

Section 8: Numbers

For informational and educational publications, documents having primarily a public audience, as well as all correspondence, use the *General Style* described in Section 8.1. For all technical and scientific reports and publications published in-house, use the *Modern Scientific Style* described in Section 8.2

8.1 General Style

For informational and educational publications, documents having primarily a public audience, as well as all correspondence, use the General Style.

a. Cardinal numbers

1. With few exceptions, single-digit numbers are spelled out.

Use: seven deer three biologists two lakes

Single-digit numbers are not spelled out in the following instances: dates, money, clock time, proportions or ratios, percentages, or when used with abbreviations or symbols of a unit of measure.

Use: November 10, 2010 10 November 12:30 PM 18:02
a ratio of 3:2 6% 7 mm 3°C \$6

2. Use numerals for two-digit numbers, except in the rather unusual situation in which a number is used idiomatically.

Use: 10 deer 11 biologists 15 percent \$64 or 64 dollars

3. Spell out all numbers that are used idiomatically or within a figure of speech when the numerative function has become secondary.

Use: a thousand and one questions
the sixty-four-thousand-dollar question
in any one [given] week

4. For closely associated numbers or numbers in a series, if any one of the numbers is two digits, then use numerals for all of the numbers. If all are single-digit numbers, spell them out.

Use: three males, four females, and seven unknown
3 males, 10 females, and 7 unknown
from five to six
two of the four
from 5 to 11
2 of the 12
of the 15 samples, 3 were contaminated and 1 was...

5. Use numerals for all decimal numbers.

Use: 1.1 million 0.3 miles 1.75 units multiplied by 0.667

b. Ordinal numbers

For ordinals, follow the scientific number style in Section 8.2.

8.2 Modern Scientific Style

Use *Modern Scientific Number Style* for all technical and scientific reports and publications. *Modern Scientific Number Style* uses numerals for most single-digit whole numbers. In this style all quantities are expressed in a similar manner; as numerals have greater visual distinctiveness than words, this increases the profile of quantities in running text (CSE 2006).

a. Cardinal numbers

Quantitative elements in scientific writing are of paramount importance; use numerals rather than words to express whole and decimal numbers in scientific text, titles, headings, tables and figure captions. This practice increases their visibility and distinctiveness, and emphasizes their enumerative function.

Use: 3 hypotheses 7 samples 52 trees
328 amino acids 4 times 0.5 mm

Numerals are also used to designate mathematical relations, such as ratios and multiplication factors.

Use: 100x magnification 5:1 4-fold

There are four categories of exceptions when numbers should be spelled out.

1. Spell out all numbers used to start a sentence. If it can be done, reword the sentence with the number appearing within the text.

Use: The largest dose is 20 mg, but 15 mg will be enough.

Use: The drug is administered in a single dose; 20 mg is the desired amount, but 15 mg is enough.

Avoid: Twenty milligrams is the desired amount, but 15 mg is enough.

2. When two numbers are adjacent, spell out the number that is most easily expressed in words, and leave the other as a numeral. In general, retain as a numeral any number that occurs with a unit of measurement. If possible, reword the sentence to separate the numbers.

Use: The sample was divided into eight 50 g aliquots.

Use: The sample was divided into 8 aliquots of 50 g each.

Avoid: The sample was divided into 8 50-gram aliquots.

3. For most general, nonenumerative uses, spell out *zero* and *one*.

Use:	one of the subspecies	in one such instance	one is obliged to
	one of the most important	at one time	the zero in Table 3
	this one is promising	zero-based budgeting	one reason

Zero and *one* also have a variety of functions which make their quantitative meaning irrelevant. When possible, reword these constructions to remove appearance of inconsistency.

Use:	One must never forget. [personal pronoun or synonym for <i>you</i>]
	This one is preferred. [indefinite pronoun]

Additionally, the numeral “1” can be easily confused with the letters “I” and “l”, particularly in running text, and the value “0” can be confused with the letters “O” or “o” used to designate a variable. However, express the whole numbers *zero* and *one* as numerals when they are connected to a unit of measure, when they are used as assigned or calculated values, or when they are part of a series, or closely or intermittently linked with numbers.

Use:	1-digit number	1 year	[unit of measure]
	when $n = 1$	0 °C	[unit of measure]
	Between 0 and 2	0, 1, 5, and 9 were	[closely linked]
	1 of 4 subspecies	2 applications instead of 1	[intermittently linked]

4. When a number does not specify a quantity or is used idiomatically, it should be expressed as a word. However, try to avoid using numbers idiomatically or as figures of speech; they are inappropriate for scientific writing as they may not be readily understood by readers whose first language is not English.

These usages are discouraged in scientific and technical documents, where exactness of meaning and the ability to interpret text into other languages is important.

Use:	We can draw several conclusions from the data.
Avoid:	This data tells us a thing or two.
Use:	The data could lead us to innumerable possible conclusions
Avoid:	The data opens up a thousand and one possibilities.

The decision between idiomatic and enumerative uses may not always be clear. For example, in the phrase “We deleted those five data points” “five” could be considered more descriptive (indicating which data points) than enumerative and as such may be better expressed as a word, although the numeral form could be used, if preferred. In contrast, in the phrase “We deleted 5 data points, the 5 is clearly enumerative (it indicates how many data points, but not which ones in particular) and therefore should be expressed as a numeral. The word *the* or *those* immediately preceding a number generally indicates ambiguous situations such as these.

b. Ordinal numbers

Ordinal numbers generally convey rank order rather than quantity. As such, rather than being expressly enumerative (answering the question “How many?”), they often instead describe *which*, *what*, or *in what sequence*. Because this function of ordinals is more prose-oriented than quantitative, distinctiveness within the text is less important for ordinal numbers, and nondisruptive reading flow and comprehension take precedence. Potential confusion between the numeral “1” and the letters “l” and “I” is also a consideration.

1. Spell out single-digit ordinals (corresponding to the numbers 1 to 9), used as adjectives or adverbs.

Use: the ninth time a third wave of immigrants
 were first discovered the first ducklings emerged

2. The numeric form of two-digit ordinals (corresponding to the numbers 10 and higher) is less likely to impede comprehension, and the practice of using the numeric form for such ordinals is well established. Therefore, express these larger ordinals as numerals.

Use: for a 10th time the 98th test run the 19th century

3. Express single-digit ordinals in the numeric form if they appear in a series or are intermittently linked with larger ordinals.

Use: The 5th, 8th, and 10th [not fifth, eighth and 10th or tenth] replications failed.
 We developed 12 hypotheses, and tested the 2nd. The 11th hypothesis was rejected as not a viable possibility.

4. To provide visual cues to comprehension, single-digit ordinals may be expressed in the numeric form if they are used repeatedly.

Use: Of the 6, we examined the 4th subject, then we looked at the 5th subject.
 We finally returned to review the 1st, 2nd, and 3rd subjects.

Although the general policy for ordinals would dictate that words be used here, the numeric form provides more distinction for the references to the individual subjects. *Subject 1*, *subject 2*, and so on would accomplish the same thing. The numeric ordinals also enhance contrast with the adverbial use of *first* in this example. Whichever style is chosen in this situation—numeric ordinals or the spelled-out form—it should be used consistently throughout a document.

8.3 Dates

For both scientific and general style, spell out the names of days of the week and months in text. When placed in tables, graphs, and references, the names of days and months can be abbreviated to their first three letters (without a period).

Do not use an apostrophe with years, unless they are possessive.

- Use: The 1988 coho salmon return to Southeast Alaska was the lowest since the 1970s.
 Use: Data collected during the past two years indicates that 2005's largest storm occurred in March.
 Avoid: We concluded that this population has probably recovered from overfishing incurred in the 1970's.

When writing dates, use no punctuation in the following formats.

- Use: On 10 November 2009 we pulled the last net.
 In November 2009 we pulled the last net.
 On November 10 we pulled the last net.

When a date is written with the day following the month, use cardinal numbers, even though they may be pronounced as ordinals (Gregg 2005).

- Use: November 10 [which may be pronounced November *tenth*]
 Avoid: November 10th
 Avoid: November 10th

However, use commas in the following format.

- Use: on November 10, 2009, we...

8.4 Time of Day

a. General style

For general style (memos, news releases, letters, and documentation for the Alaska Board of Fisheries processes), use the 12-hour system. For *ante meridiem* and *post meridiem* use lower case *a.m.* and *p.m.* with periods following. Spell out *noon* and *midnight*.

- Use: 12:45 a.m. 9:30 p.m.
 The fishery will open at noon and close at midnight.

b. Modern scientific style

For scientific style, use either the 12-hour system or the 24-hour clock (military), but not both in the same document, unless your audience is military or public safety personnel.

12-Hour System: For *ante meridiem* and *post meridiem* use uppercase or small capitals for *AM* and *PM*, separated from the time with a space, and with no periods following. Spell out *noon* and *midnight*. Minutes are separated from hours by a colon, and a leading zero is added if necessary so that the minutes are presented as a two-digit number:

Use: 12:01 in the morning is the same as 1 minute after midnight or 12:01 AM
 12:01 in the afternoon is the same as 1 minute after noon or 12:01 PM

24-Hour System: The 24-hour system is used without punctuation or AM and PM designations. The day begins at 0000 (midnight) and ends at 2359; so 2400 of one day = 0000 of the next day. If the context of time in this format could be ambiguous, put the word *hours* after the 4-digit number. Do not use the abbreviation *h* for hours after the four digits. Spell out *hours* because the abbreviation *h* is used to denote an amount of elapsed time rather than a time of day.

Use: 0602 = 6:02 AM 1802 = 6:02 PM

8.5 Fractions, Percentages, and Decimals

a. Fractions

In general, fractions should be spelled out in running text. Hyphenate all fractions, whether used as adjectives or nouns.

Use: One-half [or half] of the subjects A third of the study plots
 Nearly three-quarters of the population A two-thirds majority

For fractional quantities greater than 1, mixed fractions may be used if the precise value is not intended. The fraction should be set close to the whole number with no intervening space.

Use: was followed for 3½ years about 1¼-km distance

b. Percentages and decimals

When the precise value must be conveyed, the decimal or percent form is preferred.

Use: 3.5 L 27% of the an area measuring 1.25 × 3.0 km

For numbers less than 1.0 always use an initial zero before the decimal point in text, tables, and figures. Never terminate an integer by a decimal point except at the end of a sentence, where it is a period (CSE 2006).

Use: 0.497 Not: .497
 Use: $P = 0.05$ Not: $P = .05$
 Use: 74 Not: 74.

8.6 Ranges

a. General style

In General Style spell out two-digit whole numbers.

Use: between ten percent and thirty percent of the...

Avoid: between 10% and 30% of the...

b. Modern scientific style

When expressing a range of numbers in text, use the word *to* or *through* to connect the numbers.

Use: The daily temperature ranged from -7°F to 15°F .

Alternatively, an en dash (which means *to* or *up to and including*) may be used between two numbers (see Section 10.5 Dashes and Hyphens) that are not interrupted by words, mathematical operators, or symbols (to avoid confusion with the minus symbol).

Use: We observed weight changes of -3 to -1 g.

Avoid: We observed weight changes of $-3 - +3$ g.

If *from* or *between* is used before the first of a pair of numbers, do not use the en dash; *from* should be followed by *to* or *through*, and *between* should be followed by *and*. Avoid *between ... and* where precision is required (CSE 2006).

Use: from 240 to 350 guests
 from 7 June through 15 June
 between 7 and 12 samples

Avoid: from 240–350 guests
 from 7 June–15 June
 between 7 samples–12 samples

When the range includes numbers of several digits, do not omit leading digits from the second number in the range. Fully state both numbers in a range, so they can each stand alone.

Use: 56,000 to 74,000 Avoid: 56 to 74,000

A range of numbers and the accompanying unit can be expressed with a single unit symbol after the second number of the range if there is a space between the number and the symbol. When the symbol must be closed up to the number (e.g., the percent symbol) the abbreviation or symbol is repeated after both numbers.

Use: from 23 to 47 kV from 50 to 250 W/m² from 10% to 15%

Use: from 5 to 67 mm long between 10% and 30%

Avoid: from 5 mm to 67 mm long between 10 and 33% of the

However, when used with the en dash range indicator, use the symbol only after the second number.

Use: 10–15%

For a series of numbers, present the unit after the last numeral only, except if the unit symbol must be set close to the number:

Use: 12, 17, 43, and 76 cm categories of <3, 3–7, and >7 g
38%, 55%, and 29% \$15, \$22, or \$31

If a range begins a sentence, work to recast the sentence. The alternative is to spell out the first number, and write the second as a numeral with the accompanying unit. These constructions are awkward and appear inconsistent, and should be avoided.

Use: The test range was 23–25 km
Avoid: Twenty-three to 25 km

Do not use the word *by* before a range because it may convey an increment of change from an original value, rather than a range of values.

Use: Growth increased 0.1 to 0.3 g/d (a range)
Avoid: Growth increased by 0.1 to 0.3 g/d (to avoid implication that growth increased by 0.1 g/d to a new level of 0.3 g/d)

For the same reason, be careful when expressing two numbers preceded by words such as *increase*, *decrease*, or *change*. In those cases a range may be intended, but the reader may misinterpret the first value as the initial value and the second as the new value (CSE 2006).

Avoid: increased from 15 cm to 25 cm [could mean an increase of 10 cm, or it could mean an increase in the range of 15 to 25 cm]

Unless context makes interpretation unequivocal, qualification may be needed.

Use: increased from an initial 10 g/d to a final 18 g/d
Avoid: increased by a range of 10–18 g/d

When changes are from one range to a new range, an en dash within each range may be easier for readers to interpret quickly.

Use: increased from 10–23 mm to 12–27 mm
Avoid: increased from 10 to 23 mm to 12 to 27 mm

8.7 Units of Measure, Mathematical Symbols, and Variables

Symbols may have an alphabetic basis (e.g., mm, kV, g, qt, ft) or a nonalphabetic basis (e.g., %, \$, ≈). Spacing between numbers and units of measure or symbols varies. See Appendix A: Units of Measure, Scientific Abbreviations, Symbols, Conversions, Variables, Mathematical Operators, and Equations for more detailed information.

1. Use a single space to separate a number and subsequent alphabetic symbol. The abbreviations for units of measure are identical in the singular and in the plural.

Use: 5 g 17 qt 6 Kv A length of 130 mm

2. Close up a number and a nonalphabetic symbol, whether the symbol precedes or follows the number unless the symbol is a mathematical operator.

Use: 10% \$62.00 90°F

3. Geographic coordinates have no spaces over the entire coordinate (see Section 8.8 Latitude and Longitude).

4. Mathematical or variable symbols should not begin a sentence. Write out the complete term in words or rewrite the sentence.

Use: Five gallons of seawater were added to the tank

Avoid: Five g of seawater were added to the tank.

Use: Eighty-eight percent of the samples were not usable.

Avoid: Eighty-eight % of the samples were not usable.

See Appendix A.2 Variables and Mathematical Symbols for more information.

8.8 Latitude and Longitude

Spell out these terms when they appear alone in text without specific numeric designations, but abbreviate them to *lat* and *long* when they appear as part of a coordinate.

There are several ways of presenting latitude and longitude—such as stripping the coordinate of nonnumeric characters—which have been developed recently for storage of data in electronic databases.

Present a geographic coordinate with latitude first, followed by a comma and then longitude. The numbers and symbols are presented without spaces using a leading zero for degrees, minutes, and seconds fewer than 10, followed by the directional designation (N, S, E, W). Use the prime symbol (not a single quotation mark or apostrophe) for the minutes and the double prime symbol (not a double quotation) for seconds.

Although *N* and *S* imply latitude, and *E* and *W* imply longitude, use of the abbreviations *lat* and *long* may aid in understanding.

Use: lat 43° 15'09"N, long 116° 40'18"E or 43° 15'09"N, 116° 40'18"E
 lat 04° 59'17"S, long 01° 02'03"W or 04° 59'17"S, 01° 02'03"W

Latitude and longitude may be reported in decimal degrees instead of degrees, minutes, and seconds. Decimal degrees are easier to use in databases and spreadsheets. The degree symbol is omitted, as is the plus sign for northern latitudes and eastern

longitudes; the minus sign is included for southern latitudes and western longitudes (CSE 2006).

Use:	lat 38° 45'N	becomes	lat 38.75
	long 38° 52'30"	becomes	long 38.875

8.9 Measurements

a. Symbols

A unit of measurement may be abbreviated (12 ft) or expressed as a symbol (12') in technical material or tables. Do not use a period at end of the abbreviation.

Use: averaged 6 ft (1.8 m).

When using the symbol, use the foot and inches symbols (prime and double prime), not the apostrophe or quote symbols.

Use: 12'7"
Avoid: 12'7" or 12'7"

8.10 Pacific Salmon Ages

For any given salmon brood, their birth date is conceptually standardized at January 1 of the year following the brood year, regardless of when a given brood actually hatched. For example, a brood spawned in 1995 conceptually hatched January 1, 1996, and the aging clock begins to run on that date. Therefore, a juvenile salmon spawned in 1995 will be age 0 throughout 1996 and age 1 throughout 1997, etc.

In a document that refers to salmon ages, at least some of which include saltwater life stages, the age of salmon and other anadromous fishes should be reported using the European aging system. One digit is placed to the left of a decimal point to indicate freshwater age (not including the year spent in the gravel during egg incubation and hatching—referred to as the gravel year), and another digit is placed to the right of the same decimal point to indicate ocean age. For example, an age-2.4 Chinook salmon spent three years in freshwater (the gravel year is not included in the European aging system), four years in the ocean, and is seven years old (from the time of egg deposition/birth).

The inclusion of the qualifier *freshwater* or *saltwater* is acceptable. Use one option consistently throughout the report; do not mix.

Use:	saltwater-age-4	age-.4	ocean-age-4	age-2.4
Avoid:	4-ocean fish	ocean-4 fish		

In a document mentioning freshwater ages, drop the European system's period (i.e., avoid x.) and use the age without the period (i.e., age x); however, make sure that

you indicate freshwater-age-2 anadromous fish so that freshwater age is not confused with total age.

Use: freshwater-age-2 smolt juvenile
Avoid: age-2. age-2 [can indicate both freshwater age or total age]

When age designation is used as an adjective before the noun, the compound adjective is modifying, so there should be a hyphen separation. When the age term is being used as a noun there is no hyphen.

Use: The sibling model prediction for the return of age-1.3 sockeye salmon in 2010 was based on abundance of age-1.2 sockeye salmon in 2009.
Age-1.2 Chinook salmon represented between 4.3% (2002) and 75% (2005) of the samples collected from the test fishery.
Chum salmon mature between age 0.3 and age 0.5. [ages are not adjectives]

If a series of ages is used in a series of adjectives before the noun, the ages should have hanging hyphens. If there is a series of ages that are not used as adjectives, then there is no hyphen.

Use: All salmon were classified into age-.1, -.2, or -.3 categories. [categories is the noun]
The dominant age classes for large fish in the Blossom River were age 1.2 (13.8%), 1.3 (33.0%), and 1.4 (38.5%) for both sexes combined. [series of ages not used as adjectives]

The rules of age terms can also be applied to salmon ages. (see *age terms* in Section 4.1 Compound Words).

Use: 7-year-old Chinook salmon