MEMORANDUM

To: IDWR
        ESHMC
Fr: B. Contor
        IWRRI
Date: 1 December 2009

Re: Discussion of Calendar for ESPAM3 model development and calibration

This memo summarizes discussions of calendaring for ESPAM3 development and calibration, held at the September 2009 and November 2009 ESHMC meetings. It is IWRRI's deliverable for Task 2 of contract CON00824. The Task calls for a memo describing "agreed-upon dates." No consensus was reached in the meetings, so the memo actually describes three alternatives that resulted from discussions. These are presented as input to IDWR, without recommendation. The memo is accompanied by spreadsheet "ESPAM3_Calendar_2099118.xls," which was used to generate the figures that follow the text of this memo.

Alternative 1 is the "Big Change" calendar, designed to accommodate major changes in conceptual model, such as a multi-layer model, change to modeling software other than MODFLOW, or linkage of surface-water modeling and groundwater modeling. Accommodation is made by lengthening the period of time for model calibration and uncertainty analysis. This calendar was sketched in the September ESHMC meeting, with no modifications proposed during the November meeting. It is presented in Figure 1.

Alternative 2 is the "Incremental Change" calendar. It is designed to accommodate what appeared to be the desire of the ESHMC during development of ESPAM2, which was to revisit and reconsider many different conceptual models and calculation methods for water-budget and target data. It accomplishes this by compressing the calibration and uncertainty analysis to the end of the development period. Alternative 2 was sketched in the September meeting and modified in the November meeting. It is illustrated in Figure 2.

Alternative 3 is the "Iterative Calibration" calendar. It is designed to allow iterative calibration of the model as a process for testing conceptual models and methods for water-budget and target data, and for informing decisions on data gathering and sensitivity, as well as uncertainty. Alternative 3 was first presented to the ESHMC in the November meeting. Figure 3 illustrates Alternative 3.

Summary

The result of the ESHMC discussions is three calendars for IWRRI consideration. Alternative 1 accommodates major conceptual-model changes or modeling-platform changes, at the expense of reducing available time and resources for contemplating changes to conceptual models or calculation methods for individual water budget or target components.

Alternative 2 accommodates the pattern preferred by the ESHMC during development of ESPAM2, which was to consider large numbers of changes to calculation of water-budget and target components. It allows insufficient time for calibration and uncertainty analysis of a model structure that includes major conceptual or modeling-platform changes.

Alternative 3 is an incremental-change paradigm that includes iterative analysis of calibrated models, to allow testing of changes in component calculation methods. It will also inform the uncertainty-analysis process. It precludes major structural changes. By devoting additional effort and time to preparation of model-ready data sets for interim calibrations, as well as the iterative water-budget review activities that accompany calibration, it necessarily limits the number of component-calculation changes that may be considered, relative to Alternative 2.

It is expected that IDWR will decide the general direction that development of ESPAM3 should take, as well as manage the calendaring of activities as the project moves forward. It is also expected that any calendar adopted by IDWR will have to be modified and adjusted as model development proceeds.

Date	Big Change	
	Processes	Events
1-Sep-09		
1-Oct-09	Discuss candidate conceptual changes	
31-Oct-09		
1-Dec-09		
31-Dec-09		
31-Jan-10		Prioritize changes
2-Mar-10	Gather data and experiment with methods for proposed conceptual changes	
2-Apr-10		
2-May-10		
1-Jun-10		
2-Jul-10		
1-Aug-10		
1-Sep-10		
1-Oct-10		
1-Nov-10		
1-Dec-10		
1-Jan-11		Revisit prioirities
31-Jan-11		
2-Mar-11		
2-Apr-11		
2-May-11		
2-Jun-11		Final decision on changes
2-Jul-11	Gather data and built tools for selected conceptual model	
2-Aug-11		
1-Sep-11		
1-Oct-11		
1-Nov-11		
1-Dec-11		
1-Jan-12		
31-Jan-12		
2-Mar-12		
1-Apr-12		
2-May-12		
1-Jun-12		
1-Jul-12		
1-Aug-12		
31-Aug-12		
1-Oct-12		
31-Oct-12		
1-Dec-12		
31-Dec-12		
30-Jan-13		
2-Mar-13		
1-Apr-13		
2-May-13		
1-Jun-13		
2-Jul-13		Complete data set, native
1-Aug-13	Completion, review and vetting of tools & methods. Formatting of data for tool use.	
1-Sep-13		
1-Oct-13		
31-Oct-13		
1-Dec-13		Tools completed, accepted
31-Dec-13		Model-ready data
31-Jan-14	Calibration & uncertainty analysis	
2-Mar-14		
2-Apr-14		
2-May-14		
1-Jun-14		
2-Jul-14		
1-Aug-14		
1-Sep-14		
1-Oct-14		
1-Nov-14		
1-Dec-14		
31-Dec-14		Deliver calibrated model

Figure 1. Alternative 1 calendar.

Date	Incremental Change	
	Processes	Events
1-Sep-09		
1-Oct-09		
31-Oct-09	Discuss candidate	
1-Dec-09	conceptual changes	
31-Dec-09		
31-Jan-10		Prioritize changes
2-Mar-10		
2-Apr-10		
2-May-10		
1-Jun-10		
2-Jul-10		
1-Aug-10		
1-Sep-10		
1-Oct-10		
1-Nov-10		
1-Dec-10		
1-Jan-11		Revisit prioirities
31-Jan-11		
2-Mar-11		
2-Apr-11		
2-May-11		
2-Jun-11		
2-Jul-11	Gather data and	
2-Aug-11	experiment with methods	
1-Sep-11	for proposed conceptual	
1-Oct-11	changes	
1-Nov-11		
1-Dec-11		
1-Jan-12		
31-Jan-12		
2-Mar-12		
1-Apr-12		
2-May-12		
1-Jun-12		
1-Jul-12		
1-Aug-12		
31-Aug-12		
1-Oct-12		
31-Oct-12		
1-Dec-12		
31-Dec-12		
30-Jan-13		
2-Mar-13		Final decision on changes
1-Apr-13		
2-May-13	Gather data and build	
1-Jun-13	tools for selected	
2-Jul-13	conceptual model.	
1-Aug-13		
1-Sep-13		Complete data set, native
1-Oct-13		
31-Oct-13		
1-Dec-13	Completion, review and	
31-Dec-13	vetting of tools &	
31-Jan-14	methods. Formatting of	
2-Mar-14	data for tool use.	
2-Apr-14		
2-May-14		
1-Jun-14		Tools completed, accepted
2-Jul-14		Model-ready data
1-Aug-14		
1-Sep-14	Calibration & uncertainty	
1-Oct-14	analysis	
1-Nov-14		
1-Dec-14		
31-Dec-14		Deliver calibrated model

Figure 2. Alternative 2 calendar.

Date	Incremenatal w/ iterative calibration	
	Processes	Events
1-Sep-09		
1-Oct-09		
31-Oct-09	Discuss candidate conceptual changes	
1-Dec-09		
31-Dec-09		
31-Jan-10		Prioritize changes
2-Mar-10		Prelim change decision
2-Apr-10		
2-May-10	Gather data, experiment w/ methods	
1-Jun-10		
2-Jul-10		
1-Aug-10		
1-Sep-10		Complete data set, native
1-Oct-10		Tools completed, accepted
1-Nov-10	Completion, vetting, formatting tools & data	
1-Dec-10		
1-Jan-11		Model-ready data
31-Jan-11		
2-Mar-11	Calibration & uncertainty analysis	
2-Apr-11		
2-May-11		Deliver ESPAM2.1
2-Jun-11		Revisit prioirities
2-Jul-11		Prelim change decision
2-Aug-11	Gather data, experiment w/ methods	
1-Sep-11		
1-Oct-11		
1-Nov-11		
1-Dec-11		Complete data set, native
1-Jan-12		Tools completed, accepted
31-Jan-12	Completion, vetting, formatting tools & data	
2-Mar-12		
1-Apr-12		Model-ready data
2-May-12		
1-Jun-12	Calibration & uncertainty analysis	
1-Jul-12		
1-Aug-12		Deliver ESPAM2.2
31-Aug-12		Revisit prioirities
1-Oct-12		Prelim change decision
31-Oct-12	Gather data, experiment w/ methods	
1-Dec-12		
31-Dec-12		
30-Jan-13		
2-Mar-13		Complete data set, native
1-Apr-13		Tools completed, accepted
2-May-13	Completion, vetting, formatting tools & data	
1-Jun-13		
2-Jul-13		Model-ready data
1-Aug-13		
1-Sep-13	Calibration & uncertainty analysis	
1-Oct-13		
31-Oct-13		Deliver ESPAM2.3
1-Dec-13		Revisit prioirities
31-Dec-13		Final decision on changes
31-Jan-14	Gather data, experiment w/ methods	
2-Mar-14		
2-Apr-14		
2-May-14		
1-Jun-14		Complete data set, native
2-Jul-14		Tools completed, accepted
1-Aug-14	Completion, vetting, formatting tools & data	
1-Sep-14		Model-ready data
1-Oct-14		
1-Nov-14	Calibration & uncertainty analysis	
1-Dec-14		
31-Dec-14		Deliver ESPAM3.0

Figure 3. Alternative 3 calendar.