

5. *Numbers and Measurements*

NUMBERS

Word or Numeral?

- 5.1** As a general rule, spell out numbers less than 10 unless they are used with units of measure:

four anglers 12 boats
4 cm 7 weeks

Note that counts (e.g., numbers of fish) are not considered measurements:

six white bass *not* 6 white bass

EXCEPTIONS

- 5.2** Always spell out numbers at the beginning of a sentence; if they are used with units of measure, spell out those units as well:

Twelve repetitions were. . . . Ninety-five days later, . . .

- 5.3** Spell out numbers less than 10 that are used with units of measure (as well as the units of measure) when there are intervening words:

five long days seven or more centimeters

- 5.4** Spell out numbers less than 100 when they modify a compound adjective that contains a number:

ten 30-cm fish *but* 105 30-cm fish

- 5.5** Use numerals for all numbers that apply to the same or similar items when any of those numbers are greater than 9 and they occur in close proximity to one another:

4 rainbow trout and 12 striped bass from 5 to 20 anglers 2–20 ponds

- 5.6** Use numerals for numbers used as numbers or designating items in a sequence:

The index ranges from 1 to 5. Outcomes were coded 0 or 1.
experiment 2 tank 3

Precision

- 5.7** In general, give the same number of digits for numbers pertaining to a given phenomenon:

5.73–6.10 *not* 5.73–6.1

The one exception pertains to zeros that are not significant.

Numbers with Many Digits

- 5.8** In text, use commas in large numbers unless they are coefficients or other parameters:

1,234 . . . + 1829·x + . . .

- 5.9** Use scientific notation for very large or small numbers:

3.4×10^6 1.94×10^{-3}

Note that it is acceptable to use the word “million” in a number (e.g., 3.4 million instead of 3.4×10^6). Avoid using the word “billion,” however, because it is ambiguous (in the United States it means 10^9 , but in some other countries it means 10^{12}).

Decimals

- 5.10** Use a leading zero with decimal numbers less than 1.00:

0.05 *not* .05

Fractions

- 5.11** In text, spell out fractions:

one-third three fifty-fifths forty-two hundredths

Ordinal Numbers

- 5.12** Treat ordinal numbers the same as cardinal numbers, but spell out units of measure:

third day fifth hour 22nd day 15th repetition
every 10th meter third-order stream

Use the abbreviations “st,” “nd,” “rd,” and “th” to denote ordinal numbers; these should be set on the same line as the numeral:

11th *not* 11th

Dates and Time

- 5.13** Either the American or the European convention may be used for dates provided that the usage is consistent:

March 29, 2002 *or* 29 March 2002

Note that in text a comma follows the year in the American convention but not in the European convention:

With respect to mortality, August 11, 1999, was the peak day.

but With respect to mortality, 11 August 1999 was the peak day.

Commas should not be used when only the month and year are given:

June 2001 *not* June, 2001

- 5.14** Time should always be given in terms of the 24-hour clock:

0800 hours 1545 hours

Note that the plural “hours” is always used and that it is never abbreviated:

0030 hours *not* 0030 hour *or* 0030 h

MEASUREMENTS

English or Metric Units?

- 5.15** The term “metric units” refers to the units of measure included in the International System of Units established in 1960.

Metric units must be used in AFS books and *Fisheries* as well as in *Transactions of the American Fisheries Society* and the *Journal of Aquatic Animal Health*. Either English or metric units may be used in the *North American Journal of Fisheries Management* and the *North American Journal of Aquaculture* as long as one set of units is used consistently.

A list of acceptable units is given on the page entitled “Symbols and Abbreviations” in the back of each journal.

EXCEPTIONS

- 5.16** English units may be used in lieu of metric units when the English measure is the one most commonly used, as is frequently the case with construction materials and some pieces of equipment. To the extent that it is practical, provide a metric equivalent or conversion factor:

¼-in (0.635-cm) screw
100 hp (1 hp = 746 W)

- 5.17** Units may be mixed when this is the common practice:

grams of medication per pound of feed (g/lb)

Abbreviations

- 5.18** In text, units of measure are generally abbreviated (unless there is no abbreviation) when preceded by a number and spelled out otherwise:

3 km *but* a few kilometers
7 g *but* measured in grams

A list of acceptable abbreviations appears on the page entitled “Symbols and Abbreviations” in the back of each journal. Other abbreviations may be used but must be defined at the first occurrence.

The following units are always spelled out:

acre ton year month week

Note that there are no separate plural forms for abbreviated units of measure:

1 km 8 km

- 5.19** Units of measure that stand alone may be abbreviated when they appear in parenthetical expressions:

Fish were weighed (g). . . .
but Fish were weighed to the nearest gram. . . .

- 5.20** Avoid mixing words and abbreviations:

six boats per day *or* 6 boats/d

not

six boats/d six boats per d *or* 6 boats per day

Note that “6 boats/d” is acceptable even though the first term would ordinarily be expressed as “six boats.”

Operators

- 5.21** In text, operators such as =, >, and < may be used only in parenthetical expressions:

Trophy length fish (>380 mm). . . .
but Trophy length fish, which are those exceeding 380 mm in length, . . .

An important exception to this rule pertains to values expressed as a mean plus or minus a standard deviation:

Fish weighed 2.9 ± 0.35 kg.

Space is required around operators when the term in parentheses expresses a complete thought:

(length \leq 10 cm) *but* length (\leq 10 cm)

Sequences and Ranges

- 5.22** The unit of measure should be given only once if the measurement is written with a space between the number and the unit of measure:

from 6 to 10 mm in length 5, 6, or 7 mm in length

If the measurement is written with no space between the number and the unit of measure, the unit should be repeated when there are only two measurements but given only once when there are three or more:

between 2% and 4% *but* 5, 6, and 7%, respectively

- 5.23** Ranges may be expressed in any of the following ways:

from 72 to 84 s between 72 and 84 s 72–84 s

Note that the rule for repeating units of measure is analogous to that in section 5.22:

between 10°C and 12°C *but* 10–12°C

Monetary Values

- 5.24** Indicate the national currency the first time a monetary value is given:

US\$50,000 Can\$25,000

Consult the current edition of *Scientific Style and Format: The CBE Manual for Authors, Editors, and Publishers* (Council of Biology Editors, Chicago, Illinois) for other currencies and their abbreviations.

Ratios

5.25 Certain ratios are expressed by a colon:

(1:3, male : female) 12 h light : 12 h dark

Note that small spaces should be inserted around the colon when a number follows a letter in a ratio of this type.

5.26 More commonly, ratios are expressed by solidi (slashes):

4.29 mg/L

When there is more than one term in the denominator, negative exponents may be used instead of slashes:

$15 \text{ g}\cdot\text{m}^{-2}\cdot\text{d}^{-1}$

To prevent an expression from becoming unwieldy, it may be preferable to rewrite it:

$15 \text{ g}/(\text{m}^2\cdot\text{d})$ or $15 \text{ g}/\text{m}^2$ daily

Whichever form is used, be especially careful to avoid ambiguity in such ratios (e.g., $15 \text{ g}/\text{m}^2\cdot\text{d}$, which could be interpreted as $15 \text{ g}\cdot\text{d}/\text{m}^2$).

Concentrations

5.27 At first mention, concentrations should be stated precisely:

1 μg of gentamicin/mL of water *not* 1 $\mu\text{g}/\text{mL}$ gentamicin

After the first mention, a shortened form may be used:

1 $\mu\text{g}/\text{mL}$

A similar rule applies to the use of the term “solution”:

in a 10% solution of formalin *not* in 10% formalin

5.28 When metric units are required, parts per thousand, parts per million, and parts per billion should be expressed as in the following table, depending on whether the concentration refers to weight per unit of volume, weight per unit of weight, or volume per unit of volume (note that 1 L of water weighs 1 kg):

Concentration	Weight : volume	Weight : weight	Volume : volume
Parts per thousand	g/L (mg/mL)	g/kg (mg/g)	mL/L (μ L/mL)
Parts per million	mg/L (μ g/mL)	mg/kg (μ g/g)	μ L/L (nL/mL)
Parts per billion	μ g/L (ng/mL)	μ g/kg (ng/g)	nL/L (pL/mL)

5.29 Salinity, which is usually measured as parts per thousand, should be expressed by means of the per mille symbol (‰):

Seawater has a salinity of 30–33‰.

5.30 Blood volumes, which are usually measured in cubic centimeters (cc), should be expressed in milliliters (1 cc = 1 mL); deciliters (1 dL = 10 mL) are also acceptable.

River Kilometers

5.31 Locations along a river are usually stated in terms of the number of river kilometers from a given point:

At river kilometer (rkm [*or* RKM]) 95 of the Ohio River (measuring from its confluence with the Mississippi River), . . .

Note that the term “river kilometer” must be spelled out at first mention and that the “origin” (i.e., the 0-rkm point) must be stated.

Distance traveled along a river should be stated in terms of kilometers alone:

We moved 4 km upriver [e.g., from rkm 95 to rkm 99] to the next sampling site.