FCAT/REM Preprocessing Steps

This document is meant to serve as a training document and reference material for the preprocessing steps required for an REM project to be run in FCAT from the BlueJay VM.

First time working on an REM project:

1. Contact SIG IT support team to get VPN access and a user profile set up on the BlueJay VM (IP 10.1.30.113).
2. Map the shared drive '\\10.1.30.142\srv\share' to the BlueJay VM following these instructions.
3. Preprocessing requires some handling of GIS data. If ESRI ArcPro is your preferred software for handling GIS data and you do not have an ESRI license and ArcPro set up on your personal machine, contact the SIG IT support team to get that set up. Note: QGIS is a free, open-source GIS software that is equally as effective.
4. Download the TreeMap dataset of choice from the TreeMap webpage. Note: you only need to download these data if you need information from TreeMap for building your treatment kcp files (like a list of species or info on current forest conditions).
5. Download the 'Fire Probability Map' from the Climate Forward Data Repository website.
6. Copy (from the shared drive) or git pull (from the rem-tools github repo) the rem-tools folder to your local machine.
7. Download and install R and Rstudio to your personal machine. Instructions for how to do this are in the rem-tools folder, "HowToDownload_R_RStudio.pdf".

Every time working on an REM project:

1. Download the project treatment shapefile. These will typically be found in the corresponding project folder in the REM Active Projects Google Drive.
2. In your preferred platform for handling GIS data (these sub steps can be done in whatever order makes the most sense for your project):
    a. Ensure the project treatment shapefile has no overlapping polygons or broken geometries.
    b. Ensure the project treatment shapefile is projected and uses measurement units of meters. Recommended: project the shapefile into Transverse Mercator (UTMs).
    c. Add and fill the 4 attributes required by FCAT.
        i. p_tx_type: data type = text. This is the same as the name of the **project** treatment kcp file you will make in step 4. Should generally follow this format: <brief description of treatment>_<harvest project code>. For example: project_tx_FA020. These names should not include any characters or spaces other than underscores.
        ii. b_tx_type: data type = text. This is the same as the name of the **baseline** treatment kcp file you will make in step 4. Should generally follow this format: <brief description of treatment>_<harvest project code>. For example: baseline_tx_FA020. These names should not include any characters or spaces other than underscores. Note: having baseline

treatments is uncommon. If you do not have any baseline treatments this attribute will be NULL for each record but must still be present.

iii. tx_code: data type = double. This can be any integer less than 100 but should be unique to the tx_type.

iv. kcp_exists: data type = double. This is a binary attribute. 1 = the treatment kcp exists and 0 = the treatment kcp does not exist. For an REM project this should always be 1.

v. Other shapefile attributes can be present, FCAT will ignore them.

d. Dissolve the project treatment shapefile by the 4 FCAT attributes from step 2c.

e. Once steps 2a-2d are complete, upload the updated project treatment shapefile to the shared drive you mapped to the BlueJay VM, in '\share\rem-inputs'.

3. Still in your preferred platform for handling GIS data:
   a. Find the average annual fire probability.
      i. Buffer the treatment shapefile by 15km.
      ii. Find the average annual fire probability within the 15km buffer.
   b. Find the acreage of the project AOI and compute number of ignition simulations needed.
      i. Create a minimum bounding envelope around the 15km buffer.
      ii. Calculate the acres of the resulting rectangle.
      iii. Divide the acres by 50.
      iv. Whichever number is larger between 10,000 and acres/50 is the number of ignition simulations needed for your project.
4. Create the treatment kcp files needed for your project.
   a. If you need a list of softwoods and hardwoods for your treatment kcp:
      i. Open the R script "treemap_data_for_FVS_kcps.R" found in the rem-tools folder. Set the file paths to match your local file paths for the various files read in. Run the R script.
         - The lists of softwood and hardwood species output into the R console after the lines 'noquote(top_49_xx$code)'. These lists are needed for the treatment kcp file.
         - Be sure to keep 'OS' in your softwoods group and 'OH' in your hardwoods group.
   b. Create your own kcp file(s) from scratch (suggestion: use the FVS GUI) and/or by borrowing various pieces from existing kcp files. This document does not cover that process.
   c. Upload the treatment kcp file(s) to the shared drive in 'share\rem\CONUS\kcps'
5. Select a regeneration method for your project (species method or shade intolerance method), read about the differences in the USFS REGIMPUTE files found here. In the .ini file you will set the regen-kcp variable to either regimpute-species.kcp or regimpute-shade.kcp
6. Identify the appropriate ecoregion from the Level II ecoregions map (pdf in the rem-tools folder).
7. Once steps 1-6 are complete you are ready to proceed to running FCAT for your REM project.

8. To check the status of each FCAT microservice as it is running, in the rem-tools folder see the file ‘Signs that each FCAT step has completed running.pdf’ for guidance.