fearanalysis

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```
library(ggplot2)
library(sjPlot)
```

```
## Install package "strengejacke" from GitHub (`devtools::install_github("strengejacke/strengejacke")`)
```

```
library(AICcmodavg)
library(tidyverse)
```

```
## -- Attaching packages --------------------------------------- tidyverse 1.3.1 --
```

```
## v tibble  3.1.1     v dplyr   1.0.5
## v tidyr   1.1.3     v stringr 1.4.0
## v readr   1.4.0     v forcats 0.5.1
## v purrr   0.3.4
```

```
## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

```
library(dplyr)
library(gridExtra)
```

```
##
## Attaching package: 'gridExtra'
```

```
## The following object is masked from 'package:dplyr':
##
##     combine
```

```
library(reshape2)
```

```
##
## Attaching package: 'reshape2'
```

```
## The following object is masked from 'package:tidyr':
##
##     smiths
```

```
library(rstatix)
```

```
## Registered S3 methods overwritten by 'car':
##   method                          from
##   influence.merMod                lme4
##   cooks.distance.influence.merMod lme4
##   dfbeta.influence.merMod         lme4
##   dfbetas.influence.merMod        lme4
```

```
##
```

```
## Attaching package: 'rstatix'
```

```
## The following object is masked from 'package:stats':
##
##     filter
```

```
library(ggpubr)
library(gtable)
library(grid)
library(ggeasy)
```

```
dat<- read.csv(file="/Users/explore/Desktop/RAW_meso_data.csv")
head(dat)
```

```
##      date time hour system treatment assay distance length
## 1 6/12/22 1700    0      1        fc     a        1      3
## 2 6/12/22 1700    0      1        fc     a        2      3
## 3 6/12/22 1700    0      1        fc     a        3      3
## 4 6/12/22 1700    0      1        fc     a        4      3
## 5 6/12/22 1700    0      1        fc     a        5      3
## 6 6/12/22 1700    0      1        fc     b        1      3
```

```
##filtering out each distance so that we can take means and visualize using line graphs
fc.dat <- dat %>% filter(treatment=="fc")
fc1.dat <- fc.dat %>% filter(distance==1)
fc2.dat <- fc.dat %>% filter(distance==2)
fc3.dat <- fc.dat %>% filter(distance==3)
fc4.dat <- fc.dat %>% filter(distance==4)
fc5.dat <- fc.dat %>% filter(distance==5)


tc.dat <- dat %>% filter(treatment=="tc")
tc1.dat <- tc.dat %>% filter(distance==1)
tc2.dat <- tc.dat %>% filter(distance==2)
tc3.dat <- tc.dat %>% filter(distance==3)
tc4.dat <- tc.dat %>% filter(distance==4)
tc5.dat <- tc.dat %>% filter(distance==5)

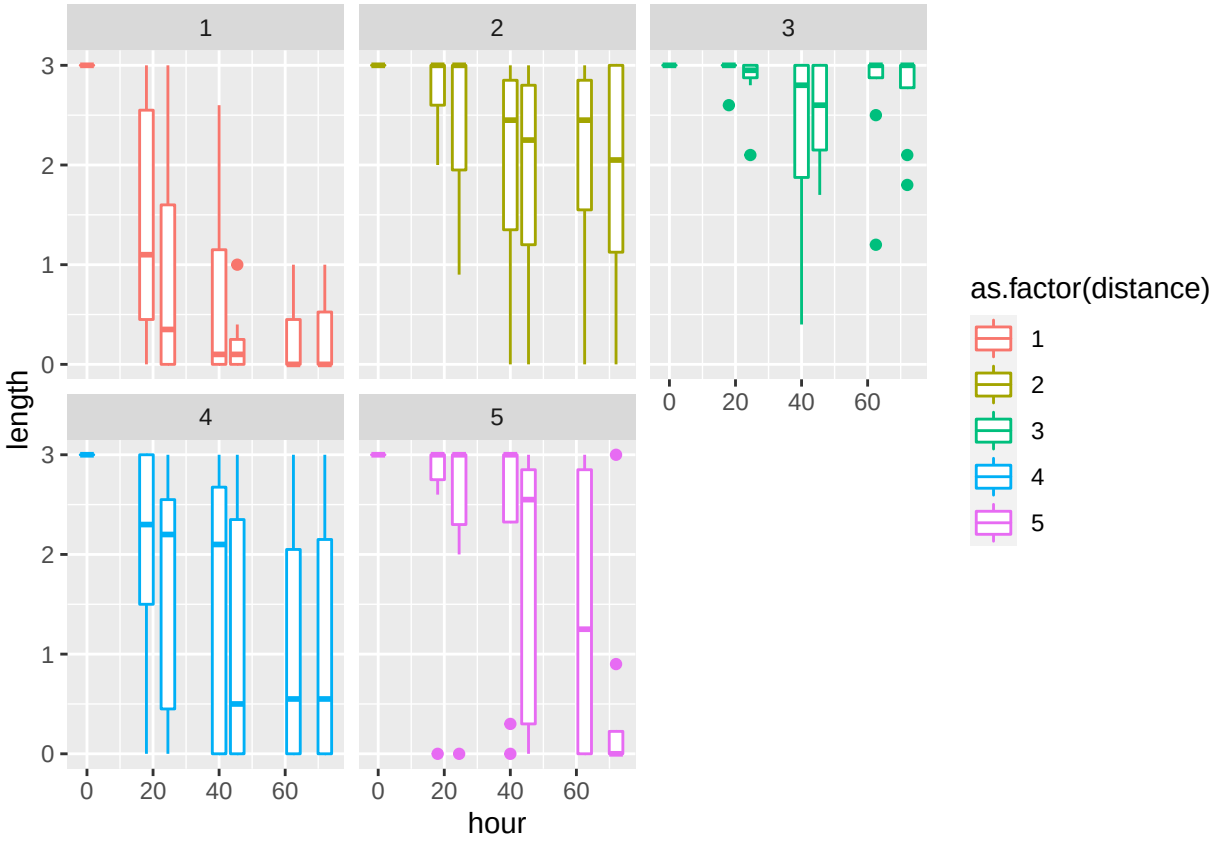

on.dat <- dat %>% filter(treatment=="on")
on1.dat <- on.dat %>% filter(distance==1)
on2.dat <- on.dat %>% filter(distance==2)
on3.dat <- on.dat %>% filter(distance==3)
on4.dat <- on.dat %>% filter(distance==4)
on5.dat <- on.dat %>% filter(distance==5)


tw.dat <- dat %>% filter(treatment=="tw")
tw1.dat <- tw.dat %>% filter(distance==1)
tw2.dat <- tw.dat %>% filter(distance==2)
tw3.dat <- tw.dat %>% filter(distance==3)
tw4.dat <- tw.dat %>% filter(distance==4)
tw5.dat <- tw.dat %>% filter(distance==5)

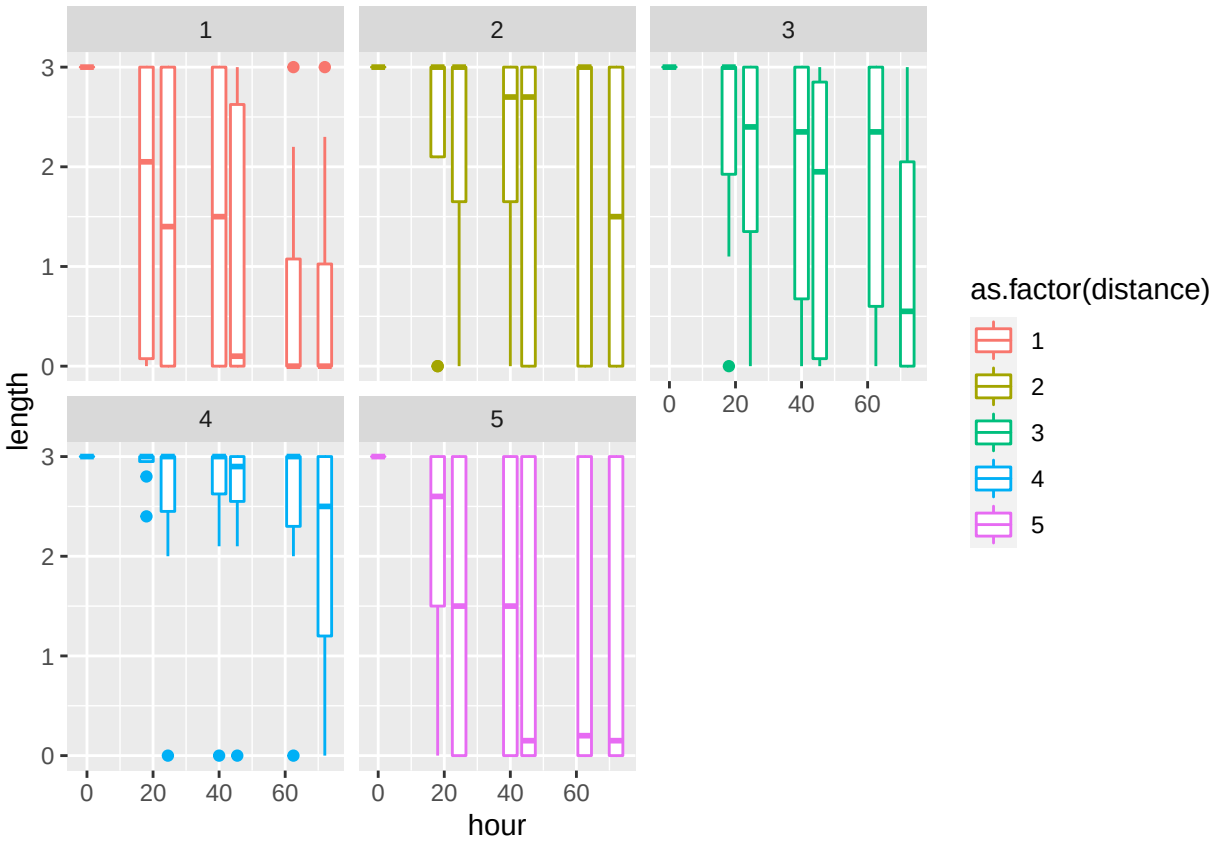

th.dat <- dat %>% filter(treatment=="th")
```

```
th1.dat <- th.dat %>% filter(distance==1)
th2.dat <- th.dat %>% filter(distance==2)
th3.dat <- th.dat %>% filter(distance==3)
th4.dat <- th.dat %>% filter(distance==4)
th5.dat <- th.dat %>% filter(distance==5)
```

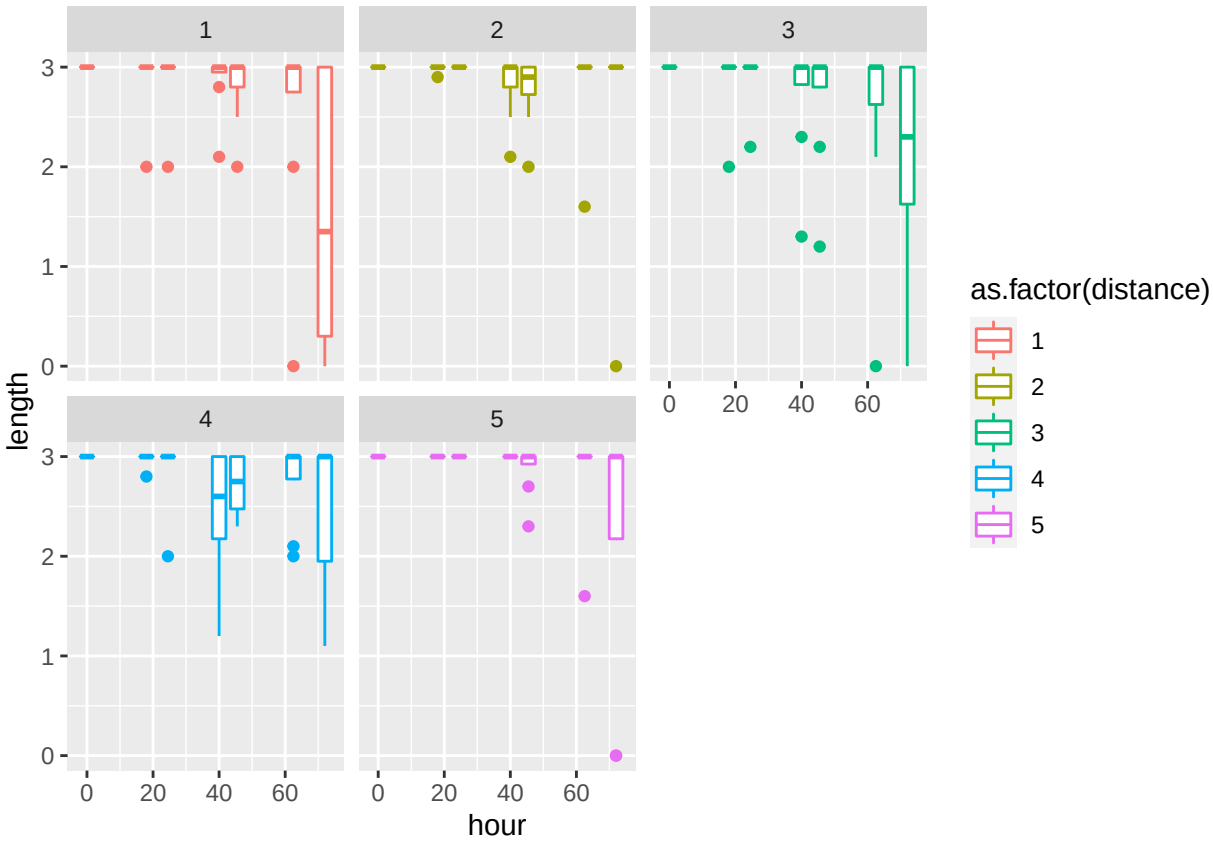
```
ggplot(data=on.dat, aes(group=hour))+
  geom_boxplot(aes(hour,length, color=as.factor(distance)))+
  facet_wrap(vars(distance))
```



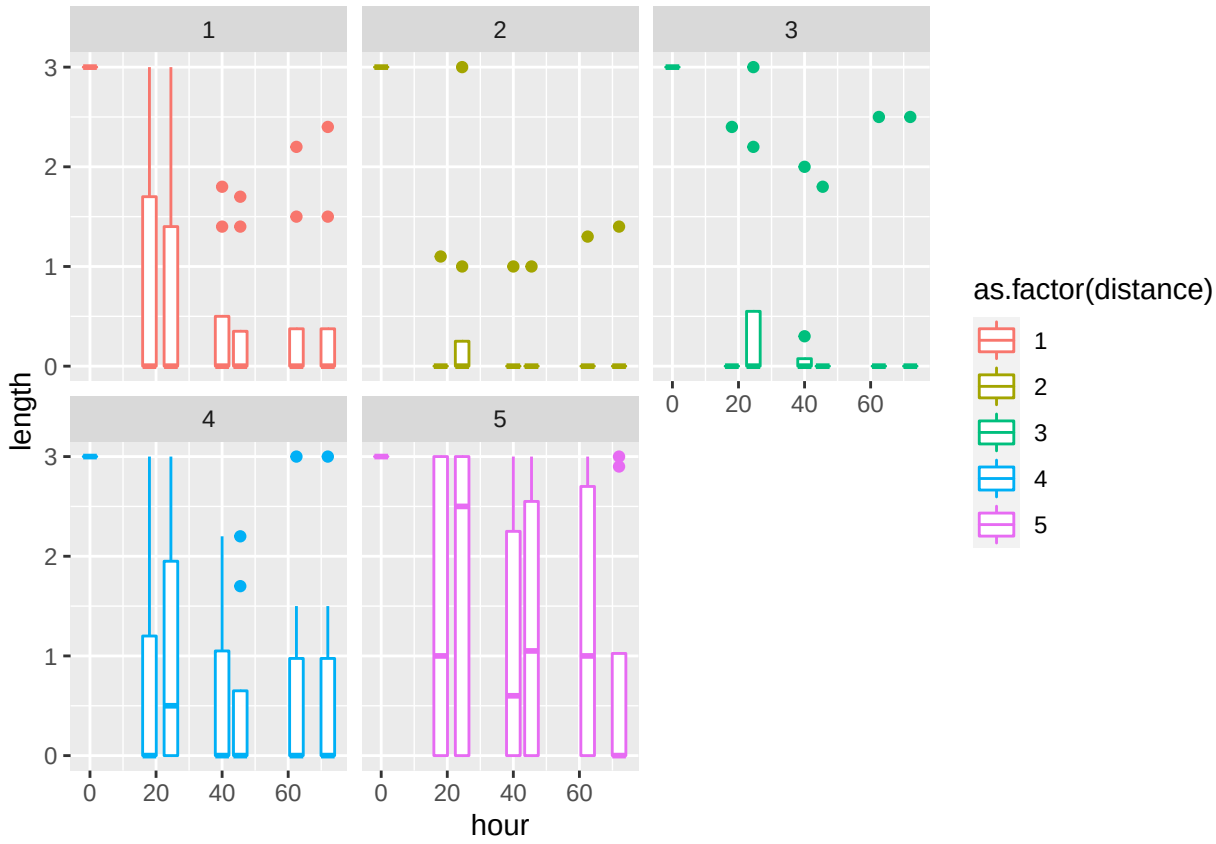

```
ggplot(data=tw.dat)+
  geom_boxplot(aes(hour,length, group=hour, color=as.factor(distance)))+
  facet_wrap(vars(distance))
```



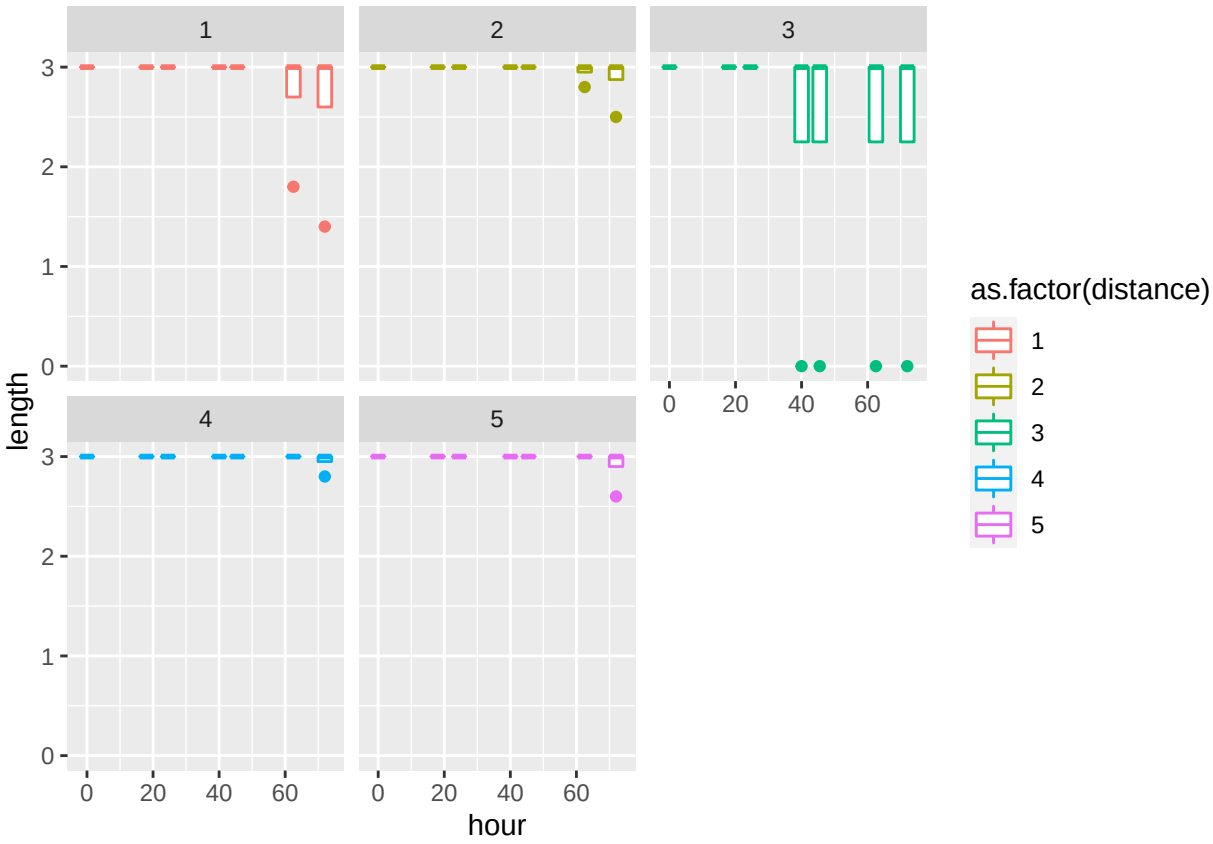

```
ggplot(data=th.dat)+
  geom_boxplot(aes(hour,length, group=hour, color=as.factor(distance)))+
  facet_wrap(vars(distance))
```




```
ggplot(data=tc.dat)+
  geom_boxplot(aes(hour,length, group=hour, color=as.factor(distance)))+
  facet_wrap(vars(distance))
```




```
ggplot(data=fc.dat)+
  geom_boxplot(aes(hour,length, group=hour, color=as.factor(distance)))+
  facet_wrap(vars(distance))
```




```
on1<-ggplot(data=on1.dat)+
  geom_point(aes(hour,length))+
  geom_smooth(aes(hour,length), colour='red')+
  scale_y_continuous(name="", limits=c(0, 3.5))+
  scale_x_continuous(name="")+
  #ggtitle("1 Predator")+
  ylab("Distance 1")+
  theme_bw()

on2<-ggplot(data=on2.dat)+
  geom_point(aes(hour,length))+
  geom_smooth(aes(hour,length), colour='red')+
  scale_y_continuous(name="", limits=c(0, 3.5))+
  scale_x_continuous(name="")+
  ylab("Distance 2")+
  theme_bw()

on3<-ggplot(data=on3.dat)+
  geom_point(aes(hour,length))+
  geom_smooth(aes(hour,length), colour='red')+
  scale_y_continuous(name="", limits=c(0, 3.5))+
  scale_x_continuous(name="")+
  ylab("Distance 3")+
  theme_bw()

on4<-ggplot(data=on4.dat)+
  geom_point(aes(hour,length))+
```

```
  geom_smooth(aes(hour,length), colour='red')+
  scale_y_continuous(name="", limits=c(0, 3.5))+
  scale_x_continuous(name="")+
  ylab("Distance 4")+
  theme_bw()

on5<-ggplot(data=on5.dat)+
  geom_point(aes(hour,length))+
  geom_smooth(aes(hour,length), colour='red')+
  scale_y_continuous(name="", limits=c(0, 3.5))+
  scale_x_continuous(name="")+
  ylab("Distance 5")+
  theme_bw()
```

```
tw1<- ggplot(data=tw1.dat)+
  geom_point(aes(hour,length))+
  geom_smooth(aes(hour,length), colour='orange')+
  scale_y_continuous(name="", limits=c(0, 3.5))+
  scale_x_continuous(name="")+
  #ggtitle("2 Predators")+
  theme_bw()

tw2<- ggplot(data=tw2.dat)+
  geom_point(aes(hour,length))+
  geom_smooth(aes(hour,length), colour='orange')+
  scale_y_continuous(name="", limits=c(0, 3.5))+
  scale_x_continuous(name="")+
  theme_bw()

tw3<- ggplot(data=tw3.dat)+
  geom_point(aes(hour,length))+
  geom_smooth(aes(hour,length), colour='orange')+
  scale_y_continuous(name="", limits=c(0, 3.5))+
  scale_x_continuous(name="")+
  theme_bw()

tw4<- ggplot(data=tw4.dat)+
  geom_point(aes(hour,length))+
  geom_smooth(aes(hour,length), colour='orange')+
  scale_y_continuous(name="", limits=c(0, 3.5))+
  scale_x_continuous(name="")+
  theme_bw()

tw5<- ggplot(data=tw5.dat)+
  geom_point(aes(hour,length))+
  geom_smooth(aes(hour,length), colour='orange')+
  scale_y_continuous(name="", limits=c(0, 3.5))+
  scale_x_continuous(name="")+
  theme_bw()
```

```
th1<- ggplot(data=th1.dat)+
  geom_point(aes(hour,length))+
  geom_smooth(aes(hour,length), colour='green')+
  scale_y_continuous(name="", limits=c(0, 3.5))+
```

```
  scale_x_continuous(name="")+
  theme_bw()

th2<- ggplot(data=th2.dat)+
  geom_point(aes(hour,length))+
  geom_smooth(aes(hour,length), colour='green')+
  scale_y_continuous(name="", limits=c(0, 3.5))+
  scale_x_continuous(name="")+
  theme_bw()

th3<- ggplot(data=th3.dat)+
  geom_point(aes(hour,length))+
  geom_smooth(aes(hour,length), colour='green')+
  scale_y_continuous(name="", limits=c(0, 3.5))+
  scale_x_continuous(name="")+
  theme_bw()

th4<- ggplot(data=th4.dat)+
  geom_point(aes(hour,length))+
  geom_smooth(aes(hour,length), colour='green')+
  scale_y_continuous(name="", limits=c(0, 3.5))+
  scale_x_continuous(name="")+
  theme_bw()

th5<- ggplot(data=th5.dat)+
  geom_point(aes(hour,length))+
  geom_smooth(aes(hour,length), colour='green')+
  scale_y_continuous(name="", limits=c(0, 3.5))+
  scale_x_continuous(name="")+
  theme_bw()
```

```
tc1<- ggplot(data=tc1.dat)+
  geom_point(aes(hour,length))+
  geom_smooth(aes(hour,length), colour='blue')+
  scale_y_continuous(name="", limits=c(0, 3.5))+
  scale_x_continuous(name="")+
 # ggtitle("0 Predator Control")+
  theme_bw()

tc2<- ggplot(data=tc2.dat)+
  geom_point(aes(hour,length))+
  geom_smooth(aes(hour,length), colour='blue')+
  scale_y_continuous(name="", limits=c(0, 3.5))+
  scale_x_continuous(name="")+
  theme_bw()

tc3<- ggplot(data=tc3.dat)+
  geom_point(aes(hour,length))+
  geom_smooth(aes(hour,length), colour='blue')+
  scale_y_continuous(name="", limits=c(0, 3.5))+
  scale_x_continuous(name="")+
  theme_bw()

tc4<- ggplot(data=tc4.dat)+
```

```
  geom_point(aes(hour,length))+
  geom_smooth(aes(hour,length), colour='blue')+
  scale_y_continuous(name="", limits=c(0, 3.5))+
  scale_x_continuous(name="")+
  theme_bw()

tc5<- ggplot(data=tc5.dat)+
  geom_point(aes(hour,length))+
  geom_smooth(aes(hour,length), colour='blue')+
  scale_y_continuous(name="", limits=c(0, 3.5))+
  scale_x_continuous(name="")+
  theme_bw()
```

```
fc1<- ggplot(data=fc1.dat)+
  geom_point(aes(hour,length))+
  geom_smooth(aes(hour,length), colour='purple')+
  scale_y_continuous(name="", limits=c(0, 3.5))+
  scale_x_continuous(name="")+
 # ggtitle("Fishless Contol")+
  theme_bw()

fc2<- ggplot(data=fc2.dat)+
  geom_point(aes(hour,length))+
  geom_smooth(aes(hour,length), colour='purple')+
  scale_y_continuous(name="", limits=c(0, 3.5))+
  scale_x_continuous(name="")+
  theme_bw()

fc3<- ggplot(data=fc3.dat)+
  geom_point(aes(hour,length))+
  geom_smooth(aes(hour,length), colour='purple')+
  scale_y_continuous(name="", limits=c(0, 3.5))+
  scale_x_continuous(name="")+
  theme_bw()

fc4<- ggplot(data=fc4.dat)+
  geom_point(aes(hour,length))+
  geom_smooth(aes(hour,length), colour='purple')+
  scale_y_continuous(name="", limits=c(0, 3.5))+
  scale_x_continuous(name="")+
  theme_bw()

fc5<- ggplot(data=fc5.dat)+
  geom_point(aes(hour,length))+
  geom_smooth(aes(hour,length), colour='purple')+
  scale_y_continuous(name="", limits=c(0, 3.5))+
  scale_x_continuous(name="")+
  theme_bw()
```

```
grid.arrange(on1,tw1,th1,tc1,fc1,on2,tw2,th2,tc2,fc2,on3,tw3,th3,tc3,fc3,on4,tw4,th4,tc4,fc4,on5,tw5,th5
             bottom = textGrob("Hours Elapsed",gp = gpar(cex = 1.5)), left = textGrob("Algae Length (cm)
```

```
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
```

```
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
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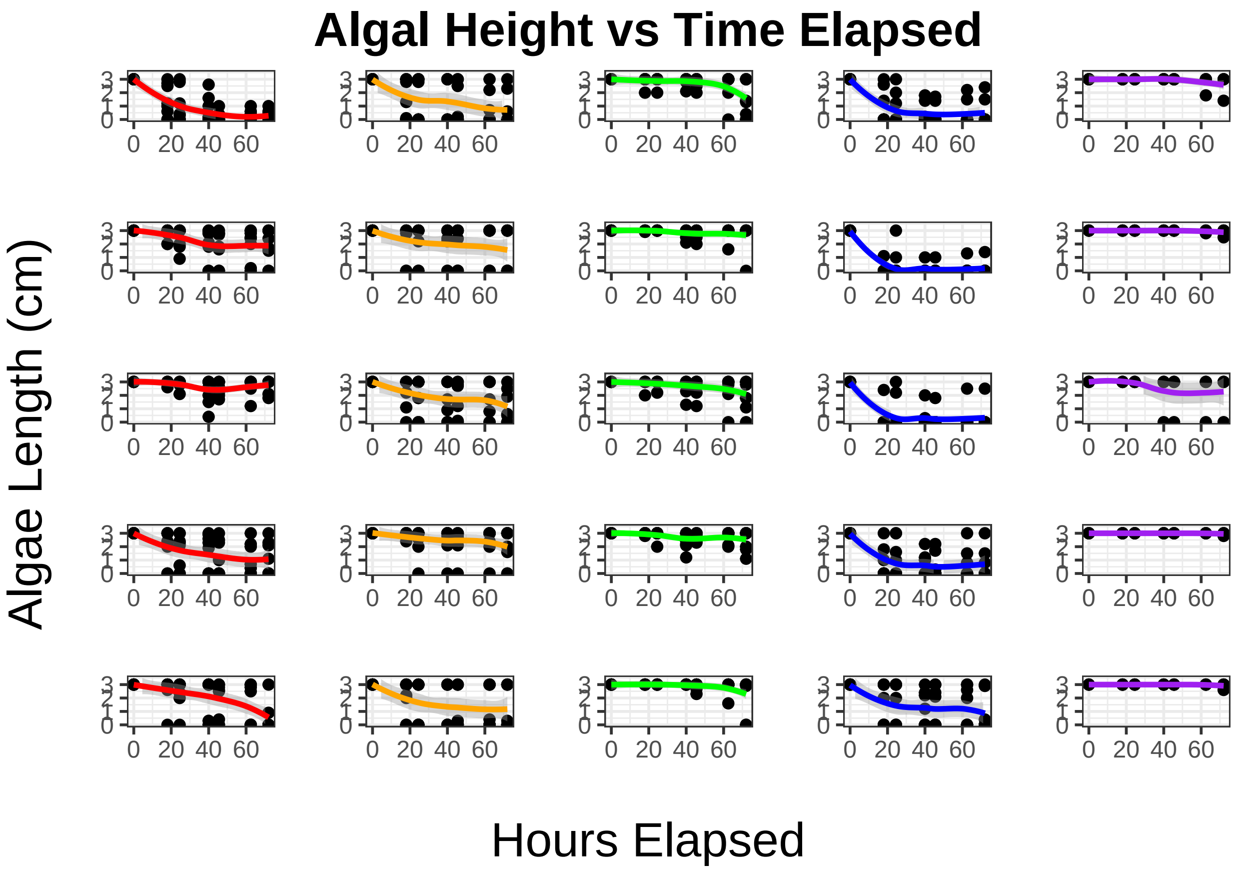
```




```
grid.arrange(on1, on2,on3,on4,on5,tw1,tw2,tw3,tw4,tw5,th1,th2,th3,th4,th5,tc1,tc2,tc3,tc4,tc5,fc1,fc2,f
             bottom = textGrob("Hours Elapsed",gp = gpar(cex = 1.5)), left = textGrob("Algae Length (cm
```

```
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
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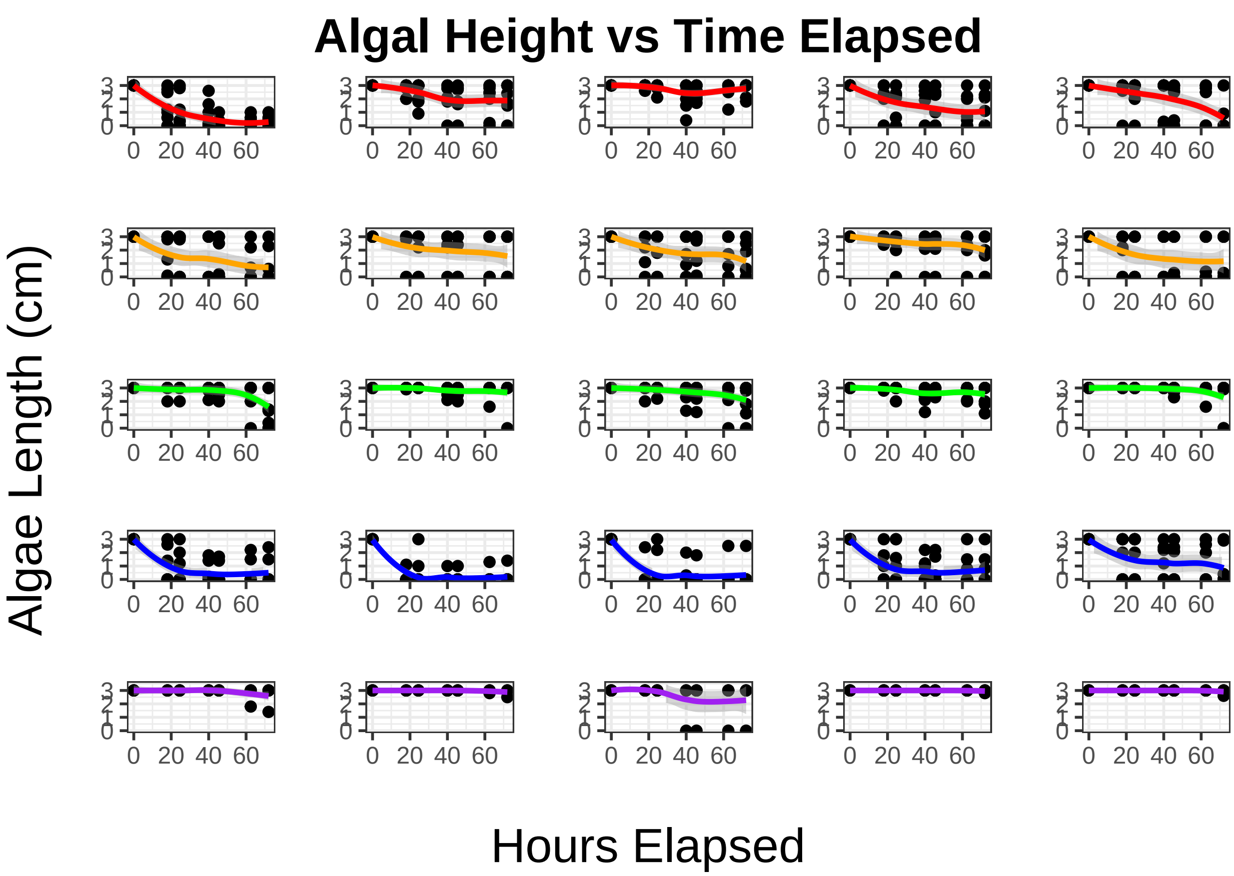
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
```



```
grid.arrange(on1,tw1,th1,tc1,fc1, nrow=1, ncol=5, top = textGrob("Algal Height vs Time Elapsed at Distar
             bottom = textGrob("Hours Elapsed",gp = gpar(cex = 1.5)),left = textGrob("Algae Length (cm)
```

```
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
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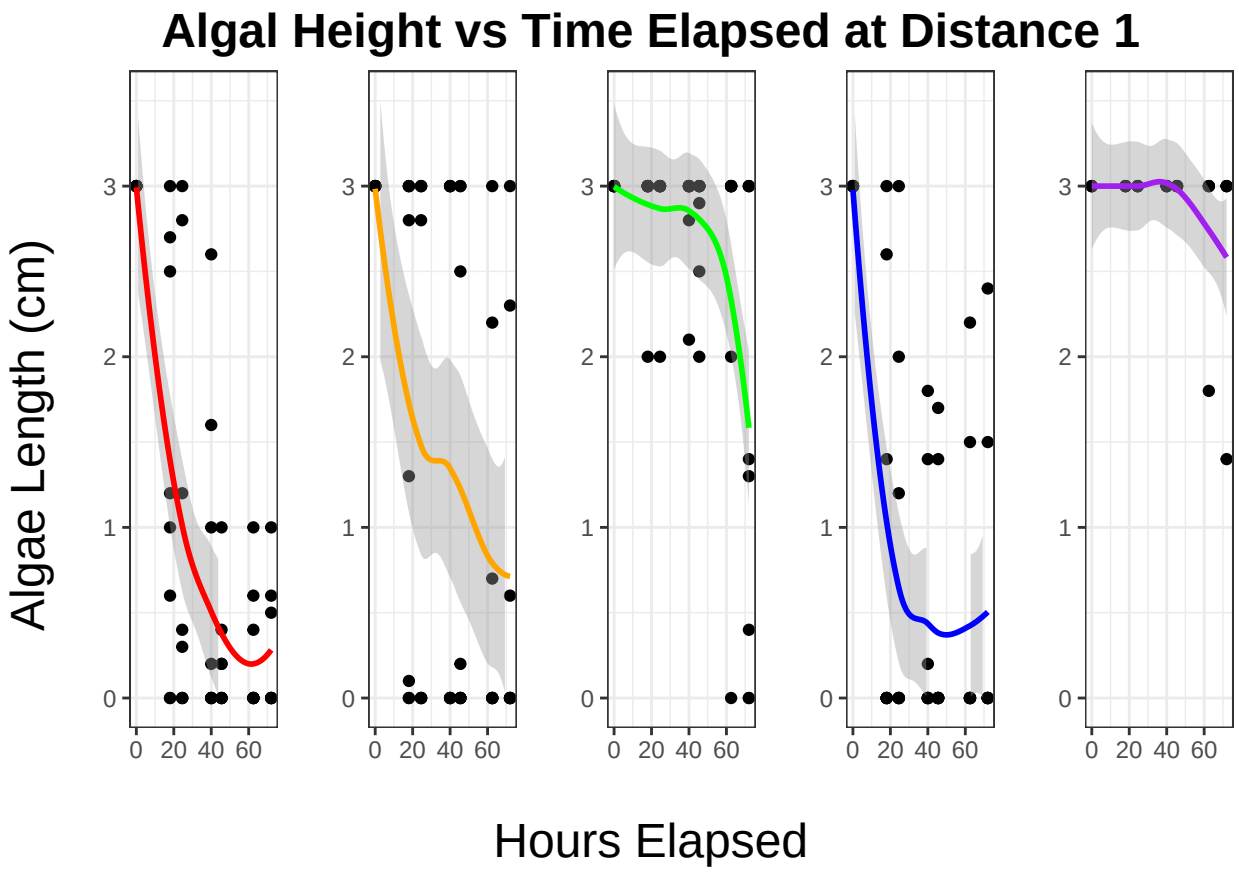
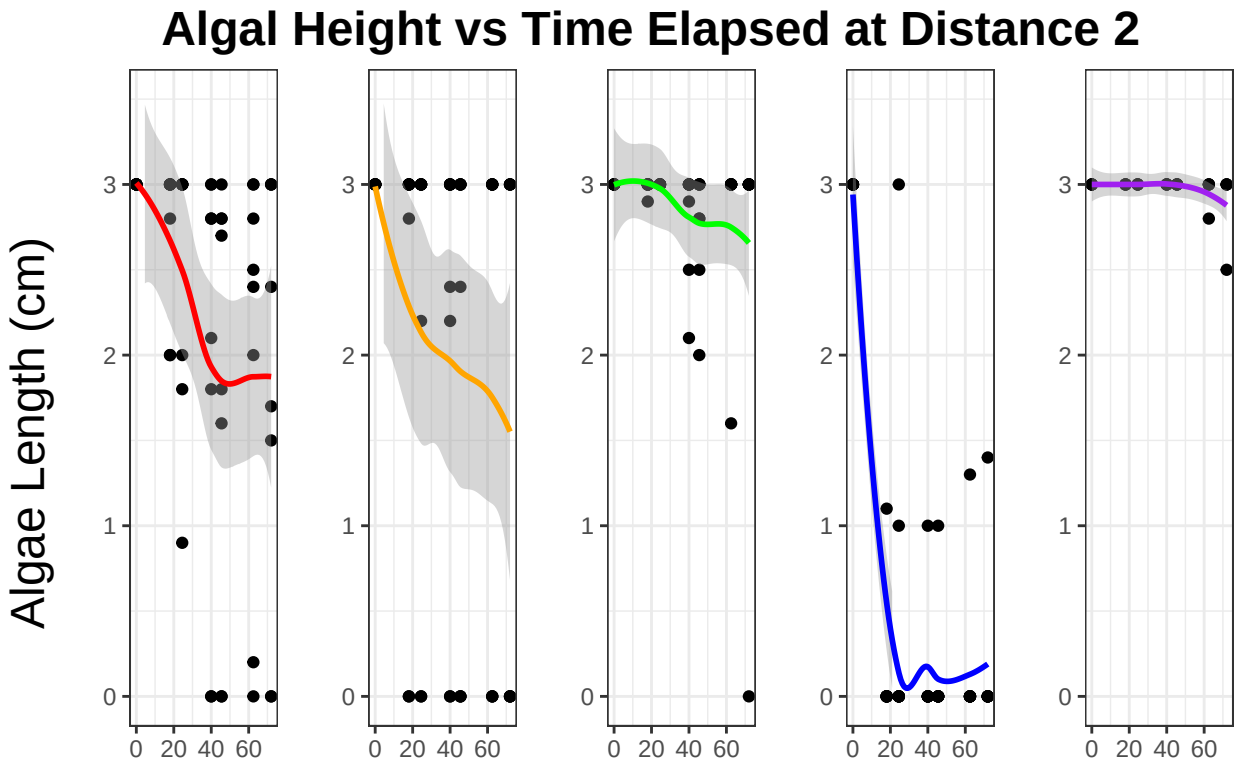
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
```




```
grid.arrange(on2,tw2,th2,tc2,fc2, nrow=1, ncol=5, top = textGrob("Algal Height vs Time Elapsed at Distar
             bottom = textGrob("Hours Elapsed",gp = gpar(cex = 1.5)),left = textGrob("Algae Length (cm)
```

```
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
```




```
grid.arrange(on3,tw3,th3,tc3,fc3, nrow=1, ncol=5, top = textGrob("Algal Height vs Time Elapsed at Distar
             bottom = textGrob("Hours Elapsed",gp = gpar(cex = 1.5)),left = textGrob("Algae Length (cm)
```

```
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
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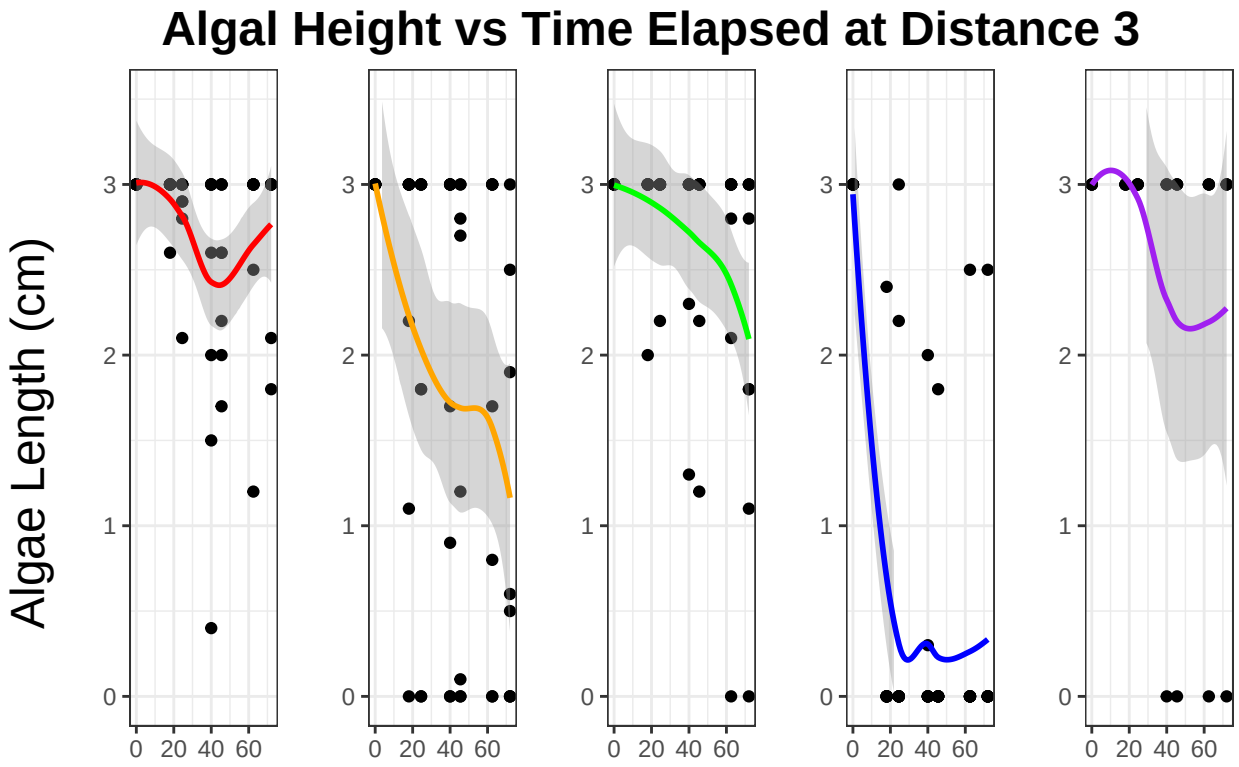
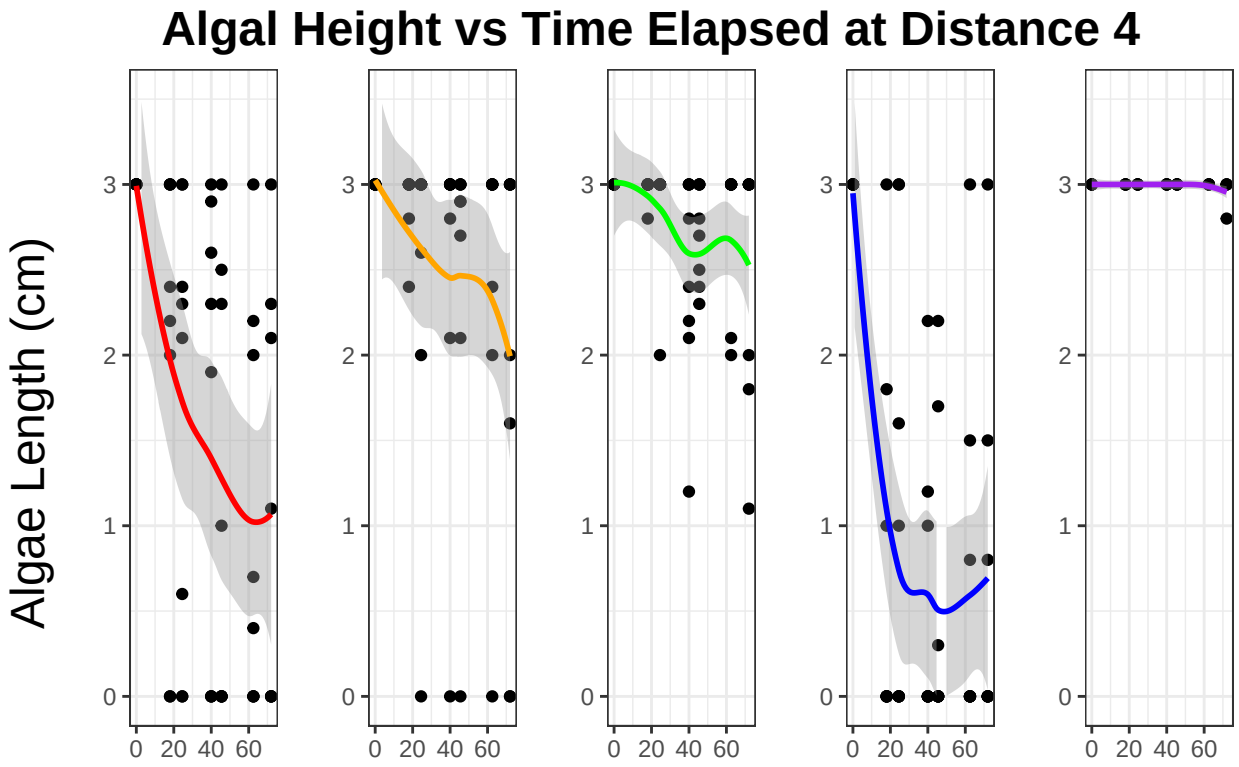
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
```



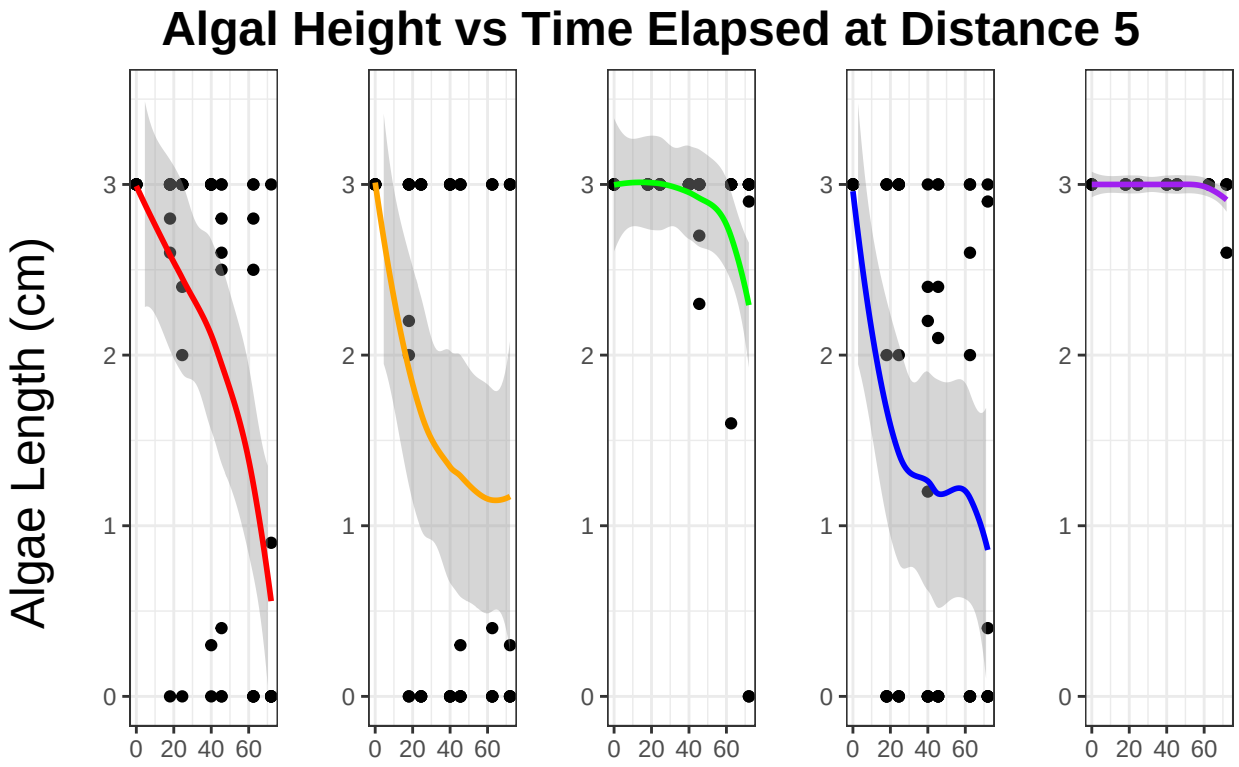

```
grid.arrange(on4,tw4,th4,tc4,fc4, nrow=1, ncol=5, top = textGrob("Algal Height vs Time Elapsed at Distar
             bottom = textGrob("Hours Elapsed",gp = gpar(cex = 1.5)),left = textGrob("Algae Length (cm)
```

```
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
```




```
grid.arrange(on5,tw5,th5,tc5,fc5, nrow=1, ncol=5, top = textGrob("Algal Height vs Time Elapsed at Distar
             bottom = textGrob("Hours Elapsed",gp = gpar(cex = 1.5)),left = textGrob("Algae Length (cm)
```

```
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
```




```
grid.arrange(on1,on2,on3,on4,on5, nrow=1, ncol=5, top = textGrob("Algal Height vs Time Elapsed in Treatr
             bottom = textGrob("Hours Elapsed",gp = gpar(cex = 1.5)),left = textGrob("Algae Length (cm)
```

```
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
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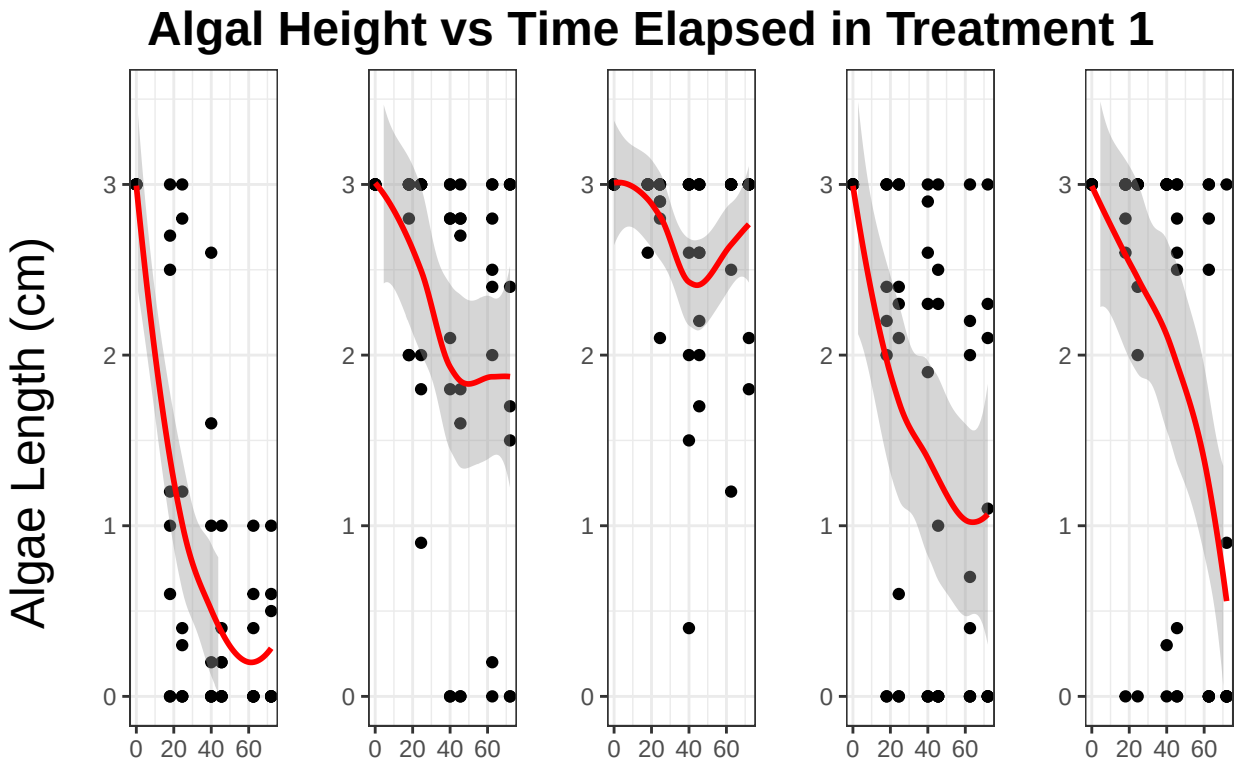
```




```
grid.arrange(tw1,tw2,tw3,tw4,tw5, nrow=1, ncol=5, top = textGrob("Algal Height vs Time Elapsed in Treatr
             bottom = textGrob("Hours Elapsed",gp = gpar(cex = 1.5)),left = textGrob("Algae Length (cm)
```

```
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
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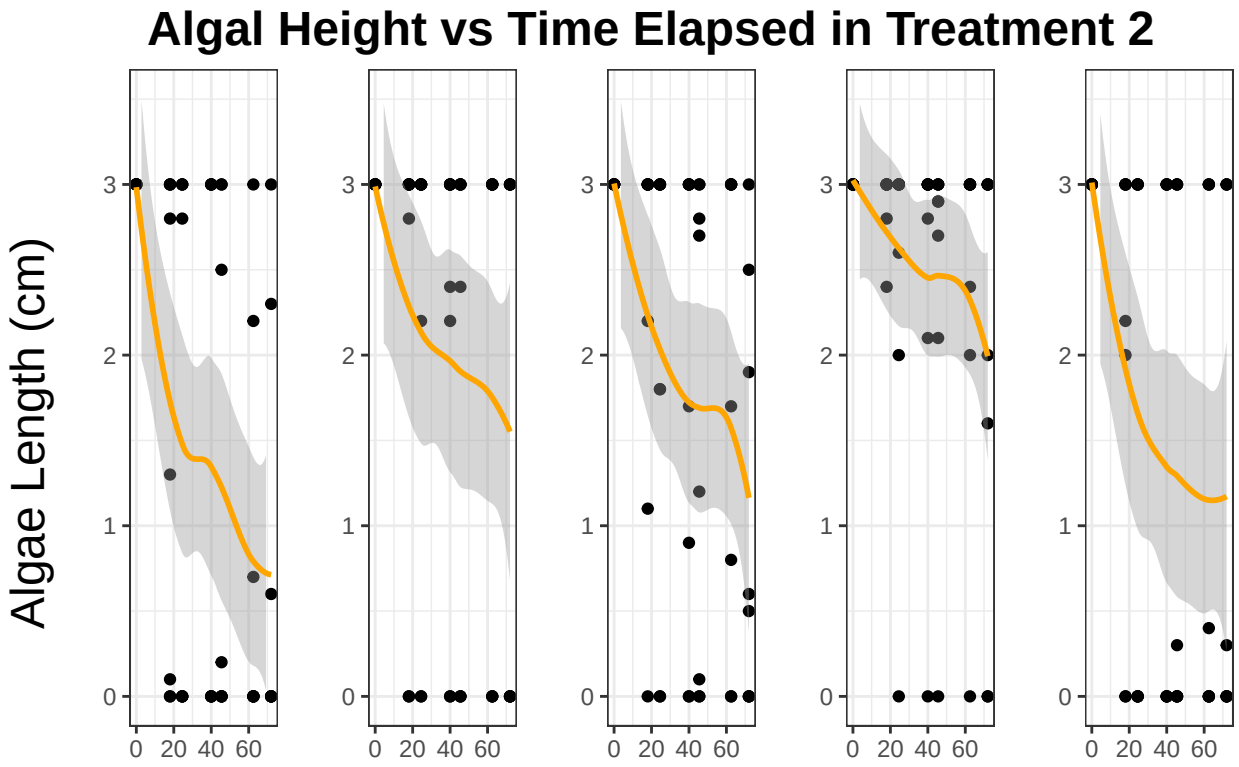
```




```
grid.arrange(th1,th2,th3,th4,th5, nrow=1, ncol=5, top = textGrob("Algal Height vs Time Elapsed in Treatr
             bottom = textGrob("Hours Elapsed",gp = gpar(cex = 1.5)),left = textGrob("Algae Length (cm)
```

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## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
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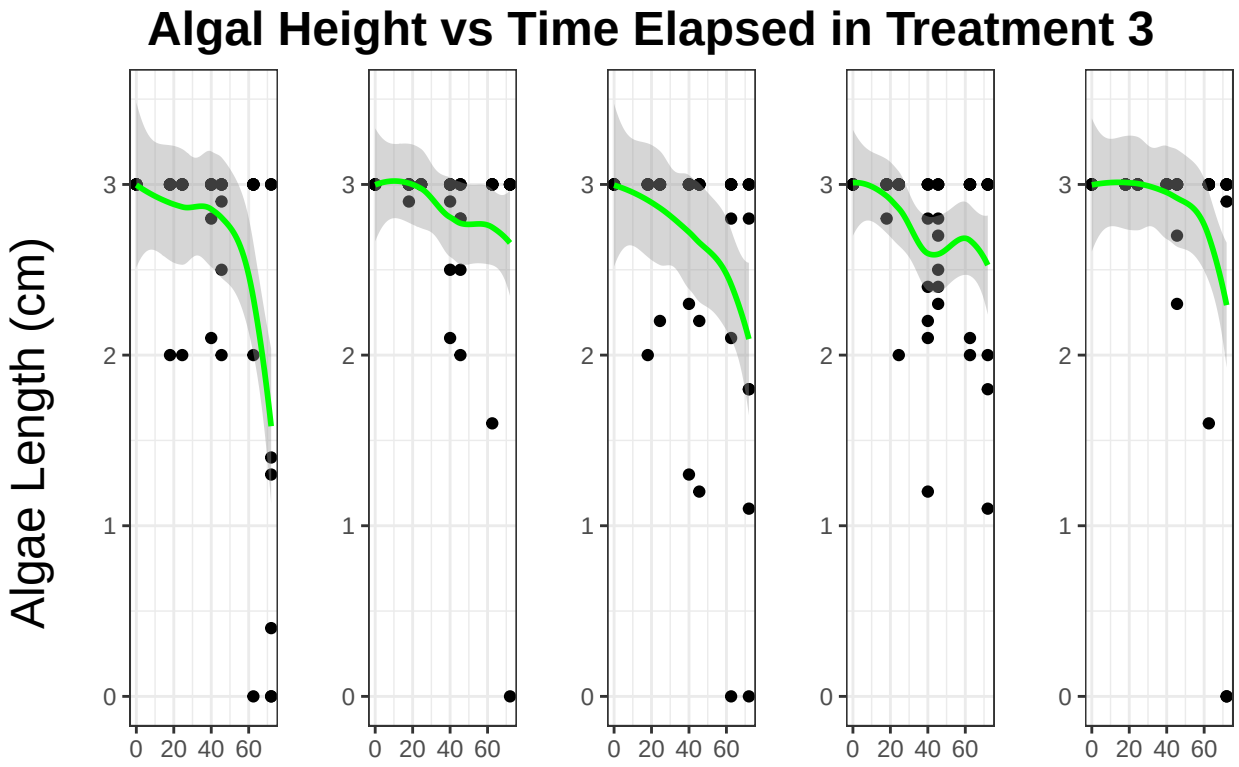
```




```
grid.arrange(tc1,tc2,tc3,tc4,tc5, nrow=1, ncol=5, top = textGrob("Algal Height vs Time Elapsed in Contr
             bottom = textGrob("Hours Elapsed",gp = gpar(cex = 1.5)),left = textGrob("Algae Length (cm)
```

```
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
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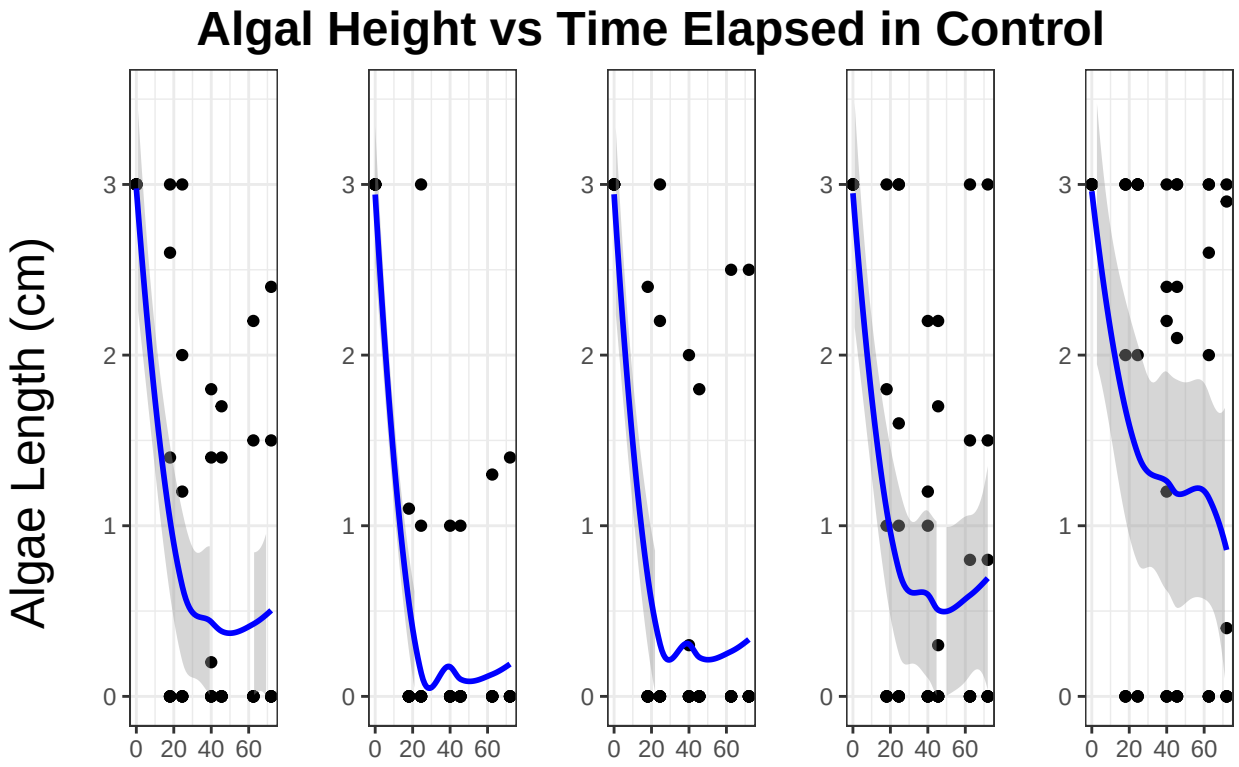
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
```




```
grid.arrange(fc1,fc2,fc3,fc4,fc5, nrow=1, ncol=5, top = textGrob("Algal Height vs Time Elapsed in Fishl
             bottom = textGrob("Hours Elapsed",gp = gpar(cex = 1.5)),left = textGrob("Algae Length (cm)
```

```
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
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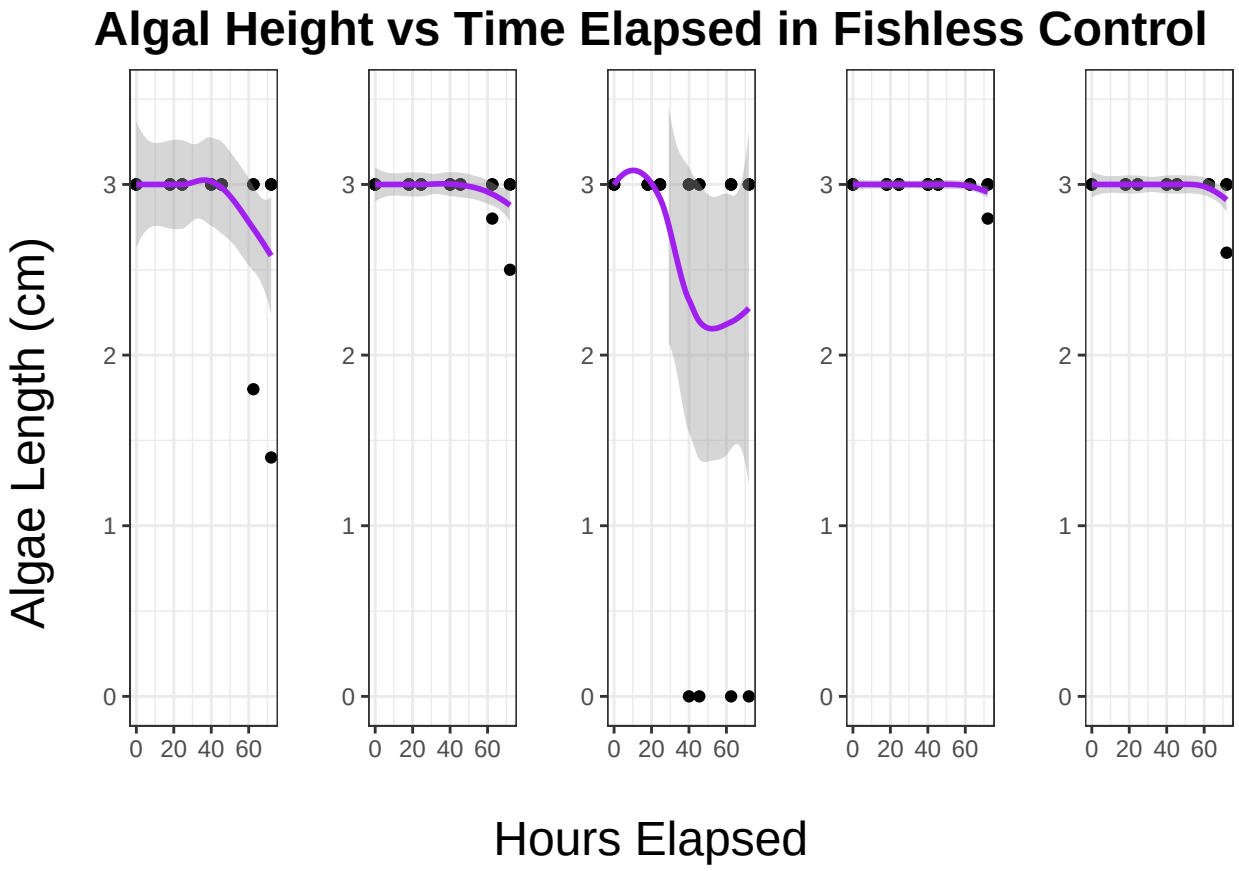
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
```


Algal Height vs Time Elapsed in Fishless Control
Algae Length (cm)
0
1
2
3
0 20 40 60
Hours Elapsed

“‘