Appendix V

DISTANCE QUICK REFERENCE

This appendix contains a copy of the DISTANCE Quick Reference Card that was supplied with Versions 2.1 (Laake et al. 1994) and earlier of the program. It is reproduced with permission. This handy reference summarizes the commands and options for DISTANCE.

DISTANCE QUICK REFERENCE CARD

DISTANCE is a command-driven program which can be used interactively or in batch mode.

Batch Mode:
Enter: DIST I=Inputfile O=Outputfile L=Logfile S=Startfile
Commands & data must be contained in Inputfile.

Interactive mode:
Enter: DIST
Commands & data are entered at one of four command prompts: DISTANCE>, OPTIONS>, DATA>, ESTIMATE>
Help is available by entering HELP; Use END; to complete entry of options, data or estimate input. Terminate DISTANCE by entering EXIT;.

The general syntax for commands is:
command_base/switch_1/switch_2.../switch_n;
Each command must end with a semi-colon (;). Command syntax is the same for interactive and batch use. Commands are listed below in alphabetical order, by command prompt. The command syntax is not shown below, if it is simply the name followed by a ';'.

DISTANCE>

ASSIGN - assign filenames

```
ASSIGN |LOG    |          |/APPEND |
       |PLOT   | = filename|/REPLACE| ;
       |RECORD |
       |BOOTSTRAP|
       |STATS  |
or
ASSIGN  OUTPUT = filename |/APPEND | |/ECHO  |
                          |/REPLACE| |/NOECHO| ;
or
ASSIGN  INPUT  = filename /NOECHO ;
or
ASSIGN  HELP   = filename ;
```

CLEAR - clear file contents

```
CLEAR |LOG   |
      |OUTPUT| ;
      |RECORD|
```

DATA - enter distance sampling data

DOS - execute a DOS command

```
DOS command_name ;
```

ESTIMATE - define and initiate density estimation

LIST - list file contents to screen

```
LIST |LOG    |
     |OUTPUT | ;
     |RECORD |
     |DATA   |
     |OPTIONS|
```

OPTIONS - initiates option entry

PAUSE - pause execution

PRINT - prints option or data values

```
PRINT |OPTIONS| ;
      |DATA   |
```

STORE - store file contents

```
STORE |LOG   |          |/APPEND |
      |OUTPUT| = filename|/RLPLACE| ;
      |RECORD|
```

OPTIONS>

AREA - set area quantities

```
AREA   /CONVERT=value  /UNITS='label' ;
```

BOOTSTRAPS - number of bootstrap samples

```
BOOTSTRAPS=value ;
```

CUERATE - set cue rate

```
CUERATE = value1 /SE=value2 ;
```

DEFAULT - resets options to default values

```
PVALUE=0.15   PRINT=SELECT      SELECTION=SEQUENTIAL
TYPE=LINE     SQUEEZE=OFF       OBJECT=SINGLE
MAXTERMS=5    BOOTSTRAPS=100    DIST=PERP/EXACT/UNITS=METERS
SEED=0        ITERATIONS=100    LENGTH/UNITS=KILOMETERS
SF=1          LOOKAHEAD=1       AREA/UNITS=HECTARES
TITLE=''      EPSILON=1.0e-6    CUERATE=1/SE=0
```

DISTANCE - set distance quantities

```
DISTANCE = |PERP  |  /WIDTH=width      /NCLASS=nclass
           |RADIAL|  /CONVERT=value   /UNITS='label'      ;
                    /MEASURE='label' /RTRUNCATE=t
                    /LEFT=left       |/INTERVALS=x1,x2,...,xn|
                                     |/EXACT                 |
```

EPSILON - fitting tolerance

```
EPSILON=value ;
```

ITERATIONS - maximum number of iterations

```
ITERATIONS=value ;
```

LENGTH - set length quantities

```
LENGTH /CONVERT=value /UNITS='label' /MEASURE='label' ;
```

LIST - list option values

LOOKAHEAD - number of added adjustments terms

```
LOOKAHEAD=value ;
```

MAXTERMS - maximum number of adjustment terms

```
MAXTERMS=value ;
```

OBJECT - SINGLE or CLUSTER

```
OBJECT= |/SINGLE                                  |
        |/CLUSTER |/EXACT                         | ;
                  |/INTERVALS=c0,c1,...,cn        |
```

PRINT - controls amount of output

```
PRINT= |SELECTION|
       |RESULTS  | ;
       |ALL      |
       |NONE     |
```

PVALUE - significance level (α-level)

```
PVALUE=a ;
```

SEED - random number seed

```
SEED=value ;
```

SELECTION - term selection mode

```
SELECTION= |SEQUENTIAL| ;
           |FORWARD   |
           |ALL       |
           |SPECIFY   |
```

SF - sampling fraction

```
SF=f ;
```

SQUEEZE - controls output pagination

```
SQUEEZE = |ON | ;
          |OFF|
```

TITLE - value of output title

```
TITLE='yourtitle' ;
```

TYPE - POINT, LINE or CUE

```
TYPE = |POINT| ;
       |LINE |
       |CUE  |
```

DATA>

Data are structured and entered in a hierarchical manner as in the schematic below:

```
stratum 1
  sample 1
    observations for sample 1
  sample 2
    observations for sample 2
stratum 2
  sample 3
    observations for sample 3
  sample 4
    observations for sample 4
```

INFILE - redirects data input to a file

```
INFILE=filename |/ECHO  | ;
                |/NOECHO|
```

LIST - list data

SAMPLE - defines effort & begins sample

```
SAMPLE  /EFFORT=value   /LABEL='label name' ;
```

STRATUM - begins stratum

```
STRATUM   /LABEL='label name'  /AREA=asize ;
```

OBSERVATION DATA FORMATS

Point transects or cue counts (*TYPE=POINT or =CUE*)

1.	Grouped distances Ungrouped cluster sizes	$df_1, df_2, df_3 \ldots df_u$; $c_1, c_2, c_3, \ldots, c_n$;
2.	Grouped distances Grouped cluster sizes	$df_1, df_2, df_3 \ldots df_u$; $cf_1, cf_2, cf_3 \ldots cf_u$;
3.	Ungrouped distances Ungrouped cluster sizes	$d_1, c_1, d_2, c_2, \ldots, d_n, c_n$;
4.	Grouped cluster sizes Ungrouped distances	$cf_1, cf_2, cf_3 \ldots cf_u$; $d_1, d_2, \ldots d_n$

Line Transects (*TYPE=LINE*)

Radial distance & angle (*DISTANCE=RADIAL*)

5.	Ungrouped distances&angle Ungrouped cluster sizes	$d_1, a_1, c_1, d_2, a_2, c_2, \ldots d_n, a_n, c_n$;
6.	Grouped cluster sizes Ungrouped distances/angles	$cf_1, cf_2, cf_3, \ldots cf_u$ $d_1, a_1, d_2, a_2, \ldots d_n, a_n$

Perpendicular Distance (*DISTANCE=PERP*)

7.	Grouped distances Ungrouped cluster sizes	same as format 1 above
8.	Grouped distances Grouped cluster sizes	same as format 2 above
9.	Ungrouped distances Ungrouped cluster sizes	same as format 3 above
10.	Ungrouped distances Grouped cluster sizes	same as format 4 above

Legend

For i=1..n (number of observations)

- d_i — i^{th} exact distance measurement (ungrouped)
- a_i — i^{th} exact angle measurement
- c_i — i^{th} exact cluster size

For j=1..u (number of intervals)

- df_j — number of observations in j^{th} distance interval
- cf_j — number of observations in j^{th} cluster size interval

If Object=Single, do not include cluster size data.

ESTIMATE>

BOOTSTRAP - bootstrap variance/confidence intervals

```
BOOTSTRAP |/STRATUM  |  /SAMPLES  /OBSERVATIONS ;
          |/INSTRATUM|
```

CLUSTERS - analysis treatment of expected cluster size

```
CLUSTERS   /WIDTH=value   /TEST=pval
                                            ;
           |/MEAN         |
           |/BIAS- |X     |
           |       |XLOG  |
           |       |CX    |
           |       |CXLOG |
```

DENSITY - density estimation

```
DENSITY by SAMPLE /DESIGN= |NONE     |  ;
                           |REPLICATE|
or
DENSITY by STRATUM /DESIGN = |NONE     |
                             |STRATA   |
                             |REPLICATE|
                   /WEIGHT= |EFFORT|        ;
                            |AREA  |
                            |NONE  |
or
DENSITY by ALL ;
```

DETECTION - detection probability estimation

```
DETECTION by |SAMPLE |    ;
             |STRATUM|
             |ALL    |
```

DISTANCE - analysis treatment of distances

```
DISTANCE  /WIDTH=value   /INTERVALS=x0,x1,x2,x3,... ,xu
          /LEFT=l        /TRUNCATE=t   /NCLASS=nclass   ;
          /SMEAR=angle,pdist
```

ENCOUNTER - encounter rate estimation

```
ENCOUNTER by |SAMPLE |     ;
             |STRATUM|
             |ALL    |
```

ESTIMATOR - model for $g(x)$

```
ESTIMATOR  /KEY= |UNIFORM|     /ADJUST= |COSINE |
                 |HNORMAL|              |POLY   |
                 |NEXPON |              |HERMITE|
                 |HAZARD |
           /SELECT= |SPECIFY   |    /ORDER=O1,O2,...,Onap
                    |SEQUENTIAL|
                    |FORWARD   |
                    |ALL       |
           /NAP=nap                 /START=a1,a2,...,anap+nkp
           /CRITERION= |AIC|        ;
                       |LR |
```

G0 - estimate of $g(0)$ and standard error

```
G0=value /SE=value ;
```

GOF - intervals for goodness-of-fit test/display

```
GOF /INTERVALS=x0,x1,x2,... ,xu    |/SAS  |    ;
                                   |/SPLUS|
or
GOF |/SAS  |     /NCLASS=nclass    ;
    |/SPLUS|
or
GOF |/SAS  |                       ;
    |/SPLUS|
```

MONOTONE - monotonicity constraints on $g(x)$

```
MONOTONE= |WEAK  |  ;
          |STRICT|
          |NONE  |
```

PICK - method of model choice

```
PICK= |NONE|   ;
      |AIC |
```

PRINT - detailed control of output

```
PRINT /YES=option list /NO=option list ;

Option List:
 All             - used in place of listing all options
 Estimate        - Density estimate table
 Explain         - Explanation of estimation options
 Fxest           - Function parameter estimates
 Fxfit           - Function fitting/model selection
 Fxiterations    - Iterations of MLE
 Fxplot          - Function/histogram plots
 Fxtest          - Chi-square goodness of fit test
 Sbarest         - Estimates of E(S)
 Sbarplot        - Size-bias regression plot
```

SIZE - expected cluster size estimation

```
SIZE by |SAMPLE |     ;
        |STRATUM|
        |ALL    |
```

VARF - variance estimation of $f(0)$

```
VARF = | MLE      |      ;
       | BOOTSTRAP|
```

VARN - variance estimation of n

```
VARN = |POISSON  |     ;
       |"b"      |
       |EMPIRICAL|
```

Example of command & data input

```
Options;
 Type=Line;
 Length/Units='Miles';
 Area/Units='Hectares';
 Distance/Intervals=0,1,2,3,4
        /Units='Feet';
End;
Data;
 Sample/Effort=11.2;
    5,6,2,1;
 Sample/Effort=14.3;
    4,3,0,2;
 Sample/Effort=5.6;
    2,0,1,0;
 Sample/Effort=111.2;
    15,6,7,0;
End;
Estimate;
 Estimator/Key=Hazard;
 Estimator/Key=Hnormal;
 Estimator/Key=Uniform;
End;
List Output;
Estimate;
 Estimator/Key=Hazard;
 Estimator/Key=Hnormal;
 Estimator/Key=Uniform;
 Distance /Width=3;
End;
```