Statistical Modelling

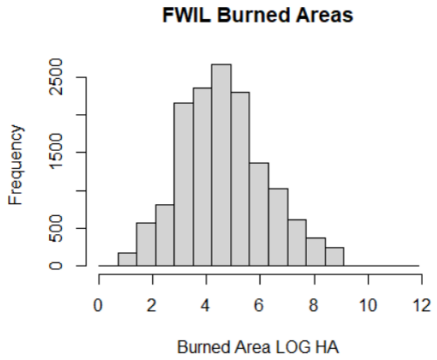
Dependent Variable = Burned Area		Subgroups								
Independent Variable	**FWI**	1 = low	2 = moderate	3= high	4= very high					
	Elevation	1 = 0-500m	2= 500-1000m	3= >1000m						
	Slope	1= 0-5 °	2= 5-10 °	3= 10-15 °	4= 15-20°	5= 20-25 °	6= 25-30 °	7= 30-35 °	8= 35-40 °	9= >40 °
	Aspect	N	NE	E	SE	S	SW	W	NW	
	Land use: CLC 1	1 = Forest and semi natural areas	2 = Agricultural areas	3= Artificial surfaces	4= water bodies	5= wetlands				
	Land use: CLC 2	3= forests	9=Open spaces with little or no vegetation	12= Scrub and/or herbaceous vegetation associations						
	Road network Distance 0-500	major	minor	Very small	Paths	Link				
	Road network Distance 500-1000	major	minor	Very small	Paths	Link				
	Road network Distance 0> 1000	major	minor	Very small	Paths	Link				
	Total Burned area	2001-2021	2001-2011	2011-2021						

What I have done

Bin fires in RStudio → Histogram

```
RandomF_his <- hist(log(RandomF$area_ha),breaks =seq(from= 0,to=12, by=0.7),
                main ="FWIL Burned Areas",xlab="Burned Area LOG HA",ylab= "Frequency")
RandomF_info <-  hist(log(RandomF$area_ha),breaks =seq(from=0,to=12, by=0.7),
                main ="FWIL Burned Areas",xlab="Burned Area LOG HA",ylab= "Frequency")
RandomF_info


RandomF_info
RandomF_counts <- RandomF_info $counts
RandomF_counts
```



 # Barplot

The number of counts per each bin and the sum of them

counts <- RandomF_counts

counts_sum <- 14613

find the exponential value of bin midpoints

ksi <- RandomF_his$mids

bin.mid.exp <- exp(ksi)

scale the burned area for each bin: multiply each bin count by the exponential value of the bin midpoint

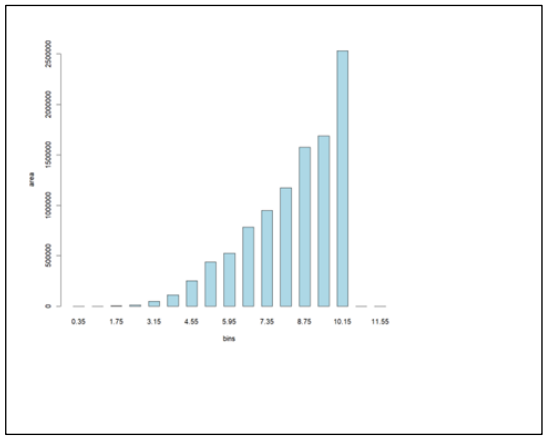
tba <- bin.mid.exp*countsc

create a data frame for the barplot

Total_dec <- data.frame(ksi, tba)

Create the barplot

```
(bp <- barplot(Total_dec$tba, names.arg=Total_dec$ksi,
        space = c(0, diff(Total_dec$ksi)),
        col="lightblue", xlab="bins", ylab="area"))
```



WHAT I SHOULD DO

I have to create a normal curve distribution scaled to the data

Attach a matlab code but I should convert in R

 # first find the bins :

```
[global_height,global_bin]=hist(log(data(:,1)),20);
statsall.bins=global_bin;
statsall.heights=global_height;
%this will make statsall.bins=global_bin;
global_height_exp=global_height.*exp(global_bin)/sum(years);
```

I DID IT

HOW TO INTERPRET WITH THIS IN RSTUDIO

%make a line that follows the normal distribution in the histogram

```
% total standard model
% this here is the normal distribution function that the values need to be fit to
lin=inline('beta(3)/((2*3.14159.*beta(2).^2)^(1/2)).*exp(-(x-beta(1)).^2/(2.*beta(2).^2))','beta','x');
% this is for finding the starting values for the fitting
beta=[mean(global_bin),2,10^6];
% this is the actual fitting
betaend=nlinfit (global_bin,global_height_exp,lin,beta);
% now we plot it.
   figure
   hold on
   bar(global_bin/2.3026,global_height_exp,'FaceColor',[.7 .7 .7]);
   xlabel('log_10 Fire size class [ha]')
   ylabel('Total contribution to annual burned area [ha/year ]')

meanval=betaend(1);
```

```
plot(global_bin,lin(betaend,global_bin),'k')
% this one check how well the fit has worked
c=corrcoef(lin(betaend,global_bin),global_height_exp);
ccs=c(1,2);
```