Notes from 3-PG user's meeting, Charlotte NC July 2, 2012

A. Outline of the planned 3-PG activities of the different research groups:

1. Bob Teskey and Maggie Wang (UGA), Chris Maier and Kurt Johnsen (USFS).

(a) Develop sets of accurate physiological parameters for the 3-PG model, validate model accuracy and then use 3-PG to predict regional productivity for both non-clonal and clonal loblolly pine plantations. This activity is currently underway.

(b) Use 3-PG to predict the impact of climate change on loblolly pine productivity.

(c) Link a soil carbon model to 3-PG model to predict the carbon sequestration of southeastern clonal and non-clonal loblolly pine. We are planning to use the Century or CO2-FIX models to link with 3-PG

2. Stape and Jose Alvarez (NCSU).

(a) Add a competition module to 3-PG, for competition both at establishment and after-thinning;

(b) Assess effects of stocking on initial stand development (up to canopy closure);

(c) Examine effects of root depth development and sensitivity to drought;

(d) Improve FR estimates by linking FR to soil attributes, based on paired plots;

(e) Perform a spatial validation of 3-PG simulations

(f) Review 3-PG structure/rationale to incorporate loblolly pine and SE US-specific cases like aeration, carbon pools, etc. Carbon pools will be examined using the G'day model.

3. Tom Fox and Santosh Subedi (VA Tech).

(a) Examine a series of potential ways to develop an a priori rating for FR including

i. Site Index

ii. Leaf area – N relationships

iii. Relationships with soil properties/productivity indices (Liebig's Law of the Minimum)

(b) Add a fertilization component to the model (probably through changes to FR)

(c) Use 3-PG to investigate soil and climate effects on growth using data from the US-Brazil loblolly clonal trials

4. Asko Noormets and Eric Ward (USFS and NCSU).

(a) Improve the stomatal conductance-VPD-soil moisture function in 3-PG

(b) Use Tier III and the Cross Site sap flux to estimate canopy conductance to constrain 3-PG GPP estimates.

(c) Link 3-PG with WaSSI

(d) Evaluate key sources of uncertainties in 3-PG (and WaSSI), including measurements, model structure/sensitivity and land use changes.

(e) Examine how respiration is modeled in 3-PG.

(f) Use data from flux sites to help assessments of understory effects carbon and water fluxes, and to help develop a fertilization function.

5. Carlos Gonzalez (UF) and Chris Maier (USFS).

(a) Improve the biomass allocation functions in 3-PG, and optimize those functions for loblolly pine.

6. Randy Wynne and Ranjith Gopalakrishnan (VA Tech).

(a) Use 3-PG to assess the effects of fire and climate change, using the model to examine the relationship between biomass and fuel load, and for predicting fuel load in the future.

B. Areas of overlap, or synergy, among 3-PG users was discussed

1. There were no areas of direct overlap but a few areas were cooperation was needed. These included:

Carbon sequestration estimates that linked 3-PG and soil carbon models (UGA/NCSU). However, the two groups will use different soil carbon models so overlap was minimized.

2. Improvements in FR estimation (NCSU, Stape and Fox) is another potential area of overlap. Communication is the key to avoid duplication of effort.

3. An area of synergy was the collaboration between Carlos Gonzalez and Chris Maier who are planning to work together to refine biomass allocation functions in 3-PG.

C. Model management was discussed

1. The group agreed to use the Fortran web-based version of 3-PG which Randy Wynne is hosting.

However, the Fortran version needs to be fully vetted, and a user interface developed (mimicking the Visual Basic version of 3-PG). Randy assured the group that these things will be accomplished very soon. In the meantime users can still use the VB version.

2. VA Tech (Wynne) will host the library of 3-PG modifications.

When a useful modification to 3-PG is made, the originator will submit documentation to Randy Wynne to place on the web. He will also be responsible for sending the information to UF for placement in the PINEMAP website.

Modifications to the code, and/or modifications to the parameter set, should be documented, with an explanation of the rationale for the change and submitted along with files containing the specific set of parameters used, the weather data used for validation runs, and the model outputs obtained.

D. Summary Discussion

1. It was clear that the incorporation of competing vegetation and fertilization into the model as well as a better method of estimating FR, i.e., one that avoided site-specific calibration, are all critical needs to help meet PINEMAP objectives and to improve 3-PG for all users.

2. Communication and collaboration among 3-PG users in PINEMAP is essential. Users are greatly encouraged to use the AIM2 Listserve and Dropbox for communication with the group.

3. Many individuals and groups are planning to make improvements to the model. These need to be well documented, and placed in the VA Tech library for everyone to have access to and use.

4. We discussed having an annual meeting, including all AIM2 members, in Charlotte spaced about 6 months away from the annual main PINEMAP meeting.