The ‘Prod\_Forecast\_Model’ folder contains code that:

1. Formats soil (spatial), weather and ndvi (temporal), productivity and cover (RAP data) downloaded from Google Earth Engine (GEE) over the desired spatial extent. You must download the data from GEE because it’s too big for us to share here. We provide scripts in GEE to do that\*\*\*\*
2. Runs the four models described in Ensley-Field et al to create a forecast model and comparison models
3. Creates point estimates of hindcasts from 1988-2020 and a forecast for 2021 from the forecast model. It saves all of these together in one csv file.
4. Separately runs a 2021 forecast and calculates process and parameter uncertainty using monte carlo sampling. We run it with 500 iterations, this might be computationally prohibitive and you can lower this number.
5. Creates figures showing maps of long term mean and standard deviation of the downloaded productivity data. It then creates a map of the long term mean of residuals and correlation between productivity data and the model run.
6. Spatial residuals by model
7. . All scripts used can be run in the “run\_everything.R” script after data from GEE is downloaded.

**\*\*\*\*Downloading data from GEE:**

Areas of interest to run this model can be modified by editing the ‘gb\_region’ FeatureCollection in the imports within Google Earth Engine, or drawing new polygon and changing the ‘region’ argument in the’ export.image.toDrive()’ function. We reduced the resolution from 4000m to 10000m in hopes that this analysis can be run on most computers. You can increase and reduce the resolution by editing the ‘scale’ argument in the ‘export.image.toDrive()’ function. This won’t work if you change the spatial extent outside the Intermountain West, where the datasets we download are available.

While the extent and resolution included as the default in this folder run on our computer, we are using a windows 10 workstation with an i7-7700 Intel Core Processor, CPU @3.6GHz, NVIDIA Quadro P600, 16 GB of RAM @2400MHz, and an SSD. Reducing the spatial extent and increasing the spatial resolution will help this run faster and use fewer computational resources.

**Scripts to download GEE data:**

RAP\_gee\_tiffs: <https://code.earthengine.google.com/1344640e568dc96d032fecd99d45e4f3>

Spatial\_gee\_tiffs: <https://code.earthengine.google.com/92f1428e7183d07afe5c4d7e42bc374a>

Temporal\_gee\_tiffs: <https://code.earthengine.google.com/02399e2d37e3e6fd92da7fa200038c88>

(the last GEE script takes >20 minutes to run and export)

These three .tiffs will appear in your google drive after running these scripts. You must then download and transfer them to the '~finefuel4cast\Prod\_Forecast\_model\gee\_4cast\_data\prod\_4cast\_tiffs' folder to run our analysis.

Sign up for a free account here: <https://earthengine.google.com/new_signup/> and for a quick intro that should allow you to run and make basic edits to our script we recommend: <https://www.youtube.com/watch?v=BUo-8I0peuI>