming is "phenology" but it usually refers to the physical cycles), exposure to parasites, respiratory environment (oxygen) and so on.. (Vincent Lyne, CSIRO)	AH: exploited includes target and bycatch (bycatch sp are still captured….), so changed changed to "impacted species". Each of these factors the reviewer suggests are indeed primary impacts, which can lead to changes in more than one of the biological properties. The emergent signs of climate change are the 4 areas….changed to "Changes in four emergent biological properties are likely to occur as a result of climate change, the first of which is best understood"
E-11-318	A	21	45	21	46	This seems overly conjectural. (John Zeldis, National Institute of Water and Atmosphere)	JS Disagree – the experimental work and paper bears out this conclusion
E-11-319	A	21	45	21	45	Hyphenate "sea-level". (Graeme Pearman, Monash University)	JS Done
E-11-320	A	21	51	22	16	Previous IPCC reports have documented evidence of potential climatic impacts on invertebrates such as tropical prawns that are sensitive to rainfall. This is not mentioned in this section. Aquaculture likewise doesn't get a mention. (Vincent Lyne, CSIRO)	AH & JS. Note that we are not meant to duplicate info in the TAR. AH: Prawn signal is not clear, and so not a good example to use. We also cannot include every example out there. We have used representative examples. JS There has been no work on climate change effects on aquaculture.
E-11-	A	21	51	22	16	I would like to see a differentiation of impacts on pelagic and demersal species. The	AH: Agreed. Added words:

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321						reasoning here is that pelagic species generally have a greater adaptive capacity than demersal ones. (Vincent Lyne, CSIRO)	"and on coastal and demersal fisheries relative to pelagic and deep-sea fisheries"
E-11-322	A	21				Section 11.4.6 Fisheries. As I pointed out in comments provided for the previous version, this section provides no discussion about freshwater fisheries or aquaculture. 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. Otherwise it gives the impression that impacts on freshwater fisheries is not an issue. Suggested wording is: Currently little if any research has been completed on impacts of climate change to freshwater fisheries and aquaculture. Key variables expected to drive climate change impacts for freshwater fisheries include: water temperature, rainfall (both timing and amount) and water runoff. Some impacts for freshwater systems identified in Table 11.4 will equally apply to freshwater fisheries. (John Garnham, Department of Primary Industries)	JS added sentence 'Currently little research has been completed on impacts of climate change on freshwater fisheries and aquaculture'.
E-11-323	A	22	3	22	3	After 'ENSO': Insert: Tuna fisheries in northeast New Zealand are affected by upwelling frequency and shelf water frontal position (Sharples 1997). (John Zeldis, National Institute of Water and Atmosphere)	JS This reference deals with climate variability only, so not used..
E-11-324	A	22	3	22	3	A bit ambiguous. Does it mean "though the influence of both the Leeuwin current and ENSO"? (Graeme Pearman, Monash University)	AH: Clarified by change to "with ENSO-Leeuwin current relationships"
E-11-325	A	22	3	22	4	"Fishers will have to respond…" suggests that fishers can go where they like. It is more appropriate to suggest that "Fisheries manager will have to respond…" by altering their management policies to incorporate changes in the fishery and the ecological systems that support them. (Vincent Lyne, CSIRO)	AH: In many places, fishers do go where they want, within an overall magament area. Within those areas, distributions will change. Management will also have to adapt,. Thus modified to "Fisheries manager will have to respond with altered management regimes; fishers will be faced with relocation or reduced catches *in situ*."

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E-11-326	A	22	5	22	5	The temperature-recruitment relationship in hoki has subsequently been shown to be invalid, since Bull and Livingstone (2001) was published, by Francis et al. (2005). (John Zeldis, National Institute of Water and Atmosphere)	JS: Deleted references and text on hoki
E-11-327	A	22	6	22	6	Renwick (2001) is not in the references. (Graeme Pearman, Monash University)	KH: Reference is Beentjes and Renwick (2001). EndNote formatting fixed
E-11-328	A	22	18	22	27	The article by Harris et al., (1989?) (reference is in the Thresher papers mentioned in this paragraph) is one of the first to document the relationship between westerly winds and changes in the distribution and abundance of a number of marine species. It should be referenced. (Vincent Lyne, CSIRO)	JS: This was in the TAR, so it is not new.
E-11-329	A	22	23	22	23	Thresher (2002) is not in the references. (Graeme Pearman, Monash University)	KH: Disagree. It is there.
E-11-330	A	22	27	22	27	This should have a reference to recent papers by Cai and others re a more positive the Southern Annular Mode, which has led to stronger ocean gyres and a more southerly extension of the East Australian Current, both observed and in models. (Barrie Pittock, CSIRO)	JS: Text and reference added into Section 11.3, with reference here to Section 11.3.1. Good point.
E-11-331	A	22	27	22	27	McInnes et al. (2003) or (2002)? (Graeme Pearman, Monash University)	AH: new reference used
E-11-332	A	22	27	22	27	After 'McInnes 2003'. 'Survival of larval snapper was shown to decrease under weak westerly wind conditions associated with El Nino (Zeldis et al. 2005) in northeast New Zealand. Increased prevalence of such conditions could be deleterious to larval recruitment in this stock. On the other hand, mussel aquaculture in Hauraki Gulf (northeast New Zealand) is enhanced under upwelling conditions which brings enriched water into the Gulf (Zeldis 2005). (John Zeldis, National Institute of Water and Atmosphere)	JS: Text added on larval snapper recruitment and reference added – see comment 543.
E-11-333	A	22	32		33	The opening sentence is too sweeping. This is true for climate variability but not necesarily for climate change. For example, the current severe water stress being experienced across most of urban Australia is not the result of a single extreme event, but a consequence of a protracted period of somewhat below average rainfall. (David Jones, Australian Bureau of Meteorology)	KH: Done. Reworded to "Settlements, industry, and society are sensitive to extreme weather events, drought and sea-level rise"
E-11-334	A	22	33	22	33	Add "and declining fresh water resources." (Barrie Pittock, CSIRO)	RW: disagree because too general – e.g. increased water resources in NZ particularly in big rivers of South Island.
E-11-335	A	22	38		38	To what does the 'national budget' refer? Unless it is made clearer I suggest deleting this phrase and leaving only the comparison with GDP.	KH: Stick with GDP as used elsewhere throughout the report

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						(Adolf Stroombergen, Infometrics)	
E-11-336	A	22	43			Insert 'through' after 'people,' (Ken Hughey, Lincoln University)	KH: Disagree. Last part of senetence is not about heatwaves
E-11-337	A	22	43			increased -> increase (David White, ASIT Consulting)	KH: Sentence deleted since it essentially duplicates the revised sentence in comment 333
E-11-338	A	22	45	22	52	Hmmm- this is spurious. What has the subject of climate change impacts on mining got to do with extreme events inundating billabongs? If it does then it needs expansion. (Ken Hughey, Lincoln University)	DG: see suggested edit in government review doc
E-11-339	A	22	46	22	46	Remove extra ")". (Graeme Pearman, Monash University)	KH Done
E-11-340	A	22	47	22	47	Add "adjacent to the Kakadu World Heritage Area of the Northern Territory" after "Uranium Mine area". (Janice Lough, Australian Institute of Marine Science)	KH: Disagree. The focus of this paragraph is mining
E-11-341	A	23	2	23	2	Suggest change "but is" to "and is". (Janice Lough, Australian Institute of Marine Science)	KH Done
E-11-342	A	23	5	23	5	McMichael et al. (20030 or (2002)? (Graeme Pearman, Monash University)	KH: 2003 is correct
E-11-343	A	23	5			Change "estimated" to "expected". (David Jones, Australian Bureau of Meteorology)	KH Disagree. "Expected" implies a high level of likelihood which is hard to justify. Revised wording to "from 350 in 1990 to about 620 in 2020 and 700 in 2055"
E-11-344	A	23	6			Change "very likely to "virtually certain" (David Jones, Australian Bureau of Meteorology)	NH to address: Agree to change as suggested
E-11-345	A	23	7	23	7	missing "," after "flooding" (Vincent Lyne, CSIRO)	KH Done
E-11-346	A	23	7			Insert a comma after flooding (Ken Hughey, Lincoln University)	KH Done
E-11-347	A	23	9		13	This sentence needs rewriting. There is an inconsistency between the first point where the "impacts" are listed, and the remainder of the sentence which lists types of impacted structures and services. (David Jones, Australian Bureau of Meteorology)	KH Done
E-11-348	A	23	18		19	Box 11.1 gives only one example of government relief (for drought) are there any others? (Clair Hanson, IPCC TSU)	KH: Another example is cyclone Larry. Relief from the federal and State governments was only $2 million, but other donations totalled $18 million

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							http://statements.cabinet.qld.gov.au/MMS/StatementDisplaySingle.aspx?id=46617 . Compared to the insured losses of $350 million, the relief payments were small, so they are not included in Box 1.1.
E-11-349	A	23	21	23	21	Capitalise “Section”. (Graeme Pearman, Monash University)	KH Done
E-11-350	A	23	23		26	The authors might consider the issue of mental health. The impact of drought and severe financial stress are widely known to have severe mental health consequences in rural Australia, for example. (David Jones, Australian Bureau of Meteorology)	KH We now cite paper by Nicholls et al (2005) on climate change, drought & suicide
E-11-351	A	23	34	23	34	You may wish to refer to the recent paper by Dupont and Pearman on climate change and security. (Graeme Pearman, Monash University)	.KH This paper is now cited in section 11.4.7, so it’s not repeated here.
E-11-352	A	23	39	24	10	The section on potential impacts / vulnerability of Maori is still very light on references to back up the statements being made. (David Wratt, National Institute of Water and Atmospheric Research)	DK : Disagree. We cite numerous references
E-11-353	A	23	45	23	45	Hyphenate “climatic-induced”. (Graeme Pearman, Monash University)	KH: done, now “climate-induced”
E-11-354	A	23	50	23	50	This broad statement about Maori “capacity” could be offensive without further explanation. (Graeme Pearman, Monash University)	DK Disagree. It’s inoffensive to say capacity varies.
E-11-355	A	24	1	24	1	Is the word “predicted” OK here? (Graeme Pearman, Monash University)	KH: Noted, “predicted” replaced with “likely”
E-11-356	A	24	5	24	5	add "some" to "adaptation options". (Barrie Pittock, CSIRO)	KH Done
E-11-357	A	24	12	24	12	Qualify "have inadequate ..." with "often have ..." or "generally have …" (Barrie Pittock, CSIRO)	DG: accept comment – suggest “often have” included
E-11-358	A	24	20			temperate should be temperature (Clair Hanson, IPCC TSU)	KH Done
E-11-359	A	24	22	24	22	With all due respect, I wonder at this conclusion. Is it well supported? I know that I would not go to any group of European Australians to ask their opinions of what has happened since European settlement. Memory and traditional stories are no match for calibrated observation. This worries me. Are we sure we are not confusing respect with science? There is an ICSU statement on traditional knowledge that might be worth looking at. (Graeme Pearman, Monash University)	DG: yes it is well supported, indigenous observations of environmental change is an area that has had a lot of coverage internationally and I am completely comfortable having it included as valid observations

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E-11-360	A	24	32	24	34	Hyphenate “sea-level”, “short-term” and “long-term. (Graeme Pearman, Monash University)	KH Done
E-11-361	A	24	40	24	40	Is this the primary reference to these data? Best to refer to the primary source not a consultant’s quotation. (Graeme Pearman, Monash University)	KH: Noted. Cited primary reference (ITR, 2006)
E-11-362	A	24	46		47	I have considerable difficultly with this sentence. It blurs timescales and the difference between transient and equilibrium climate change. While a warmer climate may be beneficial for some, the cost of transitioning is likely to be costly for most.The sentence should be deleted or expanded and substantially changed. Further, winners may become loosers and loosers winners as climate change occurs. There is also the issue of direct and indirect benefits - for example residents in Tasmania might benefit economically from an increase in migration from northern Australia which has an increasingly hot climate (an indirect benefit) but suffer from an increasingly fire prone natural environment. (David Jones, Australian Bureau of Meteorology)	SB : Accepted - deleted the whole sentence about winners and losers. Rephrased the next sentence as well.
E-11-363	A	24	48	24	48	Should be “Scott et al. 2004”. (Graeme Pearman, Monash University)	KH. Fixed in EndNote
E-11-364	A	24	50			Move the reference to "beach erosion" to late in the sentence as it is a natural attraction. (David Jones, Australian Bureau of Meteorology)	KH Done
E-11-365	A	25	1		3	It is speculative to suggest that beach activities might benefit from a warmer climate, as by the time the warmer climate is a significant factor in tourism very substantial beach erosion as a consequence of sea level rise is likely to reduce the attractiveness of beaches. Similarly, an ecosystem in decline as a consequence of climate change is hardly going to be more attractive to tourists simply because the weather is more tourist friendly. (David Jones, Australian Bureau of Meteorology)	SB: Reject, as this is not speculative, as positive direct links between climate and temperature and tourism have been establised. We add references for this (Agnew, M.D. & Palutikof, J.P. (2001). and Maddison, D. (2001). Again, DJ is referring to indirect effects which we do cover
E-11-366	A	25	3	25	3	Add at end: "Adaptations such as set backs and sea walls will adversely affect amenity and attractiveness." (Barrie Pittock, CSIRO)	KH, KH: Disagree. Adaptation covered in 11.5 SB: Reject the view that “Sea walls are unattractive”. Tourists don’t necessarily mind seawalls.
E-11-367	A	25	6		6	It is very hard to believe that the small increase in tropical cyclone intensity expected under global warming is going to have a major consequence for tourist safety and well-being! Suggest deleting this sentence altogether as it is highly speculative and probably wrong. (David Jones, Australian Bureau of Meteorology)	KH, SB: Disagree, based on evidence from recent hurricanes and TC Larry. If TC Larry had occurred on a high tide, there would have been massive inundation. Early warning systems, evacuation procedures and

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							emergency services may need to be upgraded. Kaitrina is another example that had a huge impact on touirsm; and so had the other events in Mexico etc. in 2005.
E-11-368	A	25	8	25	8	Capitalise “Section”. (Graeme Pearman, Monash University)	KH Done
E-11-369	A	25	10	25	10	Total value. Is this current or potential? (Graeme Pearman, Monash University)	SB: Noted that this is current value.
E-11-370	A	25	14	25	14	What is marginal - the food, accommodation or snow cover? (Dean Collins, Bureau of Meteorology)	KH Deleted this sentence since it’s rather loose without qualifications, e.g. marginal for resorts below 1500 metres, reliable above 2000 metres.
E-11-371	A	25	14	25	14	Reword "marginal to reliable" - unclear. (Janice Lough, Australian Institute of Marine Science)	KH Sentence deleted
E-11-372	A	25	14	25	23	I would add a comment re artificial snow-making as an adaptation, and that this may be severely limited by water supply issues. (Barrie Pittock, CSIRO)	KH Disagree. Adaptation is covered in 11.5
E-11-373	A	25	14	25	14	Flat statement about marginality of ski resorts. Is this because of the existing economics, Australian’s propensity to ski, the current length of the ski season, the level of infrastructure investment or what? (Graeme Pearman, Monash University)	KH: See comment 371
E-11-374	A	25	21			Replase "moderate tempeature increases" with "all but small temperature increases" (or similar). (David Jones, Australian Bureau of Meteorology)	BF: Accepted. Text changed
E-11-375	A	25	29	25	29	Capitalise “Section”. (Graeme Pearman, Monash University)	MH: Text amended to address this comment
E-11-376	A	25	29			average and peak energy demand are [not is] (David White, ASIT Consulting)	MH: Text amended to address this comment
E-11-377	A	25	32			Add the word "peak" between "additional generating" (David Jones, Australian Bureau of Meteorology)	MH: Text amended to address this comment
E-11-378	A	25	33	25	33	Howden and Crimp (2001) not in references. And should the reference be at the end of Lines through to 38, as the source of all of that information? (Graeme Pearman, Monash University)	MH: Reference included
E-11-379	A	25	35		36	is the 3% change an increase/decrease in demand with every 1degC below/above the winter Tmean OR is it a 3% increase with each winter Tmean above the average? Either way, it should be more clearly stated. (Clair Hanson, IPCC TSU)	MH: Text amended to address this comment.

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
E-11-380	A	25	40	25	40	Should read "There are…". (Graeme Pearman, Monash University)	MH, KH: Should read "There is", but whole sentence has been reworded.
E-11-381	A	25	48	25	48	Suggest don't define LNG and in line 51 spell out in full. This is a preference to avoid any acronyms unless there is excessive usage or very common usage. (Graeme Pearman, Monash University)	KH: Disagree – need to abbreviate to save space.
E-11-382	A	26	2	26	3	Many energy infrastructure items are such as oil refineries and storage facilities are sited near sea level at ports and are vulnerable to sea level rise. Many electricity distribution grids still have large numbers of wooden poles vulnerable to wild fires. (Barrie Pittock, CSIRO)	KH: Fair points, but not mentioned by PB Associates.
E-11-383	A	26	8			My lack of knowledge here but I would have thought higher flows in both winter, and spring? (Ken Hughey, Lincoln University)	JS: Rejected, but understandable concern.. Text rewritten to make clear we are talking about snowfall.
E-11-384	A	26	12			Section 11.4.11. Generally, there seems to be a lot of National Centre for Epidemiology and Population Health (NCEPH) literature cited in this section. While this Centre has made valuable contributions to the climate change human health area in Australia, many others have too. There may also be refereed journal literature by authors from this Centre that is worthy of inclusion in this section. Has the section been written as objectively as possible. A quick search of one of the medical databases reveals a few refereed journal articles that are relevant (i.e. cover climate change, health, and Australia) as follows, and I'm sure a more methodical search would reveal more: Epstein PR. Climate change and infectious disease: stormy weather ahead? Epidemiology. 13(4):373-5, 2002 Jul. McMichael AJ. Global climate change: will it affect vector-borne infectious diseases?. Internal Medicine Journal. 33(12):554-5, 2003 Dec. McMichael AJ. Woodruff RE. Climate change and human health: what do we know?. Medical Journal of Australia. 177(11-12):590-1, 2002 Dec 2-16. Townsend M. Mahoney M. Jones JA. Ball K. Salmon J. Finch CF. Too hot to trot? Exploring potential links between climate change, physical activity and health. Journal of Science & Medicine in Sport. 6(3):260-5, 2003 Sep. (Paul Beggs, Macquarie University)	Rosalie W: Disagree. The Epstein and both McMichael papers the reviewer cites here are both either editorials or generalist reviews of the literature. Neither is appropriate for inclusion in this chapter. JS A little bit more information has been added on New Zealand JS – Some of these have been included, but these have to assess climate change impacts on health
E-11-385	A	26	14	26	14	Are you referring here to no adaptation at all, or no planned adaptation? See earlier comments. (Graeme Pearman, Monash University)	KH: Good point – we mean no planned adaptation. Autonomous adaptation has and will occur.
E-11-386	A	26	15	26	16	It would be more accurate to start this sentence as follows: 'By 2100, the Australian annual heat-related death rate ...'. (Paul Beggs, Macquarie University)	JS Agree KH Done
E-11-	A	26	18	26	19	The sentence in these two lines is out of place here because it is background	JS Deleted sentence

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387						information which belongs (and is already included to some extent) in section 11.3.2 (see paragraph 1). (Paul Beggs, Macquarie University)	
E-11-388	A	26	21	26	21	Is it really 'overtaken by ADDITIONAL heat-related deaths' or is it 'overtaken by heat-related deaths'? (Paul Beggs, Macquarie University)	RW : Agree, delete additional
E-11-389	A	26	30	26	36	The statement in line 30 that Aedes aegypti is THE mosquito vector of the dengue virus implies a single vector, whereas the statement in line 36 'the MAJOR dengue vector' implies more than one vector. (Paul Beggs, Macquarie University)	JS Agree insert 'major' after 'the'
E-11-390	A	26	32	26	34	These large numbers vulnerable to dengue fever need explanation if they are correct, e.g., due to large and growing populations along the Queensland coast. I would be more cautious about malaria, e.g., say "Malaria could possibly re-emerge…" even though it is later qualified by public health response. (Barrie Pittock, CSIRO)	Rosalie W: Noted: The dengue text inadvertently read "cases" instead of "numbers exposed". Text has been changed. The sentence on malaria has been qualified. Rosalie W : we now state "an additional 0.1-0.3 million exposed in 2020, and 0.6-1.4 million in 2050"
E-11-391	A	26	33			Are these cases per year? (David Jones, Australian Bureau of Meteorology)	Rosalie W : average annual number of people exposed – adjusted in text: see comment 390
E-11-392	A	26	39	26	39	Might read better as "..beyond 2050". (Graeme Pearman, Monash University)	KH Done
E-11-393	A	26	39			Rephrase this sentence. One would expect that with continued warming a threshold will eventually be reached; this observation contradicts the sentence. (David Jones, Australian Bureau of Meteorology)	RW Agree, delete sentence to avoid confusion.
E-11-394	A	26	44	26	44	"and limited/poor access to …" (Barrie Pittock, CSIRO)	RW: Agree, include the word "poor"
E-11-395	A	26	45	26	45	Insert the word 'hospital' before 'admissions'. (Paul Beggs, Macquarie University)	KH Done
E-11-396	A	26	46	26	46	Why is the qualifier 'assuming no change in other circumstances' added to this statement when it applies to all statements in the section? (Paul Beggs, Macquarie University)	RW: agree, reword.
E-11-397	A	26	46			part of Australia are [not is] (David White, ASIT Consulting)	KH Done but coment applies to line 48 not 46
E-11-398	A	26	48	26	48	Replace 'is' with 'are'; and 'increased risk' of what? (Paul Beggs, Macquarie University)	RW RW: agree, text clarified
E-11-399	A	26	48			Change 'is' to 'are' (Ken Hughey, Lincoln University)	KH Done

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E-11-400	A	26	49	26	51	This final sentence does not discuss a 'Key future impact or vulnerability'. Unless something can be said about future bushfires, it should be deleted. (Paul Beggs, Macquarie University)	RW: agreed, text clarified
E-11-401	A	26	49	26	49	All impacts of climate change are uncertain to some extent. Much of the discussion in the relevant sections of the Human Health chapter (8) is globally relevant and could therefore be applied to Australia and New Zealand. Something more informative about future aeroallergens and air pollution should be said, particularly given the already high prevalence of respiratory diseases such as asthma in Australia and New Zealand. (Paul Beggs, Macquarie University)	Rosalie W: Noted I don't think we should take anything out of Disagree. Ch 8, which is generalist. We have kept the references in ANZ tightly specific to the impacts that have been estimated for ANZ. Re aeroallergens, although I think the mechanism for the relationship between climate change, aeroallergens, and asthma is plausible (this is outlined in Ch 8), and although separate parts of this chain are well-evidenced, there is as yet no quantification of the connection between climate variability and asthma. Given this, and our lack of knowledge about how climate change will influence seasonal and regional pollen production in ANZ, I think we should not embark on a discussion in this chapter (esp. given lack of space) that implies asthma rates will necessarily increase in this region.
E-11-402	A	26		26		Section 11.4.10 Shouldn't there be some comment here of mitigation and price, even if only to link with other parts of the AR4? (Graeme Pearman, Monash University)	KH & BF Accepted. A cross reference is made to Ch 18.4
E-11-403	A	27	5	27	5	Capitalise "Section". (Graeme Pearman, Monash University)	KH: Done
E-11-404	A	27	6	27	6	Planned or Spontaneous or both. Needs more rigour. See also Line 11. (Graeme Pearman, Monash University)	KH: Done, we now state "Planned adaptation"
E-11-405	A	27	6			The authors need to make clear that in many instances adaptation will simply not be an option no matter how much the affected populations desire it. An example is the ski industry which has very limited adaptive capacity in Australia beyond about 1C of further warming. (David Jones, Australian Bureau of Meteorology)	KH Noted, but adaptation is discussed in 11.5
E-11-406	A	27	6		6	Reference to six key impacts, but only five in Table 11.5 (Adolf Stroombergen, Infometrics)	KH Well spotted. We've revised Table 11.5 to list 6 key impacts
E-11-	A	27	11	27	11	Planned or Spontaneous or both. Needs more rigour. See also Line 11.	KH: Both

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407						(Graeme Pearman, Monash University)	
E-11-408	A	27	12	27	12	Capitalise “Section”. (Graeme Pearman, Monash University)	KH Done
E-11-409	A	27	15	27	15	warming relative to pre-industrial or 1990? It matters and is not clear. (Barrie Pittock, CSIRO)	KH: Done “1990”
E-11-410	A	27	15	27	15	Capitalise “Section”. (Graeme Pearman, Monash University)	KH Done
E-11-411	A	27	15			The warming at the end of the last glacial maximum was around 5C over 5-10K years. This means that a sustained rate of warming greater than about 0.05 to 0.1C/century exceeds that witnessed during this past period. The quoted 3C/century value equates to a rate of warming about 30 times than which was sustained at the end of the last glacial maximum! At the very least, the authors need to note that a warming of 3C over this century will be at least 30 and possible more than 50 times faster than that which occured during the previous warming period. (David Jones, Australian Bureau of Meteorology)	JS Changed to ‘last 10,000 years’ to be consistent with the TAR, and inserted reference to chap 3 of TAR
E-11-412	A	27	18	27	18	Capitalise “Section”. (Graeme Pearman, Monash University)	KH Done
E-11-413	A	27	21	28	1	I am surprised that under 'biosecurity' only the impact of higher temperature is mentioned. Surely there is information in the literature that outlines likely consequences of changed rainfall patters? (Holger Meinke, Department of Primary Industries and Fisheries, Qld, Australia)	JS The main influence is the increase in temperature RW: disagree with comment because the statement is specific to “warm provenance species”
E-11-414	A	27	21			Under sea level.. Change "virtually certain" to "will" . It is unimaginable that a rising sea level could not lead to these consequences. (David Jones, Australian Bureau of Meteorology)	KH Disagree. This terminology is not allowed by IPCC
E-11-415	A	27	21			Under major infrastructure, there should be a reference to the fact that significant infrastructure will simply be submerged by rising sea levels (as for example) routinely happens in cities like Cairns with King Tides each year. (David Jones, Australian Bureau of Meteorology)	KH: Done
E-11-416	A	27	21			table 2, entry 3, col.2, last line. Add "Progressive sea-level rise over the next century and beyond means that in many cases limits to defences such as sea walls or setbacks are likely to be exceeded eventually." Note that it would be a great strengthening of this chapter (and others) to show maps of areas of major cities that would be inundated by storm surges for various sea-level rises ranging from say 1 to 5 m. Need to emphasise that sea-level rise will continue for centuries. (Barrie Pittock, CSIRO)	KH: No space to add extra Figures, but a valid point about SLR beyond 2100. RW: disagree – likely to be exceeded eventually at ANY time. Maps would be nice but not practicable given space limitations
E-11-	A	27	21			Table 11.5. Under Natural systems part Hot Spots should include eastern NZ.	KH, BF Done Eastern lowlands included

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417						(John Zeldis, National Institute of Water and Atmosphere)	
E-11-418	A	27	21			Row 3 of table 11.5, change Eastern Lowlands to eastern lowlands (Ken Hughey, Lincoln University)	KH Done
E-11-419	A	27	21		21	Again reference to six key impacts, but only five in Table 11.5 (Adolf Stroombergen, Infometrics)	KH Done
E-11-420	A	27				Table 11.5. Natural systems, Line 2, hyphenate ”sea-levels” Remove period at the end of row 2, column 3, and row 3, column 2, to be consistent. Remove acronym “MDB in row 2, column 4, and spell out “MDB” in row 3, column 4. Note stray hyphen in row 4, column 1. Hyphenate “sea-level” in row 4, column 2. (Graeme Pearman, Monash University)	KH: Done. No stray hyphen in row 4 column 1.
E-11-421	A	28	3		3	Having "after adaptation" in the title of Table 11.6 is not helpful. Most of the statistics cited have nothing to do with adaptation. And those that might be affected by adaptation such as the number of heat wave deaths would seem to be prior to any adaptation. (Adolf Stroombergen, Infometrics)	KH Table 11.6 deleted since it doesn’t add much valkue to the material in Sections 11.4.1-11.4.11, and it reduces the chapter length by 1.5 pages
E-11-422	A	28	4	28	5	I don't think that the stone fruit industry would agree that a 20-80% reduction in frost days benefits horticulture. (Holger Meinke, Department of Primary Industries and Fisheries, Qld, Australia)	KH Table 11.6 deleted since it doesn’t add much valkue to the material in Sections 11.4.1-11.4.11, and it reduces the chapter length by 1.5 pages
E-11-423	A	28	4	28	4	"coral reefs replaced by macroalgae and sea weed" - remove "sea weed" - same as macroalgae (Janice Lough, Australian Institute of Marine Science)	LH, OHG: Agree - doneKH Table 11.6 deleted since it doesn’t add much valkue to the material in Sections 11.4.1-11.4.11, and it reduces the chapter length by 1.5 pages
E-11-424	A	28	4			What evidence is there that glacial shrinkage will lead to "serious impacts on tourism"? (David Jones, Australian Bureau of Meteorology)	KH Table 11.6 deleted since it doesn’t add much valkue to the material in Sections 11.4.1-11.4.11, and it reduces the chapter length by 1.5 pages
E-11-425	A	28	4			The temperature ranges refenced in the left column of table 11.6 are quite confusing. Clearly, the upper and lower values should (broadly) match the B1 and A1F1 columns; if this is so then move these numbers into the B1 and A1F1 columns. (David Jones, Australian Bureau of Meteorology)	KH Table 11.6 deleted since it doesn’t add much valkue to the material in Sections 11.4.1-11.4.11, and it reduces the chapter length by 1.5 pages
E-11-426	A	28	4			The difference in B1 and A1F1 sea level rise at 2050 will be very small. It is wrong (as the table suggests) to imply that the different emission scenario will drive a very different outcome. (David Jones, Australian Bureau of Meteorology)	KH Table 11.6 deleted since it doesn’t add much valkue to the material in Sections 11.4.1-11.4.11, and it reduces the chapter length by 1.5 pages

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E-11-427	A	28	4			Table 11.6, row 3 column 3, change 'can't' to 'cannot' (Ken Hughey, Lincoln University)	KH Table 11.6 deleted since it doesn't add much valkue to the material in Sections 11.4.1-11.4.11, and it reduces the chapter length by 1.5 pages
E-11-428	A	28	4			Table 11.6 -Row 4 (long-term impacts) Column 3 (A1F1 Scenario) - "large scale alteration to coral reefs" not a very informative statement; and difficult to relate in terms of scale or severity of impact to other projections. Suggest replacing with "widespread and potentially irreversible deterioration of coral reefs". (Paul Marshall, Great Barrier Reef Marine Park Authority)	KH, LH: Agree - Done. KH Table 11.6 deleted since it doesn't add much valkue to the material in Sections 11.4.1-11.4.11, and it reduces the chapter length by 1.5 pages
E-11-429	A	28	4			Table 11.6 - Row 4 (long-term impacts) Column 2 (B1 scenario) - I suggest the following: replace "coral reefs replaced by macro algae communities, species extincions very likely" with "coral reefs degraded, with signficantly reduced coral cover and localised extinctions of some species" (Paul Marshall, Great Barrier Reef Marine Park Authority)	KH, LH: Agree - Done.KH Table 11.6 deleted since it doesn't add much valkue to the material in Sections 11.4.1-11.4.11, and it reduces the chapter length by 1.5 pages
E-11-430	A	28	4			Table 11.6 - Row 3 (mid-term impacts) Column 3 (A1F1 scenario) - I suggest the following: replace "coral reefs replaced by macro algae and sea weed" with "coral reefs degraded toward dominance by algae" (Paul Marshall, Great Barrier Reef Marine Park Authority)	KH Table 11.6 deleted since it doesn't add much valkue to the material in Sections 11.4.1-11.4.11, and it reduces the chapter length by 1.5 pages
E-11-431	A	28	4			Table 11.6 - Row 3 (mid-term impacts) Column 2 (B1 Scenario) - need to include projected impacts on coral reefs. (Paul Marshall, Great Barrier Reef Marine Park Authority)	KH Table 11.6 deleted since it doesn't add much valkue to the material in Sections 11.4.1-11.4.11, and it reduces the chapter length by 1.5 pages
E-11-432	A	28	4			Table 11.6 - References to scale of coral bleaching are based here on spatial metrics (eg "localised", "most reefs"). The more important and relevant measure of "seriousness" is the duration and frequency (return intervals) of thermal stress events. (Paul Marshall, Great Barrier Reef Marine Park Authority)	KH Table 11.6 deleted since it doesn't add much valkue to the material in Sections 11.4.1-11.4.11, and it reduces the chapter length by 1.5 pages OHG – Intensity (thermal anomaly reached) cannot be forgotten however. I would suggest adopting "seriousness" as the intensity, duration and frequency (return intervals) of thermal stress events.
E-11-433	A	28	4			Table 11.6 - Projections are very pessimistic, and not well justified on the basis of current knowledge. At the least, the wording is more definitive than is warranted given current knowledge and levels of uncertainty about ecosystem responses to future warming. Certainly, there would not be good consensus on the specifics of this projection. This is likely to be particularly the case for the lower end of the range of warming for B1 scenarios. I suggest that more specific language be used	OHG: Disagree. We are already seeing almost annual bleacing events (as per the B1 projections). The modeling done by Done et al 2003 and Donner et al 2005 synthesize what we know and use models to demonstrate the scenarios used here. Also examples from the

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						that captures the direction and general magnitude of change (about which there is strong consensus) rather than predicting specific community shifts. Specific suggestions below. (Paul Marshall, Great Barrier Reef Marine Park Authority)	Persian Gulf and Caribbean (smaller more enclosed and hence now more impacted coral reef environments) show us how small changes in sea temperature can have major effects. And all of this does not include the effect of ocean acidification.. KH Table 11.6 deleted since it doesn't add much valkue to the material in Sections 11.4.1-11.4.11, and it reduces the chapter length by 1.5 pages
E-11-434	A	28	4			Remove reference to "but glacier retreat barely noticeable". Simple ice surface altitude/melt feedbacks mean that massive ongoing wastage of larger glaciers will occur. This will be very noticeable! (David Jones, Australian Bureau of Meteorology)	KH Table 11.6 deleted since it doesn't add much valkue to the material in Sections 11.4.1-11.4.11, and it reduces the chapter length by 1.5 pages.
E-11-435	A	28	4			Related to the above point, this table frequently mixes and confuses the effects of low emissions/high emissions and low climate sensitivity/high climate sensitivity. This needs to be fixed. (David Jones, Australian Bureau of Meteorology)	KH Table 11.6 deleted since it doesn't add much valkue to the material in Sections 11.4.1-11.4.11, and it reduces the chapter length by 1.5 pages
E-11-436	A	28	4			It is hard to believe that a 15% increase in very high and extreme fire weather days in SE Australia (at 2050s) will lead to an increase loss of property and life and challenge emergency services! Also, for A1F1 the most-intense fires are already uncontrollable (this is in essence the definition of an extreme fire weather day)... we do not need climate change to make this a reality. (David Jones, Australian Bureau of Meteorology)	KH Table 11.6 deleted since it doesn't add much valkue to the material in Sections 11.4.1-11.4.11, and it reduces the chapter length by 1.5 pages
E-11-437	A	28				Table 11.6. Caption. What kind of adaptation is really being referred to here? Hyphenate "greenhouse-gas". Hyphenate "sea-level in row 2, column s 2 and 3, first line. Mention of 0.3 million at risk of dengue. Is this after adaptation? Or is it a potential? Need rigour. Similarly to the mention of "increases in crop yield. (Graeme Pearman, Monash University)	KH Table 11.6 deleted since it doesn't add much valkue to the material in Sections 11.4.1-11.4.11, and it reduces the chapter length by 1.5 pages
E-11-438	A	29	0			Table on impacts (low emission scenario): I would have liked to see a reference in the impacts table to the highly probable predictions that the low emmissions scenario will produce significant declines in range size of vertebrates in the Wet Tropics rainforests wit hincresed population fragmentation. (Stephen E. Williams, James Cook University)	KH Table 11.6 deleted since it doesn't add much valkue to the material in Sections 11.4.1-11.4.11, and it reduces the chapter length by 1.5 pages
E-11-439	A	29	0			Table on impacts (high emission scenario): Similarly, I would have liked to a mention of the high likelihood of significant numbers of extinctions in the high altitude endemic vertebrates of the Wet Tropics World Heritage area. (Stephen E. Williams, James Cook University)	KH Table 11.6 deleted since it doesn't add much valkue to the material in Sections 11.4.1-11.4.11, and it reduces the chapter length by 1.5 pages

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E-11-440	A	29	1			Table 11.6 Column Two, row three, second bullet: "Coral reefs replaced by macroalgae and sea weed". What is the difference between macroalgae and seaweed? Also, I don't think there is evidence to suggest that reefs will always be replaced by macroalgae. Infact, in a warmer, more stratified ocean, I suspect there will be less nutrients in the water flowing over reefs, and therefore less likely to be macroalgae replacement of corals. So coral reefs may be replaced by bare reefs (Marine Ecology Progress Series 295:157-169 considers this for inshore reefs). In any case, it cannot generally be said with confidence that coral reefs will be replaced with macroalgal and seaweed except in reefs already suffering nutrient pollution. (Mark Baird, University of NSW)	KH Table 11.6 deleted since it doesn't add much valkue to the material in Sections 11.4.1-11.4.11, and it reduces the chapter length by 1.5 pages
E-11-441	A	29	9	29	9	Suggest "As described in Section 11.2.5…..". The notable steps here are referring specifically to managed adaptation, which seems to be the real thrust of the text. (Graeme Pearman, Monash University)	RW : Disagree. The thrust of this section is about "process of adaptation" relating to constraints and opportunities
E-11-442	A	29	20	29	20	Need references to support the idea that this is an "oft-promoted adaptive strategy". (Graeme Pearman, Monash University)	MH: Text changed to 'oft-discussed' as there is relatively little literature 'promoting' the point – but it does often appear in discussions. KH: deleted "oft-promoted", saving a line of text
E-11-443	A	29				Table 11.6 continued. Row 2. Remove definition of "MDB" in column 2 and spell out in column 3. (Graeme Pearman, Monash University)	KH Disagree. Need to save space.
E-11-444	A	30	0			Will Australian governments start having to take the National Drought Policy seriously? If you cannot properly manage the land for climate variability then you have little hope with respect to adaptation for climate change. (David White, ASIT Consulting)	KH: Noted, but it goes well beyond the intent of an IPCC Assesment Report (i.e. synthesis of available literature) – no literature found to support the contention that the drought policy is inadequate, although a number of media articles have suggested that drought relief payments to farmers may be a form of maladaptation in areas with margin rainfall
E-11-445	A	30	0			Water resources for irrigated horticulture and agriculture (e.g. intensive dairying) are highly vulnerable. Major threats to communities along our major rivers, especially throughout the MDB. (David White, ASIT Consulting)	MH: Agree, but this section is on adaptation measures – to reduce vunerability. Key ones relating to water are identified. It could be added that these industries may still be vulnerable – but there has been no study that these authors are aware of that has assessed this as yet.

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E-11-446	A	30	0			Essential that constraints to structural adjustment in agriculture and horticulture are minimized so as to facilitate adaptation and profitable industries. (David White, ASIT Consulting)	MH & JS Whilst not explicitly mentioned in 11.5, this area of structural adjustment is covered from several perspectives – particularly statements about removing various barriers to adaptation
E-11-447	A	30	0			Are Councils responding appropriately to future scenarios – in terms of decision-making, restrictions in building approvals (e.g. near the coast) and infrastructure investment? (David White, ASIT Consulting)	RW: answer: yes, in many cases. No need to change text. Addressed in lines 46-48
E-11-448	A	30	2	30	2	Capitalise "Section". (Graeme Pearman, Monash University)	KH Done
E-11-449	A	30	2			Change 'reviewed' to 'viewed' (Ken Hughey, Lincoln University)	KH Done
E-11-450	A	30	4	30	4	But is this ecologically sound and thus sustainable. We can keep species in zoos, but shifting single species into different ecosystems that one might expect to sustain is questionable ecology? Why not question this approach? (Graeme Pearman, Monash University)	LH: disagree. The text is not suggesting that translocation is a practical or desirable strategy. It is just making the point that there would be significant costs if the strategy were adopted for many species.
E-11-451	A	30	6		14	In discussing urban water and cliamte change the authors would do well to consider the complexity that a changing climate imposes on managing risk. For example, one is not able to reliably compute yield curves as these implicitly assume a stationary climate. In a number of ways, this is a serious impediment to adaptation, as the costs of over or under investing in adaptive infrastrastructure are so high. This is clearly evidenced in the city of Sydney with the political procrastination over building a desalination plant. (David Jones, Australian Bureau of Meteorology)	Agree – text modified
E-11-452	A	30	7	30	7	Suggest "Section 11.7". (Graeme Pearman, Monash University)	BB: the line numbers on my hardcopy of the SOD do not appear to be the same as those indicated by the reviewers. BB Sentence moved to Section 11.7
E-11-453	A	30	7	30	7	Should read: "The reduced river flows in Australia increase salinities.' (John Zeldis, National Institute of Water and Atmosphere)	Agree – text changed.
E-11-454	A	30	9	30	12	It would be worth mentioning that in addition to stormwater and recycled water that rainwater tanks provide an additional adaptation response and are being actively pursued through incentive policies and rebates, particularly in SE Queensland (Andrew Ash, CSIRO Sustainable Ecosystems)	Agree – new text added.
E-11-	A	30	10	30	11	"adapt; and "adaptation" here refers to Australia and New Zealand's capacity to	KH Inserted "planned" before "adaptation"

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455						manage adaptation. It does not address the issue of the capacity for natural or spontaneous adaptation to relieve the pressures of climate change without intervention through management. OK, but you need to be clear on what is actually being referred to. (Graeme Pearman, Monash University)	
E-11-456	A	30	13	30	14	Another major obstacle is resistance to recycled water, with organised resistance already evident in cities such as Goulbourn (NSW) and Toowoomba (Qld) by CATS (Citizens Against Recycled Sewage). (Barrie Pittock, CSIRO)	Agree – text added
E-11-457	A	30	16	30	16	Suggest “Figure”. (Graeme Pearman, Monash University)	KH Done
E-11-458	A	30	16	30	22	Consider changes in crop rotations (and land use/enterprise mix); will crop rotations be extended to make them more profitable by replacing pastures with say legume (or oilseed) crops? Will drier seasons mean more years of pasture in rotations, drought-tolerant crops, or move to pastoral farming (without crops)? (David White, ASIT Consulting)	MH & JS: Noted: text changed to accommodate these points
E-11-459	A	30	19			Change to 'eastern lowlands' (Ken Hughey, Lincoln University)	KH Done
E-11-460	A	30	21		22	This sentence (like quite a few in this section) could be shorter and direct. Suggest changing to "Farming of marginal land at the drier fringe will be increasingly challenging". (David Jones, Australian Bureau of Meteorology)	KH Noted, but can’t say “will”. ”Difficult” replaced with “challenging”
E-11-461	A	30	28	30	28	Hyphenate ”sea-level” (Graeme Pearman, Monash University)	KH done
E-11-462	A	30	30	30	30	Similar resistance is evident in Australia, e.g., with legal challenges on the Gold Coast (Barrie Pittock, CSIRO)	KH: Noted, but we need a reference
E-11-463	A	30	30	30	30	“adaptation”. These are barriers to managed adaptation, not to natural of spontaneous, although such barriers will exist, yet are not discussed. (Graeme Pearman, Monash University)	RW & NH to address. Consider autonomous adaptation on the coast. RW & NH: Agree with comment. However, this section is about opportunities and contraints to the process of adaptation, which implies planned adaptation. Discussion of spontaneous adaptation in natural systems is more appropriate for the sectoral chapters.
E-11-464	A	30	32		32	The list of barriers misses the most obvious - this uncertainities in future emissions and the magnitude, direction, and pace of future climate change. Suggest also	RW: agree.Suggest added the word “attitudinal” to capture denial, scepticism and

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						adding denial or scepticism as a key barrier to appopriate climate change adaptive responses. (David Jones, Australian Bureau of Meteorology)	problems in decision-making under uncertainty. KH: Sentence reworded as "scepticism and low levels of awareness about climate change science, uncertainty in regional climate change projections, and a lack of knowledge about how the links between climatic extremes and climate change can be used to promote adaptation"
E-11-465	A	30	39	30	40	I think it might be worth mentioning that a lack of good approaches to risk management and incorporating uncertainty is limiting the development of adaptation options. (Andrew Ash, CSIRO Sustainable Ecosystems)	KH Agree, but risk management guidelines are available for both Aus and NZ. The Aus guidelines were only released in May 2006. This is now mentioned in the text.
E-11-466	A	30	47			stronger guidance and support are required [not is] (David White, ASIT Consulting)	KH Done
E-11-467	A	30	52			I would have thought that responses were 'limited, variable and inconsistent', i.e., add limited as really they are making very few changes as of yet. (Ken Hughey, Lincoln University)	KH Done
E-11-468	A	31	2	31	7	see comments on page 10. Scenario analysis tools need to account for adaptations within the context of mitigation policy. Growing crops for biofuel, for instance, could be a powerful adaptation strategy, but requires mitigation policies that support such options. (Holger Meinke, Department of Primary Industries and Fisheries, Qld, Australia)	KH See comment 150
E-11-469	A	31	10			Australia is advanced in developing a knowledge base to inform adaption. However, the authors provide little or no evidence that the country has actually developed the capacity to adapt. (David Jones, Australian Bureau of Meteorology)	KH: Disagree. A number of examples are given in the mainstreaming section of 11.2.5 RW: Have modified text to make it less contentious.
E-11-470	A	31	22	31	22	I would add another dot point along the lines: "appropriate time scales need to be considered with respect to zoning, design criteria, investment, taking account of the high cost of retro-fitting existing structures. (Barrie Pittock, CSIRO)	RW: Disagree that this statement, however valid, is appropriate here, because: not specific to region, and not a conclusion from preceeding text.
E-11-471	A	31	22			Suggest adding to the list of conclusions that "Capacity to adapt is a function of the magnitude and rate of climate change, with adaption options for moderate and large climate change likely to be both very limited and costly". (David Jones, Australian Bureau of Meteorology)	KH: Noted. See comment 470
E-11-472	A	31	27			Again the use of "adaptation" is restrictive. (Graeme Pearman, Monash University)	KH: Noted, "adaptation" replaced by "planned adaptation"

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E-11-473	A	31	35			The effects on run-off have been "severe" not "potentially serious". (David Jones, Australian Bureau of Meteorology)	KH: Agree, text changed
E-11-474	A	31	36	31	36	Suggest “Figure”. (Graeme Pearman, Monash University)	KH Done
E-11-475	A	31	43	31	43	Period after “million”. (Graeme Pearman, Monash University)	KH Done
E-11-476	A	31	43			need full stop or reworded sentence for: 'million, Energy requirement' (Clair Hanson, IPCC TSU)	KH Done
E-11-477	A	31	43			Full stop after million and then new sentence. (Ken Hughey, Lincoln University)	KH Done
E-11-478	A	31		31		I wondered if it might be worth considering the example of sea-level rise in Fremantle and Sydney. It is a different example in that the changes are known to have lead to substantial changes in the frequency of extreme sea-level events in those harbours, yet no one noticed any impact. Presumably this is because of the time scale and that adaptation took place in the natural course of harbour development. Adaptation was not managed, but occurred anyway. Worth a thought. (Graeme Pearman, Monash University)	NH: a sensible suggestion. However, space limitations preclude another case study in the chapter.
E-11-479	A	32	35			Add 'regional council, after Plenty (Ken Hughey, Lincoln University)	RW: agree, added wording
E-11-480	A	32	48			I am uncomfortable with the sentence "Awareness of cliamte change risks is slowly taking root". This needs a reference or some evidence. (David Jones, Australian Bureau of Meteorology)	NH: We now state “Local government is clearly becoming aware of climate change risks.” Which is supported by examples in the following 2 sentences.
E-11-481	A	32	52	32	52	embedded' spelled incorrectly. (John Zeldis, National Institute of Water and Atmosphere)	KH Done
E-11-482	A	32		32		Figure 11.4. Should be a source quoted for these data. (Graeme Pearman, Monash University)	BB: The address for Fig. 11.4 (now 11.3) is: http://www.watercorporation.com.au/D/dams_streamflow.cfmBB: Done
E-11-483	A	33	7	33	7	Delete "as" (Barrie Pittock, CSIRO)	KH Done
E-11-484	A	33	13	33	13	This is a strong assertive statement that temperatures are increasing the frequency of bleaching events. This is most likely, but is it irrefutable? Similarly, while theoretically and from some observations, acidification is likely to be taking place on the GBR, but is there irrefutable evidence? If so where are the references? Needs care. (Graeme Pearman, Monash University)	OHG: Noted, but tend to disagree. The evidence for the temperature effect is irrefutable. Several lines of evidence lead us here. Firstly, the relationship between thermal stress and bleaching is so solid that satellite algorithms use it to predict bleaching

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							successfully in > 95% of the time. Secondly, we have seen a rising frequency and intensity of bleaching over the past 20 years – supported across the world's tropical oceans. The GBR, for example, has seen the two largest bleaching events in the past eight years etc. Lastly, the fact that the satellite algorithms have worked consistently over the past 20 years without any need to change the threshold settings show that there has been little adaptation by coral communities to thermal stress and hence that rising sea temperatures will have an increasing not decreasing impact via thermal stress and bleaching
E-11-485	A	33	13	33	13	Replace "acidification is reducing" to "acidification is likely to reduce". Not observed as yet. (Janice Lough, Australian Institute of Marine Science)	OHG: True. Experimental studies done in large mesocosms like Biosphere 2 have shown that increasing the acidity of seawater slows calcification in corals. A doubling of CO2 is enough to collapse calcifiation in all species tested. It has not been observed, however, on coral reefs as yet (work in progress is being published by groups at Stanford as we speak but I guess that will not make this review). I think we should accommodate the reviewer's suggestion.
E-11-486	A	33	17	33	17	Done et al 2003a should be Done et al 2003. (Janice Lough, Australian Institute of Marine Science)	OHG: Reviewer is correct – one reference which is: Done, T. J., Whetton, P., Jones, R., Berkelmans, R., Lough, J., Skirving, W., 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 Mining. Townsville.
E-11-	A	33	20	33	20	Modify according to Comments No. 2 (page 8) above.	LH & OH-G: See comment 127

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487						(Janice Lough, Australian Institute of Marine Science)	
E-11-488	A	33	20			Bleaching during 2006 was quite limited due to an active tropical cyclone season. (David Jones, Australian Bureau of Meteorology)	LH & OH-G: Does 2006 qualify as a "mass" bleaching event?. Yes – it affected about 500 km2 of the southern Great Barrier Reef. The Keppel Islands were severely affected and 40% of the corasl in the region died. Publications are being prepared by Berkelmans and others. I take the point of the reviewer (and Lough) and suggest we adopt the text as suggsted for Table 11.1: Eight mass bleaching events on the Great Barrier Reef since 1979 and no serious events known prior to 1979 (see Section 11.6). Events are triggered by unusually high sea surface temperatures. Most widespread events appear to have occurred in 1998 and 2002, affecting over 60% of reefs within the GBRMPA. Reporting on severe bleaching on the southern Great Barrier Reef in 2006 is still being compiled.
E-11-489	A	33	22	33	22	Done et al 2003a should be Done et al 2003. (Janice Lough, Australian Institute of Marine Science)	KH: See comment 486
E-11-490	A	33	24	33	26	This description of disease incidence implies that the impacts of disease on the GBR are severe and widespread. Neither of these imlications is correct. Work by Bette Willis and colleagues has found an increase in occurrence of some diseases, but these are highly localised. There is no evidence to support claims or implications that disease is currently causing ecologically-significant impacts to the GBR generally. I suggest the following wording: "The 2002 event was followed by localised outbreaks of coral disease, with incidence of some disease-like syndromes increasing by as much as 500% over the past decade at a few sites. While impacts of coral disease on the GBR ecosystem are currently minor, experiences in other parts of the world suggest that disease has the potential to be a major threat to GBR reefs." (Paul Marshall, Great Barrier Reef Marine Park Authority)	OHG: Agreed – willing to modify text modified as suggested by reviewer.
E-11-491	A	33	25	33	26	I am concerned about the linking of these events to climate change. Might be that one predisposed the reef to the other, but we need to be careful. (Graeme Pearman, Monash University)	OHG: Disagree. See comments under E-11-484. The evidence and the logic are in place and are scientifically sold.

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E-11-492	A	33	30	33	30	suggest add "which have absorbed about 30% excess CO2 released to the atmosphere" after "world's oceans". I think also the following should be referenced here: The Royal Society (2005) Ocean Acidification due to Increasing Atmospheric Carbon Dioixde. Policy Document 12/05, London UK (www.royalsoc.ac.uk), 60pp. The following is also relevant: Kleypas JA, RA Feeloy, VJ Fabry, C Langdon, CL Sabine & LL Robbins, 2006. Impacts of Ocean Acidification on Coral Reefs and Other Marine Calcifiers: A Guide for Future Research, report of a workshop held 18-20 April 2005, St Petersburg, FL, sponsored by NSF, NOAA and the US Geological Survay, 88 pp. (http://www.isse.ucar.edu/florida/) (Janice Lough, Australian Institute of Marine Science)	OHG: Agree - Added text. Raven et al 2005 is actually the Royal Society Report and has been referenced. I also agree that the Kleypas et al (2006) reference should eb added.
E-11-493	A	33	36		48	This paragraph really beats-around-the-bush. Why not simply state that "is is expected that the coral reef will be replaced with non-coral organisms by 2050, with massive impacts on biodiversity, fishing, and tourism." (David Jones, Australian Bureau of Meteorology)	KH& OH-G: Disagree. Given that impacts on the GBR are not described in detail in 11.4.2, this is the place to provide the evidence base.
E-11-494	A	33	38	33	42	Done et al 2003a should be Done et al 2003. (Janice Lough, Australian Institute of Marine Science)	KH: See comment 486
E-11-495	A	33	39	33	40	This should be referring to "recovery time from a severe bleaching-induced mortality event", rather than "recovery time from a severe bleaching event" (Paul Marshall, Great Barrier Reef Marine Park Authority)	LH & OH-G: Agree
E-11-496	A	33	39	33	40	These time estimates are both unjustifiably precise, and not entirely accurate. I suggest the following wording: "significant recovery….is unlikely to occur for many years to decades, with full recovery requiring several decades." (Paul Marshall, Great Barrier Reef Marine Park Authority)	OHG: Text modification: "is at least 10 years (and may exceed 50 years for full recovery)"
E-11-497	A	33	45		48	While initiatives such as no-take areas will reduce the stresses on the reef, it needs to be made clear that these will have little or no effect on increasing resilience to climate change where threshold are totally unrelated to fishing pressures are at play. (David Jones, Australian Bureau of Meteorology)	OHG: Agreed – could be confusing. Change last sentence to: "Given that recovery from mortality can be potentially enhanced by reducing local stresses, management initiatives such as the Reef Water Quality Protection Plan, the Representative Areas Program (including declaration of 33% GBRMP as totally protected) represent possible steps to enhance the ability of coral reefs like the Great Barrier Reef to endure the rising pressure from rapid climate change."
E-11-498	A	33	46	33	46	Suggest add something like "by relieving other simultaneous stress factors such as pollution an reef disturbance,..". Otherwise the value of these initiatives might remain obscure.	LH & OH-G: Agree – see above.

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						(Graeme Pearman, Monash University)	
E-11-499	A	33	46	33	48	How will these 3 examples help coral resilience to heating? I'm not convinced these are causal responses that you should quote. (Ken Hughey, Lincoln University)	LH & OH-G: Agree – see above.
E-11-500	A	33	47	33	47	"No-Take" Perhaps spell out. It really is jargon. (Graeme Pearman, Monash University)	KH, LH & OH-G: Agree - see text in E-11-497. "No take" removed and replaced with "total protection"
E-11-501	A	34	3	34	5	Suggest "Figure 11.5", "Sections 11.5 and11.5" and "Figure 11.1". (Graeme Pearman, Monash University)	KH Done
E-11-502	A	34	7			give figure number for Reasons for Concern figure in TAR (Clair Hanson, IPCC TSU)	KH: Done. TAR Synthesis Report Fig SPM-3
E-11-503	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)	'MH: Text revised considerably from SOD to reflect new Fig 11.4. The points made here about the flow on effects of changes in agriculture are well made and are referred to earlier in the Chapter. The adaptive capacity and vulnerability of agriculture is specifically mentioned now.'
E-11-504	A	34	8	38	8	I don't understand this statement. I would have thought that infrastructures are high vulnerable, because of the very non-linear nature of the wind speed-destruction curve resulting from kinetic energy being related to the square of the velocity, to existing building codes, and the fact that all sorts of things start to happen once roofs become detached?? The statement about natural ecosystems is equally concerning. It depends very much on the nature of the ecosystem, or at least the species contained therein. Some systems will contain a high degree of genetic diversity as a result of evolutionary pressures. Others will not. Some will be part of clinal distributions so that they can mine the genetic resources across that distribution. Others will not. Can you really justify such a bold statement? (Graeme Pearman, Monash University)	KH, BF, NH, BB, JS, LH, MH, RW Noted. Wording revised to emphasize aggregate across region for key sectors. Figure has been completely redrawn
E-11-505	A	34	12	34	29	This figure should be enlarged and the colour scale should be explained. (John Zeldis, National Institute of Water and Atmosphere)	KH: Agree. New diagram produced
E-11-506	A	34	14		14	remove insurance bar in figure 11.5 (Adolf Stroombergen, Infometrics)	TC Agree, insurance bar removed
E-11-507	A	34	26		47	remove reference to insurance (Adolf Stroombergen, Infometrics)	KH: Done
E-11-508	A	34	30			What is us meant by "sustainable development" on this figure. How can one seperate sustainable development from climate change. Suggest deleting this from	KH: Reject. This is here because of the need to address sustainable development in Article

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						the figure. (David Jones, Australian Bureau of Meteorology)	2 of the UNFCCC. and Ch 20. Definition of sustainable development is given in Ch 20.
E-11-509	A	34	30			I am suprised that the authors believe a further warming of upto 2.5C is within the coping range of major infrastructure. Such a warming will be associated with a substantial (and rapid sea level rise), and almost certainly put in train the demise of the Greenland Ice Shelf (e.g., Gregory 2004, Nature, 428, 616). It will require substantial retrofitting of large dam spill ways to match PMP estimates and threaten peak electricity supply. The modest ~1C of warming and drying since 1950 has seen the need for massive water infrastructure (new dams, water recycling, open channel piping, desalination plants) already in Australia. (David Jones, Australian Bureau of Meteorology)	KH: Noted. May be true for some infrastructure, but sea-level rise would be gradual, around 40 cm. It's true that the observed 1 C warming and drying since 1950 in southern and eastern Australia has required significant investment in adaptation for water and energy, but this demonstrates adaptive capacity. Many of the adaptation strategies are being designed to cope with future climate change up to 2050.
E-11-510	A	34	43			It is not clear how the authors determined the critical research required in the subsections 11.8.1 to 11.8.4. While I don't dispute that these are areas that need research, there are also others. The Allen Consulting Group Report 2005, cited by the authors, has done an analysis of priority areas. Their comparitive assessment indicated that agriculture needed urgent action. I do not believe this situation has changed and strongly recommend that the authors include agriculture in their list in section 11.8.1. Work in this area is now gaining some momentum in Victoria and also Australia generally and it could easily flounder if the IPCC report did not indicate the need for agriculture research. Also the authors should provide some guidance as to the criteria they used to determine critical areas, even if it only their personal assessment based on info available. (John Garnham, Department of Primary Industries)	KH: Comment seems out of place, but it is a valid point, which we briefly address in line 5 on page 36. We have added agricultural impacts as a research priority
E-11-511	A	34	44	34	44	Period at the end of the line. (Graeme Pearman, Monash University)	KH Done
E-11-512	A	34	44			A key sector not listed is agriculture. (David Jones, Australian Bureau of Meteorology)	KH: Agriculture ahs been added
E-11-513	A	34	47	34	49	To what extent does this statement reflect other parts of the text? That is, statements about risk and loss of life, etc, have ignored the fact that in the real world, adaptation such as warning systems and montoring will avoid the full impact? This is a telling point about how there needs to be rigour about what is potential impact and what is likely impact. Without such rigour, you are rightly open to accusations of scare mongering. It needs care. It comes back to the Allen Consulting diagram. Not all risks will necessary convert to vulnerabilities. (Graeme Pearman, Monash University)	KH & BF: Noted. In the opening pararaph of 11.7, we now state "Since most impact assessments in the available literature do not allow for adaptation, the representation of adaptive capacity in Figure 11.4 is indicative only.".

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E-11-514	A	34	50	34	50	several thousand deaths a year from what? Needs explanation and a reference or two. (Barrie Pittock, CSIRO)	KH: Done - heat-related deaths
E-11-515	A	35	0			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)	KH: no line number. Does the comment refer to Fig 11.6?
E-11-516	A	35	1			Fig 11.5. This diagram's claim is "synthesizes relevant information in sections 11.4 and 11.5…". Virtually no mention was made in these sections regarding "insurance" (which I presume means the insurance industry?), yet this diagram shows it as having very low coping range, and similarly low adaptive capability. There is no discussion on this matter. (And the claim of low adaptive capability at least requires some justification!) (Sam Cleland, Bureau of Meteorology)	TC Agree. See comment 506
E-11-517	A	35	5	35	5	Suggest "figure". (Graeme Pearman, Monash University)	KH Done
E-11-518	A	35	14	35	14	Hyphenate "greenhouse-gas". (Graeme Pearman, Monash University)	KH Disagree, not common usage
E-11-519	A	35	14	35	15	"Hence, adfaptationa and mitigation ARE BOTH NECESSARY to reduce regional vlnerability". The wording I have highlighted in capitals seems rather policy prescriptive. How about: "Hence, both adaptation and mitigation (net …) can contribute to reducing regional vulnerability". (There is an extra complication here - regional greenhouse gas emission abatement will not of itself reduce regional vulnerability - the long lifetimes an atmospheric mixing / transport of greenhouse gases, regional reductions of greenhouse gas radiative forcing are dependent on global-scale abatement. (David Wratt, National Institute of Water and Atmospheric Research)	KH & BF: Accepted. Text changed to incorporate suggestion
E-11-520	A	35	16	35	40	The ocean off south east Australia is expected to experience warming larger than those of other regions around Australia. This warming and its potential impacts (which is discussed in the Lyne et al. 2005 reference) needs to be on the map. (Vincent Lyne, CSIRO)	LH : I have not been able to get a copy of this paper so can't confirm. Jim doesn't have it either. General view of LAs was that map was already pretty full
E-11-521	A	35	16	35	40	Change to 'Eastern lowlands' (Ken Hughey, Lincoln University)	KH: conflicts with Government Review comment 37 which requested "Lowlands" changed to "Regions". We have elected to use "Regions"
E-11-522	A	35	40			Fig 11.6 - text box beginning "Queensland Wet Tropics…." - statement "Loss of coral reefs" is not accurate or meaningful. Suggest: "Deterioration of coral reefs". (Paul Marshall, Great Barrier Reef Marine Park Authority)	KH Done

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E-11-523	A	35	45	35	52	It would, I think, be useful here to emphasise that there are key uncertainties regarding overall changes in rainfall for parts of Australia which also link to uncertainties as to what may happen to ENSO events and the PDO. (Janice Lough, Australian Institute of Marine Science)	Disagree. Regional rainfall uncetainty is already stated in lines 45-46, and this encapsulated ENSO (which is only one of the drivers of rainfall variability)
E-11-524	A	35	45	35	45	I am not sure how the word "precision" applies to "scenarios" and "projections" which is what a lot of the previous text is built around. I suggest reword. Hyphenate "climate-change". Also on Line 49. (Graeme Pearman, Monash University)	RW: Agree – text modified
E-11-525	A	35	49	35	49	I am not sure how the word "precision" applies to "scenarios" and "projections" which is what a lot of the previous text is built around. I suggest reword. Hyphenate "climate-change". Also on Line 49. (Graeme Pearman, Monash University)	RW: Duplicate comment – see response above 49
E-11-526	A	36	5	36	5	Suggest "Chapter". (Graeme Pearman, Monash University)	KH: Agree - done
E-11-527	A	36	7	36	7	Hyphenate "long-term". Note also that "Modelling" is spelt here with one "l", as it is mostly elsewhere, with 2. I suggest that the latter is more conventional, but IPCC might see that differently. (Graeme Pearman, Monash University)	KH: Noted. One "l" used throughout this chapter, except for 18 references in the bibliography..
E-11-528	A	36	16	36	16	Is there a need to cover the issue of evaporation and the relationship between precipitation and stream-flow? (Graeme Pearman, Monash University)	BB: Disagree – this is not a research need: standard hydrology provides this information already
E-11-529	A	36	25		26	remove reference to insurance, but add the words " with accompanying higher insurance costs" at the end of the first sentence. (Adolf Stroombergen, Infometrics)	KH: Agree – text modified
E-11-530	A	36	29	36	31	Given the recent debate about 'tipping points' and the non-linearity of our climate systems, I find it surprising that so little attention has been paid to 'climate surprises'. Some discussion about the climate changes and adaptive responses that have already occurred would also be helpful in this context. (Holger Meinke, Department of Primary Industries and Fisheries, Qld, Australia)	BB: Knowledge in this area is incomplete. Abrupt climate change already mentioned under bulleted point on *Climate surprises*
E-11-531	A	36	36			It would be helpful up-front to acknowledge that modern humans have virtually no experience of climate change adaptation owing to the slight pace of climate change until recent decades. (David Jones, Australian Bureau of Meteorology)	BB: Disagree. Much has been learnt about adaptation through recent experience. Implementation is very limited.
E-11-532	A	37	0			The coverage of trade and immigration is particularly weak. I suspect you need some alternative expertice. You might consider the Dupont and Pearman (2006) paper, and Barnett in Climatic Change 61, 321-337 (2003), and Global Environmental Change 13, 7-17 (2003), for references that may relate to the Theme	KH: Noted. Text added about immigration from the Asia-Pacific region. No relevant literature available on trade implications for ANZ

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						of this Chapter. (Graeme Pearman, Monash University)	
E-11-533	A	37	3			Section 11.8.3. This needs to mention and give an example of impact assessments which look at the impacts for a full range of IPCC scenarios and compares these with various stabilisation scenarios. These have been done for parts of Australia and are most instructive. (Barrie Pittock, CSIRO)	KH: Agree. Text revised
E-11-534	A	37	24	37	24	Change "worsen" to "increase the need to relocate local populations," (Barrie Pittock, CSIRO)	BB: Agree – done
E-11-535	A	37	25	37	25	Mention should be made of some of the key conclusions of the Lowy Institute Paper # 12 by Dupont and Pearman on climate change and security, which is most relevant. See www.lowyinstitute.org. (Barrie Pittock, CSIRO)	KH. Noted, see comment 532
E-11-536	A	38	44	38	45	The Anderson reference in incompletely specified. Is it a PhD thesis ? A departmental report ? An article in a book ? (ie reference should be complete enough for a reader of the IPCC report to be able to locate or request it). (David Wratt, National Institute of Water and Atmospheric Research)	JS: It's an unpublished PhD thesis
E-11-537	A	41	46	41	52	Done et al 2003a and 2003b are the same report. (Janice Lough, Australian Institute of Marine Science)	KH. Noted, fixed
E-11-538	A	42	28			Add reference: Francis, R.I.C.C., Hadfield, M.G., Bradford-Grieve, J.M., Renwick, J.A., Sutton, P.J.H. (2005). Environmental predictors of hoki year-class strength: an update. New Zealand Fisheries Assessment Report 2005/58. 22 p. (John Zeldis, National Institute of Water and Atmosphere)	JS: Not cited. Text on hoki removed
E-11-539	A	44	19	44	20	Hoegh-Guldberg (2005) Low coral cover in a high CO2-world. Journal of Geophysical Research, 110, C09S06, doi:10.1029/2004JC002528 maybe a more comprehensive reference than Hoegh-Guldberg (2004). (Janice Lough, Australian Institute of Marine Science)	OH-G: Agreed. The 2004 review has some modelling which is relevant here – add both.
E-11-540	A	49	33			NIWA, 2005 (with no further details) is not sufficient specification for a reference. (David Wratt, National Institute of Water and Atmospheric Research)	JS Full reference obtained
E-11-541	A	52	22			Add reference:Sharples, J. (1997). Cross-shelf intrusions of subtropical water into the coastal zone of northeast New Zealand. Continental Shelf Research 17 (7): 835-857. (John Zeldis, National Institute of Water and Atmosphere)	JS: Used in TAR, so not used here.
E-11-542	A	55	21			Table 11.5, entry at the bottom of page 27. Saying "Capital Cities" are at risk from sea-level rise, more intense tropical cyclones and larger storm surges is a bit general - I suspect that even if the West Antarctic Ice Sheet goes Canberra will still be a long way from the coast ?	KH Done

Chapter-Comment	Batch	From Page	From Line	To Page	To line	Comments	Notes of the writing team
						(David Wratt, National Institute of Water and Atmospheric Research)	
E-11-543	A	55	50			Add references: Zeldis, J.R., Walters, R.A., Greig, M.J.N., Image, K. (2004). Circulation over the northeastern New Zealand continental slope, shelf and adjacent Hauraki Gulf, from spring to summer. Continental Shelf Research (24): 543-561. Zeldis, J.R. (2004). New and remineralised nutrient supply and ecosystem metabolism on the northeastern New Zealand continental shelf. Continental Shelf Research (24): 563-581. Zeldis, J., Oldman. J., Ballara S., Richards, L (2005). Physical fluxes, pelagic ecosystem structure, and larval fish survival in Hauraki Gulf, New Zealand. Canadian Journal of Fisheries and Aquatic Sciences. 62: 593-610. (John Zeldis, National Institute of Water and Atmosphere)	JS The first does not deal with climate variability. JS This last reference added in fisheries section