**UPGM and AgES-W Tasks**

**March 2, 2015**

Core UPGM/AgES-W Linkage Tasks

1. Verify that the UPGM plant growth component is reading correctly from an input (.csv) database (i.e., the WEPS plant database w/ UPGM parameters added) and writing correctly to an output (.csv) file (need to finalize all SWAT/UPGM plant growth component output variables).
2. Verify that all variables needed for the daily execution of the UPGM plant growth model have been identified and initialized, re-initialized correctly for each HRU, and passed correctly to UPGM across space and time. (**Completed** **as of 2/10/15).**
3. Verify that all UPGM variables needed for other AgES-W components have been identified, initialized correctly for each HRU, and passed correctly to AgES-W components across space and time.
4. Determine the optimal location for calling UPGM in relation to water, N, and temperature stress factors.
5. Verify that the UPGM component is running “correctly” for the Drake Farm/Greeley LIRF simulation scenarios.

Additional UPGM/SWAT Plant Growth Component Development Tasks

1. Determine how to handle plant N concentration in growing/senescing tissues required for N balance and calculating the N stress factor.
2. Input atmospheric CO2 concentration at different time scales into AgES-W and pass to UPGM on a daily basis (atmospheric CO2 concentration should also be available for other processes/classes in AgES-W).
3. Create flag(s) to allow user to select running AgES-W with: (a) the current SWAT plant growth component, (b) UPGM using the original WEPS plant growth component, and/or (c) UPGM using (b) plus enhanced components for phenology, seedling emergence, and canopy height.
4. Reconcile SWAT vs. UPGM temperature stress calculations, i.e., have alternative temperature stress factor functions available in the Plant\_Growth\_Stress class by adding the UPGM temperature stress function and allow the user to select the desired function.
5. Expose additional UPGM variables for each HRU output in tables/graphs needed for verifying the linkage and for evaluation.
6. Correct problems with current AgES-W/SWAT model:

* Correct N stress factor error calculation.
* Correct management input file (management.csv) structure and execution to eliminate current problems with timing of planting/plant growth events and to allow easier implementation of fallow periods and perennial crops.
* Correct problem that LAI does not decline.
* Reverse current 0-1 stress factor from 0 meaning no stress to meaning maximum stress, and 1 meaning maximum stress to meaning no stress as original SWAT (and other EPIC-based models) have it. When done, then remove modification of how stress factors are passed to UPGM.

1. Overall UPGM code cleanup, i.e., remove include files from AgES-W/UPGM, streamline data passing, remove unused variables, etc.

UPGM/AgES-W Evaluation Tasks

1. Delineate Drake Farm for several HRU scenarios:
2. 2-3 HRU’s on the Scott Field. This would probably be used for the initial evaluation, and likely would be for summit positions where run-on is not occurring. The HRU’s also should be selected for locations with available soil and plant observed data are “best”.
3. Sub-portion of the Scott Field (possibly two strips?).
4. Whole Scott Field (probably somewhere between 18 and 42 HRU’s).
5. Whole Drake Farm.
6. Create optimized soil parameter/input files for each scenario, beginning with Scenario 1a.
7. Get each HRU scenario set up in the repository.
8. Summarize observed data for each scenario, beginning with Scenario 1b.
9. Begin initial evaluation using generic weather data for the Drake Farm, using Luca-determined soil parameter files, and running a generic 2 HRU scenario already established for 30-yrs of generic weather.
10. When beginning calibration phase, consider using Luca to determine plant parameters.
11. Final validation efforts 🡪 write paper.