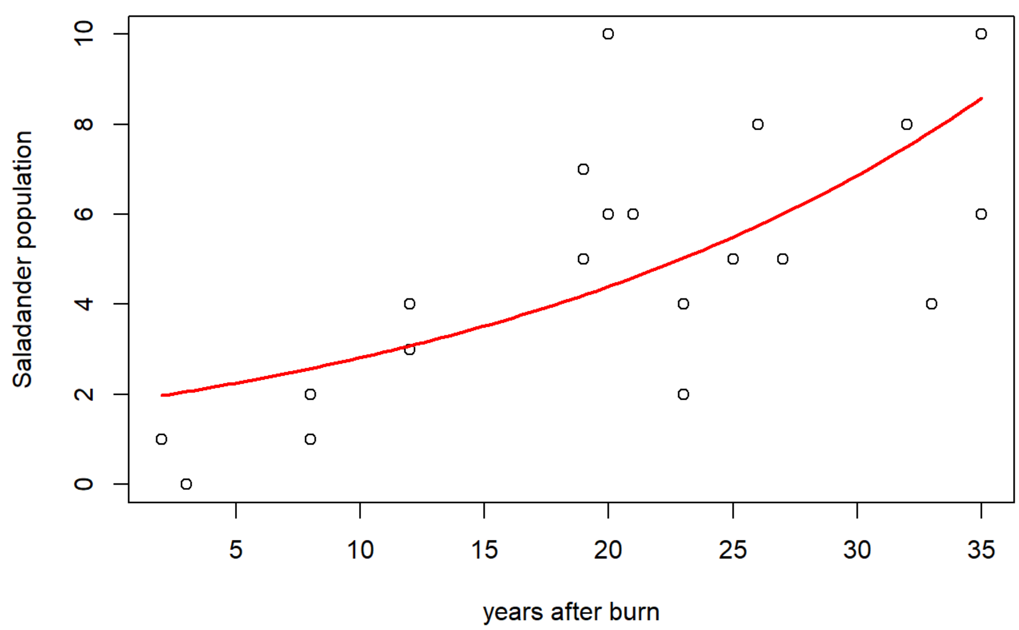
Lec19_3

Ex 18

```r
#Fit the model
burn <- data.frame(year = c(12, 12, 32, 20, 20, 27, 23, 19, 23, 26, 21, 3, 8, 35, 2, 19, 8, 25, 33, 35),
                   Salamanders = c(3, 4, 8, 6, 10, 5, 4, 7, 2, 8, 6, 0, 2, 6, 1, 5, 1, 5, 4, 10))
fit <- glm(Salamanders ~ year, family = poisson(link = "log"), data=burn)
summary(fit)
```

```
##
## Call:
## glm(formula = Salamanders ~ year, family = poisson(link = "log"),
##     data = burn)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -2.0320  -0.8082  -0.1310   0.5307   2.2846
##
## Coefficients:
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.59136    0.29200   2.025   0.0428 *
## year         0.04451    0.01136   3.919  8.9e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for poisson family taken to be 1)
##
##     Null deviance: 37.761  on 19  degrees of freedom
## Residual deviance: 21.219  on 18  degrees of freedom
## AIC: 88.648
##
## Number of Fisher Scoring iterations: 5
```

```r
#Graph
plot(x = burn$year, y = burn$Salamanders, xlab = "years after burn", ylab = "Saladander population")
curve(expr = exp(fit$coefficients[1] + x*fit$coefficients[2]), lwd = 2, add = TRUE, col = "red")
```



We can see poisson regression using a linear term of expanatory variable mostly fits well, however the left-tail seems to be slightly upward biased, but given there are less observations at the left side this bias might be a normal phenomenon; and the right side appears to have large variance, so there may exist some other effects that help explain population change.

```r
##Find the percentage change in Salamander population when year +1
round(100*(exp(fit$coefficients[2]) - 1), 2)
```

```
## year
## 4.55
```

One additional year after burn yields 4.55% increase in salamander population.