Best Practices for Designating Authorship
NOAA Scientific Integrity Committee

I. INTRODUCTION AND BACKGROUND

NOAA science serves society. The agency conducts world-class earth system science that directly benefits the American people by saving lives, protecting property, conserving natural resources, and empowering the national economy. The public relies on NOAA to produce that science. On average, NOAA scientists publish approximately 2,000 peer-reviewed articles in scientific journals and over 1,000 informal technical and scientific publications per year. NOAA is an agency that conducts science in support of public policy. Therefore, the scientific results and conclusions produced by the agency must be reviewed and published in peer-reviewed publications in order to ensure quality, credibility, and accessibility. Authorship is one aspect of publishing that can affect the quality and credibility of our science. Thus, NOAA and NOAA-affiliated authors should adhere to a set of well-documented best practices for authorship to reduce the risk to NOAA's scientific integrity. This is particularly critical when considering that in the event of a scientific misconduct issue, all authors will be considered responsible unless it is demonstrated that a particular author or authors were not involved in the misconduct.

Authorship practices are often guided by scientific disciplines, institutions, research groups, and the policies of journals or publishers. Differences in authorship practices can lead to ambiguity, uncertainty, and inconsistency. A standard set of best practices for NOAA fulfills the need for common understanding of how to recognize most appropriately the contributions of individuals through authorship of NOAA publications. This Best Practices document summarizes the most essential authorship concepts, but is not exhaustive or unnecessarily restrictive. The document enhances the culture of scientific integrity within the agency, and increases transparency with agency partners and the public by identifying who is responsible for the information and conclusions in NOAA publications and how they were developed.

In a 2017 report entitled *Fostering Integrity in Research,* the National Academies of Sciences, Engineering, and Medicine (NASEM) identified detrimental authorship practices as a common, widespread, and growing concern and an issue that affects scientific integrity. Authorship conveys significant privileges and responsibilities for the integrity of the science; within NOAA, authorship also forms an important aspect for agency evaluation and individual career rewards and advancement. Therefore, detrimental practices in authorship affect not only the integrity of the agency's science but also the career development of individual scientists.

"All of the authorship abuses . . . undermine research integrity. Even when the research that is reported is correct and of high quality, inaccurate and misleading authorship designations can lead to misallocation of credit, rewards, and future resources. They can damage the conduct of science if, for example, authorship credit without deep knowledge or skill in the science involved helps promote an honorary author to a position of authority. They can also obscure responsibility for reported work and make it more difficult to address other forms of misconduct, such as data fabrication." – NASEM Report, pgs. 116-117

Working with existing resources, this guidance document: 1) identifies authorship criteria; 2) specifies contributions that do not merit authorship but may merit acknowledgement or citation; and 3) identifies explicitly unacceptable authorship practices.

This document does not create new rules for designating authorship. The best practices described in this document represent widely accepted approaches derived from authorship policies of various federal agencies, professional societies, and international organizations (see Section XI: Resources). This document also draws from authorship documents developed by laboratories and programs within NOAA and other parts of the federal government, as well as by journal publishers and professional societies.

II. SCOPE

This document covers all NOAA publications that have authors listed, i.e., not policy technical documents that have been worked on by multiple individuals but are anonymous. These publications include fundamental research communications (FRCs) that are published in scientific or technical journals or may remain internal such as technical reports. See the full definition of Publication in Section III.

III. DEFINITIONS

Lead Author

The lead author is the individual who directs the team of those who create a written work, all of whom meet the criteria outlined in this guidance. Authors are distinguished from those who serve as compilers, translators, editors, or copyists.

Co-author

A Co-Author is any person who has made a significant contribution to a journal article, meeting the criteria outlined in this guidance. They also share responsibility and accountability for the results of the published research.

Corresponding Author

If more than one author writes an article, the authorship team may choose one person to be the corresponding author. This may not necessarily be the lead author. This person handles all correspondence about the article. They are responsible for ensuring that all the authors' contact details are correct, and affirm the order that their names will appear in the article as agreed upon in developing the manuscript. The authors also need to make sure that affiliations are correct. The Corresponding Author keeps all authors informed about the process and does not conceal any aspects of the process of submitting, receiving/handling peer reviews, or finalizing the article for publication in the journal. This author may also be the individual who is responsible for ensuring the publication costs are accepted and applied.

Publication

Publication in this guidance generally refers to FRCs. An FRC is any communication, regardless of avenue of dissemination, or method of presentation that "is intended for, or should reasonably be expected to have, broad distribution outside the U.S. government,…relates to the Department's programs, policies, or operations and takes place or is prepared officially … and deals with the products of basic or applied research in science or engineering, the results of which ordinarily are published and shared broadly within the scientific community, so long as the communication does not contain information that is proprietary, classified, or restricted by federal statute" (Departmental Administrative Order (DAO) 219-1). FRCs further include products of basic or applied research in social science and policy research, the results of which ordinarily are published and shared broadly with the scientific community.

IV. OVERARCHING BEST PRACTICE

Although these guidelines identify a variety of best practices related to authorship, *the most important best practice* for collaborators working on a specific project *is to discuss responsibilities and authorship among participating individuals before a project commences and periodically as work progresses*. Most authorship disputes can be avoided or resolved by having open and honest conversations early and often. The decisions should be put in writing and agreed upon by all the participants together. It should be accompanied with a notional timeline for revisiting the agreement.

All authors are expected to agree to be considered accountable for all aspects of the work and to ensure that any related questions of accuracy and scientific integrity are properly addressed.

Additionally, these guidelines encourage authors to consider aspects of equity and inclusion in developing authorship of a new project, providing mentorship and opportunities for interns, students, and junior staff to learn from and participate in developing manuscripts with experienced staff.

V. AUTHORSHIP CRITERIA

Authorship of scientific works conveys significant privileges and responsibilities, and denotes a pledge to maintain the integrity of the science within the publication.

Qualifying as an author on a NOAA publication requires participation in at least two of the activities listed under either criterion 1 and criterion 2 below; criterion 3 is mandatory. See Appendix 1 for the specific elements under each criterion. Authorship teams should consider carefully their criteria for including people as either authors or individuals to be acknowledged. The three criteria for authorship are:

1. Provides substantial intellectual contribution to the concept, design, execution or interpretation of the publication;
2. Drafts the publication or provides meaningful revision of the publication;
3. Reviews and approves the final version of the publication and agrees to be accountable for one's own work. An author should be able to identify the contributions of all other authors and have confidence in the integrity of their contributions. The lead author should ensure and track that all authors have reviewed and approved the final versions of the publication.

Any individual who has met the criteria as described above, independent of status or affiliation, should be named as an author. Conversely, any individual who has not met the criteria should not be named as an author. For best practices in author affiliation and attribution, please see the NOAA Framework for Internal Review and Approval of Fundamental Research Communications, which is referenced in Section XI of this document.

Use of Generative Artificial Intelligence and Machine Learning

The use of generative artificial intelligence tools for writing and developing portions of a manuscript does not constitute authorship. Per the Committee on Publication Ethics (COPE):" AI tools cannot meet the requirements for authorship as they cannot take responsibility for the submitted work. As non-legal entities, they cannot assert the presence or absence of conflicts of interest nor manage copyright and license agreements. Authors who use AI tools in the writing of a manuscript, production of images or graphical elements of the paper, or in the collection and analysis of data, must be transparent in disclosing in the Materials and Methods (or similar section) of the paper how the AI tool was used and which tool was used. Authors are fully responsible for the content of their manuscript, even those parts produced by an AI tool, and are thus liable for any breach of publication ethics."

Authorship Order Criteria

Authorship order varies in different scientific disciplines and may be prescribed by the peer-reviewed journal. Examples include order based on level of effort, lead author first, lead author

last, alphabetical order, and other approaches. Initial authorship order should be agreed on at the start of the project, subject to revision as the project evolves, and should be based on the following criteria (not necessarily in order of weight):

1. The number of roles (weighted or otherwise) the person has fulfilled (e.g., in Appendix I);
2. The time contribution the person has given to fulfill the role responsibilities;
3. Equity considerations (e.g., not all authors are at the same point in their career or education);
4. Any other criteria specific to the particular publishing company (e.g., alphabetical order of authorship).

This must be an open and ongoing conversation among co-authors, because contributions can change over time. Please refer to the resources in Section XI, Sub-section 1 for examples of guidelines from a variety of publishing companies.

Acknowledgement

Individuals who make a substantial contribution to a publication but do not meet the authorship criteria (as specified above) should be acknowledged separately in the publication with a brief description of their role, if possible. Contributions worthy of acknowledgment may include: securing funding for the research; providing general supervisory or administrative support for the research; technical writing, editing and proofreading of the article; making available data collected for previously reported work; providing materials or space; statistical consultation; routine assistance. Individuals listed in the acknowledgments should be notified before final publication.

VI. DETRIMENTAL AUTHORSHIP PRACTICES

Misallocation of authorship credit can damage the reputation of all involved, and can even be grounds for an allegation of misconduct and/or fraud. Authorship abuses generally fall into two types - honorary authorship (giving undue authorship credit) and ghost authorship (withholding authorship credit). Both of these are detailed below and are strongly discouraged at NOAA:

1. Honorary Authorship: listing an author who does not meet the criteria in Section V for authorship. There are a variety of ways in which this can happen.
    - Authorship by Authorities - occurs when authorship is improperly provided to an individual in authority (laboratory director or supervisor), because the individual expects it (often deemed coercive authorship–when an individual demands authorship because of seniority or in return for access to previously collected data or materials) or the researcher hopes to raise the profile of the work by associating it with a more senior figure.

- Gift Authorship - takes place when authors give credit to colleagues who do not meet authorship criteria in an attempt to mutually inflate publication records. Gift authorship can take place with or without the knowledge of the individual being "honored".
- Coercive Authorship - occurs when an author is bullied or threatened into giving an authorship by an individual who is in a position of power over the author.
- Authorship for Financing - This can happen when an author is added who has a mechanism for covering the publishing fees that saves money for the other authors or institution(s).

2. Ghost Authorship: denying or withholding authorship for any reason from individuals who meet the criteria for authorship. This is sometimes done with the intent to conceal involvement of institutions or individuals. Ghost authorship may also be associated with selective reporting or suppression of findings. Suppressing authorship by unreasonably interfering with or influencing inappropriately in the ability of an individual to meet the criteria is a violation of the NOAA Scientific Integrity Policy.

For additional information, please refer to the guidance from the National Academies of Science and the Environmental Protection Agency provided in Section XI.

VII. AUTHORSHIP BY AFFILIATES AND OTHERS

Contractors

NOAA contractors who meet the authorship criteria listed above may be included as a co-author but their primary listed affiliation should be with the contracting company, rather than NOAA. Per the NOAA Framework for Internal Review and Approval of Fundamental Research Communications, such work is subject to the internal review standards and process set by the agency. If a work product is authored only by contract employees on their own time, with the appropriate non-NOAA affiliation, they are subject to the internal standards set by the entity for which they work.

Cooperative Institute Employees

NOAA Cooperative Institute (CI) employees may be listed as co-authors if they meet the authorship criteria guidelines above. They must list their primary institution (and CI) as their affiliation rather than NOAA. If they are authors along with NOAA federal employees, the work is subject to the internal review standards and process set by NOAA. If a publication is authored only by CI employees, with the appropriate non-NOAA affiliation, they are subject to the internal standards set by the academic institution for which they work.

Other Affiliates

NOAA interns, fellows, and students who meet the authorship criteria listed above may be included as co-authors but their listed affiliation should be with their role at NOAA per the guidance provided in the NOAA Framework for Internal Review and Approval of Fundamental Research Communications. If they are co-authors along with NOAA federal employees, the work is subject to the internal review standards and process set by NOAA.

Retired and Separated Federal Employees

NOAA federal employees who are nearing retirement or planning to separate from the government should plan ahead for the completion of manuscripts that are started during their employment. While retired employees and those with emeritus status may be able to develop agreements with their former office to complete and publish manuscripts, this is at the discretion of the office. The best option is to complete publications prior to separation from the government. Note that this Best Practices document does not represent a statement of policy regarding compensation by the government, payment of publication fees, use of government resources, etc. These issues need to be resolved with the individual's management and/or Office of Human Capital Services personnel prior to retirement or separation from the government. NOAA line offices may have different policies with respect to retired employees but should have clear affiliation guidelines if those individuals are authors on NOAA publications.

Authorship Outside of Official Duties

NOAA employees may choose to conduct research and draft manuscripts on personal time with no NOAA resources. If this work is not done as part of official duties but is related to NOAA's mission, it falls into the category of Non-Official Communications of Interest (Departmental Administrative Order 219-1 Public Communications). This work should be reviewed internally before it is submitted to a scientific journal, following the NOAA and line office guidance for review and approval of FRCs. Authors may use their NOAA affiliation but there must be a disclaimer in these manuscripts "The scientific results and conclusions, as well as any views or opinions expressed herein, are those of the author(s) and do not necessarily reflect the views of NOAA or the Department of Commerce." (from the FRC guidelines). Employees working on their own time and not as part of their official duties are not entitled to compensation for the work or payment of publication fees by the government.

VIII. AUTHORSHIP DISPUTES

This Best Practices document does not prescribe how authorship disputes should be adjudicated. In general, these should be resolved at the appropriate level in the line office. If they cannot be resolved amicably at that level, the line office may consider the use of Alternative Dispute Resolution processes. Authorship disputes usually are not considered violations of scientific integrity but, depending on the circumstances, may become the basis for allegations of scientific misconduct.

IX. OTHER CONSIDERATIONS FOR AUTHORS

The following are issues that are related to publishing but do not directly affect authorship designation. They may be addressed by other NOAA policies.

Plagiarism
Knowingly publishing the intellectual work of another without giving appropriate credit is plagiarism, a violation of the NOAA Scientific integrity Policy, NAO 202-735D.3. This may include self-plagiarism of previously-published words or parts of a paper already published originally in a journal.

Conflicts of Interest
Under Federal ethics rules, a conflict of interest means that a government employee (or special government employee) is prohibited from participating in matters that affect their financial interests as well as those of the employee's spouse, minor child, or a general partner - an organization which the employee serves as an officer, director, trustee, partner or employee; or an organization with which the employee is negotiating for future employment. What this means for authorship is that an employee should avoid giving co-authorship to a spouse or individual with whom they have a financial relationship.

Predatory Publishing
According to the NOAA Library, predatory publishers exploit the open access publishing model for profit by creating pseudo-Academic Journals. They use deception to appear legitimate (falsify editorial board, impact factor, etc.). They make false claims about services (editorial, peer review, etc.) and have no concern for the quality of work published. They also charge exorbitant fees and often go out of business, causing the "published" papers to no longer be publicly available. Publishing in predatory journals is strictly prohibited by the NOAA Scientific Integrity Policy. If a NOAA employee or affiliate is asked by a colleague, either in NOAA or an affiliated institution, to serve as a co-author on a paper that will be submitted to a predatory journal, the employee/affiliate must refuse. More information on predatory publishing is available in the NOAA Library guide on predatory publishing (see Section XI).

Paper Mills
Per the COPE, a paper mill is an entity where "manufactured manuscripts are submitted to a journal for a fee on behalf of researchers with the purpose of providing an easy publication for them, or to offer authorship for sale." These businesses are sometimes aligned with predatory publishers but will also produce content to be submitted to reputable journals as well. Participation in paper mills should be avoided and if a NOAA or affiliated author is asked or made aware that authorship of their manuscript has been compromised by paper mill activity, the NOAA employee or affiliate should immediately attempt to be removed from the author list.

Publication Costs
Authors should have a transparent conversation about how publication costs such as article processing charges (APCs) will be covered at the start of the project. This includes which office or program will cover costs and how those costs will actually be paid (e.g., purchase card, micro purchase request). NOAA federal employees who are listed as the corresponding author on manuscripts submitted to select publishers are eligible for APC coverage through the NOAA Library. For more information on this program please see the Library's Open Access Publishing Guide (Section XI).

Author Responsibilities related to Public Access Requirements
All peer-reviewed scholarly publications authored or co-authored by NOAA employees, contractors, affiliates, or grantees, are required to be submitted to the NOAA Institutional Repository (NIR), as per the NOAA Public Access to Research Results (PARR) Plan. Authors are required to submit their final post-refereed, pre-publication manuscript. When permissible, the publisher's version of record may be substituted.

X. CONCLUSION

Authorship is one aspect of NOAA's wider world of research and development. Publishing the results of NOAA science is a crucial step in communicating to other scientists and the public the work that NOAA does to protect and predict the environment. Ensuring that those who do this work get appropriate credit and recognition for their work is an important part of scientific integrity as well. This document is intended to clarify this process and result in fewer questions and concerns about authorship.

XI. RESOURCES

1. Authorship policies

National Academies of Science Engineering and Medicine Report. Fostering Integrity in Research. 2017. (see pp 114 discussion of authorship-related challenges to scientific integrity)
Environmental Protection Agency Best Practices for Designating Authorship
Environmental Protection Agency Essential Concepts trifold
Springer Nature Portfolio Authorship (including many sub-references)
International Committee of Medical Journal Editors (ICMJE)
Council of Science Editors
Centers for Disease Control, HHS

Office of Research Integrity, HHS
Committee on Publication Ethics
Example conversation around authorship equity
https://civiclaboratory.nl/2016/05/23/equity-in-author-order/

2. *DOC and NOAA Policies*

NAO 202-735D-3 Scientific Integrity
NAO 202-735D-3 Procedural Handbook
DAO 219-1 Public Communications
NOAA Framework for Internal Review and Approval of Fundamental Research Communication
NOAA Public Access to Research Results (PARR) Plan (currently under revision as NAO 205-18 Public Access Policy for NOAA Publications and Data)
NOAA Library guide on predatory publishing
NOAA Library guide on open access publishing

Appendix I: Authorship Contribution Description and Checklist

The following is a table of contribution descriptions for authorship. It may be used as a checklist to determine if a particular person's contributions fulfill the requirements set forth in this document to qualify as an author of a NOAA publication (adapted from NOAA Pacific Islands Fisheries Science Center Social Economic and Ecological Systems group, based on work of Dr. Liboiron[1] and their research team).[2]

Authorship Criteria	Qualifying Activities for Authorship (as listed in Section V)	Author Role	Associated CRediT Roles[3]	Author Fulfills Qualifying Activity
1. Provides substantial intellectual contribution to the concept, design, execution or interpretation of the work described in the publication.				
	Participates in discussions for the theoretical framing / research questions of the work, and / or of the outline of the manuscript and intended audience	Idea/Framing	Conceptualization; Methodology; Project Administration; Supervision; Funding acquisition;	
	Performs the literature review and synthesis to inform the introduction and discussion sections of the manuscript	Literature review	Writing--original draft	

[1] Liboiron et al. 2017. Equity in Author Order: A Feminist Laboratory's Approach. Catalyst 3:2

[2] https://civiclaboratory.nl/2016/05/23/equity-in-author-order/

[3] CRediT (Contributor Roles Taxonomy) is utilized by many publishers to identify the contributions of those listed as authors on publications.

	Collects and performs quality control on data used for any analysis in the manuscript. This is intended more for data collection specific to the paper rather than e.g., publicly-available data obtained without the direct involvement of the data producer	Data collection	Data curation; Investigation; Software; Resources	
	Conducts quantitative and / or qualitative analysis of the data, including interpretation	Analysis	Formal analysis; Software; Validation; Visualization	
2. Drafts the publication or provides meaningful revision of the publication.				
	Writes or substantively contributes to one or more sections of the manuscript (scientifically, not simply e.g., taking dictation)	Section writing	Writing--original draft; Visualization	
	Reviews all or part of the manuscript for flow, readability, scientific integrity, and quality	Internal editing	Writing--review & editing	
	Formats the manuscript for final submission	Manuscript finalization	Writing--review & editing	
	Submits the manuscript	Manuscript submission	Writing--review & editing	
	Responds to comments from any internal and external reviews and may resubmit the manuscript	Manuscript review; Manuscript resubmission	Writing--review & editing	
3. Reviews and approves the initial submission and any subsequent revisions to the publication and agrees to be accountable for one's own work. An author should be able to identify	**This is required for all authors of a publication.**			

the contributions of all co-authors and have confidence in the integrity of the co-authors' contributions.			