

## ***Interactive comment on “Road and stream network connectivity and potential: northeastern Puerto Rico, an exploratory analysis” by K. R. Sherrill et al.***

### **Anonymous Referee #1**

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Overall this is an interesting paper that provides another example of the using landscape indicators, measured over multiple scales, to predict in-stream characteristics. The newer angle of the work is in explicitly accounting for the influence of roads.

### General Comments

There is quite a bit of literature, perhaps more in the ecology than hydrology literature, discussing the relationship between landscape indicators and stream biota, flows, geomorphology, etc. This work is not well-cited, particularly in the discussion section. It would be helpful to know, how does the authors' specific results compare to

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other studies relating stream geomorphic/biotic variables to landscape-level variables? Does explicitly accounting for roads (a more novel aspect of this study) improve the predictive ability of such models, as compared to other studies which did not account for roads?

The logic for the selection of the biotic variables is vague other than they are in use for a related, larger project. However, diversity measures can be quite misleading and problematic if an area is occupied by invasive species. A stream may be quite diverse, but this not necessarily an indicator of any sort of ecological integrity. It is implied that the diversity measures are meant to represent something related to positive stream health conditions or ecological integrity (excuse those loaded terms), but it not well-explained why these measures are useful for documenting the ecological status of the watersheds.

The questions, data and presentation of the results, left several unanswered ideas:

It is interesting that the explanatory power ( $r^2$ ) for the geomorphic and biotic models were so different. Why might this be? Could it be due to difference in the scale at which hydrologic variability would be expected to influence one set of variables over the other?

The primary questions presented as setup for the paper should be more closely linked to the way the subsequent results are presented. Three suggestions include:

(a) In the data presentation (the tables), the emphasis is on the improvements seen when adding X,Y geographic positional variables to the models. This is important and interesting, however, it seems to answer a different question about regional variability and regional differences in RSNC relationships. (b) The authors did a good job in the study design used to select watersheds (detailed in Table 1), as it was quite more detailed and systematic than most studies published on this topic (which seem to utilize whatever data happens to be available). However, I was left wondering, given this design, does the strength of the statistical relationships vary among watersheds with

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large, medium, small streams? or roads of various size? (c) Lastly, while the logic behind a multi-scale approach for this type of work is quite sound in the published literature (many examples abound), the literature supporting this approach is not discussed well in the paper. There are many papers specifically detailing directly multi-scale interactions of streams and watersheds which are not cited. Instead, more generic Hierarchy Theory papers are cited. Furthermore, in the discussion of the results, no comparison is made of the authors' findings to those of the other multi-scale papers.

## Specific Comments

**Introduction:** The first paragraph focuses on the impacts of roads on terrestrial ecosystems. Rather, relevant research related to landscape indicators and streams should be discussed.

**Abstract:** The last sentence of the abstract should be made more compelling to emphasize what is new or novel about this work: ...demonstrating the GIS derived variables can successfully be used to model important stream biota and geomorphology response variables... This particular point has been made in many, many previous papers.

**Table 3.** The header needs to clearly state these are hypothesized relationships (otherwise this looks like a summary of results).

**Table 6 and 7.** The emphasis in these tables is on the differences in models seen with X and Y variables versus not; whereas the questions of the paper and methodological design relate more to questions of scale, stream size, and road size.

**Figure 1.** Some sort of figure here is probably necessary, but this one is unclear and does not convey the primary points well.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 5, 1731, 2008.

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