**UPGM Workplan (2012-2013)**

**(Last Updated June 4, 2012)**

**Goal #1: (a) Incorporate the UPGM standalone model (in FORTRAN) into the AgES-W model. (b) Incorporate components (in Java) from the UPGM standalone model (e.g., seedling emergence, canopy height, and phenology) into the AgES-W model (i.e., modify the SWAT model).**

Specific tasks for Goal 1a:

Jimbo: I have no idea on the completion dates for goal 1a, particularly since I don’t know which student (yours or Laj’s) will be working with Olaf on this. However, I’m assuming it would be best to work on this AFTER the UPGM/WEPS interface work is “done” in September/October 2012 so as not to distract from our efforts on that, and would like to have UPGM Fortran standalone integrated with AgES-W by the end of 2012. However, this time line is not fully testing the linkage and any problems with UPGM (in the remotely unlikely possibility that exists!). Last, I’ve included some steps here that may have already been done with the UPGM/WEPS interface work.

1. Goal 1b is **entirely dependent** on the ability of OMS3 to integrate and debug mixed Java and FORTRAN components and then create an executable (e.g., \*.jar or \*.exe) file. *(Person(s) responsible: Olaf / Due date: 3/1/2012)* **Completed**

2. Perform further optimization of the restructured UPGM standalone component to ensure a single entry/exit point (i.e., one “main” component contains all the input/output variables required by all other underlying components). *(Person(s) responsible: Jim / Due date: 10-1-2012???)*

3. Examine existing crop growth component code in AgES-W to determine integration point for the UPGM FORTRAN crop growth component. Integrate the UPGM FORTRAN crop growth component into AgES-W and verify with test data sets. Modify AgES-W input files to incorporate input parameters for UPGM components. *(Person(s) responsible: Olaf, Student, Greg, Debbie, Jim / Due date: 12-1-2012???)*

4. Work on verifying code for all components/processes of UPGM (e.g., multiple years and multiple cropping systems, perennial crops, linkages with water and N balance). *(Person(s) responsible: Olaf, Student, Greg, Debbie, Jim / Due date: 4-1-2013???)*

5. Work on evaluating the linkage of the UPGM Fortran standalone model with AgES-W, incorporate new enhancements to the UPGM model as they are available, begin parameterization for watersheds identified in CRIS project plan, and possibly use OMS sensitivity and uncertainty analysis tools to further evaluate UPGM. *(Person(s) responsible: Greg, Debbie, and others as outlined on CRIS responsibilities / Due date: 9-31-2013???)*

*Note: The completion of Goal 1a essentially fulfills the 12- and 24-month UPGM model development tasks as indicated in the new Spatial Modeling CRIS Project Plan. However, ongoing assistance (e.g., input file setup, model parameterization, further model evaluation, etc.) from others will be required to satisfy journal paper deadlines as itemized in the Project Plan.*

Specific tasks for Goal 1b:

*NOTE: Because of lack of personnel currently, this goal will not be completed for the foreseeable future. Therefore, no timelines are given, merely a list of the tasks envisioned.*

Jimbo, I don’t really see why many of these tasks will need to be done again after completing Goals 1a and 2, but I left in or slightly modified. Also, I would think the processes needs to be similar to what was done in bringing in PhenologyMMS code into UPGM, where the subrountines are “clearly” identified (no Common Blocks), and then figuring out how to specifically tie it into SWAT-Java. …

1. Update the current UPGM FORTRAN standalone model with the latest WEPS crop growth component code. *(Person(s) responsible: Jim / Due date: ???)* Delete? This should have been done with UPGM-WEPS interface and/or UPGM-AgES-W work.

2. Restructure the current PhenologyMMS/UPGM FORTRAN standalone model into a modular FORTRAN 95 component (ideally with no common blocks). In addition, optimize code for reusability and modularity. *(Person(s) responsible: Jim, Greg, Debbie / Due date: ???)* Delete?

3. Disaggregate UPGM FORTRAN standalone components from #3 (i.e., seedling emergence, canopy height, and phenology) and verify code for each component. Understand inputs/outputs for each component. *(Person(s) responsible: Jim, Greg, Debbie / Due date: ???)* Delete?

4. Convert PhenologyMMS/UPGM component/subroutine code from FORTRAN to Java and verify Java component code. *(Person(s) responsible: Olaf, Greg, New Student / Due date: ???)*

5. Examine existing crop growth component code in AgES-W (or are we just modifying the SWAT-Java plant growth model?) to determine integration points for PhenologyMMS/UPGM seedling emergence, canopy height, and phenology Java components. Integrate PhenologyMMS/UPGM components into AgES-W and verify with test data sets. Modify AgES-W input files to incorporate input parameters for UPGM components. *(Person(s) responsible: Olaf, New Student, Greg / Due date: ???)*

**Goal #2: Develop a WEPS-based UPGM crop growth model that includes all WEPS code related to the crop growth model (including management practices/water balance routines and the currently inactive N balance routines). All WEPS science code not related to the crop growth model (e.g., WEPS erosion routines) will be removed and the WEPS interface modified as necessary (including better output visualization).**

Specific tasks for Goal 2:

This task assumes that Matt Stobber will start either June 4 or 18, 2012. This will be Matt’s primary responsibility and focus when he starts working with ASRU.

1. Obtain the latest WEPS science and interface code from WERU and the required input file structure and variables, particularly for the crop growth routines and parameter inputs. *(Person(s) responsible: Jim / 6-1-2012???)* Jim, this assumes that Shilpa will work on step 2, that Matt does not start until June 18th, and Debbie will be able to start helping on this (especially step 3) while I am gone from June 8th through about June 26.

2. Compile the WEPS science code (using Intel FORTAN Composer running under Microsoft .NET 2010) and the WEPS interface code (using NetBeans 7). Run the interface with the input files and EXE using the WEPS model.  *(Person(s) responsible: Jim, Shilpa / 6-8-2012???)* Jim, this assumes it will take Shilpa 1 week to do the work, and can show Debbie the interface and get it set up on her computer to help with Step 3.

3. Understand the WEPS interface input file writing capabilities (e.g., which sections of the interface read/write which input files).  *(Person(s) responsible: Matt, Greg, Debbie / 6-29-2012)*

4. Modify WEPS interface screens to include only those related to the WEPS crop growth model. *(Person(s) responsible: Matt, Greg, Debbie, Jim / ?-?-2012)*

5. Modify WEPS interface screens to allow for inputs for fertilizer and other UPGM enhancements (e.g., seedling emergence, canopy height, and phenology). *(Person(s) responsible: Matt, Greg, Debbie, Jim / ?-?-2012)*

6. Modify WEPS interface for NRMV (Natural Resource Model Visualizer) capabilities. *(Person(s) responsible: Matt, Greg, Debbie, Jim / ?-?-2012)*

7. (Jim, I’m not sure when this should be done in terms of the previous steps on the interface work.) Deliver the optimized restructured FORTRAN UPGM standalone component to WERU and discuss most efficient way to integrate the UPGM enhancements for seedling emergence, canopy height, and phenology into the WEPS model. Also, determine where this code will be maintained. *(Person(s) responsible: Jim, Greg, Debbie, Larry, Fred / ?-?-1-2012)* Jim, I was hoping that we would be able to simply copy the subroutines that we have altered in the UPGM Fortran standalone when incorporating the new components that would then also write in the new input files. This step also seems to be getting into step 8 below, isn’t it? Am I missing something here?

8. Modify the WEPS FORTRAN code to incorporate current UPGM enhancements for seedling emergence, canopy height, and phenology (and other improvements such as improving and testing methods for incorporating water and N stress factors). [*(a) Person(s) responsible: Fred, Larry, Jim, Greg, Debbie, Matt] [(b) Person(s) responsible: Greg, Debbie, Jim, Matt*] *[(c) Person(s) responsible: Fred, Larry, Jim, Greg, Debbie, New Student / TBD???]*

9. Upon completion of #8, all WEPS science code not related to the crop growth model will be removed. Science code will then be the UPGM model (without the interface). *(Person(s) responsible: Jim, Greg, Debbie, New Student / TBD???)*

10. Finalize the WEPS interface to include only the GUI screens needed for the UPGM science model (Step 9) to provide the fully implemented standalone UPGM model that can then be used for further development, testing/evaluation, and application as desired. *(Person(s) responsible: Jim, Greg, Debbie, New Student / ?-?-2012)*

11. Continue development and testing/evaluation on the UPGM science model such as (a) fully linking the phenology module, and (b) implement enhancements to the WEPS crop growth model as initially proposed by Wagner/Fox in 2005.

***Note: Initiation of #4??? assumes that the WEPS input files have been converted to XML file format. Jimbo, this was a left-over from earlier draft and I hope/think that maybe this will not be an issue any more. Still, we need to discuss this with Larry and Fred.***

JIMBO: Should we consider deleting this goal?

**Goal #3: Incorporate the optimized restructured FORTRAN UPGM standalone component into the AgES-C (Conservation) model (FORTRAN code).**

Specific tasks for Goal 3: TBD

1. Work begins in October 2012.
2. The restructured code from Goal 1b #2 will be used.