**CNH Lakes Manuscript Authorship Invitation Memo**

**TO**: All CNH Lakes team members

**FROM**: Reilly Henson, Kelly Cobourn

**DATE**: October 15, 2018

**MANUSCRIPT TITLE**: A practical guide for managing interdisciplinary teams: Lessons learned from a coupled natural and human systems (CNHS) modeling project

**MANUSCRIPT TYPE**: interdisciplinary research; essay/commentary

**TARGET JOURNAL**: to be determined (possibly *Frontiers in Ecology and the Environment*)

**MANUSCRIPT DESCRIPTION**: Best practices for team assembly, leadership, and interpersonal skill-building have been discussed a great deal in the scientific literature, but the practical, day-to-day aspects of teamwork required to implement complex projects have received less attention. These challenges include overcoming cross-disciplinary communication barriers, integrating complex tasks, and coordinating diverse and geographically distributed researchers. In this manuscript, we aim to present our experiences from the CNH Lakes project, contextualized within the growing body of literature that describes best practices for team science. In particular, we will build upon a framework developed by the National Research Council to provide concrete and detailed examples of the ways we address the broad categories of challenges in team science established by theoretical and empirical study. The result will be a “roadmap” for dealing with the logistics of such projects.

We are contacting you because you have been listed as a potential co-author on the above manuscript that is associated with the CNH-Lakes project. On the next page is a list of potential contributions by co-authors on manuscripts. This list is intended to foster an open dialogue on authorship that starts at the very beginning phase of a manuscript and carries through until manuscript submission and acceptance. This document is intended to clearly define each co-author’s responsibilities and accomplishments throughout the effort, as well as the overall strategy for determining co-authorship as described below.

**Because this manuscript will draw on our team’s collective experiences, even if you choose not to be a co-author, you will still have an opportunity (albeit somewhat limited in scope) to share your opinions and insights on how we present the lessons learned in the manuscript.** However, as with all manuscripts, co-authors will have the ultimate authority to decide upon the content that is included or excluded.

1. **If you are interested in being a co-author on this manuscript, we ask that you email Reilly Henson (****vrhenson@vt.edu****) by October 31, 2018, and describe in specific terms the ways that you will contribute to the manuscript.** Some examples ofpotential manuscript contributions are listed on the next page(note that this list is not exhaustive; please contact the lead author(s) if you would like to make contributions not included in the list).For each of these contributions, please be as specific as possible as to your contribution (e.g., instead of “collect data,” please specify what data will be collected and how this data collection will occur); this additional step is critical for tracking the progress of this contribution in ODS, as described in the CNH-Lakes Manuscript Authorship Guidelines.
2. **Addition of co-authors.** We recognize that in some cases it may be impossible to identify all co-authors at the beginning stages of a manuscript. In situations when an individual’s expertise is added to a manuscript in the middle of the manuscript development process, they should be added to the author list if their contributions satisfy the conditions described below.
3. **This list of potential contributions is not intended to be a checklist: we recognize that there are many different possible types of contributions to manuscripts** throughout the initiation, development, analysis, and writing processes and that it is difficult to compare these contributions. Our goal is to be as inclusive and flexible as possible for each person who makes a substantive contribution to the manuscript. Here, we define a substantive contribution as a contribution in which the manuscript would not have been possible without it, or that it substantially enhances the breadth or quality of the manuscript. The specific contributions of each participant will be considered on a case-by-case basis and co-authorship status will be determined as the outcome of a discussion between manuscript lead(s), potential co-authors, and if necessary, the CNH-Lakes Steering Team (see the note on conflict resolution below).
	1. Some contributions may be more appropriately recognized in the acknowledgments section of a manuscript, rather than with a co-authorship. This determination will be made on a case-by-case basis via discussion between manuscript lead(s) and established co-authors. **Exceptions to this guideline:** We recognize that all manuscripts may not neatly fit within this guideline. For example:
4. Given the interdisciplinary nature of the CNH-Lakes project, this guideline will need to be flexible to accommodate domain experts who should be listed as co-authors (e.g., helped with conception and model interpretation such that the breadth or quality of the manuscript is enhanced).
5. Manuscripts that are position-pieces or commentaries may need different criteria.
6. **Once contributions are identified, the manuscript lead(s) should create a task for each co-author in ODS. Each co-author should then populate ODS with specific sub-tasks that describe their contributions to the manuscript.** We expect the co-authors to regularly update their progress in ODS to ensure transparency with the full CNH team and enable coordination of manuscript activities within the authorship team.
7. **Author ordering will be determined on a case-by-case basis after discussions among all co-authors of the contributions of each co-author throughout the manuscript process.** In general, authorship is in order of significance of contributions by each co-author to the final manuscript. However, we recognize that some disciplinary differences exist with respect to authorship position (e.g., the last author indicates lab leadership in some scientific disciplines). It will most often be the case that the manuscript lead(s) will be listed first, followed by co-authors in order of contribution. Where different contributions cannot be compared, an alphabetical listing of co-authors is the recommended practice.
8. **In general, data provision is not assumed *a priori* to warrant co-authorship**. In many cases, providing data in and of itself is not considered a contribution significant enough to constitute co-authorship. However, there may be exceptions when significant data processing has been undertaken to make the data usable for this manuscript, the manuscript may not have been possible without the data, or the suggestion of providing the data led to enhancing the breadth or quality of the manuscript. If any data provider expresses an interest in co-authorship, it is the responsibility of the manuscript lead(s) to contact that person to confirm the data provision and other contributions justify co-authorship.
9. **All co-authors must approve the final version of the manuscript prior to submission.** It is unethical to submit a manuscript in which all co-authors did not read and approve the final submitted version. This task is not included in the contributions list below because all co-authors must do it.
10. **Co-authors are held accountable for the content of the manuscript**. This idea provides an important distinction between a co-author and someone who is acknowledged. We recognize that every co-author will not have full knowledge of all aspects of the research; however, they need to know enough to defend the work.
11. **It is recommended that an author-contribution paragraph be written for each manuscript.** This step is important to ensure that all co-authors (particularly early-career team members) are recognized for the contributions that they make to the CNH-Lakes project. Because many journals don’t automatically publish these statements, we recommend adding it to the Acknowledgements section in the manuscript.
12. **Conflict resolution**: As noted above, it is our goal to be as inclusive as possible in the CNH-Lakes project. In the event of a disagreement between contributors and manuscript lead(s) about co-authorship contributions and status, we encourage manuscript lead(s) to err on the side of being inclusive of those who view their contributions as substantive enough to warrant co-authorship. In the event of a dispute about authorship or manuscript content, the first stage in conflict resolution is for the lead(s) and the contributor in question to meet with the Steering Team (Cobourn, Carey, and Boyle) to discuss and resolve the disagreement. If the disagreement involves one or more members of the Steering Team, an ad-hoc committee of 3 CNH-Lakes research participants not participating in the manuscript will be formed to review and mediate the dispute.

**Examples of Potential Co-author Contributions**

Potential co-author contributions identified here are a starting point for CNH team members to think about whether their contributions to a manuscript rise to the level of co-authorship. This is by no means an exhaustive list of ways in which co-authors may contribute, and not all of these contributions may warrant co-authorship. As the project evolves and different types of manuscripts are created, the contributions made by potential co-authors are likely to vary significantly and should be evaluated on a case-by-case basis.

**Examples of Concept and Design Contributions**

1. Conceived or contributed to the conception of a manuscript idea/overarching topic such that input helped define the fundamental contribution of the manuscript
2. Developed or fundamentally contributed to formulating research questions
3. Designed/outlined the manuscript
4. Contributed to the conceptual/theoretical framework for the manuscript
5. Supervised and/or co-supervised authors and manuscript progress
6. Provided platform for research to occur (e.g., facilitated interactions with lake associations, created CNH-Lakes infrastructure that enabled research interactions to occur, etc.)

**Examples of Research Contributions**

1. Collected data (e.g., lake association interviews, downloaded data from databases)
2. Compiled or synthesized data (e.g., merged data from different datasets for model activities)
3. Oversaw or led quality assurance/quality control (QA/QC) of data
4. Developed models or a part of a model
5. Calibrated models
6. Ran or estimated models
7. Integrated models
8. Developed model scenarios
9. Analyzed observed data or model output data
10. Contributed new analyses or methods
11. Interpreted results or placed results in a policy context to enhance the greater contributions of the CNH-Lakes project

**Examples of Writing Contributions**

1. Wrote sections of text
2. Designed figures and tables
3. Performed critical reviews or substantial re-working of manuscript

**Other**

We welcome additional contributions and encourage a potential co-author to discuss other contributions with the lead author(s) so that they can be made explicit in ODS.