

SLR Weight-Length Relation

Preliminaries

Load Necessary Packages

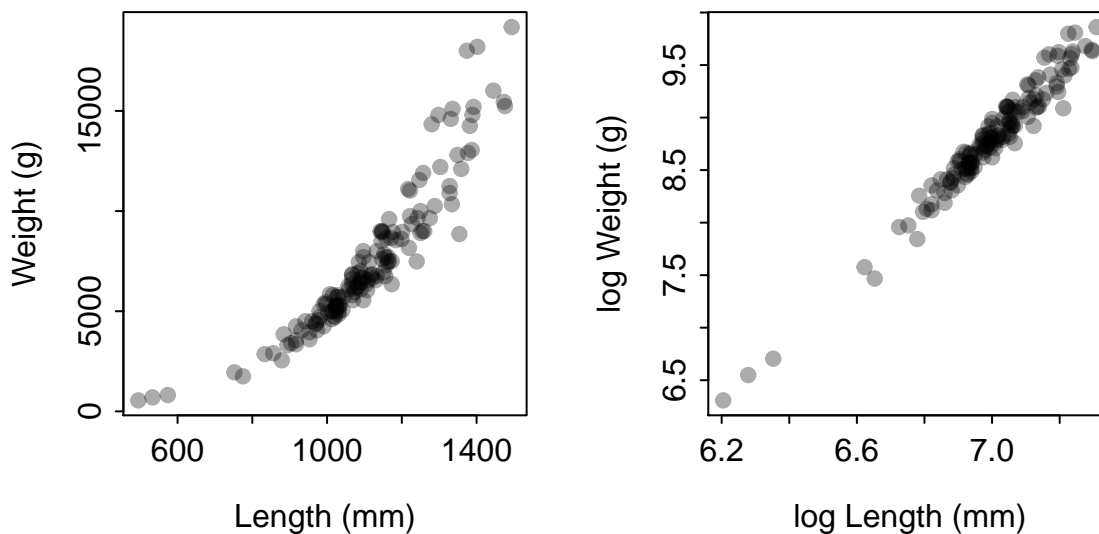
```
> library(FSA)      # for filterD(), hist(), Summarize()
> library(dplyr)     # for mutate(), select()
```

Load Data

```
> # Set your working directory to where your external data files (and scripts) are located.
> setwd("C:/aaaWork/Web/GitHub/RcourseNunavut2016/Handouts")
> dSC <- read.csv("SawyerCo_reduced.csv")
> dSC <- mutate(dSC, loglen=log(len), logwt=log(weight))
> Sturg <- filterD(dSC, waterbody=="CHIPPEWA RIVER", species=="Lake Sturgeon", !is.na(len), !is.na(weight))
```

Quick Summaries

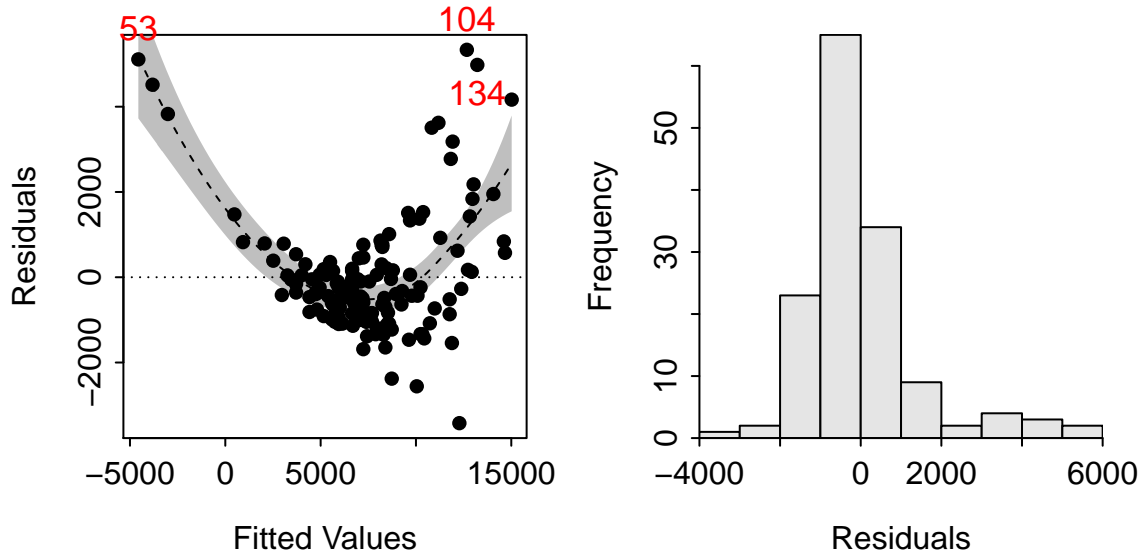
```
> plot(weight~len, data=Sturg, pch=19, col=col2rgb("black", 1/3),
       xlab="Length (mm)", ylab="Weight (g)") # Left
> plot(logwt~loglen, data=Sturg, pch=19, col=col2rgb("black", 1/3),
       xlab="log Length (mm)", ylab="log Weight (g)") # Right
```



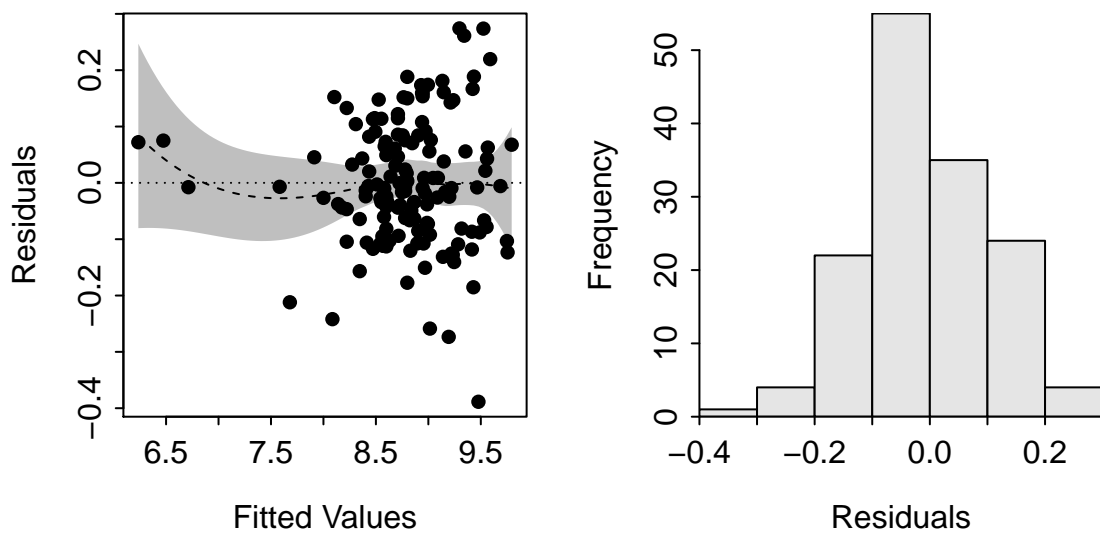
Simple Linear Regression

Fitting the Model

```
> slr1 <- lm(weight~len,data=Sturg)
> residPlot(slr1)
```



```
> slr2 <- lm(logwt~loglen,data=Sturg)
> residPlot(slr2)
```



```
> summary(slr2)
```

Call:

```
lm(formula = logwt ~ loglen, data = Sturg)
```

Residuals:

Min	1Q	Median	3Q	Max
-0.38861	-0.07813	-0.00929	0.07502	0.27416

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-13.75159	0.39032	-35.23	<2e-16
loglen	3.22139	0.05575	57.78	<2e-16

Residual standard error: 0.1122 on 143 degrees of freedom
Multiple R-squared: 0.9589, Adjusted R-squared: 0.9586
F-statistic: 3339 on 1 and 143 DF, p-value: < 2.2e-16

```
> cbind(ests=coef(slr2),confint(slr2))
              ests      2.5 %    97.5 %
(Intercept) -13.751588 -14.523137 -12.980038
loglen        3.221387  3.111185  3.331589
```

Making Predictions

```
> predict(slr2,data.frame(loglen=log(500)),interval="confidence")
      fit      lwr      upr
1 6.26807 6.179663 6.356478
```

```
> predict(slr2,data.frame(loglen=log(c(500,800))),interval="prediction")
      fit      lwr      upr
1 6.268070 6.029290 6.506851
2 7.782134 7.556875 8.007393
```

Summary Plot

```
> Summarize(~loglen,data=Sturg,digits=1)
      n  nvalid  mean   sd   min    Q1  median    Q3  max percZero
145.0  145.0    7.0   0.2   6.2    6.9    7.0    7.1    7.3    0.0
```

```
> logL <- seq(6.2,7.4,length.out=199)
> logW <- predict(slr2,data.frame(loglen=logL),interval="prediction")
> L <- exp(logL)
> W <- exp(logW)
> headtail(W)
      fit      lwr      upr
1   503.2122  396.0909  639.3040
2   513.1332  403.9989  651.7484
3   523.2498  412.0642  664.4362
197 23100.9539 18415.9227 28977.8622
198 23556.3982 18776.6121 29552.9296
199 24020.8217 19144.3296 30139.4663
```

```
> plot(weight~len,data=Sturg,pch=19,col=col2rgb("black",1/3),xlab="Length (mm)",ylab="Weight (g)")
> lines(L,W[, "fit"],lwd=2)
> lines(L,W[, "lwr"],lwd=2,lty=2)
> lines(L,W[, "upr"],lwd=2,lty=2)
```

