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 abnormally cold 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 nine 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 Give the same number of digits for numbers stemming from the same set of measurements or calculations:

5.73–6.10 cm *not* 5.73–6.1 cm

Numbers with Many Digits

5.8 Use commas in numbers with four or more digits:

1,234 56,789.12

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 words "billion" and "trillion," however, because they have different meanings in different countries (e.g., 1 billion is 10^{9} in the United States but 10^{12} in the United Kingdom).

Decimals

5.10 Place a zero before the decimal point in 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 on the same line as the numeral:

11th *not* 11^{th}

Dates and Time

5.13 The U.S. convention should be used for dates:

March 29, 2002 *not* 29 March 2002

Note that in text a comma follows the year:

August 11, 1999, was the peak day for mortality.

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*, the *Journal of Aquatic Animal Health*, and *Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science*. 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 as well as in Appendix B.

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

Lists of acceptable abbreviations appear at the back of each journal and at the front of all symposium proceedings. See Chapter 1 for more details.

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 Operators such as =, >, and < may be used in straight text as well as in parenthetical expressions:

Fish weighed 2.9 ± 0.35 kg.

Values were deemed significant at $\alpha \leq 0.05$.

Trophy length fish (>380 mm). . . .

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

(length ≤ 10 cm) *but* length (≤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

not from 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 *Merriam-Webster's Collegiate Dictionary* 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

strontium : calcium Sr:Ca

Note that there should be spaces around the colon when it is either preceded or followed by a whole word.

5.26 More commonly, ratios are expressed by forward slashes:

4.29 mg/L

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

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

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

$15\ g/m^2$ daily

Concentrations

5.27 At first mention, concentrations should be stated precisely:

1 μg of gentamicin/mL of water

However, if there is no possibility of misunderstanding, the shortened form

1 μg/mL gentamicin

may be used instead. After the first mention, the still more concise form

1 μg/mL

may be used.

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

in a 10% solution of formalin

should be used at first mention and

in 10% formalin

thereafter.

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 (μL/mL)
Parts per million	mg/L (μg/mL)	mg/kg (μg/g)	μL/L (nL/mL)
Parts per billion	μg/L (ng/mL)	μg/kg (ng/g)	nL/L (pL/mL)

5.29 Salinity is usually expressed either as parts per thousand (i.e., grams per liter of water) or as the ratio of the conductivity of the water in question to that of a standard potassium chloride solution. The latter is known as the practical salinity scale and has no units. When salinity is expressed as parts per thousand, the per mille symbol (‰) should be used:

Seawater has a salinity of 30–33‰.

When it is expressed in terms of the practical salinity scale, authors should note that fact. Alternatively, they may indicate that salinity is given in “practical salinity units” or psu.

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.

Geographic Coordinates

5.32 Geographic coordinates may be expressed either in the conventional degrees–minutes–seconds format or as decimal degrees:

> 45°50′28.9386″N, 121°56′43.6668″W
>
> *or*
>
> 45.841372°, –121.945463°

Note that compass directions (N, W, etc.) are not used with decimal degrees.

The precision with which geographic coordinates are reported should be determined by their purpose, i.e., how much detail the reader requires.