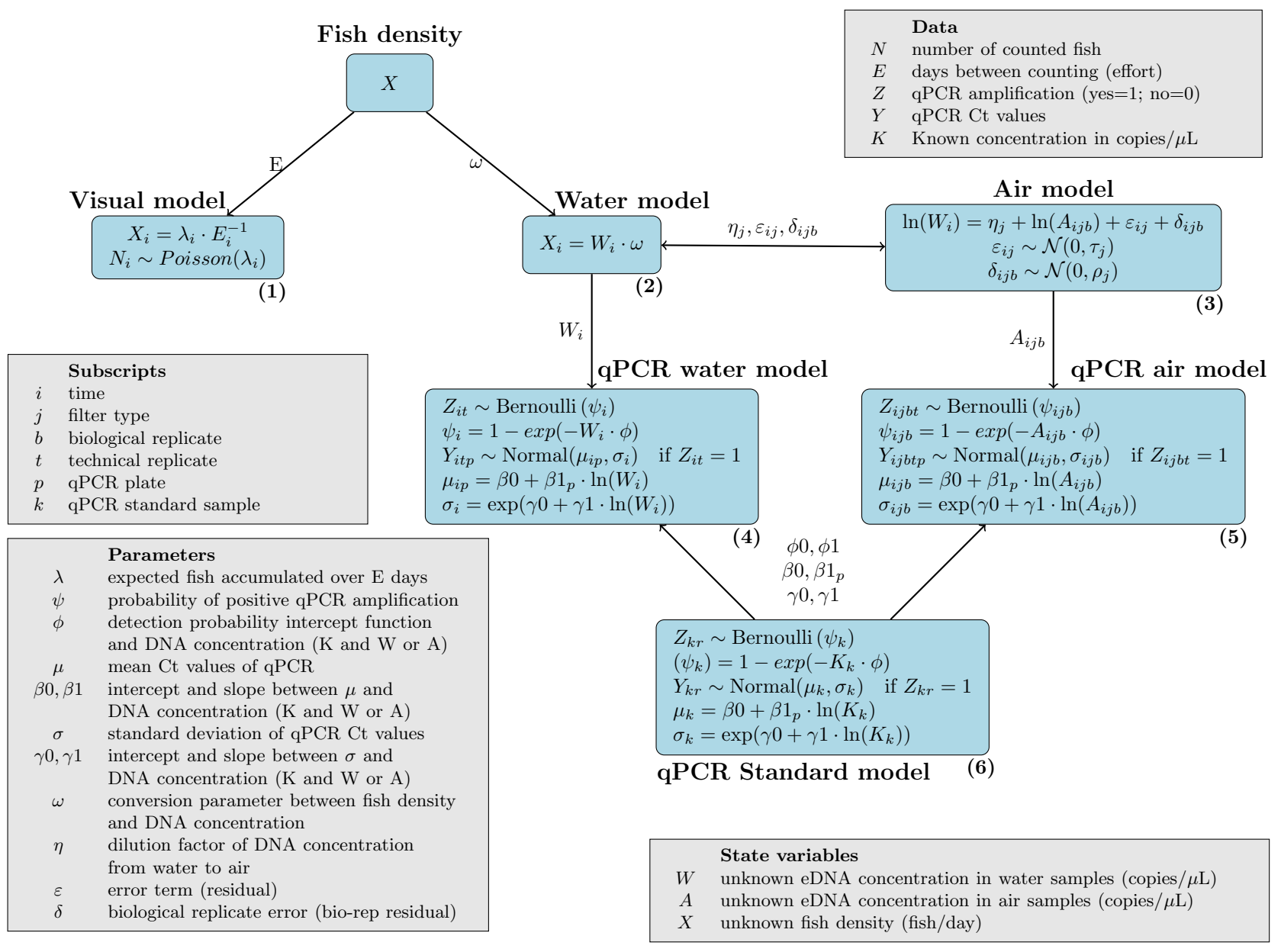

Data

N	number of counted fish
E	days between counting (effort)
Z	qPCR amplification (yes=1; no=0)
Y	qPCR Ct values
K	Known concentration in copies/μL

Subscripts

i	time
j	filter type
b	biological replicate
t	technical replicate
p	qPCR plate
k	qPCR standard sample

Parameters

λ	expected fish accumulated over E days
ψ	probability of positive qPCR amplification
ϕ	detection probability intercept function and DNA concentration (K and W or A)
μ	mean Ct values of qPCR
$\beta 0, \beta 1$	intercept and slope between μ and DNA concentration (K and W or A)
σ	standard deviation of qPCR Ct values
$\gamma 0, \gamma 1$	intercept and slope between σ and DNA concentration (K and W or A)
ω	conversion parameter between fish density and DNA concentration
η	dilution factor of DNA concentration from water to air
ε	error term (residual)
δ	biological replicate error (bio-rep residual)

State variables

W	unknown eDNA concentration in water samples (copies/μL)
A	unknown eDNA concentration in air samples (copies/μL)
X	unknown fish density (fish/day)