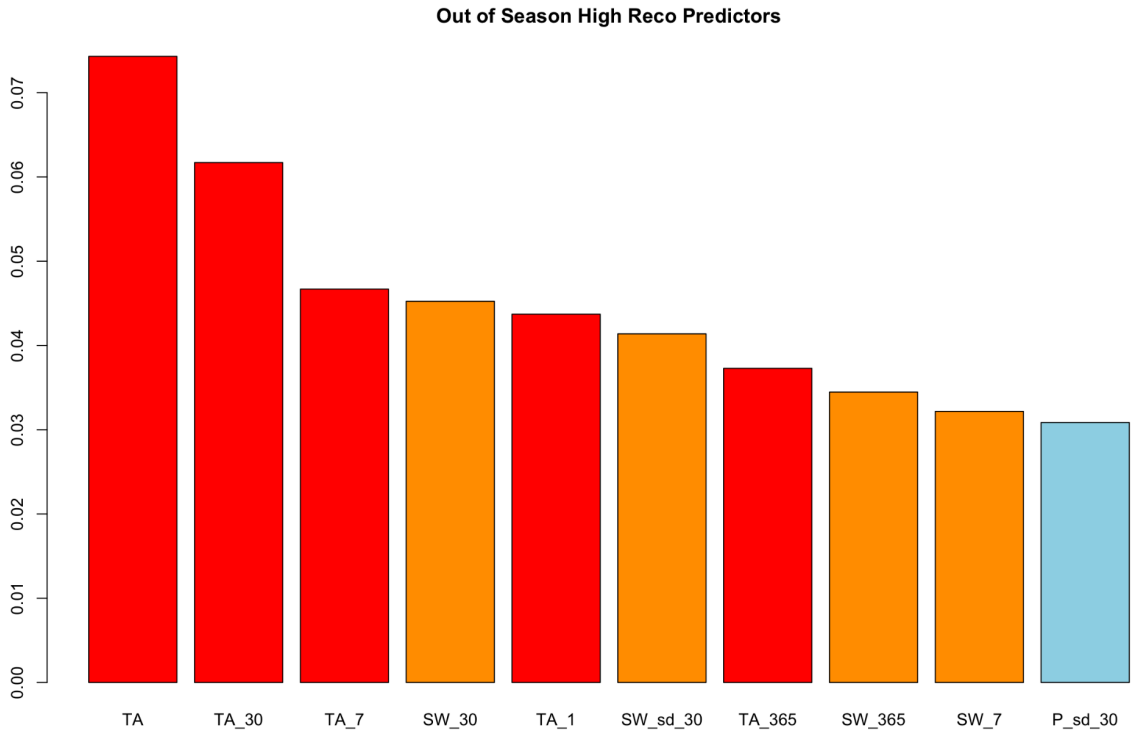
Case 12: Non-Season Strong Source



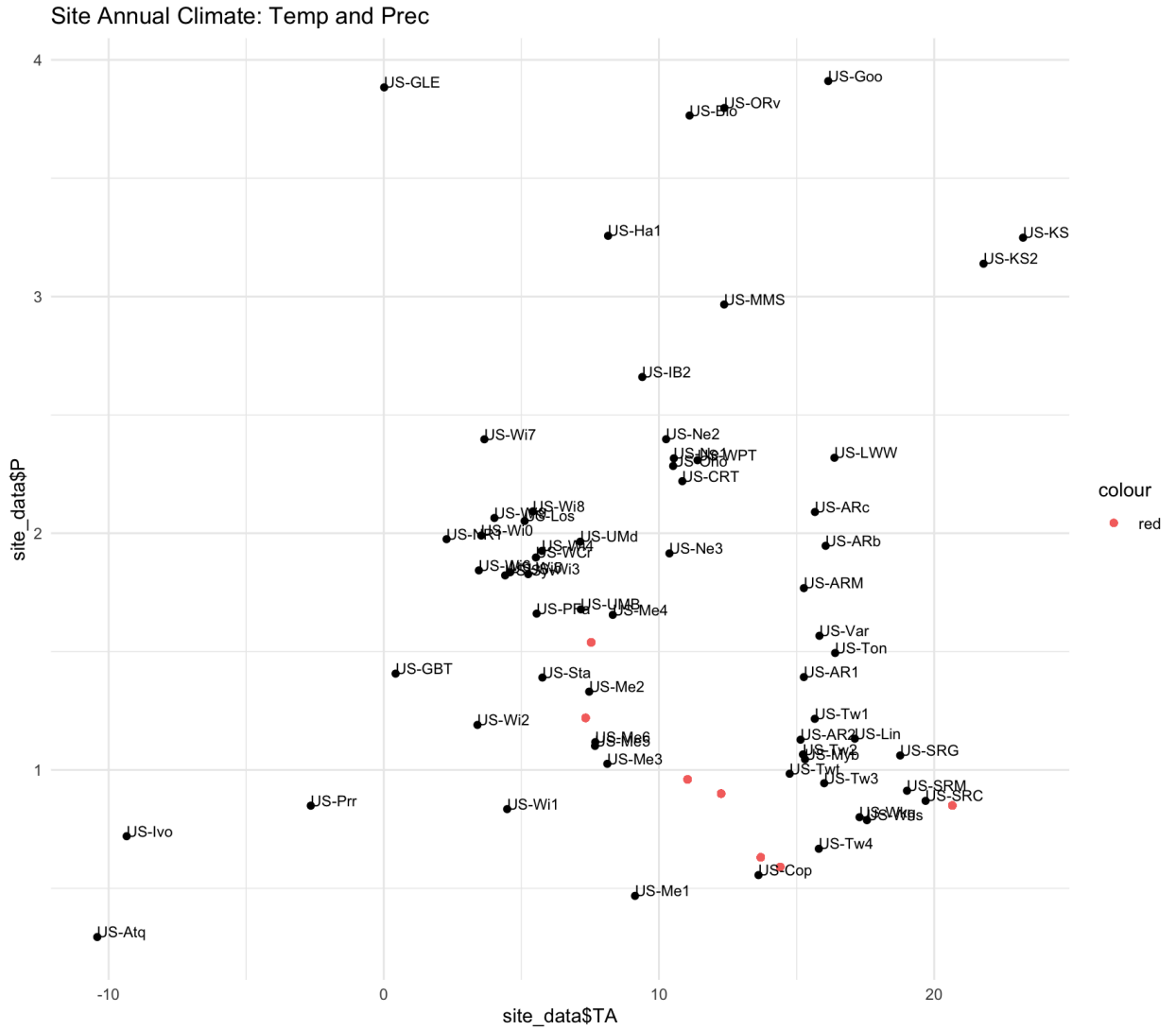
- They are almost entirely temperature and shortwave radiation. Most of them are the mean value, as opposed to the standard deviation. This is interesting given that there's so many different climate situations across the sites… I figured standard deviation would rise in importance as compared to the actual value.
- Also, it's interesting that in the initial 7 site combined season model, VPD was so important. In the off- season with all the sites, VPD just doesn't make a presence. It doesn't show up in the combined either in the 50 site combined season either, so I wonder if this is due to site level. Leads me to question if misclassifications could be coming from one site or climate region.
- Summed importance of temperature variables is .312

In order to explore effects of temperature and shortwave radiation on high reco during the out of season, I think it's important to understand a few things

(1) What months are out of season and what months do these out-of-season sources fall?
(2) Is there a certain temporal location within out of season that the sources fall?
(3) Are the out of season's grouped into certain years that have stronger climatic conditions (like a very hot year) or are they dispersed arbitrarily and or evenly?
(4) Do these results vary based on sites with similar climates?

In order to answer these questions, I am going to start by looking at the clumping of the sources (2).

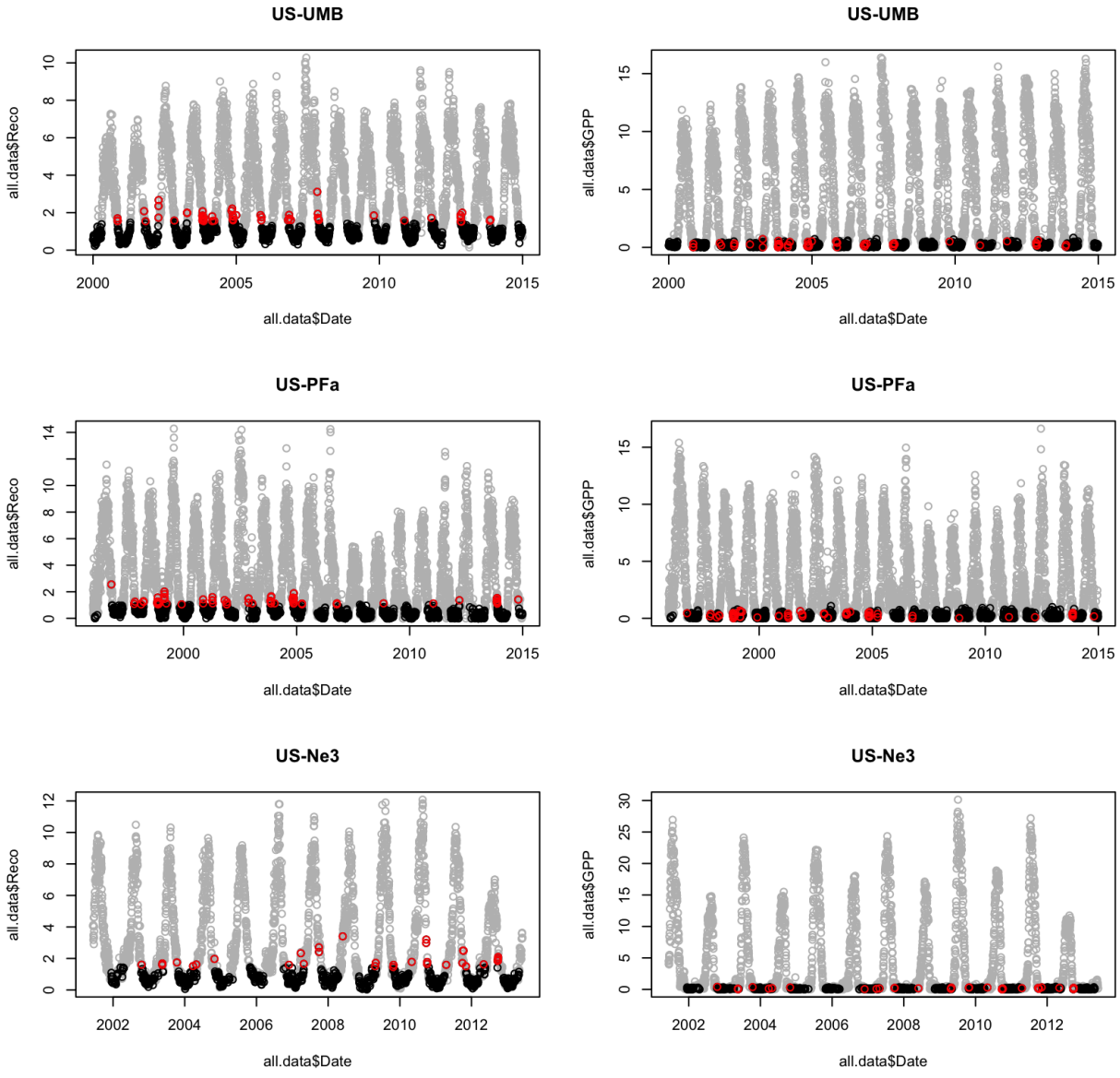
Here is a plot of all the sites temperature and precipitation for a quick understanding of the climatic relationships between sites.



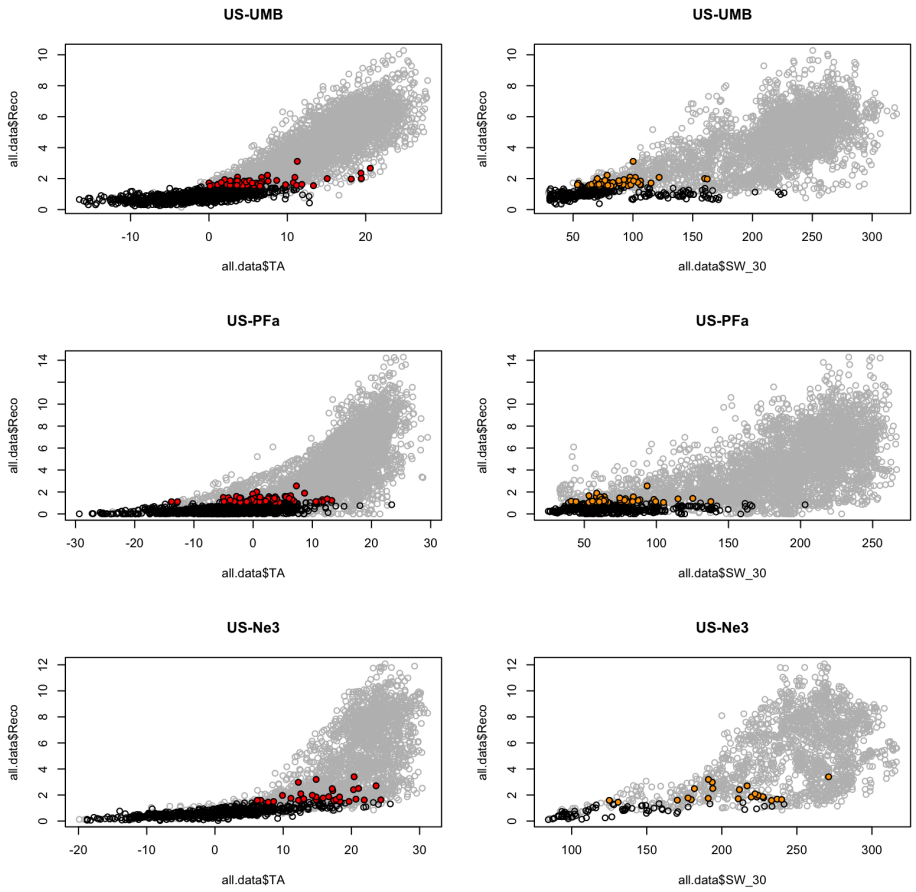
I am going to take a few that appear to be similar, group them together, and analyze their results for similarities and differences amongst and between each other.

The group in “center” (medium temp and above avg prec) climate exhibit A LOT of similarity in their patterns of high reco during out of season. Basically, every year has these reco sources at the same point of the year. I included an example of these sites below, but I haven’t exhaustively looked at all of them.

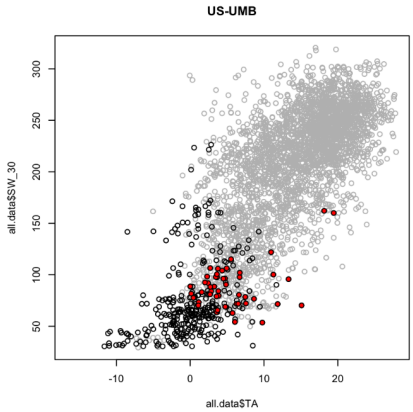
This is the Reco and GPP of 3 of these enter site sources. You can see that it is most commonly the transition into the not growing season where these lie. Some years have more, which begs the question why. Looking at year averages might be helpful with this one. And PDP plots.
I would call these sites cool and wet.

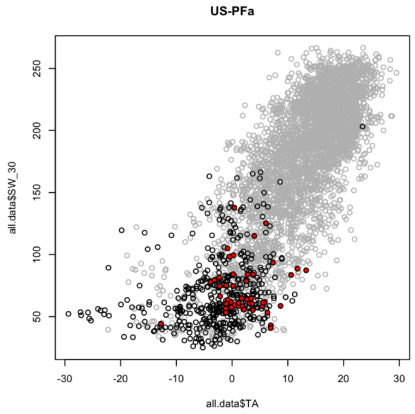


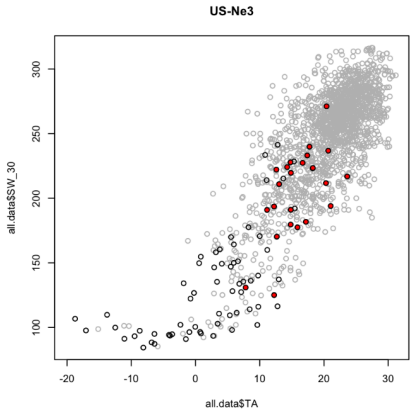
Lets plot these along temperature and SW now.
Below are plots of the out of season sources along temperature and sunlight radiation. This is interesting because you can clearly see there's a threshold for temperature, which is around the same for the threshold that knocks days into growing season. So temperature for these out of seasons is a temperature that is normal of a growing season (or at least on the lower end of it), but the points themselves are not due to some other covariate factors. SW 30 is a very similar case, just the threshold appears to be a bit wider. This is probably why it's not as important as temperature.



I want to see the interplay between these two variables now.
This is both TA and SW 30 at the same time. These two covariate values for the out of season sources are in the ranges of the in season. What I am thinking is that out of season sources are driven by VPD and P being normal for out of season, but temperature and sunlight variables being spiked to what is seen in season. You see this hard threshold for temperature, which is probably why all its covariates show up as so important. On the other hand, SW30 is like 5th importance, which you can see that there are brighter days that aren't necessarily strong sources, so this threshold is a little weaker and thus not as strong of a predictor as temperature is. It's interesting that it's grouped into a little box too.

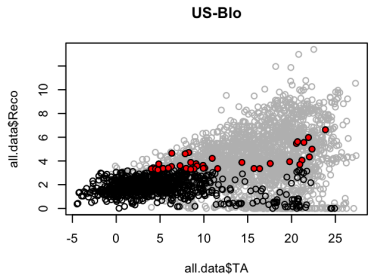


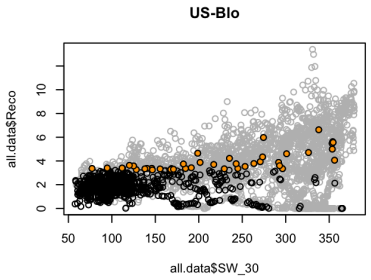


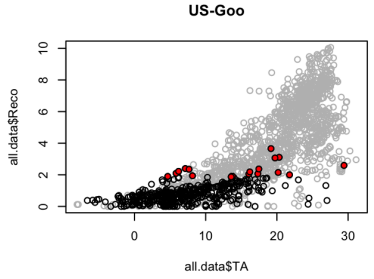


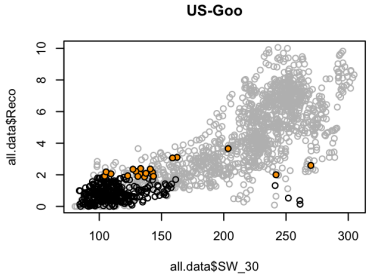
I checked the densities P30 in season, out of season, and out of season high reco, and its honestly all over the place. This could indicate why precipitation isn't that important for predicting this state, since the relationship is inconsistent from site to site.

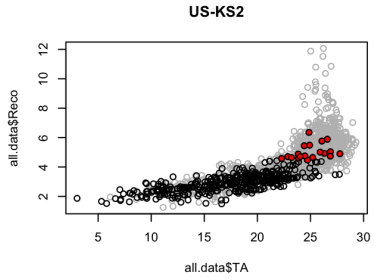
Looking at the hot wet sites, there's obviously similar patterns to the cool wet sites seen previously with the thresholds.

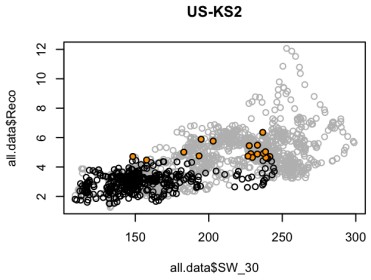




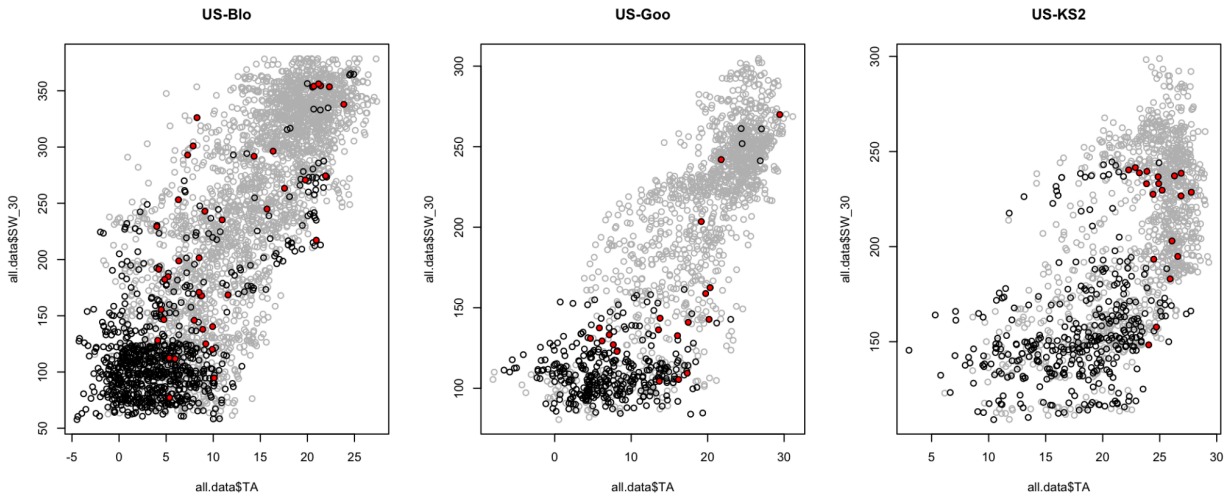






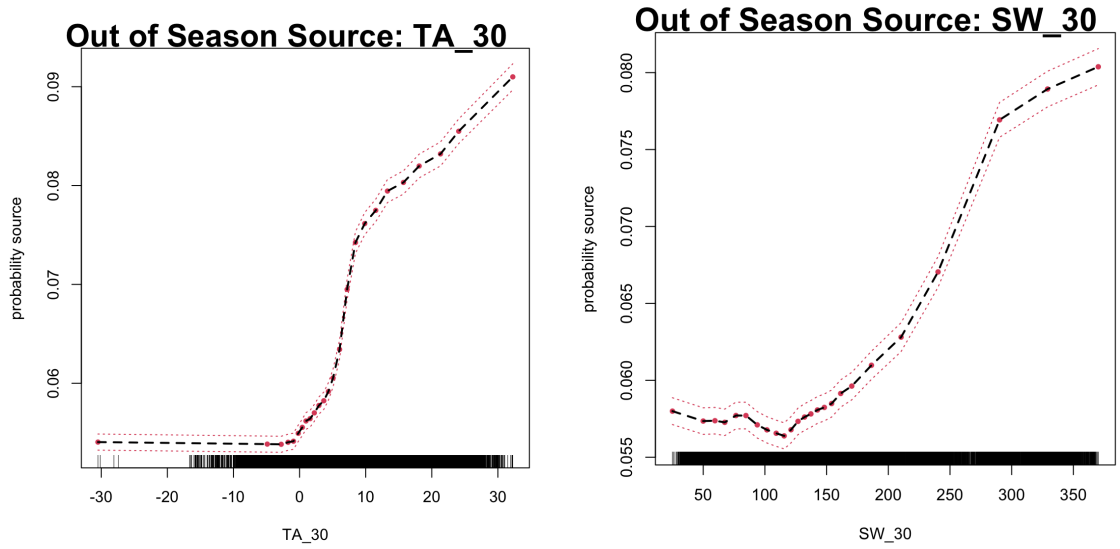


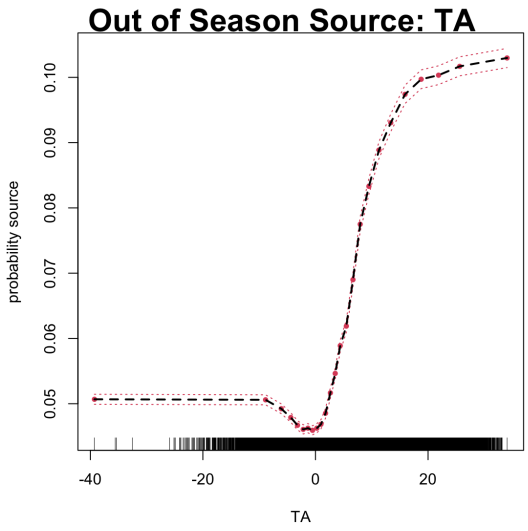
One thing you can notice is some more variation in the SW30 of sources with respect to its range. Maybe since it has a much wetter climate, those covariates we aren't seeing play a stronger differentiating role than seen in the cool and a little wet climates.



The arid and hot sites are where things get more unpredictable! In some sites, like SRG and WKG, Reco doesn't have that linearly positive relationship with TA and SW30 that we see at other sites. Instead, too much sunlight causes a drop in Reco. These two sites are different in that a majority of their days are lumped at excruciatingly hot days, instead of a kind of even linear spread amongst the range.

I am now going to make some PDP plots to see what the generalized threshold is.





For TA, yes it does appear as a threshold, but it should be noted that the increase is over a 10 degree range, so it's not as thresholdy as it appears to be. I wonder where the dip comes from, potentially some of the colder sites? TA 30 flattens out earlier because this is still within the not growing season, so it's not going to be as common to see periods of time where its 30 degrees for a month and not active. It's good to see the threshold pattern diminish in SW30 since we are dealing with so many sites, there's no way there’s one threshold.