Appendix A List of common and scientific names cited

Common name	Scientific name
Abert's towhee	*Pipilo aberti*
American robin	*Turdus migratorius*
Ash-throated flycatcher	*Myiarchus cinerascens*
Baltic rush	*Juncus balticus*
Bewick's wren	*Thryomanes bewickii*
Blackbird	*Turdus merula*
Blackcap	*Sylvia atricapilla*
Black-tailed gnatcatcher	*Polioptila melanura*
Blue-winged teal	*Anas discors*
Bobolink	*Dolichonyx oryzivorus*
Brown-headed cowbird	*Molothrus ater*
Brown towhee	*Pipilo fuscus*
Bullrush	*Scirpus validus*
Bushtit	*Psaltriparus minimus*
Cactus wren	*Campylorhynchus brunneicapillus*
California grey whale	*Eschrichtius robustus*
Cassin's finch	*Carpodacus cassinii*
Cattail	*Typha latifolia*
Chaffinch	*Fringilla coelebs*
Chiffchaff	*Phylloscopus collybita*
Cinnamon teal	*Anas cyanoptera*
Clark's nutcracker	*Nucifraga columbiana*
Coal tit	*Parus ater*
Crissal thrasher	*Toxostoma crissale*
Dall's porpoise	*Phocoenoides dalli*
Dark-eyed junco	*Junco hyemalis*
Darkling beetle	*Eleodes* spp.
Deer	*Odocoileus* spp.
Dolphins	Delphinidae
Dunnock	*Prunella modularis*
Dusky flycatcher	*Empidonax oberholseri*
Eastern grey kangaroo	*Macropus giganteus*

Common name	Scientific name
Field mouse	*Peromyscus* spp.
Fin whale	*Balaenoptera physalus*
Fruit bat	*Chiroptera* spp.
Gadwall	*Anas strepera*
Garden warbler	*Sylvia borin*
Gila woodpecker	*Melanerpes uropygialis*
Goldcrest	*Regulus regulus*
Greasewood	*Sarcobatus vermiculatus*
Green-winged teal	*Anas carolinensis*
Grouse	Tetraoninae
Hares	*Lepus* spp.
Hermit thrush	*Catharus guttatus*
House wren	*Troglodytes aedon*
Jackrabbit	*Lepus* spp.
Kangaroo	Macropodidae
Ladder-backed woodpecker	*Picoides scalaris*
Lake trout	*Salvelinus namaycush*
Lion	Felidae
Long-billed curlew	*Numenius americanus*
Long-tailed tit	*Aegithalos caudatus*
Lucy's warbler	*Vermivora luciae*
Mallard	*Anas platyrhynchos*
Minke whale	*Balaenoptera acutorostrata*
Mistle thrush	*Turdus viscivorus*
Mountain chickadee	*Parus gambeli*
Northern bobwhite quail	*Colinus virginianus*
Northern oriole	*Icterus galbula*
Northern pintail	*Anas acuta*
Northern shoveler	*Anas clypeata*
Omao	*Phaeornis obscurus*
Pacific white-sided dolphin	*Lagenorhynchus obliquedens*
Pheasant	Phasianidae
Pine siskin	*Carduelis pinus*
Porpoise	Phocoenidae
Pronghorn	*Antilocapra americana*
Quail	Odontophorinae
Rabbitbrush	*Chrysothamnus* spp.
Rabbits	Leporidae
Red crab	*Grapsus grapsus*
Redhead	*Aythya americana*
Redpoll	*Carduelis flammea*
Red-winged blackbird	*Agelaius phoeniceus*
Risso's dolphin	*Grampus griseus*
Robin	*Erithacus rubecula*
Rockfish	*Sebastes* spp.
Ruby-crowned kinglet	*Regulus calendula*
Rufous-sided towhee	*Pipilo erythrophthalmus*
Sagebrush	*Artemisia* spp.
Saltgrass	*Distichlis stricta*

APPENDIX A

Common name	Scientific name
Savannah sparrow	*Passerculus sandwichensis*
Scrub jay	*Aphelocoma coerulescens*
Seal	Otariidae/Phocidae
Sedge	*Carex* spp.
Siskin	*Carduelis spinus*
Song sparrow	*Melospiza melodia*
Song thrush	*Turdus philomelos*
Spikerush	*Eleocharis macrosachya*
Spotted dolphin	*Stenella attenuata*
Tree pipit	*Anthus trivialis*
Tuna	*Thunnus* spp.
Verdin	*Auriparus flaviceps*
Whale	Balaenopteridae
White-crowned sparrow	*Zonotrichia leucophrys*
Whitethroat	*Sylvia communis*
Willow warbler	*Phylloscopus trochilus*
Wolf spider	*Atrax* spp.
Wren	*Troglodytes troglodytes*
Wrentit	*Chamaea fasciata*
Yellowfin tuna	*Thunnus albacares*
Yellow-rumped warbler	*Dendroica coronata*
Yellow warbler	*Dendroica petechia*

Appendix B Notation and abbreviations, and their definitions

The following list is not exhaustive; notation is only included here if it is used through much of the text. Some of the notation listed below is occasionally used for another purpose; in such cases, the temporary definition is stated in the text. Standard mathematical and statistical symbols such as ∞, $\sum$ and $\hat{}$ are not listed.

μ effective strip width $= 1/f(0) = \int_0^w g(x)dx$; the half-width of the strip extending either side of a transect centreline such that as many objects are detected outside the strip as remain undetected within it

ν effective area $= 2\pi/h(0) = 2\pi\int_0^w rg(r)dr$ (point transect sampling); the area such that as many objects are detected outside it as remain undetected inside it

$\pi(s)$ probability distribution of cluster sizes in area A
$\pi^*(s)$ probability distribution of sizes of detected clusters; this differs from $\pi(s)$ when sampling of clusters is size-biased

ρ effective radius $= \sqrt{(\nu/\pi)}$; the radius of the circle around each point such that as many objects are detected beyond ρ as remain undetected within ρ

σ a scale parameter, used primarily in the half-normal and hazard-rate detection functions

θ sighting angle (subscript i, if present, denotes the ith detection)

a area within distance w of surveyed lines or points; the surveyed area
A size of study area, containing N objects; a sample of size a of this area is surveyed (subscript v, if present, denotes the vth stratum)
AIC Akaike's Information Criterion, used for model selection

b dispersion parameter, also called variance inflation factor
B number of bootstrap resamples

c the sampling fraction, usually equal to one, but equal to 0.5 if just one side of the line is recorded (line transect sampling), or $\phi/2\pi$ if just an arc of ϕ radians is counted (point transect sampling and, especially, cue counting)
c_i cutpoint i, separating interval i from interval $i+1$, grouped distance data
cov sampling covariance
cv coefficient of variation = (standard error)/(estimate). When expressed numerically, usually converted to a percentage by multiplying by 100

D density of objects in study area = N/A (subscript v, if present, denotes the vth stratum)

$E(s)$ the mean size of the N_s clusters in the study area

$f(y)$ the probability density function of perpendicular distances (line transects) or detection distances (point transects)
$f(y, s)$ the joint probability density function of distances y and cluster sizes s
$f(y \mid s)$ the conditional probability density function of distances y given cluster size s
$f(0)$ the value of the probability density function of perpendicular distances, evaluated at zero distance (line transect sampling)

$g(y)$ the detection function; the probability that an object at distance y from the line or point is detected. If $g_0 < 1$, $g(y)$ is the conditional probability, scaled such that $g(0) = 1$
$g(y, s)$ the bivariate detection function; the probability that a cluster of size s and at distance y from the line or point is detected
$g(y \mid s)$ the conditional detection function; the probability that a cluster at distance y from the line or point is detected, given that it is of size s; functional expression is equivalent to $g(y, s)$
g_0 the probability that an object that is on the line or point ($y = 0$) is detected

$h(0)$ the slope of the probability density function of detection distances, evaluated at distance zero (point transect sampling) = $f'(0) = 2\pi/v = 1/\int_0^w rg(r)\,dr$

k number of replicate lines or points (subscript v, if present, denotes the vth stratum)

l_i the length of line i in a line transect survey, $i = 1, \ldots, k$
L the total line length in a line transect survey = $\sum_{i=1}^{k} l_i$ (subscript v, if present, denotes the vth stratum)
$\mathcal{L}$ the likelihood function for distance sampling

n sample size; number of objects detected (subscript v, if present, denotes the vth stratum)
N population size; total number of objects in the study area of size A (subscript v, if present, denotes the vth stratum)
N_s when objects occur in clusters, the total number of clusters in the study area

P_a the probability that an object in the surveyed area a is detected
pdf probability density function, for example $f(y)$

r the detection or radial distance; the distance of an object from the observer at the time the object is detected (subscript i, if present, denotes the ith detection)
$r_{1/2}$ the distance from a point at which probability of detection is one half

s the size of a cluster of objects (subscript i, if present, denotes the ith detection)
sd standard deviation
se standard error

V number of strata
var sampling variance

w the truncation point; distances exceeding w either are not recorded or are truncated before analysis

x the perpendicular distance; the distance of a detected object from the transect centreline (subscript i, if present, denotes the ith detection)

y the perpendicular distance x of a detected object from the centreline (line transect sampling) or the detection distance r of an object from the point (point transect sampling) (subscript i, if present, denotes the ith detection)

z distance parallel to the centreline of an object from the observer at the moment of detection (subscript i, if present, denotes the ith detection)

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