

Distance sampling analysis using R



File View Tools Analysis - Inputs Window Help

Project Browser

Set: Set 1

ID	Name	# params	Delta AIC	AIC	ESW/EDR	DS	D	D LCL	D UCL	D CV	N
1	Full geog stratification	4	0.00	315.79		0.021	0.021	0.012	0.037	0.278	14954
2	Pooled f(0)										
3	No stratification	2	2.93	318.72	0.91	0.026	0.026	0.016	0.045	0.263	18868

Analysis 2: [Pooled f(0)] Set: [Set 1]

Name: Pooled f(0)
Created: 24/07/2002 14:38:34

Run:

Survey: Set 1 [1] New Survey

Data filter:

1 7 eq int to 1.5

Model definition:

1 hazrat+no adj full strat
2 hazrat+no adj pooled f(0)
3 hazrat + no adj no strat

Comments

Model Definition Properties: [hazrat+no adj pooled f(0)]

Analysis Engine: CDS - Conventional distance sampling

Estimate Detection function Cluster size Multipliers Variance Misc.

Stratum definition:

☐ No stratification Layer type: Field name:
☒ Use layer type: Stratum
☐ Post-stratify, using: Stratum Area

Sample definition (for encounter rate):

Use layer type: Sample

Quantities to estimate and level of resolution

	Level of resolution of estimates		
	Global	Stratum	Sample
Density	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Encounter rate	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Detection function	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cluster size (if required)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Global density estimate is Mean of stratum estimates
 weighted by Stratum area ☐ Strata are replicates

Defaults Name: hazrat+no adj pooled f(0) OK Cancel

Inputs Log Results

95 Percent Confidence Interval

0.87901	1.3884
0.48017	0.75843
0.72025	1.1374

Log Results

1.2 1.4 1.6 miles

File Edit Code View Plots Session Build Debug Profile Tools Help

Go to file/function Addins Project: (None)

Untitled1* x Untitled2* x montrave-dsm.rmd x

Source on Save Source

```

31
32 stratify.hazard <- ddf(dsmodel=~cds(key="hr", fo
33                       meta.data=list(width=1.94
34                       control=list(mono=TRUE, m
35                       data=stratify.proj$'Half-
36 hazard.aic <- stratify.hazard$criterion
37 halfnorm.aic <- stratify.reanalyse$criterion
38
39 library(Distance)
40 stratify.hazard <- ds(key="hr", formula=~1, adj=
41                       truncation=1.940000572204
42                       data=stratify.proj$'Half-n
43
44 ama.hn.mas <- run_analysis(amakihi.proj$m13 - H
45
46 ama.data.std <- amakihi.proj$m13 - HN MAS w82.5
47 ama.data.std$MAS.std <- ama.data.std$MAS/sd(ama.
48

```

54:1 (Top Level) R Script

Console ~/

```

detection function parameters
Scale coefficient(s):
              estimate      se
(Intercept) 4.7311401 0.8092230
MAS.std     0.1022007 0.2442025

```

Environment History Connections

Import Dataset Grid

Global Environment

Name	Type	Le...	Size	Value
ama...	dat...	9	9...	158 ob...
ama...	ds	14	51...	List o...
ama...	ds	14	55...	List o...
amak...	dat...	8	54...	1487 o...

Files Plots Packages Help Viewer

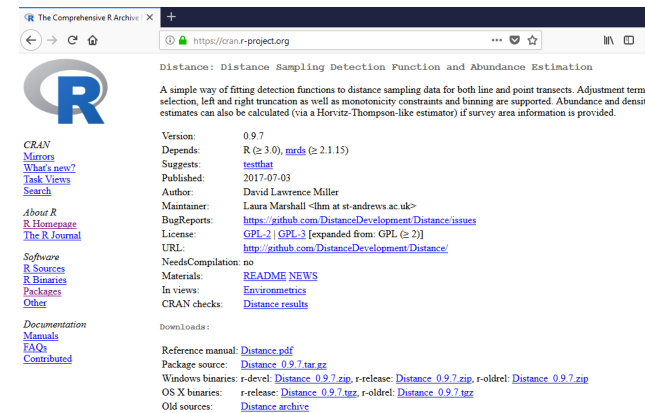
Zoom Export

Detection probability

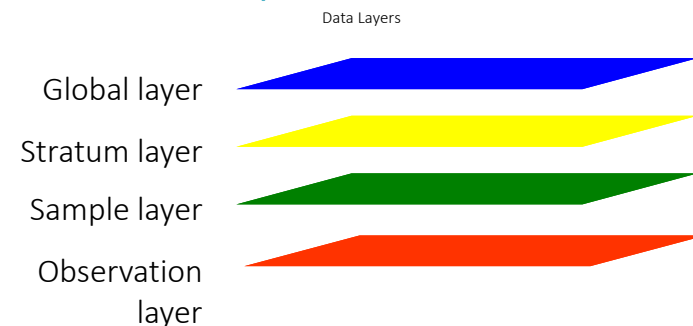
Distance

Three elements needed to begin analysis using R

- Assume you have installed R (www.cran.r-project.org) and also R-Studio (www.rstudio.com)
- Beyond this, you will need the package Distance available from CRAN
- Deeper understanding of distance sampling survey data organisation



Survey data in Distance



Survey data in Distance

Data Layers

Global Stratum Sample Observation

Contents of Observation layer 'Observation' and all fields from higher layers

Study Area			Region			Line transect			Observation		
ID	Label		ID	Label	Area	ID	Label	Line length	ID	Perp distance	Cluster size
n/a	n/a		n/a	n/a	Decimal	n/a	n/a	Decimal	n/a	Decimal	Integer
Int	Int		Int	Int	nautmi2	Int	Int	nautmi	Int	Int	Int
1	Stratify example		1	Ideal Habitat	85000	8	8	59	29	0.6	1
						9	9	10	30	0.1	2
						10	10	13			
						11	11	56			
						12	12	1			
									31	0.1	1
									32	0.68	1
									33	0.31	2
									34	0.58	2
									35	0.49	1
									36	0.46	2
									37	0.36	2
									38	0.09	2
									39	0.03	2
									40	0.49	1
									41	1.94	8
									42	1.1	10
									43	0.85	5
									44	0.63	7
									45	0.36	2
			2	Marginal Habitat	600000	14	14	75			

File View Tools Data Window Help

Project Browser

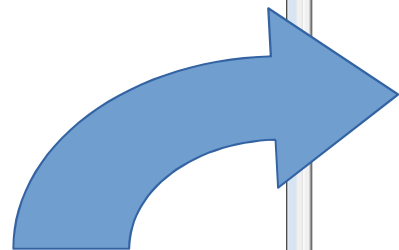
Data Maps Designs Surveys Analyses Simulations

Data layers

- Study area
 - Region
 - Line transect
 - Observation

Contents of Observation layer 'Observation' and all fields from higher layers

Study area		Region		Area	Line transect			Observation	
ID	Label	ID	Label		ID	Label	Line length	ID	Perp distance
n/a	n/a	n/a	n/a	km2	n/a	n/a	km	n/a	m
Int	Int	Int	Int	Int	Int	Int	Int	Int	Int
								1	0.06
								2	0.07
								3	0.04
								4	0.01
								5	0.37
								6	0.36
								7	0.51
								8	0.45
								9	0.32
								10	0.61
								11	0.61
								12	0.66
								13	0.69
					1	1	128.75	14	1.02
								15	1.15
								16	1
								17	1.03
								18	1.05
								19	1.41
1	Monte Vista NWR	1	Default	40.47				20	1.4
								21	1.63
								22	1.61
								23	2
								24	1.97
								25	1.95
								26	2.13
								27	2.27
								28	0.28
								29	0.23
								30	0.1
								31	0.38
								32	0.59
								33	0.86
					2	2	128.75	34	0.86
								35	0.89
								36	0.82
								37	0.76
								38	1.19
								39	1.05
								40	1.05

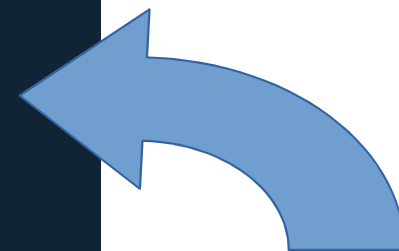


Distance for windows data tab

ducks-area-effort.csv

```

1 Region,Label,Area,Sample,Label,Effort,distance
2 Default,40.47,1,128.75,0.06
3 Default,40.47,1,128.75,0.07
4 Default,40.47,1,128.75,0.04
5 Default,40.47,1,128.75,0.01
6 Default,40.47,1,128.75,0.37
7 Default,40.47,1,128.75,0.36
8 Default,40.47,1,128.75,0.51
9 Default,40.47,1,128.75,0.45
10 Default,40.47,1,128.75,0.32
11 Default,40.47,1,128.75,0.61
12 Default,40.47,1,128.75,0.61
13 Default,40.47,1,128.75,0.66
14 Default,40.47,1,128.75,0.69
15 Default,40.47,1,128.75,1.02
16 Default,40.47,1,128.75,1.15
17 Default,40.47,1,128.75,1
18 Default,40.47,1,128.75,1.03
19 Default,40.47,1,128.75,1.05
20 Default,40.47,1,128.75,1.41
21 Default,40.47,1,128.75,1.4
22 Default,40.47,1,128.75,1.69
23 Default,40.47,1,128.75,1.61
24 Default,40.47,1,128.75,2
25 Default,40.47,1,128.75,1.97
26 Default,40.47,1,128.75,1.95
27 Default,40.47,1,128.75,2.13
28 Default,40.47,1,128.75,2.27
29 Default,40.47,2,128.75,0.28
30 Default,40.47,2,128.75,0.23
31 Default,40.47,2,128.75,0.1
32 Default,40.47,2,128.75,0.38
33 Default,40.47,2,128.75,0.59
34 Default,40.47,2,128.75,0.86
35 Default,40.47,2,128.75,0.86
36 Default,40.47,2,128.75,0.89
37 Default,40.47,2,128.75,0.82
38 Default,40.47,2,128.75,0.76
39 Default,40.47,2,128.75,1.19
40 Default,40.47,2,128.75,1.05
41 Default,40.47,2,128.75,0.94
42 Default,40.47,2,128.75,0.94
43 Default,40.47,2,128.75,1.27
44 Default,40.47,2,128.75,1.23
45 Default,40.47,2,128.75,1.41
46 Default,40.47,2,128.75,1.39
47 Default,40.47,2,128.75,1.31
48 Default,40.47,2,128.75,1.74
49 Default,40.47,2,128.75,2.21
50 Default,40.47,2,128.75,2.29
51 Default,40.47,2,128.75,2.19
52 Default,40.47,2,128.75,2.38
53 Default,40.47,2,128.75,2.22
54 Default,40.47,3,128.75,0.2
55 Default,40.47,3,128.75,0.1
56 Default,40.47,3,128.75,0.06
  
```



Comma separated values file of same data

Exercises accompanying analysis using R

- Duck nests
 - Conventional distance sampling analysis
 - Also used in Chapter 1 of online workshop
- Amakihi songbirds
 - Point transects
 - Multiple covariate distance sampling analysis
 - Also used in Chapter 5 of online workshops
- Scottish Crossbills
 - Detection function derived from a separate survey
 - Detection probability applied to data from main survey
 - Uncertainty derived using bootstrapping technique
- Multi-species songbird survey
 - Techniques for filtering species-specific data from multi-species data
 - Challenge is to ensure survey effort is correctly recorded
 - Introducing programming to modularise analyses