

Susitna-Watana Hydroelectric Project Document

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Style Guide Version 5

Style Guide for Licensing Documents

Susitna- Watana Hydroelectric Project (FERC No. 14241)

Prepared for

Alaska Energy Authority

Prepared by

MWH Americas, Inc. & Long View Associates, Inc.

December 2012

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1. PURPOSE AND USE OF THIS STYLE GUIDE

This style guide is intended to provide a simple, straightforward reference for authors and contributors to the Proposed and Revised Study plans, Initial and Updated Study reports, the Draft and Final License Applications, and other documents that will be generated as part of the licensing of the Susitna-Watana Hydroelectric Project, FERC No. 14241 (Project) licensing process. The objectives of having this style guide are to maximize clarity of materials for readers, avoid inconsistencies in substance and format, and streamline the document synthesis and technical editing processes. This style guide therefore includes facts and other Project-related information that will commonly be used in the licensing documents. It will also provide guidance for authors on terminology and proper names, acronyms and abbreviations, certain specific punctuation and wording conventions to be followed for editorial consistency, and document format aspects such as section headings, headers/footers, document dating convention, table styles, etc. Not included is any guidance related to basic grammar or stylistic aspects of writing; useful references for that type of guidance include the Chicago Manual of Style (15th ed., 2003) and The Elements of Style (3rd ed., 1979), by W. Strunk, Jr., and E.B. White.

Because this is a new project that is still in the early planning stages, it is expected that Project information will be changing, so special consideration needs to be given to characterizing facilities and operations. However, so some basic terminology and project facts are included herein.

The guidance in this document is organized into three main sections, as follows:

- Purpose and Use of This Style Guide
- Project Information and Usage Conventions
 - Names of Project Features and related information
 - Names of Geographic Features
 - Acronyms and Abbreviations
 - Wording, Spelling, and Punctuation Conventions
- Document Style and Format
 - Primary Document Components
 - Document Date and Filename Conventions
 - Tables and Figures

2. PROJECT INFORMATION

2.1. Project Description

Because the proposed project is under development, a set description of the proposed project is not provided in the style guide. Authors should refer to the most recent published FERC filings. As of this writing (December, 2012), Section 1 of the Revised Study Plan (RSP) contains up-to-date descriptions of the Project, its location, maps, and key project features. Authors are responsible for verifying that project descriptions used in their documents are up to date.

2.1.1. Project History

A Susitna Hydroelectric Project was formerly proposed by the Alaska Power Authority (now AEA) in the early 1980s (FERC No. 7114). That Project (which should be referred to as the “APA Project”) was to be composed of two major dams (the Watana Dam and Devils Canyon Dam) constructed in three stages, although it was never licensed or built. A draft Environmental Impact Statement was prepared by FERC but development efforts were halted in 1986 because of a significant reduction in oil prices leading to a drop in State revenue and discovery of large quantities of low cost stranded gas in the Cook Inlet area. The currently proposed Susitna-Watana Project dam is located at the same location as the APA Project’s Watana Dam site, although it is smaller and the project does not include a Devils Canyon development. The Project would provide energy to the Railbelt region of Alaska. The Railbelt region is generally defined as the service areas of six regulated public utilities, including: Anchorage Municipal Light & Power (ML&P), Chugach Electric Association (Chugach), Golden Valley Electric Association (GVEA), Homer Electric Association (HEA), Matanuska Electric Association (MEA), and the City of Seward Electrical System (SES). The Railbelt region contains the majority of the State population and economic activity.

2.2. Names of Project Features

Full names and alternate/abbreviated names (if any) of Project features as they should be used in licensing documents are as follows (please note capitalization):

- Susitna-Watana Hydroelectric Project (FERC No.14241), “Susitna-Watana Project” or “the Project”
- APA Project (e.g., the 1980s project; *not*, “Su-Hydro Project”)
- Watana Dam site, or “the Project dam site”
- Watana Reservoir
- Watana Camp
- Susitna-Watana Transmission Line
- Susitna-Watana Road
- Project area
- Project vicinity

- Susitna river system
- Susitna River

Table 2.2-1. Susitna River Segment and Basin Capitalization.

Correct ¹	Definition ²	Incorrect
Upper Susitna River Segment	Susitna River (RM 184-248)	upper Susitna River segment
Upper Susitna River, Upper River (when referring to this defined segment)		upper Susitna River reach upper river
Middle Susitna River Segment	Susitna River (RM 98 - 184)	middle Susitna River segment
Middle Susitna River, Middle River (when referring to this defined segment)		middle Susitna River reach middle river
Lower Susitna River Segment	Susitna River (RM 0-98)	lower Susitna River segment
Lower Susitna River, Lower River (when referring to this defined segment)		lower Susitna River reach lower river
Upper Susitna River Basin Upper Basin		upper Susitna River basin upper basin
Middle Susitna River Basin Middle Basin		middle Susitna River basin middle basin
Lower Susitna River Basin Lower Basin		lower Susitna River basin lower basin
Susitna River Basin		Susitna River basin

- Devils Canyon (not Devil's or Devil)
- Three Rivers Confluence (not 3 rivers, 3 Rivers confluence, Talkeetna confluence with Chulitna River)
- Geomorphic Reach MR-1 (as example – not Geomorphic Reach MR1, MR2, etc)
- Focus Area (not focus area)
- Proposed Focus Area (not candidate Focus Area).

KIRBY – ADD PROJECT FEATURES with Wayne's input?

2.3. Names of Geographic Features

Guidelines regarding the use of names of geographic features to be followed in all licensing documents are listed below. This list may be supplemented in future updates of this style guide to provide additional specific names or clarifications, as needed.

- In general, use only the official geographic names shown on USGS maps.
- Capitalize the entire official name for a feature as shown on USGS maps.

¹ Refer to Appendix 5 of this Style Guide for mainstem habitat classification guidance (and "reach" versus "segment")

² The 1980 APA Project studies defined these portions of the river differently than the current Project.

- Do not capitalize any additional descriptive words that are not part of the official name. Similarly, geographic units that are not specifically labeled on USGS maps should not be capitalized.
- When referring to a “subbasin” or “subwatershed” that is not an official designation, it should be used only in the context of discussing the larger drainage area; otherwise, eliminate the “sub” prefix.
- In general, always use the full, official name for geographic features. In situations where this may become cumbersome, a shorthand form of the name may be used. In such cases, the first use of the shorthand form should be given in parentheses following the full, official name.
- When grouping the names of multiple features of a similar type in a sentence, do not capitalize the plural words (again, unless it is shown under a combined name on the USGS map). By way of illustration, the following would all be correct:
 - upper Susitna and McLaren rivers
 - Chulitna and Susitna rivers
 - Watana and Devils canyons
 - Watana Canyon and Devils Canyon

2.4. Acronyms and Abbreviations

Acronyms and abbreviations will typically be used throughout almost any licensing document. The convention to be followed for use of acronyms and abbreviations is that the first use of the acronym/abbreviation should be given in parentheses following the first use of the term being abbreviated, e.g., Alaska Department of Fish and Game (ADF&G). Subsequent uses should all be the acronym/abbreviation, e.g., ADF&G. Various terms and their corresponding acronyms or abbreviations that are acceptable for use in the licensing documents are provided in the following lists. Also noted are some terms that should not be abbreviated.

2.4.1. Scientific and Research Terminology

(see Appendix 2, List of Acronyms and Scientific Labels)

2.4.2. Agencies, Tribes, and Other Entities

(see Appendix 2, List of Acronyms and Scientific Labels)

2.4.3. Acts, Policies, Plans, and Documents

(see Appendix 2, List of Acronyms and Scientific Labels)

2.4.4. Engineering and Environmental Terms

(see Appendix 2, List of Acronyms and Scientific Labels)

2.4.5. Use of English vs. Metric System

English system measurements will be used as the default throughout the licensing documents. Any data or information cited in English units does not need to be accompanied by the metric equivalent. For any field data collected in metric units, or data from other sources reported in metric, the data may be cited in the licensing document as metric, followed by the English equivalent in parentheses. Thus, the following examples are all correct for the purposes of the licensing documents:

- 25 feet
- 25°C (77°F)
- 80 miles
- 6 Rkm (3.7 RM)

2.5. Wording, Numeric, and Punctuation Conventions

In general, other than standard correct usage, there are no particular wording, spelling, or punctuation conventions that need to be followed in the licensing documents. However, there are a few common types of uses for which specific conventions are requested to help limit the amount of time required for consistency-related technical editing of these documents. These are as follows:

2.5.1. Wording

Affect vs. effect. As a verb, “affect” means “to change or influence.” “Effect” means “bring about.” Before you use “affect,” try to find a more specific word, such as “negatively affect,” “delay,” “reduce,” “enhance,” “improve,” “speed up,” etc. Rarely is there a need to use “effect” as a verb. “Effect” is most commonly used as a noun (“...to have an effect”). Again, it is better to specify the effect rather than use this general word.

Comparisons. “More,” “greater,” “less,” and “fewer” imply a comparison with another item; a sentence that includes any of these words should also include “than” and the item to which the comparison is being made. Note: many –er words are comparison words and require “than.”

“e.g.,” means “for example” or “such as”; “i.e.,” means “that is” or “in other words.” Follow each with a comma.

Majority vs. most/few vs. less. Use “a majority” only for items that can be counted (votes, buildings, Europeans, days); use “most” for items considered as an aggregate (sand, groundwater, time [without units]). Similarly, use “few” and “fewer” for countable items, and “less” and “lesser” for those not counted (e.g., less water, fewer bears).

Capitalization. Capitalize federal or state only when used as part of an official agency name or in government documents where these terms represent an official name. If they are being used

as general terms, use lowercase letters. Capitalize the formal name of a government entity such as the Municipality of Anchorage or the entity's shortened form ("the Municipality") when the word is standing in for the formal name. Avoid capitalizing "city" or "municipal" when used as an adjective (e.g. municipal permits, city leaders).

Passive language. Activities don't just happen—people *do* things. For example, "A review was performed" doesn't tell the reader who performed the review, so the reader has nowhere to go if he/she has questions. In other words, your report is giving the reader less information than he/she may need and no way to get the information. However, "the team performed a review" points the reader in the right direction for further information.

"Sexist" words and pronouns: Try to avoid using gender-specific terms and pronouns where not needed. For example:

- Use "angler" instead of "fisherman."
- Use "artificial" instead of "manmade."
 - Recast sentences to avoid using gender-specific pronouns (better than using combined pronouns such as "he/she"), for example, by changing the subject from singular to plural or changing the verb from active to passive:
 - Change "The traveler should always double-check to make sure he has packed the essentials," to "Travelers should always double-check to make sure they have packed the essentials."
 - Change "A college professor typically receives tenure after he/she completes an initial 'trial' period," to "A college professor typically receives tenure after completing an initial 'trial' period."

Pronoun agreement for organizations: An agency, organization, or similar entity is an "it" not a "they" (e.g., "The USFS has indicated it is in favor of the proposed measure.")

2.5.2. Punctuation

- Commas, periods, semicolons, etc. reside within quotations.
- Use a comma before the and in a series: "...this, that, and the other."
- Use a semicolon in a list if part of the list has "and" in it: "ham; peanut butter and jelly; and cheese sandwiches." Use colons and dashes sparingly, if at all.

2.5.2.1. Use of Hyphens and Dashes:

An **"en dash"** (– /shortcut: ctrl + -) is used to denote ranges . Examples include:

- 2009–2011
- 8–32 feet in height

An **"em dash"** (— /shortcut: ctrl + alt + -) is used to set off a phrase within a sentence for emphasis. If no emphasis is needed, commas or parentheses are usually more appropriate. For example: "Activities just don't happen—people *do* things."

Multiple-word unit modifiers:

Multiple-word unit modifiers should be hyphenated if it helps to clarify the meaning or to improve readability; for example:

- a 5- to 10-m-thick layer of gravel
- three-hole punch
- non-gold-bearing rock
- civil-service employee
- blue-green-stained surface

There is a no need to hyphenate a multiple-word unit modifier if it does not aid readability or if the meaning is clear without the hyphenation (e.g., when the modifiers commonly go together). Examples include:

- Alaska state residents
- high school student
- Fourth of July parade
- rainbow trout habitat
- almost full reservoir

Multiple-word unit modifiers should not be hyphenated when one of the modifiers is an adverb ending in “ly”:

- poorly sorted gravel
- finely tuned operation
- gravely serious condition

Parallel construction. In a list of items separated by commas or in bullet form, ensure that each item in the list is constructed in the same way (e.g., in the same tense).

For the Project:

- AEA **will** produce a schedule. ✓
- The subconsultant **will** develop reports. ✓
- The subconsultant **will** write weekly progress reports. ✓
- Submittal of change orders occurs when necessary. ✗

The first three bullets follow the form “X will do Y” and are therefore parallel; the fourth changes from active to passive voice (who does the submitting, anyway?), and from future to present tense—no-no’s all around.

2.5.3. Numbering: Word vs. Numeral

2.5.3.1. Numbers:

- Always use numerals for quantities and measurements, according to the following conventions:

- Age, measurement, money, percentage, proportion, time, etc., are expressed in figures (e.g., 4 feet, 20 pounds, 8 days [i.e., a single time lapse], 4 weeks, 11:00 P.M.).
- Exceptions are for millennia, centuries or decades (e.g., “five decades”).
- Another exception is where the reference is to multiple increments of time (e.g., “three consecutive weeks;” “she attends meetings three days each week”).
- Spell out numbers one through nine in text, except for quantities and measurements. Use numerals for numbers 10 and up.
- Generally, use numerals for all numbers in tables.
- Use commas in numerals greater than 999 (1,000 and up).
- If a number is the first word of a sentence, spell it out; if it is a large number (thousands or millions), avoid placing it as the first word of a sentence. For numbers in the millions and higher, use the word “million” or “billion” in place of many zeroes (e.g., 23 million).
- It is acceptable to use a dollar sign (\$) ahead of numbers denoting currency instead of spelling out “dollars.” If you choose to spell out “dollars”, do so consistently within your document.

2.5.3.2. *Plurals:*

- The word *criteria* is plural; the singular form is *criterion*. *Data*, *media*, and *strata* are plural for *datum*, *medium*, and *stratum*. *Memoranda* and *phenomena* are the plurals of *memorandum* and *phenomenon*. Use the plural verb form with these words, e.g., “The *criteria are* long and complex”; “The *data are* poor”; “The *media are*...”; “The *strata are*...”
- Agenda, however, has become singular. Use “The agenda *is* coming to you via email.” Use appendices, indices, and matrices as the plurals of appendix, index, and matrix. Use radii and termini as plurals for radius and terminus.

Table 2.5-1. Commonly Troublesome Plurals.

Singular	Plural
Criterion	Criteria
Datum	Data
Medium	Media
Stratum	Strata
Memorandum	Memoranda
Phenomenon	Phenomena
Agenda	Agendas

- Make numbers (dates) and abbreviations plural without use of apostrophes: “1920s” and “VOCs” not “1920’s” and “VOC’s.”

- A company or city is singular—an “it,” not “they”: “The company’s slogan is that it is the consultant of choice,” not “The company’s slogan is that they are the company of choice.”
- For individual items or units, use words for numbers up to ten; then use numerals (e.g., “three houses”; 15 apartment buildings”).
- Exception: Do not start a sentence with a numeral; substitute the word (e.g., “Forty-seven homesteads were settled in this area by 1870.”)
- Use the same format (word or symbol) for similar types of items within a given paragraph (e.g., “The second sampling event yielded 3 sockeye salmon and 24 coho salmon within the first stream reach.”).
- Use of numerals in one sense does not preclude the use of words in another sense (and vice-versa) within a sentence or paragraph. For example, “Biologists observed three female bears and five pairs of nesting loons within 15 miles of the Project.”
- For ordinal numbers, use the word version for first through tenth. After that, use the numeric version (e.g., 11th, 22nd, etc.).

2.5.3.3. *Verb Agreement for Quantities*

Refer to a given quantity of anything in the singular, regardless of the unit of measure. In other words, a large volume of water expressed in gallons is not typically used in the sense of a collection of discrete 1-gallon volumes of water.

The following examples show correct verb agreement:

- “Of the total area of cultivated farmland, 45 acres is planted with corn.”
- “Approximately 2,000 gallons was unaccounted for; the missing water was presumed to have leaked from a fracture in the pipeline.”
- “Several parcels totaling 35 acres were sold to the same buyer.”

2.5.3.4. *Phone numbers*

Standard style for telephone numbers is (NNN) NNN-NNNN.

2.5.4. **Miscellaneous**

Stream gage. For this specific use, follow USGS convention and spell this term as stream “gage.” Use the more generic spelling “gauge” in all other uses (e.g., “gauge the distance” or “gauge the level of effort”).

Percent vs. %. Use the word rather than the symbol in the main body of the documents. In tables and figures, it is fine to use the symbol.

Temperature. Do not put any spaces between the value, the symbol, and the scale (e.g., 4°C, 55°F).

Time of day. Use lower case with a period after each letter; i.e., a.m. and p.m. Ideally, use “small caps” font so that it appears as A.M. and P.M., but this font change can also be left to the technical editing/formatting phase.

Date ranges. If using a dash, write out the full date at the beginning and end of the range; for example, the time period of 1998 through 1999 should be 1998–1999 (not 1998–99 or 98–99).

(see **RSP Section X.X**). When referring to other sections of the RSP. For example, text within the instream flow RSP would refer to Ice Processes as (Section 7.6).

(see **Section X.X.X.X**). When referring to subsections within the Instream Flow Study. For example, text within the instream flow RSP would refer to instream flow study methods as (Section 8.5.4.).

Refer to the Common Terminology and Style Corrections Table in Appendix 3 (RSP Light Editing Cheat Sheet) for additional common terminology and style issues.

3. DOCUMENT STYLE AND FORMAT

This section provides specific instructions and templates for formatting Susitna-Watana Project licensing documents.

3.1. Primary Document Components

The components and formatting of the licensing documents are briefly outlined below.

3.1.1. Title Page

Document title. Use the format shown on the template.

Authorship. (Note that AEA will be identified as the author of the PSP, and other primary licensing documents). Study reports and similar documents will be shown as authored by study researcher(s).

Date. Should be current for each new version circulated.

3.1.2. Table of Contents

- Table of contents of main document, shown to Level 3 of headings/subheadings.
- Lists of appendices, tables, and figures.
- Times 12 pt, 6pt space after.

Note: Unformatted drafts do not need to include a table of contents; this can be generated during the technical editing/formatting phase.

3.1.3. Headings and Subheadings

- Use title-style capitalization (see headings in this document, for example).
- Outline format, font, and paragraph style:

1. LEVEL 1 HEADING (ARIAL, 14 PT, ALL CAPS, 0.5-INCH INDENT/HANGING)

1.1. Level 2 Heading (Arial Bold, 14 pt, 0.6-inch hanging indent/tab)

1.1.1. Level 3 Heading (Arial Bold, 12 pt, 0.7-inch indent/hanging)

1.1.1.1. Level 4 Heading (Arial Italic, 12 pt, 0.8 inch hanging indent/tab)

1.1.1.1.1. Level 5 Heading (Arial Italic, 11 pt, 0.9-inch hanging indent/tab)

1.1.1.1.1.1. Level 6 Heading (Times New Roman Bold, 12 pt, 1-inch hanging indent/Tab)

1.1.1.1.1.1.1. Level 7 Heading (Times New Roman Bold Italic, 12 pt, 1.1-inch indent/hanging)

- All headings are preceded by a “Normal” style carriage return.
- All headings are followed by a 12pt line width space.

3.1.4. Main Body Text

Note: Authors do not need to use the font or paragraph styles shown in the accompanying template, but the outline numbering as shown above and in the template should be followed, even on simple, unformatted drafts.

- **Font:** Times New Roman, 12 pt.
- Left justify, no indent on first line.
- A full hard return between paragraphs.

Note: For document consistency, double-spacing between sentences is preferred (but not critical; i.e., do not bother if it would require unlearning your typing habits).

3.1.5. Bulleted Lists

- Bullet styles as shown in this document and on template.
- Punctuation:
 - Simple lists do not require a period, comma, or semicolon at end of individual items.
 - The third level bullet character is a small dot
 - Like this
 - Punctuate bulleted items that are full sentences (use period at end).

3.1.6. Numbered Lists

- Use numbered lists when order or numbering of items is meaningful.
- Otherwise, use bullets.

3.1.7. Title, Headers and Footers

- Full name of document, centered, goes at beginning of first page of study plan, report, or similar document. (Omitted on larger documents such as license application.)
- Name of document goes in header, at left (except on first page, if title is shown (e.g., for study plan)).
- Project name/number, licensee, and document date (Month Year) go in footer.
 - Document date for internal drafts should read “AEA Review Draft: [date]”
 - Document date for final version should read “[Month][Year]”

Titles. Put titles for books, periodicals, reports, and technical journals in *italics*; don’t underscore them. Put titles of articles, book chapters, and professional papers in quotation marks. When referring to a part of a document, simply use initial capitals (as in headings). If this is not sufficient identification, add “Subsection 3.5,” or “Appendix D,” before the title to clarify the reference.

3.1.8. References

Citations. Include in-line reference citations in text wherever appropriate. In-line citations are set off in parentheses, with no commas between author(s) and date: “...text text text (HDR Alaska, Inc. 2007).” (See other examples shown below in Table 3.1-1.)

List of references. In the References section of the document, the standard citation is author-date-title-publisher-city.

- Only include references that are cited in the document.
- For multiple listings by same author(s), organize chronologically.
- Where an agency/organization is identified as the author, the first listing in the references should be spelled out in full, followed by the appropriate acronym/abbreviation in parentheses. Subsequent listings should then just use the acronym/abbreviation.
 - The format to be used is shown in Table 3.1-1 and in the accompanying template. The specified format is borrowed/modified from the Chicago Manual of Style (15th Edition) author-date system format, with slight simplifications for some types of citations. Note capitalization and italicization conventions.
 - For the authors’ names, use full first names or just the initials, according to how the names are shown on the source document.

An exception to the standard format is when documents on the Internet, are cited as follows:

Strunk Jr., William, and E.B. White. 1979. *The Elements of Style*. MacMillian Publishing Co., New York.

Alaska Department of Transportation and Public Facilities. March 2006. "East Dowling Road Extension and Reconstruction Project: Scoping and Public Involvement Plan." Published on-line at www.eastdowling.com/reports.htm. Accessed 11/6/07.

Note: Word will automatically turn any Web address into a hyperlink, which means blue text and underlining that does not translate well in a printed document. To remove the hyperlink, highlight the hyperlink, right click, and select "remove hyperlink."

Table 3.1-1. Examples of in-line reference citations and reference list styles to be used for the Susitna-Watana Project licensing documents (modified after Chicago Manual of Style, 15th Edition, University of Chicago Press, 2003).

In-Line Citation	Reference List Format
Books with one author	
(Doniger 1999)	Doniger, Wendy. 1999. <i>Splitting the difference</i> . University of Chicago Press. Chicago.
Book with two authors	
(Cowlshaw and Dunbar 2000)	Cowlshaw, Guy, and Robin Dunbar. 2000. <i>Primate conservation biology</i> . University of Chicago Press. Chicago.
Book with more than three authors	
(Laumann et al. 1994)	Laumann, Edward O., John H. Gagnon, Robert T. Michael, and Stuart Michaels. 1994. <i>The social organization of sexuality: Sexual practices in the United States</i> . University of Chicago Press. Chicago.
Editor, translator, or compiler	
(Lattimore 1951)	Lattimore, Richmond, trans. 1951. <i>The Iliad of Homer</i> . University of Chicago Press. Chicago.
Chapter or other part of a book	
(Twaddell 1957)	Twaddell, W. Freeman. 1957. A note on Old High German umlaut. In <i>Readings in linguistics I: The development of descriptive linguistics in America, 1925–1956</i> . 4th ed. Edited by Martin Joos. University of Chicago Press. Chicago. pp 85–87.
Chapter of an edited volume originally published elsewhere (common for primary sources)	
(Cicero 1986)	Cicero, Quintus Tullius. 1986. Handbook on canvassing for the consulship. In <i>Rome: Late republic and principate</i> , edited by Walter Emil Kaegi Jr. and Peter White. Vol. 2 of University of Chicago readings in western civilization, edited by John Boyer and Julius Kirshner. University of Chicago Press. Chicago. Originally published in Evelyn S. Shuckburgh, trans., <i>The letters of Cicero</i> , vol. 1 (London: George Bell & Sons, 1908). p. 33.
Preface, foreword, introduction, and similar parts of a book	
(Rieger 1974)	Rieger, James. 1974. Introduction to <i>Frankenstein, or The modern Prometheus</i> , by Mary Wollstonecraft Shelley. University of Chicago Press. Chicago.
Book published in both printed and electronic forms	
(Kurland and Lerner 1987)	Kurland, Philip B., and Ralph Lerner, eds. 1987. <i>The Founders' Constitution</i> . Chicago: University of Chicago Press. Also available online at http://press-pubs.uchicago.edu/founders/ and as a CD-ROM.
Journal / Manuscript article	
(Smith 1998)	Smith, John Maynard. 1998. The origin of altruism. <i>Nature</i> 393: 639–40.
Article in an electronic journal	
(Hlatky et al. 2002)	Hlatky, Mark A., Derek Boothroyd, Eric Vittinghoff, Penny Sharp, and Mary A. Whooley. 2002. Quality-of-life and depressive symptoms in postmenopausal women after receiving hormone therapy: Results from the Heart and Estrogen/Progestin Replacement Study (HERS) trial. <i>Journal of the American Medical Association</i> 287, no. 5 (February 6), http://jama.ama-assn.org/issues/v287n5/full/joc10108.html#aainfo .

In-Line Citation	Reference List Format
Theses and dissertations	
(Amundin 1991)	Amundin, M. 1991. Click repetition rate patterns in communicative sounds from the harbour porpoise, <i>Phocoena phocoena</i> . Ph.D. diss., Stockholm University.
Paper presented at a meeting or conference	
(Doyle 2002)	Doyle, Brian. 2002. Howling like dogs: Metaphorical language in Psalm 59. Paper presented at the annual international meeting for the Society of Biblical Literature, June 19–22, 2002, in Berlin, Germany.
Memorandum	
(Smith 2005)	Smith, Jane. 2003. Memorandum to Dan Foster (Superintendent, Wilcox State Park) regarding explanation of proposed changes to work plan for completion of the Hayley Campground addition. TerraNova Construction. Fort Worth, Texas. January 18, 2003.
Government publication	
(USFS 1989)	USDA Forest Service (USFS). 1989. Land and resource management plans: Ochoco National Forest and Crooked River National Grassland. U.S. Department of Agriculture, Forest Service, Ochoco National Forest. Prineville, Oregon.
Personal communications	
In-line citation in text: (J. Doe, affiliation/title, personal communication, October 31, 2002). (No need to include personal communications in list of references)	

3.2. Document Date and Filename Conventions

The conventions that should be followed for dating documents and naming files are as follows:

- Provide the date of the current version on the cover page.
- In the footer, note whether the document is a draft or final document (being more descriptive is fine; e.g., “AEA Review Draft”), and note the date of the document version.
- For each version of a document issued, include in the filename the following, in order (example filename: “pad-terrestrial-sec1_2008-1001-draft.doc”):
 - Document name or abbreviated description
 - word “draft” or “final,” as appropriate
 - Date of that version with the year first
 - Use only underscores and hyphens to separate the sections. Do not use capitals.
- Be sure dates are updated for each new version (paper and filename).

3.3. Tables and Figures

The basic format for tables and figures to be used in the licensing documents is outlined in this section and shown in the accompanying template. Other considerations for authors are also listed below.

3.3.1. Style/Format

3.3.1.1. Tables

- Tables are to be numbered unique to each second level section, thus the first table of a particular section is X.X-1, and so on.
- Captions: Use Word's built-in caption style: Times New Roman Bold, 9 pt. font. Place the caption above the table.
- Table entries: Arial Narrow, 10 pt.
- Column headings: Arial Narrow 10 pt. bold. Justify headings according to what looks best (centered or left justified).
- Borders: all 0.5pt lines.
- Size and alignment: Tables should be 6.5 inches wide for portrait and 9.5 inches for landscape (i.e., width of left/right margins when page is turned landscape). Landscape orientation is fine if necessary to legibly display data. For tables wider than 4.5 inches, center-align. For smaller tables, left-align.
 - Apply "Repeat as a header row at the top of each page" to the header row so that it will appear at the top of the part of the table that appears on each page.
 - Add two blank paragraph spaces following tables.
- Footnotes may be added below a table as shown in Table 3.3-1.

Table 3.3-1. (Example, formatted figure caption.)

Column Heading (Arial Narrow, Bold, centered, 10 pt font) ¹	Column Heading (Arial Narrow, Bold, centered, 10 pt font) ¹	Column Heading (Arial Narrow, Bold, centered, 10 pt font) ¹	Column Heading (Arial Narrow, Bold, centered, 10 pt font) ¹
Content (Arial Narrow, 10 pt font)	Cell margins (Options): 0.03 vertical, 0.06 horizontal	Deselect "automatically resize to fit" (Options)	

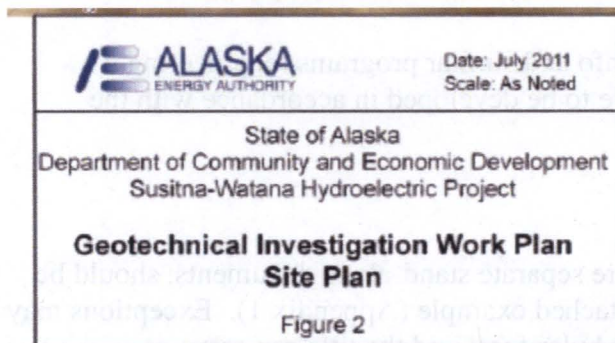
Notes:

- ¹ Format notes referring to footnoted material in the table as shown here.

3.3.1.2. Figures

- Figures are to be numbered unique to each second level section, thus first figure of a particular section is X.X-1, and so on. Standard legend block is shown below, to be placed in lower right corner if possible.

- For labels, use bold Times New Roman, 9 pt. font.
- Captions use Word's built-in caption style: Times New Roman Bold, 9 pt. font. Place the caption below the figure.
- Make sure any color graphic used in a table/figure is visible if printed in black & white or gray scale.
- Other map legend boxes can be used to show thematic map color code indices, etc.
- North Arrow and scale can be labeled in lower map, right side.
- Add two blank paragraph spaces following figures



3.3.2. Numbering Convention

- **Short documents:** a simple sequence of 1 through n for tables and figures is fine.
- **Longer documents:** restart numbering after each Level 2 section heading
- Make sure the table/figure call-out in the text matches the appropriate table/figure.
- Captions may be provided separately, but make sure that full captions are provided for each table/figure, and that it is clear which caption goes with which table/figure.

3.3.3. Placement

- For first draft submittals, provide each (numbered) figure and table at the back of the document or in a separate file(s), for the purposes of initial technical/content editing. Tables and figures will be placed during subsequent formatting and pagination.
- Placement of figures and tables in final document will be as shown in the template; specifically:
 - **Tables:** Tables should fit between margins. For larger tables, the table may extend slightly beyond the margins, if necessary. Tables may fit landscape under special circumstances. Smaller tables will be left-justified.
 - **Figures.** Figures will be placed left-justified in the final document.

3.3.4. Graphic File Types

- Provide all figures as separate files with first draft.

- Preferred file types:
 - jpeg
 - tiff
 - anything imported into a Word document: wmf, emf, or png.
- Not preferred but acceptable:
 - pdf (not from scanned documents, though)
 - ai/eps
 - pict

Graphics generated in AutoCAD, ArcView, ArcInfo and similar programs (engineering designs/drawings, plan views, schematics, etc.) are to be developed in accordance with the Susitna-Watana Project GIS teamlet standards....

3.4. Appendices

Appendices to licensing documents, where they are separate stand-alone documents, should be preceded with a cover page as illustrated in the attached example (Appendix 1). Exceptions may be made where the entirety of the appendix is in tabular form and the title can serve as effectively as the table caption. Arial 14 pt style is used, using all capital letters for the appendix title. The appendix number is followed by the title. Retain the header as provided for in this style guide, and modify the footer as follows:

- The page number is omitted from the cover page of the appendix
- Page numbers on subsequent pages are restarted to Page 1, and preceded by “Appendix N—“

APPENDIX 1. EXAMPLE COVER PAGE FOR SUPPLEMENTAL
LICENSING MATERIAL

**Susitna-Watana Hydroelectric Project
Railbelt Large Hydro**

Aquatic Resources Data Gap Analysis
Draft

Prepared for:



Alaska Energy Authority
813 W Northern Lights Blvd
Anchorage, AK 99503-6690

Prepared by:

HDR Alaska, Inc.
2525 C Street, Suite 305
Anchorage, AK 99503

July 20, 2011

APPENDIX 2. LIST OF ACRONYMS AND SCIENTIFIC LABELS

(THIS VERSION OF THE TABLE WAS INCLUDED WITH THE RSP (DEC. 2012), WITH A FEW ADDITIONAL CHANGES)

Abbreviation	Definition
μg	microgram
μg/L	micrograms per liter
μg/m ³	microgram per cubic meter
μL	microliter(s)
¹⁴ C	Carbon 14
AAC	Alaska Administrative Code
ac-ft	acre-feet
ACHP	Advisory Council on Historic Preservation
Active floodplain	The flat valley floor constructed by a river during lateral channel migration and deposition of sediment under current climate conditions.
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
Adfluvial	Fish that spend a part of their life cycle in lakes and return to rivers and streams to spawn.
ADNR	Alaska Department of Natural Resources
ADOT&PF	Alaska Department of Transportation and Public Facilities
ADOTPF CR	ADOT Central Region Planning
ADOTPF NR	ADOT Northern Region Planning
AEA	Alaska Energy Authority
AEIDC	Arctic Environmental Information and Data Center
AFB	air force base
AFFI	Alaska Freshwater Fish Inventory
Age-0 juvenile	The description of an organism that, in its natal year, has developed the anatomical and physical traits characteristically similar to the mature life stage, but without the capability to reproduce.
AHMG	Alaska Habitat Management Guides
AHRS	Alaska Heritage Resources Survey
Ahtna	Ahtna, Inc.
AKNHP	Alaska Natural Heritage Program
Algae	Single-celled organisms (as individual or cells grouped together in colonies) that contain chlorophyll-a and are capable of the photosynthesis.
Alluvial	Relating to, composed of, or found in alluvium.
AMP	Airport Master Plan
Anadromous	Fishes that migrate as juveniles from freshwater to saltwater and then return as adults to spawn in freshwater.
Anchor ice	Submerged ice attached or anchored to the bottom, irrespective of the nature of its formation. Often accumulates as frazil slush in open reaches.
ANCSA	Alaska Native Claims Settlement Act
ANILCA	Alaska National Interest Lands Conservation Act of 1980

Abbreviation	Definition
ANOVA	Analysis of variance, a collection of statistical models, and their associated procedures, in which the observed variance in a particular variable is partitioned into components attributable to different sources of variation.
APA	Alaska Power Authority
APA Project	APA Susitna Hydroelectric Project
APE	area of potential effect
APLICs	Alaska Public Lands Information Centers
Aquifer	A geologic formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to springs and wells.
ARLIS	Alaska Resources Library and Information Services
ARRC	Alaska Railroad Corporation
AS	Alaska Statutes
ASCP	Alaska Shorebird Conservation Plan
ASFDB	Alaska Subsistence Fisheries Database
ASG	Alaska Shorebird Group
Assay	Investigative (analytic) procedure in laboratory medicine, pharmacology, environmental biology, and molecular biology for qualitatively assessing or quantitatively measuring the presence or amount or the functional activity of a target entity (the analyte).
ASTM	American Society for Testing and Materials
ATV	all-terrain vehicle
AVC	Alaska Vegetation Classification
AWC	The Anadromous Waters Catalog, a catalog and atlas maintained by the Alaska Department of Fish and Game (ADF&G) of waters important for the spawning, rearing or migration of anadromous fishes.
Backwater	Off-channel habitat characterization feature found along channel margins and generally within the influence of the active main channel with no independent source of inflow. Water is not clear.
Bank	The sloping land bordering a stream channel that forms the usual boundaries of a channel. The bank has a steeper slope than the bottom of the channel and is usually steeper than the land surrounding the channel.
Bankfull stage (flow)	The discharge at which water completely fills a channel; the flow rate at which the water surface is level with the floodplain.
Bankfull width	The width of a river or stream channel between the highest banks on either side of a stream.
Baseflow	The portion of stream flow that comes from the sum of deep subsurface flow and delayed shallow subsurface flow. It should not be confused with groundwater flow.
Baseline	Baseline (or Environmental Baseline): the environmental conditions that are the starting point for analyzing the impacts of a proposed licensing action (such as approval of a license application) and any alternative.
BCC	birds of conservation concern
BDPs	Best development practices
Beacon (tag)	A beacon is an intentionally conspicuous device, in this case a telemetry tag, designed to attract attention to a specific location.
Beaver complex	Off-channel habitat characterization feature consisting of a ponded water body

Abbreviation	Definition
	created by beaver dams.
Benthos (benthic)	Defining a habitat or organism found on the streambed or pertaining to the streambed (or bottom) of a water body.
BGEPA	Bald and Golden Eagle Protection Act
BIA	DOI, Bureau of Indian Affairs
Biotelemetry	The remote detection and measurement of a human or animal function, activity, or condition (as heart rate or body temperature)
BLM	DOI, Bureau of Land Management
BLM-S	BLM sensitive species
BLM-W	BLM watch list species
BMC	birds of management concern
BMI	benthic macroinvertebrates
BMPs	best management practices
BOD	biochemical oxygen demand
BOF	Alaska Board of Fisheries
Bonferroni's method	A statistical method used to counteract the problem of multiple comparisons.
Border ice	Ice sheet in the form of a long border attached to the bank or shore; shore ice.
Boulder	Substrate particles greater than 12 inches in diameter. Larger than cobble.
BP	before present
BPIFWG	Boreal Partners in Flight Working Group
Braided streams	Stream consisting of multiple small, shallow channels that divide and recombine numerous times. Associated with glaciers, the braiding is caused by excess sediment load.
Brash ice	Accumulations of floating ice made up of fragments not more than about 2 meters (6 feet) across; the wreckage of other forms of ice.
Break-up	Disintegration of ice cover.
Break-up jam	Ice jam that occurs as a result of the accumulation of broken ice pieces.
Break-up period	Period of disintegration of an ice cover.
Calibration	In the context of hydrologic modeling, calibration is the process of adjusting input variables to minimize the error between predicted and observed water surface elevations or other hydrologic parameters.
Capillary fringe	The subsurface layer in which groundwater seeps up from a water table by capillary action to fill soil pores.
Carbon isotope ratio	The identification of isotopic signature, the distribution of certain stable isotopes and chemical elements within chemical compounds.
Cascade	The steepest of riffle habitats. Unlike rapids, which have an even gradient, cascades consist of a series of small steps of alternating small waterfalls and shallow pools.
CATC	CIRI Alaska Tourism
Catch per unit effort	The quantity of fish caught (in number or in weight) with one standard unit of fishing effort.
Catchability coefficient (fishwheel)	The relationship between the catch rate (CPUE) and the true population size, aka effectiveness.
CCCMA	Canadian Centre for Climate Modeling and Analysis.

Abbreviation	Definition
CDP	census-designated place
CEII	Critical Energy Infrastructure Information
CFR	Code of Federal Regulations
cfs	cubic feet per second
Channel	A natural or artificial watercourse that continuously or intermittently contains water, with definite bed and banks that confine all but overbank stream flows.
3.4.1.1.1.1. Chugach	3.4.1.1.1.2. Chugach Electric Association
CIBW	Cook Inlet Beluga Whales
CIRI	Cook Inlet Region, Inc.
Cirques	A bowl-shaped depression on the side of a mountain at the head of a glacier.
cm	centimeter
CNIPM	Alaska Committee for Noxious and Invasive Plants Management
Cobble	Substrate particles between 3 and 12 inches in diameter. Larger than gravel and smaller than boulder.
Commercial fishery	A term related to the whole process of catching and marketing fish and shellfish for sale. It refers to and includes fisheries resources, fishermen, and related businesses.
Conductivity	In terms of water conductivity, the ability of water to conduct electricity, normally through the presence of dissolved solids that carry electrical charges.
Confluence	The junction of two or more rivers or streams.
Consecutive dry days	Number of days in a row without precipitation.
Consecutive wet days	Number of days in a row with precipitation.
COY	cubs of the year
CPOM	course particulate organic matter, particle size larger than 1 mm in size
CPUE	Catch per unit effort. See definition for "catch per unit effort."
Cross-section	A plane across a river or stream channel perpendicular to the direction of water flow.
CRREL	U.S. Army Cold Regions Research and Engineering Laboratory, Hanover, New Hampshire.
CSIS	ADF&G Community Subsistence Information System
Datum	A geometric plane of known or arbitrary elevation used as a point of reference to determine the elevation, or change of elevation, of another plane (see gage datum).
DBSD	Denali Borough School District
DCCED	Alaska Department of Commerce, Community, and Economic Development
Decision tree barrier analysis	A step-wise process for evaluating potential barriers in the field. Quantitative metrics are used at each step in the decision tree to identify the impassability of the potential barrier.
Degree-day	Also termed freezing degree-day, a measure of the departure of the mean daily temperature below a given standard, usually 0°C (32°F).
Delta	A low, nearly flat accumulation of sediment deposited at the mouth of a river or stream, commonly triangular or fan-shaped
DEM	Digital elevation model.

Abbreviation	Definition
Denaturation	Denaturation is a process in which proteins or nucleic acids lose the tertiary structure and secondary structure which is present in their native state, by application of some external stress or compound such as a strong acid or base, a concentrated inorganic salt, an organic solvent, or heat.
Depth	Water depth at the measuring point (station).
Devils Canyon	Located at approximately Susitna River Mile (RM) 150-161, Devils Canyon contains four sets of turbulent rapids rated collectively as Class VI. This feature is a partial fish barrier because of high water velocity.
DHSS	Alaska Department of Health and Social Services
DIDSON	Dual Frequency Identification Sonar. Sonar imaging instrumentation developed by Sound Metrics Corp. with applications for fish enumeration, behavior and habitat mapping.
Direct solar radiation	Sunlight not blocked by clouds.
Discharge	The rate of stream flow or the volume of water flowing at a location within a specified time interval.
Discontinuous permafrost	Permafrost that is laterally discontinuous, or isolated by thawed soils or bedrock.
Distribution (species)	The manner in which a biological taxon is spatially arranged.
Diurnal	Any pattern that reoccurs daily.
DNA	A nucleic acid containing the genetic instructions used in the development and functioning of all known living organisms.
DO	dissolved oxygen. The amount of gaseous oxygen (O ₂) dissolved in the water column.
DOI	U.S. Department of the Interior
Downwelling	The downward movement of water from rivers, streams, sloughs and other surface water features into soils and bedrock.
Doyon	Doyon, Ltd.
DPOR	ADNR Division of Parks and Outdoor Recreation
Drainage area	The total land area draining to any point in a stream. Also called catchment area, watershed, and basin.
DSM	Demand Side Management
Duration of ice cover	The time from freeze-up to break-up of an ice cover.
EARMP	East Alaska Resource Management Plan
ECHAM5	A global climate model developed by the Max Planck Institute for Meteorology.
Edge habitat	The boundary between natural habitats, in this case between land and a stream. Level five tier of the habitat classification system.
EE	energy efficiency
Effectiveness (fishwheel)	aka catchability coefficient, the relationship between the catch rate (CPUE) and the true population size
EFH	essential fish habitat
EIM	Environmental Information Management
EIS	environmental impact statement
El.	elevation
Electrofishing	A biological collection method that uses electric current to facilitate capturing fishes.
Emergence	The process of becoming visible after being concealed, the escape of an organism from an egg.

Abbreviation	Definition
EMS	emergency medical services
Entrainment	The unintended diversion of fish into an unsafe passage route.
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EROS	Earth Resources Observation System.
ESA	Endangered Species Act
Escapement (spawning)	The number or proportion of fish surviving (escaping from) a given fishery at the end of the fishing season and reaching the spawning grounds.
et al.	"et alia"; and the rest
Evapotranspiration	The sum of evaporation and plant transpiration to the atmosphere.
FAA	Federal Aviation Administration
FBOM	fine benthic organic matter
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FHA	USDOT Federal Highway Administration
Firn	Granular, partially consolidated snow that has passed through one summer melt season but is not yet glacial ice.
Fish barrier	Barriers to fish migration
Fishers exact test	A statistical significance test used in the analysis of contingency tables. Although in practice it is employed when sample sizes are small, it is valid for all sample sizes.
Fishery	Generally, a fishery is an activity leading to harvesting of fish. It may involve capture of wild fish or raising of fish through aquaculture.
Fishing	Any activity, other than scientific research conducted by a scientific research vessel, that involves the catching, taking, or harvesting of fish; or any attempt to do so; or any activity that can reasonably be expected to result in the catching, taking, or harvesting of fish, and any operations in support of it.
Fishing gear	The equipment used for fishing (e.g. gillnet, hand line, harpoon, haul seine, long line, bottom and midwater trawls, purse seine, rod-and-reel, pots and traps). Each of these gears can have multiple configurations.
Fishwheel	A device for catching fish which operates much as a water-powered mill wheel. A wheel complete with baskets and paddles is attached to a floating dock. The wheel rotates due to the current of the stream it is placed into. The baskets on the wheel capture fish traveling upstream. The fish caught in the baskets fall into a holding tank.
FLIR	Forward looking infrared, an imaging technology that senses infrared radiation. Can be used for watershed temperature monitoring.
Flood	Any flow that exceeds the bankfull capacity of a stream or channel and flows out on the floodplain.
Floodplain	1. The area along waterways that is subject to periodic inundation by out-of-bank flows. 2. The area adjoining a water body that becomes inundated during periods of over-bank flooding and that is given rigorous legal definition in regulatory programs. 3. Land beyond a stream channel that forms the perimeter for the maximum probability flood. 4. A relatively flat strip of land bordering a stream that is formed by sediment deposition. 5. A deposit of alluvium that covers a valley flat from lateral erosion of meandering streams and rivers.
Floodplain vegetation – groundwater / surface water regime functional groups	Assemblages of plants that have established and developed under similar groundwater and surface water hydrologic regimes.

Abbreviation	Definition
Fluvial	Of or pertaining to the processes associated with rivers and streams and the deposits and landforms created by them.
FMP	Fishery Management Plan
Focus Area	Areas selected for intensive investigation by multiple disciplines as part of the AEA study program.
Fork length	A measurement used frequently for fish length when the tail has a fork shape. Projected straight distance between the tip of the snout and the fork of the tail.
FPOM	fine benthic organic matter
fps	feet per second
FR	Federal Register
Frazil	Fine spicules, plates, or discoids of ice suspended in water. In rivers and lakes it is formed in supercooled, turbulent waters.
Frazil pan	A circular agglomerate of loosely packed frazil that floats.
FRP	Fish Resource Permit
Freeze-up jam	Ice jam formed as frazil ice accumulates and thickens during the freeze-up period.
Freeze-up period	Period of initial formation of an ice cover.
Fry	A recently hatched fish. Sometimes defined as a young juvenile salmonid with absorbed egg sac, less than 60 mm in length.
FS	featured species
ft	feet
ft MSL	feet mean sea level
FY	fiscal year
Fyke net	Hoop nets are tubular shaped nets with a series of hoops or rings spaced along the length of the net to keep it open.
g	gram
Gaging station	A specific site on a stream where systematic observations of stream flow or other hydrologic data are obtained.
Genepop	A population genetics software package originally developed by Michel Raymond and Francois Rousset, at the Laboratoire de Genetique et Environnement, Montpellier, France.
Genetic markers	A gene or DNA sequence with a known location on a chromosome that can be used to identify individuals or species.
Genetic tree	A diagram showing the lineage or genealogy of an individual and all the direct ancestors, usually to analyze or follow the inheritance of trait.
Genotype	The genetic makeup of a cell, an organism, or an individual (i.e. the specific allele makeup of the individual) usually with reference to a specific character under consideration.[
Geohydrologic unit	An aquifer, a confining unit, or a combination of aquifers and confining units comprising a framework for a reasonably distinct geohydrologic system.
Geohydrology	The study of water in the Earth's surface, commonly called groundwater.
Geomorphic mapping	A map design technique that defines, delimits and locates landforms.
Geomorphic reach	Level two tier of the habitat classification system. Separates major hydraulic segments into unique reaches based on the channel's geomorphic characteristic.
Geomorphology	The scientific study of landforms and the processes that shape them.
Gillnet	With this type of gear, the fish are gilled, entangled or enmeshed in the netting. These nets may be used to fish on the surface, in midwater or on the bottom.

Abbreviation	Definition
GIS	Geographic Information System. An integrated collection of computer software and data used to view and manage information about geographic places, analyze spatial relationships, and model spatial processes.
Glacial mass wasting	When large amounts of glacial ice rapidly disintegrate and melt.
Glacial surge	Relatively rapid movement of a glacier down-gradient. Frequently accompanied by increased flow of meltwater and additional sediment production. These events typically have a sudden onset, extremely high (tens of meters/day) maximum flow rate, and a sudden termination, often with a discharge of stored water.
Glacier geometry changes	Changes in the size or shape of a glacier over time.
Glacier mass balance	The difference between accumulation and ablation of a glacier.
Glacier outburst	A sudden release of water from a glacier.
Glacier retreat	The upslope migration of the terminus of a glacier.
Glide	An area with generally uniform depth and flow with no surface turbulence. Low gradient; 0-1 % slope.
GMP	General Management Plan
GMU	Game Management Unit
GPS	global positioning system. A system of radio-emitting and -receiving satellites used for determining positions on the earth.
Gradient	The rate of change of any characteristic, expressed per unit of length (see Slope). May also apply to longitudinal succession of biological communities.
Gravel	Substrate particles between 0.1 and 3.0 inches in size, larger than sand and smaller than cobble.
Grounded ice	Ice that has run aground or is in contact with the ground underneath it.
Groundwater (GW)	In the broadest sense, all subsurface water; more commonly that part of the subsurface water in the saturated zone.
Growth rate	Annual or seasonal. The increase in weight of a fish per year (or season), divided by the initial weight.
Growth Rate Potential	The amount of growth predicted for fish with known prey availability and environmental conditions.
GU	globally unrankable
GVEA	Golden Valley Electric Association
GW/SW interactions	The physical interactions between groundwater and surface water.
GWh	gigawatt-hours
Habitat	The environment in which the fish live, including everything that surrounds and affects its life, e.g. water quality, bottom, vegetation, associated species (including food supplies). The locality, site and particular type of local environment occupied by an organism.
Habitat Suitability Criteria	A graph/mathematical equation describing the suitability for use of areas within a stream channel related to water depth, velocity and substrate by various species/life stages of fish.
Habitat Suitability Index	A suitability index providing a probability that the habitat is suitable for the species, and hence a probability that the species will occur where that habitat occurs.
Habitat Suitability Modeling	A tool for predicting the quality or suitability of habitat for a given species based on known affinities with habitat characteristics, such as depth and substrate type.
Hanging dam	A mass of ice composed mainly of frazil or broken ice deposited under an ice cover in a region of low flow velocity.
Harvest	The total number or weight of fish caught and kept from an area over a period of time.

Abbreviation	Definition
HEA	Homer Electric Association
Heat transfer model	A model for migration of heat from a warm body to cold.
Hierarchical log-likelihood ratio analysis	A technique used in statistics to examine the relationship between more than two categorical variables.
Histogram	A graphical representation showing a visual impression of the distribution of data. It is an estimate of the probability distribution of a continuous variable.
Homogeneity	Homogeneity is the state of being homogeneous. Pertaining to the sciences, it is a substance where all the constituents are of the same nature; consisting of similar parts, or of elements of the like nature.
Hook and line	A type of fishing gear consisting of a hook tied to a line.
Hoop net	Hoop nets are tubular shaped nets with a series of hoops or rings spaced along the length of the net to keep it open.
HRM	Historic River Mile
HSC	Habitat Suitability Criteria
HSI	Habitat Suitability Index
Hummocked ice	Ice piled haphazardly, one piece over another, to form an uneven surface.
Hydraulic head	A measure of energy or pressure, expressed in terms of the vertical height of a column of water that has the same pressure difference.
Hydraulic model	A computer model of a segment of river used to evaluate stream flow characteristics over a range of flows.
Hydrograph	A graph showing stage, flow, velocity, or other property of water with respect to time.
Hyporheic	The hyporheic zone is the subsurface volume of sediment and porous space beneath and lateral to a river or streambed, where there is mixing of shallow groundwater and surface water.
Hyporheic flow	Shallow subsurface (groundwater) flow through porous sediments adjacent to river channels.
Ice bridge	A continuous ice cover of limited size extending from shore to shore like a bridge.
Ice concentration	The ratio (in eighths or tenths) of the water surface actually covered by ice to the total area of surface, both ice-covered and ice-free, at a specific location or over a defined area.
Ice cover	A significant expanse of ice of any form on the surface of a body of water.
Ice floe	Free-floating piece of ice greater than about 1 meter (3 feet) in extent.
Ice jam	A stationary accumulation of fragmented ice or frazil that restricts or blocks a stream channel.
Ice run	Flow of ice in a river. An ice run may be light or heavy, and may consist of frazil or broken sheet ice.
Ice-free	No floating ice present.
IFRR	Instream Flow Relationships Report
ILP	Integrated Licensing Process
in	Inch
Inclined plane trap	This trap consists of a revolving screen suspended between two pontoons. Downstream migrant fish reaching the back of the trap are dropped into a live box where they can later be enumerated.
Index count	An index is a statistic that is assumed to be correlated to the true parameter of interest (population) in some way

Abbreviation	Definition
InSAR	Interferometric Synthetic Aperture Radar
Instream flow	The rate of flow in a river or stream channel at any time of year.
IFIM	Instream Flow Incremental Methodology integrates concepts of water-supply planning, analytical hydraulic engineering models, and empirically derived habitat-versus-flow functions to address water-use and instream-flow issues and questions concerning life-stage-specific effects on selected species and the general well-being of aquatic biological populations.
Interannual stream flow variations	Changes in stream flow on a year-to-year basis.
Interflow	The lateral movement of water in the upper part of the unsaturated zone, or vadose zone, which directly enters a stream channel or other body of water.
Intergravel	Intergravel refers to the subsurface environment within the riverbed.
Invertebrate	All animals without a vertebral column; for example, aquatic insects.
IPCC	Intergovernmental Panel on Climate Change
ISER	University of Alaska Anchorage Institute for Social and Economic Research
ISR	Initial Study Report
Juvenile	A young fish or animal that has not reached sexual maturity.
kcmil	circular mils
kg	kilogram
km	kilometer
km ²	kilometer(s) squared
kV	kilovolt
L	liter(s)
LAI	Leaf area index. LAI is the one-sided green leaf area per unit ground area in broadleaf canopies, or as the projected needle leaf area per unit ground area in needle canopies.
lb	pound
Leading edge of ice cover	The upstream extent of a continuous ice cover that is progressing upstream via juxtaposition (accumulation) of frazil ice pans.
licensing participants; Participants	Agencies, ANSCA corporations, Alaska Native entities and other licensing participants
LiDAR	Light Detection and Ranging. An optical remote sensing technology that can measure the distance to a target; can be used to create a topographic map.
Life stage	An arbitrary age classification of an organism into categories relate to body morphology and reproductive potential, such as spawning, egg incubation, larva or fry, juvenile, and adult.
Loci	The position of a gene (or other significant sequence) on a chromosome.
LOEL	Lowest Observable Effect Level
LOKI	A software package developed by Simon C. Heath, which analyses a quantitative trait observed on large pedigrees using Markov chain Monte Carlo multipoint linkage and segregation analysis.
Lotic	Refers to flowing water.
Lower segment Susitna	The Susitna River from Cook Inlet (RM 0) to the confluence of the Chulitna River at RM 98.
LP DAAC	Land Processes Distributed Active Archive Center.

Abbreviation	Definition
L RTP	Long Range Transportation Plan
LWCF	Land and Water Conservation Fund
LWD	large woody debris
m	meter(s)
M	million
m ²	square meter(s)
Macroinvertebrate	An invertebrate animal without a backbone that can be seen without magnification.
Main channel	For habitat classification system: a single dominant main channel. Also, the primary downstream segment of a river, as contrasted to its tributaries.
Main channel habitat	Level four tier of the habitat classification system. Separates main channel habitat types including: tributary mouth, main channel, split main channel, multiple split main channel and side channel into mesohabitat types. Mesohabitat types include pool, glide, run, riffle, and rapid.
Mainstem	Mainstem refers to the primary river corridor, as contrasted to its tributaries. Mainstem habitats include the main channel, split main channels, side channels, tributary mouths, and off-channel habitats.
Mainstem habitat	Level three tier of the habitat classification systems. Separates mainstem habitat into main channel, off-channel, and tributary habitat types. Main channel habitat types include: tributary mouth, main channel, split main channel, multiple split main channel and side channel. Off-channel habitat types include: side slough, upland slough, backwater, and beaver complex. Tributary habitat is not further categorized.
Major hydraulic segment	Level one tier of the habitat classification system. Separates the River into three segments: Lower River (RM 0-98), Middle River (RM 98-184), and Upper River (RM 184-233).
Manning's equation	$V = 1.486 R^{2/3} S^{1/2} / n$ in English units ($V = R^{2/3} S^{1/2} / n$ in SI units) where V = mean flow velocity, R = hydraulic radius, and S = hydraulic slope; n is a coefficient of roughness.
MAPS	Monitoring Avian Productivity and Survivorship
Mat-Su	Matanuska Susitna
MBTA	Migratory Bird Treaty Act
MEA	Matanuska Electric Association
Mesh size	The size of holes in a fishing net.
Mesohabitat	A discrete area of stream exhibiting relatively similar characteristics of depth, velocity, slope, substrate, and cover, and variances thereof (e.g., pools with maximum depth <5 ft, high gradient riffes, side channel backwaters).
MET	Meteorological stations.
mg	milligram
mg/L	milligrams per liter
mi	mile(s)
mi ² ; sq.mi.	square mile(s)
Middle segment Susitna	The Susitna River from the confluence of the Chulitna River at RM 98 to the proposed Watana Dam Site at RM 184.
Migrant (life history type)	Some species exhibit a migratory life history type and undergo a migration to from rivers/lakes/ocean.
Migration	Systematic (as opposed to random) movement of individuals of a stock from one place to another, often related to season.

Abbreviation	Definition
Minnow trap	Normally composed of small steel mesh with 2-piece torpedo shape design, this trap is disconnected in the middle for easy baiting and fish removal.
MIROC	Model for Interdisciplinary Research on Climate.
Mixed stock (fishery)	A fishery whose stock consists of fish that are of a variety of ages, sizes, species, geographic or genetic origins or any combination of these variables.
Mixed stock analyses	Traditional mixed stock analyses use morphological, chemical, or genetic markers measured in several source populations and in a single mixed population to estimate the proportional contribution of each source to the mixed population.
ml	milliliter(s)
ML&P	Anchorage Municipal Light and Power
mm	millimeter(s)
MODFLOW	The name of a common USGS finite difference 3-D groundwater flow model.
MON	Museum of the North
Monte Carlo	Monte Carlo simulation is a statistical approach whereby the inputs that are used for a calculation are resampled many times assuming that the inputs follow known statistical distributions.
MP	mile post
mph	miles per hour
MRLC	Multi-Resolution Land Characteristics.
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSB	Matanuska-Susitna Borough
MSL	mean sea level
Multidimensional scaling	A set of related statistical techniques often used in information visualization for exploring similarities or dissimilarities in data.
Multiple split main channel	Main channel habitat characterization feature where more than three distributed dominant channels are present.
MVA	megavolt-Ampere
MW	megawatts (one million watts)
MWh	megawatt hour
n.d.	no date
N/A	not applicable or not available
NAAQS	National Ambient Air Quality Standards
NARR	North America Regional Reanalysis.
NAWCP	North American Waterfowl Conservation Plan
NAWMP	North American Waterfowl Management Plan
NCI	Northern Cook Inlet
NCIMA	Northern Cook Inlet Management Area (sport fish harvest)
NCM	Newton centimeter
NEPA	National Environmental Policy Act
Nested design	Nested design (sometimes referred to as a hierarchical design) is used for experiments in which there is an interest in a set of treatments and the experimental units are sub-sampled.

Abbreviation	Definition
NGO	non-governmental organization
NHPA	National Historic Preservation Act
Nitrogen isotope	Stable isotopes are method for understanding aquatic ecosystems because they can help scientists in understanding source links and process information in marine food webs. Certain isotopes can signify distinct primary producers forming the bases of food webs and trophic level positioning. Nitrogen isotopes indicate the trophic level position of various marine organisms.
NLCD	National Land Cover Dataset
NLUR	Northern Land Use Research
NMFS	NOAA National Marine Fisheries Service
No.	number
NO ₂ ; NO ₂	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
Nodes (genetic tree)	Nodes represent taxonomic units, such as an organism, a species, a population, a common ancestor, or even an entire genus or other higher taxonomic group.
NOEL	No Observed Effects Level
NOI	Notice of Intent
Non-native	Not indigenous to or naturally occurring in a given area.
NPS	DOI, National Park Service
NRCS	USDA Natural Resources Conservation Service
NRHP	National Register of Historic Places
NTU	nephelometric turbidity unit
NWI	National Wetlands Inventory
NWR	National Wildlife Refuge
O&M	operations and maintenance
O ₃	ozone
°C	degrees Celsius
°F	degrees Fahrenheit
Off-channel	Those bodies of water adjacent to the main channel that have surface water connections to the main river at some discharge levels.
Off-channel habitat	Habitat within those bodies of water adjacent to the main channel that have surface water connections to the main river at some discharge levels.
OHV	off-highway vehicle
Open lead	Elongated opening in the ice cover caused by water current (velocity lead) or warm water (thermal lead).
OPMP	Office of Project Management and Permitting
ORV	off-road vehicle
Otolith	The ear bone of a fish. Otoliths have rings on them like the rings on a tree stump, and are used to find the age of the fish and its growth rate.
Outmigrant trap	Several types of trapping equipment that can be used to estimate the abundance of downstream migrating anadromous salmonid smolts.
Overbank flow	Flow that exceeds the level of a river's banks and extends into the floodplain. Also overflow.

Abbreviation	Definition
Overwintering	Freshwater habitat used by salmonids during the winter for incubation of eggs and alevin in the gravel and for rearing of juveniles overwintering in the stream system before migrating to saltwater the following spring.
PAD	Pre-Application Document
Partial barrier	A feature that is impassable to some fish species, during part or all life stages at all flows.
Pb	lead
PCE	primary constituent elements
PDD	Preliminary Decision Document
Period of record	The length of time for which data for an environmental variable has been collected on a regular and continuous basis.
Permafrost	Earth materials that remains continuously at or below 0oC for at least two consecutive years.
Permanent barrier	A feature that is impassable to all fish at all flows. Results in the exclusion of all species from portions of a watershed.
Permeability	The capacity of a rock for transmitting a fluid; a measure of the relative ease with which a porous medium can transmit a liquid.
Personal use fishery	In Alaska, "Personal use" is a legally defined regulatory category of fishery. It is defined as "the taking, fishing for, or possession of finfish, shellfish, or other fishery resources, by Alaska residents for personal use and not for sale or barter, with gill or dip net, seine, fishwheel, long line, or other means defined by the Board of Fisheries".
pH	A measure of the acidity or basicity of a solution.
PHABSIM	Physical Habitat Simulation, a specific model designed to calculate an index to the amount of microhabitat available for different life stages at different flow levels. PHABSIM has two major analytical components: stream hydraulics and life stage-specific habitat requirements.
PhD	Doctor of Philosophy
Piezometer	A type of groundwater well installed to specifically measure water levels or pressure levels.
PIT	Passive Integrated Transponder tags used to individually identify animals and monitor their movements.
PL	Public Law
PLC	programmable logic controller
PLP	Preliminary Licensing Proposal
PM	particulate matter
PM&E	protection, mitigation and enhancement
PM ₁₀ ; PM10	particulate matter up to 10 microns in diameter
PM _{2.5} ; PM2.5	particulate matter up to 2.5 microns in diameter
PMF	probable maximum flood
Pool	Slow water habitat with minimal turbulence and deeper due to a strong hydraulic control.
Porosity	The ratio of the volume of voids in a rock or soil to the total volume.
Potentiometric surface	An imaginary surface representing the static head of ground water in tightly cased wells that tap a water-bearing rock unit (aquifer); or, in the case of unconfined aquifers, the water table.

Abbreviation	Definition
POW	palustrine open water (ponds under 20 ac)
ppb	parts per billion
PRECPTOT	Total precipitation for a year.
PRISM	Parameter-elevation Regressions on Independent Slopes Model. PRISM uses point measurements of precipitation, temperature, and other climatic factors to produce continuous, digital grid estimates of monthly, yearly, and event-based climatic parameters.
PRM	Project River Mile
Process domains	Define specific geographic areas in which various geomorphic processes govern habitat attributes and dynamics (Montgomery 1999).
Project	Susitna-Watana Hydroelectric Project
PSD	Prevention of Significant Deterioration
PSP	Proposed Study Plan
Pump test	A method of determining aquifer properties by pumping water from a well and measuring the water level drawdown or recovery in the well, and nearby piezometers or wells.
Q	Hydrological abbreviation for discharge, usually presented as cfs (cubic feet per second) or cms (cubic meters per second). Flow (discharge at a cross-section).
R (program)	R is an open source programming language and software environment for statistical computing and graphics. The R language is widely used among statisticians for developing statistical software and data analysis.
Radiotelemetry	Involves the capture and placement of radio-tags in adult fish that allow for the remote tracking of movements of individual fish.
Railbelt	The cities, towns, villages, and region served by Alaska Railroad tracks. The Railbelt includes the two most populous cities in Alaska - Anchorage and Fairbanks.
Ramping rates	The rate at which (typically inches per hour) a flow is artificially altered to accommodate diversion requirements.
Rapid	Swift, turbulent flow including small chutes and some hydraulic jumps swirling around boulders. Exposed substrate composed of individual boulders, boulder clusters, and partial bars. Lower gradient and less dense concentration of boulders and white water than Cascade. Moderate gradient; usually 2.0-4.0% slope.
RASP	Regional Aviation System Plan
RCC	roller compacted concrete
Rd	recreation-dispersed
Rearing	Rearing is the term used by fish biologists that considers the period of time in which juvenile fish feed and grow.
Recreational Fishery	Harvesting fish for personal use, sport, and challenge (e.g. as opposed to profit or research). Recreational fishing does not include sale, barter, or trade of all or part of the catch.
Redd	The spawning ground or nest of various fishes
Refugia	An area protected from disturbance and exposure to adverse environmental conditions where fish or other animals can find shelter from sudden flow surges, adverse water quality, or other short-duration disturbances.
Regime	The general pattern (magnitude and frequency) of flow or temperature events through time at a particular location (such as snowmelt regime, rainfall regime).
Relative abundance	Relative abundance is an estimate of actual or absolute abundance; usually stated as some kind of index.
Reservoir	A body of water, either natural or artificial, that is used to manipulate flow or store

Abbreviation	Definition
	water for future use.
Resident	Resident fish as opposed to anadromous remain in the freshwater environment year-round
Riffle	A fast water habitat with turbulent, shallow flow over submerged or partially submerged gravel and cobble substrates. Generally broad, uniform cross-section. Low gradient; usually 0.5-2.0% slope.
Riparian	Pertaining to anything connected with or adjacent to the bank of a stream or other body of water.
Riparian process domain	Define specific geographic areas in which various geomorphic processes govern floodplain habitat attributes and dynamics.
Riparian vegetation	Vegetation that is dependent upon an excess of moisture during a portion of the growing season on a site that is perceptively more moist than the surrounding area.
Riparian zone	A stream and all the vegetation on its banks that is influenced by the presence of the stream, including surface flow, hyporheic flow and microclimate.
RIRP	Railbelt Integrated Resources Plan
River	A large stream that serves as the natural drainage channel for a relatively large catchment or drainage basin.
River corridor	A perennial, intermittent, or ephemeral stream and adjacent vegetative fringe. The corridor is the area occupied during high water and the land immediately adjacent, including riparian vegetation that shades the stream, provides input of organic debris, and protects banks from excessive erosion.
River mile	The distance of a point on a river measured in miles from the river's mouth along the low-water channel.
RM	River Mile(s) referencing those of the 1980s APA Project.
ROS	recreational opportunity spectrum
Rosgen channel-type	The Rosgen stream classification system which categorizes streams based on channel morphology so that consistent, reproducible, and quantitative descriptions can be made.
RS	revised statute
RSP	Revised Study Plan
RTE	rare, threatened and endangered
RTK	Real time kinematic, in reference to a GPS survey method.
Run (habitat)	A habitat area with minimal surface turbulence over or around protruding boulders with generally uniform depth that is generally greater than the maximum substrate size. Velocities are on border of fast and slow water. Gradients are approximately 0.5 % to less than 2%. Generally deeper than riffles with few major flow obstructions and low habitat complexity.
Run (migration)	Seasonal migration undertaken by fish, usually as part of their life history; for example, spawning run of salmon, upstream migration of shad. Fishers may refer to increased catches as a "run" of fish, a usage often independent of their migratory behavior.
s	second
Sand	Substrate particles less than 0.1 inches in diameter, smaller than gravel.
SANPCC	Southcentral Alaska Northern Pike Control Committee
SaSI	Salmonid Stock Inventory
SB	Senate bill
SCORP	Statewide Comprehensive Outdoor Recreation Plan

Abbreviation	Definition
Screw trap	A floating trap that relies on an Archimedes screw built into a screen covered cone that is suspended between two pontoons is used.
SCRO	ADNR South Central Regional Office
SD1	Scoping Document 1
SD2	Scoping Document 2
SDVCSC	South Denali Visitor Center Steering Committee
Seasonal barrier	A feature that is impassable to all fish at certain flow conditions (based on run timing and flow conditions). Can result in a delay in movement beyond the barrier for some period of time.
Sediment	Solid material, both mineral and organic, that is in suspension in the current or deposited on the streambed.
Sediment load	The portion of the sediment that is carried by a fluid flow which settle slowly enough such that it almost never touches the bed.
Sediment transport	The movement of solid particles (sediment), typically due to a combination of the force of gravity acting on the sediment, and/or the movement of the fluid in which the sediment is entrained.
Seine (beach)	A fishing net that hangs vertically in the water with its bottom edge held down by weights and its top edge buoyed by floats. Seine nets can be deployed from the shore as a beach seine, or from a boat.
SES	City of Seward Electric System
sf; ft ²	Square foot (feet)
SHPO	State Historic Preservation Officer
Side channel	Lateral channel with an axis of flow roughly parallel to the mainstem, which is fed by water from the mainstem; a braid of a river with flow appreciably lower than the main channel. Side channel habitat may exist either in well-defined secondary (overflow) channels, or in poorly-defined watercourses flowing through partially submerged gravel bars and islands along the margins of the mainstem.
Side slough	Off-channel habitat characterization of an Overflow channel contained in the floodplain, but disconnected from the main channel. Has clear water,
Side-scan sonar	Side scan sonar uses transducers that emit fan-shaped acoustic pulses down toward the riverbed or seafloor.
Simple daily intensity index	Known also as SDII, it is the annual total precipitation divided by the number of wet days in the year.
Slope	The inclination or gradient from the horizontal of a line or surface.
Slough	A widely used term for wetland environment in a channel or series of shallow lakes where water is stagnant or may flow slowly on a seasonal basis. Also known as a stream distributary or anabranch.
Slush ice	An agglomerate of loosely packed frazil floating on the water surface or adhered to the bed or underside of the ice cover.
SMAP	Susitna Matanuska Area Plan
Smolt	An adolescent salmon which has metamorphosed and which is found on its way downstream toward the sea.
Smoltification	The physiological changes anadromous salmonids and trout undergo in freshwater while migrating toward saltwater that allow them to live in the ocean.
SMP	Shoreline Management Plan
SNAP	Scenarios Network for Alaska and Arctic Planning.
SNP markers	Single-nucleotide polymorphism (SNP) is a change to a single nucleotide in a DNA sequence. The relative mutation rate for an SNP is extremely low. This makes them

Abbreviation	Definition
	ideal for marking the history of genetic trees.
SO ₂ ; SO ₂	Sulfur dioxide
Soil heat transfer	Heat flow between the soil surface and the deeper layers. Heat transfer varies with soil type, moisture, horizon, etc. The flow of heat is directed from warmer layers to cooler layers. Heat transfer in soil is substantially influenced by the snow cover, vegetation, and terrain.
Soil water storage variations	Seasonal changes in where and how water is stored in a hydraulic system.
Solar geometry	Angle of the sun's rays to the surface.
Spaghetti tag	A long, thin external tag type used to mark individual fish. Sometimes referred to as anchor or dart tags, they are usually made of vinyl tubing that can have study information printed upon.
Spawning	The depositing and fertilizing of eggs by fish and other aquatic life.
Split main channel	Main channel habitat characterization where three or fewer distributed dominant channels.
Sport fishery	Also known as a recreational fishery, a sport fishery consists of fish taken for pleasure or competition. It can be contrasted with commercial fishing, which is fishing for profit, or subsistence fishing, which is fishing for survival.
Spring	Area where there is a concentrated discharge of groundwater that flows at the ground surface.
SpUD	Special use district
SQL	Standard query language
SRMAs	Special Recreation Management Areas
Stable isotope analysis	Stable isotopes have become a popular method for understanding aquatic ecosystems because they can help scientists in understanding source links and process information in marine food webs. Certain isotopes can signify distinct primary producers forming the bases of food webs and trophic level positioning.
Stage	The distance of the water surface in a river above a known datum.
Stage-discharge relationship	The relation between the water-surface elevation, termed stage (gage height), and the volume of water flowing in a channel per unit time.
Staging	Increase in water levels upstream of the leading edge of ice cover caused by the partial blockage of the channel by ice.
STATSGO	U.S. General Soil Map Data, a digital general soil association map developed by the National Cooperative Soil Survey and distributed by the Natural Resources Conservation Service of the U.S. Department of Agriculture.
STB	Surface Transportation Board
Stranding	Fish stranding is any event in which fish are restricted to poor habitat as a consequence of physical separation from a main body of water.
Stratified sampling	A method of sampling from a population. In statistical surveys, when subpopulations within an overall population vary, it is advantageous to sample each subpopulation (stratum) independently. Stratification is the process of dividing members of the population into homogeneous subgroups before sampling.
Streambed	The bottom of the stream channel; may be wet or dry.
Subsistence fishery	A fishery that is typically small-scale and low-technology aimed at supporting oneself at a minimum level.
Supercooled water	Water with a temperature slightly below the freezing point (0°C or 32°F).
SVO	Successor Village Organizations
SW	Surface water. Water that has not infiltrated below ground surface, including rivers,

Abbreviation	Definition
	streams, sloughs, lakes, ponds, wetlands.
SWHS	Statewide Harvest Survey
TCP	traditional cultural property
TCW	Talkeetna Mountains and Chulitna-Watana Hills
TDG	total dissolved gas
TDS	total dissolved solids
TEK	Traditional Environmental Knowledge
Temporary barrier	A feature that that is impassable to all fish for a period of time and is not flow dependent. Temporary instream barriers are widely used for construction and maintenance purposes, as well as access and erosion control.
Terminus	The down-gradient end of a glacier.
Thalweg	A continuous line that defines the deepest channel of a watercourse.
Thermal break-up	Melting in place. Also called in situ break-up.
Thermal cycling	Consists of cycles of repeated heating and cooling of the reaction for DNA melting and enzymatic replication of the DNA.
Thermal ice	Solid ice formed in place in low-velocity areas.
Three Rivers Confluence	The confluence of the Susitna, Chulitna, and Talkeetna rivers at Susitna River Mile (RM) 98.5 represents the downstream end of the Middle River and the upstream end of the Upper River.
TM	Thematic Mapper. One of the Earth observing sensors introduced in the Landsat program.
TOC	total organic carbon
Tracer study	In terms of groundwater applications, the use chemical or physical (usually temperature) properties to determine groundwater pathways and mass exchange with surface water.
Trap and haul	A fish passage facility designed to trap fish for upstream or downstream transport to continue their migration.
Tributary	A stream feeding, joining, or flowing into a larger stream (at any point along its course or into a lake). Synonyms: feeder stream, side stream.
Tributary mouth	Main channel habitat characterization of clear water areas that exist where tributaries flow into Susitna River main channel or side channel habitats.
Trimline	Soil stripped of vegetation by a glacier.
Trotline	A heavy fishing line with baited hooks attached at intervals by means of branch lines called snoods. A snood is a short length of line which is attached to the main line using a clip or swivel, with the hook at the other end.
TSP	total suspended particulate
Turbidity	The condition resulting from the presence of suspended particles in the water column which attenuate or reduce light penetration.
TWG	Technical Workgroup
U.S., US	United States
U.S.C.; USC	U.S. Code
UAAES	University of Alaska Agriculture Experiment Station
UAFAFES	University of Alaska Fairbanks Agricultural and Forestry Experiment Station
UCG	underground coal gasification

Abbreviation	Definition
UCIMA	Upper Cook Inlet Management Area (commercial fish harvest)
Unconfined aquifer	Aquifer whose upper surface is a water table free to fluctuate.
Undercut bank	A bank that rises vertically or overhangs the stream.
Underwater video	Underwater video imaging which can record images in real-time over short time intervals and can provide information on fish species presence/absence in the immediate vicinity. Although water clarity and lighting can limit the effectiveness of video sampling, a distinct advantage of video over DIDSON is the ability to clearly identify fish species.
Unsaturated zone	A subsurface zone above the water table where the pore spaces may contain a combination of air and water.
Upland slough	Off-channel habitat characterization feature that is similar to a side slough, but contains a vegetated bar at the head that is rarely overtopped by mainstem flow. Has clear water.
Upper segment Susitna	The Susitna River upstream of the proposed Watana Dam Site at RM 184.
Upstream fish passage	A fishway system designed to pass fish upstream of a passage impediment, either by volitional passage or non-volitional passage.
Upwelling	The movement of groundwater into rivers, stream, sloughs and other surface water features. This is also called groundwater discharge and may be associated with a gaining reach of a river or stream.
USACE	U.S. Army Corps of Engineers
USCB	U.S. Department of Commerce, Census Bureau
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USFS	USDA, Forest Service
USFWS	DOI, Fish and Wildlife Service
USGS	DOI, Geological Survey
USR	Updated Study Report
USSCP	U.S. Shorebird Conservation Plan
VFD	Volunteer Fire Department
VHF	very high frequency
VOC	volatile organic compound
Volitional passage	Fish passage made continuously available without trap and transport.
VRM	Visual Resource Management system
WaSiM	Water Balance Simulation Model.
Watana Dam	The dam proposed by the Susitna-Watana Hydroelectric project. The approximately 750-foot-high Watana Dam (as measured from sound bedrock) would be located at river mile (RM) 184 on the Susitna River. The dam would block the upstream passage of Chinook salmon, possibly other salmon species, and resident fish that migrate through and otherwise use the proposed Watana Dam site and upstream habitat in the Susitna River and tributaries.
Water slope	Change in water surface elevation per unit distance.
Water stage	The water surface elevation above the bottom of the river channel or above some arbitrary datum.
Water table	The top water surface of an unconfined aquifer at atmospheric pressure.

Abbreviation	Definition
Wetted channel width (wetted Perimeter)	The length of the wetted contact between a stream of flowing water and the stream bottom in a plane at right angles to the direction of flow.
WGEN	Weather generator model that can be used to generate daily values for precipitation, maximum temperature, minimum temperature, and solar radiation. The model accounts for the persistence of each variable, the dependence among the variables, and the seasonal characteristics of each variable.
WSR	Wild and Scenic River
yd	Yard

APPENDIX 3. CHEAT SHEET FOR COMMON TERMINOLOGY AND STYLE CORRECTIONS

Use	Don't Use
X°F Y°C	X °F Y °C
1980s	1980's (search for 0's)
1-D 2-D	1D (except when part of a model's name) 2D (except when part of a model's name)
acre	ac
ADNR <per Style Guide>	DNR
bedload	bed load
break-up	breakup
bullet punctuation Complete thought: <ul style="list-style-type: none"> • XXXXXXXX xx xxx xxxxxxxxxxxx xxxx xxx xxxxxxxxxxxx. • XXXxxxxxxxxxxxx. • XXXxxxxxxxx. or: Complete thought: <ul style="list-style-type: none"> • XXXxxxxxxxxxxxx • XXXxxxxxxxxxxxx • XXXxxxxxxxx 	Incomplete thought: <ul style="list-style-type: none"> • XXXxxxxxxxxx; • XXXxxxx; • XXXx. XXXxxxxxxxx; and • XXXxxx.
chlorophyll-a	chlorophyll-a or chlorophyll a
citations (Doe 2010; Smith et al. 2005; Jones 1994)	(Doe 2010, Smith et al. 2005, Jones 1994)
cross-section	cross section
data (plural)	data (singular)
database	data base
dataset	data set
daytime	day-time
Devils Canyon	Devil's Canyon

Use	Don't Use
Dolly Varden	dolly varden
down-gradient	downgradient
downriver	down river
electrofishing	electro-fishing or electro fishing
Focus Area	FA
Focus Areas	FAs
Fish and Aquatic TWG	FA TWG
fieldwork	field work
fishwheel	fish wheel
Fish and Aquatics Instream Flow Study (FA-AFS)	Instream Flow Study – Fish and Aquatics
floodplain	flood plain
Focus Area	intensive study site or focus area
freshwater (adj)	
fresh water (noun)	
gamebirds	game birds
geo-referenced	georeferenced
gillnet	gill net or gill-net
groundwater	ground water or ground-water
Habitat Suitability Criteria	Habitat Suitability Curve
hand-held	handheld
hydroregime	hydro regime
ice-scar	icescar or ice scar
in situ	in-situ or <i>in-situ</i>
individuals per square meter	individuals/m ²
instream	in-stream
Instream Flow Study (IFS)	instream flow study, Instream Flow study, ISF
Interior Alaska	interior Alaska
intergravel	intragravel, intra-gravel, inter-gravel
landbird	land bird
landform	land form
land use	landuse
off-channel habitat	lateral habitat
License Application	license application
licensing participant	Stakeholder; license participant

Use	Don't Use
life cycle	lifecycle
life history	life-history
life stage	Lifestage
load-following	load following
mainstem	main stem
Mainstem (Open-water) Flow Routing Model	Summer Mainstem Flow Routing Model, Ice-free Mainstem Flow Routing Model
man-made	manmade
meltwater (noun)	melt water (noun)
mesohabitat	meso-habitat
N/A	na n/a
nearshore (adjective)	near shore (adjective)
nighttime	night-time
non-native	nonnative
northern pike	Northern pike
off-channel	off channel
off-site	offsite
on-site	onsite
out-migration	out migration or outmigration
photosignature	photo-signature
pre-nesting	prenesting
Project	project (referring to the Susitna-Watana Project)
Q1 2013	Q1 of 2013 or 1 st Quarter of 2013
QA/QC	QAQC
radio collar (noun) radio-collar (verb)	radiocollar
radio tag (noun) radio-tag (verb forms or adjective)	radiotag
radio-track (verb forms)	radiotrack or radio track
radio telemetry (noun)	radiotelemetry (noun)
Railbelt	railbelt
rangefinder	range-finder
Riparian Instream Flow Study (R-IFS)	Instream Flow Study - Riparian

Use	Don't Use
river mile (RM)	River Mile
riverbank	river bank
runoff	run-off or run off
saltwater (adj) salt water (noun)	
Section xxx	section xxx
shorebird	shore bird
side channel	sidechannel
Southcentral Alaska	southcentral Alaska
Southeast Alaska	southeast Alaska
spaghetti tag (noun) spaghetti-tagged (verb forms or adjective)	
sportfish	sport fish
stream bank	streambank
streamflow	stream flow
Stream gage	stream gauge
subbasin	sub-basin
sub-sample	subsample
surface water	surface-water
Three Rivers Confluence	3 rivers confluence or Three Rivers' Confluence or confluence with Chulitna River
Technical Workgroup	Technical Work Group
tidewater	tide water
time-lapse camera	time lapse camera
trapline	trap line
wadeable	wadable
waterbird	water bird
water body	waterbody
waterfowl	water fowl
Water Year	water year
website	Web site or web site
Whiskers Slough	Whisker's Slough
workgroup	work group

APPENDIX 4. RSP LIGHT EDITING CHEAT SHEET

Items to Check:

General tech edit items

- Read for spelling and grammar errors.
- Define abbreviations at first reference in each study plan (not clear what to do for intro sections X.1-X.4).
- Check consistency of terminology (with above list, the latest style guide (V5, as of December 2012), R2's study guide addendum, and mainstem habitat classification table).
- Cross check in-line citations with Literature Cited section.
- Confirm each table/figure is referenced in the text.
- Verify that all headings are left justified (note that Heading Level 3 is often out of whack).

Header

- Should say "Revised Study Plan" (Arial narrow font, 10 pt, italics).

Footer

- Arial narrow font, 10 pt, right-hand corner should say "December 2012".
- Check footer format on landscape pages and move tabs to the right margin accordingly.

"INTERIM DRAFT" Watermark

- Delete from all pages.

Tables/Figures

- Move to the proper sections at the end of each study plan, as necessary. Tables are typically Section X.Y.10, and figures are typically Section X.Y.11.
- Table and figure captions are Times New Roman font, 9 pts, bold; lower case (as appropriate); end with a period.
- Table captions go above the table; figure captions go below the figure.

Standard Language – Section X.4

- Confirm that leads have revised this section as follows: 1) no longer include any discussion of pre-PSP consultation; 2) summarize key post-PSP consultation efforts (TWG meetings, site visits, telephone calls, etc.); and 3) include a reference to both comment/response tables as attached to the RSP, consistent with the below:

- Summary tables of comments and responses from formal comment letters filed with FERC through November 14, 2012, are provided in Appendix 1. Copies of the formal FERC-filed comment letters are included in Appendix 2. In addition, a single comprehensive summary table of comments and responses from consultation, dated from Proposed Study Plan (PSP) filing (July 16, 2012) through release of Interim Draft RSPs, is provided in Appendix 3. Copies of relevant informal consultation documentation are included in Appendix 4, grouped by resource area.

General order of Heading Level 3 sections at end of each study plan

- Schedule
- Interdependencies with Other Studies
- Level of Effort and Cost
- Literature Cited
- Tables
- Figures

Schedule section

- Confirm that each study plan includes a schedule table, consistent with the standard format (most if not all should, exception may be Section 16, an initial draft of which was just recently posted).
- Delete the 2012 columns in the schedule table if there is no corresponding scheduled effort for 2012 (list of 18 2012 study efforts at end of this document).
- NOTE: No standard text regarding commitment to quarterly TWG meetings has been inserted into any study plans to date.
- Dates for ISR and USR (in Schedule section, in schedule table, and elsewhere in text)
 - ISR –in text “February 2014”, in schedule table 1Q 2014.
 - USR – in text “February 2015”, in schedule table 1Q 2015.

“Interdependency with Other Studies” section

- To be a separate section following Schedule section (typically Section X.Y.7).
- Interdependency materials should include both explanatory text and a figure/chart (reference to figure/chart in text, actual figure/chart in Figures section).

2012 STUDIES (18 TOTAL)**Water Resources**

- Review of Existing Water Temperature Model Results and Data Collection
- Aquatic Habitat and Geomorphic Mapping of the Middle River Using Aerial Photography
- Reconnaissance-Level Geomorphic and Aquatic Habitat Assessment of Project Effects on Lower River Channel
- Documentation of Susitna River Ice Breakup and Formation

Instream Flow

- Instream Flow Planning Study
- River Flow Routing Model Data Collection

Fish and Aquatic Resources

- Synthesis of Existing Fish Population Data
- Adult Salmon Distribution Habitat Utilization Study
- Upper Susitna River Fish Distribution and Habitat Study
- Cook Inlet Beluga Whale Anadromous Prey Analysis

Botanical Resources

- Vegetation and Wildlife Habitat Mapping Study
- Wetland Mapping Study
- Riparian Study

Wildlife Resources

- Eagle and Raptor Nest Study
- Past and Current Big Game Harvest Study
- Wildlife Habitat Use and Movement Study

Recreation and Aesthetic Resources

- Aesthetic and Recreation Resources Study

Cultural Resources

- Cultural Resources Study

APPENDIX 5. MAINSTEM HABITAT CLASSIFICATION TABLE

One of the FERC comments noted that there needed to be consistency in terminology and categories of habitat classification across resource disciplines.

Level	Unit	Category	Definitions
1	Major Hydrologic Segment	Upper, Middle, Lower River	Defined Reach Breaks <i>Upper River</i> – RM184-248 (Note Mapping only extends to RM 233) <i>Middle River</i> – RM 98.5-184 <i>Lower River</i> – RM 0-98.5
2	Geomorphic Reach	Upper River Reaches 1-6 Middle River Reaches 1-8 Lower River Reaches 1-4	Geomorphic reaches that uniquely divide major hydraulic segments for the upper, middle and lower river based on geomorphic characteristics
3	Mainstem Habitat	Main Channel Habitat Off-Channel Habitat Types ¹ Tributary Habitat	Main Channel Habitat: <i>Main Channel</i> – Single dominant main channel <i>Split Main Channel</i> – Less than 3 distributed dominant channels <i>Braided Main Channel</i> – Greater than 3 distributed dominant channels <i>Side Channel</i> – Channel that is turbid and connected to the active main channel but represents non-dominant proportion of flow <i>Tributary Mouth</i> – Clear water areas that exist where tributaries flow into the Susitna River main channel or side channel habitats (upstream Tributary habitat will be mapped as a separate effort) Off-Channel Habitat: <i>Side Slough:</i> Overflow channel contained in the floodplain, but disconnected from the main channel. Has clear water. ² <i>Upland Slough:</i> Similar to a side slough, but contains a vegetated bar and is rarely overtopped by mainstem flow. Has clear water. ² <i>Backwater:</i> Found along channel margins and generally within the influence of the active main channel. Water is not clear. <i>Beaver Complex</i> – Complex ponded water body created by beaver dams Tributary Habitat: Tributaries will be mapped to the upper hydrological influence of the mainstem

Level	Unit	Category	Definitions
4	Main Channel Mesohabitat	Main Channel and Tributary Habitat	Main Channel and Tributary Mesohabitat: Cascades – a fast water habitat with turbulent flow and hydraulic steps Riffle – fast turbulent water with shallow flow Pool – slow water habitat with minimal turbulence and deeper in depth due to a hydraulic control Run – fast water with minimal to moderate turbulence Glide – slower water with minimal turbulence
5	Edge Habitat	Length of Shoreline Habitat	Calculation – will be determined by doubling the length of the mapped habitat unit

TEXT FROM IFS RSP –

Further refinements to the stratification system being applied to the Susitna River have been made since the PSP as a result of discussions during the August, September, and October 2012 TWG meetings and two interdisciplinary team meetings that were focused on study site selection and habitat mapping. Although the major divisions associated with the Middle and Lower segments have been retained, these are now incorporated into a more refined hierarchical stratification system that scales from relatively broad to more narrowly defined categories as follows:

Segment → Geomorphic Reach → Mainstem Habitat Type →

Main Channel Mesohabitat Types → Edge Habitat Types

The highest level category is termed **Segment** and refers to the Middle River Segment and the Lower River Segment.

The **Geomorphic Reach** level is next and consists of the eight categories (*MR-1 through MR-8*) for the Middle River Segment and six categories (*LR-1 through LR-4*) for the Lower Segment (see RSP Section 6.5.4.1.2.2 and Table 8.5-5). The geomorphic reach breaks were based in part on the following five factors: 1) Planform type (single channel, island/side channel, braided); 2) Confinement (approximate extent of floodplain, off-channel features); 3) Gradient; 4) Bed material / geology; and 5) Major river confluences.

This level is followed by **Mainstem Habitat Types**, which capture the same general categories applied during the 1980s studies but includes additional sub-categories to provide a more refined delineation of habitat features (Table 8.5-6). Major categories and sub-categories under this level include Main Channel Habitats consisting of *Main Channel, Split Main Channel, Braided Main Channel, Side Channel, and Off-channel Habitats* that include *Side Slough, Upland Slough, Backwater and Beaver Complexes*; and *Tributary Habitats* that consist of the segment of the tributary influenced by mainstem flow.

The next level in the hierarchy is **Main Channel and Tributary Mesohabitats**, which classifies habitats into categories of *Cascades, Riffle, Pool, Run, and Glide*. The mesohabitat level of classification is currently limited to the main channel and tributary mouths for which the ability to delineate these features is possible via aerial imagery and videography. Mesohabitat mapping in side channel and slough habitat types will require ground surveys.

The last level in the classification is **Edge Habitat** and is intended to provide an estimate of the length of shoreline in contact with water within each habitat unit. The amount of edge habitat within a given habitat unit will provide an index of habitat complexity, i.e., more complex areas that consist of islands, side channels, etc. will contain more edge habitat than uniform, single channel areas.

These stratification levels are described in Table 8.5-6 with further information provided in both the Geomorphic Study Plan (see RSP Section 6.5.4.1.2.2) and the Habitat Characterization Study Plan (see RSP Section 9.9).

The fundamental goal of stratification is to define segments/reaches with effectively similar characteristics where, ideally, repeated replicate sampling would result in parameter estimates with similar statistical distributions. The stratification/classification system described above is designed to provide sufficient partitioning of sources of variation that can be evaluated through focused study efforts that target each of the habitat types, and from which inferences concerning habitat–flow responses in unmeasured sites can be drawn.