

1 **Communicating Confidence Levels in the**
2 **Main Conclusions of the NCA 2013 Report**

3
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5
6 **Background**

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8 This paper recommends the elements of a simple, common approach for
9 characterizing and reporting levels of confidence and uncertainties for use by
10 authors preparing technical inputs or chapters of the 2013 NCA report. Given the
11 diverse subjects and regions covered by the report, the guidelines are necessarily
12 general – lead authors will need to formulate detailed strategies consistent with the
13 guidance that are appropriate to their particular subject.

14
15 **Assessing and applying the literature to stakeholder questions**

16
17 1. Working with stakeholders, identify a small number of key questions (3-4) that
18 are of greatest importance from among the topics considered in your chapter.
19 Clarify how stakeholders will use the information. Set priorities and focus on a
20 manageable number of key questions and findings. Systematically characterizing
21 confidence and uncertainty and communicating these judgments to stakeholders
22 requires time and effort.

23
24 2. Carefully review the literature and develop answers to the issues/questions
25 addressed in your chapter. Whenever there is sufficient evidence, develop
26 quantitative estimates. Provide ranges of estimates that reflect uncertainties,
27 considering the tails of the distribution and possible outliers. After establishing the
28 range and identifying outliers, provide a “best estimate” if appropriate. Include
29 information on potential high consequence impacts important to stakeholders, for
30 example large magnitude, long lasting, widespread, and/or irreversible outcomes.

31
32 **Characterizing confidence**

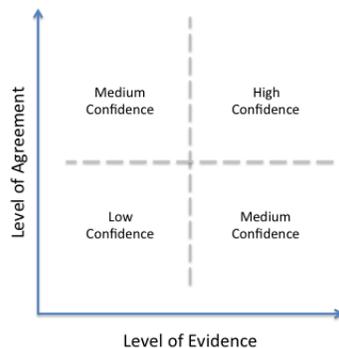
33
34 3. For the issues/questions identified in step 1, provide a qualitative summary
35 assessment of the degree of confidence of the lead authors in the finding,
36 considering (a) quality of evidence and (b) level of agreement across the community
37 of experts. Use the framework in Figure 1 below for your evaluation.

38
39 4. In evaluating the evidence, consider the technical characteristics of observations,
40 model results, research about underlying climate, ecological, or socioeconomic
41 processes, and other relevant information. Is the information peer reviewed and of

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42 high quality? Are there multiple, independent studies or lines of evidence that reach
 43 similar conclusions? Possible sources of uncertainty include: ambiguously defined
 44 concepts or outcomes; competing theories or explanations that cannot be reconciled
 45 with available information; missing values, errors, or imprecision in
 46 observations/data; a variety of factors that create uncertainty in model results;
 47 irreducible uncertainty due to natural variability; and uncertainty arising from the
 48 inability to predict human decisions, for example uncertainty in future estimates of
 49 greenhouse gas emissions and hence climate change.
 50

Summary Evaluation of Confidence: Evidence and Agreement



51

52

(after Mastrandrea et al. 2010)

53 Figure 1

54

55 In general, multiple lines of high quality evidence (e.g., supporting theory,
 56 observations, model results, process research) and agreement will result in a rating
 57 of “high confidence” while conclusions that reflect limited evidence and agreement
 58 will be assessed as “low confidence”.

59

60 The “medium confidence” cells represent situations in which levels of evidence and
 61 agreement are mixed. High evidence but low agreement represents what could be
 62 termed “a well posed controversy” in which the evidence supports serious
 63 competing hypotheses, each with a number of adherents in the relevant research
 64 communities.

65

- A hypothetical example:

66

67 - Several high quality, independent data sets support the conclusion that a
 68 metropolitan region is experiencing more numerous and severe episodes of
 69 urban flooding, but the relevant expert community does not agree whether
 70 these episodes are the result of more frequent and intense precipitation
 71 events or an increase in the extent of impenetrable paved surfaces increasing
 72 runoff.

72

73 Low evidence but high agreement could be thought of as "an emerging
74 finding or hypothesis".

75 • Two hypothetical examples:

76 - Current understanding of the factors affecting land use and a small
77 number of climate sensitivity studies support the conclusion that
78 under the B1 scenario, land and water use conflicts will increase by
79 2030 in the Midwest region due to increased demand for biomass
80 energy, increased demand for food production, and reduced crop
81 productivity resulting from increased temperatures and variability
82 in precipitation. Most land use/cover change modelers support this
83 hypothesis, but it lacks confirming support from multiple model
84 runs using regional integrated models that adequately represent the
85 major contributing processes.

86 - Another possible example of low evidence and high level of
87 consensus is the hypothesis that increased ozone concentrations in
88 the 21st century will reduce the strength of the terrestrial carbon
89 sink. Most ecologists and biologists would agree - the hypothesis
90 makes sense in terms of current understanding of ecophysiology and
91 the sensitivity of ozone photochemistry to increased atmospheric
92 temperatures. But the number of studies that have actually
93 investigated this is really quite small.

94

95 Authors should resist the temptation to assign "medium confidence" ratings to
96 vague or broad statements with qualifiers such as *could*, *might*, *would*, and *may*.

97

98 **Communicating confidence in findings to stakeholders**

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100 Communication is a two-way exchange of information that requires an
101 understanding of the mental models and beliefs of the audience as well as clear
102 expression on the part of assessors. It is beyond the scope of this document to
103 provide overall recommendations for effective communications. These
104 recommendations provide a simple approach to convey the degree of confidence
105 associated with findings. One overarching recommendation is to include both high
106 confidence findings (i.e., ones with strong evidence and agreement) and areas of
107 uncertainty, indicating how sensitive overall conclusions are to their resolution (i.e.,
108 how much they matter).

109

110 5. For each of the issues identified in step 1, prepare a summary "traceable account"
111 (a few sentences to a paragraph) that describes the main factors that contributed to
112 the conclusion and level of confidence. This can include a description of different
113 lines of evidence used, the ranges of estimates contained in the literature, the degree
114 of consistency in the evidence, important assumptions made, and the level of
115 understanding in interpreting the evidence. For descriptions of projected impacts,
116 specify the assumptions or scenario of climate change being used. Authors may also
117 include more extended traceable accounts in appendices, but a summary account in

118 the main document is essential. Get some people outside the writing group to read
119 drafts of the text, in order to see if they are understood as intended.

120

121 6. In presenting your findings, use the terms in Figure 2 based on the confidence
122 assessment developed in step 3 in a parenthetical phrase following the finding to
123 convey to users the level of confidence that the authors associate with the finding.
124 This is in addition to providing the summary traceable account, not a replacement
125 for it.

126



127

128 Figure 2

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130 **NCADAC Next steps**

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132 (1) The NCADAC will need to review and approve this guidance.

133

134 In addition, the NCADAC should consider the following steps to improve reporting of
135 confidence and uncertainties in the 2013 report and build capacity for the ongoing
136 assessment process:

137

138 (2) Include specialists in decision analysis and risk communication in the author
139 teams of several high priority chapters. PL 101-606 identifies a set of priorities from
140 which the NCADAC Executive Secretariat could develop recommendations for
141 consideration by the full committee:

142

143 (3) Commission expert elicitations on a small number of key questions that will be
144 addressed in an overview of synthesis document. The NCADAC Executive Secretariat
145 could develop recommendations for consideration by the full committee.

146

147 (4) Commission development and implementation of an evaluation of the process in
148 order to review experience with this approach and make adjustments as warranted
149 to improve future practice. The NCADAC Executive Secretariat could develop
150 recommendations for consideration by the full committee.

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152 **References**

153

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