Periodic Checking of Turtle Ants

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Install Relevant Libraries and Load the Data from GDrive

```
setwd('../turtleAnt_dataAnalysis/')
library(ggplot2)
library(gsheet)

setwd('../turtleAnt_dataAnalysis/')
urlList=c('https://docs.google.com/spreadsheets/d/1cvECaZLMiSOCoJlqv3W8xpVNIWY5Nf5zsw8b7khrvSA/edit#gid=
          'https://docs.google.com/spreadsheets/d/1cvECaZLMiSOCoJlqv3W8xpVNIWY5Nf5zsw8b7khrvSA/edit#gid=
          'https://docs.google.com/spreadsheets/d/1cvECaZLMiSOCoJlqv3W8xpVNIWY5Nf5zsw8b7khrvSA/edit#gid=
          'https://docs.google.com/spreadsheets/d/1cvECaZLMiSOCoJlqv3W8xpVNIWY5Nf5zsw8b7khrvSA/edit#gid=
          'https://docs.google.com/spreadsheets/d/1cvECaZLMiSOCoJlqv3W8xpVNIWY5Nf5zsw8b7khrvSA/edit#gid=
          'https://docs.google.com/spreadsheets/d/1cvECaZLMiSOCoJlqv3W8xpVNIWY5Nf5zsw8b7khrvSA/edit#gid=


colData=data.frame()
colonies=c('T1','T2','T3','V1','V2','V3')
for(i in 1:length(urlList)){
  coli=read.csv(text=gsheet2text(urlList[i], format='csv'))[,1:8]
  coli$colony=colonies[i]
  coli$Number.Workers=as.numeric(as.character(coli$Number.Workers))
  print(names(coli))
  colData=rbind(colData,coli)
}
```

```
## No encoding supplied: defaulting to UTF-8.

## [1] "Date"            "Time"            "Box"             "Number.Workers"
## [5] "Number.Soldiers" "Number.Queens"   "Number.Larva"    "Number.Eggs"
## [9] "colony"

## No encoding supplied: defaulting to UTF-8.

## [1] "Date"            "Time"            "Box"             "Number.Workers"
## [5] "Number.Soldiers" "Number.Queens"   "Number.Larva"    "Number.Eggs"
## [9] "colony"

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## [1] "Date"            "Time"            "Box"             "Number.Workers"
## [5] "Number.Soldiers" "Number.Queens"   "Number.Larva"    "Number.Eggs"
## [9] "colony"

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## [1] "Date"            "Time"            "Box"             "Number.Workers"
## [5] "Number.Soldiers" "Number.Queens"   "Number.Larva"    "Number.Eggs"
## [9] "colony"

## No encoding supplied: defaulting to UTF-8.
```

```
## [1] "Date"            "Time"            "Box"             "Number.Workers"
## [5] "Number.Soldiers" "Number.Queens"   "Number.Larva"    "Number.Eggs"
## [9] "colony"
```

```
## No encoding supplied: defaulting to UTF-8.
```

```
## [1] "Date"            "Time"            "Box"             "Number.Workers"
## [5] "Number.Soldiers" "Number.Queens"   "Number.Larva"    "Number.Eggs"
## [9] "colony"
```

Clean Up Data and Add Time Info

```
colData=colData[colData$Box!='0',]
#colDataSplit=split(colData, colData$colony)
dim(colData)
```

```
## [1] 678   9
```

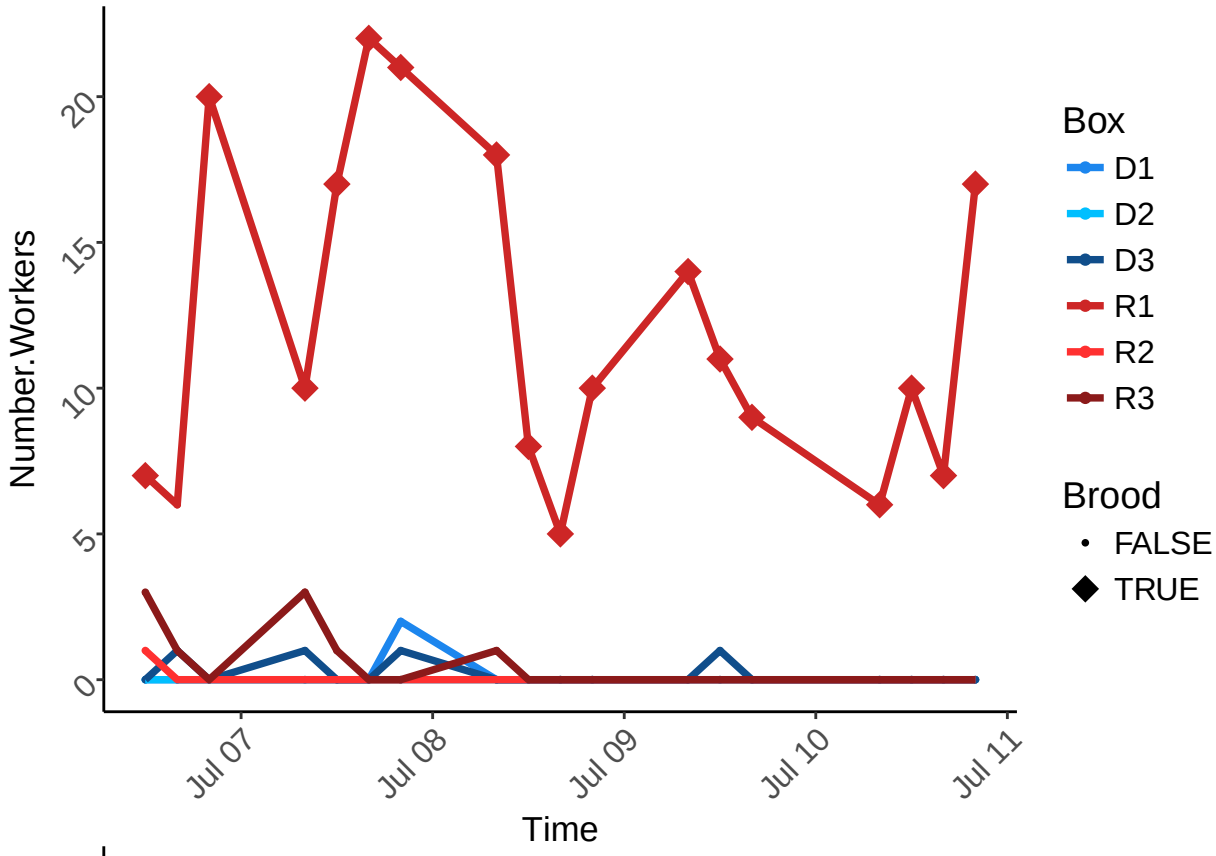
```
colData=na.omit(colData)

splitted=t(matrix(unlist(strsplit(as.character(colData$Date),'/')),nrow=3))
colData$Date=sprintf(paste(paste0('0',splitted[,1]),"%02d",paste0('20',splitted[,3]), sep='/'), as.nume


time=paste(colData$Date, colData$Time)
colData$Posix=as.POSIXct(time , format = "%m/%d/%Y %I:%M %p")

colData$PosixTime=as.POSIXct(colData$Time , format = "%I:%M %p")

colData$Number.Workers=as.numeric(as.character(colData$Number.Workers))

for(i in 1:nrow(colData)){
  colData$Brood[i]=(colData$Number.Larva[i]!=0|colData$Number.Eggs[i]!=0)
}

summary(colData)
```

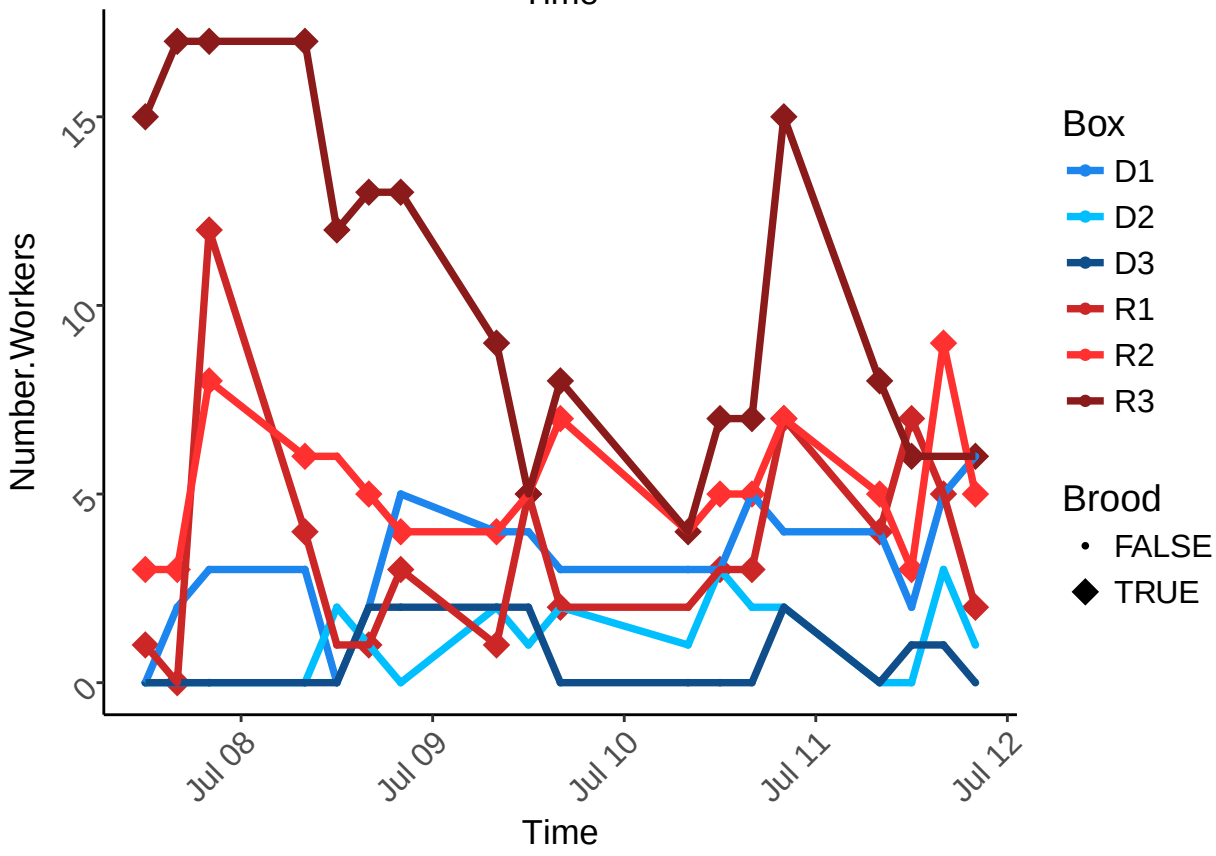
```
##      Date                 Time     Box      Number.Workers
##  Length:659         12:00 PM:180   D1:110   Min.   : 0.00
##  Class :character   4:00 PM :179   D2:110   1st Qu.: 1.00
##  Mode  :character   8:00 AM :144   D3:110   Median : 5.00
##                     8:00 PM :156   O :  0   Mean   :10.26
##                                    R1:110   3rd Qu.:12.00
##                                    R2:110   Max.   :78.00
##                                    R3:109
##  Number.Soldiers  Number.Queens     Number.Larva     Number.Eggs
##  Min.   : 0.000   Min.   :0.0000   Min.   : 0.000   Min.   : 0.000
##  1st Qu.: 0.000   1st Qu.:0.0000   1st Qu.: 0.000   1st Qu.: 0.000
##  Median : 0.000   Median :0.0000   Median : 0.000   Median : 0.000
##  Mean   : 1.982   Mean   :0.2549   Mean   : 2.856   Mean   : 3.727
##  3rd Qu.: 2.000   3rd Qu.:0.0000   3rd Qu.: 0.000   3rd Qu.: 1.000
##  Max.   :24.000   Max.   :4.0000   Max.   :50.000   Max.   :57.000
##
##     colony              Posix
```

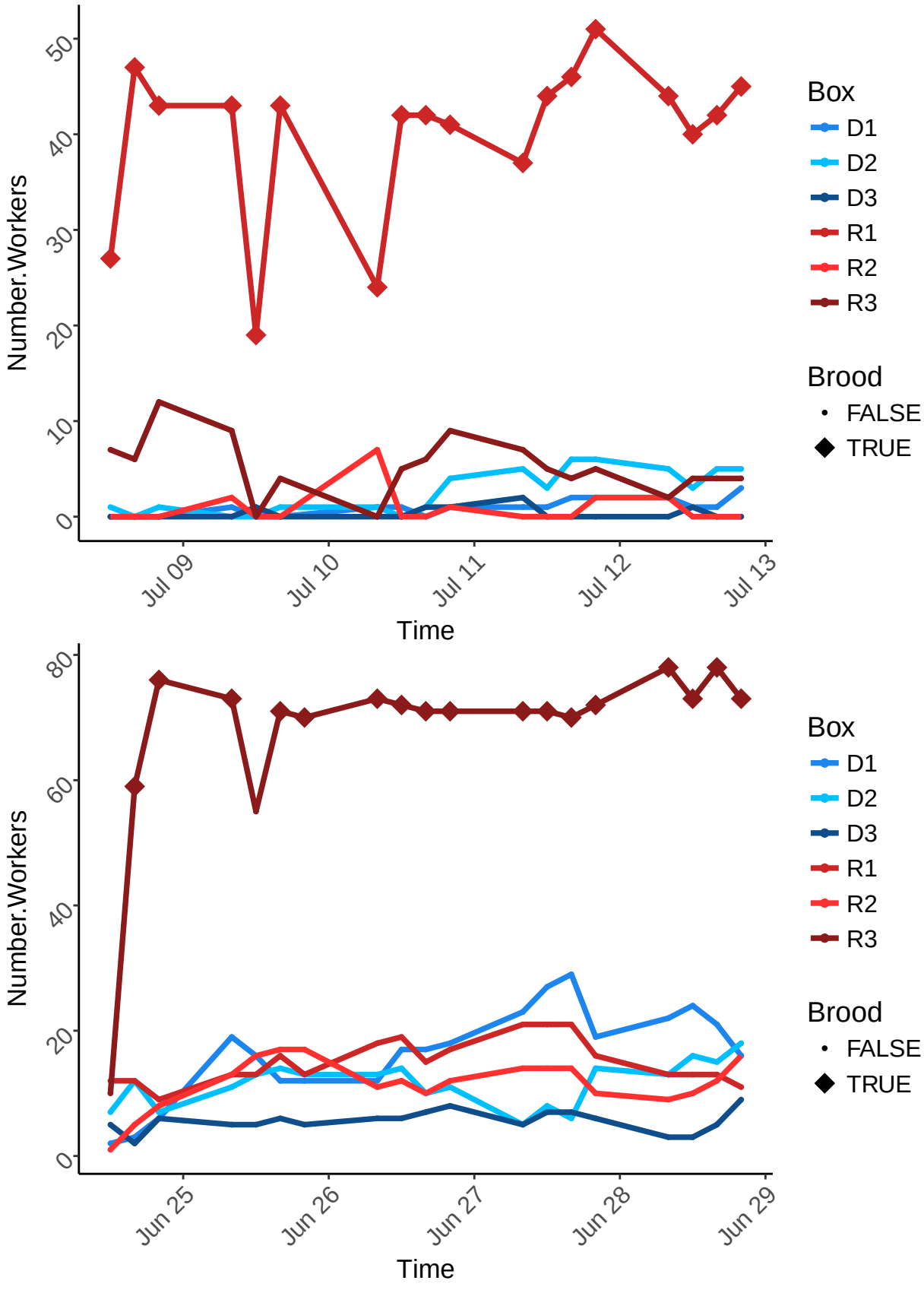
```
##  Length:659         Min.   :2017-06-24 12:00:00
##  Class :character   1st Qu.:2017-06-27 16:00:00
##  Mode  :character   Median :2017-06-30 12:00:00
##                     Mean   :2017-07-03 13:09:33
##                     3rd Qu.:2017-07-09 12:00:00
##                     Max.   :2017-07-12 20:00:00
##
##    PosixTime                     Brood
##  Min.   :2017-07-20 08:00:00   Mode :logical
##  1st Qu.:2017-07-20 12:00:00   FALSE:473
##  Median :2017-07-20 16:00:00   TRUE :186
##  Mean   :2017-07-20 14:06:22
##  3rd Qu.:2017-07-20 16:00:00
##  Max.   :2017-07-20 20:00:00
##
```

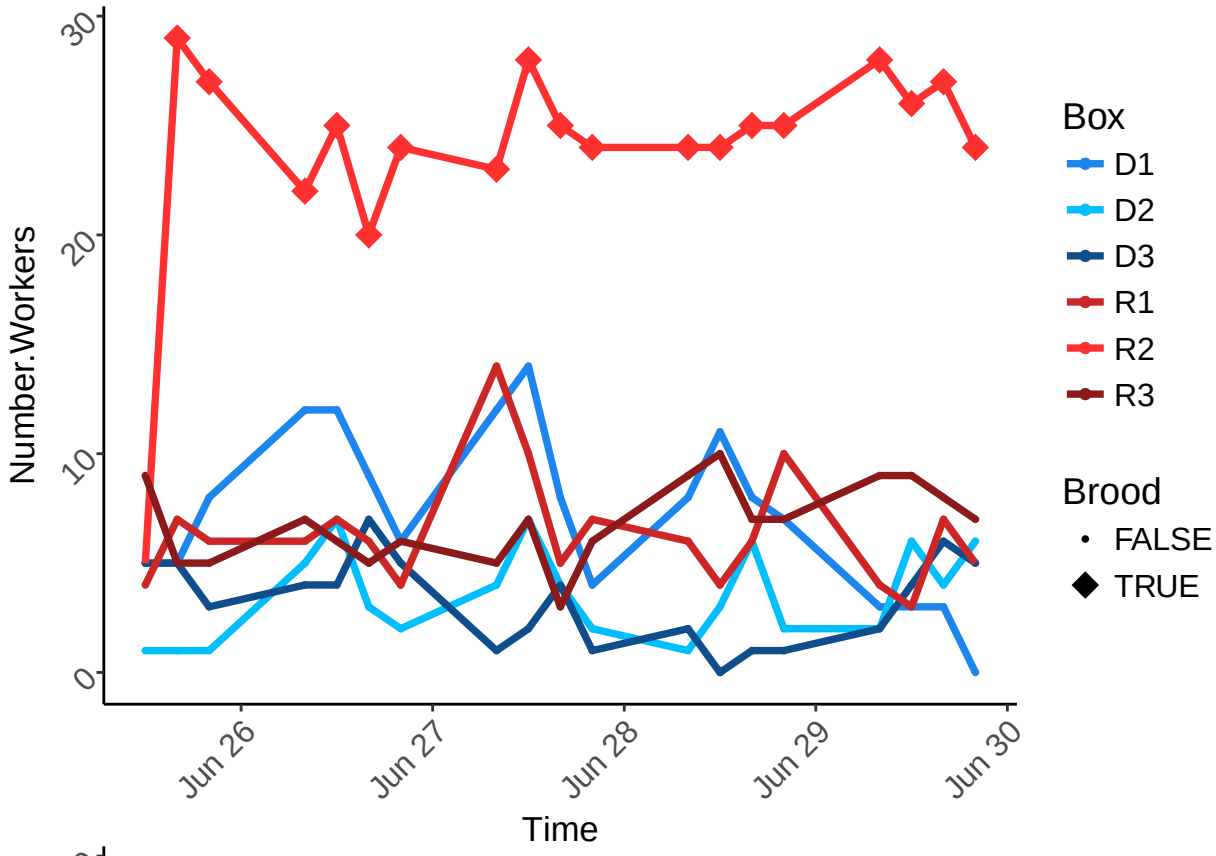
Plot Number of Workers Over Time

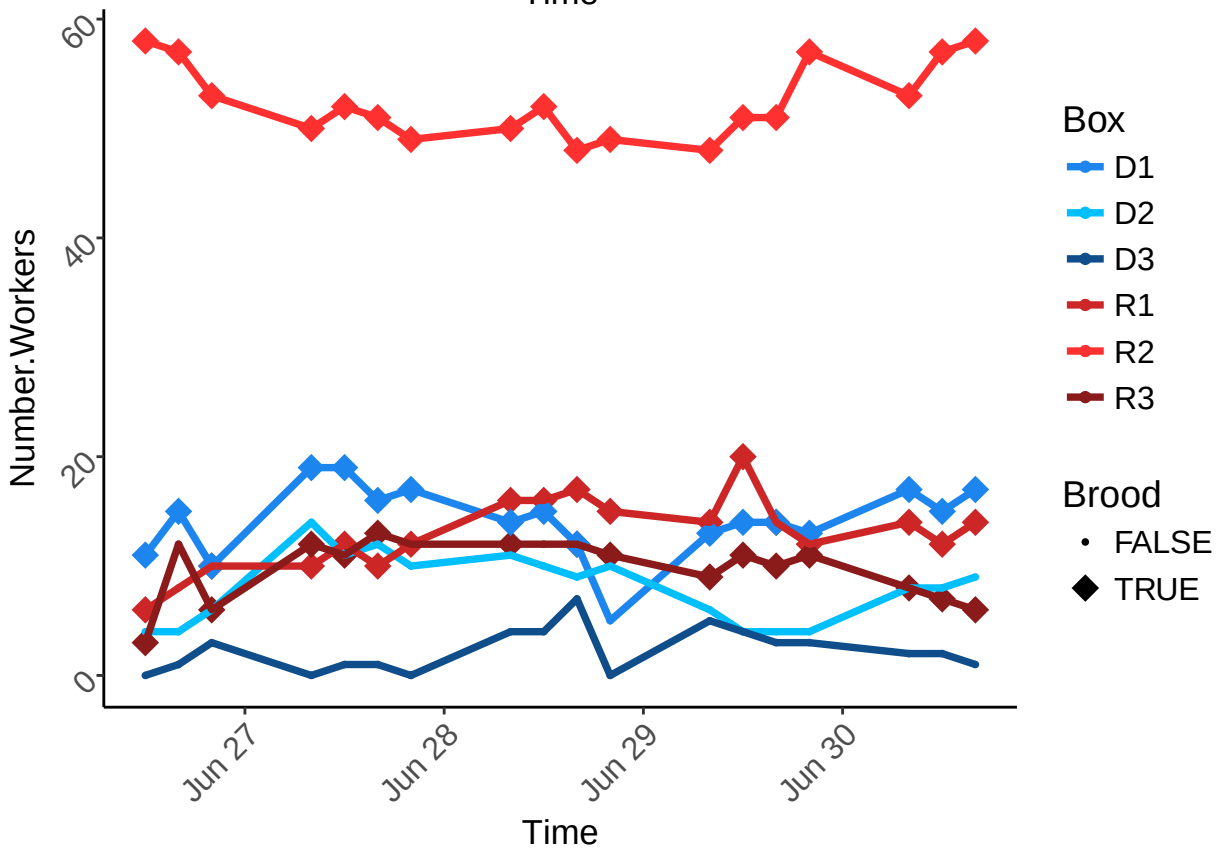
```
for(i in colonies){
  #png(paste0('finalPoster/line_workers_col',i,'.png'))
  p=ggplot(data=colData[colData$colony==i,], aes(x=Posix, y=Number.Workers, group=Box, color=Box, shape=
    geom_point()+
    geom_line(size=1.3)+
    scale_shape_manual(values=c(16, 18))+
    scale_size_manual(values=c(1,4.5))+
    labs(x='Time')+
    scale_colour_manual(values=c( 'dodgerblue2','deepskyblue1','dodgerblue4', 'firebrick3', 'firebrick1
    theme_classic()+
    theme(axis.title=element_text(size=13),axis.text=element_text(size=12, angle=45, hjust=1), legend.t
  #geom_bar(stat='identity')
  plot(p)
  #graphics.off()
}
```


Number.Workers
0
5
10
15
20
Jul 07
Jul 08
Jul 09
Jul 10
Jul 11
Time
Box
D1
D2
D3
R1
R2
R3
Brood
FALSE
TRUE


Number.Workers
0
5
10
15
Jul 08
Jul 09
Jul 10
Jul 11
Jul 12
Time
Box
D1
D2
D3
R1
R2
R3
Brood
FALSE
TRUE


Number.Workers
0
10
20
30
40
50
Jul 09
Jul 10
Jul 11
Jul 12
Jul 13
Time
Box
D1
D2
D3
R1
R2
R3
Brood
FALSE
TRUE
Number.Workers
0
20
40
60
80
Jun 25
Jun 26
Jun 27
Jun 28
Jun 29
Time
Box
D1
D2
D3
R1
R2
R3
Brood
FALSE
TRUE

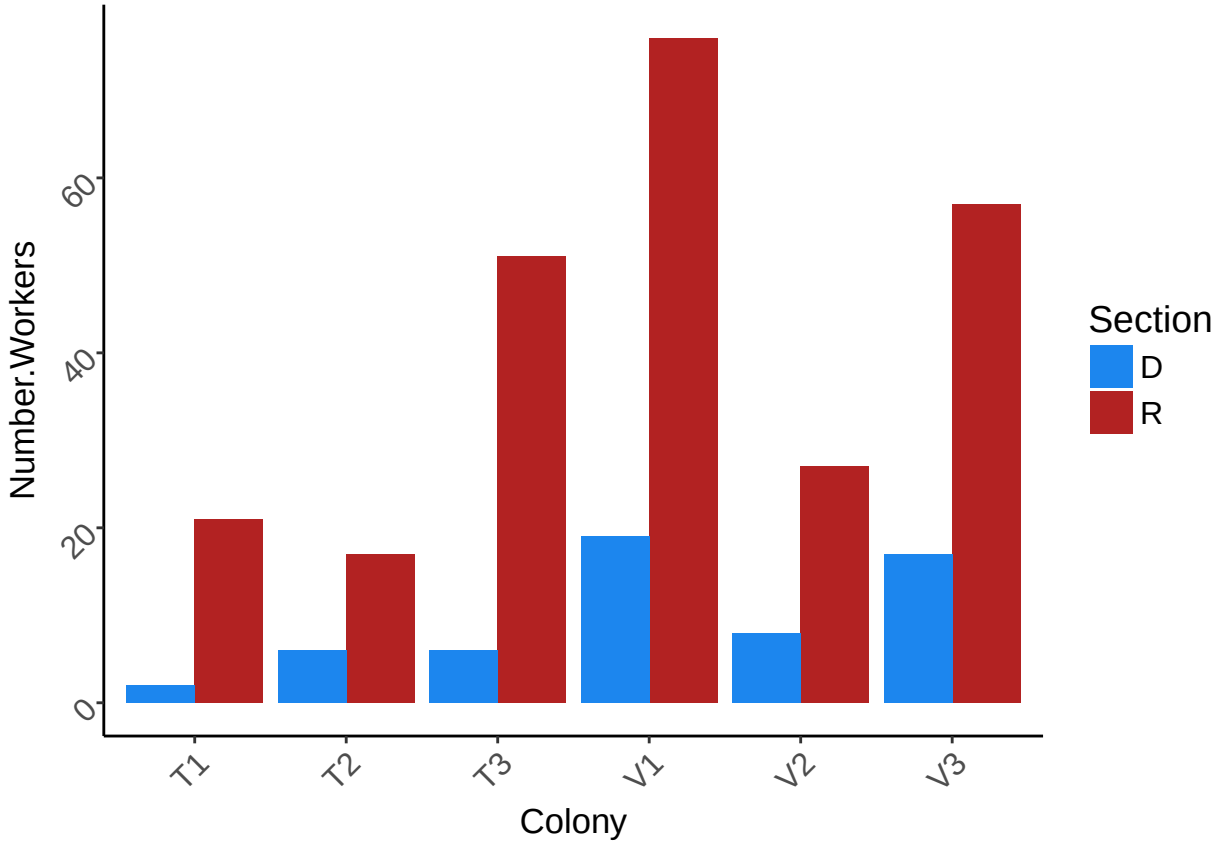

Number.Workers
30
20
10
0
Jun 26
Jun 27
Jun 28
Jun 29
Jun 30
Time
Box
D1
D2
D3
R1
R2
R3
Brood
FALSE
TRUE


Number.Workers
60
40
20
0
Jun 27
Jun 28
Jun 29
Jun 30
Time
Box
D1
D2
D3
R1
R2
R3
Brood
FALSE
TRUE

```
#
#
```

Plot Summary of Final Count For Each Colony

```
colData$DR=as.factor(t(matrix(unlist(strsplit(as.character(colData$Box), '')),nrow=2))[,1])
#png('finalPoster/final_counts.png')
ggplot(colData[colData$Time=='8:00 PM',], aes(y=Number.Workers, x=as.factor(colony), fill=DR))+
  geom_bar(stat='identity', position='dodge')+
  scale_fill_manual(values=c('dodgerblue2','firebrick'),name='Section')+
  labs(x='Colony')+
  theme_classic()+
  theme(axis.title=element_text(size=13),axis.text=element_text(size=12, angle=45, hjust=1), legend.tit
```




```
#graphics.off()
```