Mortality Estimation

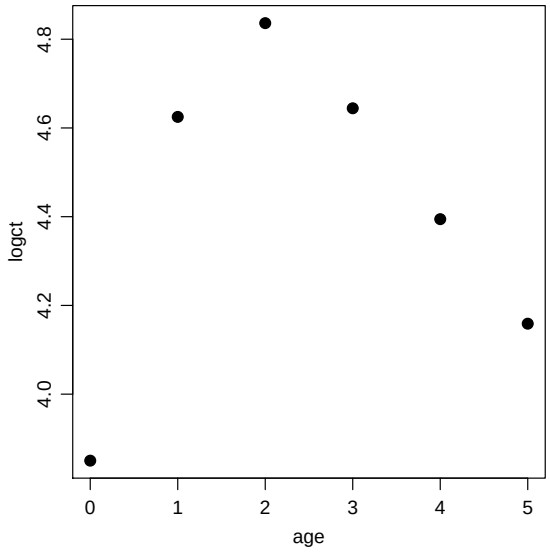
1 Initialization

```
> library(FSA)
> setwd("C://aaaWork/Class Materials//MnDNR_ShortCourse//Readings//mortality//")
```

2 Previously Summarized Catches

2.1 From First Principles

```
> age <- 0:5
> ct <- c(47, 102, 126, 104, 81, 64)
> logct <- log(ct)
> plot(logct ~ age, pch = 19, cex = 1.25)
```



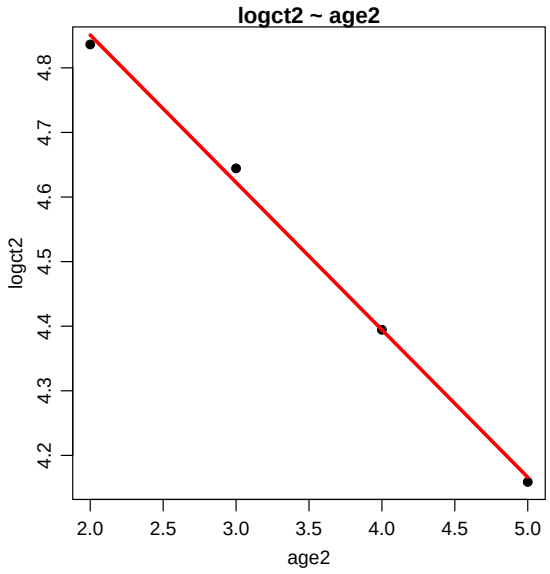

```
> rows2use <- 3:6
> age2 <- age[rows2use]
> logct2 <- logct[rows2use]
> lm1 <- lm(logct2 ~ age2)
> summary(lm1)

Call:
lm(formula = logct2 ~ age2)

Residuals:
         1          2          3          4
```

```
-0.0145401  0.0217827  0.0000548 -0.0072974

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)  5.307250   0.031589  168.01 3.54e-05 ***
age2        -0.228214   0.008597  -26.54  0.00142 **
---
Signif. codes:  0 Ś***Š 0.001 Ś**Š 0.01 Ś*Š 0.05 Ś.Š 0.1 Ś Š 1

Residual standard error: 0.01922 on 2 degrees of freedom
Multiple R-Squared: 0.9972,        Adjusted R-squared: 0.9958
F-statistic: 704.6 on 1 and 2 DF,  p-value: 0.001416
```

```
> confint(lm1)
```

```
                2.5 %     97.5 %
(Intercept)  5.1713333  5.4431659
age2        -0.2652056 -0.1912221
```

```
> fit.plot(lm1)
```



2.2 Using `catch.curve()`

```
> cc1 <- catch.curve(age, ct, 2:5)
> summary(cc1)
```

```
Call:
lm(formula = log.catch.e ~ age.e)

Residuals:
        1         2         3         4
-0.0145401  0.0217827  0.0000548 -0.0072974

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
```

```
(Intercept)  5.307250   0.031589  168.01 3.54e-05 ***
age.e       -0.228214   0.008597  -26.54  0.00142 **
---
Signif. codes:  0 Ś***Š 0.001 Ś**Š 0.01 Ś*Š 0.05 Ś.Š 0.1 Ś Š 1

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```

```
> confint(cc1)
```

```
                2.5 %     97.5 %
(Intercept)  5.1713333  5.4431659
age.e       -0.2652056 -0.1912221
```

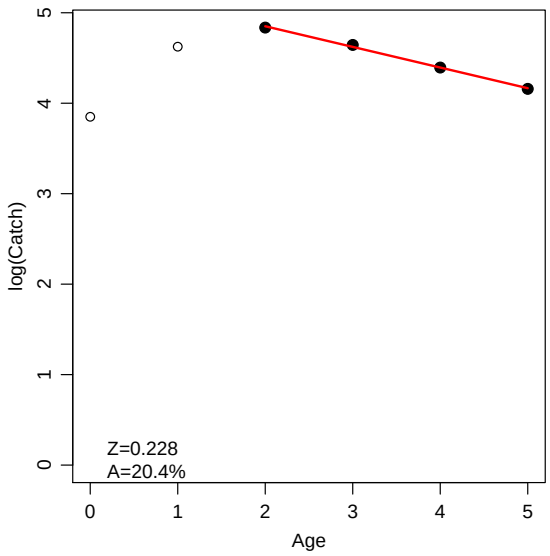
```
> summary(cc1, type = "params")
```

```
    Estimate  Std. Error  t value    Pr(>|t|)
Z  0.2282138 0.008597424 26.54444 0.001416216
A 20.4045950          NA       NA          NA
```

```
> confint(cc1, type = "params")
```

```
     95% LCI    95% UCI
Z  0.1912221  0.2652056
A 17.4050868 23.2951735
```

```
> plot(cc1)
```



3 Data File of Ages

```
> data(FWDrumLE1)
> str(FWDrumLE1)
```

```
'data.frame':        1577 obs. of  2 variables:
 $ age: int  1 1 1 1 1 1 1 1 1 1 ...
 $ tl : int  106 100 117 110 110 115 118 118 113 126 ...
```

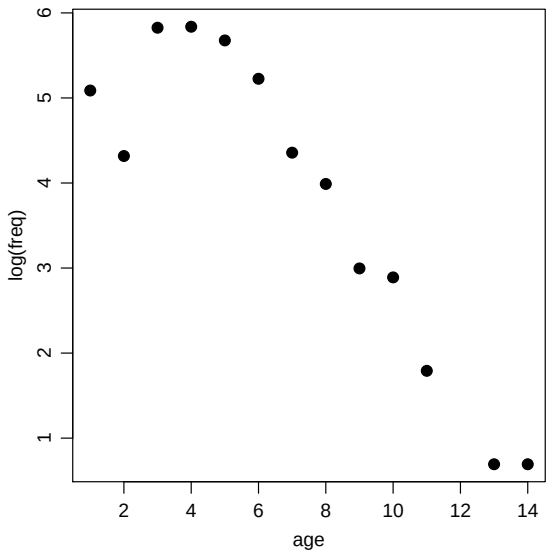
```
> rhead(FWDrumLE1)
```

```
     age  tl
1444   7 341
1428   7 325
40     1 133
1048   5 278
1365   6 320
354    3 228
```

```
> age.freq <- table(FWDrumLE1$age)
> age.freq
```

```
  1   2   3   4   5   6   7   8   9  10  11  13  14
162  75 339 343 292 186  78  54  20  18   6   2   2
```

```
> age <- as.numeric(rownames(age.freq))
> freq <- as.numeric(age.freq)
> plot(log(freq) ~ age, pch = 19, cex = 1.25)
```



NOTE that no fish of age-12 were observed.

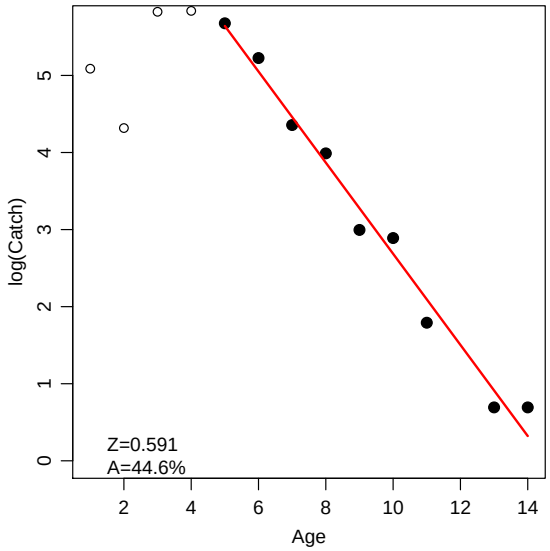
```
> cc2 <- catch.curve(age, freq, c(5:11, 13, 14))
> summary(cc2, type = "params")
```

```
    Estimate Std. Error  t value     Pr(>|t|)
Z  0.5911686 0.02936888 20.12908 1.870079e-07
A 44.6320147         NA       NA           NA
```

```
> confint(cc2, type = "params")
```

```
     95% LCI   95% UCI
Z  0.5217223  0.660615
A 40.6502498 48.346644
```

```
> plot(cc2)
```

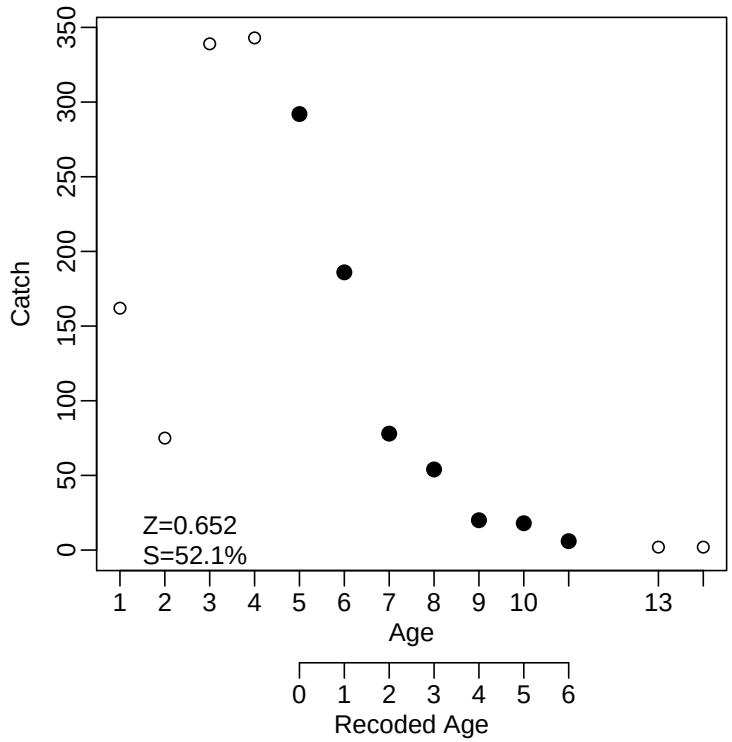



```
> cc3 <- catch.curve(age, freq, 5:11)
> summary(cc3, type = "params")

    Estimate Std. Error  t value     Pr(>|t|)
Z  0.6316682 0.03969337 15.91369 1.783397e-05
A 46.8295924         NA       NA           NA

> confint(cc3, type = "params")

     95% LCI    95% UCI
Z  0.5296331  0.7337033
A 41.1179051 51.9872339
```

4 Chapman-Robson Method

```
> cr1 <- chapman.robson(age, freq, 5:11)
> summary(cr1)

Intermediate Statistics
n=654; T=710

Estimates with Standard Errors
   Estimate  Std. Err.
S 0.5209098 0.01353634
Z 0.6521785 0.02598597

> confint(cr1)

    95% LCI   95% UCI
S 0.4943790 0.5474405
Z 0.6012469 0.7031100
```

```
> plot(cr1)
```


Catch
0
50
100
150
200
250
300
350
Z=0.652
S=52.1%
1
2
3
4
5
6
7
8
9
10
13
Age
0
1
2
3
4
5
6
Recoded Age