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Supporting Information: Overview of CJS models.

The following Supporting Information is available for this article online.

This Supporting Information describes each CJS model analyzed in Table 2 (see Table S1 for summary). We use the following symbols**:** Φ= apparent survival; Disease State is composed of three states**:** Bd(+) = animal tested positive for Bd; Bd(-) = animal tested negative for Bd; Bd(0) = animal untested, therefore, unknown.

At the sites where Bd was detected (LT and BR), we supposed that untested animals would be a combination of Bd-positive and Bd-negative individuals and therefore Φ for untested individuals would be intermediate between positive and negative individuals. To evaluate this supposition, we developed models in which Φ did not vary between individuals of different disease states as well as models that allowed Φ to differ between individuals of different disease states. In contrast, at the site where Bd was not detected (DC), we supposed that untested animals would have the same Φ as those that tested negative. To evaluate this supposition, we developed models in which Φ was the same between untested individuals and individuals that tested negative at DC, as well as models in which Φ in these two groups differed.

The physiogeographic characteristics of a location and genetics can influence survival and perhaps alter the effect of disease on Φ in individuals. Given this, we assessed the question of whether Φ was influenced by individual disease state differentially across populations (i.e.,

did individuals that tested positive for Bd have different survival probabilities in different populations?). We addressed this question by including models that allowed Φ of individuals of a particular disease state to vary among populations.

We expected that the number of killing frost days during the breeding season (KFdays) and the timing of the last killing frost (KFlast) would be negatively related to Φ and would affect Bd-positive animals more than Bd-negative individuals, due to potential cold-stress of already sick individuals. Conversely, we expected average minimum temperature during the breeding season (TMINbrd) to be positively associated with Φ, because warmer nights would increase overall survival (less environmental stress) and potentially increase disease resistance. However, if assessed from the perspective of the fungus, low TMINbrd and high KFdays might negatively affect zoospore activity in cold water bodies or fungus growth on amphibian skin. Thus, the relationship between TMINbrd or KFdays and Φ at Bd-positive sites (LT and BR) may be positive or negative.

We expected that the average maximum temperature (TMAXact) and the availability of basking time (BASKhr) during the active season would be positively related to Φ. Boreal toads in the Rocky Mountains are able to raise their body temperatures to ≥ 30°C by basking (Carey 1978; Bartelt & Peterson 2005), thereby exceeding the lethal limit for Bd (Piotrowski et al. 2004). Increased basking at high temperatures may provide toads the opportunity to eliminate Bd from their skin via high temperatures (Woodhams et al. 2003).

Table S1. Model rank, name, and description.

Model rank	*Model name*	*Model description*
1	ϕ(Disease State)	Survival probability varies across individuals of different

		disease states (pooled across all sites); All individuals at DC are assumed to be Bd negative, including untested individuals.
2	ϕ(LT, BR + Disease State)	Survival probability varies across individuals of different disease state and between LT and BR; survival probability of individuals at DC differs from individuals at LT and BR but does not vary between untested and Bd-negative individuals at DC
3	ϕ(LT, BR * Disease State)	Survival probability varies between untested and Bd-positive individuals at LT and BR, and the effects of being untested or Bd-positive on survival probability vary between LT and BR; survival probability of Bd-negative individuals at DC does not differ from Bd-negative individuals at LT and BR and does not differ between untested and Bd-negative individuals at DC
4	ϕ(LT/BR + Disease State)	Survival probability varies across individuals of different disease state pooled between BR and LT,; survival probability of individuals at DC differs from Bd(-) individuals at LT and BR
5	ϕ(Disease State* KFdays; DC)	The effect of disease state on survival probability varies with KFdays at LT and BR; survival probability of individuals at DC does not vary by disease state or KFdays
6	ϕ(Bd(0) BR, LT, Bd(+); Bd(0) at DC, Bd(-))	Survival varies between Bd untested and Bd negative at

		DC, survival was pooled across sites for other disease statuses. Survival probability varies across individuals of different disease state but not between LT and BR; survival probability of Bd-negative individuals at DC does not differ from Bd-negative individuals at LT and BR but varies between untested and Bd-negative individuals at DC
7	ϕ(Disease State * TMINbrd; DC)	The effect of disease state on survival probability varies with TMINbrd at LT and BR; survival probability of individuals at DC does not vary by disease state or TMINbrd
8	ϕ(LT, BR * Bd(0), Bd(+); Bd(0), DC)	Survival probability varies between untested and Bd-positive individuals at LT and BR, and the effects of being untested or Bd-positive on survival probability vary between LT and BR; survival probability of Bd-negative individuals at DC does not differ from Bd-negative individuals at LT and BR but does differ between untested and Bd-negative individuals at DC
9	ϕ(Disease State * KFlast; DC)	The effect of disease state on survival probability varies with KFlast at LT and BR; survival probability of individuals at DC does not vary by disease state or KFlast
10	ϕ(Disease State * TMAXact; DC)	The effect of disease state on survival probability varies with TMAXact at LT and BR; survival probability of individuals at DC does not

		vary by disease state or TMAXact
11	ϕ(LT, BR * Bd(0), Bd(+); DC)	Survival probability varies between LT and BR, and the effects of being untested or Bd-positive on survival probability vary between LT and BR; survival probability of Bd-negative individuals at DC differs from Bd-negative individuals at LT and BR but does not differ between untested and Bd-negative individuals at DC
12	ϕ(Disease State * BASKhr; DC)	The effect of disease state on survival probability varies with BASKhr at LT and BR; survival probability of individuals at DC does not vary by disease state or BASKhr
13	ϕ(.)	Survival probability is constant