

# Introduction to Remote Sensing for Scenario-Based Ecoforecasting

Please type your questions in the Question Box. We will try and get to all your questions, but if we don't, feel free to email Amber Jean McCullum your question at [amberjean.mccullum@nasa.gov](mailto:amberjean.mccullum@nasa.gov)

## Session 4 Q&A Transcripts

Question 1: Is there a remote sensing product/data that could be used to study distribution of Kentucky blue grass, e.g., in the state of North Dakota?

Answer 1: As long as it's distinct at a certain type of year from the other vegetation. Similar methods have been done in other studies, so the example referenced with grass in WY is one published manuscript you could look at that has the methods well laid out that can be used as a template to be followed for other species.

Question 2: Is the SAHM software free license and can we download it? Is there any Quick link for that ?

Answer 2: Yes - the easiest way to find it is to go to [my.usgs.gov/catalog/ram/SAHM](http://my.usgs.gov/catalog/ram/SAHM) (on slide 19 in presentation)

Question 3: How many times do you recommend running the stochastic models?

Answer 3: This is a fairly common question for people working with simulation models. I don't know of a magic number that's applicable across simulations but there are some general considerations: how complicated and how much uncertainty is built into the model? This might dictate the range of uncertainty in your outcomes and the number of times you want to run it. Generally, hear that you want to run the model for at least 40-50 different iterations, run it at least 100 times is even better, but of course the number of times you're able to run the simulation is often dictated by the run time. So a very complicated model might take a lot of computing capacity and it might take a long time to run each Monte Carlo simulation. Sometimes your hands are tied and you can only do it a few times, but at least document the number of iterations you've run so people can better interpret the uncertainty in your simulations.

Question 4: Is it possible to employ VisTrails: SAHM for determining river hydraulics influence on the ecological habitat of a river?

Answer 4: Preface by saying: don't really work in river systems, but Catherine would assume that rivers are much more linear and it's important to have information on movement upstream/downstream, and that sort of thing doesn't work well within the type of models SAHM does. Catherine would assume there are other models that might work better in river systems.

Question 5: Question for Brian: Can you provide some context on the breadth of applications of STSMs for management decision making? How broadly are they being applied both in agencies in the United States and abroad? Thanks!

Answer 5: STSMs are really gaining momentum in terms of their application. They don't have quite as broad recognition as species distribution models, and are used by a smaller community of people, but we're seeing broader and broader applications over time. STSMs are often used to look at exotic species spread and management. Folks are also using them to look at responses to climate change, and looking at it in a couple of different ways. These models can track carbon dynamics on the landscape - stock and flow transition models - in other cases STSMs are being used to explore resource management of things like the mountain pine beetle and how that affects forests in the Western U.S. Another example is the use of STSMs to look at the composition and productivity of grassland species and how that relates to grazing, fires, and different management scenarios. State-and-transition models were initially used for rangeland systems, and a lot of times it's still used for that, but they are starting to be used for other systems: land use changes, forests, etc. Don't know of international applications beyond use in Canada.

Question 6: Is it possible with SAHM software to use several models (GLM, RandomForest, Maxent, etc) and then see which is the best of them?

Answer 6: Yes! You can run all of those different models that were shown in the presentation (6), and you can run them all with the same data and adjust the parameters for each individual model algorithm as needed and get comparable output. You can compare them and see if one is working better than the others.

Question 7: Are the species distribution models able to handle migrating species, or mainly just primarily resident ones?

Answer 7: In applications Catherine's seen of species distribution models talked about today, for migrating species involve creating a different model for different times of year - create a model for winter habitat, for summer habitat. They can be used for migrating species, but you end up with several different models to piece together to get what habitat is needed across the year.

Question 8: Aren't there any plugins for R and QGIS that we can use to create scenarios and create state-and-transition models?

Answer 8: Don't know - there very well may be, but I recommend using the software mentioned (ST-Sim). It's free, which is a bonus, and it's really user-friendly. There's not a steep learning curve - you don't need to learn a programming language, and be used through a graphical user interface. They're constantly improving that platform, so it's really the gold-standard in state and transition modeling software. Check it out if you are seriously considering building a state-and-transition simulation model. As far as creating scenarios, scenario planning (described last week) is the most meaningful and vetted way.

Question 9: What is STSM model?

Answer 9: STSM: State and Transition Simulation Model

Question 10: Can you provide an example or references of the state-and-transition models in pelagic fisheries or biological oceanography?

Answer 10: Brian's Not aware of any marine applications of STSM. Typically used for looking at terrestrial vegetation dynamics. It's not to say marine applications are impossible, but to knowledge they've been for terrestrial vegetation.

Question 11: Any suggestions for incorporating pollen and seed dispersal into SDM?

Answer 11: Catherine has seen dispersal kernels included as a predictor in models and seen a SDM created for habitat suitability for a species and that overlaid with some sort of seed dispersal. Not sure about incorporating pollen - don't remember seeing anything related to that. Also mention that one way the STSM Brian talked about can be useful is to use that habitat suitability model as an input and you can simulate things like dispersal across the landscape.