**Purpose:** A function used to calculate the spatial and or temporal variability in condition factor. There are 5 models to choose from + the glm model to get the general MW-SH relationship.

* Note: We use our MW-SH lme to get our condition factor (CF) to use in the GAM. But this CF is calculated across all of our data, whereas our Meat Weight data is only calculated for the current year using the same lme model (just different data). There are some funny disconnects here that we should discuss/tidy up. in model 1 we average across the years, while in model 2 we don’t… If we use GAM’s long term shouldn’t we fold the initial lme model into the gam and just have the one model for both? Random effects in gam’s are no problem.

**Version Control:** Multiple versions exist, usually duplicates of each other but no guarantees.

Required packages: mgcv

**Function Arguments Summary**

1. **wgt.dat**: The data to model
2. **pred.dat**: Generate model predictions. Default is NULL which does nothing. Would need to be a data frame of appropriate (depth, year and/or lon/lat) data to predict on.
3. **b.par**: Do we want to use the data/model to 'estimate' the allometric relationship or force it

to be a specific number (i.e. 3). Default is b.par=3

1. **model.type**: What type of model should we fit. Default ='glm', Options include:
   * "glm" which has covariates depth and year, Gaussian family and identity link.
   * "gam\_d" which has both depth and year fit as thin plate regression splines, Gaussian family and identity link.
   * "gam\_s" which has location (lat/lon), depth, and year fit as thin plate regression splines, Gaussian family and identity link.
   * "gam\_f" which has location (lat/lon) and depth fit as thin plate regression splines, year is a factor, Gaussian family and identity link.
   * "gam\_sy" which has location (lat/lon) by year and year fit as thin plate regression splines, Gaussian family and identity link.
2. **plt**: Make a plot. (T/F) defalut = F
3. **y2**: Use alternate year data. (T/F) default = F
4. **ADJ\_depth**: Use column ADJ\_depth. (T/F) default = F
5. **pred**.**loc**: The depth, lat, and lon that you are predicting on (GAM selection dependent). These should be user specified although I do have a backup method set up for these.
6. **dirct**: The directory in which the shwt.lme.r function is located. Default = "Y:/Offshore scallop/Assessment/Assessment\_fns/"

**Section 1**

Meat weight and shell height data/metadata is entered with some minor initial modifications. The CF (the intercept) is first calculated from the MW-SH model assuming an isometric relationship. The model output is then used in 1 of 5 different models (see details in Function Arguments Summary section). Optionally we can produce plots of the results and/or generate predicted data using the results based on user specified data (which would be some combination of year,lat/lon, and depth in meters).

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