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Global responsibility for species is not reflected in local conservation priorities

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Abstract

Prioritizing species for conservation attention is a crucial issue facing scientists and policy-makers in conservation biology. Regionally based institutions that focus on species locally at risk, and global institutions that focus on the status of species worldwide can conflict in the conservation priorities they identify for a particular jurisdiction. Furthermore, the biological criteria for prioritization can yield vastly different threat levels for species when employed at different spatial scales. We explored the relationships between provincial listing status of terrestrial mammals, amphibians and reptiles in British Columbia (BC; Canada), and species' total range size, global listing status and the proportion of their range in BC. We found that, while globally-listed species were also more likely to be listed locally in BC, *less*-endemic species were more likely to be listed than more-endemic species, regardless of their global range size. These patterns hold independent of other important predictors of species listing status such as population trend, number of occurrences of a species that are protected (e.g. within a nature preserve), whether or not a species' range is disjunct in BC, and the taxon of a species. Our results suggest that current conservation effort may be overly focused on the status of species at the local level rather than on global stewardship, which is likely to be detrimental to global biodiversity as a whole.

Introduction

Prioritizing species for conservation attention in the face of widespread species decline and loss is one of the most important issues currently facing conservation biologists and conservation policy-makers. Setting conservation priorities is complicated by the fact that locally based institutions (such as state or provincial conservation authorities) tend to focus on species that are locally at risk (Wells et al. 2010), while institutions that focus on the status of species at a larger scale (e.g. NatureServe; IUCN) emphasize species that are globally threatened. Hence, these bodies can conflict in the conservation priorities they identify for a particular jurisdiction. A local focus can neglect global patterns of rarity, so when a species is locally secure but globally threatened, it may be underserved by local conservation priorities. Alternatively, species that are locally rare but globally secure might receive disproportionate investment. For example, Wells et al. (2010) showed that over half of bird species included on U.S. state lists of conservation priority were species that both were at low risk globally, and did not have a substantial proportion of their global population within the listing states. This type of 'parochial' conservation prioritization has been criticized for its disproportionately high (on a needs basis) resource allocation to species that are globally secure. For example, when the scale of analysis was changed from treating North America as a single unit to treating all North American (U.S., Mexico and Canada) states and provinces separately, Vazquez, Rodríguez and Arita (2008) found that the number of 'priority areas' identified as conservation targets in order to protect a given set of species increased by approximately an order of magnitude. This indicates that limited conservation resources will be allocated less efficiently when applied to local conservation concerns.

Local conservation priorities may particularly conflict with global priorities when species are peripheral in a particular jurisdiction (species with only a small proportion of their range falling within the borders of a particular geopolitical entity; Hunter and Hutchinson 1994; Bunnell, Campbell and Squires 2004). Conversely, a global conservation focus, while aiming to maximize the total level of biodiversity that is maintained globally, can lead to loss of biodiversity at the local scale. While jurisdictional conservation priorities would ideally encompass both local and global conservation concerns, limited human or financial conservation resources constrain the number of species for which conservation action can be taken.

In the context of such resource allocation concerns, a socio-political conceptualization of endemism could help to focus scarce conservation resources on species that exist primarily in a single area that is governed by a particular political body. The idea that socio-political entities (e.g. nations, states) should accept stewardship responsibility for species with a substantial proportion of species' ranges falling within their borders is consistent with a public preference for the conservation of locally endemic species (Meuser, Harshaw and Mooers 2009; Verissimo et al. 2009). When the concept of endemism is applied in the geopolitical sense, endemism works in tandem with threat to define a concept described by Bunnell et al. (2004) as 'global stewardship responsibility' for species. This approach has been criticized because socio-political boundaries are irrelevant to the biological entities themselves (see, e.g. Connolly et al. 2010); however, as conservation resources tend to be allocated over spatial scales much smaller than the span of many species' geographical ranges, stewardship responsibility may represent an approach to conservation prioritization that is consistent with current decision-making frameworks and pre-existing local conservation capabilities.

Although endemic species enjoy public (Meuser et al. 2009; Verissimo et al. 2009) and scientific (Bunnell et al. 2004) support for their conservation, this has not translated into more-endemic species being prioritized for conservation at either the provincial (Bunnell et al. 2004) or the federal level (Findlay et al. 2009) in Canada. For instance, species that exist only within the single Canadian province of BC (true endemics) were less likely to be listed on the provincial Red and Blue lists than peripheral species (species for which <10% of their range falls within the focal jurisdiction; Bunnell et al. 2004). Canada-wide, Findlay et al. (2009) found that as more of a species' range fell within Canadian borders, the less likely they were to be listed under Canada's Species At Risk Act (SARA 2003), although this relationship was complicated by a strong relationship between degree of endemism and taxonomy (72% of the more-endemic species were mammals or fishes in their data set).

While some component of species' risk status may reflect geopolitical boundaries, biological and ecological factors are, of course, important to the listing status of species. In particular, small range size is one of the most important predictors of extinction risk (Purvis et al. 2000). Here, we investigate how an ecological factor, total range size, interacted with a human-imposed condition, the proportion of a species' range falling within a jurisdiction, in their effect on the probability that a species would be included in jurisdictional lists of at-risk species.

Following from the preliminary findings of Bunnell et al. (2004; Fig. 1a) and the federal listing patterns documented by Findlay et al. (2009) that more-endemic species are less likely to be listed, we predicted that species with larger proportions of their ranges in BC (more endemic) would be less likely to be provincially listed than species with a smaller proportion of their ranges in BC (more peripheral). We also expected that because small ranges can reflect greater extinction risk, species with smaller range sizes would be more likely to be included on provincial Red and Blue lists of at-risk species than species with larger range sizes, for a given proportion of range falling within BC (Fig. 1b). Finally, we test for an interaction between these two factors: if conservation prioritization in BC is blind to global endangerment, then we might expect a negative interaction, such that both small- and large-ranged species might be listed if they are peripheral, while only small-ranged species are likely to be listed if much of their range is in the province.

Methods

We obtained extent of occurrence (range) maps for terrestrial mammals, amphibians and reptiles (N=135) from the IUCN website (http://www.iucnredlist.org/technical-documents/spatial-data; Accessed 22/09/2010). Based on these maps (transformed to cylindrical equal-areas projections), we used ArcGIS (9.3, 2008) to determine the total range size of each species, and the proportion of each species' total range that falls within BC. Both total range size and proportion of range in BC were included in the analysis as transformed variables (log and arcsin square root, respectively) as both raw variables were non-normally distributed.

We obtained information on the number of adequately protected or managed occurrences of each species, population trends and global status from the NatureServe and IUCN websites. Information about whether or not species' ranges are disjunct in BC (where the population in BC is geographically separated from other populations of the same species) was obtained from Bunnell, Kremsater and Houde (2007). Table 1 describes the variables that were included in the analysis. Preliminary analysis of correlations between variables showed insufficient multicollinearity to warrant excluding any variables (correlations ranged from |0.05|- |0.5|; Table 2).

The binary response variable (listed/not listed) was based on provincial listing status from the BC Ministry of Environment's Species and Ecosystems Explorer (http://www.env.gov.bc.ca/atrisk/red-blue.htm; Accessed 30/09/2010). For the purposes of this analysis, we classified species as 'listed' if they were designated under either Red or Blue lists, and 'not listed' if species were provincially Yellow listed (not at risk), or were indicated as 'unknown' or 'no status.' It is important to note that these provincial lists do not confer legal protection on species, but rather serve to identify at-risk wildlife for the purposes of conservation prioritization, or to inform more formal conservation designations at the provincial or federal level.

We predicted that there would be an interaction between the total range size of a species and the proportion of that range falling within BC in their effect on the probability that a species will be listed as a conservation priority (Fig. 1b). Therefore, both of these variables, as well as their interaction, were included in each candidate model. The other variables listed in Table 1 were included to explain additional variation in species' probability of listing, but are not an exhaustive list of variables one might expect to be influential upon this outcome. For example, species' economic or ecological importance is not included in this analysis.

Given the dichotomous outcome variable (listed/not listed), we used logistic regression (which constrains the response variable to values between 0 and 1) to describe a candidate set of linear models. We then used an information-theoretic approach to model selection, comparing Akaike information criteria from each candidate model to select the best model (lowest AIC) and other models with substantial empirical support (within +2 AIC units of the best model; Burnham and Anderson, 2002). In order to explicitly test the hypothesis of an interaction effect between species' range size and the proportion of their range in BC on their probability of being listed in BC, we generated one model including only these two variables and their interaction term, as well as a model including all variables from the best model, but excluding the range-by-proportion interaction term. All models were tested in the R (2010) software environment using the glm command of the linear and non-linear mixed-effects models library (Pinheiro et al. 2010; R package version 3.1-97).

Results

Thirty-seven terrestrial mammal, amphibian and reptile species out of 135 (27.4%) are included on British Columbian Red and Blue Lists, with species that are globally at risk being more likely to be listed locally than species that are not globally at risk ($\chi^2 = 21.11$, $p<0.001$; Fig. 2). Two mammals and one amphibian have IUCN (global) Red List ranks of G1-G3, or Critically Imperilled to Vulnerable (Vancouver Island Marmot, G1; Oregon Spotted Frog, G2; Keen's Myotis, G2G3), and these are included on BC lists of at-risk species. Eighteen species (7 amphibians and 11 mammals) have an

IUCN Red List rank of G4-G4G5 (Apparently Secure) of which 11 (4 amphibians and 7 mammals) are included on provincial lists. The remaining 114 species (12 amphibians, 90 mammals, and 12 reptiles) have an IUCN rank of G5, or Secure. Of these, 23 (4 amphibians, 14 mammals and 6 reptiles) are included on provincial lists (Fig. 2).

The model of provincial listing with the greatest empirical support (model 1a, AIC=86.77; Table 3) included total range size, the proportion of species range in BC, number of protected occurrences, population trend, and the interaction between range size and proportion of range in BC. The four best-supported models of listing probability showed a positive effect of range size and proportion of range in BC, and a negative relationship with the interaction between range size and proportion of range in BC. The number of occurrences of a species that are protected and species population trend were also negatively related to listing probability, while species that are disjunct in BC showed a positive relationship (models 3 and 4). Amphibians and reptiles were also more likely to be listed than mammals in models 2 and 4 (Table 3).

Importantly, model 5, which included *only* range size, proportion of range in BC, and their interaction term, also had some degree of empirical support (model 5, $\Delta_i = 3.08$; Table 3), meaning that these three terms contribute to listing. Conversely, when the interaction term was removed from the overall best-supported model, the resulting model had essentially no empirical support (model 1b, $\Delta_i = 20.11$; Table 3).

The interaction between total range size and proportion of species range in BC captures the observation that species with both small and large ranges were similarly likely to be provincially listed when they were more peripheral. More-endemic species having small global ranges were somewhat less likely to be included on provincial lists, while more-endemic species with large global ranges were much less likely to be provincially listed (Figs. 1c and 3). Looking at this relationship separately by taxonomic group, the pattern of large-ranged species being more likely to be listed when they were more peripheral holds for reptiles and mammals, but not for amphibians (Figs. 4a-c). Small-ranged species were equally likely to be provincially listed with either high or low proportions of their ranges falling within BC for the reptiles and amphibians, while more-endemic, small-ranged mammals were more likely to be listed than small-ranged mammals that were more peripheral (Figs. 4a-c). However, given the small number of species generating these relationships for the reptiles and amphibians, these latter taxonomic differences should be interpreted cautiously.

Species' total range size and the proportion of their range falling within BC were negatively correlated ($r = -0.317$, $p = 0.001$; Fig. 4a-c) with a triangular projection in log-space due in part to the total hard upper limit imposed by the size of BC. The extreme end of the distribution was comprised of large-ranged carnivores. To test these species' effect on the relationships obtained in the models described below, we re-ran the analysis excluding the 5 largest-ranged carnivores (*Vulpes vulpes*, *Canis lupus*, *Mustela nivalis*, *Mustela erminea*, and *Ursus arctos*). While the magnitude of coefficients generated by the logit regressions changed when these species were excluded, the direction and significance of relationships between variables did not.

Discussion

British Columbian conservation priorities are relatively congruent with global conservation priorities for terrestrial mammals, amphibians and reptiles (Fig. 2). However, given that only three species in this data set are at high-risk globally, this is not necessarily indicative of provincial policy being intentionally in line with global priorities. Indeed, Bunnell et al.'s (2004) findings indicate that this is unlikely to be the case. A majority of species (11/18=61%) in the G4 global risk category were listed provincially, but it is perhaps concerning that not all of these species were listed in preference to other, listed species in the G5 (secure) global risk category (for which 23/114=20% of species in this data set were provincially listed; Fig. 2).

Applying conservation criteria at the regional level has been critiqued for two, conflicting reasons: the unaltered application of global criteria at a local scale when that is not reflective of the local status of the species; and the application of local criteria within jurisdictional boundaries without regard for species' ecological status in neighbouring regions (Bunnell et al. 2004). The former problem will tend to downplay local risk factors, while the latter exaggerates local phenomena that may or may not be important to the population at an ecologically relevant scale. Based on the results of this analysis, BC appears to fall in the second category, with more-peripheral species being more likely to be included on lists of conservation concern than species for which BC bears greater global responsibility. Specifically, the hypothesis of an interaction effect between total range size and proportion of range in BC was supported by the analysis, indicating that while jurisdictional rarity influences regional listings, this effect does not operate independently of biological rarity. It is, however, important to note that our data do not allow us to comment on whether these listing decisions are positive or negative for biodiversity conservation in the province, as this would require information about, e.g. future range shifts due to climate change, the opportunity costs of listing one species over others, and the effect of local listing status on the conservation of a species.

Small-ranged species are intrinsically more likely to be threatened with extinction than species with larger ranges (Purvis et al. 2000), so, other things being equal, should be more likely to be included on lists of conservation concern. The fact that small-ranged species were more likely to be listed when they were more peripheral than when they were more endemic to the province indicates that spanning a geopolitical border has an impact on how species are treated within the province. It appears that jurisdictional priorities in BC tend to focus on biological and ecological variables that are BC-specific, regardless of the status of species beyond provincial borders.

Notably, more-peripheral, large-ranged species were equally likely to be listed provincially as more peripheral, small-ranged species, and more likely to be listed than small ranged species that were more endemic. These large-ranged peripheral species are those for which BC is unlikely to contribute substantially to their current conservation.

Indeed, targeting these species as conservation priorities overlooks the fact that species have natural spatial extents. There has been extensive study of the factors limiting the geographic distributions of species (see, e.g., Gaston 2003). These include insufficient resources (Alkon and Saltz 1988), high mortality or poor growth or development of young (St. Clair and Gregory 1990; Morita and Yamamoto 2000), and low genetic variability (Yamashita and Polis 1995) at species' range margins, while gene flow from central populations to peripheral populations can prevent adaptation of local populations to local conditions (Kirkpatrick and Barton 1997; Bridle and Vines 2006). Because conditions at the margins of a species' range are less favourable to the species than conditions at the centre (Lesica and Allendorf 1995), populations at the edges of ranges tend to be smaller and more fragmented (Brown, Mehlman and Stevens 1995; Thomas and Kunin 1999), and show more demographic variability and different genetic structure (Vucetich and Waite 2003) than those at the centre. Essentially, these factors amount to peripheral populations more likely being sink populations, characterized by a lower birth rate than death rate and therefore dependent on continual migration from connected source populations. Setting local conservation priorities for species having fluctuating populations across a geopolitical border because they appear to be at risk ignores these important issues: Bunnell et al. (2004) note that the suite of peripheral species considered to be locally at risk in a particular jurisdiction would change if the borders of that jurisdiction shifted, without a change in the species' abundance or distribution. Thus, apparent species rarity can be the result of human-imposed boundaries.

While inclusion of species as conservation priorities simply by merit of their being peripheral is not a good strategy, deprioritizing species simply because they are peripheral is similarly unwise. For example, a local focus can also help to motivate local conservation efforts beyond regulatory status, given that this is the scale at which most conservation organizations operate. Such local concern is likely to lead to better conservation outcomes.

There are also biologically compelling reasons for prioritizing peripheral populations for conservation (e.g. Fraser 2000). In general, species tend to collapse toward the edges of their ranges (Lomolino and Channell 1995), and are rediscovered at the edges of their range where they may be isolated from threats at the range centre (Fisher and Blomberg 2010; Fisher, in press). So, peripheral populations of species have been used to repopulate more central portions of a species' range when central populations suffer from extreme bottlenecks or are extirpated (e.g. sea otter, Watson et al. 1997). Margins of species ranges have also been identified as areas where speciation may be more likely to occur, due to reduced gene flow from central populations and different abiotic and biotic conditions (Keyghobadi, Roland and Strobeck 2005).

Especially with regard to peripheral species, a local conservation focus can help to maintain the full complement of genetic diversity (Manos, Doyle and Nixon 1999) and ecological roles represented within a species. Populations on the margins of a species' range can be adapted to more extreme environments (Parsons 1991; Lesica and Allendorf 1995; Guo et al. 2005; Bears, Martin and White 2009) or be involved in different ecological associations than populations nearer the centre of the range (Hunter and Hutchinson 1994; Hardie and Hutchings 2010). This is particularly true when peripheral populations are also disjunct (Bunnell et al. 2004). These observations imply that neglecting species that are peripheral in BC may have consequences for these species' future persistence.

Importantly, species' ranges are not static. Faced with projected shifts in species ranges associated with global climate change, in this case study, southern areas of British Columbia may become an increasingly important refuge for species that are unable to tolerate newly inhospitable climates in their historical ranges. Population adaptations to more marginal conditions may aid species in shifting their ranges in response to climate change (Crozier 2003).

Administratively, the picture for provincial listing of species, particularly of endemic species, may soon change in British Columbia: the province's new Conservation Framework (Ministry of Environment 2009) includes an explicit focus on species for which British Columbia bears a high stewardship responsibility (Bunnell et al. 2004). Local environmental NGOs have spoken out against this move (Connolly et al. 2010), fearing that BC may now justify an overall less resource-intensive approach, with a focus on more-endemic species while neglecting more-peripheral species. These concerns may be well-founded: Ninety-six per cent of BC's species are shared with other jurisdictions, with many of these being peripheral (67% of mammals, amphibians and reptiles had <10% of their range falling within BC in this data set); deprioritizing these species at the provincial level may have important consequences for local biodiversity (Connolly et al. 2010). It is imaginable that a provincial conservation strategy that focuses on species that are more endemic to the province could be 'successful' at protecting its target species while the majority of provincial biodiversity remained locally at risk.

Ecologists have long recognized the necessity of incorporating information across different spatial and temporal scales (Levin 1992; Gaston 2003). An approach to conservation that is balanced between local and global priorities is likely to be the best strategy to maintaining the maximum level of biodiversity. However, the optimal approach to conservation priorities depends on the desired outcomes of conservation, and these are not always clear. That said, the patterns we document here are consistent with the view that current conservation effort may be too focused on the status of species at the local level, perhaps to the detriment of global biodiversity as a whole, if over-allocation of limited conservation resources to locally rare species while neglecting globally threatened species contributes to global species loss (Bunnell et al. 2004; Wells 2010).

Making appropriate conservation prioritization decisions is contingent upon being clear about the specific objectives of, and timescale relevant to, the particular conservation focus in a given situation. There are compelling reasons to protect both more-endemic and less-endemic species, and deciding which species to focus conservation attention on requires input from both the natural and social (economics, policy, psychology/sociology) sciences. Ensuring that species for which a jurisdiction has high stewardship responsibility are afforded protection may help to remedy the situation documented here in which species that the province is least able to protect (peripheral species) are those that are most likely to be listed. However, peripheral species are also important in their contribution to overall local biodiversity, as well as improving the chances of species' persistence. Limited conservation resources necessitate difficult decision making between conservation priorities, and this will always be an uncomfortable and delicate balance.

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Figure and table captions

Figure 1: Contrasting predictions of jurisdiction-based species prioritization. Dark-shaded ranges are predicted to have a higher probability of being included as conservation priorities, unshaded the lowest probability, and grey-hatched a medium probability. Rectangles represent the focus jurisdiction, while ovals represent species' ranges. (a) Prediction based on the findings of Bunnell et al. (2004, (b) the hypothesis of an interaction effect on provincial listing status between range size and proportion of range in British Columbia presented here; (c) the results of the analysis. We did not make a prediction about the difference in probability of listing between the two grey-hatched ranges in (b).

Figure 2: British Columbian conservation listings of mammal, reptile and amphibian species, compared to global status (IUCN Redlist) ranks. N = 135; species for which provincial status was listed as 'unknown' or 'no status' were included as Not Listed.

Figure 3: Listing probability for species with large or small range sizes, with large or small proportions of their ranges falling within BC.

Figure 4: Plots of a) amphibian, b) mammal, and c) reptile species' log total range sizes versus the proportion of their range in BC. Filled points indicate provincially listed species; open points indicate unlisted species.

Table 1: Variables included in logit models of species' local listing probability.

Table 2: Correlations among variables included in models. Read cells as: Pearson correlation (r); *P-value*. N= 105 for all comparisons.

Table 3: Variables retained in models of provincial listing status. Model 1a has the greatest empirical support, while models 2-4 have Δ_i <2. Model 5 includes only the variables involved in the hypothesis: range, proportion of range in BC and their interaction. Model 1b is the best-supported model (1a) with the interaction term (Total range size*Proportion of range in BC) removed.

Figure 1:

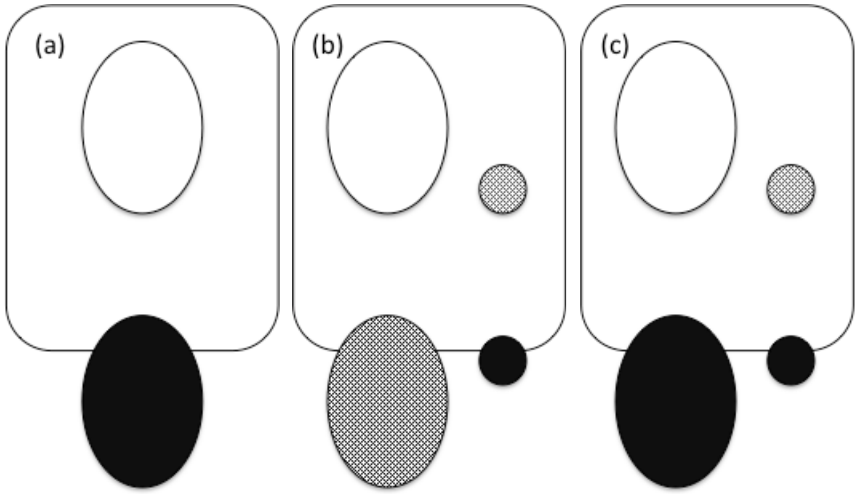

Figure 2:

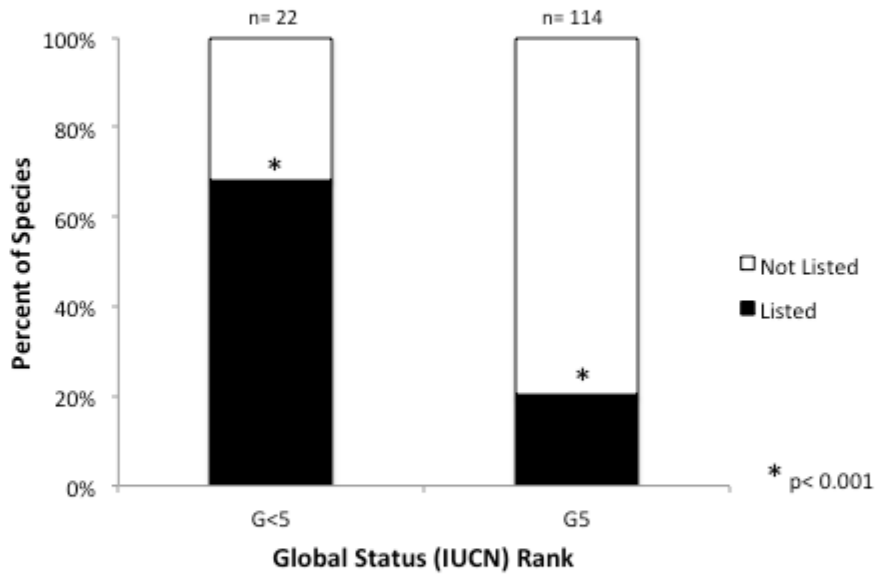
n= 22
n= 114
100%
80%
60%
40%
20%
0%
Percent of Species
*
*
Not Listed
Listed
* p< 0.001
G<5
G5
Global Status (IUCN) Rank

Figure 3:

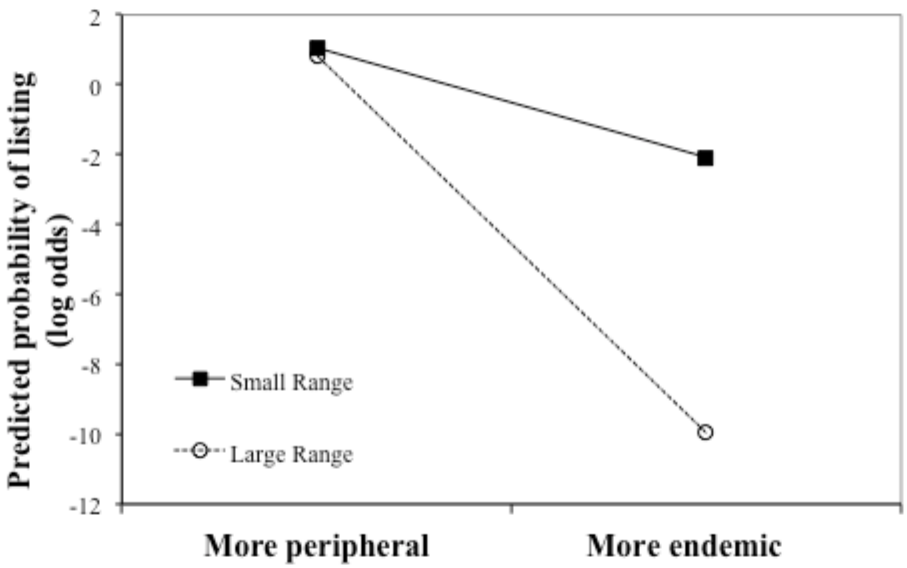
2
0
-2
-4
-6
-8
-10
-12
Predicted probability of listing (log odds)
Small Range
Large Range
More peripheral
More endemic

Figure 4:

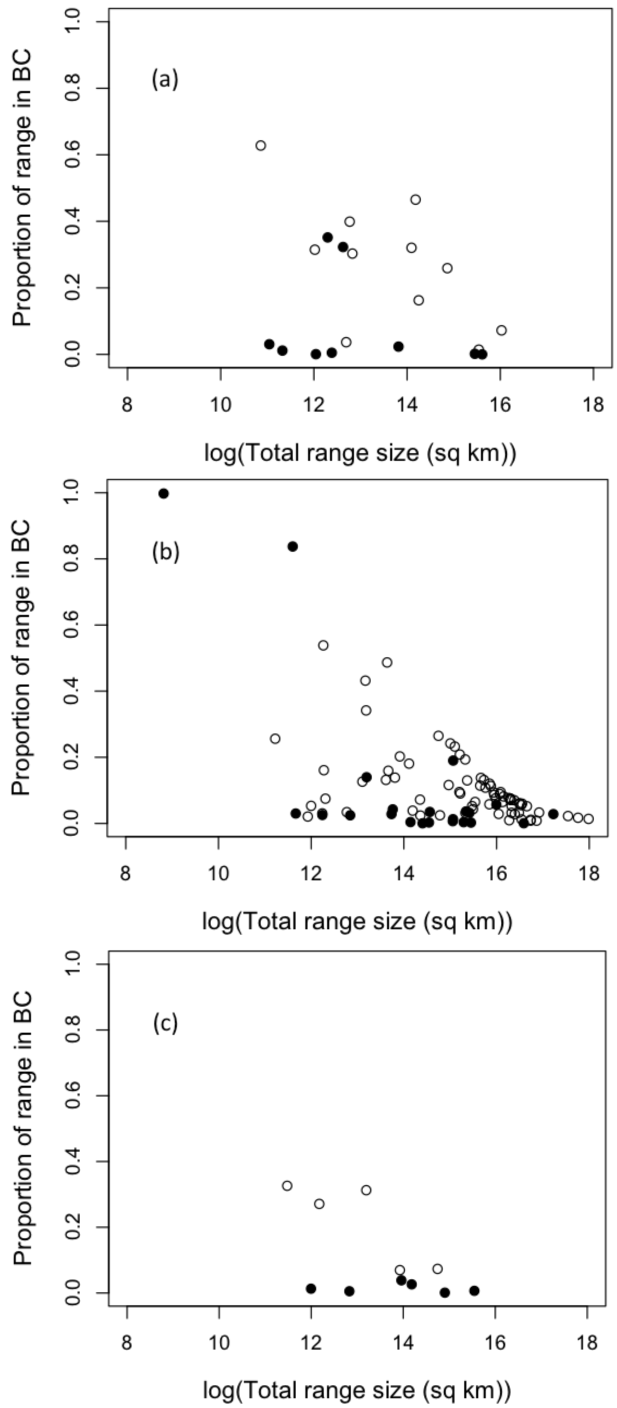
(a)
Proportion of range in BC
0.0
0.2
0.4
0.6
0.8
1.0
8
10
12
14
16
18
log(Total range size (sq km))
(b)
Proportion of range in BC
log(Total range size (sq km))
(c)
Proportion of range in BC
log(Total range size (sq km))

Table 1:

Variable	Traits
Total range size	Continuous; 6744-51 600 000 km^2
Proportion of range in BC	Continuous; <0.01-1.00
Disjunct in BC	Categorical; 1 if species' range is disjunct in BC, 0 otherwise
Occurrences protected	Categorical; 0 if none, 1 if few, 2 if moderate, 3 if many
Population trend	Categorical; -1 if declining, 0 if stable, 1 if increasing
Amphibian	1 if amphibian, 0 otherwise
Reptile	1 if reptile, 0 otherwise

Table 2:

	Total range size	Proportion of range in BC	Disjunct	Occurrences protected	Population trend	Amphibian
Proportion of range in BC	-0.317 *0.001*					
Disjunct in BC	-0.092 *0.348*	-0.135 *0.169*				
Occurrences protected	0.193 *0.049*	-0.217 *0.026*	0.115 *0.244*			
Population trend	0.103 *0.295*	-0.191 *0.051*	-0.218 *0.026*	0.248 *0.011*		
Amphibian	-0.227 *0.020*	0.140 *0.154*	0.254 *0.009*	0.056 *0.568*	-0.506 *<0.001*	
Reptile	-0.187 *0.056*	-0.057 *0.561*	0.201 *0.040*	0.353 *<0.001*	0.100 *0.311*	n/a

Table 3:

Model	Variables included	Coefficient (95% C.I.)	AIC	Δ_i
1a	Total range size	0.39 (-0.87, 1.66)	86.77	0
	Proportion of range in BC	41.47 (14.21, 74.65)		
	Population trend	-1.62 (-3.23, -0.26)		
	Occurrences protected	-0.17 (-0.94, 0.63)		
	Range*Proportion	-8.76 (-15.05, -3.72)		
2	Total range size	0.88 (-0.54, 2.36)	86.82	0.05
	Proportion of range in BC	45.06 (16.18, 79.25)		
	Population trend	-0.98 (-2.81, 0.60)		
	Occurrences protected	-0.90 (-2.06, 0.18)		
	Amphibian	1.58 (-0.61, 3.87)		
	Reptile	1.89 (-0.08, 4.06)		
	Range*Proportion	-9.34 (-15.78, -4.05)		
3	Total range size	0.49 (-0.80, 1.80)	88.04	1.27
	Proportion of range in BC	42.48 (14.74, 76.14)		
	Population trend	-1.51 (-3.14, -0.11)		
	Occurrences protected	-0.24 (-1.04, 0.57)		
	Disjunct in BC	1.45 (-1.75, 5.19)		
	Range*Proportion	-8.89 (-15.27, -3.78)		
4	Total range size	0.95 (-0.49, 2.48)	88.46	1.69
	Proportion of range in BC	46.19 (16.76, 81.00)		
	Population trend	-0.91 (-2.75, 0.69)		
	Occurrences protected	-0.94 (-2.12, 0.15)		
	Disjunct in BC	1.02 (-2.14, 4.79)		
	Amphibian	1.60 (-0.61, 3.92)		
	Reptile	1.78 (-0.23, 3.97)		
	Range*Proportion	-9.51 (-16.08, -4.14)		
5	Total range size	0.42 (-0.74, 1.57)	89.85	3.08
	Proportion of range in BC	43.90 (16.47, 75.09)		
	Range*Proportion	-9.01 (-14.89, -4.03)		
1b	Total range size	-1.33 (-2.15, -0.61)	106.88	20.11
	Proportion of range in BC	-4.58 (-7.69, -1.99)		
	Population trend	-1.41 (-2.62, -0.29)		
	Occurrences Protected	-0.06 (-0.75, 0.66)		