From:
With the spatially explicit cell-based model SHIFT, the probability of colonization over the next 100 years is estimated for each grid cell (1 km) from the current distribution boundary. DISTRIB is a statistical model that uses RandomForest to predict current and future potential habitat for the species.

The intersection of the outputs from DISTRIB and SHIFT was used to create an output that estimates the probability of colonization over 100 years along with the suitable habitat estimated to be available in 2100 (see figure below). DISTRIB provides the future suitable habitat, which imposes climate, soil, and land-use constraints on the species. SHIFT provides the probability of colonization in the face of spatial constraints of distance and percent forest in each km^2 cell.
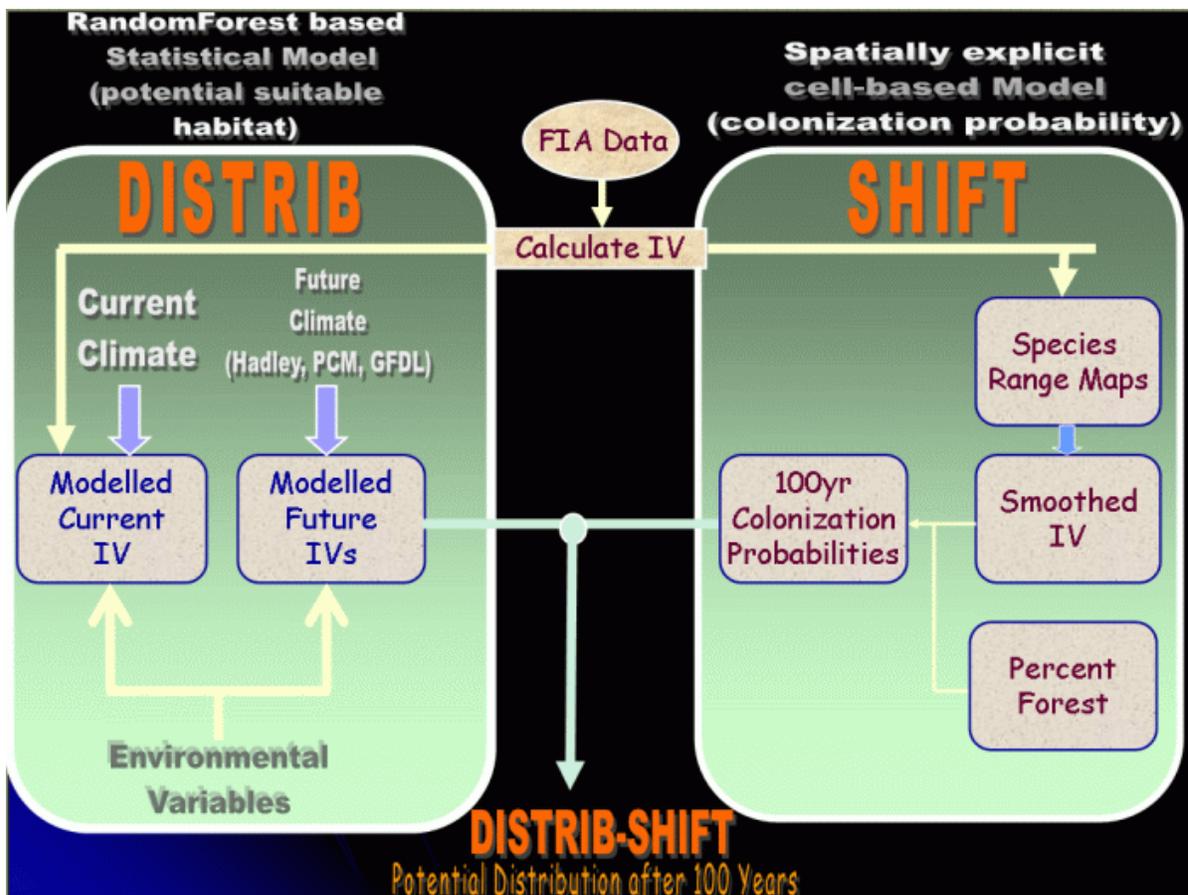
Thus, we create a plausible scenario for the species where the region of suitable habitat will shift northward, and identify the extent to which this new habitat could be colonized from species migration over the next 100 years. Of course, our models carry numerous assumptions and uncertainties. See SHIFT_assumptions.pdf and DISTRIB_assumptions.pdf.
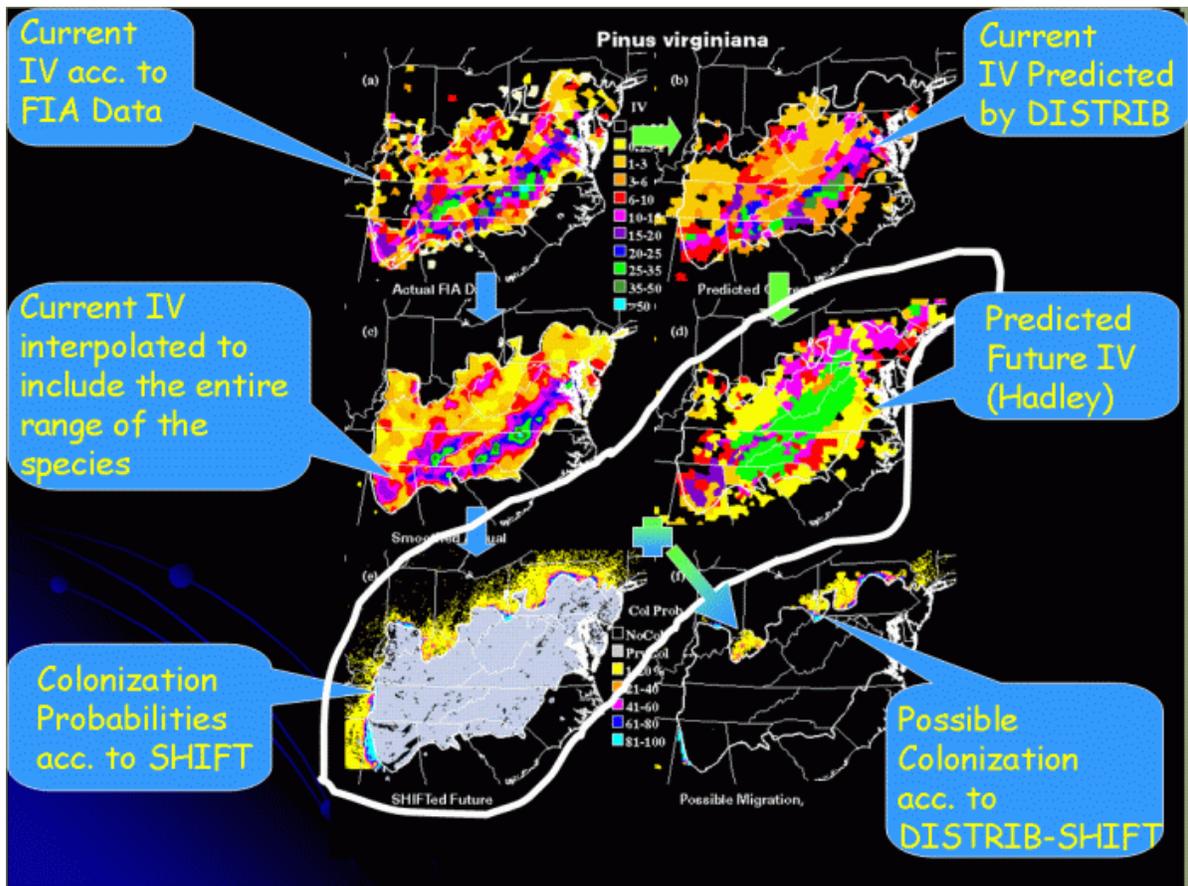
The figure above illustrates how the integration of DISTRIB and SHIFT was achieved using Virginia Pine as an example. When the map of colonization probabilities according to SHIFT is overlaid with the future importance value (IV) map according to DISTRIB we see that there is a large reduction in overall suitable habitat, with some northward movement of the species distribution limit and a northward expansion of areas with potential high habitat suitability (as connoted by the high IVs). The current fragmented landscapes thus constrain the movement

of the species to its future potential suitable habitats. Of course there could be other biotic and abiotic effects that could further constrain or facilitate the movement of the species to the possible future habitats that SHIFT does not consider.