

Best Practices for Peer Review

Overview

This document provides guidance on how to ensure that all science information products produced by the Inventory & Monitoring Division receive the appropriate level of peer review, as called for in Core Expectations for Vital Signs Monitoring, #3, “Ensure Scientific Excellence and Integrity.”

Peer review is essential for Inventory & Monitoring Division (IMD) science products. It instills credibility, is required by policy, and helps supply decision-makers with reliable scientific information. The Peer Review Working Group was convened to facilitate, streamline, and standardize peer review within IMD. This document clarifies the requirements for peer review of IMD science products, including which types of peer review are necessary, who should oversee peer reviews, and what type of records management is required.

In all cases, peer reviews should be designed to evaluate the:

- Technical accuracy, objectivity, and methodology of scientific work and results, and
- Administrative policy, financial, or operational factors associated with a scientific project and its outcomes.

This guidance is intended to promote rigorous and thorough review of IMD science products, yet be flexible enough that managers can design the appropriate peer-review process with minimal administrative burden. Peer Review Managers or their designees should design peer-review processes based on:

- the expected impact of the work,
- the size or cost of the project, and
- the degree to which the work may be controversial.

Peer Review Managers should scale reviews to ensure the credibility of the science while promoting the timely delivery and use of actionable science. This document is intended to help program managers determine how to design the best peer-review process for their science products, with the understanding that all reviews should be as rigorous as necessary to ensure high-quality science.

Key Takeaways

1. All IMD science products (see *What is a Science Product?* below) need both administrative and technical review. Peer review is the process by which most scientific work is evaluated for technical soundness.
2. The approach to peer review is based on the content of the report/product, including the degree of novelty, its intended use, management implications, and whether it is based on previously reviewed products. The medium or vehicle used for publication and dissemination does not

affect the peer-review process (i.e., a report must be peer-reviewed the same regardless of whether published on the web or in print format).

3. Many IMD products can be informally peer-reviewed, avoiding some of the administrative requirements that come with formal peer review. Informal reviews must still be rigorous and thorough.
4. Administrative review should not be treated as a separate process. It should be incorporated into the peer-review process.
5. Unless they are an author, network program managers are the default peer-review managers for most work conducted by their network. Inventory Program managers are the default peer-review managers for projects they manage. This responsibility can be delegated.
6. In all cases, peer reviewers may be internal or external to the National Park Service (NPS).
7. Network and Inventory program managers are responsible for approving the release of scientific work from their program. This responsibility cannot be delegated.
8. Works that are exempt from peer review must still undergo a technical review (i.e., a review of technical accuracy, objectivity, and methodology). Basic technical review should be conducted (at a minimum) by authors and their supervisors before publishing.

What is a Science Product (and what is not)?

As stated in NPS (2008), the National Park Service must ensure appropriate peer review of all scientific and scholarly information prior to use in decision-making, regulatory processes, or dissemination to the public and regardless of media (i.e., print, digital, audiovisual, or Web). Scientific and scholarly information is defined as outputs (hereafter, “science products”) that consist of proposals, hypotheses, models, written documents, records, and assessments.

For IMD purposes, science communication products (i.e., secondary materials or programs derived from peer-reviewed scientific and scholarly work) are not considered scientific and scholarly works, and are outside the scope of peer review requirements. Note, however that science communication products are still subject to information quality standards (see DO-11B), and should be reviewed by programs before approval for release.

Levels and Types of Review

Figure 1 presents a decision tree for determining which type of review is required for a given science product. Review types are described below. Two items to note:

- In most cases, IMD science products can undergo informal review.
- Formal reviews have more—and specific—recordkeeping requirements, and the review may need to be made publicly available if the credibility of the science is questioned.

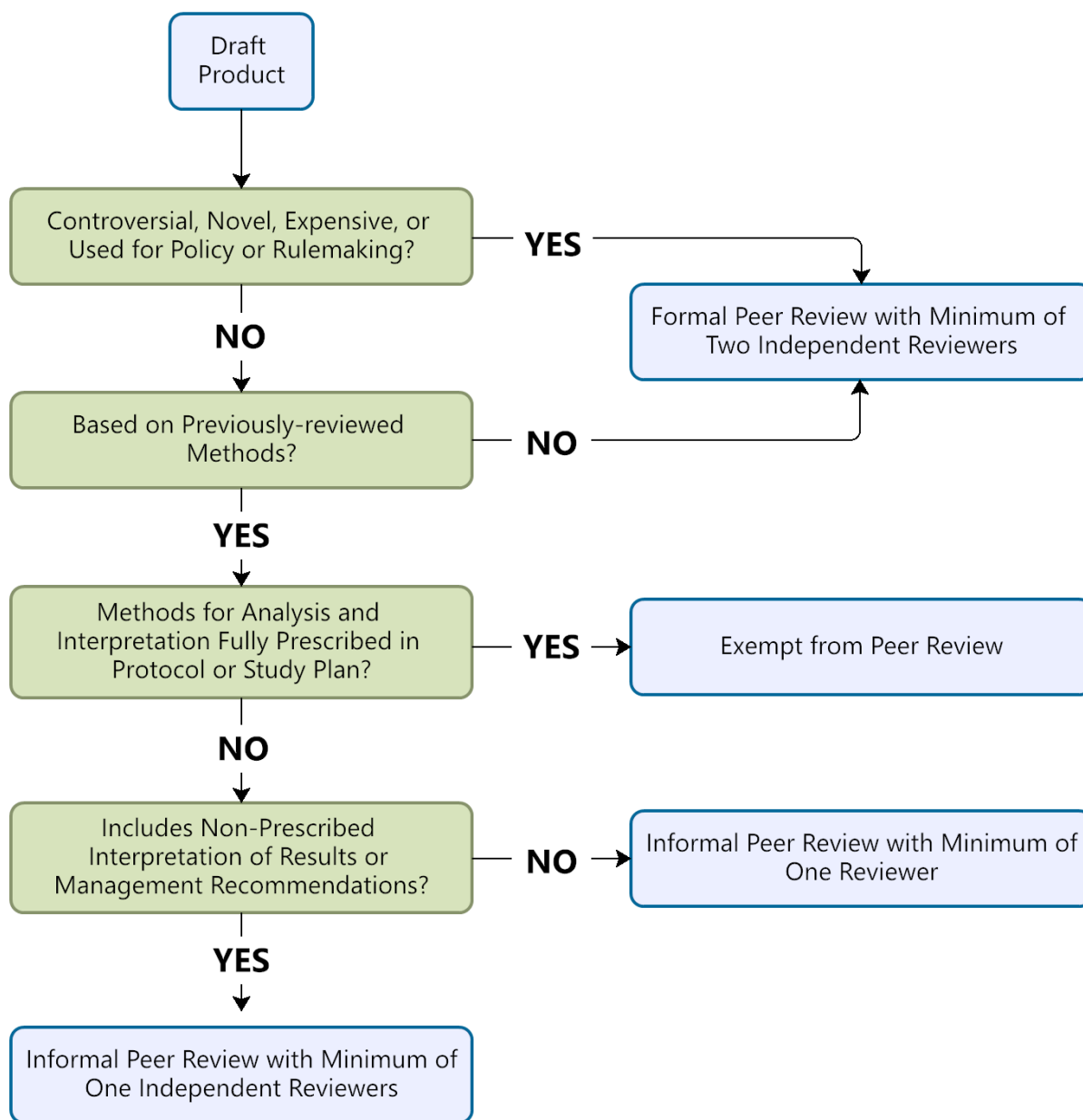


Figure 1. Decision tree for determining which type of peer review to conduct, assuming the science product under review does not rise to the level of requiring an Influential or Highly Influential review.

Formal Peer Review

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For NPS, formal peer review is defined as a review conducted by independent subject-matter peers of the author(s) under the direction of a Peer Review Manager in accordance with the procedures outlined

in NPS (2008). All peer-review comments and correspondence must be documented and permanently retained in a peer-review record (see *Best Practices for Records Management*, below). Formal peer reviews typically have a minimum of two independent reviewers who are not associated directly or indirectly with the activity under review.

As per OMB (2004), reviewers are considered independent if they are not associated with the information under review:

1. By direct involvement in its development,
2. Indirectly, by significant consultation during development or by supervising the personnel who conducted it, or
3. By significant personal relationship to persons directly involved in the development of the information.

A supervisor may serve as an additional peer reviewer when they have the appropriate technical expertise.

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For IMD, a formal peer-review process must be used in cases where the work can reasonably be expected to be used in policymaking, rulemaking, regulatory settings, legal proceedings, or may be controversial. Because IMD's work is intended to be used in supporting management decisions, any analyses that have not been performed before or are novel must also be formally reviewed. Additionally, study plans for large projects should undergo formal review when they are expected to involve the expenditure of significant amounts of government resources in a given year or their implementation period. As a general rule, study plans for projects that exceed \$250K in one year or \$1M during the life of the effort should undergo formal peer review. All protocols must undergo formal peer review.

Informal Peer Review

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For NPS, informal peer review can be accomplished through an evaluation of the merit of scientific work by peers with relevant subject-matter expertise, as well as background and experience on par with the persons conducting the activity, under the direction of a peer-review manager. In an informal review process, reviewers do not need to be entirely independent. They may include the supervisor. Findings are typically provided informally to the person conducting the activity. Informal review has lighter records-management requirements.

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Most IMD science can be published using an informal peer-review process. Routine reports that use previously peer-reviewed reports as templates can be informally reviewed. Informal peer reviews must still be rigorous and thorough. Peer review should always include as many reviewers as necessary to ensure all technical aspects of the work are reviewed by someone with sufficient expertise to properly evaluate the quality of the work. Products that include interpretations of results or management recommendations must include at least one independent reviewer who is not directly or indirectly associated with the activity under review and is not the author's supervisor.

Exempt from Peer Review

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Peer review is not required for the following, based on exemptions provided in OMB M-5-03 or DO-11B:

- Routine statistical data analyses used to compute standard indicators and trends that are gathered using methods based on well-established, peer-reviewed protocols and are analyzed and interpreted within the guidelines of the protocols.
- Information that is peer-reviewed by other federal agencies following the requirements of the OMB Peer Review Bulletin.
- Information published either in a peer-reviewed journal listed on the Thomson Scientific Master Journal List or in an official report of the National Academies of Sciences.

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For IMD, routine products that do not discuss or interpret results, such as data summaries or routine status and trend analyses, may be exempt from peer review, *provided the analyses and interpretations follow methods prescribed in their related protocols*. Data released by IMD that were collected following a peer-reviewed protocol or study plan should need only basic technical review. Products exempt from peer review still need administrative review, and must be reviewed by authors and their supervisors for technical soundness before release.

OMB Influential or Highly Influential Reviews

Influential peer review is defined as review of science products intended for large, controversial, or impactful decision-making (including economic impacts). Science products of this nature tend to be the primary justification behind such decisions, especially in cases where the same decision could not be made without the product. Influential and Highly Influential reviews require coordination with the Office of Management and Budget, development of a peer-review plan, opportunity for public comment, and transparency of review results through a peer-review report.

Only six NPS reports have risen to the level of OMB Influential since 2009, none of which were from IMD (IMD's work is considered informative scientific and scholarly information). It is unlikely that IMD products would ever rise to the level of needing influential or highly influential reviews, but consult the CSO or your regional science advisor if you think you have a product that rises to this level.

Administrative Review

Administrative review examines policy, financial, or operational factors and ensures the plan or product aligns with NPS policies and regulations. Administrative review is required for all scientific activities and products. See *What is an Administrative Review?* below.

All IMD products must undergo administrative review prior to release, but this can be built into the peer or technical review process. See more details below.

Other types of review

Materials produced by NPS may also be subject to other reviews to ensure compliance with editorial style, NPS graphic identity standards, accessibility requirements, or other factors not covered in this document.

What Needs to be Reviewed, and How Do I Do It?

All products developed by IMD must be reviewed prior to release. At a minimum, the technical accuracy, objectivity, and methodology should be reviewed by authors and supervisors, in addition to conducting an administrative review. Table 1 presents suggested (default) peer review to be conducted based on the material to be published. The peer-review manager has the discretion to select the review type and design how it should be conducted. *It should be noted that a product's "type" is determined by its content—not its format.* For peer-review purposes, a web article, for instance, might qualify as a routine data summary, a project report, or a communications product—each with different potential review requirements.

Table 1. Suggested levels of peer review for IMD science products.

Product type	Default Review	Notes & Considerations
Monitoring Protocols	Formal	Formal review required due to anticipated expenditure of federal funds over the implementation period. Subsequent versions may be informal depending on what is revised.
Study plans, QAPs	Informal	Formal review encouraged in cases where resulting work is expected to be used in policy, rulemaking, or regulatory/legal situations; or in cases where findings may be controversial.
Procedures (SOPs)	Informal	Formal review required in cases where SOPs document methods for the collection, quality management, or analysis of data that have not been otherwise peer-reviewed.
Routine Data Summaries	Informal	Exempt from peer review in cases where data are collected, summarized, and reported in accordance with previously peer-reviewed methods or protocols.
Project Reports	Informal	Typically summarize and interpret findings from projects/studies with peer-reviewed protocols or study plans. Minimum of one independent reviewer if report includes interpretation of results or management recommendations. Formal review required in cases where resulting work is expected to be used in policy, rulemaking, or regulatory/legal situations; or in cases where findings may be controversial.
Complex Science Reports	Formal	Examples include works that are developed outside of peer-reviewed study plans (inquiry-based science) or include novel methods for analyzing and interpreting data.
Models and Analytical Code	Informal	Formal review required in cases where products are intended to be used to inform or justify resource management decision-making, policy, rulemaking, or regulatory/legal situations.
Data	Exempt	Informal review required if collected without a study plan or protocol. Formal review only required in cases of influential or highly influential

Product type	Default Review	Notes & Considerations
		data (which we should not encounter). Data must undergo technical review to ensure quality before release.
Field Notes & Raw Data	Administrative Only	Because they are not outputs of scientific and scholarly work, field notes and raw data are not considered science products. Although they do need to be retained, they do not require technical review prior to release. Such artifacts should be administratively reviewed to ensure that information does not contain protected information.
Science Communication Products	Not required	Because these are defined as materials derived from other peer-reviewed products, peer review is not required .

What Is an Administrative Review?

Administrative reviews are required of all science products. They should be built into the peer-review process by considering several questions that can be addressed by either the peer-review manager or peer reviewers. Questions that cannot be answered by peer reviewers may require engaging with park staff or others as appropriate.

1. For all products:
 - a. What is the appropriate level of peer review?
 - b. Is information about NPS, parks, laws, policies, or plans presented accurately?
 - c. Is there any information that might be considered sensitive, controversial, or OMB influential that might inform the peer-review process?
 - d. Is there any information that may warrant coordination with NPS or IMD communications programs?
 - e. Are there any inappropriate editorial, opinion, or advocacy positions?
2. For protocols, procedures, and planning documents:
 - a. Is there program/financial/logistic commitment to carry out the project as planned? If not, what are the risks to the ultimate utility of the results?
 - b. Is the project designed in such a way that it will result in information that is in alignment with funding/program/NPS objectives (will the information be “fit for use”)?
 - c. Is there a data management plan in place that accounts for the appropriate collection, management, and archival of information in a persistent manner?
 - d. Have appropriate procedures been identified for cases where data must receive special handling or access such as Controlled Unclassified Information (protected data), Personal Identifying Information, or Sovereign (Tribal) Data?
3. For routine data summaries, project reports, or synthetic reports:

- a. Is there any information that should be restricted from full and open access, such as Controlled Unclassified Information (protected data), Personal Identifying Information, or Sovereign Data? And are there changes that can be made to make information more open?

Peer-Review Roles and Functions: Who Does What?

There are five key roles involved with the review process:

1. Author,
2. Supervisor,
3. Peer-Review Manager,
4. Peer Reviewer, and
5. Approving Official (Table 2).

People may serve multiple roles, with the exception that Authors may not be Peer Reviewers or Peer-Review Managers of their own work.

Network program managers are the default Peer-Review Managers for all materials produced by their networks. The program manager may delegate the Peer-Review Manager role to someone else (e.g., Supervisor), as long as that person is not involved in the product development. When formal peer review is needed and the network program manager cannot serve as the Peer-Review Manager due to a conflict of interest (e.g., they are an Author), then the network program manager should consult with their regional program manager to identify a substitute Peer-Review Manager.

Table 2. Roles and functions of individuals involved in the peer-review process.

Who	What
Author	• Prepares the draft manuscript or product. • Suggests qualified Peer Reviewers to Supervisor. • Collaborates with Supervisor to determine the need for courtesy review (reviews by others for awareness or non-technical purposes). • Ensures all manuscripts sent for peer review and courtesy review carry the OMB-required nondisclosure statement: “THIS INFORMATION IS DISTRIBUTED SOLELY FOR THE PURPOSE OF PRE-DISSEMINATION PEER REVIEW UNDER APPLICABLE INFORMATION QUALITY GUIDELINES. IT HAS NOT BEEN FORMALLY DISSEMINATED BY THE NATIONAL PARK SERVICE. IT DOES NOT REPRESENT AND SHOULD NOT BE CONSTRUED TO REPRESENT ANY AGENCY DETERMINATION OR POLICY.” • Addresses (reconciles) Peer Reviewers’ comments. • Addresses comments from other reviews (e.g., administrative, editorial style, accessibility) • Informs the Supervisor and Peer-Review Manager if significant changes in draft occur so they may determine if further review and approval is warranted. • Ensures publication approval is obtained and that the approved manuscript is subsequently submitted for release in a timely manner.

Who	What
Supervisor	• Ensures the quality of science information products by Authors they supervise. • Conducts administrative review. • Ensures editorial review is obtained, if appropriate, and that review comments are adequately addressed. • Alerts appropriate officials (such as the regional program manager) and offices (including the Natural Resource Office of Communications) about potential high-visibility products and controversial or policy-sensitive issues in information products. • Makes decisions pertaining to the allocation of resources to conduct the scientific endeavor.
Peer-Review Manager (Typically, the program manager or Supervisor of the Author/project lead)	• Determines the level and type of review necessary and establishes review objectives, structure, questions, and timeline. • Collaborates with the Author and consults the Approving Official to determine whether products should be considered OMB Influential. • Ensures the selection of appropriate independent and qualified Peer Reviewers. Peer Reviewers should be selected such that all important areas of expertise are covered to ensure appropriate review of a product. • Determines the need for courtesy review. • Facilitates sending package to Peer Reviewers. • Collates comments from Peer Reviewers and provides guidance to Author on what must be addressed in the revision process. May synthesize reviews and identify specific points for the Author to address. • Ensures the Author has adequately addressed peer-review and editorial comments. • Determines whether the work under review is suitable for publication and release or requires further review/revisions. • Recommends to the Approving Official that the final draft of the product is suitable for publication and release. • Informs the Approving Official about any product content that might be sensitive or controversial and identifies any internal or external groups or agencies that might have particular and (or) immediate interest in such a product. • Ensures required documentation and recordkeeping materials (such as those associated with peer review and copyright permission) are maintained.
Peer Reviewer	• Performs independent scientific or technical review.
Approving Official (typically the network program manager)	• Grants NPS approval for release, which involves confirming that the appropriate review, approval, and release requirements are followed to ensure NPS science quality standards are met. • Confirms that the appropriate officials and offices have been notified of potentially policy-sensitive or high-visibility information products. • Interacts with appropriate officials and managers, Supervisors, Authors, and others in the conduct of their approval responsibilities. • Contacts the appropriate regional directors and the NPS Chief Science Integrity Officer to resolve issues as necessary.

Best Practices for Records Management

NPS staff are required to maintain records of the peer-review process. Multiple individuals produce these records during the review and publication process. The network or regional program manager is responsible for ensuring that all records are retained in accordance with general NPS records

management policies (DO #11D, NPS 2012b; Table 3). For informal reviews, the recordkeeping requirements are minimal. Drafts of reports should generally be retained, but review comments and publication approvals may be given via email. Electronic copies of the draft report, peer-review comments, and publication approval should be retained on a program SharePoint site or server.

Table 3. Records required based on the type of review conducted.

Record	Informal	Formal
Draft(s) of Documents under Review	Yes	Yes
Peer-Reviewer Information	No	Yes
Peer Reviewer Confidentiality and Conflict of Interest Forms	No	Yes
Peer Reviewers' Comments	Yes	Yes
Responses to Peer-Reviewer Comments	No	Yes
Review/Publication Approval	Yes	Yes

Formal reviews require retention of specific peer-review records that include documentation of the process and outcomes with enough detail that an uninvolved person will understand the product reviewed, type of review conducted, and any changes to the product made as a result of the review. The following records need to be retained for each formally reviewed product:

1. The product that was reviewed.
2. The name and position of the Peer-Review Manager.
3. For each Peer Reviewer:
 - a. Qualifications, including name, credentials, and institutional affiliation (in cases where reviewers wish to remain anonymous, the Peer-Review Manager should only disclose credentials and institution), and
 - b. Applicable confidentiality and conflict of interest documentation.
4. A copy of all Peer-Reviewer comments, including any synthesis of comments created by the Peer-Review Manager. Which format Peer-Reviewer comments take is up to the discretion of the Peer-Review Manager. Comments may be provided using standardized forms, free-form comments, or in-text editing, such as track changes in MS Word.
5. Description from Author of how Peer-Reviewer comments were addressed.
6. Record of decision from the Peer-Review Manager indicating that the product was recommended for a next phase, dissemination, or publication.
7. Peer-Review Managers may combine any of the above information into a cover memo.
8. Programs must maintain peer-review records in perpetuity.

The Inventory and Monitoring Division recommends storing all the materials described above, in addition to the final product, on program (not employee) SharePoint sites or on program servers in

accordance with their records management plans. **Formal peer review records should not be stored in DataStore.**

Checklists and Tools

The following are suggested checklists and forms that Peer-Review Managers can adapt to their needs:

General Peer Review Forms

- [IMD General Peer-Review Form](#). Can be used or adapted for most reports. Based on [USGS' general peer-review form](#).
- [Protocol Peer-Review Form](#). Can be used or adapted for study plans.
- [Conflict of Interest Form](#). Based on the draft NPS Reference Manual being developed to accompany DO-11B.

Data Review Guidelines

- [Data Package Review Checklist](#)
- [USGS Metadata Review Guidelines](#)

References

National Park Service (NPS). 2002. [Director's Order #11B: Ensuring Quality of Information Disseminated by the National Park Service](#).

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