In conservation biology, islands are of particular concern because they have unusually high rates of extinction. Famous examples are the dodo bird of Mauritius, or many species of honey creepers (birds) in Hawaii. In general, islands have smaller populations and lower genetic diversity than the mainland (Frankham 1997), which makes them more prone to extinction. Islands are also more susceptible to natural disturbance (e.g., hurricanes), but human activity has contributed more by far to island extinction. Introduction of invasive species (e.g., rats) and disease, habitat destruction and development all make islands among the most threatened habitats on the planet.

MacArthur and Wilson (1963) developed a hypothesis/model that predicts equilibrium in biodiversity on islands. In their model, species colonize islands by migrating from the mainland at some rate, and the existing species on the islands go extinct at some rate. Island colonization of new species is a function of the island's distance from the mainland (colonization is more likely if the island is near), and the number of species already on the island (the more species, the less likely a colonizer will be a new species). The extinction rate is a function of the island's size (with larger islands having a lower rate), and also the number of species present (the more there are, the more likely one will go extinct). Simberloff and Wilson (1969) actually tested this model experimentally using small mangrove islands in southern Florida. They first fumigated the islands to remove all the arthropods, and then sampled the arthropod diversity over several years. Their results generally supported Macarthur & Wilson's model.

Model Details

With this simulation you can explore the relationship of island size and distance from the mainland with the supported biodiversity. Also, you can compare these relationships using different taxa (e.g., birds or arthropods), and different habitat types (e.g., tropical forest or tundra).

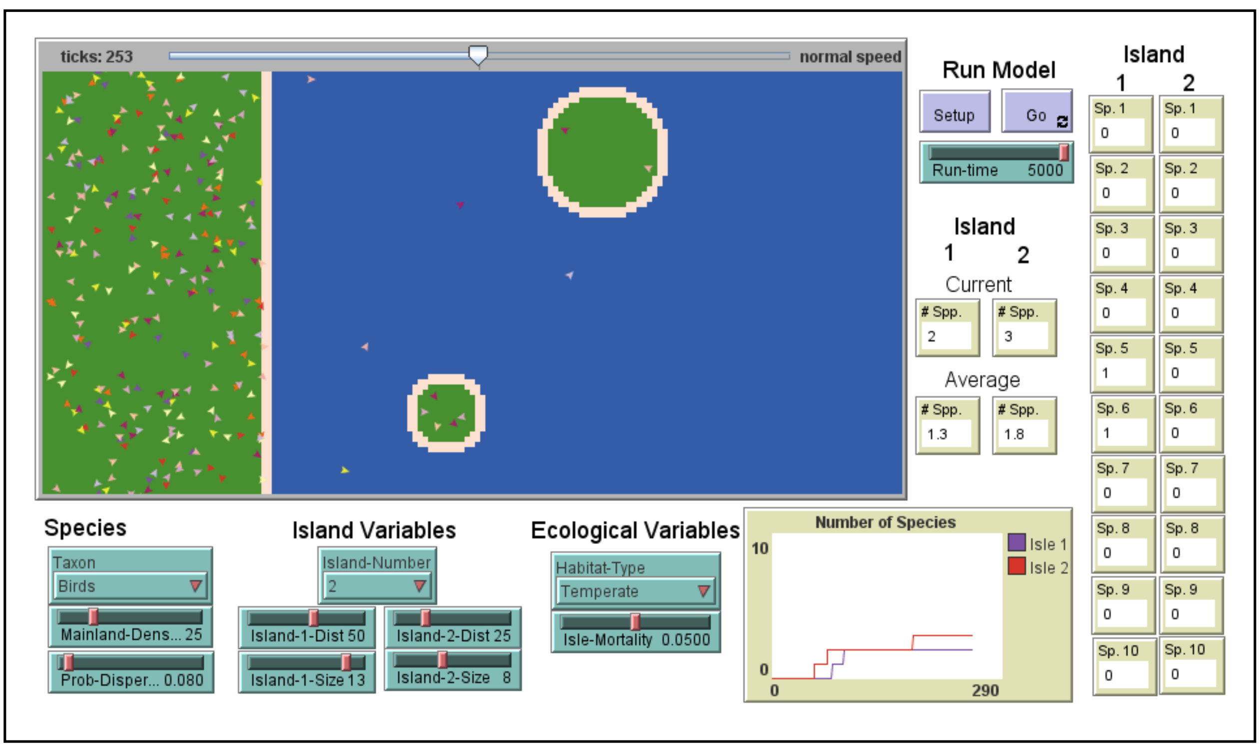
Table 1: Model controls and parameters

Control/Parameter	Action
Setup	Sets the model ready to go with the assigned parameters
Go	Puts the tadpoles in motion
Run-Time	Sets the number of ticks the model will run
Taxon	Selects what animal will be modeled (Birds, Reptiles, Insects, Mammals)
Mainland Density	Sets density of each animal species on the mainland (0-100)
Prob-Disperse	The likelihood that if an individual on the main shore will head out to sea
Island-Number	Sets the number of islands to be modeled (1-2)
Island-1-Dist	The distance of Island 1 from the mainland (0-90)
Island-1-Size	The size of Island 1 (3-15)
Island-2-Dist	The distance of Island 2 from the mainland (0-90)
Island-2-Size	The size of Island 2 (3-15)
Habitat-Type	The habitat of the islands (Tropical, Sub-Tropical, Temperate, Desert, Savanah)
Isle-Mortality	The probability that an individual on an island will die in a tick (0-0.1)

Table 2: Model reporters

Reporter	Description
Number of Species Plot	The number of different species on each island over time
Current # Spp.	The number of different species currently on each island
Average # Spp.	The average number of species on each island over the entire run
Sp.1-10	The number of individuals of each species on each island

Figure 1: screen shot of the Island Biogeography simulation



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