



# NMFS-NWFSC Scientific Publications: Style Guide

**Print Version 6**  
March 2017

**Northwest Fisheries Science Center**  
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# Introduction

Technical Memorandums and Processed Reports are the only type of Fundamental Research Communications published here at NWFSC. As such, in addition to the usual review process, they are subject to an additional editorial review by the NWFSC Technical Editor. All references throughout this Style Guide to “Technical Memorandums” or “Tech Memos” are understood to apply to both Tech Memos and Processed Reports.

The purpose of this Style Guide is to establish and describe the basic set of formatting, stylistic, and grammatical guidelines for these reports, ensuring a consistent look and style both within and across all NWFSC Tech Memos. While following these guidelines to the letter is not necessary, the NWFSC Technical Editor uses this Style Guide as the basis for editing your manuscript. The closer your manuscript follows these guidelines, the faster the editing process, and the sooner we can publish your report.

We assume that your manuscript will be prepared in Microsoft Word. The current standard is Word 2016 for both PC and Mac. References throughout this Style Guide to menu options or commands are to these versions of Word, and appear in a **unique font**. If you use a different version of Word, some of these may be slightly different.

The Style Guide is broken into four main sections: Format, Style Conventions, Grammar and Punctuation, and Legal Requirements. *Format* covers the prewriting mechanics that apply to every Tech Memo, regardless of content—page and table layout, choice of font, approved color palettes, figure design, etc. The *Style Conventions* section deals with questions about abbreviating, using scientific names, writing numbers and equations, citing and referencing sources, and so forth. *Grammar and Punctuation* tackles a few troublesome issues related to the linguistic conventions of scientific English writing. The final section, *Legal Requirements*, explains some of the rules and regulations Tech Memos must comply with by virtue of their status as official government publications. This is where you will find guidance about accessibility and writing alternative text for your figures, as well.

## Suggested Resources

This Style Guide is meant as a quick reference to answer some of the most common questions about acceptable formatting, style, and grammar for reports published as NMFS-NWFSC scientific publications. It also covers some rules and regulations specific to federal publications.

It is *not* comprehensive, and does not attempt to cover every possible issue. For questions not specifically addressed here, authors and editors are advised to refer to the references listed below, available in the Northwest and Alaska Fisheries Science Centers Library and/or online, or to contact the Editor directly.

- *United States Government Printing Office Style Manual*, 30th edition. [Online PDF](#).<sup>1</sup> The main authority on style for all federal publications, and the primary source on which this Style Guide is based.
- *Merriam-Webster's Collegiate Dictionary*, 11th edition. The primary authority on spelling and word meanings for Tech Memos.
- *The Chicago Manual of Style*, 16th edition. University of Chicago Press. This is a useful general authority on grammar, punctuation, format, citation and reference style, table structuring, and more—useful when writing Tech Memos, Processed Reports, journal articles, etc.
- *Instructions for Authors*. [Website](#).<sup>2</sup> NMFS Scientific Publications Office. Provides links to NMFS guidelines and policies on style in publications.
- *A Guide to AFS Publications Style*. [Online PDF](#).<sup>3</sup> American Fisheries Society. Chapter 8 provides detailed examples of how to format references in Tech Memos.
- *Common and Scientific Names of Fishes from the United States, Canada, and Mexico*, 7th edition. American Fisheries Society. The primary authority on fish names. For other species (e.g., marine mammals, birds, invertebrates, etc.), we recommend consulting the [Integrated Taxonomic Information System](#).<sup>4</sup>
- *Scientific Style and Format: The CSE Manual for Authors, Editors, and Publishers*, 8th edition. Council of Science Editors. This book is a useful authority on signs and symbols, mathematical expressions, and scientific conventions.
- *Social Security Administration Guide: Alternate text for images*, Version 1.2. [Online PDF](#).<sup>5</sup> Social Security Administration Accessibility Resource Center. Excellent guidelines for and examples of how to write alt-text for images.

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<sup>1</sup> <http://www.gpo.gov/fdsys/pkg/GPO-STYLEMANUAL-2008/pdf/GPO-STYLEMANUAL-2008.pdf>

<sup>2</sup> <http://spo.nwr.noaa.gov/authors>

<sup>3</sup> [http://fisheries.org/docs/pub\\_stylefl.pdf](http://fisheries.org/docs/pub_stylefl.pdf)

<sup>4</sup> <http://www.itis.gov>

<sup>5</sup> [https://www.ssa.gov/accessibility/files/SSA\\_Alternative\\_Text\\_Guide.pdf](https://www.ssa.gov/accessibility/files/SSA_Alternative_Text_Guide.pdf)

## Submitting a Manuscript

This process is discussed in detail in the Procedure document. Here, we summarize the main steps related to submitting Technical Memorandums to NWFSC Publications.

Remember that your manuscript should be submitted in several parts. Please *do not combine everything* into a single Word document. Instead, submit each of the following *separately*:

1. The manuscript itself. Simply type up each section using Word's default formatting and fonts. Separate different sections with blank lines.
2. All tables and table headings. Type these into a Word document. Do not apply Word's table styles; leave tables unformatted.
3. A link to a Google Drive folder containing original copies of all images intended for use in the Tech Memo. *Do not embed the pictures in the Word file.* The Editor will insert the pictures during layout.
4. Any additional files for appendices, etc.
5. Your signed NOAA Form 25-700. This should be delivered to the Editor's mailbox on the 3rd floor, West building.

## Note for Multiple Authors

Technical Memorandums are often collaborative projects between many authors that may take from a few months to over a year to compile and draft. It is only natural that some inconsistencies would creep in. We do our best to correct for such errors during the editing process, but this can be time-consuming and is one of the main causes of delays. If authors are aware and proactive while writing, many of these issues can be avoided.

Consistency is key. Once a pattern has been established, the same pattern should be maintained throughout the entire document, whether it be 50 or 500 pages. To the extent possible, all authors should strive to maintain consistency in:

- **Tone.** Tech Memos are formal documents that are expected to maintain an elevated, academic tone. No one section should be noticeably more informal, verbose, fond of metaphors, etc., than any other.
- **Terminology.** If you call them *killer whales* in the introduction, then continue to do so throughout; do not suddenly switch to *orcas* for a section or two. Similarly, if you often refer to *the U.S.–Mexico border*, then the other border should not be *the Canada–Washington border*; instead, follow the established pattern: *the U.S.–Canada border*.
- **Spelling.** Especially when working with international authors who may be more familiar with the conventions of British English, watch for consistency in spelling (American spelling is preferred: *color*, not *colour*; *gray*, not *grey*; *program*, not *programme*; etc.). This does not apply to titles of sources listed in the References section, however.
- **Measurement.** Once you begin providing measurements in, e.g., *m/s* or *km<sup>2</sup>*, it is best not to switch to *km/h* or *km × km*.
- **Figure design.** Be consistent in your use of font, color, size, and layout. If Figures 1–4 use Arial and one of the NWFSC Color Palettes, then so should Figures 5 and 6.
- **Table structure.** To the extent possible, tables should follow similar organizational patterns. If, for example, Tables 1 and 2 have a list of references at the bottom, then Table 3 should not have this list in a column on the right.
- **Order of key terms and concepts.** Generally speaking, the first mention of a list of key terms establishes the order of that list as canonical for a given Tech Memo. If you say that you will be discussing *species A, B, C, and D*, then they should be referred to in that order whenever they appear together throughout the document—in text, figures, tables, appendices, and everywhere else—and never as, e.g., *species D, B, A, and C*.
- **References.** As discussed in [References](#), Tech Memos published at NWFSC use the American Fisheries Society’s reference style. All authors should be made aware of the appropriate format. In addition, if you are planning to use EndNote or Zotero for references, make sure that all contributors are able to use it and are using the same style. It is not acceptable for, e.g., some references to be created with EndNote while others are typed in Word. In general, we recommend that one author assume responsibility for all references in a given project to ensure consistency.

# NWFSC Scientific Publications Style Guide

## Format

In contrast to previous versions of this Style Guide, *there is no requirement to apply any formatting to the text of your document*. You may type your manuscript using whatever font, line spacing, margins, etc., you feel comfortable with. However, figures—charts, maps, and other data visualizations—that do not follow the guidelines in [Tables and Figures](#) may be returned to authors for regeneration.

All NWFSC Tech Memos and Processed Reports are published in a consistent format and layout. The overall appearance is determined in large part by the recommendations of the Government Printing Office and the NMFS Scientific Publications Office. Your document will be formatted to comply with these standards, and then laid out in InDesign. This means that *the published document will look different from the manuscript you submit*, even if you follow every recommendation on these pages. For this reason, we suggest that authors concentrate on the content, and leave the formatting to the Editor, who automatically checks all manuscripts for formatting issues as a matter of course. For authors who prefer to approximate the format of the final product while drafting, this section presents the standards used for scientific publications at NWFSC.

## Basic Mechanics

### Using styles

Tech Memos use the fonts **Minion Pro** for text and **Helvetica (Regular and Condensed)** for titles and section headings. These are proprietary fonts and might not be installed on your computer. *Don't buy them* (and definitely don't download "free" versions from the Internet)—they will be applied during editing. You should feel free to type using whatever font you feel comfortable with.

That said, applying **Styles** to your document will save the Editor some time. These can be found on the **Home** tab in Word. There are many predefined styles included there. Unfortunately, in preparing Tech Memos, we use some that do not come predefined. Word default styles include **Title**, **Body Text**, and **Headings 1–5**. (If they do not already appear in your Word toolbar, you can usually find them by clicking on the down arrow to the right of the box and selecting **Apply Styles** [on Mac, use the **Styles Pane**], then searching for or typing the name of the style.)

We also use styles called **Figure Caption** and **Table Heading** to help generate lists of figures and tables, and **Reference** to easily format the list of references. These have been created in-house. Examples of each appear in the relevant sections of this Style Guide.

There are many reasons for using styles, including:

- They help to quickly and painlessly generate tables of contents and figures.
- Modifications can be applied to the whole document at once.

- They are essential for creating the PDF file used when publishing the final version of the Tech Memo.

Note: The default **Heading** styles in Word look different from those used in Tech Memos. This is unimportant. As long as you have applied styles to the different textual elements in your manuscript, they will be modified as needed during editing. Also note that **Body Text** is not the same as **Normal**, which is not used for formatting in Tech Memos.

## Layout

### *Margins*

Use 1-inch margins on all four sides of a standard Letter-size page. This setting is usually the default setting in Word (on the **Layout** tab, click **Margins** and select **Normal**). If the **Normal** settings are different in your version of Word, you can set **Custom Margins** at the bottom of the drop-down menu.

### *Justification*

Do not **Justify** text flush right. Use **Align Left (Ctrl-L or ⌘-L)** instead (it should be the default setting). This will give the paragraphs a “ragged-right” edge, as in this Style Guide.

### *Line and sentence spacing*

You can set your line spacing to double in manuscripts submitted to the Tech Memo series if that is how you prefer to write, but the manuscript will be single-spaced when it is published. Put only one space after colons and between sentences.<sup>6</sup> Body paragraphs are not indented, and should have one 12-point space separating them. On the **Home** tab, under **Paragraph**, select **Line Spacing Options** (or, on Mac, **Line and Paragraph Spacing**). Under **Spacing**, set **After** to **12 pt**. More information about spacing appears in [Spaces](#).

## Pagination

Page numbers will be added to Tech Memos during layout, so they are not necessary in manuscripts. If you prefer to work with them (i.e., you will be printing a draft of your manuscript and are concerned that pages might get shuffled, etc.), we recommend centering them in a footer at the bottom of the page. That is where they will appear in the final layout.

Page numbering will change between a draft and a layed-out proof. As such, it is best to refer the reader to sections rather than pages within a single Tech Memo (e.g., “This is discussed further under [Histopathology](#)”<sup>7</sup> rather than “See page 12 for more details”). If you must refer to a specific page, write *[000]* instead of a number, as in “See page *[000]*.” The correct page will be added during layout.<sup>8</sup>

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<sup>6</sup>This is a change from previous versions of this Style Guide and reflects the use of proportional fonts in modern publishing; such fonts eliminate the need for two spaces between sentences, for both print and web typesetting. All fonts used in Tech Memos are proportional.

<sup>7</sup>Clickable cross-references can be added by the Editor to make navigating the PDF more convenient for your readers. Leave a **Comment** wherever you would like one inserted.

<sup>8</sup>Avoid the generic “see below.” It is unhelpful, as a reader will have no idea whether the related information is to be found further in the same section, in some other section any number of pages further on, or even in a figure or table. Be as specific as possible when referring to other sections of your manuscript.

## Tables and Figures

All tables and figures are numbered consecutively, provided with descriptive text, and mentioned at least once in the text. If a table or figure is not discussed, it should not be included.

Table headings appear before the table; figure captions appear at the bottom of the figure. Descriptions should be ample enough to allow the table or figure to be intelligible on its own, without reference to the body of the Tech Memo. All unusual symbols should be defined in the description. For tables, citations and comments are footnoted with lowercase superscript letters.<sup>9</sup> For figures, citations and comments are treated within the caption.

Remember that *all images must be provided with alternative text* for accessibility compliance. This is discussed in further detail under [Legal Requirements](#), as is NWFSC [copyright policy](#).

### Formatting tables

Build all tables in a separate Word document.<sup>10</sup> If you have tables that require landscape orientation (i.e., they are too wide for a vertical page and should be rotated 90°), the easiest way to do this is to include those in another separate document. Both drafting and layout will proceed much more quickly than if the tables are included in separate sections within the Tech Memo.

If you insert a table built in another application as an image, you will have to supply alternative text for it, so we recommend creating tables in Word, instead. Tables from Excel can be inserted into a Word document with a simple **Copy–Paste**. They will appear as Word tables, not images.

To create a table in Word, go to the **Insert** tab and select **Table**. After you place the cursor in a cell, two new **Table Tools (Design and Layout)** will appear in your list of tabs. These will help you create the table you want by merging and splitting cells, inserting or deleting rows and columns, and choosing text alignment. All tables should be created in this way. Never create tables using the Tab key, as this causes problems for accessibility.

You will find a selection of **Table Styles** under the **Design** tab. *Please do not apply them.* NMFS-NWFSC Technical Memorandums have a standard table style, but it is not one of the Word defaults. The Editor will apply the appropriate formatting to all of your tables during layout. Here is an example of a typical Tech Memo table:

Table F-1. Steelhead fisheries reported harvest by county for 1895.<sup>a</sup>

County	Gear (catch kg)		Total (kg)	Count (@ 4.5 kg)	Run (40% harvest)
	Gill net	Seine net			
King	204,704	—	204,704	45,490	113,725
Snohomish	264,372	—	264,372	58,749	146,873
Skagit	93,268	—	93,268	20,726	51,815
Whatcom	347,856	10,503	358,359	79,635	199,088
		<b>Total:</b>	<b>920,703</b>	<b>204,600</b>	<b>511,500</b>

<sup>a</sup>Data from Wilcox (1898).

<sup>9</sup> Don't use the **Insert Footnote** function (on the **References** tab) for this purpose. That is only for footnotes in the main body of the document. Create table footnotes manually by superscripting letters (**Ctrl-Shift++** or **⌘-Shift++**).

<sup>10</sup> In your manuscript, simply write “<Table x>” on a separate line after the paragraph where the table is first mentioned. The Editor will insert the required table as close as possible to this point.

This formatting is sufficient for the majority of tables. If you feel that your table is complex enough that additional formatting elements (e.g., vertical lines or alternating shaded rows) are required, the Editor will work with you to achieve a solution.

## Formatting figures

Word embeds full-sized picture files into its documents, so placing many illustrations into the body of a Tech Memo tends to slow down computer performance considerably. For this reason, we ask that you *submit all figures as image files in a separate folder*. Label them clearly (e.g., “Figure 5.jpg”). *Do not paste them into the body of your manuscript*. Instead, write the figure’s number, caption, and an alt-text description (if necessary) in angle brackets on a separate line after the paragraph of first mention. For example:

...The chemical structure of PBDEs consists of two phenyl rings connected by an ether bond with from one to ten bromine or hydrogen atoms attached (Figure 2). PBDEs are structurally similar to PCBs and have similar physicochemical properties.

<Figure 2. Chemical structure of PBDEs. The numbers assigned to the carbon atoms indicate the potential positions of the bromine atoms on the phenyl rings. Alt-text: “Chemical diagram showing two hexagonal rings joined by single bonds to a shared oxygen atom.”>

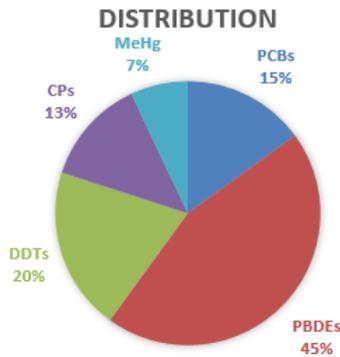
In general, several PBDEs are lipophilic, persist in the environment, and accumulate in ocean sediments because of their high binding affinity to particles (de Wit 2002)....

During layout, the Editor will place the figure as close as possible to this point, label it with the caption, and tag it with the alternative text. Depending on their size, both figures and tables may be aligned with the top or bottom margin of the page where they are first referenced. Very small tables may be placed into a two-column format. Full-page or very wide figures or tables may be rotated 90°.

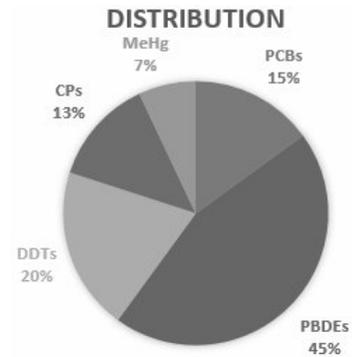
We recommend using a sans-serif font (preferably **Arial**, **Calibri**, or **Helvetica**) in all figures. For legibility, the size of the font should be no less than 8 and no more than 11 points.

### *Color*

The Tech Memo series is published online in PDF format, so you may use color if it adds clarity to your illustration. Generally speaking, charts shouldn’t use more than five colors at a time, both for simplicity and for compliance with accessibility requirements. We must be able to accommodate those who, regardless of reason, view charts in black and white. Many charts are generated in Excel, older versions of which often use a default color palette that looks like this:



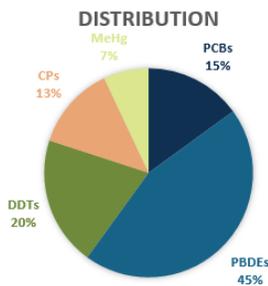
The problem with these colors is that they do not convert well to grayscale, as can be seen here:



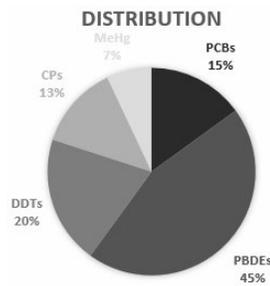
The red and purple sections become nearly indistinguishable, as do the green and light blue sections. On a pie chart this might be acceptable, but not on a line graph. For this reason, the NWFSC Communications team has developed a set of color palettes that, when grayscale, still retain high contrast.

Here is a side-by-side comparison of the above figure using the approved color palettes:

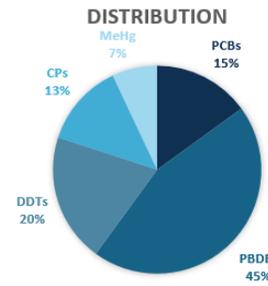
#### Polychrome Palette



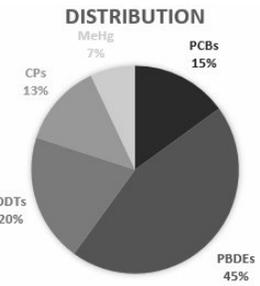
#### Grayscaled



#### Monochrome Palette



#### Grayscaled



### Maps

Some maps use color gradients to display various data plots. If your map uses more than one gradient, check to be sure information isn't lost or conflated after grayscale. (A simple test is to print the map on a black-and-white printer.) In general, maps should use color sparingly, applying it only to the most important features.

In addition to the data they are depicting, all maps should contain the following elements:

- *A directional compass/north arrow and degree labels.* North does not have to point precisely to the top of the page, but should generally aim in that direction. Degrees latitude and longitude should be clearly labeled, either on a grid or with tic marks. On the left and right sides of the map, the label orientation should be set to vertical to save space.
- *A scale bar.* This is preferable to a ratio, as interpreting a scale bar is more spatially intuitive. A bar will also resize itself should the reader enlarge or shrink the image. The bar should have no more than two divisions, using common (and rounded) values (e.g., 5, 10, 50, 100, etc.). The units on the scale must be the same as those used in the surrounding information (i.e., the caption and body text).
- *A legend.* Explain what different map features mean. This can only be omitted on extremely simple maps where every feature is labeled.
- *Labels.* NMFS Scientific Publications Office's *Instructions for Authors* require labels for bodies of water (in italics) and land masses (not italics). Provide a title for your map.

- *Citations.* Within the figure, cite the spatial and/or tabular data used to make the map (e.g., GIS layers, tables, aerial/satellite imagery, raster files, etc.). Remember to include these in the document’s list of references as well.
- *A date/place stamp.* The author (organizational unit) and the map’s production date should be included within the body of the figure. Maps often become separated from their parent document, and this provides a traceable path. Preferred format: *NOAA Fisheries – NWFSC, August 2016.*

If supplying maps created in ArcMap, 1) export them as Map Packages so that they remain editable, and 2) include the highest-resolution output images possible.

## Organization

This section applies mainly to Technical Memorandums. The organization of a Processed Report depends in large part on its function. Both types of reports must contain, at minimum, an executive summary/abstract, an explanation of the purpose of the report, and a list of references.

### Major sections

#### *Front matter*

The front matter comprises, in order: the cover, the title pages, a table of contents, a list of figures, a list of tables, a dedication (optional), an executive summary, acknowledgments (optional), and a list of abbreviations or symbols (optional). Most of these are not your responsibility. The table of contents and the lists of tables and figures will be generated after editing by the Editor, as pagination often changes during layout. The cover and title page are also generated by the Editor, though you must provide the information necessary to do so.<sup>11</sup> Of the remaining sections, only the executive summary is required.

#### *Body*

The body of a Tech Memo, like most scientific writing, typically begins with an introduction followed by materials and methods, results, and discussion sections, though the exact number and names of your sections depend on the nature of the report. This does not apply to Processed Reports, which can be not much more than collections of tables or other data compilations.

#### *Back matter*

The back matter begins with the references. You may also choose to provide a glossary or some appendices, though these are optional. These sections (including all appendices) should be included within the same Word document as the Tech Memo itself.

Some authors choose to submit PDF files to be included as appendices. These can’t be embedded in the Word file. The files should be clearly labeled (e.g., “Appendix B-2.pdf”), and *alternative text must be provided for all images* in the PDFs. The Editor will tag the images during layout.

### Supplementary material

Some scientific publications allow authors to provide links to related materials online. Many publications, including the NMFS Scientific Publications Office’s own *Fishery Bulletin* and

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<sup>11</sup> If you will not be printing your report and would like to use a nonstandard cover (e.g., a color photograph, NOAA Fisheries branding, etc.), please notify the Editor at the time of submission.

*Marine Fisheries Review*, provide this option due to limitations of space. Space, however, is not an issue for Technical Memorandums. While most Tech Memos range from 50–200 pages, the longest have been close to 600 pages long.

Moreover, because NWFSC reports are official government publications, they need to be archivable in a way that journal articles might not. This includes making all essential information available in a single location. In the past, all Tech Memos have been printed, meaning that there were always at least a few paper copies available in the Center library. As we transition away from print, there still needs to be a single PDF file that is the official, archival copy of the Tech Memo.

That said, some material may be impractical for inclusion in a paper (e.g., video clips or certain data visualizations like Prezis, PowerPoint slides, etc.). Use such material sparingly. *You must provide an explanation for why the material is necessary*; the final decision about whether to include it rests with the NWFSC Communications team.

Supplementary material must be assigned a DOI number before it can be included. If present, it is referred to following the guidelines for URLs, with a hyperlink pointing to the DOI address.

# Style Conventions

This section covers some of the most common issues associated with style as it relates to NMFS-NWFSC Technical Memorandums and Processed Reports. They are presented alphabetically. If you have a question about a style issue that isn't covered here, you can refer to the list of [Suggested Resources](#), or contact the Editor.

## Abbreviations

Abbreviations and acronyms eliminate the repeated use of long names throughout a report. A useful list of standard abbreviations is included in the *GPO Style Manual*.

Here are some standards for abbreviation usage for NWFSC publications:

- Abbreviations are usually spelled out or defined at first occurrence, for example: *Northwest Fisheries Science Center (NWFSC)*. Because the executive summary, body, and each appendix of a Technical Memorandum are somewhat independent, begin this process anew in each of those parts of the document.
- Consider abbreviations singular and add -s to form the plural, unless they are units of weights and measures or inherently plural.
- Too many abbreviations clutter the text and make reading difficult. One way to avoid this is to alternate an abbreviation such as *JBS* (for *juvenile bypass system*) with a short phrase such as “the system.” If many abbreviations are necessary, consider adding a list of abbreviations or a glossary.
- If the abbreviation for two organizations is the same, avoid using it. For example, if a Northwest Power Planning Committee and a Council, both represented as *NWPPC*, appear in the same manuscript, you can refer to them as “the planning committee” or “the committee” and “the planning council” or “the council.”
- The common abbreviations *e.g.* and *i.e.* are sometimes misused. Remember that *e.g.* stands for *exempli gratia*, meaning “for example.” In contrast, *i.e.* stands for *id est*, or “that is.” The English equivalents are preferable in formal prose, but the abbreviations are used in parenthetical material.
- There is no period after “et” in the abbreviation *et al.*
- Do not begin a sentence with an abbreviation such as *O. nerka*; spell out *Oncorhynchus*.
- Do not use periods after abbreviations of weights and measurements (e.g., *lb* not *lb.*). Do not add an “s” for plurals (e.g., pounds = *lb* not *lbs*).
- Abbreviate *fathom* as *fth*. The abbreviation *fm* stands for *femtometer*.
- Abbreviate *United States* when used as an adjective: *the U.S. border*. Spell it out when used as a noun.

- Spell out state names in text, headings, and references. Use two-letter postal abbreviations in tables to save space.
- For abbreviated compass points in addresses, use one- or two-letter abbreviations without dots (even though this differs from the *GPO Style Manual*): *NW, SE, W, N*, etc.
- Spelling out time periods (*second, minute, hour, day, week, month, year*) is generally preferable to abbreviating them, except when space is at a premium in tables.
- When citing a reference credited to an organization, use the organization's acronym or initialism in the text citation: (*EPA 2005*). In the references section, list the abbreviation followed by the name of the organization spelled out in parentheses: *EPA (Environmental Protection Agency). 2005*.
- Unless an abbreviation is commonly understood (e.g., *DDT* for *dichlorodiphenyltrichloroethane*), do not use it in titles or headings.

## Acknowledgments

This section, if you choose to include it, should be kept short and factual. It is generally assumed that acknowledgment in this section is due to assistance or advice above and beyond the call of duty (e.g., it would not be necessary to acknowledge the NWFSC Technical Editor for editing your manuscript). A good rule of thumb is no more than two sentences per person or administrative unit being acknowledged. Because the section is more informal than the rest of the paper, titles are not usually used. Agency names, however, should be written out in full.

## Affiliations

Authors' names and the institutions they are affiliated with at the time of publication appear on the title page of the Technical Memorandum. The lead author's name appears first, followed by coauthors in (roughly) decreasing order of contribution. Affiliations (institutional names and addresses) appear below this, beginning with the lead author's affiliation. If any coauthors are affiliated with the same institution as the lead author, their names appear without numbers. All coauthors from different institutions have their names followed by superscripted numbers. For example:

Michael M. Pollock, Joseph M. Wheaton,<sup>1</sup> Nick Bouwes,<sup>2</sup> Carol Volk,<sup>3</sup> Nicholas Weber,<sup>2</sup>  
and Chris E. Jordan

Note: The Editor will lay out this page using the information provided at the time of submission. Please verify that all names appear as intended before delivering the manuscript. For example: An author goes by "Jim Wilson" in his daily life, but prefers his name written as "R. James Wilson" in publications. If the name provided to the Editor is written as "Jim Wilson," that is how it will appear on the title page.

As detailed in NWFSC's policy document on Fundamental Research Communications, the NMFS Science Board has established the form and content of affiliations based on the author's employment status. The format has been slightly modified for Technical Memorandums. There are four options for scientists affiliated with NWFSC:

#### 1. Full-time NWFSC employees (FTE)

Division  
Northwest Fisheries Science Center  
2725 Montlake Boulevard East  
Seattle, Washington 98112

#### 2. Full- or part-time contractors

Contracting firm  
Under contract to the Northwest Fisheries Science Center  
2725 Montlake Boulevard East  
Seattle, Washington 98112

#### 3. Cooperative Institute or other grantee

Home institution  
Cooperative Institute or other granting organization  
Award number

#### 4. Visiting scientists

Home institution  
Visiting Scientist at the Northwest Fisheries Science Center  
2725 Montlake Boulevard East  
Seattle, Washington 98112

Coauthors affiliated with other branches of NMFS or other external institutions (the West Coast Region, the University of Washington, the SeaDoc Society, the Washington Department of Fish and Wildlife, etc.) should use the address approved by that institution.

## Capitalization

The *GPO Style Manual* is the primary authority on capitalization. Some recurring issues are discussed below.

- The words *Federal* and *State* are capitalized when used as or in place of a proper name: *the Federal Government; in Washington State; the State manages shellfish harvesting*. When they are adjectives, they are lowercase: *several federal and state agencies*.
- Although the *GPO Style Manual* capitalizes *Continental Shelf*, the term often appears together with *continental slope*. For consistency, both terms should be lowercase.
- Capitalize *East Coast* and *West Coast* when referring to the coasts of the United States. This follows the style of guides other than the *GPO Style Manual*. However, *the west coast of North America* is lowercase.
- In general, lowercase *northern*, *northwest*, *south*, etc., when they indicate compass direction or location, and capitalize these words when they are regional or geographical terms that are accepted as proper names: *the Pacific Northwest* and *Southern California*, but *the western United States* and *the south fork of the Stillaguamish River*.

- Capitalize a geographical term (lake, river, ocean, etc.) that forms part of a proper name: *the Pacific Ocean, the Fraser River*. A common noun that comes second and applies to more than one name is usually lowercased: *the Skagit and Snohomish rivers*. Do not capitalize a generic term that follows a capitalized one: *the Columbia River basin*. Variations of these principles can occur based on context and accepted usage (e.g., *Pacific ocean perch*).

## Citations

In scientific publications, the term *citations* is usually reserved for the indicators in text, figures, and tables that point to the references, and the term *references* usually means the descriptors of works cited, as in the references list at the end of the document.

Guidelines for citations:

- Every citation must appear in the list of references, and every reference listed must be cited at least once in the Tech Memo.
- Citations can take either of two forms: “Tsuchie (2014) examines the effects of PCBs on juvenile salmonids...” or “The effects of PCBs on juvenile salmonids have been examined (Tsuchie 2014).”
- A parenthetical sequence of citations is listed chronologically, beginning from the oldest, then alphabetically within years: (*Jalaeian 2002, McCall and Lawley 2005, Slagoski et al. 2005, Hunt 2011a, 2011b*).
- Avoid the use of *Anonymous* or *Anon*. When no author names are given, credit the organization that printed the document or published the electronic source. Abbreviate the citation, and provide an explication in parentheses in the list of references: (*SSA-ARC 2010, NMFS 2012*).

See also the section on [References](#).

## Unpublished data and personal communications

When data are referred to in the discussion that have not been published or formally peer-reviewed, they do not appear in the list of references. Instead, they are cited in parentheses. There are three main possibilities:

1. The source of the data is the sole author of the report, or all of the authors together. In this case, the citation is simply the word “author” or “authors,” followed by “unpublished data.” This is true for all mentions of this data source. For example:

...preliminary results appear positive, but more research remains to be done (authors, unpublished data)...

2. The source of the data is one of the several authors of the report:

First mention: (*S. M. Graves, unpublished data*)  
Subsequent mentions: (*Graves, unpublished*)

3. The source of the data is not an author of the report. In this case, an affiliation must be included:

First mention: (*K. Dennison, University of Washington, unpublished data*)  
Subsequent mentions: (*Dennison, unpublished*)

The data may also come from external sources with different affiliations:

First mention: (*K. Dennison, University of Washington, and A. J. Collins, SeaDoc Society, unpublished data*)  
Subsequent mentions: (*Dennison and Collins, unpublished*)

Depending on the type of information provided to the author(s), it may be more appropriate to refer to it as a personal communication:

First mention: (*K. Dennison, University of Washington, personal communication*)  
Subsequent mentions: (*Dennison, personal communication*)

## Common and Scientific Names

Our authority for common and scientific names of fish species is the American Fisheries Society's *Common and Scientific Names of Fishes from the United States, Canada, and Mexico*, 7th edition. For fishes elsewhere, use [FishBase](#).<sup>12</sup> For other animals, plants, fungi, microbes, etc., use the [Integrated Taxonomic Information System](#).<sup>13</sup>

N.B.: The plural form *fishes* is used when different species are being discussed. For example:

On the first midwater tow, only 25 fish of an unidentified species were captured. On the second tow, 502 fishes of a variety of species were captured.

Some guidelines:

- Provide the scientific name (Latin binomial) of any species the first time it is specifically mentioned, then use only the common name thereafter. This applies to the executive summary, the body, and each appendix individually. Scientific names are italicized in parentheses following the common names: “coho salmon (*Oncorhynchus kisutch*).”
- It is not necessary to provide scientific names when referring to species in general: “The charter fishing industry is highly dependent on salmon.”
- Reference to a genus already mentioned can be abbreviated, unless it occurs at the beginning of a sentence or there is a possibility of confusion (e.g., two or more genera beginning with the same letter).

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<sup>12</sup> <http://www.fishbase.org>

<sup>13</sup> <http://www.itis.gov>

- When a common name contains two or more elements (*Chinook salmon*, *humpback whale*), use both throughout the manuscript.
- For an unspecified species, do not italicize “sp.,” *Oncorhynchus* sp. For plural unspecified species, use “spp.”
- Names of divisions and subdivisions higher than genus are capitalized but not italicized: “Salmonidae.” English names, though sometimes derived from the scientific names, are lowercased (e.g., “copepod” from “Copepoda”).

## Countries

Names of foreign countries are generally spelled out. Countries whose names are compounds should be spelled out the first time they appear in the executive summary, body, and each appendix. They can then be abbreviated when used as adjectives, with periods (no spaces) between the initials: *U.S.* (United States), *U.K.* (United Kingdom), *P.R.O.C.* (People’s Republic of China), etc.

## Dates and Time

Use the format *DD Month YYYY* (*14 August 2013*, not *August 14, 2013*). However, the month is placed first in tables where dates are in numerals: *08/14/13*.

If referring to a range of dates, use an en dash: *14–18 August 2013*, *29 May–3 June 2014*, etc.

Do not use an apostrophe when referring to decades: *1990s*, not *1990’s*. To indicate a range of years, use *2004–2009*. For inconsecutive years, use *2004 and 2009*. Centuries are spelled out and lowercased: *the twenty-first century*.

Use the 24-hour clock: *14:30*, not *2:30 p.m.* Add a zero when the hour is between midnight and ten in the morning: *00:30*, *04:45*, etc.

## Equations

When included in the body of the Tech Memo, equations typically function as clauses or sentences, and should be punctuated as required (e.g., with periods, commas, semicolons, etc.). Equations are centered, numbered in sequence, and designated by a numeral within parentheses set flush right, as below.



Cite the equation in the text as “Equation 1.”

Put a space before and after mathematical symbols in equations, but no spaces before superscripts or subscripts. For relatively simple equations, the math symbols and the equation tools available in Word (on the **Insert** tab, select **Equation**) should be sufficient. For more complex equations, specialized software is advised. Remember, however, that if you insert an equation as an image, you must provide alternative text for it.

For additional guidelines, see *Scientific Style and Format: The CSE Manual for Authors, Editors, and Publishers* and *The Chicago Manual of Style*.

## Footnotes

Footnotes are numbered sequentially throughout the text using superscript numbers. They should be used sparingly. In Tech Memos, the footnote number is placed *after* the punctuation mark, except in the case of an em dash or when the footnote applies only to material contained entirely within parentheses. In Word, on the **References** tab, choose **Insert Footnote** with your cursor in the appropriate location.

Footnotes are required for providing URLs.

Footnotes are not used in executive summaries. When using footnotes in tables, since numerals can be confused with exponents, use lowercase superscript letters (<sup>a</sup>). Manually place the footnotes below the body of the table (do not use the **Insert Footnote** command). For an example, see Formatting tables.

## Foreign Words

Most Latin derivations, abbreviations, and phrases are no longer italicized. This includes the familiar i.e., e.g., cf., etc., and et al., as well as phrases like in situ, in utero, en route, and many others. When in doubt, consult *Merriam-Webster's Collegiate Dictionary*, 11th edition.

Check foreign words in a foreign language dictionary, or the original source when quoting. Include diacritical marks in foreign words (e.g., *El Niño*). If an author's name contains diacritics that you cannot reproduce, indicate so in a **Comment**—the Editor will place them where needed.

## Latitude and Longitude

Abbreviate latitude as *lat* and longitude as *long*. The abbreviation of each precedes its coordinate. When used together, latitude is given first: *lat 20°N, long 120°W*. Note that *20°N* is written without spaces or a period following the direction.

When specifying degrees, minutes, and seconds, use degree signs (°), primes (′), and double primes (″), not superscripted Os, apostrophes, and quotation marks. Compare:

*Correct:* lat 20°15′09″N      *Incorrect:* lat 20°15′09″N

Latitude and longitude can also be expressed in decimal degrees if that coordinate system is consistently used throughout the document (e.g., *lat 47.645°N, long 122.307°W*). Be consistent in the number of decimal places used (i.e., do not use three in one section and five in another.)

## Lists

Lists can be bulleted or numbered. When listing items in numbered sequence within a sentence, follow numbers with a single parenthesis. For example:

The habitat elements of this study were to 1) describe fish and habitat relationships, 2) identify factors causing decline, and 3) identify actions for recovery.

For longer lists, allow Word to create them for you. On the **Home** tab, choose **Bullets or Numbering** to quickly and easily create lists. Generally, it is understood that the items in a bulleted list should be more or less interchangeable, whereas those in a numbered list must (for whatever reason—importance, chronology, etc.) appear in a specific order.

## Numbers

The rules for when to spell out numbers and when to write them using numerals are complex and often self-contradictory. Here are a few guidelines for some of the most common issues. When in doubt, consult the *GPO Style Manual* or contact the Editor.

- Never begin a sentence with a numeral; spell the number out or rewrite the sentence.
- Spell out cardinal numbers from one through ten, unless they are part of a unit of measurement or time (e.g., *three species were identified* but *8 kg, 3.5 hours, or 6 October 2009*).
- Spell out ordinal numbers in text: *first, second, third, ..., tenth*. Use the shortened forms after *11th* and in tables and figures: *1st, 2nd*, etc. Do not superscript the suffixes.
- Spell out fractions, unless they are part of a unit of measurement: *one-half of the fleet*, but not *a one-half m squid*. In units of measurement, convert fractions to decimals or percentages: *the net was 0.5 m in diameter; 25% of age-2 salmonids*.
- A zero always precedes the decimal point in values less than one.
- Trailing zeroes can often be dropped: not *10.0°C* or *0.350 g*, but *10°C* and *0.35 g*. An exception would be when maintaining a certain number of decimal places for consistency among measurements (e.g., all entries in a table are calculated to four decimal places).
- Numerical ranges are expressed with a single unit symbol after the second number of the range: *25–30%*, not *25%–30%*. In ranges of numbers, use an “en dash” (instead of a hyphen) with no spaces around it. To make an en dash, press **Ctrl** or **⌘** and the **number pad minus** (not the minus on the top row of the keyboard). More information on dashes can be found in [Dashes and Hyphens](#).
- Four-digit or larger numbers (except years) in text, figures, and tables always have commas every three digits (counting from the right): *1,000* (not *1000*), except after the decimal point: *3.14159*. Follow the *GPO Style Manual* in using the forms *1.6 million* (not *1,600,000*) and *300,000* (not *300 thousand*).

## Quotations

Quoted text can be 1) enclosed in quotation marks within the surrounding text, or 2) set off as a block quotation. All quoted text must be cited/referenced. In general, a short quotation (no more than four lines) is enclosed, while longer quotations are set off as a block:

Block quotations start on a new line and are not enclosed in quotation marks. The block is indented 0.5 inch from the left and right margins. The citation of a block quotation can be placed in parentheses at the end of the block, inside the ending punctuation mark (Quimby, 2015).

Omitted text is indicated with the use of an ellipsis: “Sediments or tissues... are customarily analyzed in batches of 12 to 14 field samples (Sloan et al. 2014).”

Quotations within quotations are set off using single quotes. Square brackets may be used to alter verb tenses and capitalization to better fit the flow of your train of thought: “According to Salvucci and Taatgen (2012), ‘[D]rivers [are] increasingly engaging in secondary tasks while driving’” (Lewis, 2016).

## References

Technical Memorandums and Processed Reports in the NMFS-NWFSC series use the reference style developed by the American Fisheries Society.<sup>14</sup> The best source of examples and explanations of this style is *A Guide to AFS Publications Style*, Chapter 8. This section of the NWFSC Style Guide summarizes some of the key points and provides an abridged set of examples.

All contributors to a submitted manuscript should be familiar with the contents of this section. Alternatively—and preferably!—we recommend that one author assume responsibility for all references in a given project. This will help ensure consistency, especially in longer manuscripts.

Entries in the references section are listed alphabetically in hanging indent format, with the first line flush left and subsequent lines indented 0.3 inch. Non-peer-reviewed (“gray”) literature (i.e., unpublished data or personal communications) is not included in this section, but is referred to in citations where appropriate, as described in [Citations](#).

Note: There can be more than one references section in a Tech Memo. Typically this happens when appendices contain their own citations of sources. In this case, it is more convenient for readers when each appendix contains its own (even very short) references section—even if many of the sources are the same.

## Reference managers

Reference managers are programs that help authors keep track of references and citations within their reports. Popular examples are EndNote and Zotero. NWFSC owns an EndNote license, and the IT Helpdesk can install EndNote on your computer quickly and at no extra cost. Zotero is available as a plugin for most web browsers, and can be installed without assistance from IT. The Editor recommends using one of these programs, as a well-maintained reference manager not only saves an author time, but helps ensure consistency in the use of citations and references. However, if you choose to do this, please make sure that all contributors are a) using the same reference manager, and b) using the AFS reference style.

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<sup>14</sup> This is a change from all previous versions of this Style Guide and took effect on 1 January 2017.

The AFS style is available by default in both EndNote and Zotero. In EndNote, under the **Edit** menu, hover over **Output Styles** and select **Open Style Manager....** Scroll down to **Trans Amer Fish Soc** and click the checkbox, then click the **Edit** button at the bottom of the window. In the left panel of the window that appears, look for **Bibliography**. If the triangle is pointed to the right, click it to expand the submenu. Under **Bibliography**, click **Author Lists**. On the right of the window, under **Abbreviated Author List**, select **List all author names**. Repeat this process for **Editor Lists**, then close the window. You will be prompted to save your changes. Select **Save**, and name the style whatever you like. (The Editor recommends “AFS for NWFSC.”) Now, uncheck **Trans Amer Fish Soc** and scroll to **AFS for NWFSC** (or whatever you called your newly saved style). Make sure the box is checked and close the window. Finally, open the **Edit** menu, hover over **Output Styles**, and select the new style from the list that appears.

In Zotero, the style is called **American Fisheries Society**. Simply make sure this is selected as the **Citation Style** when you add a citation or bibliography.

For authors who prefer not to use a reference manager, the next pages in this section summarize some of the most important information about the AFS reference style.

## General rules

- Place spaces (for non-breaking, use **Ctrl-Shift-space** on both PC and Mac) between initials in authors’ names, and add commas between names. Eliminate spaces between colons and page numbers.
- Do not abbreviate the titles of journals, organizations, government departments, universities, etc. Spell them out in full.
- Use the published capitalization for the titles of books, articles, chapters, etc. This may be Sentence case (capitalize only the first word of the title and any conventionally capitalized proper nouns), Title Case (capitalize all words except for articles [a, the], prepositions [in, at, with, during], and conjunctions [and, or, but]), or ALL CAPS (treat this as Title Case).
- Avoid the use of *Anonymous* or *Anon*. When no author names are given, credit the organization that printed the document instead: (*SSA-ARC 2010*). Abbreviate the citation, and provide an explication in parentheses in the list of references:

SSA-ARC (Social Security Administration—Accessibility Resource Center). 2010. Social Security Administration guide: Alternate text for images, ver. 1.2. Available: [www.ssa.gov/accessibility/files/SSA\\_Alternative\\_Text\\_Guide.pdf](http://www.ssa.gov/accessibility/files/SSA_Alternative_Text_Guide.pdf). (August 2016).

## Alphabetical order

List references in alphabetical order by first author’s surname, then by additional authors’ surnames. References by a single author precede those with multiple authors. Alphabetical order takes precedence over publication date.

List works by the same author(s) chronologically, oldest work first. If author order is exactly the same for several publications, list them in chronological order; if year of publication is also the

same, then list them alphabetically by title, and use a lowercase letter after the year (1997a, 1997b, etc.); the order of letters is determined by the alphabetical order of the sources, not by the order they are cited in text.

Smith, J. M. 1997.

Smith, J. M. 2001.

Smith, J. M., and L. R. Adams. 1998a. Determinants of...

Smith, J. M., and L. R. Adams. 1998b. Spawning Patterns in...

Smith, J. M., L. R. Adams, and N. K. Peterson. 1998.

Smith, J. M., and N. K. Peterson. 1997.

Smith, J. M., N. K. Peterson, and L. R. Adams. 1996.

## Examples

This is just a sample of a few of the most common types of references. For more detailed examples, refer to *A Guide to AFS Publications Style*, Chapter 8.

### *Book*

Zara, J. H. 1984. *Biostatistician Analysis*, 2nd edition. Prentice Hall, Englewood Cliffs, New Jersey.

### *Chapter in a book*

Brett, J. R., and T. D. D. Groves. 1979. Physiological Energetics. Pages 279–352 in W. S. Hoar, D. J. Randall, and J. R. Brett, editors. *Fish Physiology*, volume 8. Academic Press, New York.

### *Peer-reviewed journal article*

Rutherford, E. S., J. T. Tilmant, E. B. Thue, and T. W. Schmidt. 1989. Fishery harvest and population dynamics of gray snapper, *Lutjanus griseus*, in Florida Bay and adjacent waters. *Bulletin of Marine Science* 44(3):639–654.

### *NOAA Technical Memorandum*

Myers, J. M., J. J. Hard, E. J. Connor, R. A. Hayman, R. G. Kope, G. Lucchetti, A. R. Marshall, G. R. Press, and B. E. Thompson. 2015. Identifying Historical Populations of Steelhead within the Puget Sound Distinct Population Segment. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-NWFSC-128. DOI: 10.7289/V5/TM-NWFSC-128.

## Online sources

If the literature you are citing is available online—whether exclusively, or in addition to a print version—add the online address at the end of the citation using the format below. If a DOI number is available, provide it.

Anderson, J. J., E. Gurarie, C. Bracis, B. J. Burke, K. L. Laidre. 2013. Modeling climate change impacts on phenology and population dynamics of marine migrating species. *Ecological Modelling* 264(24):83–97. Available: [www.sciencedirect.com/science/article/pii/S030438001300166X](http://www.sciencedirect.com/science/article/pii/S030438001300166X). (September 2015). DOI: 10.1016/j.ecolmodel.2013.03.009

The DOI number should contain an embedded hyperlink to the address *http://dx.doi.org/xxx*, where *xxx* is the DOI number itself. The website URL is written without *http://* at the beginning, though the hyperlink should contain it. Neither is underlined. This style differs from the treatment of URLs elsewhere in the text; see URLs, below.

## Unpublished data

Personal communications, reports that have not been peer-reviewed, internal working papers, and other such collections of unpublished data may be used to inform the discussion, but do not appear in the list of references. They are cited at the appropriate point in the text. See Citations.

## Signs and Symbols

Do not use English letters to approximate Greek letters (e.g., *u* for  $\mu$ ). These are very easy to miss during editing. Instead, on the **Insert** tab, choose **Symbol**, then **More Symbols**. (On a Mac, just choose **Advanced Symbol**.) Change the **Font** to **Symbol** and insert the appropriate letter. If you can't find a particular symbol that you need, leave a **Comment** in the margin for the Editor.

Some other quick points:

- A space precedes and follows most operation or relation signs (e.g., =,  $\approx$ ,  $\neq$ , +, -,  $\times$ ,  $\div$ , <, >, etc.) in mathematical expressions.
- Spaces are not needed between signs and numbers when providing approximations, minimum/maximum ranges, confidence intervals, etc.: *~3 kg*, *>20 m wide*,  *$\pm 10\%$* .
- For multiplication, use a times sign ( $\times$ ), not the letter *x*.
- Single letters for variables are in italics: *n* = 12; *P* < 0.01;  $\chi^2 = 2.2727$ ;  $r^2 = 0.78$ . Note: *n* is for sample size only, not for number of samples or variables, etc.

## URLs

URLs, or webpage addresses, are often long, unsightly, and even confusing. When pasted into a paragraph of text, a long URL not only creates formatting issues (e.g., white space at the ends of lines, or the need to add spaces where they don't technically belong), but can also interrupt a reader's train of thought as they scan past it looking for the continuation of the sentence.

Consider this example:

The sediment grain size data layer is available for download at the Pacific Coast Ocean Observing Station (PaCOOS; [http://pacoos.coas.oregonstate.edu/archive/woc\\_sgh\\_grsz2.zip](http://pacoos.coas.oregonstate.edu/archive/woc_sgh_grsz2.zip)) and was derived from an interpolation of USGS usSEABED (Reid, 2006) and OSU (authors, unpublished data) sediment seabed sample databases.

Instead, provide a hidden hyperlink (underlined) in the text, and put the full URL in a footnote (hyperlinked but unformatted). This is much less distracting to readers in all media. Readers of

an electronic document will be able to follow the link with a click or tap, while print readers can still refer to the footnote for the URL should they wish to copy it into a browser.

Embed hyperlinks by selecting a word or phrase and pressing **Ctrl-K** or **⌘-K** and entering the link into the **Address** box.

Here is an edited version of the above example:

The sediment grain size data layer is available for download at the Pacific Coast Ocean Observing Station's (PaCOOS) West Coast Habitat Server,<sup>15</sup> and was derived from an interpolation of USGS usSEABED (Reid, 2006) and OSU (authors, unpublished data) sediment seabed sample databases.

Note that the format for URLs when providing links in the list of references differs from that outlined here. See Online sources for more information.

## Vessel Names

Vessel names are given in full and are italicized. We use RV for research vessel, MV for motor vessel, and FV for fishing vessel (no slash, not italicized): RV *Robert L. Emmett*. If the vessel is part of NOAA's fleet, it is referred to as "NOAA Ship" regardless of its designation: NOAA Ship *Bell M. Shimada*. Provide the vessel's designation upon first mention within major sections of the report; subsequent mentions within each section can omit the designation for readability:

...local vessels will not be able to effectively tow the sampling gear employed by the NOAA Ship *Miller Freeman* during slope surveys. The *Miller Freeman* is 215 feet (65.5 m) long...

In alphabetical lists, vessels named after persons are alphabetized by last name, so RV *George M. Bowers* is listed under "B," though the vessel name is not inverted (i.e., is not *Bowers, George M.*).

## Weights and Measures

Use metric units for weights and measures of physical and chemical quantities. An exception is that crab catches are reported in pounds. Do not use periods after abbreviated units (e.g., *lb* not *lb.*) and note that there are no plural forms (e.g., *7 cm* not *7 cms*). Spell out names of units when used in text without an accompanying numeric value, though in figures and tables, unit symbols and abbreviations without accompanying numeric value may be used to save space.

When used as an adjective, a numeral and its accompanying unit of measurement are connected with a hyphen: *a 4-kg sablefish*.

If the actual measurement or specification is not already metric, provide an approximate metric equivalent in parentheses after the nonmetric measurement: *a 17-ft (5.2-m) shark*.

Ratios involving two or more units of measure should be indicated by forward slashes: *100 m<sup>2</sup>/km<sup>2</sup>, 45,000 ng/g*, etc. Do not use negative exponents.

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<sup>15</sup> [http://pacoos.coas.oregonstate.edu/archive/woc\\_sgh\\_grsz2.zip](http://pacoos.coas.oregonstate.edu/archive/woc_sgh_grsz2.zip)

For Tech Memos, follow the capitalization rules found in the *Chicago Manual of Style* over those found in *Merriam-Webster's Collegiate Dictionary*. When in doubt, check with the Editor.

Some unit abbreviations are so common that they may be used without definition:

°C	degree Celsius	G	giga	mg	milligram
cm	centimeter	h	hour	mL	milliliter
°F	degree Fahrenheit	Hz	hertz	mm	millimeter
k	kilo	L	liter	min	minute
kg	kilogram	m	meter	s	second
km	kilometer	M	mega	V	volt
g	gram	μ	micro	W	watt

Others should be defined upon their first mention, including:

bp	boiling point	hp	horsepower	P	probability
Btu	British thermal unit	J	joule	pH	measure of acidity
cal	calorie	K	kelvin	ppm	parts per million
cg	centigram	kn	knot	rkm	river kilometer
d	deci	n	nano	SD	standard deviation
fth	fathom	N	newton	SE	standard error
ha	hectare	nm	nautical mile/ nanometer	t	metric ton

# Grammar and Punctuation

The Editor will check grammar and punctuation in your Tech Memo during the editing process. The fewer mistakes there are, however, the faster the edit will proceed. This section describes some common issues to bear in mind while drafting your manuscript.

If you have a question about a grammar or punctuation issue that isn't covered here, you can refer to the list of [Suggested Resources](#), or contact the Editor.

## Colons and Semicolons

Always use a colon before a list and between a title and its subtitle. You can also use a colon to introduce a long quotation. Capitalize the first word after a colon only if the material that follows stands alone as a sentence or is the subtitle of a publication.

Use a semicolon when the second of two clauses does not explain the first, or before a transitional expression (*however, thus* or *therefore, nevertheless*, etc.) that links them. Also use a semicolon to separate coordinate clauses (joined by *and, or, or but*) when they are long or when they contain commas.

Do not use a semicolon to separate publications in parenthetical citations. Use only commas: (*Jackson 2012, 2013, Smith et al. 2014*).

## Comparisons

When comparing two things in terms of their qualities, use the form *X is bigger/more significant than Y*. Do not use *X is bigger/more significant compared to Y*. If you want to use *compared to*, this is preferable: *Compared to Y, X is bigger/more significant*.

When comparing things in terms of quantity, remember that *more* is allowed for all nouns, but *less* and *fewer* depend on whether the noun itself can be counted:

There were more sharks than seals. (*Sharks* and *seals* are countable nouns.)  
We added more water to the tank. (*Water* is not countable and usually not pluralized.)

There were fewer seals than sharks. (*Fewer* is used with countable nouns.)  
Tank A has less water than Tank B. (*Less* is used with uncountable nouns.)

## Contractions

Scientific writing has a long tradition of avoiding contractions. Always write out the full forms of all verbs and negatives. The only acceptable use of an apostrophe is for possession.

## Dashes and Hyphens

There are three types of dashes: the hyphen (-), the en dash (–), and the em dash (—). All three can be created with simple keystrokes. To create a hyphen, press either of the **minus** keys (top row or number pad). To create an en dash, press **Ctrl** or **⌘** and the **number pad minus**. For an em dash, press **Ctrl-Alt-number pad minus** or **⌘-option-number pad minus**. Do not use two hyphens

(-- ) for an em dash. None of these dashes should ever have spaces around them. (In the mathematical expression  $5 - 3 = 2$ , the “dash” is not a dash or hyphen, but a minus sign, and is surrounded by spaces. See [Signs and Symbols](#).)

## En and em dashes

Hyphens are discussed separately below. The en dash replaces “from... to” or “through” to indicate an inclusive range of values: *5–8 April 2015*, etc. Uses for the em dash include: setting off an amplifying or explanatory element, showing a break in thought or a shift of tone—like this!— or creating a strong break in the structure of a sentence. Em dashes can be particularly useful in a sentence that is long and complex or has a number of commas within it. They may also be used in table cells to indicate that data are missing.

## Hyphens

Hyphenation is usually used to divide words at the end of a line, link certain compound words, or clarify two- and three-word modifiers. Because Tech Memo text is not justified, there is usually no need to hyphenate at the ends of lines. Hyphenation can be used sparingly in tables and figures.

Many questions arise about when to hyphenate compounds. This relates to the phrase’s part of speech. A phrase used as a noun is not normally hyphenated: *The charter boat sailed over the deep sea*. When these same phrases are adjectival, hyphens are necessary: *That charter-boat company offers spectacular deep-sea tours*. That said, some adjectival phrases are traditionally left unhyphenated (e.g., *sea surface temperature* or *whale watching tours*).

Some hyphenated phrases actually require en dashes instead of hyphens. This happens when the two words are joined, but do not modify each other. In the phrase *a deep-sea tour*, the first word in the compound modifies the second: the *sea* is *deep*. Use a hyphen here. However, in a phrase like *the octanol–water partitioning coefficient*, the first word in the compound is independent from the second: the *water* is not *octanol*. The same goes for *the U.S.–Mexico border*. In such phrases, use an en dash.

The modern tendency is to eliminate the hyphen between prefixes and roots unless the root is a proper noun. For example, write *nonnative*, *preadult*, *coauthor*, and *reexamine*, but *non-U.S.* When combining prefixes with root words, hyphens help the reader distinguish when the combined form means something different than an already existing form (e.g., use *re-cover* when you mean “to cover again,” and *recover* for “get something back” or “get over an illness”).

Some other common hyphen-related issues:

- Do not hyphenate a two-word unit modifier when the first element is an adverb ending in *-ly*, as in *naturally produced stock*.
- Sometimes it is necessary to use hyphenated combinations of letters and numbers (e.g., chemical congeners like *PCB-52*, or killer whales like *L-112*). When these appear in a list, they may break improperly across lines: *the two antiestrogenic compounds PCB-138 and -180*. During layout, this can be corrected using nonbreaking hyphens.

- Avoid hyphenating proper nouns unless they are unusually long and not breaking them would leave an inordinate space at the end of a line or when space is crucial (e.g., table column headings). If proper names must be broken, they should be divided syllabically; use a dictionary as your guide.
- Terms such as *2–4 day old eggs* are ambiguous. Do you mean an undetermined number of eggs that are two to four days old, or two to four eggs that are each just one day old? Following are examples of clear usage and the proper placement of hyphens.

Eggs were 1 day old.  
 We found 20 1-day-old eggs.  
 Eggs were determined to be 11–14 days old.  
 We found some 11- to 14-day-old eggs.  
 We found 50–100 1-day-old eggs.  
 Age-1 walleye Pollock....  
 We used 100 m of line.  
 We used 100-m line.

## Lay vs. Lie

This is enough of an issue that a brief reminder seems warranted. When authors need to refer to the action of resting on the back, side, or belly, these verbs are often confused. There is a strict grammatical difference, however. *Lay* is transitive: it always takes an object. Think of it as a gentler synonym for *put down* or even *drop*: *The mother is laying her child in the crib. Fish lay eggs.* As a transitive verb, *lay* can be used in the passive voice: *Over 12,000 eggs were laid in the nesting colony.*

*Lie* is intransitive: no object is required. It is often used with a preposition or prepositional phrase: *The tired child is lying down. Dogs lie on their sides.* Because *lie* is intransitive, it cannot be used in the passive voice.

The conjugations of these verbs are easily confused. Here is a table of forms:

	Present	Present participle	Past	Past participle
<b>Lay</b>	lay(s)	laying	laid	laid
<b>Lie</b>	lie(s)	lying	lay	lain

Note also that *lay* forms compounds such as *lay out* (e.g., graphic elements on a web page) and *overlay*. These compounds conjugate in the same way: *were laid out, have been overlaid, etc.*

## Parallel Constructions

For effective and elegant writing, groups of equally important ideas should be presented using parallel constructions. Each element within a parallel construction matches the others in terms of both structure (words are paired with other words, phrases with phrases, and clauses with clauses) and grammatical function (nouns are paired with other nouns, adjectives with adjectives, and verbs with verbs).

Nonparallel constructions are most noticeable in a sequence of three or more items when one stands out as different from the others, resulting in an awkward and jarring delivery.

*Awkward:* Orcas were taught to jump, splash visitors, pose on platforms, and fed a diet of frozen, dead fish. (*Fed* is not an infinitive verb like the others in the series.)

*Parallel:* Orcas learned to jump, splash visitors, pose on platforms, and subsist on a diet of frozen, dead fish.

*Awkward:* Samples were collected in the Straits of Juan de Fuca, Georgia and Puget Sound. (*Puget Sound* is not a strait.)

*Parallel:* Samples were collected in Puget Sound and the Straits of Georgia and Juan de Fuca.

Note that, when used properly, parallel constructions also allow some redundant words to be omitted (i.e., *to* in the first example, and *in* and *the Straits of* in the second).

Certain pairs of terms always require parallel constructions, including: *either-or*, *neither-nor*, *both-and*, *not only-but (also)*, and *if-then*. In these cases, be careful about the placement of the first term of the pair. For example:

Concerns have been raised over the effects of exposure, both because of the worldwide use of fossil fuels, and the occurrence of oil spills.

The phrase *because of* should be moved in front of the word *both*, as *the occurrence of oil spills* is also a cause of exposure.

More details and examples can be found in the *Chicago Manual of Style*.

## Possessives

To form the possessive of a singular noun or phrase, no matter what letter it ends with, add 's: *Amy's report*; *James's book*; *NMFS's policy*; *the Northwest Fisheries Science Center's library*.

To form the possessive of a plural noun or phrase, add 's unless it already ends in s; then just add an apostrophe: *the children's toys*; *an authors' checklist*.

## Sentence Structure

Sentence fragments should be avoided in scientific writing, except when saving space in tables and figures. Bulleted lists, procedural outlines, etc., contained in body text should be written in complete sentences.

Complete sentences always contain, at the very least, one main verb. They also contain all necessary articles, prepositions, helping verbs, punctuation, etc.

*Fragmentary:*

- b. Convert grid point layer to raster
  - i. If not already there add a Point\_ID column to attribute table
    1. Make as long integer
    2. Field calculator Point\_ID=FID+1

*Complete:*

- b. Convert the grid point layer to a raster image.
  - i. If it is not already there, add a Point\_ID column to the attribute table:
    1. Make it a long integer.
    2. In the Field calculator, set the Point\_ID to FID + 1.

## Spaces

Your report will be typeset using proportional fonts. As such, there will be one space between sentences. If you have an unbreakable habit of typing with two spaces, feel free to continue this way. Simply run a global search-and-replace before submitting your manuscript. To do so, press **Ctrl-H** or **⌘-Shift-H**. Next to **Find what** (or, on Mac, **Search Document**), type two spaces. Next to **Replace with**, type a single space. Then click **Replace All**. You may need to repeat this procedure more than once, until the number of replacements is zero.

Scientific writing uses a large number of very small words, symbols, etc., many of which shouldn't be broken at the ends of lines or pages. Initials (A. E. Smith), Latin expressions (et al.), short mathematical notations ( $P < 0.01$ ), etc., should all be created using nonbreaking spaces. Simply use **Ctrl-Shift-space** (on both PC and Mac), and these expressions will wrap around lines and pages as if they are single words.

# Legal Requirements

NWFSC Technical Memorandums and Processed Reports are federal government publications governed by the NWFSC policy on Fundamental Research Communications. As such, they undergo a stringent review process with evaluations by internal (and possibly external) reviewers, the Division Director, the Technical Editor, and the Deputy Science Director. Some of these reviews are designed to help ensure that these reports comply with certain legal requirements, including those outlined in Section 508 of the Rehabilitation Act of 1973. This section describes some of the most common.

If you have a question about a legal issue that isn't covered here, please contact the Editor.

## Accessibility

NOAA Technical Memorandums are the official publications of a government agency, so they must meet the requirements of [Section 508](#)<sup>16</sup> of the federal Rehabilitation Act. To comply, all documents posted to the Internet (and to the Center's Intranet) must be prepared in such a way that users with disabilities (e.g., blindness, inability to operate a computer with their hands, etc.) can access their content through assistive technology. For example, all figures—charts, graphs, diagrams, maps, etc.—must be accompanied by alternative text descriptions. Since Word has accessibility features that are convertible into PDF, Word is the preferred application for drafting Tech Memos. For NWFSC policy documents on accessibility, see [Accessibility Tools](#).<sup>17</sup>

Note: Many of the steps required to make a PDF accessible can only be performed once the document has been completely edited and laid out. As such, this is generally the last step of the production process prior to actual publication. It can be very time-consuming, especially if your report contains a lot of tables. (Tables are very difficult to format.) The Editor will give you a rough estimate of how long the process should take.

## Alternative Text

The images included with Tech Memos (photographs, Excel charts, maps, equations and chemical structures drawn in external applications, etc.) must be tagged with alternative text descriptions. If a table is included as an image file, it must be tagged, as well. Alt-text is used by screen reading software to make the content of images accessible to people who cannot see it, as well as by voice input software to assist those who can't use their hands.

The most comprehensive advice about alt-text is in the [Social Security Administration Guide](#).<sup>18</sup>

Not every image requires alt-text. The *SSA Guide* identifies three main types of images: informative, redundant, and decorative. *Informative* images present important information not conveyed in the adjacent text. Alt-text is required for informative images. *Redundant* images contain information that is duplicated in the adjacent text or contained in the caption. Alt-text is usually avoided when redundant, as accessibility users shouldn't have to listen to the same

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<sup>16</sup> <https://www.section508.gov/>

<sup>17</sup> [https://inside.nwfsc.noaa.gov/computers/web/webpolicies/accessibility\\_tools.cfm](https://inside.nwfsc.noaa.gov/computers/web/webpolicies/accessibility_tools.cfm)

<sup>18</sup> [https://www.ssa.gov/accessibility/files/SSA\\_Alternative\\_Text\\_Guide.pdf](https://www.ssa.gov/accessibility/files/SSA_Alternative_Text_Guide.pdf)

information twice. Any information not conveyed in the surrounding text, however, must still be supplied in alt-text. *Decorative* images contain no information necessary for the comprehension of the document’s content, so alt-text should not be added to them.

## Providing alt-text

We recommend including alt-text descriptions together with the figure captions within the body of your manuscript (see [Formatting figures](#)). Alternatively, you can type them up into a separate document—just be sure to clearly indicate which figure each description is meant to apply to. The Editor will tag the images with the alt-text during layout.

## Writing alt-text

The *SSA Guide* presents very detailed explanations of how to write alt-text, including good and bad examples. Please refer to it for guidance. Here, we summarize the most important points.

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2. *Do not provide irrelevant details.* If you are writing alt-text for a picture of a scientist holding a rockfish, the background of the picture may be unimportant. She could be holding the fish on a boat, in a lab, or anywhere else. Unless the location is helpful to understanding the purpose of the image, you don’t need to describe it.
3. *Do not repeat body text verbatim.* The body text and caption will be read by assistive technology. If everything important about an image has already been mentioned in the caption and/or discussed in the body, you can simply say something like “This image is described in the caption,” or “Bar chart, as described in text.”
4. *If there is text in an image, repeat it verbatim.* Text in images is “invisible” to a screen reader, so it must be quoted in alt-text. If the image is only text, simply copy it word-for-word as alt-text.
5. *Combine separate images into one when they are visually and logically presented as such* (e.g., a flow chart or hierarchy diagram). Even if the image is made up of separate files, write only a single description of the entire image.
6. *Supply the major trends and/or data points highlighted in charts, diagrams, etc.* Do not repeat every data point individually; summarize only the most important information.
7. *Keep your description short and meaningful.* There are no specific limits on text length, but the *SSA Guide* recommends keeping the description to approximately 160 characters. (This limit does not apply when copying image text as per recommendation 4.)

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