**BioLUC Test Plan**

16 May 2013

Goal

To verify the basic reasonableness of the formulation, behavior, output, and usability of the BioLUC model under a representative set of scenarios and digressions from them.

Scope [ASSIGNMENTS: Brian, Laura, Eric]

The following items are in scope:

1. Accuracy of the equations in the model
2. Consistency of units of measure
3. Appropriateness of the variable names
   1. Spelling
   2. Misleading names
   3. Spaces and special characters
   4. Input/output variables need special scrutiny
4. No fudge factors , unless there is a clear justification for them in terms of deficiencies in input data and modeling assumptions
5. Usability and functionality of the user interface
   1. Accuracy of labels
   2. Behavior and ranges on controls
   3. Clarity of graphs
   4. Sufficiency and ability to run and interpret interesting scenarios
6. Accuracy, clarity, usability of the documentation and tutorials
   1. Purpose, scope, and applicability/usage
   2. Context and conceptual framework
   3. Assumptions (resolution, processes, feedbacks, scenarios, exogeneities)
   4. Inputs
   5. Outputs
   6. Calibration
   7. Validation
   8. Sensitivities
7. General reasonableness of metrics from canned scenarios, including
   1. Per capita consumption and shortfalls
   2. Land usage
   3. International trade flows
   4. Ratio of vegetable to animal products
8. Reasonableness of system behavior, including
   1. Directionality of trends in response to input parameter changes
   2. Response to perturbations (pulse, steps, ramps, etc.), especially
      1. Stability or instability
      2. Time scales of responses and intensity of damping
   3. Stability of steady-state if inputs are appropriate
   4. Extreme value testing for basic metrics
   5. Non-negative stocks should stay positive
   6. Independent variable in lookup functions stays within the domain of the function
9. Packaging of the model and data files for release, including license files

The following items are out of scope:

1. Overall design of the model
2. Formulation of feedback
3. Verification of input data
4. Validation against historical data
5. Comparison against results and publications of other models
6. Sensitivity analysis
7. Comprehensive extreme value testing
8. Use on platforms other than STELLA 10.0.3 running on Windows
9. Section 508 compliance

Approach

1. The scope for testing will be divided among the testing team.
2. The milestone tracker at <https://github.com/NREL/bioluc/issues/milestones> will be used to organize the testing scope and track progress.
3. The issue tracker at <https://github.com/NREL/bioluc/issues> will be used to record test results and communicate with the model developers.
4. Model revision numbers will be recorded for all testing.
5. Snapshots of the model and input/output files will be archived in order to facilitate the reproduction of test conditions and results, and the verification of model changes made in response to the tests.
6. For the reasonableness tests, definitions of “reasonableness” will be documented in the test results.
7. The testing team will consult with NREL Legal Counsel regarding packaging requirements.
8. The testing team will consult with NREL Communications regarding issues of releasing the model on the NREL GitHub website, particularly Section 508 compliance issues.

Timeline

Apr-May: Preliminary testing and follow-up in conjunction with workshop at ORNL  
Jun-Jul: Completion of testing  
Aug-Sep: Verification of test results

Resources

Brian Bush, Laura Vimmerstedt, and one or more summer interns will perform the testing. Len Malczynski of SNL may informally participate in the testing, too. No automated testing software will be utilized.

Artifacts

The test results and supporting material will be documented at <https://github.com/NREL/bioluc>. No stand-alone test report will be delivered.