DRAFT

External Peer Review of EPA's Draft Document
BASINS and WEPP Climate Assessment Tools (CAT):
Case Study Guide to Potential Applications

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Review by
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Peer Review Comments on EPA's Draft Document
BASINS and WEPP Climate Assessment Tools (CAT):
Case Study Guide to Potential Applications

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February 9, 2012

I.   GENERAL IMPRESSIONS

My overall impression is that the case study report is accurate and informative. Without actually rerunning the models and comparing the results with those presented in the case studies, it is difficult to know if the information presented is accurate, but there is nothing that looks obviously in error.

The presentations are relatively clear. I would have liked more details (steps) shown, but I recognize that this document is not meant to be a user manual but a series of examples of the CAT applications. Reference to the BASINS CAT user manual should be included in the Executive Summary.

The soundness of the conclusions is good, but incomplete. There is no mention in any of the case studies of the precipitation and temperature climate changes impacts on snow accumulation and melt. The omission of this issue is disappointing in climates where snowmelt is a factor in the production of streamflow.

II.   RESPONSE TO CHARGE QUESTIONS

1. *Please comment on the overall document organization, clarity, and level of detail. Are there any structural changes you think would improve this report? What information, if any, could be added or deleted to improve the report?*

The overall document organization is good; clarity is fair; and the level of detail appropriate for this type of document (see above comment about details and the user manual). In each case study, a table of the CAT options available and those selected would add to the clarity.

2. *Please comment on the effectiveness of individual case studies. Is there any case study you think is particularly weak (or strong)? If so, how can weak case studies be improved? Do you have other suggestions for improving the presentation of case studies without significantly increasing the length?*

The effectiveness of the individual case studies is generally good. The SWMM case study is weak due to the fact that it is a single-event model simulation with only ten precipitation values.

It appears that the use of BASINS CAT to modify the SWMM precipitation is overkill, although there is technically nothing wrong with the concept shown in this case study. The addition of a discussion of snow accumulation and melt would make the HSPF Tualatin River and Patuxent River case studies stronger.

3. *Does the group of case studies when considered together provide a general conceptual understanding of how scenario-based analyses using the CATs can be applied to assess a range of different questions related to climate change and water? If not, how could the report be revised to better convey this understanding?*

Yes, except for the omission of a discussion related to impacts to snow accumulation and melt and the resulting changes in streamflow.

4. *Do you have other comments or suggestions for improving the quality of this report?*

See the Specific Observations section below.

5. *EPA is evaluating the need for future CAT tool documentation, user support, and software revisions. Based on your understanding of the capabilities provided by the BASINS and WEPP tools in this report, can you suggest any specific need or opportunities for improving the function and utility of these tools?*

It would be very useful to have stand-alone versions of the CAT software that are independent of BASINS and WEPP so that the user does not have to learn all of the additional details of how to navigate the BASINS/WEPP software to make use of CAT to modify precipitation and temperature time series.

III.   SPECIFIC OBSERVATIONS

Page	Line #	Comments
		General Comment: In the text, the term "BASINS" is sometimes written as "BASIN;" this should be corrected.
14	22-24	The effects of climate change will vary in different locations depending on the specific type of change that occurs together with the attributes individual watersheds including physiographic setting, land-use, and human use and management of water. *Comment: Sentence is confusing; the sentence is missing a verb or comma or something.*
18-19	Table 2.1	Export BASINS CAT climate change scenarios as text (ASCII) files. *Comment: Shouldn't this read "Export BASINS CAT climate change scenario time series data as text (ASCII) files?"* Calculate duration-frequency events based on model output time series (e.g., 100-year flood, 2-year flood) *Comment: The examples are frequency events; can durations be calculated? Needs clarification or divided into two distinct bullet points:*

		one for frequency and one for duration.
19-20	35-1	For overland flow, the model assumes one directional kinematic-wave flow. *Comment: I assume that this should read "For streamflow routing..." instead of "For overland flow..."*
24	27	GCM and RCM modeling experiments *Comment: Define GCM and RCM in this chapter even if they have been previously mentioned.*
33	Tables 3.6 and 3.7	*Comment: Results should be shown to the one-hundredth of a unit instead of just a tenth.*
35	Figure 3.4	*Comment: The original figure lines appear to be in color; color is needed to read the figure.*
48	9-11 and 34-37	Initial assessment of model simulations indicated that temperature was not a significant factor given the short timescale of the event; therefore, changes to temperature were not included in the simulations. For each model run, BASINS CAT was used to generate a revised PET record based on the revised temperature record using the Hamon method (Hamon, 1961). The revised PET record was then provided as an input variable to the SWMM model in the same manner as the revised temperature and precipitation records. *Comment: the text says that changes to temperature were not included in the simulations and then says that the revised PET record was based on the revised temperature record. This is confusing and clarification is needed.*
55	Figure 3.15	*Comment: The figure column "TempSep" implies that temperature was included in the model simulations.*
60-61	Tables 3.20 and 3.21	*Comment: It is not clear why an increase in air temperature should produce an increase in mean annual sediment yield. Discussion of this result would be informative.*
79	21-23	The Duration and Duration/Severity scenarios were developed by decreasing all rainfall events in 1962 – 1963 by the same amount, the early 1962 precipitation still remained substantial and led to significantly increased streamflow (see 'Duration' and 'Duration/Severity' curves in plot). *Comment: "significantly increased streamflow" should read "significantly decreased streamflow."*

Review by
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Peer Review Comments on EPA's Draft Document
BASINS and WEPP Climate Assessment Tools (CAT):
Case Study Guide to Potential Applications

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February 20, 2012

I.   GENERAL IMPRESSIONS

This is a very well written report and should prove to be a useful introduction for water managers showing how one can use these two tools for scenario analysis. The scenarios analyzed are clearly explained and the summaries provided for each case study are clear and offer a helpful synthesis of results. My more detailed responses to the charge questions deal with the following concerns: the Executive Summary needs further elaboration of results; some figure legends need to include additional explanation; more attention is given to BASINS-CAT than to WEPP-CAT; consider using both approaches in the same watershed with the same scenarios; incorporate connected imperviousness rather than (or in addition to) imperviousness; and I identify some specific areas where further explanation is needed.

The conclusions presented are sound, except I have difficulty with those based on Table 3.36. Perhaps I do not understand how % change in mean annual load has been calculated. I would think it would be calculated as (altered-baseline)/baseline. How can a change from 0.06 to 0.07 tonnes be a 31% change in the first panel but only 21% in the second panel? And a change from 0.06 to 0.05 tonnes be -4% in one line and -10% in the next? I think some further explanation is needed to justify those results and the conclusions based on them.

II.   RESPONSE TO CHARGE QUESTIONS

1. *Please comment on the overall document organization, clarity, and level of detail. Are there any structural changes you think would improve this report? What information, if any, could be added or deleted to improve the report?*

Overall, the document was a pleasure to read, well organized, and was easily understood (with a couple of rough spots -- detailed below). The one part of the document that I found inadequate was the Executive Summary. The results presented (p. 13, lines 1-8) are so obvious as to be common sense. They are hardly subtleties. This paragraph does not adequately represent the interesting results in this report. A manager reading this paragraph would not be interested in reading the report because it sounds as though there is nothing new in it. Further information on results from the different scenarios need to be incorporated, particularly on results of different management options. More detail is needed. It appears that paragraphs from the concluding

comments were used in the Executive Summary. That is inappropriate because the two serve a different purpose. The vague generalities are OK in the concluding comments because by then the reader has presumably read the document. But the Executive Summary is supposed to provide a brief synopsis of what is in the report. This one does not. In my more detailed comments below, I provide some examples of the kinds of results I think should be incorporated into the Executive Summary.

The fact that BASINS CAT requires an already calibrated BASINS model (p. 18, line 6) needs to be stated in the Executive Summary. A potential user needs to know that up front. The Executive Summary should also clarify why two tools and not just one are presented and how they differ. How would a user decide to use one versus the other? These things should be addressed briefly in the Executive Summary because they will help a potential user decide if these models are appropriate and therefore whether it will be worthwhile to read the whole report.

The Executive Summary ends on a weak note. Further study is always needed. Do the authors want managers to use these or not? No mention is made of management alternatives evaluated in these scenarios; yet I would think that is what decision-makers would be interested in.

Some figure legends need further elaboration (specific suggestions below). In particular, when windows from the computer are shown, more explanation needs to be provided as to why the values shown are in those fields and precisely which scenario choices are being shown, what the values in the fields are supposed to indicate (e.g., see comment below on Figure 3.2).

I like the way they have put the features of the models that they are using in bold italics. That should help the user find out information about a particular feature of interest. The authors could consider having an index-like table showing on which pages a particular model feature (e.g., multiple changes within a user specified range) is mentioned to further help a reader find that information.

2. *Please comment on the effectiveness of individual case studies. Is there any case study you think is particularly weak (or strong)? If so, how can weak case studies be improved? Do you have other suggestions for improving the presentation of case studies without significantly increasing the length?*

Only one of the six case studies uses WEPPCAT. That strikes me as an uneven presentation of the two models. It may be appropriate, but some justification for the number of case studies done with each model should be provided, either in chapter 2 or in the introduction to chapter 3.

Did the authors consider using both models in one watershed? That would give the reader an idea of the strengths and weaknesses of the two. The Raccoon River strikes me as a good candidate for such an analysis – or is it on too large a scale for WEPPCAT? Perhaps one could do a field scale analysis using some of the same scenarios used in the existing case study. I would think a water manager might want to understand a range of predictions based on different assumptions, which is what a comparison of results from the two models would provide.

The Patuxent case study: Reductions in impervious cover in a highly urbanized watershed may be difficult to achieve, but one could reduce connected imperviousness. Many of the negative effects of imperviousness are correlated best with connected imperviousness. This case study might be more relevant to managers in a highly urbanized watershed if it were illustrating reductions in connected imperviousness. The analyses shown are relevant to new development, but they also need to address the effectiveness of reducing connected imperviousness in an already developed watershed.

3. *Does the group of case studies when considered together provide a general conceptual understanding of how scenario-based analyses using the CATs can be applied to assess a range of different questions related to climate change and water? If not, how could the report be revised to better convey this understanding?*

I think it presents a very clear picture of what can be accomplished using scenario analysis with these models. However, nothing is said about uncertainty and the inability to put error bars around the results presented in the models; some mention of that belongs in section 3.8.

4. *Do you have other comments or suggestions for improving the quality of this report?*

Second case study, Part B: This scenario appropriately uses as baseline the watershed without stormwater detention but with considerable impervious surface. The hydrographs for centralized and distributed stormwater management are different. One wonders which is more similar to more natural conditions, i.e., with forested rather than impervious cover. If a manager is seeking to restore a stream to more natural conditions, an understanding of what a natural flow regime looked like with forest instead of impervious surface could aid the decision on whether to use centralized or distributed stormwater management. My guess is that the distributed looks more like the "natural" but it would be worth showing that hydrograph.

5. *EPA is evaluating the need for future CAT tool documentation, user support, and software revisions. Based on your understanding of the capabilities provided by the BASINS and WEPP tools in this report, can you suggest any specific need or opportunities for improving the function and utility of these tools?*

I think the current versions are weakest in their ability to explore alternative management options in great enough detail. One important aspect that I don't think can be incorporated yet is where in the watershed or stream network a particular management action would be most effective. This was touched on in the case study with centralized vs. distributed stormwater management, but further abilities to analyze spatial configuration would seem useful.

III.   SPECIFIC OBSERVATIONS

Page	Line #	Comments
17	17-19	This needs some further clarification. Are the meteorological data that are created specific to the region of interest? Is the closest weather station used for the historical data? How large is the "region" for which the meteorological data are created? For example, is it at the scale of the Pacific Northwest? west of the Cascades? Skagit River watershed?

		What size watershed? Scale needs to be clarified.
18	Figure 2.1	Figure 2.1 is useful. I realize that it is probably the standard diagram for BASINS. Many of the labels are understandable to the uninitiated, but others are not: WDMUtil, HSPF parm (are these used in all models? That is what the figure implies.), HSPFWln/HSPF, GenScn. If the authors don't want to change the figure, more explanation should be provided in the figure legend.
20	25-26	"SWAT does not simulate event-based changes." If one of the likely consequences of climate change is change in frequency and intensity of events, how is SWAT useful in a CAT? Or does that statement mean that changes in a SINGLE event cannot be simulated? Clarification needed.
22	Figure 2.2	Figure 2.2 is very different from Figure 2.1 in that model components are not shown. Is there not a diagram for WEPP more similar to what is illustrated for BASINS?
24	40	Future land use and land cover will also be affected by climate change. I presume that is not considered in these models. I think that needs to be explicitly stated. Is the impact of climate change on crop production considered in WEPPCAT?
27	15	Surely fertilizer use should be included in this list!
29	Table 3.3	I am not familiar with the Nash-Sutcliffe Efficiency coefficient. A footnote explaining it or with a reference to it would be useful. It would be useful to know the units in which each of the variables (streamflow, TN, etc.) were reported.
31	Figure 3.2	It is difficult to understand how the values shown in this figure relate to the various scenarios discussed on p. 30. It would be useful if the figure legend would explain how this relates to the different scenarios and how the values shown (0.9, 1.2, 0.05) relate to the scenarios being discussed.
31	18	Give units for each of these in parentheses.
35	Figure 3.4	This one takes a little time to understand. The numbers to the right of the graph confuse things because they are not lined up with the lines they are supposedly labeling. The individual lines are labeled, so I suggest eliminating the numbers to the right. If negative changes were in one color and positive in another, the figure might be easier to interpret. I guess that is done with black and grey now, but it is not very clear.
36	12	"future conditions" is too vague – what year?
36	37	Was spatial variability a part of ALL runs in Part B? That should be clarified.
41	Figure 3.8	It appears that only one pattern of temperature variation was used, so it is confusing to have CC-3, 5 and 6 with different symbols in the temperature figure. The legend should also include CC3 since that is on the figures also.
45	26	For some parts of the country (e.g., Pacific NW) seasonal shifts in precipitation (e.g., more rain on snow events) are well understood and seem fairly certain. I think the statement about lack of understanding

		and some uncertainty should be qualified as being true for some regions of the country. I don't think it is true for all regions.
45	34-35	Statements like this are the kind of thing that should be in the Executive Summary rather than the very general statement of results that is currently there.
48	10	It makes perfect sense that temperature changes wouldn't influence things over the short duration of the storm, but it certainly could affect the moisture content of the soil (e.g., higher temperature, more ET, and therefore lower soil moisture). Was that dealt with by altering SWMM soil moisture parameters? Some recognition of that and explanation of how that was handled would be valuable. Is that what is in lines 33-37 – perhaps that just needs to be acknowledged earlier or else the statement on line 10 needs to be less absolute, i.e. do not say that temperature is not a significant factor.
50	Table 3.16	I don't understand why the authors didn't calculate load rather than EMC. Load is what is influencing downstream ecosystems and should be reported.
52	Figure 3.13	The legend for this figure would be clearer if it stated exactly what this listing of parameters was going to accomplish.
		Second case study, Part B: Why wasn't N, P, TSS reported for this scenario? Do different management approaches result in different loadings?
57	32	Citation needed for hydrologic groups A and B. What are they? Next sentence – C and D? I see they are defined later; move the definition up to here.
60	Table 3.20	In table legend explain what bold numbers represent. Why no bold numbers in Table 3.21?
65	Figure 3.19	Forested buffer mentioned in legend, but it is not shown in the figure.
65	15	Rather than the general statement about crop type and slope, state that soy yielded more than corn, and 5% more than 2% slope.
69	Table 3.26	NSE needs a citation. What is E'?
70	9-16	This is a very confusing explanation. Take out the hour references in parentheses because it makes no sense that the first event is hr 16-17 whereas the second is 1-2. I understand what that means from the figure, but it just confuses things for the reader. Lines 11-16 are difficult to understand and Figure 3.22 is very difficult to interpret. Can the information be presented in a different way?
76	Table 3.30	Where are Wheeler Springs and Fillmore gages? Show them on Figure 3.24.
77	7-13	This is the kind of information I am asking to be put in the figure legend, i.e. what each field means.
83	Table 3.34	NSE citation needed.
85	Figure 3.29	I do not understand how the numbers shown in the fields generates the scenario described above, e.g., where is the >70th percentile of storms shown? More explanation of fields is needed.
		Some of the most interesting results are when a percent change in

		precipitation results in a greater % change in an endpoint (e.g. 86, lines 22 and 24-25 and 27-31; 87, lines 5-7). This is the kind of thing that needs to be in the Executive Summary.
88	25	I think more needs to be said about ways of reducing impervious cover and disconnecting connected imperviousness. At the very least, provide citations where further information is available.
91	29	What is hinted at here is that these practices, if employed now, will provide benefits in the present as well as reducing the impacts of future climate change. I think that needs to be explicitly stated.
Grammar/Typos		
14	23	attributes OF individual…
15	1	take out "the" at the end of this line
24	18 & others	"analogue" Are we using British spelling in this document? I guess that is the spelling used by IPCC, but it looks very strange to an American reader.
63	16	PART misspelled
71	Table 3.28	should all be on one page
80	15	modify specific time span subsets should be bold italics
83	20	data WERE, not was

Review by
Bethany T. Neilson, Ph.D.

Peer Review Comments on EPA's Draft Document
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March 5, 2012

I.   GENERAL IMPRESSIONS

In general, the document structure was easy to follow and could be read in sections (which I
think is more likely the way it will be read in practice). The accuracy of the information
presented is difficult to assess given the limited information regarding the models. However, the
text about tables and figures usually matched up (with the exceptions noted below). The clarity
of the presentation was very good in general. Again, the exceptions were a couple of case studies
that were not set up as clearly and were difficult to follow (detailed information provided below).
Further, there were some sections where I felt the conclusions were either overstated or the
information used to make these conclusions was not clearly identifiable. Based on my
understanding, this document was intended to illustrate the utility of BASINS CAT and
WEPPCAT. I think the document should stick with this and avoid trying to make broad
interpretations or conclusions when information is limited. If conclusions or broad statements are
made, the figure/table used to justify the statement should be specified.

II.   RESPONSE TO CHARGE QUESTIONS

1. *Please comment on the overall document organization, clarity, and level of detail. Are there*
any structural changes you think would improve this report? What information, if any, could
be added or deleted to improve the report?

A number of case studies are well framed and relatively easy to follow, but a few of them could
provide more information. In particular, I found the presentation of the California and Maryland
case studies the most clearly organized and it was obvious that the emphasis was on
understanding how CAT was utilized within the case study. Conversely, Part B of the Raccoon
River, Iowa SWAT case study was very difficult to follow. Granted it is a complicated case
study, but the presentation of the different scenario options were not easy to follow and more
detail about the scenarios need to be added. I have provided a number of specific comments
below regarding my thoughts on the necessary additional information. The other case study that
was difficult to follow was the WEPPCAT case study. I have never used WEPP, but I feel like
these case studies should be easy to follow without an understanding of the actual model being
used. The presentation of the scenarios within the case study seemed relatively straight forward,
however, the presentation of the results were difficult to follow. This made me question if I

understood all the various scenarios that were being considered. Some specific comments about this section are provided below.

2. *Please comment on the effectiveness of individual case studies. Is there any case study you think is particularly weak (or strong)? If so, how can weak case studies be improved? Do you have other suggestions for improving the presentation of case studies without significantly increasing the length?*

As I mentioned above, Part B of the Iowa study could be significantly stronger if there was a clearer presentation of the various climate change scenarios. Specific comments are made below, but, in general, the changes from baseline to CC1-6 should be stated up front in Table 3.9 and not just included in the figures associated with the results. There should also be a clear link between the names contained within the second column of the table and each scenario. Further, interpretation of the results provided more questions than clarity. Many of the statements seem unfounded, but this may be in part due to me not understanding the scenarios completely.

3. *Does the group of case studies when considered together provide a general conceptual understanding of how scenario-based analyses using the CATs can be applied to assess a range of different questions related to climate change and water? If not, how could the report be revised to better convey this understanding?*

Yes, in general. The WEPPCAT case study was less informative. See comments above and in detail below.

4. *Do you have other comments or suggestions for improving the quality of this report?*

Figure quality should be improved in general. Some are good, but many are blurry. Many detailed comments are provided below. These will significantly improve the quality of the report.

5. *EPA is evaluating the need for future CAT tool documentation, user support, and software revisions. Based on your understanding of the capabilities provided by the BASINS and WEPP tools in this report, can you suggest any specific need or opportunities for improving the function and utility of these tools?*

I have not spent a lot of time trying to develop scenarios, so I have no further suggestions.

III.   SPECIFIC OBSERVATIONS

Page	Line #	Comments
12	15-17	Should add reference to this sentence
General		Many of the citations throughout the document don't have the second author or the necessary "et al.". Further, there are a number of citations that need formatting
General		A number of acronyms are used and then defined or a number are defined twice (once in intro and again in a new chapter). Should be consistent.

14	9-10	This sentence is not clear. Instead of management goals, should this say infrastructure?
14	31	Again, confusing use of term management. The statement that "current water management may not be adequate....." Do you mean management options.....or water infrastructure. Or do you really mean that the management (people) is not adequate? For some reason, this is how it reads to me.
18	13	The text associated with this bullet is unclear. What is meant by this? Please provide clarification about how this is relevant to the key topics here.
19	29	May be useful to specify BASINS version here.
20	1-2	This sentence would read better as: "The receiving water bodies are assumed to be completely mixed." Completely mixed includes all directions within a reach.
20	4	Processes simulated?
20	16-17	I don't think this bullet should be included. It is not unique to HSPF.
20	19	Is this a new feature? Is this something that should be included here in a summary?
20	23-29	This entire paragraph should be deleted. The following paragraph is much clearer and restates much of what this paragraph seemed to try and state, but was difficult to follow and poorly worded.
21	38	Delete "comprised of multiple time steps."
21	46	These bullets should read like a list rather than sentences that have been split up into a list.
22	27	It seems a bit more information about Cligen would be useful for readers unfamiliar with it.
24	27	Define GCM and RCM. Don't think they have been defined previously.
29	29	Table 3.3 shows an NSE = 1. That seems a bit strange. A plot should be added here that shows the calibration of the model for Q, TN, TP, and TSS. In reading through this, I felt like there was too little information provided about the calibration. This statement would be applicable to all case studies.
29	32	Is this a leftover heading?
31	18	Since Tables 3.4-3.7 are mentioned in the text before Figure 3.3, they should be moved before the figure.
33	15	The use of the term likely here seems unnecessary. Given the fact that this is a process based model you should be able to determine what is causing the decrease in flow.
35	1	I was surprised that the contours were linear in this figure.
36	2-3	Why wasn't this mentioned in Part A and just mentioned here?
36	14-27	This section needs more information. In Table 3.9, unless you are familiar with these NARCCAP Climate Model definitions, it is very difficult to figure out what is going on in these scenarios. It would be useful if Table 3.9 included a quick summary of the climate scenarios. Further, I think there should be some plots of what the temperature and precipitation time series looked like in this section (rather than just plot

		them in the results). Another missing link was where the numbers you put into CAT (line 26-27) came from. It may just be my lack of familiarity with these models, but I assume I will not be the only one.
36	30-33	Was this information about Part A provided in Part A? If not, it should be.
38	7-8	This is overstated based on the Figure 3.6 (top). It is also unclear what is meant by spring, fall, and summer throughout this paragraph. Please use month numbers to be clearer.
38	12-13	I am not sure I agree with this statement. Seems that TSS and TP differences would likely be due to changes in runoff.
38	18	Instead of referring to top panel or just the entire figure, I suggest adding a, b, c to all of the plots within this section. Then a subplot can be referenced directly.
38	19-22	Not sure these statements are justified by the plots. Please revisit and ensure they are not overstated and are correct.
41		Seem to be missing CC 3 and CC 5 lines…..if they are under CC 6, a note about this should be added to caption.
45	10	Add S to BASIN
45	30	Add simulation after baseline?
47	5	Top should be tops?
47	18	Series of SWMM models? This is a bit confusing.
48	6	Define SCS.
48	23-24	Used to define boundary conditions? Can this be explained a bit more.
50		Figure 3.12 +30% and +20% colors are indistinguishable.
51	24	Why go between cms and cfs? Should be consistent through this entire section. Table 3.17 is in cms and Figure 3.15 is in cfs.
55	10	Should "design" be here?
57	4	First sentence in box is difficult to follow. Please rewrite.
59		Extra or no spaces in line 4 of footnote.
60	9-24	It is very hard to follow this section because it is unclear what table or figure is being referred to. Within each sentence, there should be a reference to the figure/table of interest.
63	13	Was this statement made based on part A or other info?
63		Table 3.22 wasn't mentioned in the text.
65	10	Should this reference be to Table 3.24?
65	10-12	Should the following sentence have a reference to Table 3.25?
65	14	Is there a Table 3.26?
68	12	Space between BASINS and 4
68	12-16	Are the 3 NCDC stations chosen within BASINS? These sentences are a bit confusing.
69	2	Define terms within this table. What is E'? I also think a plot of the calibration and validation would be useful.
69	5	Terms defined within caption are confusing. Are the / signs division? Please clarify.
71	22	Suggest replacing the word depths here.

78		Suggest adding table describing all scenarios.
79	21	Delete extra period.
81	4	Combinations should be singular.
86	5	Spell out West Branch here.
89	7	Fix spelling of behavior.
90	10	Subscript 2 in CO2.

**Review by
Mark T. Southerland, Ph.D.**

Peer Review Comments on EPA's Draft Document
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Case Study Guide to Potential Applications

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February 16, 2012

I.   GENERAL IMPRESSIONS

The report is generally well written and organized. I am not an expert in the BASINS or WEPP CAT component models, but their characteristics were clearly presented so that I could follow the presentation. The presentation of climate change issues, while brief, was clear and useful. I applaud the approach of focusing on the case studies, as that is the best illustration of the utility of the tools. The case studies were generally easy to follow.

I am most concerned that the conclusions of the case studies may be misleading, even though there are frequent caveats in the report about the importance of specific underlying conditions for each scenario.

Some additional explanation of the relative merits of the synthetic, analog, and model-driven approaches to scenario development would be beneficial. I think the report would most benefit from additional discussion of and comparison among the six case studies (additional case studies might be useful but are not critical, as readers can be overwhelmed). For example, a table listing (1) scenario approach, (2) baseline conditions, (3) scenario changes, (4) endpoints, (5) reasons for endpoints, (6) summary results, (7) limitations, and (8) possible improvements. Other approaches to this more in-depth comparative discussion would also work.

Lastly, I would like to see more on the range of possible endpoints and their selection. Ultimately, selecting endpoints linked to management actions will be the key to the utility of these tools.

II.   RESPONSE TO CHARGE QUESTIONS

1. *Please comment on the overall document organization, clarity, and level of detail. Are there any structural changes you think would improve this report? What information, if any, could be added or deleted to improve the report?*

The report is generally well written and organized. I am not an expert in the BASINS or WEPP CAT component models, but their characteristics were clearly presented so that I could follow the presentation. The presentation of climate change issues, while brief, was clear and useful. I

applaud the approach of focusing on the case studies, as that is the best illustration of the utility of the tools. The case studies were generally easy to follow.

2. *Please comment on the effectiveness of individual case studies. Is there any case study you think is particularly weak (or strong)? If so, how can weak case studies be improved? Do you have other suggestions for improving the presentation of case studies without significantly increasing the length?*

I am most concerned that the conclusions of the case studies may be misleading even though there are frequent caveats in the report about the underlying conditions of each scenario. For example, the impervious cover case study (3.7 Western Branch of Patuxent River, MD) concludes that TSS will decrease with an increase in impervious cover; this is attributed to the conversion of agriculture (rather than forest) land use to urban land use, but there is no mention of the role of bank erosion as a contributor to TSS, raising the question of whether bank erosion is included in the underlying model. I have a similar concern about whether the BMP performances are included adequately. The report raises at the end the significant issues of unknown influences on watershed system behaviors from groundwater, evapotranspiration, and vegetative processes.

3. *Does the group of case studies when considered together provide a general conceptual understanding of how scenario-based analyses using the CATs can be applied to assess a range of different questions related to climate change and water? If not, how could the report be revised to better convey this understanding?*

Some additional explanation of the relative merits of the synthetic, analog, and model-driven approaches to scenario development would be beneficial. In addition, I would like to see more on the range of possible endpoints and their selection. Ultimately, selecting endpoints linked to management actions will be the key to the utility of these tools.

4. *Do you have other comments or suggestions for improving the quality of this report?*

I found the case studies that quantified the interactions of climate change with (1) other stressors such as impervious cover or (2) management actions such as agricultural BMPs to be the most informative. I think the report would most benefit from additional discussion of and comparison among the six case studies (additional case studies might be useful but are not critical, as readers can be overwhelmed). For example, a table listing (1) scenario approach, (2) baseline conditions, (3) scenario changes, (4) endpoints, (5) reasons for endpoints, (6) summary results, (7) limitations, and (8) possible improvements. Other approaches to this more in-depth discussion would also work.

5. *EPA is evaluating the need for future CAT tool documentation, user support, and software revisions. Based on your understanding of the capabilities provided by the BASINS and WEPP tools in this report, can you suggest any specific need or opportunities for improving the function and utility of these tools?*

No.

III.   SPECIFIC OBSERVATIONS

Page	Line #	Comments
		None

PEER REVIEWER COMMENT TABLE

(See Attachment A)