Lab 4: Adequacy

Name:

A conservation target is an explicit goal that is set to the minimum amount of a habitat, species distribution or other biodiversity feature that we would like to conserve. Target-based conservation planning drives environmental policy at many scales: global (i.e. Convention of Biological Diversity); regional (i.e. the Coral Triangle Initiative) and national (i.e. rezoning of the Great Barrier reef and the australian national reserve system (NRS)). The main objective of target-based conservation is to ensure adequate protection at a minimum cost. fractional targets are often relatively higher for features that are rarer or more threatened.

Which targets are set for a given plan will ultimately depend on the political process driving the conservation effort, not necessarily the ecology. See below for an example of target-based policy for conservation at a global scale. In this lab we will look more deeply at the theory behind identifying targets.

Section 1: Targets

*Convention on Biological diversity-Aichi Biodiversity target 11:*

By 2020, at least 17 per cent of terrestrial and inland water, and 10 percent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes (2006).

Critics and advocates alike can ask questions of target based conservation, such as: How much is enough? Or, can we ever gaurantee the persistence of biodiversity in perpetuity by setting targets (refer to lectures on viability)?

Lets look at another way of identifying conservation priorities.

* In groups of 2-3 people search through the literature online to gain an understanding of the minimum viable habitat area (MVHA) approach to conservation.
* Find examples in the literature of where MVHA has been identified for the 10 species in Tasmania. If you can’t find a target for a particular species maybe you can find a target for a closely related species and use that.
* Discuss how your target areas compare with 10% and 20% targets?
* go to activity 2 and test out the targets for your species. Explore the tables to see if your targets have been met.
* Do you think there is a reasonable way of setting new fractional targets that takes into account the information you have gathered? What does the new reserve system look like? (Insert a screen shot of your new plan).

We will now look at another key issue in conservation: spatial configuration. The spatial arragement of protected areas will affect both the persistence of populations and the cost of management. The size, the shape and the number of areas to protect and monitor may be influenced by the budget and enforecment capacity of the overseeing agency. Quite literally, lines must be drawn. How and where they are drawn will affect the costs and benefits of a reserve system. Lets explore this more using a tool in the Marxan toolbox called the Boundary length modifier or BLM.

Section 2: Clustering

* go to http://marxan.net/CONS7021.html and link to Activity 5b
* The boundary length modifier is a parameter that affects the compactness of our solutions. The higher the blm, the more clumped our solution is.
* We have set the limits of 10 blm values between 1 and 10 trillion. In the BLM summary table, we can see the randomly selected BLM values spanning this range, and the corresponding cost and boundary values associated with each.
* Take a minute to scroll through the different blm solutions using the which map do you want to display setting in the control panel and viewing the corresponding map.
* Your task is to identify an appropriate blm for this example through calibration. luckily for you, determing the best blm is not an exact science.
* Select the Plot tab to view the trade-off between our boundary and cost relationships for the 10 blms we have.
* Look for the steepest areas on the graph where the boundary length is reduced for the smallest increase in cost. Note the BLM values on the curve that sit on either side of this area.
* enter these new min and max blm values in the control panel
* run marxan
* do this until you find a blm and level of clumping that you like.

Insert a screen shot of your final map and describe why you chose it.

Explain the cost and boundary trade-off curve in your own words?

Due to the nature of this online activity, you have limited access to the full suite of information needed to make an informed decision about BLMs. What other information would you need to examine in order to calibrate and select a BLM? Discuss in small groups and write your response.

As you can imagine, building an adequate conservation plan means more than simply meeting targets for feature represenatation. On top of protecting a sample of all habitats and species present, we also want to spatially replicate our features across our conservation plan. This acts like an insurance policy in case a catastrophe or distaster destroys part of the system. By placing each feature in several protected areas, we minimize the chance that all samples of that feature are lost.

Section 3: Replication

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| Macintosh HD:Users:uqjmcgow:Desktop:BLM40k.png | Macintosh HD:Users:uqjmcgow:Desktop:BLM5k.png |

Above you see two different outputs from two different boundary length modifiers for our tasmanian example.

Lets explore how well these configurations capture replicates of our habitats.

* Download and open the Activity 5c replicates table. make a bar graph of the two BLM scenarios showing the number of replicates per habitat type for both scenarios. Use the feature names for labels on the x-axis.

insert your graph below

From your reading on MVHA, what do you think is a reasonable number of replicates per species? Do you think some species need more replication than others? Hint: Think about the catasrophies that affect species and the frequency and spatial scale of those catastrophies. Discuss.

Are either of these plans better or worse?

Which species are not replicated in either solution? Can you explain why this happened?