Dear authors,

I enjoyed reading the paper and I think your proposed model can be useful for the management of species, not even only invasive; even more useful that for advancing ecological questions since you are using them to create the model (I explain this further below).

As such I would like to see it publish but first I think some ammendments should be done. I state them below.

All the best luck.

Introduction and methods

Lines 32-33. I find this sentence a bit hard to follow, needed to read it three times. It might be worth to shorten it or divide it. In fact, I think that you could define what do you understand by biodiversity refuges, is that a protected area? Or free of invasive species area?

Also, when you say “by dispersing animals on mainland settings”, where are the reinvaders coming from? The mainland? Then shouldn’t is say “from mainland…”?

37. Why are you assuming the first strategy you mention do not consider the spatial ecology of the surroundings? I do not think concentrating the efforts in an area of X size is incompatible to consider the ecology of the surrounding. I am aware that most control or eradication programs do not account for the large spatial ecology in their actions, but not all do so. What I mean is that strategy 1+2 are combinable, despite not very often done and probably the trade-off between effort and success is not very positive.

Line 38. Once again I think you could define biod refuge before, it is central in your study. Also include that (I assume) they are free of invasive species or at very low densities with no negative effect on native species. Otherwise reinvasion makes no sense, right?. Also I assume it is a high quality area for the invasive species (based on lines 41) but not all refuges are so per se. So worth to say it. Then it all makes sense: a protected area (biod refuge) of attractive high quality for the invasive species, with low densities or none surrounded by invades areas. Also take into account that low densities or none areas might be not too attractive for some species or reduce the attractiveness if there is conspecific attraction. This that not affect your model, actually reinforces it because it increases the importance of including large lands-level metrapopulation ecology intro eradication and control programs.

Also, I am not sure the wording “landscape level” is the best, not wrong but it can be confused with you applying mostly landscape ecology with no population ecology linked to it; since they are not always together. Maybe worth to think of another wording?

Line 45. Is this paper a note?! I think it is worth for a n original research paper.

Line 50. “individual dispersal behaviour, population, and metapopulation factors”, which is population that does not includes metapopulation? Worth to be a bit more specific

Line 65. I think this sentence “We generated a simplified landscape model that broadly represented the situation in the Taranaki region in the North Island of New Zealand.” Should be actually merged with the intro split between the line 47 and when you mention NZ, so reader already knows that that is what you will be doing. Also with that sentence there I was expecting that the model was explained at the following sentences which surprised me because of the section title. Thus, it seems more logical to state directly in the intro so to already inform us and then in this section start directly with the landscape.

I missed some lines, even if short, about characteristics of the species that are relevant for the model, such as dispersal distances, home ranges (size, lineal as in some other mustelids or not), if solitary or not…this information might seem basic but for people not aware of the species are essential to better understand the model. For example, are 85x85 km of simulated landscape enough? Depends on the dispersal distances of the species.

It is also important for the use od the models for another species of interest, so that scientist and specially managers better understand the specifications of the model and know what they should modify to use it for other cases. If there is a space problem for the paper, something like this can be added in supplementary material.

For example in line 101 you say the model runs for 4 months, which I guess is because of the dispersal period of ferrets, but it is worth to mention it with the explanation of the species.

Results

Line 145. Then you are defined reinvasion as at least one individual reinvading the area, that is ok. But here comes even more important the idea of adding survival, as this individual might died. I don’t mean you must change your model now, but as a future improvement. Meanwhile you can reinforce your idea of the model being useful (which is) for predicting a proxy of reinvasion pressure, but not invasion rate per se which will be much more sensitive to survival, dispersal success and other factors such as density dependence processes (e.g. conspecific attraction).

Lines 152 and methods. I do not think getting the goodness of fit estimating a p-value is the best option since the model is based on simulated value; this method is developed for empirical data models not for simulation models. This is because fitness of good of simulated models may change based on the entered values (since they are predefined by the modeller) and also by running more simulations (the more runs the better fit, since sample size increases). The most correct way to test it might be to compare it with a real situation or, if not possible, by assuring the input data is the most realistic as possible. I am sure there are some on stats about this.

Discussion:

I think you should also talk about the utility of your model for management prevention of reinvasion.

Line 174. “The overall ecological dynamics of our reinvasion system concur with the predictions of metapopulation and landscape ecology “ .This is obvious since you wrote it based on metapopulation theory, so it would be impossible not to concur. Same with 180-184, what a simulation model highlights depend on the model created itself, so it seems like a circled statement these points of writing a model merging landscape and metapopulation and then saying that it highlights them. Explain what the model adds that has not been specified in the model construction itself.

196. Put this on the state of art since it is not something new, so state what you advance from what is being done and known. Check for example Justin Travis’ team or jean Cobert and Aurelie Coulon on IBMs for metapopulations for example

Line 204 -206: Better to say how.

Line 207. I completely agree and I think you are missing out here the potential of your model for management, even more than for ecological advances. Since there are more advance IBMs for the later but how often do managers use them?

Other general comments:

I would like to see a bit more research on the state of art of modelling metapopulations, and its application for management, so you can specify and highlight your new advances to them.

Fig. 2. This is fine but keep it clear that output depends on input, so it is important realistic inputs so the output predicts realistic potential scenarios. Otherwise it is not useful since reality can be completely different. Otherwise the output might be completely different to reality. Keep in mind it is a simulation, not an statistical test of empirical field data.

The model is good and at the same time it is simple enough to be used by non-modellers as some managers may be, so I actually think it has a good potential. However, it is always wise to also state the model caveats in the paper. From what I see, there are some but also potential for future improvement:

* You are assuming that all refuge area is equally attractive, not sure if it is clear enough in the methods and could be added as a potential future improvement.
* The model does not include juvenile disperser mortality, which usually is high. I think you could take it into account, even if it is just by reducing the number of dispersers with the reduction based of known survival rates of the ferret.
* Why do you set uniform distribution for dispersal? Wouldn’t it be more realistic a dispersal kernel?
* You assume there is no selection of dispersal habitat, this could be added in the future because recent papers and IBMs models actually do so, since realistically animals are able to perceive and potentially choose. See e.g. DOI 10.1890/14-1690.1, and Clobert et al. (2012), Part IV.

Please be aware I have no reviewed the abstract and the references.