Guidance Regarding Authorship of Papers and Products from Projects with Multiple Collaborators

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Land management agencies like the U.S. Fish and Wildlife Service (USFWS) are using scientific information to make management decisions daily. Their ability to defend their decisions to the public depends upon the quality of the science behind those decisions. The science community considers research papers published in peer-reviewed journals to be the 'gold standard' for scientific endeavor. There is an old saying, 'if it isn't published, it doesn't exist'. Scientific information and methods allow for transparent, structured decision-making, allowing the public to understand the process used to make decisions.

Because of the high value placed upon peer-reviewed science and its key role in decision-making, the USFWS seeks to advance science that will improve management decisions. This has led to a cooperative research effort with the U.S. Geological Survey (USGS), the Refuge Cooperative Research Program (RCRP). Under this program, multiple refuges are involved in management-focused research. Currently, the USFWS is engaged in a number of cooperative research projects designed to improve management of wetlands, grasslands, coastal salt marshes, and invasive species; most have USGS or university-based collaborators in addition to Service staff.

The rise of collaborative research in within the USFWS has led to confusion over how to recognize the contributions of multiple participants. Professional recognition has always been based in authorship of scientific publications and other products (internet resources, decision tools); this will continue to be so in the future (Weltzin et al. 2006). Scientists, land managers, and USFWS biologists all deserve recognition for their unique contributions to the scientific process and the useful products that result. Numerous papers have attempted to clarify criteria for authorship of scientific papers and the order of authors (Hunt 1991). Guidelines have also been developed for who should be acknowledged at the end of a paper. Unfortunately, there are no simple rules that cover all situations.

The Ecological Society of America (ESA) code of ethics guidelines state, "Researchers will claim authorship of a paper only if they have made a substantial contribution" (ESA 2007) (Appendix A). Authorship may legitimately be claimed if researchers:

1. conceived the ideas or experimental design;
2. participated actively in execution of the study;
3. analyzed and interpreted the data; or
4. wrote the manuscript.

In a recent paper on this topic, Weltzin et. al (2006) provide several suggestions. First, early and ongoing communication about authorship is essential among participants in collaborative research. A byline statement, published with the paper or online, summarizing the contributions of each author helps to clarify who did what; this has become standard practice in the medical sciences (Klein and Moser-Veillon 1999) and was recently incorporated into the guidelines for authorship for the Proceedings of the National Academy of Sciences of the United States of America (PNAS 2007) (Appendix A). It is not a standard practice in the ecological or wildlife literature. Weltzin et. al (2006) suggest that accountability and responsibility for the quality of the product are important considerations, along with accounting for the time invested in the various functions. In many cases, the senior authors put considerable time into a project as well as are held ultimately accountable for the results, interpretations, and completed publications. Persons engaged in laboratory or field data collection may have specialized expertise, put a substantial amount of time into a project, and are accountable for the quality of the work they do, but, they are not always held accountable for the quality or completion of final products.

As an example, the existing RCRP studies employ a model where USFWS staff identify general management questions and craft a call for research proposals. USGS or other scientists (Principal Investigators [PI]) write and submit proposals and compete for research funds. Once a proposal is accepted, the PI meets with USFWS to work out the details of implementing the research and collecting data. The PI assumes responsibility for writing and defending the study plan, overseeing the science, and guiding data collection. USFWS personnel often assume responsibility for coordinating among refuge stations, biologists, and managers and collecting high quality data, interpreting the results, and incorporating the results into future management decisions. Usually, the majority of the data analysis, synthesis, interpretation, and writing of the journal paper is the responsibility of the PI, however the USFWS carries a responsibility for guiding the analysis and interpretation so that key management questions are addressed. In some cases, USFWS staff may take on additional responsibilities by adding an additional component to the project to address a related question, or analyzing portions of the data set, or writing part or all of a paper, all in cooperation with the PI and other project staff. The tightly interconnected nature of these multi-refuge projects makes it difficult to provide 'rules' about sorting out authorship issues.

GUIDELINES:

The following guidance is proposed, based on both the ESA and the PNAS guidelines (Appendix A) and the specifics of collaborative research described above.

1) Expected journal papers and other (internet) products will be outlined in the Study Plan and authorship discussions will begin at the first project workshop. Regular communications about authorship will occur as the project proceeds and the specific journal or other scientific products begin to take shape.
2) The first author is the person who is fully accountable for the entire paper or product as an accurate, verifiable report of the research presented and has overall responsibility for all or nearly all of the functions below. In addition, the first author has other responsibilities, as outlined in Appendix A.
   a) Designed research
   b) Performed research
   c) Contributed new reagents or analytic tools
   d) Analyzed data
   e) Wrote the paper
3) Co-authorship is based on the level of interest, effort, innovation, and expertise that contribute to a successful published product, in descending order. Co-authors contribute substantially to one or more of the above functions and accept responsibility for the quality and satisfactory completion of a significant subset of the project. For example, acting in a leadership or coordination role among participating NWRS stations that produces a high quality data set, data analysis that appears in the final product, writing a portion of the final product, or making a substantial contribution to the interpretation of results. In addition, co-authors must meet the other requirements described in Appendix A (e.g. review and agree to the final content of the paper).
4) As the number of co-authors for a product increases, the time and effort spent on communication and coordination also increases. From a practical standpoint, very long author lists complicate the process of producing a paper. It becomes difficult to achieve timely turnaround on drafts and consensus about wording and presentation, not to mention meeting the peer review requirements of multiple agencies. Very rarely can more than four people dedicate the required time and effort needed to contribute meaningfully to the writing and interpretation of a paper. Very long author lists also put undue burden on the first author to communicate well and often with all authors, mediate disagreements, and deal with multiple peer review requirements, slowing down the publication process. Thus, author lists should be as short as possible while still providing recognition to those most involved from a functional and/or accountability standpoint.
5) Persons who contribute the following deserve greater recognition than a simple acknowledgment:
   a) identification of study questions, study design, and protocols;
   b) are responsible for quality of treatments and data collection at individual study sites; and
   c) provide input and review of analyses

   These individuals, their study site, location, and contributions will be listed in an appendix to the publications. In addition, these individuals may be co-authors, if their involvement justifies it.
6) Persons who contributed access to property, funding, or assisted with field work but are not accountable for the paper as an accurate, verifiable report of the research are generally listed in the acknowledgements, but authorship in special cases can be negotiated. Reviewers are usually acknowledged; they have a responsibility to review the paper for clarity, errors of fact, interpretation, or misuse of statistical tools, but they are not held accountable for the content of the final published paper. In some cases, key collaborators (potential authors) may be initially involved with a project, but then drop out or fade away as the project progresses, for various reasons. If, in doing so, they give up their responsibility and accountability for the final product, they probably belong in the acknowledgements section.
7) In the end, even with clear guidelines, negotiating issues of authorship on journal papers and other products is as much art as science; key elements are mutual respect, open communication, and a desire to be fair to all parties.
8) The first author is responsible for complying with the peer review guidelines of his/her own agency. Co-authors are responsible for negotiating a peer review process that also meets the requirements of their own respective agencies. The goal is to move the paper as quickly as possible from draft form to journal submission, without violating the peer review requirements of any of the co-authors.

PROCESS FOR MULTI-REFUGE PROJECTS AND OTHER USFWS OFFICES AS APPROPRIATE:

1) The USGS and USFWS staff attending the first coordination workshop for a new multi-refuge project will sign an agreement to apply the above guidelines.
2) At the first coordination workshop, the participants will discuss what effort or contribution they consider deserving of co-authorship versus those contributions that should be acknowledged, but do not deserve authorship. The above guidelines will be used as a starting point, but additional factors unique to the particular project may also be discussed.
3) Any collaborators in the project can request clarification or discussion about authorship as the project progresses.
4) When the first draft of a planned journal paper or other product is outlined, key collaborators should discuss and decide upon possible publication outlets, authorship responsibilities for writing, analysis, editing, and interpretation of findings, and order of authorship. A draft list of acknowledgements will also be discussed. The decisions will be recorded and circulated to all collaborators.
5) These guidelines, along with any new guidance supplied by professional science organizations, will be used to resolve conflicting opinions about these matters.
6) If appropriate, the final draft of the paper or product, authors will indicate their specific contributions to the published work in a byline (Weltzin et al. 2006) (Appendix A) or footnote.

LITERATURE CITED:

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Appendix A. Guidelines for Authorship from Scientific Organizations

Ecological Society of America Code of Ethics (ESA 2007)

The following principles of ethical professional conduct apply to members reviewing, editing, or publishing grant proposals and papers in the professional literature in general, and particularly to all ecologists seeking publication in the Society's journals.

1) Researchers will claim authorship of a paper only if they have made a substantial contribution. Authorship may legitimately be claimed if researchers
   a) conceived the ideas or experimental design;
   b) participated actively in execution of the study;
   c) analyzed and interpreted the data; or
   d) wrote the manuscript.
2) Researchers will not add or delete authors from a manuscript submitted for publication without consent of those authors.
3) Researchers will not include as coauthor(s) any individual who has not agreed to the content of the final version of the manuscript.
4) Researchers will not submit for publication any manuscript containing data they are not authorized to use. ESA assumes the principal investigator(s) of a research project retain the right to control use of resulting unpublished data unless otherwise specified by contract or explicit agreement.
5) Researchers will not represent research results as new if they have been published or submitted elsewhere, or submit a manuscript for publication while it is under review for possible publication elsewhere.
6) Editors or reviewers will treat manuscripts under review as confidential, recognizing them as intellectual property of the author(s).
7) When using ideas or results of others in manuscripts submitted for publication, researchers will give full attribution of sources. If the ideas or results have not been published, they may not be used without permission of the original researcher. Illustrations or tables from other publications or manuscripts may be used only with permission of the copyright owner.
8) Ecologists will not serve as editors or reviewers of a manuscript if present or past connections with the author or the author's institution may prevent objective evaluation of the work.
9) Ecologists will not purposefully delay publication of another person's manuscript to gain advantage over that person.
10) Ecologists submitting manuscripts for publication will promptly report to editors any errors in research results or interpretations discovered after submission or publication.

Proceedings of the National Academy of Sciences of the United States of America (PNAS 2007)

Authorship should be limited to those who have contributed substantially to the work. The corresponding author must have obtained permission from all authors for the submission of each version of the paper and for any changes in authorship.

All collaborators share some degree of responsibility for any paper they co-author. Some co-authors have responsibility for the entire paper as an accurate, verifiable report of the research. These include co-authors who are accountable for the integrity of the data reported in the paper, carry out the analysis, write the manuscript, present major findings at conferences, or provide scientific leadership to junior colleagues. Co-authors who make specific, limited contributions to a paper are responsible for their contributions, but may have only limited responsibility for other results. While not all co-authors may be familiar with all aspects of the research presented in their paper, all collaborators should have in place an appropriate process for reviewing the accuracy of the reported results.

Authors must indicate their specific contributions to the published work. This information will be posted online as a footnote to the paper. Examples of designations include:

Designed research
Performed research
Contributed new reagents or analytic tools
Analyzed data
Wrote the paper

An author may list more than one contribution, and more than one author may have contributed to the same aspect of the work.