> #COX MODELS TO START OFF ANALYIS

> model1<-coxph(Surv(beetle$Life, beetle$Status) ~ beetle$Density+beetle$Length+beetle$Sex

+ +beetle$Block)

> cox.zph(model1)

rho chisq p

beetle$DensityLow -0.1135 10.146 1.45e-03

beetle$DensityMed -0.0555 2.657 1.03e-01

beetle$Length 0.0730 4.842 2.78e-02

beetle$SexM -0.1019 7.726 5.44e-03

beetle$BlockB 0.0120 0.106 7.45e-01

beetle$BlockC -0.0120 0.112 7.38e-01

beetle$BlockD 0.1970 30.278 3.74e-08

GLOBAL NA 57.134 5.62e-10

> summary(model1)

Call:

coxph(formula = Surv(beetle$Life, beetle$Status) ~ beetle$Density +

beetle$Length + beetle$Sex + beetle$Block)

n= 729, number of events= 729

(126 observations deleted due to missingness)

coef exp(coef) se(coef) z Pr(>|z|)

beetle$DensityLow 0.34628 1.41380 0.12133 2.854 0.00432 \*\*

beetle$DensityMed 0.09910 1.10417 0.10354 0.957 0.33853

beetle$Length 0.04601 1.04708 0.12945 0.355 0.72229

beetle$SexM -0.03582 0.96482 0.07526 -0.476 0.63413

beetle$BlockB 0.25295 1.28782 0.09567 2.644 0.00819 \*\*

beetle$BlockC 0.35365 1.42426 0.10786 3.279 0.00104 \*\*

beetle$BlockD 0.22594 1.25351 0.11629 1.943 0.05202 .

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

exp(coef) exp(-coef) lower .95 upper .95

beetle$DensityLow 1.4138 0.7073 1.1146 1.793

beetle$DensityMed 1.1042 0.9057 0.9014 1.353

beetle$Length 1.0471 0.9550 0.8124 1.349

beetle$SexM 0.9648 1.0365 0.8325 1.118

beetle$BlockB 1.2878 0.7765 1.0676 1.553

beetle$BlockC 1.4243 0.7021 1.1529 1.760

beetle$BlockD 1.2535 0.7978 0.9980 1.574

Concordance= 0.552 (se = 0.013 )

Rsquare= 0.032 (max possible= 1 )

Likelihood ratio test= 23.67 on 7 df, p=0.001301

Wald test = 23.92 on 7 df, p=0.001176

Score (logrank) test = 24.08 on 7 df, p=0.001105

>

> model2<-coxph(Surv(beetle$Life, beetle$Status) ~ beetle$Density+beetle$Sex+beetle$Block)

> cox.zph(model2)

rho chisq p

beetle$DensityLow -0.11321 9.3603 2.22e-03

beetle$DensityMed -0.03290 0.7900 3.74e-01

beetle$SexM -0.07530 4.2203 3.99e-02

beetle$BlockB -0.00618 0.0279 8.67e-01

beetle$BlockC -0.09358 6.4470 1.11e-02

beetle$BlockD 0.09882 7.0637 7.87e-03

GLOBAL NA 34.1482 6.30e-06

> summary(model2)

Call:

coxph(formula = Surv(beetle$Life, beetle$Status) ~ beetle$Density +

beetle$Sex + beetle$Block)

n= 852, number of events= 729

(3 observations deleted due to missingness)

coef exp(coef) se(coef) z Pr(>|z|)

beetle$DensityLow 0.33679 1.40045 0.10764 3.129 0.00176 \*\*

beetle$DensityMed 0.07698 1.08002 0.08369 0.920 0.35764

beetle$SexM -0.03680 0.96387 0.07479 -0.492 0.62268

beetle$BlockB 0.20081 1.22240 0.09524 2.108 0.03499 \*

beetle$BlockC -0.11218 0.89389 0.10554 -1.063 0.28781

beetle$BlockD -0.60919 0.54379 0.11396 -5.346 9e-08 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

exp(coef) exp(-coef) lower .95 upper .95

beetle$DensityLow 1.4005 0.7141 1.1341 1.7294

beetle$DensityMed 1.0800 0.9259 0.9166 1.2725

beetle$SexM 0.9639 1.0375 0.8324 1.1160

beetle$BlockB 1.2224 0.8181 1.0142 1.4733

beetle$BlockC 0.8939 1.1187 0.7269 1.0993

beetle$BlockD 0.5438 1.8389 0.4349 0.6799

Concordance= 0.603 (se = 0.012 )

Rsquare= 0.07 (max possible= 1 )

Likelihood ratio test= 62.25 on 6 df, p=1.568e-11

Wald test = 58.78 on 6 df, p=7.97e-11

Score (logrank) test = 60.38 on 6 df, p=3.774e-11

>

> model3<-coxph(Surv(beetle$Life, beetle$Status) ~ beetle$Density+beetle$Block)

> cox.zph(model3)

rho chisq p

beetle$DensityLow -0.11478 9.63848 1.91e-03

beetle$DensityMed -0.03157 0.72740 3.94e-01

beetle$BlockB -0.00326 0.00775 9.30e-01

beetle$BlockC -0.09756 7.00806 8.11e-03

beetle$BlockD 0.10001 7.23344 7.16e-03

GLOBAL NA 30.23447 1.33e-05

> summary(model3)

Call:

coxph(formula = Surv(beetle$Life, beetle$Status) ~ beetle$Density +

beetle$Block)

n= 855, number of events= 730

coef exp(coef) se(coef) z Pr(>|z|)

beetle$DensityLow 0.33613 1.39953 0.10758 3.124 0.00178 \*\*

beetle$DensityMed 0.07241 1.07509 0.08359 0.866 0.38635

beetle$BlockB 0.20186 1.22367 0.09522 2.120 0.03400 \*

beetle$BlockC -0.11592 0.89055 0.10538 -1.100 0.27132

beetle$BlockD -0.62266 0.53652 0.11356 -5.483 4.18e-08 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

exp(coef) exp(-coef) lower .95 upper .95

beetle$DensityLow 1.3995 0.7145 1.1335 1.7281

beetle$DensityMed 1.0751 0.9302 0.9126 1.2665

beetle$BlockB 1.2237 0.8172 1.0154 1.4747

beetle$BlockC 0.8905 1.1229 0.7244 1.0949

beetle$BlockD 0.5365 1.8639 0.4295 0.6703

Concordance= 0.605 (se = 0.012 )

Rsquare= 0.072 (max possible= 1 )

Likelihood ratio test= 64.22 on 5 df, p=1.624e-12

Wald test = 60.49 on 5 df, p=9.626e-12

Score (logrank) test = 62.22 on 5 df, p=4.221e-12

>

>

> ##Mortality curves

> surv = Surv(beetle$week, event = abs(as.numeric(beetle$Status)), type = "right")

> coxph(surv ~ 1)

Call: coxph(formula = surv ~ 1)

Null model

log likelihood= -4349.462

n= 855

> fit = coxph(surv ~ 1)

> summ = summary(survfit(fit))

> x = summ$time

> Lx = summ$surv

> Px = Lx[1:13]/c(1,Lx[1:12])

>

> plot(log(-log(Px)), cex.axis = 1, xlab = "Adult age (in weeks)",

+ ylab = "Mortality (Log-scaled)", cex.lab = 1,cex =2,ylim = c(-5,1),

+ main = "Mortality Plot", cex.main = 2, bty = "l")

>

> flexsurvreg(surv ~ 1, dist="exp")

Call:

flexsurvreg(formula = surv ~ 1, dist = "exp")

Estimates:

est L95% U95% se

rate 0.10186 0.09473 0.10952 0.00377

N = 855, Events: 730, Censored: 125

Total time at risk: 7167

Log-likelihood = -2397.464, df = 1

AIC = 4796.929

> flexsurvreg(surv ~ 1, dist="gompertz")

Call:

flexsurvreg(formula = surv ~ 1, dist = "gompertz")

Estimates:

est L95% U95% se

shape 0.460825 0.432044 0.489606 0.014685

rate 0.005465 0.004285 0.006970 0.000678

N = 855, Events: 730, Censored: 125

Total time at risk: 7167

Log-likelihood = -1819.536, df = 2

AIC = 3643.072

> flexsurvreg(surv ~ 1, dist="gompertz")$coef

shape rate

0.4608248 -5.2094148

> shape = flexsurvreg(surv ~ 1, dist="gompertz")$coef[1]

> rate = flexsurvreg(surv ~ 1, dist="gompertz")$coef[2]

> x = seq(1,13)

> y = rate + x \* shape

> lines(x = x, y = y, lwd = 2)

>

> ##Looking at density

> survD = Surv(beetle$week, event = abs(as.numeric(beetle$Status)), type = "right")

> coxph(survD ~ beetle$Density)

Call:

coxph(formula = survD ~ beetle$Density)

coef exp(coef) se(coef) z p

beetle$DensityLow 0.267 1.31 0.107 2.49 0.013

beetle$DensityMed 0.122 1.13 0.083 1.47 0.140

Likelihood ratio test=6.28 on 2 df, p=0.0432 n= 855, number of events= 730

> fitD = coxph(survD ~ beetle$Density)

> summD = summary(survfit(fitD))

> xD = summD$time

> LxD = summD$surv

> PxD = LxD[1:13]/c(1,LxD[1:12])

> cox.zph(fitD)

rho chisq p

beetle$DensityLow -0.0947 6.498 0.0108

beetle$DensityMed -0.0312 0.713 0.3984

GLOBAL NA 6.609 0.0367

> plot(log(-log(PxD)), cex.axis = 1, xlab = "Adult age (in weeks)",

+ ylab = "Mortality (Log-scaled)", cex.lab = 1,cex =2,ylim = c(-5,1),

+ main = "Mortality Plot", cex.main = 2, bty = "l")

>

> flexsurvreg(surv ~ 1, dist="exp")

Call:

flexsurvreg(formula = surv ~ 1, dist = "exp")

Estimates:

est L95% U95% se

rate 0.10186 0.09473 0.10952 0.00377

N = 855, Events: 730, Censored: 125

Total time at risk: 7167

Log-likelihood = -2397.464, df = 1

AIC = 4796.929

> flexsurvreg(surv ~ 1, dist="gompertz")

Call:

flexsurvreg(formula = surv ~ 1, dist = "gompertz")

Estimates:

est L95% U95% se

shape 0.460825 0.432044 0.489606 0.014685

rate 0.005465 0.004285 0.006970 0.000678

N = 855, Events: 730, Censored: 125

Total time at risk: 7167

Log-likelihood = -1819.536, df = 2

AIC = 3643.072

> flexsurvreg(surv ~ 1, dist="gompertz")$coef

shape rate

0.4608248 -5.2094148

> shape = flexsurvreg(surv ~ 1, dist="gompertz")$coef[1]

> rate = flexsurvreg(surv ~ 1, dist="gompertz")$coef[2]

> x = seq(1,13)

> y = rate + x \* shape

> lines(x = x, y = y, lwd = 2, lty=3)

>

> ##Density mortality curves for all beetles

> survH = Surv(beetle$week[which(beetle$Density == "High")], event =

+ abs(as.numeric(beetle$Status))[which(beetle$Density == "High")], type =

+ "right")

> coxph(survH~1)

Call: coxph(formula = survH ~ 1)

Null model

log likelihood= -1239.665

n= 303

> fitH = coxph(survH ~ 1)

> summH = summary(survfit(fitH))

> xH = summH$time

> LxH = summH$survH

> PxH = LxH[1:13]/c(1,LxH[1:12])

> survM = Surv(beetle$week[which(beetle$Density == "Med")], event =

+ abs(as.numeric(beetle$Status))[which(beetle$Density == "Med")], type =

+ "right")

> coxph(survM ~ 1)

Call: coxph(formula = survM ~ 1)

Null model

log likelihood= -1782.774

n= 394

> fitM = coxph(survM ~ 1)

> summM = summary(survfit(fitM))

> xM = summM$time

> LxM = summM$survM

> PxM = LxM[1:13]/c(1,LxM[1:12])

> survL = Surv(beetle$week[which(beetle$Density == "Low")], event =

+ abs(as.numeric(beetle$Status))[which(beetle$Density == "Low")], type =

+ "right")

> coxph(survL ~ 1)

Call: coxph(formula = survL ~ 1)

Null model

log likelihood= -575.6056

n= 158

> fitL = coxph(survL ~ 1)

> summL = summary(survfit(fitL))

> xL = summL$time

> LxL = summL$survL

> PxL = LxL[1:13]/c(1,LxL[1:12])

>

> plot(log(-log(PxH)), cex.axis = 1, xlab = "Adult age (in weeks)", ylab = "Mortality (Log-scaled)",

+ cex.lab = 1,cex =2,ylim = c(-5,1),xlim = c(0,13),

+ main = "Mortality curve for the three Density Treatments", cex.main = 2, bty = "l")

> points(log(-log(PxM)), pch = 16, cex=2)

> points(log(-log(PxL)), pch=8, cex=2)

> labels<-c("High", "Medium", "Low")

> legend("bottomright", title="Legend", labels, pch=c(1, 16, 8), lty=c(1:3), cex=1)

>

> flexsurvreg(survH ~ 1, dist="exp")

Call:

flexsurvreg(formula = survH ~ 1, dist = "exp")

Estimates:

est L95% U95% se

rate 0.09707 0.08580 0.10983 0.00611

N = 303, Events: 252, Censored: 51

Total time at risk: 2596

Log-likelihood = -839.7391, df = 1

AIC = 1681.478

> flexsurvreg(survH ~ 1, dist="gompertz")

Call:

flexsurvreg(formula = survH ~ 1, dist = "gompertz")

Estimates:

est L95% U95% se

shape 0.479177 0.428263 0.530092 0.025977

rate 0.004284 0.002767 0.006633 0.000955

N = 303, Events: 252, Censored: 51

Total time at risk: 2596

Log-likelihood = -631.8167, df = 2

AIC = 1267.633

> flexsurvreg(survH ~ 1, dist="gompertz")$coef

shape rate

0.4791772 -5.4528151

> shape = flexsurvreg(survH ~ 1, dist="gompertz")$coef[1]

> rate = flexsurvreg(survH ~ 1, dist="gompertz")$coef[2]

> x = seq(1,13)

> y = rate + x \* shape

> lines(x = x, y = y, lwd = 2)

> flexsurvreg(survM ~ 1, dist="exp")

Call:

flexsurvreg(formula = survM ~ 1, dist = "exp")

Estimates:

est L95% U95% se

rate 0.10272 0.09242 0.11417 0.00554

N = 394, Events: 344, Censored: 50

Total time at risk: 3349

Log-likelihood = -1126.867, df = 1

AIC = 2255.733

> flexsurvreg(survM ~ 1, dist="gompertz")

Call:

flexsurvreg(formula = survM ~ 1, dist = "gompertz")

Estimates:

est L95% U95% se

shape 0.480526 0.438459 0.522594 0.021463

rate 0.004698 0.003274 0.006741 0.000865

N = 394, Events: 344, Censored: 50

Total time at risk: 3349

Log-likelihood = -831.5167, df = 2

AIC = 1667.033

> flexsurvreg(survM ~ 1, dist="gompertz")$coef

shape rate

0.4805263 -5.3605889

> shape = flexsurvreg(survM ~ 1, dist="gompertz")$coef[1]

> rate = flexsurvreg(survM ~ 1, dist="gompertz")$coef[2]

> x = seq(1,13)

> y = rate + x \* shape

> lines(x = x, y = y, lwd = 2, lty=2)

> flexsurvreg(survL ~ 1, dist="exp")

Call:

flexsurvreg(formula = survL ~ 1, dist = "exp")

Estimates:

est L95% U95% se

rate 0.10966 0.09258 0.12989 0.00947

N = 158, Events: 134, Censored: 24

Total time at risk: 1222

Log-likelihood = -430.1942, df = 1

AIC = 862.3884

> flexsurvreg(survL ~ 1, dist="gompertz")

Call:

flexsurvreg(formula = survL ~ 1, dist = "gompertz")

Estimates:

est L95% U95% se

shape 0.39072 0.32770 0.45375 0.03216

rate 0.01111 0.00677 0.01824 0.00281

N = 158, Events: 134, Censored: 24

Total time at risk: 1222

Log-likelihood = -350.1313, df = 2

AIC = 704.2626

> flexsurvreg(survL ~ 1, dist="gompertz")$coef

shape rate

0.3907248 -4.4996186

> shape = flexsurvreg(survL ~ 1, dist="gompertz")$coef[1]

> rate = flexsurvreg(survL ~ 1, dist="gompertz")$coef[2]

> x = seq(1,13)

> y = rate + x \* shape

> lines(x = x, y = y, lwd = 2, lty=3)

>

###Full cox model has shown a difference but where?

> ### High and medium populations are proportional - now only look at these ones to look for an effect of density

> beetleHM<-read.table(file.choose(), header = T)

> head (beetleHM)

Block Density Rep Life Sex Length Status

1 A High 1 5 M 2.93 1

2 A High 1 89 M 3.34 1

3 A High 1 79 M 3.04 1

4 A High 1 79 M 3.53 1

5 A High 1 51 M 3.58 1

6 A High 1 65 M 4.14 1

>

> model5<-coxph(Surv(beetleHM$Life, beetleHM$Status) ~ beetleHM$Density)

> cox.zph(model5)

rho chisq p

beetleHM$DensityMed -0.038 0.861 0.354

> summary(model5)

Call:

coxph(formula = Surv(beetleHM$Life, beetleHM$Status) ~ beetleHM$Density)

n= 697, number of events= 596

coef exp(coef) se(coef) z Pr(>|z|)

beetleHM$DensityMed 0.128 1.137 0.083 1.542 0.123

exp(coef) exp(-coef) lower .95 upper .95

beetleHM$DensityMed 1.137 0.8799 0.9659 1.337

Concordance= 0.52 (se = 0.012 )

Rsquare= 0.003 (max possible= 1 )

Likelihood ratio test= 2.39 on 1 df, p=0.122

Wald test = 2.38 on 1 df, p=0.1231

Score (logrank) test = 2.38 on 1 df, p=0.1229

>

> #PH occur but no difference between the two

>

> ###So what about the low density ones? - make new excel sheet with only

> #the low and the medium ones and then split the ages

> beetleML<-read.table(file.choose(), header = T)

> head (beetleML)

Block Density Rep Life Sex Length Status

1 A Med 1 47 M 4.40 1

2 A Med 1 61 M 3.94 1

3 A Med 1 70 M 4.07 1

4 A Med 1 51 M 4.06 1

5 A Med 1 68 M 4.23 1

6 A Med 1 54 M 4.29 1

>

> model6 <- Surv(beetleML$Life, event = abs(as.numeric(beetleML$Status)), type = "right") ~ beetleML$Density

> cox.zph(coxph(model6))

rho chisq p

beetleML$DensityMed 0.0915 3.97 0.0462

> coxph(model6)

Call:

coxph(formula = model6)

coef exp(coef) se(coef) z p

beetleML$DensityMed -0.162 0.85 0.102 -1.59 0.11

Likelihood ratio test=2.46 on 1 df, p=0.117 n= 552, number of events= 478

> #slightly violates the PH but no effect anyway

>

> ##splitting the ages

> ##Do LOW and MEDIUM have proportional hazards when YOUNG or when OLD?

> #OLD (>4weeks old)

> oldbeetle = beetleML[which(beetleML$Life > 30),]

> head(oldbeetle)

Block Density Rep Life Sex Length Status

1 A Med 1 47 M 4.40 1

2 A Med 1 61 M 3.94 1

3 A Med 1 70 M 4.07 1

4 A Med 1 51 M 4.06 1

5 A Med 1 68 M 4.23 1

6 A Med 1 54 M 4.29 1

> summary(oldbeetle)

Block Density Rep Life Sex

A:160 Low:136 Min. : 1.000 Min. :31.00 F :262

B:136 Med:380 1st Qu.: 2.000 1st Qu.:48.00 M :251

C: 97 Median : 4.000 Median :57.00 NA's: 3

D:123 Mean : 4.267 Mean :57.36

3rd Qu.: 5.000 3rd Qu.:66.00

Max. :13.000 Max. :91.00

Length Status

Min. :2.790 Min. :0.0000

1st Qu.:3.810 1st Qu.:1.0000

Median :4.000 Median :1.0000

Mean :3.937 Mean :0.8605

3rd Qu.:4.120 3rd Qu.:1.0000

Max. :4.450 Max. :1.0000

NA's :72

>

> model7 <- Surv(oldbeetle$Life, event = abs(as.numeric(oldbeetle$Status)), type = "right") ~ oldbeetle$Density

> cox.zph(coxph(model7))

rho chisq p

oldbeetle$DensityMed 0.0229 0.232 0.63

> coxph(model7)

Call:

coxph(formula = model7)

coef exp(coef) se(coef) z p

oldbeetle$DensityMed -0.0521 0.949 0.109 -0.478 0.63

Likelihood ratio test=0.23 on 1 df, p=0.634 n= 516, number of events= 444

> ##sample size so low we can no longer detect the effect we would like to - type2 error high

>

> #YOUNG

> youngbeetle = beetleML[which(beetleML$Life < 31),]

> summary(youngbeetle$Density)

Low Med

22 14

>

> model8 <- Surv(youngbeetle$Life, event = abs(as.numeric(youngbeetle$Status)), type = "right") ~ youngbeetle$Density

> cox.zph(coxph(model8))

rho chisq p

youngbeetle$DensityMed -0.0169 0.00926 0.923

> coxph(model8)

Call:

coxph(formula = model8)

coef exp(coef) se(coef) z p

youngbeetle$DensityMed -0.127 0.881 0.352 -0.361 0.72

Likelihood ratio test=0.13 on 1 df, p=0.717 n= 36, number of events= 34

> ##again PH but no difference - splitting leads to a loss of power so we can't see the effect

>

> ##Do LOW and HIGH have PH?

> beetleHL<-read.table(file.choose(), header = T)

> head (beetleHL)

Block Density Rep Life Sex Length Status

1 A High 1 5 M 2.93 1

2 A High 1 89 M 3.34 1

3 A High 1 79 M 3.04 1

4 A High 1 79 M 3.53 1

5 A High 1 51 M 3.58 1

6 A High 1 65 M 4.14 1

>

> model9 <- Surv(beetleHL$Life, event = abs(as.numeric(beetleHL$Status)), type = "right") ~ beetleHL$Density

> cox.zph(coxph(model9))

rho chisq p

beetleHL$DensityLow -0.129 6.32 0.0119

> coxph(model9)

Call:

coxph(formula = model9)

coef exp(coef) se(coef) z p

beetleHL$DensityLow 0.288 1.33 0.107 2.68 0.0073

Likelihood ratio test=6.98 on 1 df, p=0.00823 n= 461, number of events= 386

>

> ##No proportional hazards but significant difference

>

> ##Now to split OLD and YOUNG again

> #OLD

> oldbeetle2 = beetleHL[which(beetleHL$Life > 30),]

> summary(oldbeetle2)

Block Density Rep Life Sex

A:107 High:285 Min. : 1.000 Min. :31.00 F:219

B: 87 Low :136 1st Qu.: 1.000 1st Qu.:51.00 M:202

C:102 Median : 2.000 Median :58.00

D:125 Mean : 3.192 Mean :58.67

3rd Qu.: 3.000 3rd Qu.:66.00

Max. :13.000 Max. :91.00

Length Status

Min. :2.520 Min. :0.000

1st Qu.:3.460 1st Qu.:1.000

Median :3.720 Median :1.000

Mean :3.686 Mean :0.829

3rd Qu.:3.960 3rd Qu.:1.000

Max. :4.390 Max. :1.000

NA's :72

>

> model10 <- Surv(oldbeetle2$Life, event = abs(as.numeric(oldbeetle2$Status)), type = "right") ~ oldbeetle2$Density

> cox.zph(coxph(model10))

rho chisq p

oldbeetle2$DensityLow -0.106 3.86 0.0495

> coxph(model10)

Call:

coxph(formula = model10)

coef exp(coef) se(coef) z p

oldbeetle2$DensityLow 0.223 1.25 0.115 1.94 0.052

Likelihood ratio test=3.68 on 1 df, p=0.0552 n= 421, number of events= 349

> ##PH almost there but effect is also on the margin of significance

>

> #YOUNG

> youngbeetle2 = beetleHL[which(beetleHL$Life < 31),]

> youngbeetle2$Density

[1] High High High Low Low Low Low Low Low Low Low Low Low

[14] High High High High High High High Low Low Low Low High High

[27] High High High High Low Low Low Low Low Low High High Low

[40] Low

Levels: High Low

> summary(youngbeetle2)

Block Density Rep Life Sex

A:13 High:18 Min. : 1.00 Min. : 1.00 F:21

B:11 Low :22 1st Qu.: 1.00 1st Qu.: 5.75 M:19

C:12 Median : 2.50 Median :13.50

D: 4 Mean : 4.25 Mean :14.45

3rd Qu.: 7.00 3rd Qu.:23.00

Max. :12.00 Max. :30.00

Length Status

Min. :2.410 Min. :0.000

1st Qu.:3.260 1st Qu.:1.000

Median :3.510 Median :1.000

Mean :3.518 Mean :0.925

3rd Qu.:4.090 3rd Qu.:1.000

Max. :4.500 Max. :1.000

NA's :3

>

> model11 <- Surv(youngbeetle2$Life, event = abs(as.numeric(youngbeetle2$Status)), type = "right") ~ youngbeetle2$Density

> cox.zph(coxph(model11))

rho chisq p

youngbeetle2$DensityLow 0.0866 0.265 0.607

> coxph(model11)

Call:

coxph(formula = model11)

coef exp(coef) se(coef) z p

youngbeetle2$DensityLow -0.553 0.575 0.34 -1.63 0.1

Likelihood ratio test=2.6 on 1 df, p=0.107 n= 40, number of events= 37

> #proportional hazards occur but difference is not significant

> #low sample size has increased the cance to the type 2 error again.

>

> ###Now time to merge the HIgh and the medium ones

> HM<-beetle$Density

> levels(HM)<-c("HighMed", "Low", "HighMed")

> summary (HM)

HighMed Low

697 158

>

> model12 <- Surv(beetle$Life, event = abs(as.numeric(beetle$Status)), type = "right") ~ HM

> cox.zph(coxph(model12))

rho chisq p

HMLow -0.0899 5.87 0.0154

> coxph(model12)

Call:

coxph(formula = model12)

coef exp(coef) se(coef) z p

HMLow 0.22 1.25 0.0958 2.29 0.022

Likelihood ratio test=5.01 on 1 df, p=0.0252 n= 855, number of events= 730

> ##NO PH but densities do differ