2015 NutNet Workshop: Business meeting & discussion forum
5 August 2015
St. Paul, MN USA

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Outline of topics
1. Post-treatment soil sampling
2. NutNet 2.0: exploring options with research abstracts
3. DroughtNet & Nutrient Network
4. Communication within NutNet
5. Manuscript circulation procedures
6. NutNet manuscript best practices

1. Post-treatment soil sampling
Soil sampling has been done pre-treatment at all experimental sites, and after 3-4 years at many "first generation" sites. *Eric Seabloom* (*ES*) raised point that it is time to coordinate sampling among both newer and older experimental sites to keep that basic level of analysis. Pre-treatment and first round of post-treatment soil analysis was funded by *ES* and *Elizabeth Borer (EB)*, but not necessarily funded for next round.

Stan Harpole proposed setting some soil aside as "standards" so that if current labs (A&L laboratory of Memphis TN; and University of Nebraska Elemental Analysis lab) are unavailable we could compare new lab results to standards.

Discussion ensured about ways to fund soil analysis. In *EB/ES* experience NSF not a good option. *Phil Fay* offered to investigate funding options in ARS. Suggestion arose that **sites could still send soils to *EB/ES* lab under permit, and centralize analysis and data management, but then be billed directly for only their site (~$600 USD).** This approach will be tried with a few sites.

Actions: notification of soil sampling collection for sites for next field season [EL].

2. Nutrient Network experiment 2.0
With ten years of the original NutNet experiments approaching, planning is beginning for a new experiment to be implemented in the network ("NutNet 2.0"). The ideal experiment would be similar in terms of low levels of investment in any manipulations; fair in the sense of placing sites on equal footing no matter when they begain the original NutNet experiments; and scientifically engaging with a range of potential questions arising from the resulting data. Earlier in the meeting, *EB* presented one such option with the goal of testing out the scientific interest from workshop participants, by assigning each participant to come up with an abstract for a paper or investigation centered around an example of a proposed treatment, "NukeNet." This treatment would be to remove vegetation and seed bank from the "future" subplot of NutNet

plots. Abstracts covered a range of community and ecosystem ecology topics with additional add-on ideas as well.

The decision about what experiment to move forward with (if any) has not been made. The process for that decision will be decided on by a representative group of NutNet participants, will full Network input (including future opportunities to brainstorm scientific questions and debate methods).

An 'exit strategy' for PIs who cannot or do not wish to participate in the Network should be established, including a final sampling protocol.

*Actions: * Create process for designing NutNet 2.0 experiment with network input [NutNet Steering committee]*
        * Create final sampling plan for sites leaving network [EL / EB / ES]

3. DroughtNet & Nutrient Network
DroughtNet (http://wp.natsci.colostate.edu/droughtnet/) is a new network of existing and future experiments to examine the influence of reduced precipitation on ecosystems. The International Drought Experiment (IDE) portion of DroughtNet is a new experiment being set up to manipulate rainfall, and is being planned to occur at many NutNet sites as well as other grassland locations.

The issue discussed was how to link, or best incorporate, DroughtNet and NutNet. One way is to cross nutrient availability with precipitation manipulation. Proposals to do so included building a larger shelter than the minimum IDE shelter, and adding nutrients (e.g. N+P+K) to a subplot, or embedding a smaller IDE shelter into the existing subplot framework of NutNet. *Laureano Gherardi and Laura Yahdjian* offered to push this forward as members of the DroughtNet leadership team. A breakout group also was formed to pursue discussions further.

Action: a recommended setup for integrating DroughtNet and NutNet [?]

4. Communication within NutNet
EL reminded workshop participants to keep the network and especially HQ (*EL, EB, ES*) abreast of site-level projects centered on NutNet, especially "broader impacts" related items such as education, outreach, training, and popular press notices. *Stan Harpole* suggested distributing to each PI a list of papers that have used data from their site(s), something that would be mutually beneficial to track. An additional reminder was given that the abstract system online (http://nutnet.org/research-abstracts, login required) should be used to propose and track manuscripts, including basic data needs and proposed timelines.

5. Manuscript Circulation procedures
Jon Bakker initiated discussion over circulation of manuscripts. Many authors can feel left out of papers if they are circulated too far along the process (i.e. are a nearly finished product when circulated). He proposed initiating a "webinar" or skype call to discuss theory of paper and rationale before too far along the process, so that others can help shape or decide to participate at an earlier stage.

Stan Harpole added that co-authorship was not just technical writing, but also buying into the ideas of the paper and its place in the scientific conversation. Lead authors should educate potential co-authors by providing core background reading, and potentially "requiring" reading of these key papers before signing on.

EB mentioned that manuscript preparation was a creative process from the standpoint that by the time you articulate the ideas, get a result, and frame the contribution of the paper, you have a manuscript, and that people differ in the process towards this.

EL suggested that Network members have to trust each other not to be too harsh on the more ragged ideas, and that circulating an outline and some figures, together with some kind of interactive session, would be a way to allow significant feedback.

ES gave an example of the lead author of a paper asking potential co-authors for suggestions on important papers speaking to the idea in the paper, or whether there is support in their mind for a particular hypothesis. Opinions can help narrow scope of paper and focus on troublesome issues early on in the process.

A to-do list of specific tasks is always helpful to co-authors who want to participate but may not know how.

6. NutNet authorship best practices
A discussion about the role of code evaluation and double-checking began. *Stan* proposed multiple people using cleaned-up dataset and final code to double check models, assumptions, figures, etc. *EL and EB* described recently doing just that for the Borer et al. *Nature* paper, going line-by-line through *ES* code to confirm reliability before posting. Remaking graphs from scratch (i.e., independent figures derived from fresh code) could be a huge contribution of co-authorship.

Ryan Williams suggested making use of private version control repositories such as *git* early on in a project, so that people can work simultaneaously on code and paper together.

A comment was offered originally from *Scott Collins* that each NutNet paper should have a robust statement about inclusion of sites, and with what criteria. He worries about being criticized or pushed back for cherry-picking sites for results.

The "internal peer review" process within NutNet, whereby co-authors of diverse persepctives offer feedback, can be a strength of NutNet papers once they are submitted into journals.

Actions: Individual authors can apply some of these best practices to improve the NutNet collaboration, but also (and especially) their own manuscripts.