References

Ackerman, B.; Leban, F.; Samuel,; and Garton, E. 1990. Program home range. Moscow, Idaho: Forest, Wildlife and Range experiment station, University of Idaho.

Auffenberg, W., and Iverson, J.B. 1979. Demography of terrestial turtles. Pages 541-569 *in* M. Harless and N. Morlock, (editors). Turtles : perspectives and research. New York: Wiley.

Bhumpakkapun, N., Kutintara, U., and Naksatit, N. 1985. The wild fauna of Huai Kha Khaeng Wildlife Sanctuary. Dept. of forest Biology, Kasetsart Univ. Report, Thailand. 19 pp.

Buhlmann, K.A. 1995. Habitat Use,Terrestrial Movement, and Conservation of the turtle, *Deirochelys reticularis* in Virginia. J. Herpetology. 29: 173-181.

Burt, W.H. 1943. Territoriality and home range concepts as applied to mammals. J. Mammal. 24: 345-352.

Calzolai, R., and Chelazzi, G. 1991. Habitat use in a central Italy populatioof *Testudo hermanni* Gmelin (Reptilia: Testudinidae). J. Ethology Ecology &Evolution. 3: 153-166.

Colinvaux, D. 1973. Introduction to ecology. U.S.A: John Wiley & Sons.

Clarke, G.L. 1954. Elements of ecology. New York: John Wiley & Sons.

Das, I. 1991. Colour guide to the turtles and tortoises of the Indian Subcontinent. Avon: R&A Publishing.

Dice, L.R. 1952. Natural communities. Michigan: University of Michigan Press.

Dodd, C.K.Jr., Frang, R., and Smith, L.L. 1994. Activity Patterns and Habitat Use of Box Turtles (*Terrepane carolina bauri*) on a Florida Island, with Recommendation for Management. Chelonian Conservation and Biology. 1: 97-106.

Ehrlich, P.R., and Roughgarden, J.R. 1987. The science of ecology. New York: Macmillan Publishing.

Ernst, C.H., and Barbour, R.W. 1989. The turtles of the world. Washington : Smithsonian Institution Press.

Forman, R.T.T., and Godran, M. 1980. Landscape ecology. U.S.A: John Wiley & Sons.

Harris, S., Cresswell, W.J., Forde, P.G., Trewhelia, W.J., Woolland, T., and Wray, S. 1990. Home-range analysis using radio-tracking data, a review of problems and techniques particularly as applied to the study of mammals. Mammal Rev. 20: 97-123.

IUCN 1996. 1996 IUCN Red list of Threatened Animals. IUCN, Gland, Switzerland.

Jenkins, M.D. 1995. Tortoises and freshwater turtles:the trade in Southeast Asia. Cambridge: Traffic international.

Kendeigh, S.C. 1974. Ecology with special reference to animals & man. U.S.A: Prentice-Hall.

Kenward, R. 1987. Wildlife Radio Tagging. London: Acedemic Press.

McRae, W.A., Lander, J.L., and Garner, J.A. 1981. Movement Pattern and Home range of the Gopher Tortoise. J.the American Midland Naturalist. 106: 165-179.

Nieuwolt, P.M. 1996. Movement, activity, and microhabitat selection in the Western box turtle, *Terrapane ornata luteola*, in New Mexico. Herpetologica. 52: 487-495.

Nutaphand, W. 1979. The turtles of Thailand. Bangkok: Siamfarm Zoological Garden.

O'Connor, M.P., Zimmerman, L.C., Ruby, D.E., Bulava, S.J., and Spotila, J.R. 1994. Home range size and movement by desert Tortoises, *Gopherus agassizii*, in the Eastern Mojve Desert. Herpetological Monographs. 8: 60-71.

Odum, E.P. 1983. Basic ecology. USA: Sanders college publishing.

Pianka, E.R. 1983. Evolutionaly ecology 3rd ed. New York: Harper and Row.

Plummer, M.V., and Shirer, H.W. 1975. Movement Patterns in a river population of the Softshell Turtle, *Trionyx muticus*. Occasional papers of the Museum of Natural History. 43: 1-26.

Ponsena, P. 1988. Biological Characteristics and Breeding Behaviour of Green Peafowl in Huai Kha Khaeng Wildlife Sanctuary, Master's Thesis,Kasetsart University, Bangkok.

Porter, K.R. 1972. Herpetology. Philadelphia: W.B.Saunders.

Prayurasiddhi, T. 1992. Huai Kha Khaeng : The World Natural Heritage. Suwat Asavachaichan editor. Bangkok: Feature Magazine Press (in Thai).

Prichard, P.C.H. 1979. Encyclopedia of turtles. U.S.A: T.F.H. publication.

Rabinowitz, A. 1990. Research on the Carnivore Community in Dry Tropical Forest Mosaic in Huai Kha Khaeng Wildlife Sanctuary, Thailand, 1987-1990. New York: Wildlife Conservation International.

Ricklefs, R.F. 1973. Ecology. Oregon: Chiron Press.

Smith, M.A. 1931. The fauna of British India. Reptilia and Amphibia, Vol. 1. Loricata,Testudines. London.

Smith, R.L. 1974. Ecology & Field biology. 2nd ed. New York: Harper & Row.

Smith, R.L. 1992. Elements of Ecology. 3rd ed. New York: Harper Collins.

Stott, P. 1986. The spatial pattern of dry season fires in the savanna forests of Thailand. J. of Biogeography. 13: 345-358.

Taylor, E.H. 1970. The tortoises and crocodiles of Thailand and adjacent waters, with a synoptic herpetological bibliography. Univ. Kansas Sci.Bull. 49(3): 87-179.

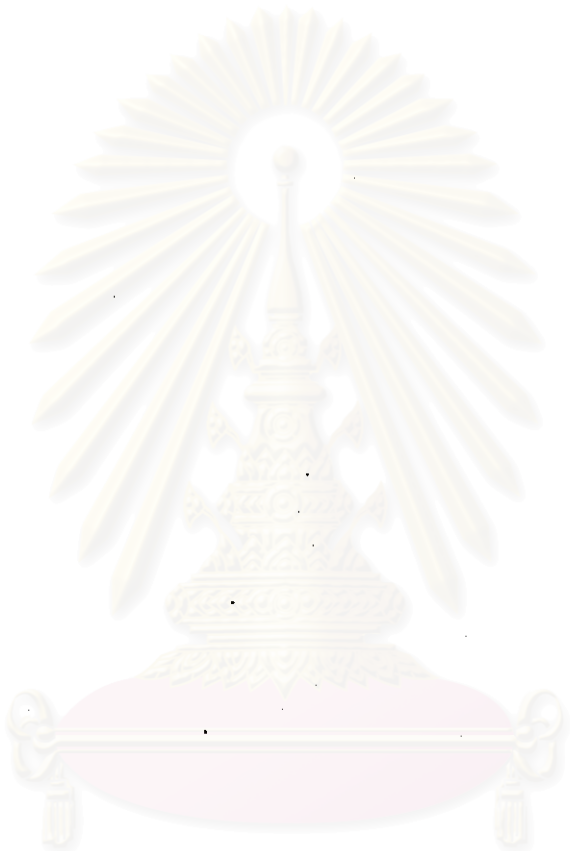
Thirakhupt, K., and Van Dijk, P.P. 1994. Species diversity and conservation of turtles of western Thailand. Natural history Bulletin of the Siam Society. 42: 207-257.

Thitathamakul, P. 1985. Vegetation change along the altitudinal gradient in Huay Kha Khaeng Wildlife Sanctuary. MS. Thesis, Univ.of Kasetsart, Bangkok.

Tsuji, A., Poonswad, P., and Jirawatkavi, N. 1987. Application of radio tracking to study ranging patterns of Hornbills (Bucerotidae) in Thailand. Faculty of Science, Mahidol University, Bangkok.

White, G.C., and Garrott, A.R. 1990. Analysis of Wildlife Radio-Tracking Data. San Diego: Academic press.

Zhao, Er-Mi., and Adler, K. 1993. Herpetology of China. U.S.A: Society for the Study of Amphibians and Reptiles.



Appendix

(Home Range Calculations)

```
                    Date:  4-10-2097  Time: 15:56:36
 ------------------------------------------------------------
|                                                            |
|                      PROGRAM HOME RANGE                    |
|                                                            |
|                        S/N 90060012                        |
|                                                            |
|                 Copyright (c) 1987, 1988, 1989, 1990.      |
|               Bruce B. Ackerman and Michael D. Samuel      |
|                                                            |
|                        February 1990                       |
|                                                            |
|          *** DIMENSIONED TO READ 1000 OBSERVATIONS ***     |
|            --- maximum grid size set at 72 by 32 ---       |
|                                                            |
 ------------------------------------------------------------

Name of input file is: A:Z14W.DAT
File containing HOME RANGE output   text is: A:Z14W.OUT
File containing HOME RANGE plotting data is: A:Z14W.PLT
File containing HOME RANGE harmonic grid is: A:Z14W.HAR
File containing animal locations to plot is: A:Z14W.MOV

TITLE IS YELLOW 14 WILD*** FEMALE WET*** 95-96

ENTER OPTIONS FOR CONTOURS, WEIGHTED BIVARIATE NORMAL HOME RANGE, CORE AREA,
     OUTLIER OBSERVATIONS, BIVARIATE NORMAL HOME RANGE, BIVARIATE NORMAL TEST,
     AND MINIMUM CONVEX POLYGON AREA

ANSWER WAS 2 1 1 1 1 1 1

     HARMONIC CALCULATIONS WILL BE SUPPRESSED

     WEIGHTED BIVARIATE NORMAL HOME RANGE WILL BE PLOTTED

     CORE AREAS WILL BE PLOTTED

     OUTLIERS WILL BE IDENTIFIED

     BIVARIATE NORMAL HOME RANGE WILL BE PLOTTED

     LOCATIONS WILL BE TESTED FOR BIVARIATE NORMALITY

     MINIMUM CONVEX POLYGON WILL BE ESTIMATED

     NUMBER OF GRID POINTS ON X AND Y AXIS ARE      -1     -1

     PLOT SIZE IS X =  24.00  Y =  10.00

ENTER UNITS, PLOT INCH SCALE, AND MINIMUM DISTANCE BETWEEN OBSERVATIONS
          1220.00 METERS      = 1 INCH ON PLOTTER OR
                1 METERS      =     .0008 INCHES ON PLOTTER

     MINIMUM MEASURED DISTANCE BETWEEN OBSERVATIONS =   100.0000  METERS

ENTER METHOD (ENTER, EVAL 1, EVAL 2)

METHOD IS ENTER
```

ENTER OFFSET AND CENTERING OPTION

X OFFSET IS .00 Y OFFSET IS .00 WITH AUTOMATIC CENTERING

ENTER NUMBER OF CONTOURS

CONTOUR LEVELS ARE TREATED AS PERCENTILES OF THE ANIMAL UTILIZATION DISTRIBUTI

THERE IS 1 CONTOUR WHICH IS
1.00

X AND Y COORDINATES AND IDS ARE READ IN WITH THE FOLLOWING
FORMAT (T1,F6.0,T8,F7.0,T16,A3,T20,F4.2)

THE DATA VALUES ARE

OBS	X COORD	Y COORD	ID	WEIGHTS
1	532633.00	1710506.00	XXX	1.0000
2	532608.00	1710319.00	XXX	1.0000
3	532663.00	1710289.00	XXX	1.0000
4	532849.00	1710381.00	XXX	1.0000
5	532794.00	1710078.00	XXX	1.0000
6	532795.00	1710077.00	XXX	1.0000
7	532816.00	1710130.00	XXX	1.0000

XMIN = 532608.00 YMIN = 1710077.00
XMAX = 532849.00 YMAX = 1710506.00

*** ANIMAL LOCATIONS HAVE BEEN SAVED TO FILE ***

ARITHMETIC CENTER OF OBSERVATIONS:

X = 532736.8571
Y = 1710254.2857

DISTANCE MOVED BETWEEN CONSECUTIVE OBSERVATIONS

OBS	X-COORD	Y-COORD	DISTANCE MOVED	ID
1	532633.00	1710506.00	.00	XXX
2	532608.00	1710319.00	188.66	XXX
3	532663.00	1710289.00	62.65	XXX
4	532849.00	1710381.00	207.51	XXX
5	532794.00	1710078.00	307.95	XXX
6	532795.00	1710077.00	1.41	XXX
7	532816.00	1710130.00	57.01	XXX
			825.20	

MEAN DISTANCE BETWEEN CONSECUTIVE LOCATIONS = 137.5328 METERS

MEAN DISTANCE FROM ARITHMETIC CENTER TO EACH LOCATION = 197.7584 METERS

SERIAL CORRELATIONS AND CROSS-CORRELATIONS

P(X,X-1)= .6276 P(Y,Y-1)= .5212 P(X,Y-1)= -.6453 P(Y,X-1)= -.9060

THREE INDICES OF AUTOCORRELATION:

T2 = 30110.8300 R2 = 36849.0500

T2/R2 = .8171 (SWIHART AND SLADE. 1985. ECOLOGY 66(4):1176-1184.)
PSI = 2.7001 (SWIHART AND SLADE. 1985. J. WILDL. MANAGE. 49(4):1019-1
GAMMA = .5744 (SWIHART AND SLADE. 1986. ECOLOGY 67(1):255-258.)

LAMBDA1 = 30831.2909 LAMBDA2 = 6018.0099
ECCENTRICITY = 2.2634

STANDARD DEVIATIONS OF T2/R2 UNDER DIFFERENT ASSUMPTIONS:

A. CONSECUTIVE OBSERVATIONS (SWIHART AND SLADE. 1985. ECOLOGY 66(4):1176-1

SDCU = .5808 (UNIFORM DISTRIBUTION - EQ. 5)
SDCN = .5816 (NORMAL DISTRIBUTION - EQ. 6)

B. NONCONSECUTIVE OBSERVATIONS (SWIHART AND SLADE. 1985. ECOLOGY 66(4):1176-

SDNU = .6483 (UNIFORM DISTRIBUTION - EQ. 7)
SDNN = .6329 (NORMAL DISTRIBUTION - EQ. 8)

C. TRAPPING GRID (SWIHART AND SLADE. 1987. AM. MIDL. NAT. 117(1):204-207.)

SDTG = .5723 (TRAPPING GRID)

THE GEOMETRIC CENTER IN UNCENTERED PLOT IS 0, 0

THE NEW XMIN VALUE IS 532608.0000
THE NEW YMIN VALUE IS 1710077.0000

NOTE: THE REMAINING COMPUTATIONS CONSIDER ALL LOCATIONS TO BE INDEPENDENT AND TO HAVE EQUAL IMPORTANCE. WEIGHTS ASSIGNED FOR HARMONIC MEAN CALCULATION DO NOT APPLY TO SUBSEQUENT ESTIMATES.

WEIGHTED BIVARIATE NORMAL HOME RANGE AREA

75%	=	90588.35
95%	=	196829.84
SQRT DET S	=	10601.16
XMEAN	=	532733.43
YMEAN	=	1710250.41
SXX/SYY	=	.3415
SXY	=	-8834.48

LIST OF WEIGHTED POINTS

ORDER	X-COORD	Y-COORD	WEIGHT	ID	OLD ORDER
4	532849.00	1710381.00	.79297	XXX	4

ASYMPTOTIC SE FOR 95% AREA = 88918.66
ASYMPTOTIC SE FOR 75% AREA = 40923.64

WEIGHTED BIVARIATE NORMAL HOME RANGE HAS BEEN PLOTTED

WEIGHTED BIVARIATE NORMALITY TEST FOR GOODNESS OF FIT TEST USES CRAMER-VON MISES STATISTIC

W SQUARED = .1865

CRITICAL VALUES:

ALPHA = .01	.300
ALPHA = .025	.245
ALPHA = .05	.214
ALPHA = .10	.171
ALPHA = .15	.150

BIVARIATE NORMAL HOME RANGE AREA

75% =	142243.66
95% =	307595.49
SQRT DET S =	16345.69
XMEAN =	532736.86
YMEAN =	1710254.29
SXX/SYY =	.3584
SXY =	-10610.54

ASYMPTOTIC SE FOR 95% AREA = 137560.90
ASYMPTOTIC SE FOR 75% AREA = 63613.30

BIVARIATE NORMAL HOME RANGE HAS BEEN PLOTTED

BIVARIATE NORMALITY TEST FOR GOODNESS OF FIT
TEST USES CRAMER-VON MISES STATISTIC

W SQUARED = .1791

CRITICAL VALUES:

ALPHA = .01	.329
ALPHA = .025	.267
ALPHA = .05	.219
ALPHA = .10	.173
ALPHA = .15	.146

THREE SEEDS FOR THE RANDOM NUMBER GENERATOR ARE:
SEED #1 = 17935, SEED #2 = 14626, SEED #3 = 11700

VALUE RETURNED BY THE RANDOM NUMBER FUNCTION IS .9211

BIVARIATE UNIFORM TEST FOR GOODNESS OF FIT
TEST USES CRAMER-VON MISES STATISTIC

W SQUARED = .2274

CRITICAL VALUES:

ALPHA = .01	.329
ALPHA = .025	.267
ALPHA = .05	.219
ALPHA = .10	.173
ALPHA = .15	.146

100% CONVEX POLYGON HOME RANGE

THERE ARE 7 POINTS DEFINING THE PERIMETER OF THIS HOME RANGE.

NO	INDEX	X	Y	ID	OLD ORDER
1	1	532633.00	1710506.00	XXX	1

2	4	532849.00	1710381.00	XXX	4
3	7	532816.00	1710130.00	XXX	7
4	6	532795.00	1710077.00	XXX	6
5	5	532794.00	1710078.00	XXX	5
6	2	532608.00	1710319.00	XXX	2
7	1	532633.00	1710506.00	XXX	1

NOTE: 1. POINTS ARE LISTED CLOCKWISE.
2. THIS POLYGON ENCLOSES 7 POINTS, I.E., NO OUTLIERS WERE EXCLUDED.
3. FIRST AND LAST POINTS ARE THE SAME TO CLOSE THE POLYGON.

THE AREA OF THIS 100% CONVEX POLYGON HOME RANGE IS:
ENCLOSED AREA = 58505.00 SQUARE METERS

TOTAL AREA WITHIN CONTOUR = 58505.00 SQUARE METERS

NOMINAL CONTOUR LEVEL IS: 100% ACTUAL PERCENT OF POINTS INCLUDED IS: 100.0%

Date: 4-10-2097 Time: 15:56:41

----------end of home range output----------

```
                    Date:  3-26-2097  Time: 15:13:16
 ------------------------------------------------------------
|                                                            |
|                      PROGRAM HOME RANGE                    |
|                                                            |
|                        S/N 90060012                        |
|                                                            |
|                    Copyright (c) 1987, 1988, 1989, 1990.   |
|                  Bruce B. Ackerman and Michael D. Samuel   |
|                                                            |
|                        February 1990                       |
|                                                            |
|                *** DIMENSIONED TO READ 1000 OBSERVATIONS ***|
|                  --- maximum grid size set at 72 by 32 --- |
|                                                            |
 ------------------------------------------------------------

Name of input file is: A:Z14D.DAT
File containing HOME RANGE output   text is: A:Z14D.OUT
File containing HOME RANGE plotting data is: A:Z14D.PLT
File containing HOME RANGE harmonic grid is: A:Z14D.HAR
File containing animal locations to plot is: A:Z14D.MOV

TITLE IS YELLOW 14 WILD*** FEMALE DRY*** 95-96

ENTER OPTIONS FOR CONTOURS, WEIGHTED BIVARIATE NORMAL HOME RANGE, CORE AREA,
     OUTLIER OBSERVATIONS, BIVARIATE NORMAL HOME RANGE, BIVARIATE NORMAL TEST,
     AND MINIMUM CONVEX POLYGON AREA

ANSWER WAS 1 1 1 1 1 1 1

     CONTOURS WILL BE PLOTTED

     WEIGHTED BIVARIATE NORMAL HOME RANGE WILL BE PLOTTED

     CORE AREAS WILL BE PLOTTED

     OUTLIERS WILL BE IDENTIFIED

     BIVARIATE NORMAL HOME RANGE WILL BE PLOTTED

     LOCATIONS WILL BE TESTED FOR BIVARIATE NORMALITY

     MINIMUM CONVEX POLYGON WILL BE ESTIMATED

     NUMBER OF GRID POINTS ON X AND Y AXIS ARE      -1      -1

     PLOT SIZE IS X =  24.00  Y =  10.00

ENTER UNITS, PLOT INCH SCALE, AND MINIMUM DISTANCE BETWEEN OBSERVATIONS
        1220.00 METERS       = 1 INCH ON PLOTTER OR

              1 METERS       =     .0008 INCHES ON PLOTTER

     MINIMUM MEASURED DISTANCE BETWEEN OBSERVATIONS =   100.0000  METERS

ENTER METHOD (ENTER, EVAL 1, EVAL 2)

METHOD IS ENTER
```

ENTER OFFSET AND CENTERING OPTION

X OFFSET IS .00 Y OFFSET IS .00 WITH AUTOMATIC CENTERING

ENTER NUMBER OF CONTOURS

CONTOUR LEVELS ARE TREATED AS PERCENTILES OF THE ANIMAL UTILIZATION DISTRIBUTI

THERE IS 1 CONTOUR WHICH IS
1.00

X AND Y COORDINATES AND IDS ARE READ IN WITH THE FOLLOWING
FORMAT (T1,F6.0,T8,F7.0,T16,A3,T20,F4.2)

THE DATA VALUES ARE

OBS	X COORD	Y COORD	ID	WEIGHTS
1	532814.00	1710325.00	XXX	1.0000
2	532745.00	1710301.00	XXX	1.0000
3	532682.00	1710334.00	XXX	1.0000
4	532724.00	1710266.00	XXX	1.0000
5	532720.00	1710272.00	XXX	1.0000
6	532674.00	1710263.00	XXX	1.0000
7	532689.00	1710399.00	XXX	1.0000
8	532700.00	1710395.00	XXX	1.0000
9	532818.00	1710267.00	XXX	1.0000
10	532815.00	1710275.00	XXX	1.0000
11	532815.00	1710265.00	XXX	1.0000
12	532895.00	1710199.00	XXX	1.0000
13	532621.00	1710169.00	XXX	1.0000
14	532636.00	1710152.00	XXX	1.0000

XMIN = 532621.00 YMIN = 1710152.00
XMAX = 532895.00 YMAX = 1710399.00

*** ANIMAL LOCATIONS HAVE BEEN SAVED TO FILE ***

PLOT GRID DENSITY AUTOMATICALLY CALCULATED

error H122
- grid density exceeds the maximum -> change SCALE
density set to maximum by default

NO. OF GRID POINTS ON THE X AXIS = 72
NO. OF GRID POINTS ON THE Y AXIS = 32

ARITHMETIC CENTER OF OBSERVATIONS:

X = 532739.1429
Y = 1710277.2857

DISTANCE MOVED BETWEEN CONSECUTIVE OBSERVATIONS

OBS	X-COORD	Y-COORD	DISTANCE MOVED	ID
1	532814.00	1710325.00	.00	XXX
2	532745.00	1710301.00	73.05	XXX
3	532682.00	1710334.00	71.12	XXX

4	532724.00	1710266.00	79.92	XXX
5	532720.00	1710272.00	7.21	XXX
6	532674.00	1710263.00	46.87	XXX
7	532689.00	1710399.00	136.82	XXX
8	532700.00	1710395.00	11.70	XXX
9	532818.00	1710267.00	174.09	XXX
10	532815.00	1710275.00	8.54	XXX
11	532815.00	1710265.00	10.00	XXX
12	532895.00	1710199.00	103.71	XXX
13	532621.00	1710169.00	275.64	XXX
14	532636.00	1710152.00	22.67	XXX
			1021.37	

MEAN DISTANCE BETWEEN CONSECUTIVE LOCATIONS = 78.5668 METERS

MEAN DISTANCE FROM ARITHMETIC CENTER TO EACH LOCATION = 98.7731 METERS

SERIAL CORRELATIONS AND CROSS-CORRELATIONS

P(X,X-1)= .2986 P(Y,Y-1)= .6272 P(X,Y-1)= .3467 P(Y,X-1)= -.2739

THREE INDICES OF AUTOCORRELATION:

T2 = 11970.5400 R2 = 11792.5100

T2/R2 = 1.0151 (SWIHART AND SLADE. 1985. ECOLOGY 66(4):1176-1184.)
PSI = 1.5464 (SWIHART AND SLADE. 1985. J. WILDL. MANAGE. 49(4):1019-102
GAMMA = .4629 (SWIHART AND SLADE. 1986. ECOLOGY 67(1):255-258.)

LAMBDA1 = 6541.7002 LAMBDA2 = 5275.5629
ECCENTRICITY = 1.1136

STANDARD DEVIATIONS OF T2/R2 UNDER DIFFERENT ASSUMPTIONS:

A. CONSECUTIVE OBSERVATIONS (SWIHART AND SLADE. 1985. ECOLOGY 66(4):1176-118

SDCU = .3630 (UNIFORM DISTRIBUTION - EQ. 5)
SDCN = .3650 (NORMAL DISTRIBUTION - EQ. 6)

B. NONCONSECUTIVE OBSERVATIONS (SWIHART AND SLADE. 1985. ECOLOGY 66(4):1176-1

SDNU = .3873 (UNIFORM DISTRIBUTION - EQ. 7)
SDNN = .3822 (NORMAL DISTRIBUTION - EQ. 8)

C. TRAPPING GRID (SWIHART AND SLADE. 1987. AM. MIDL. NAT. 117(1):204-207.)

SDTG = .3668 (TRAPPING GRID)

THE GEOMETRIC CENTER IN UNCENTERED PLOT IS 1, 1

THE NEW XMIN VALUE IS 517981.0000
THE NEW YMIN VALUE IS 1704052.0000

THE MINIMUM H VALUE IS 177.13 AT 37,16
Minimum X-coordinate of harmonic grid is: 517981.0000
Maximum X-coordinate of harmonic grid is: 546854.3000
Minimum Y-coordinate of harmonic grid is: 1704052.0000
Maximum Y-coordinate of harmonic grid is: 1716659.0000

*** GRID HARMONIC VALUES HAVE BEEN SAVED TO FILE ***

GRID POINT HARMONIC MEAN BY OBSERVATIONS

OBS	X-COORD	Y-COORD	H-MEAN	ID	OLD ORDER
1	532814.00	1710325.00	177.132	XXX	1
2	532745.00	1710301.00	177.132	XXX	2
3	532682.00	1710334.00	177.132	XXX	3
4	532724.00	1710266.00	177.132	XXX	4
5	532720.00	1710272.00	177.132	XXX	5
6	532674.00	1710263.00	177.132	XXX	6
7	532689.00	1710399.00	285.314	XXX	7
8	532700.00	1710395.00	285.314	XXX	8
9	532818.00	1710267.00	177.132	XXX	9
10	532815.00	1710275.00	177.132	XXX	10
11	532815.00	1710265.00	177.132	XXX	11
12	532895.00	1710199.00	300.866	XXX	12
13	532621.00	1710169.00	177.132	XXX	13
14	532636.00	1710152.00	177.132	XXX	14

SORTED HARMONIC MEANS

OBS	X-COORD	Y-COORD	H-MEAN	ID	OLD ORDER
1	532814.00	1710325.00	177.132	XXX	1
2	532745.00	1710301.00	177.132	XXX	2
3	532682.00	1710334.00	177.132	XXX	3
4	532724.00	1710266.00	177.132	XXX	4
5	532720.00	1710272.00	177.132	XXX	5
6	532674.00	1710263.00	177.132	XXX	6
7	532818.00	1710267.00	177.132	XXX	9
8	532815.00	1710275.00	177.132	XXX	10
9	532815.00	1710265.00	177.132	XXX	11
10	532621.00	1710169.00	177.132	XXX	13
11	532636.00	1710152.00	177.132	XXX	14
12	532689.00	1710399.00	285.314	XXX	7
13	532700.00	1710395.00	285.314	XXX	8
14	532895.00	1710199.00	300.866	XXX	12

NO OUTLIER POINTS DETECTED

ESTIMATED PERCENTILE CONTOUR LEVELS
1 382.601 1.000

177.132 ESTIMATED CORE AREA WITH 33.33 PERCENT OF AREA
AND 57.74 PERCENT OF UTILIZATION VOLUME

CONTOUR LEVEL = 1 H MEAN = 382.6007 PERCENT LEVEL 1.00
ENCLOSED AREA = 383078.42 SQUARE METERS

TOTAL AREA WITHIN CONTOUR = 383078.42 SQUARE METERS

CONTOUR LEVEL = 2 H MEAN = 177.1322 PERCENT LEVEL .58

NOTE: THE REMAINING COMPUTATIONS CONSIDER ALL LOCATIONS TO BE INDEPENDENT AND TO HAVE EQUAL IMPORTANCE. WEIGHTS ASSIGNED FOR HARMONIC MEAN CALCULATION DO NOT APPLY TO SUBSEQUENT ESTIMATES.

WEIGHTED BIVARIATE NORMAL HOME RANGE AREA

75%	=	40928.59
95%	=	88929.40
SQRT DET S	=	4789.70
XMEAN	=	532739.64
YMEAN	=	1710281.42
SXX/SYY	=	1.1844
SXY	=	-99.80

LIST OF WEIGHTED POINTS

ORDER	X-COORD	Y-COORD	WEIGHT	ID	OLD ORDER
10	532621.00	1710169.00	.83549	XXX	13
11	532636.00	1710152.00	.81459	XXX	14
14	532895.00	1710199.00	.79781	XXX	12

ASYMPTOTIC SE FOR 95% AREA = 25932.34
ASYMPTOTIC SE FOR 75% AREA = 11935.02

WEIGHTED BIVARIATE NORMAL HOME RANGE HAS BEEN PLOTTED

WEIGHTED BIVARIATE NORMALITY TEST FOR GOODNESS OF FIT
TEST USES CRAMER-VON MISES STATISTIC

W SQUARED = .1843

CRITICAL VALUES:

ALPHA = .01	.300
ALPHA = .025	.245
ALPHA = .05	.214
ALPHA = .10	.171
ALPHA = .15	.150

BIVARIATE NORMAL HOME RANGE AREA

75%	=	55270.24
95%	=	119519.40
SQRT DET S	=	6351.29
XMEAN	=	532739.14
YMEAN	=	1710277.43
SXX/SYY	=	1.2250
SXY	=	213.29

ASYMPTOTIC SE FOR 95% AREA = 34502.28
ASYMPTOTIC SE FOR 75% AREA = 15955.14

BIVARIATE NORMAL HOME RANGE HAS BEEN PLOTTED

BIVARIATE NORMALITY TEST FOR GOODNESS OF FIT
TEST USES CRAMER-VON MISES STATISTIC

W SQUARED = .1579

CRITICAL VALUES:

ALPHA = .01	.333
ALPHA = .025	.270
ALPHA = .05	.221

ALPHA = .10 .175
ALPHA = .15 .147

THREE SEEDS FOR THE RANDOM NUMBER GENERATOR ARE:
SEED #1 = 10598, SEED #2 = 13313, SEED #3 = 11101

VALUE RETURNED BY THE RANDOM NUMBER FUNCTION IS .6620

BIVARIATE UNIFORM TEST FOR GOODNESS OF FIT
TEST USES CRAMER-VON MISES STATISTIC

W SQUARED = .1308

CRITICAL VALUES:

ALPHA = .01 .333
ALPHA = .025 .270
ALPHA = .05 .221
ALPHA = .10 .175
ALPHA = .15 .147

100% CONVEX POLYGON HOME RANGE

THERE ARE 7 POINTS DEFINING THE PERIMETER OF THIS HOME RANGE.

NO	INDEX	X	Y	ID	OLD ORDER
1	12	532689.00	1710399.00	XXX	7
2	13	532700.00	1710395.00	XXX	8
3	1	532814.00	1710325.00	XXX	1
4	14	532895.00	1710199.00	XXX	12
5	11	532636.00	1710152.00	XXX	14
6	10	532621.00	1710169.00	XXX	13
7	12	532689.00	1710399.00	XXX	7

NOTE: 1. POINTS ARE LISTED CLOCKWISE.
2. THIS POLYGON ENCLOSES 14 POINTS, I.E., NO OUTLIERS WERE EXCLUDED.
3. FIRST AND LAST POINTS ARE THE SAME TO CLOSE THE POLYGON.

THE AREA OF THIS 100% CONVEX POLYGON HOME RANGE IS:
ENCLOSED AREA = 38079.00 SQUARE METERS

TOTAL AREA WITHIN CONTOUR = 38079.00 SQUARE METERS

NOMINAL CONTOUR LEVEL IS: 100% ACTUAL PERCENT OF POINTS INCLUDED IS: 100.0%

Date: 3-26-2097 Time: 15:13:35

----------end of home range output----------

```
                    Date:  3-26-2097  Time: 13:01:05
 ---------------------------------------------------------
|                                                         |
|                    PROGRAM HOME RANGE                   |
|                                                         |
|                       S/N 90060012                      |
|                                                         |
|          Copyright (c) 1987, 1988, 1989, 1990.          |
|        Bruce B. Ackerman and Michael D. Samuel          |
|                                                         |
|                      February 1990                      |
|                                                         |
|     *** DIMENSIONED TO READ 1000 OBSERVATIONS ***       |
|       --- maximum grid size set at 72 by 32 ---         |
|                                                         |
 ---------------------------------------------------------

Name of input file is: A:Z14.DAT
File containing HOME RANGE output   text is: A:Z14.OUT
File containing HOME RANGE plotting data is: A:Z14.PLT
File containing HOME RANGE harmonic grid is: A:Z14.HAR
File containing animal locations to plot is: A:Z14.MOV

TITLE IS YELLOW 14 WILD*** FEMALE YEAR** 95-96

ENTER OPTIONS FOR CONTOURS, WEIGHTED BIVARIATE NORMAL HOME RANGE, CORE AREA,
     OUTLIER OBSERVATIONS, BIVARIATE NORMAL HOME RANGE, BIVARIATE NORMAL TEST
     AND MINIMUM CONVEX POLYGON AREA

ANSWER WAS 1 1 1 1 1 1 1

     CONTOURS WILL BE PLOTTED

     WEIGHTED BIVARIATE NORMAL HOME RANGE WILL BE PLOTTED

     CORE AREAS WILL BE PLOTTED

     OUTLIERS WILL BE IDENTIFIED

     BIVARIATE NORMAL HOME RANGE WILL BE PLOTTED

     LOCATIONS WILL BE TESTED FOR BIVARIATE NORMALITY

     MINIMUM CONVEX POLYGON WILL BE ESTIMATED

     NUMBER OF GRID POINTS ON X AND Y AXIS ARE      -1      -1

     PLOT SIZE IS X =  24.00  Y =  10.00

ENTER UNITS, PLOT INCH SCALE, AND MINIMUM DISTANCE BETWEEN OBSERVATIONS

          1220.00 METERS      = 1 INCH ON PLOTTER OR

                1 METERS      =     .0008 INCHES ON PLOTTER

     MINIMUM MEASURED DISTANCE BETWEEN OBSERVATIONS =   100.0000  METERS

ENTER METHOD (ENTER, EVAL 1, EVAL 2)

METHOD IS ENTER
```

ENTER OFFSET AND CENTERING OPTION

X OFFSET IS .00 Y OFFSET IS .00 WITH AUTOMATIC CENTERING

ENTER NUMBER OF CONTOURS

CONTOUR LEVELS ARE TREATED AS PERCENTILES OF THE ANIMAL UTILIZATION DISTRIBUT

THERE IS 1 CONTOUR WHICH IS
1.00

X AND Y COORDINATES AND IDS ARE READ IN WITH THE FOLLOWING
FORMAT (T1,F6.0,T8,F7.0,T16,A3,T20,F4.2)

THE DATA VALUES ARE

OBS	X COORD	Y COORD	ID	WEIGHTS
1	532633.00	1710506.00	XXX	1.0000
2	532608.00	1710319.00	XXX	1.0000
3	532663.00	1710289.00	XXX	1.0000
4	532849.00	1710381.00	XXX	1.0000
5	532794.00	1710078.00	XXX	1.0000
6	532795.00	1710077.00	XXX	1.0000
7	532816.00	1710130.00	XXX	1.0000
8	532814.00	1710325.00	XXX	1.0000
9	532745.00	1710301.00	XXX	1.0000
10	532682.00	1710334.00	XXX	1.0000
11	532724.00	1710266.00	XXX	1.0000
12	532720.00	1710272.00	XXX	1.0000
13	532674.00	1710263.00	XXX	1.0000
14	532689.00	1710399.00	XXX	1.0000
15	532700.00	1710395.00	XXX	1.0000
16	532818.00	1710267.00	XXX	1.0000
17	532815.00	1710275.00	XXX	1.0000
18	532815.00	1710265.00	XXX	1.0000
19	532895.00	1710199.00	XXX	1.0000
20	532621.00	1710169.00	XXX	1.0000
21	532636.00	1710152.00	XXX	1.0000
22	532599.00	1710174.00	XXX	1.0000
23	532764.00	1710243.00	XXX	1.0000
24	532853.00	1710079.00	XXX	1.0000

XMIN = 532599.00 YMIN = 1710077.00
XMAX = 532895.00 YMAX = 1710506.00

*** ANIMAL LOCATIONS HAVE BEEN SAVED TO FILE ***

PLOT GRID DENSITY AUTOMATICALLY CALCULATED

error H122
- grid density exceeds the maximum -> change SCALE
density set to maximum by default

NO. OF GRID POINTS ON THE X AXIS = 72
NO. OF GRID POINTS ON THE Y AXIS = 32

ARITHMETIC CENTER OF OBSERVATIONS:

X = 532738.4167

Y = 1710256.5833

DISTANCE MOVED BETWEEN CONSECUTIVE OBSERVATIONS

OBS	X-COORD	Y-COORD	DISTANCE MOVED	ID
1	532633.00	1710506.00	.00	XXX
2	532608.00	1710319.00	188.66	XXX
3	532663.00	1710289.00	62.65	XXX
4	532849.00	1710381.00	207.51	XXX
5	532794.00	1710078.00	307.95	XXX
6	532795.00	1710077.00	1.41	XXX
7	532816.00	1710130.00	57.01	XXX
8	532814.00	1710325.00	195.01	XXX
9	532745.00	1710301.00	73.05	XXX
10	532682.00	1710334.00	71.12	XXX
11	532724.00	1710266.00	79.92	XXX
12	532720.00	1710272.00	7.21	XXX
13	532674.00	1710263.00	46.87	XXX
14	532689.00	1710399.00	136.82	XXX
15	532700.00	1710395.00	11.70	XXX
16	532818.00	1710267.00	174.09	XXX
17	532815.00	1710275.00	8.54	XXX
18	532815.00	1710265.00	10.00	XXX
19	532895.00	1710199.00	103.71	XXX
20	532621.00	1710169.00	275.64	XXX
21	532636.00	1710152.00	22.67	XXX
22	532599.00	1710174.00	43.05	XXX
23	532764.00	1710243.00	178.85	XXX
24	532853.00	1710079.00	186.59	XXX
			2450.06	

MEAN DISTANCE BETWEEN CONSECUTIVE LOCATIONS = 106.5244 METERS

MEAN DISTANCE FROM ARITHMETIC CENTER TO EACH LOCATION = 127.3403 METERS

SERIAL CORRELATIONS AND CROSS-CORRELATIONS

P(X,X-1)= .4345 P(Y,Y-1)= .4552 P(X,Y-1)= -.1505 P(Y,X-1)= -.3476

THREE INDICES OF AUTOCORRELATION:

T2 = 19259.4400 R2 = 19661.7200

T2/R2 = .9795 (SWIHART AND SLADE. 1985. ECOLOGY 66(4):1176-1184.)
PSI = 1.3877 (SWIHART AND SLADE. 1985. J. WILDL. MANAGE. 49(4):1019-1
GAMMA = .4449 (SWIHART AND SLADE. 1986. ECOLOGY 67(1):255-258.)

LAMBDA1 = 13242.3612 LAMBDA2 = 6450.1742
ECCENTRICITY = 1.4328

STANDARD DEVIATIONS OF T2/R2 UNDER DIFFERENT ASSUMPTIONS:

A. CONSECUTIVE OBSERVATIONS (SWIHART AND SLADE. 1985. ECOLOGY 66(4):1176-11

SDCU = .2957 (UNIFORM DISTRIBUTION - EQ. 5)
SDCN = .2960 (NORMAL DISTRIBUTION - EQ. 6)

B. NONCONSECUTIVE OBSERVATIONS (SWIHART AND SLADE. 1985. ECOLOGY 66(4):1176-

SDNU = .3078 (UNIFORM DISTRIBUTION - EQ. 7)
SDNN = .3051 (NORMAL DISTRIBUTION - EQ. 8)

C. TRAPPING GRID (SWIHART AND SLADE. 1987. AM. MIDL. NAT. 117(1):204-207.)

SDTG = .3004 (TRAPPING GRID)

THE GEOMETRIC CENTER IN UNCENTERED PLOT IS 1, 1

THE NEW XMIN VALUE IS 517959.0000
THE NEW YMIN VALUE IS 1703977.0000

THE MINIMUM H VALUE IS 223.87 AT 37,16
Minimum X-coordinate of harmonic grid is: 517959.0000
Maximum X-coordinate of harmonic grid is: 546832.3000
Minimum Y-coordinate of harmonic grid is: 1703977.0000
Maximum Y-coordinate of harmonic grid is: 1716584.0000

*** GRID HARMONIC VALUES HAVE BEEN SAVED TO FILE ***

GRID POINT HARMONIC MEAN BY OBSERVATIONS

OBS	X-COORD	Y-COORD	H-MEAN	ID	OLD ORDER
1	532633.00	1710506.00	247.717	XXX	1
2	532608.00	1710319.00	247.717	XXX	2
3	532663.00	1710289.00	247.717	XXX	3
4	532849.00	1710381.00	333.605	XXX	4
5	532794.00	1710078.00	223.868	XXX	5
6	532795.00	1710077.00	223.868	XXX	6
7	532816.00	1710130.00	272.357	XXX	7
8	532814.00	1710325.00	333.605	XXX	8
9	532745.00	1710301.00	247.717	XXX	9
10	532682.00	1710334.00	247.717	XXX	10
11	532724.00	1710266.00	223.868	XXX	11
12	532720.00	1710272.00	223.868	XXX	12
13	532674.00	1710263.00	223.868	XXX	13
14	532689.00	1710399.00	247.717	XXX	14
15	532700.00	1710395.00	247.717	XXX	15
16	532818.00	1710267.00	272.357	XXX	16
17	532815.00	1710275.00	272.357	XXX	17
18	532815.00	1710265.00	272.357	XXX	18
19	532895.00	1710199.00	272.357	XXX	19
20	532621.00	1710169.00	223.868	XXX	20
21	532636.00	1710152.00	223.868	XXX	21
22	532599.00	1710174.00	223.868	XXX	22
23	532764.00	1710243.00	223.868	XXX	23
24	532853.00	1710079.00	272.357	XXX	24

SORTED HARMONIC MEANS

OBS	X-COORD	Y-COORD	H-MEAN	ID	OLD ORDER
1	532794.00	1710078.00	223.868	XXX	5
2	532795.00	1710077.00	223.868	XXX	6
3	532724.00	1710266.00	223.868	XXX	11
4	532720.00	1710272.00	223.868	XXX	12
5	532674.00	1710263.00	223.868	XXX	13
6	532621.00	1710169.00	223.868	XXX	20
7	532636.00	1710152.00	223.868	XXX	21

8	532599.00	1710174.00	223.868	XXX	22
9	532764.00	1710243.00	223.868	XXX	23
10	532633.00	1710506.00	247.717	XXX	1
11	532608.00	1710319.00	247.717	XXX	2
12	532663.00	1710289.00	247.717	XXX	3
13	532745.00	1710301.00	247.717	XXX	9
14	532682.00	1710334.00	247.717	XXX	10
15	532689.00	1710399.00	247.717	XXX	14
16	532700.00	1710395.00	247.717	XXX	15
17	532816.00	1710130.00	272.357	XXX	7
18	532818.00	1710267.00	272.357	XXX	16
19	532815.00	1710275.00	272.357	XXX	17
20	532815.00	1710265.00	272.357	XXX	18
21	532895.00	1710199.00	272.357	XXX	19
22	532853.00	1710079.00	272.357	XXX	24
23	532849.00	1710381.00	333.605	XXX	4
24	532814.00	1710325.00	333.605	XXX	8

NO OUTLIER POINTS DETECTED

ESTIMATED PERCENTILE CONTOUR LEVELS
1 286.988 1.000

warning H132
- no significant core area present

CONTOUR LEVEL = 1 H MEAN = 286.9885 PERCENT LEVEL .00
ENCLOSED AREA = 177352.93 SQUARE METERS

TOTAL AREA WITHIN CONTOUR = 177352.93 SQUARE METERS

NOTE: THE REMAINING COMPUTATIONS CONSIDER ALL LOCATIONS TO BE INDEPENDENT AND TO HAVE EQUAL IMPORTANCE. WEIGHTS ASSIGNED FOR HARMONIC MEAN CALCULATION DO NOT APPLY TO SUBSEQUENT ESTIMATES.

WEIGHTED BIVARIATE NORMAL HOME RANGE AREA

75%	=	72490.50
95%	=	157506.93
SQRT DET S	=	8483.25
XMEAN	=	532739.47
YMEAN	=	1710254.21
SXX/SYY	=	.6768
SXY	=	-2177.14

LIST OF WEIGHTED POINTS

ORDER	X-COORD	Y-COORD	WEIGHT	ID	OLD ORDER
8	532599.00	1710174.00	.95653	XXX	22
10	532633.00	1710506.00	.77846	XXX	1
23	532849.00	1710381.00	.95826	XXX	4

ASYMPTOTIC SE FOR 95% AREA = 33921.52
ASYMPTOTIC SE FOR 75% AREA = 15611.93

WEIGHTED BIVARIATE NORMAL HOME RANGE HAS BEEN PLOTTED

```
     WEIGHTED BIVARIATE NORMALITY TEST FOR GOODNESS OF FIT
     TEST USES CRAMER-VON MISES STATISTIC

     W SQUARED =       .2284

     CRITICAL VALUES:

     ALPHA = .01       .300
     ALPHA = .025      .245
     ALPHA = .05       .214
     ALPHA = .10       .171
     ALPHA = .15       .150

BIVARIATE NORMAL HOME RANGE AREA

     75%          =      83984.06
     95%          =     181611.74
     SQRT DET S   =       9650.89
     XMEAN        =     532738.42
     YMEAN        =    1710256.50
     SXX/SYY      =         .6371
     SXY          =      -2701.81

     ASYMPTOTIC SE FOR 95% AREA =     38719.75
     ASYMPTOTIC SE FOR 75% AREA =     17905.46

BIVARIATE NORMAL HOME RANGE HAS BEEN PLOTTED


     BIVARIATE NORMALITY TEST FOR GOODNESS OF FIT
     TEST USES CRAMER-VON MISES STATISTIC

     W SQUARED =       .1725

     CRITICAL VALUES:

     ALPHA = .01       .335
     ALPHA = .025      .271
     ALPHA = .05       .223
     ALPHA = .10       .176
     ALPHA = .15       .148

THREE SEEDS FOR THE RANDOM NUMBER GENERATOR ARE:
     SEED #1 = 15490, SEED #2 = 19125, SEED #3 = 24301

VALUE RETURNED BY THE RANDOM NUMBER FUNCTION IS  .2865

     BIVARIATE UNIFORM TEST FOR GOODNESS OF FIT
     TEST USES CRAMER-VON MISES STATISTIC

     W SQUARED =       .1968

     CRITICAL VALUES:

     ALPHA = .01       .335
     ALPHA = .025      .271
     ALPHA = .05       .223
     ALPHA = .10       .176
     ALPHA = .15       .148

100% CONVEX POLYGON HOME RANGE
```

THERE ARE 9 POINTS DEFINING THE PERIMETER OF THIS HOME RANGE.

NO	INDEX	X	Y	ID	OLD ORDER
1	10	532633.00	1710506.00	XXX	1
2	23	532849.00	1710381.00	XXX	4
3	21	532895.00	1710199.00	XXX	19
4	22	532853.00	1710079.00	XXX	24
5	2	532795.00	1710077.00	XXX	6
6	7	532636.00	1710152.00	XXX	21
7	8	532599.00	1710174.00	XXX	22
8	11	532608.00	1710319.00	XXX	2
9	10	532633.00	1710506.00	XXX	1

NOTE: 1. POINTS ARE LISTED CLOCKWISE.
2. THIS POLYGON ENCLOSES 24 POINTS, I.E., NO OUTLIERS WERE EXCLUDED.
3. FIRST AND LAST POINTS ARE THE SAME TO CLOSE THE POLYGON.

THE AREA OF THIS 100% CONVEX POLYGON HOME RANGE IS:
ENCLOSED AREA = 87068.50 SQUARE METERS

TOTAL AREA WITHIN CONTOUR = 87068.50 SQUARE METERS

NOMINAL CONTOUR LEVEL IS: 100% ACTUAL PERCENT OF POINTS INCLUDED IS: 100.0%

Date: 3-26-2097 Time: 13:01:23

----------end of home range output----------

Biography

Mr. Kampanat Tharapoom was born in Bangkok on May 14, 1971. He graduated with the degree of Bachelor of Science (Agriculture) from the King Mongkut Institute of Technology Ladkrabang, in 1992. In 1993, he enrolled in the Graduate School of Chulalongkorn, Department of Biology, Faculty of Science. At present, he lectures at the Department of Biology, Faculty of Science, Silpakorn University.