Predictive Ecology: a Re-imagined Foundation and Toolkit for Ecological Models

Eliot McIntrie[1], Alex Chubaty[2], Steve Cumming[3], David Andison[4], Ceres Barros[5], Céline Boisvenue[1], Samuel Hache[6], Yong Luo[7], Tatiane Micheletti[8], and Frances Stewart[1]

[1]Natural Resources Canada
[2]FOR-CAST Research & Analytics
[3]Université Laval
[4]Bandaloop Landscape-Ecosystem Services Ltd.
[5]The University of British Columbia
[6]Environment and Climate Change Canada
[7]Canadian Forest Service
[8]University of British Columbia Faculty of Forestry

March 30, 2021

Abstract

Prediction from models and data in Ecology has a long history and can be made from many types of statistical, simulation, and other classes of models. To date, our ability to use the predictive approach as a tool for developing, validating, updating, integrating and applying models across scientific disciplines and to influence management decisions, policies and the public has been hampered by disparate perspectives on prediction and inadequate tools. We present a coherent perspective that follows a Predictive Ecology approach based on 5 principles: Reusable, Freely available and Interoperable models, built around a Continuous workflow, which are Tested automatically (PERFICT). We describe the SpaDES toolkit that helps implement these principles. We outline some benefits for society of working with these principles, including 1) speeding up scientific advances; 2) data science advances; and 3) improving science-policy integration.

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