Chapter 3 Results

# **Occupancy Modeling**

## Longnose Dace:

summary(lnd.results.p$p.Dot.Psi.global)

Output summary for Occupancy model

Name : p(~1)Psi(~avwid + pctcbbl + pctSlope + med\_len + adult\_100m)

Npar : 7

-2lnL: 225.5893

AICc : 240.4442

Beta

estimate se lcl ucl

p:(Intercept) 0.6868804 0.2295692 0.2369248 1.1368360

Psi:(Intercept) -5.4966721 1.1210231 -7.6938773 -3.2994669

Psi:avwid 1.2150251 0.2718213 0.6822554 1.7477948

Psi:pctcbbl 0.0139794 0.0119925 -0.0095258 0.0374847

Psi:pctSlope -0.0192572 0.0307475 -0.0795223 0.0410080

Psi:med\_len 0.0021187 0.0023482 -0.0024839 0.0067212

Psi:adult\_100m -0.1846429 0.0525097 -0.2875620 -0.0817238

Real Parameter p

1 2 3

0.6652726 0.6652726 0.6652726

Real Parameter Psi

1

0.1772292

lnd.results.psi

model npar AICc DeltaAICc weight Deviance

2 p(~1)Psi(~avwid + pctcbbl + pctSlope + med\_len + adult\_100m) 7 240.4442 0.00000 9.999118e-01 225.58926

3 p(~1)Psi(~avwid + pctcbbl + pctSlope) 5 259.1619 18.71773 8.619045e-05 248.71082

4 p(~1)Psi(~med\_len + adult\_100m) 4 266.6971 26.25286 1.991712e-06 258.39857

1 p(~1)Psi(~1) 2 274.3253 33.88106 4.393213e-08 14.31515

lnd.results.p$p.Dot.Psi.global$results$real

estimate se lcl ucl fixed note

p g1 a0 t1 0.6652726 0.0511216 0.5589557 0.7570982

Psi g1 a0 t1 0.1772292 0.0425171 0.1084454 0.2761284

## Southern Redbelly Dace:

##Examine model list and look at model comparisons

> srd.results.psi

model npar AICc DeltaAICc weight Deviance

3 p(~avdep)Psi(~MEANT + HAiFLS\_alt) 5 264.2524 0.000000 0.6007189534 253.8013

2 p(~avdep)Psi(~MEANT + HAiFLS\_alt + med\_len + BRT) 7 265.0848 0.832354 0.3962123034 250.2298

4 p(~avdep)Psi(~med\_len + BRT) 5 275.1473 10.894870 0.0025875001 264.6962

1 p(~avdep)Psi(~1) 3 278.5115 14.259020 0.0004812431 272.3337

summary(srd.results.psi$p.depth.Psi.habitat) #top model

Output summary for Occupancy model

Name : p(~avdep)Psi(~MEANT + HAiFLS\_alt)

Npar : 5

-2lnL: 253.8013

AICc : 264.2524

Beta

estimate se lcl ucl

p:(Intercept) -2.0766401 0.8981200 -3.8369553 -0.3163249

p:avdep 7.2675336 2.8877221 1.6075981 12.9274690

Psi:(Intercept) -8.4798436 2.2035788 -12.7988580 -4.1608291

Psi:MEANT 0.3246357 0.1126804 0.1037820 0.5454893

Psi:HAiFLS\_alt 0.0189594 0.0109765 -0.0025545 0.0404734

Real Parameter p

1 2 3

0.4477518 0.4477518 0.4477518

Real Parameter Psi

1

0.2451977

> srd.results.psi$p.depth.Psi.habitat$results$real

estimate se lcl ucl fixed note

p g1 a0 t1 0.4477518 0.0693694 0.3187289 0.5842153

Psi g1 a0 t1 0.2451977 0.0546142 0.1541038 0.3667901

> summary(srd.results.psi$p.depth.Psi.global) #2nd top model

Output summary for Occupancy model

Name : p(~avdep)Psi(~MEANT + HAiFLS\_alt + med\_len + BRT)

Npar : 7

-2lnL: 250.2298

AICc : 265.0848

Beta

estimate se lcl ucl

p:(Intercept) -2.3753089 0.8843720 -4.1086780 -0.6419398

p:avdep 8.1134114 2.8420862 2.5429223 13.6839000

Psi:(Intercept) -8.7316822 2.7195589 -14.0620180 -3.4013467

Psi:MEANT 0.3755492 0.1362342 0.1085302 0.6425681

Psi:HAiFLS\_alt 0.0159741 0.0118581 -0.0072677 0.0392160

Psi:med\_len -0.0032805 0.0050665 -0.0132107 0.0066498

Psi:BRT -0.1597852 1.2861188 -2.6805781 2.3610077

Real Parameter p

1 2 3

0.4277252 0.4277252 0.4277252

Real Parameter Psi

1

0.2532309

> srd.results.psi$p.depth.Psi.global$results$real

estimate se lcl ucl fixed note

p g1 a0 t1 0.4277252 0.0691048 0.3005917 0.5651782

Psi g1 a0 t1 0.2532309 0.0589728 0.1554231 0.3845632

srd.results.p

model npar AICc DeltaAICc weight Deviance

2 p(~avdep)Psi(~MEANT + HAiFLS\_alt + med\_len + BRT) 7 265.0848 0.000000 6.937403e-01 250.22983

8 p(~avdep + mFlow)Psi(~MEANT + HAiFLS\_alt + med\_len + BRT) 8 267.3044 2.219610 2.286729e-01 250.19671

4 p(~1)Psi(~MEANT + HAiFLS\_alt + med\_len + BRT) 6 270.3631 5.278272 4.954898e-02 257.72670

6 p(~mFlow)Psi(~MEANT + HAiFLS\_alt + med\_len + BRT) 7 271.5898 6.505010 2.683193e-02 256.73484

1 p(~avdep)Psi(~1) 3 278.5115 13.426666 8.426233e-04 272.33368

7 p(~avdep + mFlow)Psi(~1) 4 280.6187 15.533916 2.937988e-04 272.32020

3 p(~1)Psi(~1) 2 284.5240 19.439163 4.169041e-05 16.67921

5 p(~mFlow)Psi(~1) 3 285.3329 20.248116 2.782111e-05 279.15513

## Cottus:

cott.results.p

**model npar AICc DeltaAICc weight Deviance**

p(~mFlow)Psi(~avgT + BrBank + HAiFLS\_for + med\_len + adult\_100m) 8 149.7377 0.000000 6.865058e-01 132.630040

p(~pctcbbl + mFlow)Psi(~avgT + BrBank + HAiFLS\_for + med\_len + adult\_100m) 9 152.0237 2.285967 2.189036e-01 132.628

p(~1)Psi(~avgT + BrBank + HAiFLS\_for + med\_len + adult\_100m) 7 154.6083 4.870530 6.012044e-02 139.753300

p(~pctcbbl)Psi(~avgT + BrBank + HAiFLS\_for + med\_len + adult\_100m) 8 155.7228 5.985090 3.443487e-02 138.615130

p(~mFlow)Psi(~1) 3 170.2823 20.544605 2.373776e-05 164.104560

p(~pctcbbl + mFlow)Psi(~1) 4 172.2666 22.528915 8.801414e-06 163.968140

p(~1)Psi(~1) 2 175.5223 25.784523 1.728248e-06 1.972209

p(~pctcbbl)Psi(~1) 3 176.5365 26.798815 1.040771e-06 170.358770

>

> #only one model <2 DeltaAICc

> summary(cott.results.p$p.flow.Psi.global)

Output summary for Occupancy model

Name : p(~mFlow)Psi(~avgT + BrBank + HAiFLS\_for + med\_len + adult\_100m)

Npar : 8

-2lnL: 132.63

AICc : 149.7377

Beta

estimate se lcl ucl

p:(Intercept) 3.2071851 0.8236693 1.5927933 4.8215769

p:mFlow -7.8543816 3.1392023 -14.0072180 -1.7015449

Psi:(Intercept) -1.6126833 2.5680332 -6.6460285 3.4206618

Psi:avgT -0.1562129 0.1547258 -0.4594754 0.1470497

Psi:BrBank -0.4459738 0.6372870 -1.6950564 0.8031087

Psi:HAiFLS\_for 0.0354437 0.0112359 0.0134214 0.0574660

Psi:med\_len 0.0053648 0.0033647 -0.0012301 0.0119597

Psi:adult\_100m 0.0623979 0.0293455 0.0048807 0.1199150

Real Parameter p

1 2 3

0.7861848 0.7861848 0.7861848

Real Parameter Psi

1

0.0671929

##Examine model list and look at model comparisons

> cott.results.psi

model npar AICc DeltaAICc weight Deviance

2 p(~mFlow)Psi(~avgT + BrBank + HAiFLS\_for + med\_len + adult\_100m) 8 149.7377 0.000000 9.758206e-01 132.6300

3 p(~mFlow)Psi(~avgT + BrBank + HAiFLS\_for) 6 157.4448 7.707111 2.069150e-02 144.8085

4 p(~mFlow)Psi(~med\_len + adult\_100m) 5 161.0251 11.287396 3.454166e-03 150.5740

1 p(~mFlow)Psi(~1) 3 170.2823 20.544605 3.374159e-05 164.1046

cott.results.psi$p.flow.Psi.global$results$real

estimate se lcl ucl

0.7861848 0.0652886 0.6320043 0.8872881

0.0671929 0.0290098 0.0282558 0.1514251

# **CPUE comparisons and modeling:**

## Comparisons of CPUE b/w sites with and without Brown Trout:

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>

> # Mann Whitney U / Wilcox Sign Rank Test

>

> # using subsetted data -- only when SGCNs of interest are present

> #-----

> #LND

> #-----

> class(ldace$BRT)

[1] "factor"

> wilcox.test(ldace$LND\_CPUE ~ ldace$BRT, mu=0, alt="two.sided", conf.int=T, conf.level=0.95, paired=F,

+ exact=F)

Wilcoxon rank sum test with continuity correction

data: ldace$LND\_CPUE by ldace$BRT

W = 135, p-value = 0.9564

alternative hypothesis: true location shift is not equal to 0

95 percent confidence interval:

-1.777859 2.191316

sample estimates:

difference in location

0.04975342

> #-----

> #SRD

> #-----

> class(sdace$BRT)

[1] "factor"

> wilcox.test(sdace$SRD\_CPUE ~ sdace$BRT, mu=0, alt="two.sided", conf.int=T, conf.level=0.95, paired=F,

+ exact=F)

Wilcoxon rank sum test with continuity correction

data: sdace$SRD\_CPUE by sdace$BRT

W = 157.5, p-value = 0.2456

alternative hypothesis: true location shift is not equal to 0

95 percent confidence interval:

-0.3134583 4.5286369

sample estimates:

difference in location

0.4347949

> #no difference

> #-----

> #Cottus

> #-----

> class(cott$BRT)

[1] "factor"

> wilcox.test(cott$Cottus\_CPUE ~ cott$BRT, mu=0, alt="two.sided", conf.int=T, conf.level=0.95, paired=F,

+ exact=F)

Wilcoxon rank sum test with continuity correction

data: cott$Cottus\_CPUE by cott$BRT

W = 18, p-value = 1

alternative hypothesis: true location shift is not equal to 0

95 percent confidence interval:

-68.49425 49.15872

sample estimates:

difference in location

0.5416241

> #LND

> wilcox\_test(LND\_CPUE~BRT, data=ldace, distribution="exact") #p = 0.95

Exact Wilcoxon-Mann-Whitney Test

data: LND\_CPUE by BRT (0, 1)

Z = 0.072907, p-value = 0.9497

alternative hypothesis: true mu is not equal to 0

> #SRD

> wilcox\_test(SRD\_CPUE~BRT, data=sdace, distribution="exact") #p = 0.25

Exact Wilcoxon-Mann-Whitney Test

data: SRD\_CPUE by BRT (0, 1)

Z = 1.1797, p-value = 0.2457

alternative hypothesis: true mu is not equal to 0

> #Cottus

> wilcox\_test(Cottus\_CPUE~BRT, data=cott, distribution="exact") #p = 1

Exact Wilcoxon-Mann-Whitney Test

data: Cottus\_CPUE by BRT (0, 1)

Z = 0, p-value = 1

alternative hypothesis: true mu is not equal to 0

> #LND

> oneway\_test(LND\_CPUE~BRT, data=ldace,

+ distribution=approximate(B=9999)) #p = 0.95

Approximative Two-Sample Fisher-Pitman Permutation Test

data: LND\_CPUE by BRT (0, 1)

Z = -0.07401, p-value = 0.9424

alternative hypothesis: true mu is not equal to 0

> #SRD

> oneway\_test(SRD\_CPUE~BRT, data=sdace,

+ distribution=approximate(B=9999)) #p = 0.16

Approximative Two-Sample Fisher-Pitman Permutation Test

data: SRD\_CPUE by BRT (0, 1)

Z = 1.3951, p-value = 0.1637

alternative hypothesis: true mu is not equal to 0

> #Cottus

> oneway\_test(Cottus\_CPUE~BRT, data=cott,

+ distribution=approximate(B=9999)) #p = 0.91

Approximative Two-Sample Fisher-Pitman Permutation Test

data: Cottus\_CPUE by BRT (0, 1)

Z = 0.19465, p-value = 0.9166

alternative hypothesis: true mu is not equal to 0