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Camp Version I

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DESERT BIOME

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MODELS

CAMP

VERSION I

MODELLING REPORT SERIES NUMBER 9

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DESERT BIOME
UTAH STATE UNIVERSITY
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I N T R O D U C T I O N

Reports in this series are intended for internal use by Desert Biome collaborators. They are not to be quoted or referred to in formal publications. These reports have been produced by the Desert Biome Modelling Group, with the assistance of participants in the Desert Biome and other researchers.

The main function of the models, at this stage of their development, is to provide guidance in the research efforts of the Biome. Therefore, it will be noted that most of the information which they contain is fragmentary evidence, best available estimates, arbitrary assumptions or non-Biome supported research. The collection and incorporation of more accurate data will come after these models have been prepared in this form. Validation of the models will also come later.

Any use of the models must recognize the limitations imposed by their development at this early stage of research.

(1) Biological interpretations must be performed with extreme caution. Output, for example, should be viewed in relation to system behavior (stability, general time relationships, relative magnitude of the variables, general responses to parameter modifications, etc.). These properties should be related to the processes incorporated in the model structure. No particular significance should be attached to the specific numbers given as output.

(2) Data included in these models must not be used without explicit approval of the investigators who have supplied them to us. Please contact the Desert Biome Central Office for details.

(3) The material contained in the models does not constitute publication. It is subject to revision. The modeling group requests that this material not be cited without their expressed permission.

As particular models are revised we will be re-issuing them in new versions. The versions will be numbered according to the general scheme:

Version 1. Models which have been developed by the modeling group in isolation from subject area specialists who have provided the question which has been modeled.

Version 2. Models revised to incorporate subject-areas specialist's criticisms.

Version 3. Models revised to incorporate finds of biome-sponsored research.

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                /*      WE'RE TENTING TONIGHT ON THE OLD CAMPGROUNDS                */ C000001
1               CAMP: PROC OPTIONS (MAIN);                                           CA000100
2               DCL INTPOL ENTRY (FLOAT DEC,(*) FLOAT DEC,(*) FLOAT DEC)
                           RETURNS (FLOAT DEC);
                /*                                                                  */
                /***********************************************************************/
                /*                                                                  */
                /*      CAMP IS A MODEL WRITTEN IN RESPONSE TO QUESTION BL2604,     */ C000101
                /* "WHAT IS THE EFFECT OF HUMAN CAMP OCCUPANCY ON THE ECOLOGY OF THE */ C000102
                /* AREA?" THE SITE HAS BEEN CONSIDERED AS A TERRESTRIAL CAMPGROUND  */ C000103
                /* IN A DESERT OF THE SOUTHWESTERN UNITED STATES. THE EFFECTS       */ C000104
                /* CONSIDERED ARE TRAMPLING OF VEGETATION AND SOIL AND THE INCREASED */ C000105
                /* EROSION THEREFROM, BURNING OF DEAD WOOD IN CAMPFIRES, GARBAGE    */ C000106
                /* AND TRASH DEPOSITION AND ITS ATTRACTIVE EFFECT ON ANIMALS, AND   */ C000107
                /* "VANDALISM" SUCH AS EXCESS LITTERING, SHOOTING ANIMALS, AND      */ C000108
                /* KILLING LARGE PLANTS.                                            */ C000109
                /*                                                                  */
                /***********************************************************************/
                /*                                                                  */
                /*                                                                  */
                /***********************************************************************/
                /*                                                                  */
                /*      SET UP AXES FOR INTERPOLATION GRAPHS (SEE FIGURES AT END OF */ C000120
                /* PROGRAM).                                                        */ C000121
                /*                                                                  */
                /***********************************************************************/
                /*                                                                  */
3                   DCL X1(6) INIT(  0,  2,  4,  6,  8, 10),                        CA000200
                        Y1(6) INIT(  1,.85,.70,.50,.25,  0),                        CA000300
                        X2(6) INIT(  0,.01,.02,.03,.05,1.0),                        CA000400
                        Y2(6) INIT( .5, .6, .8,.96,.98,1.0),                        CA000500
                        X3(6) INIT(  0,.05, .1, .2, .5,2.0),                        CA000510
                        Y3(6) INIT( .6, .7, .9,1.0,1.0, .3),                        CA000511
                        X4(6) INIT(  0,  1,  2,  3,  4,  5),                        CA000512
                        Y4(6) INIT(  0, .1, .4,1.1,1.5,  2),                        CA000513
                        Y5(6) INIT(  1,1.1,1.2,1.5,  2,  4),                        CA000514
                        X6(2) INIT(  0,  5),                                        CA000515
                        Y6(2) INIT(  1,  2),                                        CA000516
                        Y7(6) INIT(  0,.01,.04,.09,.16,.25),                        CA000517
                        Y8(6) INIT( .5, .6, .8,  1,1.5,  2),                        CA000518
                        Y9(6) INIT(  0,  2,  3,  2,-.1,-.3),                        CA000519
                        YA(2) INIT(  0, -3),                                        CA000520
                        YB(2) INIT( .1, 5),                                         CA000521
                        YC(2) INIT(  0, -2),                                        CA000522
                        YD(2) INIT(1.00,.90),                                       CA000523
                        YE(2) INIT(  1,.01),                                        CA000524
                        YF(2) INIT(  1,  4),                                        CA000525
                        YG(2) INIT(  1,.25),                                        CA000526
```

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/*                                                                    */
/**********************************************************************/
/*                                                                    */
/*      THE TOTAL AREA AFFECTED BY THE CAMPGROUND IS DIVIDED INTO     */ C000590
/* SUB-AREAS OF MORE OR LESS HOMOGENEOUS USE. THESE MAY BE DEFINED    */ C000591
/* IN ANY MANNER AS LONG AS AREA(1) IS THE PRIME CAMPSITE AND THE     */ C000592
/* OTHERS ARE ARRANGED IN DESCENDING ORDER OF PROXIMITY TO THE MAIN   */ C000593
/* CAMPGROUNDS. FOUR AREAS WHICH ARE VISUALIZED AS A CAMPGROUND       */ C000594
/* A TRAIL, A SAGUARO STAND, AND THE REMAINING AREA SURROUNDING THE   */ C000595
/* CAMPGROUND HAVE BEEN USED.                                         */ C000596
/*                                                                    */
/**********************************************************************/
/*                                                                    */
      #_AREAS FIXED DEC(2) INIT (4),                                  CA000600
/*                                                                    */
/**********************************************************************/
/*                                                                    */
/*      THE FOLLOWING DECLARATIONS, INITIALIZATIONS, AND ASSIGNMENTS  */ C000690
/* ARE RELATIVELY SELF-EXPLANATORY. ANY SUBSCRIPTED VALUE WITH A 4    */ C000691
/* AS THE SUBSCRIPT IS A QUANTITY HELD SEPARATE FOR EACH OF THE AREAS */ C000692
/* WITHIN EACH AREA ALL QUANTITIES ARE PER SQUARE METER AND SIZE OF   */ C000693
/* AREAS IS GIVEN IN SQUARE METERS. TIME IS IN MAN-HOURS.             */ C000694
/*                                                                    */
/**********************************************************************/
/*                                                                    */
      ATTRACTIVE_ANIMALS_IN_AREA (4) INIT (.1,.1,.3,.1),              CA000700
      BASIC_ATTRACTIVENESS(4) INIT (10,2,3,1),                        CA000800
      EROSION_IN_AREA(4) INIT((4) .01),                               CA000850
      FIGURES_WANTED BIT(1) INIT ('0'B),                              CA000860
      FIREWOOD_GATHERED_IN_AREA(4),                                   CA000890
      FIREWOOD_GATHERING_IN_AREA(4),                                  CA000900
      FIREWOOD_IN_AREA(4) INIT (.001,.001,.03,.001),                  CA001000
      GARBAGE_IN_AREA(4) INIT ((4) 0),                                CA001100
      GRASS_IN_AREA (4) INIT ((4) .1),                                CA001300
/*                                                                    */
/**********************************************************************/
/*                                                                    */
/*      MAX_PART_OF_TIME_FOR_WOOD IS THAT PROPORTION OF THE TOTAL     */ C001400
/* MAN-HOURS OF CAMPING THAT AN AVERAGE PARTY WOULD BE WILLING TO     */ C001401
/* SPEND SEARCHING FOR FIREWOOD.                                      */ C001402
/*                                                                    */
/**********************************************************************/
/*                                                                    */
      MAX_PART_OF_TIME_FOR_WOOD FLOAT DEC INIT (.06),                 CA001550
      MONTHLY_USE_PATTERN (12) FLOAT DEC                              CA001700
           INIT ((2) .2,(3) 1,(3) .4,(3) 1,.2),                       CA001701
      PESTS FLOAT DEC,                                                CA001799
      PESTS_IN_AREA (4) INIT ((4) .01),                               CA001800
      POTENTIAL_MONTHLY_MAN_HOURS (12),                               CA001900
      RELATIVE_EASE_IN_WOOD_GATHERING(4),                             CA001980
      RELATIVE_USE_PER_AREA(4),                                       CA002000
      SIZE_OF_AREA (4) INIT (5000,1000,1000,10000),                   CA002100
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                /*                                                                    */
                /**********************************************************************/
                /*                                                                    */
                /*      TIME_PER_FIREWOOD_UNIT_IN_AREA IS THE TIME NECESSARY TO       */ C002140
                /* GATHER A UNIT OF FIREWOOD FROM A SQUARE METER OF AREA WHEN         */ C002141
                /* FIREWOOD IS AVAILABLE AT ONE UNIT PER SQUARE METER.                */ C002142
                /*                                                                    */
                /**********************************************************************/
                /*                                                                    */
                      TIME_PER_FIREWOOD_UNIT_IN_AREA(4) INIT (.01,.015,.1,.1),        CA002150
                      TRASH_IN_AREA(4) INIT ((4) 0),                                  CA002180
                      USE_PER_UNIT_AREA(4) INIT ((4) 0),                              CA002250
                      VANDALISM(4) INIT ((4) 0),                                      CA002270
                      WOODY_VEGETATION_IN_AREA(4) INIT (.01,.01,.3,.01),              CA002300
                      YEAR FIXED BIN;                                                 CA002400
                /*                                                                    */
                /**********************************************************************/
                /*                                                                    */
                /*      EATING RATE IS THE NUMBER OF UNITS OF GARBAGE EATEN BY AN     */ C002540
                /* ANIMAL UNIT IN A MONTH.                                            */ C002541
                /*                                                                    */
                /**********************************************************************/
                /*                                                                    */
   4              EATING_RATE = 1 ;                                                   CA002550
   5              FIREWOOD_PER_MAN_HOUR = .0001;                                      CA002600
   6              FIREWOOD_FACTOR = 1 ;                                               CA002601
   7              WOODY_DEATH_RATE = .001;                                            CA002610
   8              YEARS_PER_RUN = 5;                                                  CA002800
   9              EROSION = .01;                                                      CA002900
  10              PERSONS_PER_PARTY = 3;                                              CA003000
  11              #_CAMPSITES = 5;                                                    CA003100
                /*                                                                    */
                /**********************************************************************/
                /*                                                                    */
                /*      THIS STATEMENT ALLOWS MODIFICATION OF ANY OF THE ABOVE        */ C003190
                /* VALUES FOR A SINGLE RUN. IF NO CHANGES ARE DESIRED ENTER A BLANK   */ C003191
                /* AND A SEMICOLON ON THE DATA CARD.                                  */ C003192
                /*      IF GRAPHS OF THE FUNCTIONS USED IN INTPOL ARE DESIRED THEN    */ C003193
                /* ENTER FIGURES_WANTED = '1'B ON THE DATA CARD.                      */ C003194
                /*                                                                    */
                /**********************************************************************/
                /*                                                                    */
  12              DATA2: GET DATA COPY;                                               CA003200
```

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13                    IF FIGURES_WANTED THEN DO ;                                CA003250
15                         CALL PUT_CURVE('FIG. 1  CHANGE IN ATTRACTIVENESS WITH'||  CA003251
                               ' TRASH, GARBAGE,AND PESTS',X1,Y1);                 CA003252
16                         CALL PUT_CURVE('FIG. 2  CHANGE IN ATTRACTIVENESS WITH'||  CA003253
17                             ' WOODY VEGETATION',X2,Y2); PUT PAGE;               CA003254
18                         CALL PUT_CURVE('FIG. 3  CHANGE IN ATTRACTIVENESS WITH'||  CA003255
                               ' ATTRACTIVE ANIMALS',X3,Y3);                       CA003256
19                         CALL PUT_CURVE('FIG. 4  CHANGE IN VANDALISM WITH USE',   CA003257
20                             X4,Y4); PUT PAGE;                                   CA003258
21                         CALL PUT_CURVE('FIG. 5  CHANGE IN VANDALISM AND TRASH'||  CA003259
                               ' AND GARBAGE DEPOSITION WITH TRASH',X1,Y5);        CA003260
22                         CALL PUT_CURVE('FIG. 6  CHANGE IN VANDALISM WITH PESTS', CA003261
23                             X2,Y8); PUT PAGE;                                   CA003262
24                         CALL PUT_CURVE('FIG. 7  CHANGE IN TRASH AND GARBAGE '||  CA003263
                               'DEPOSITION WITH USE',X4,Y7);                       CA003264
25                         CALL PUT_CURVE('FIG. 8  CHANGE IN TRASH AND GARBAGE '||  CA003265
26                             'DEPOSITION WITH VANDALISM',X6,Y6); PUT PAGE;       CA003266
27                         CALL PUT_CURVE('FIG. 9  CHANGE IN ATTRACTIVE ANIMALS'||  CA003267
                               ' WITH GARBAGE',X1,Y9);                             CA003268
28                         CALL PUT_CURVE('FIG. 10  CHANGE IN ATTRACTIVE ANIMALS'||  CA003269
29                             ' WITH VANDALISM',X6,YA); PUT PAGE;                 CA003270
30                         CALL PUT_CURVE('FIG. 11  CHANGE IN ATTRACTIVE ANIMALS'||  CA003271
                               ' WITH WOODY VEGETATION',X6,YB);                    CA003272
31                         CALL PUT_CURVE('FIG. 12  CHANGE IN PESTS WITH VANDALISM'  CA003273
32                             ,X6,YC); PUT PAGE;                                  CA003274
33                         CALL PUT_CURVE('FIG. 13  CHANGE IN WOODY VEGETATION '||  CA003275
                               'WITH VANDALISM',X6,YD);                            CA003276
34                         CALL PUT_CURVE('FIG.14  CHANGE IN GRASS WITH USE',X6,YE);CA003277
35                         PUT PAGE; CALL PUT_CURVE('FIG. 15  CHANGE IN EROSION'||  CA003278
                               ' WITH USE',X6,YF);                                 CA003279
37                         CALL PUT_CURVE('FIG. 16  CHANGE IN EROSION WITH GRASS',  CA003280
38                             X6,YG); END;                                        CA003281
```

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/*                                                                    */
/**********************************************************************/
/*                                                                    */
/*      MAXIMUM USE OF A CAMPSITE IS DEFINED HERE AS 16 HOURS/DAY     */ C003290
/* FOR 365 DAYS A YEAR. MAXIMUM MONTHLY USE IS THEN ONE-TWELFTH OF    */ C003291
/* THAT MULTIPLIED BY A SEASONAL USE FACTOR. FOR THE EXAMPLE THIS     */ C003292
/* USE IS GREATEST IN SPRING AND FALL AND LESS IN WINTER BECAUSE OF   */ C003293
/* COLD AND SUMMER DUE TO HEAT. THIS USE PATTERN MIGHT BE TYPICAL OF  */ C003294
/* DESERTS OF THE SOUTHWEST.                                          */ C003295
/*                                                                    */
/**********************************************************************/
/*                                                                    */
39      POTENTIAL_YEARLY_MAN_HOURS=#_CAMPSITES*PERSONS_PER_PARTY*365*16;   CA003300
40      POTENTIAL_MONTHLY_MAN_HOURS = POTENTIAL_YEARLY_MAN_HOURS/12 *      CA003400
                                      MONTHLY_USE_PATTERN;                 CA003401
/*                                                                    */
/**********************************************************************/
/*                                                                    */
/*      TOTAL_AREA IS THE SUMMATION OF THE SIZES OF THE INDIVIDUAL    */ C003490
/* AREAS.                                                             */ C003491
/*                                                                    */
/**********************************************************************/
/*                                                                    */
41      TOTAL_AREA = SUM(SIZE_OF_AREA);                                  CA003500
/*                                                                    */
/**********************************************************************/
/*                                                                    */
/*      BEGIN TO CYCLE THROUGH THE PROGRAM BY YEARS.                  */ C003590
/*                                                                    */
/**********************************************************************/
/*                                                                    */
42      YEAR_LOOP: DO YEAR = 1 TO YEARS_PER_RUN;                         CA003600
/*                                                                    */
/**********************************************************************/
/*                                                                    */
/*      WRITE THE HEADINGS FOR THE TABLE OF OUTPUT.                   */ C003605
/*                                                                    */
/**********************************************************************/
/*                                                                    */
43        PUT PAGE DATA (YEAR);                                          CA003610
44        PUT SKIP EDIT('ATTRACT','FIRE','WOODY','MONTH','AREA',         CA003620
             'ANIMALS','EROSION','WOOD','GARBAGE','GRASS','PESTS',     CA003621
             'TRASH','USE','VANDALS','VEG.')(COL(16),A,COL(37),A,      CA003622
             COL(107),A,COL(1),A,COL(9),A,COL(16),A,COL(26),A,COL(37)  CA003623
             ,A,COL(46),A,COL(57),A,COL(67),A,COL(77),A,COL(88),A,     CA003624
             COL(96),A,COL(107),A);                                    CA003625
```

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                    /*                                                                  */
                    /**********************************************************************/
                    /*                                                                  */
                    /*      IF IT IS THE FIRST YEAR OF THE RUN PRINT THE INITIAL STATE  */ C003626
                    /* OF THE AREA.                                                     */ C003627
                    /*                                                                  */
                    /**********************************************************************/
                    /*                                                                  */
45                           IF YEAR = 1 THEN DO;                                        CA003630
47                                PUT SKIP(2) EDIT ('INITIAL')(A);                       CA003640
48                                DO I = 1 TO #_AREAS;                                   CA003650
49                                     PUT EDIT (I,ATTRACTIVE_ANIMALS_IN_AREA(I),        CA003660
                                          EROSION_IN_AREA(I),FIREWOOD_IN_AREA(I),       CA003661
                                          GARBAGE_IN_AREA(I),GRASS_IN_AREA(I),          CA003662
                                          PESTS_IN_AREA(I),TRASH_IN_AREA(I),            CA003663
                                          USE_PER_UNIT_AREA(I),VANDALISM(I),            CA003664
                                          WOODY_VEGETATION_IN_AREA(I))(COL(1),F(1),     CA003665
                                          COL(16),F(7,5),COL(26),F(7,5),COL(36),F(7,5), CA003666
                                          COL(46),F(7,5),COL(56),F(7,5),COL(66),F(7,5), CA003667
                                          COL(76),F(7,5),COL(86),F(7,5),COL(96),F(7,5), CA003668
50                                        COL(106),F(7,5));    END;   END;               CA003669
                    /*                                                                  */
                    /**********************************************************************/
                    /*                                                                  */
                    /*      CYCLE THROUGH EACH YEAR, ONE MONTH AT A TIME.               */ C003790
                    /*                                                                  */
                    /**********************************************************************/
                    /*                                                                  */
52                           MONTH_LOOP: DO MONTH = 1 TO 12;                             CA003800
```

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                /*                                                                    */
                /**********************************************************************/
                /*                                                                    */
                /*      INDICATORS OF GENERAL CONDITIONS FOR DETERMINING USE OF       */ C003890
                /* TOTAL AREA ARE FIRST SET TO ZERO THEN SUMMED OVER THE AREAS.       */ C003891
                /* PESTS, TRASH, AND GARBAGE ARE ALL WEIGHTED WITH THE PRIME AREA     */ C003892
                /* GIVEN A WEIGHTING OF #_AREAS; THE SECOND AREA IS WEIGHTED ONE      */ C003893
                /* LESS, ETC., UNTIL THE LAST AREA IS WEIGHTED ONE. ATTRACTIVE        */ C003894
                /* ANIMALS AND WOODY VEGETATION ARE SIMPLY AVERAGED OVER THE TOTAL    */ C003895
                /* AREA.                                                              */ C003896
                /*                                                                    */
                /**********************************************************************/
                /*                                                                    */
53                      TRASH,GARBAGE,ATTRACTIVE_ANIMALS,PESTS,WOODY_VEGETATION  CACC3900
                             = 0;                                                  CAC03901
54                      DO I  = 1 TO #_AREAS;                                    CA004000
55                           TRASH = TRASH + TRASH_IN_AREA(I)*(#_AREAS+1-I);     CACC4100
56                           GARBAGE=GARBAGE+GARBAGE_IN_AREA(I)*(#_AREAS+1-I);   CA004200
57                           ATTRACTIVE_ANIMALS = ATTRACTIVE_ANIMALS +           CA004300
                                  ATTRACTIVE_ANIMALS_IN_AREA(I)*SIZE_OF_AREA(I); CA004400
58                           PESTS = PESTS + PESTS_IN_AREA(I)*(#_AREAS+1-I);     CACC4500
59                           WOODY_VEGETATION = WOODY_VEGETATION+SIZE_OF_AREA(I) CA004600
                                  * WOODY_VEGETATION_IN_AREA(I);                 CA004601
60                      END;                                                     CA004700
61                      WOODY_VEGETATION = WOODY_VEGETATION / TOTAL_AREA;        CA004800
62                      ATTRACTIVE_ANIMALS = ATTRACTIVE_ANIMALS / TOTAL_AREA;    CA004900
63                      PESTS = PESTS / #_AREAS ;                                CA005000
64                      TRASH = TRASH / #_AREAS ;                                CA005100
65                      GARBAGE = GARBAGE / #_AREAS;                             CA005200
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                /*                                                                    */
                /**********************************************************************/
                /*                                                                    */
                /*      THE ATTRACTIVENESS OF THE AREA IS CALCULATED FROM THE GRAPHS */ C005290
                /* SHOWN AT THE END OF THE LISTING. THIS FIGURE WHICH VARIES FROM    */ C005291
                /* ZERO TO ONE IS THEN MULTIPLIED TIMES POTENTIAL USE TO DETERMINE   */ C005292
                /* ACTUAL USE.                                                       */ C005293
                /*                                                                    */
                /**********************************************************************/
                /*                                                                    */
66                   ATTRACTIVENESS_TO_MAN = INTPOL(TRASH,X1,Y1) * INTPOL      CA005300
                        (GARBAGE,X1,Y1) * INTPOL(WOODY_VEGETATION,X2,Y2) *  CA005301
                        INTPOL (ATTRACTIVE_ANIMALS,X3,Y3) * INTPOL (PESTS,  CA005302
                          X1,Y1) * FIREWOOD_FACTOR ;                        CA005304
67                   ACTUAL_MONTHLY_USE=POTENTIAL_MONTHLY_MAN_HOURS(MONTH)*   CA005400
                        ATTRACTIVENESS_TO_MAN;                              CA005401
                /*                                                                    */
                /**********************************************************************/
                /*                                                                    */
                /*      DEMAND FOR FIREWOOD IS CALCULATED FROM THE ACTUAL USE OF THE */ C005590
                /* TOTAL AREA. THE FIREWOOD IN EACH AREA IS THEN INCREMENTED BY THE  */ C005591
                /* DEATH RATE OF WOODY VEGETATION, AND THE TIME AVAILABLE FOR        */ C005592
                /* COLLECTING WOOD IS CALCULATED. FD IS A TEMPORARY VARIABLE FOR     */ C005593
                /* STORING THE FIREWOOD DEMAND; IT WILL LATER BE COMPARED WITH THE   */ C005594
                /* AMOUNT OF WOOD GATHERED TO DETERMINE THE FIREWOOD FACTOR USED IN  */ C005595
                /* CALCULATING ATTRACTIVENESS TO MAN.                                */ C005596
                /*                                                                    */
                /**********************************************************************/
                /*                                                                    */
68                   FIREWOOD_DEMAND = FIREWOOD_PER_MAN_HOUR*                 CA005600
                        ACTUAL_MONTHLY_USE;                                 CA005601
69                   FIREWOOD_IN_AREA = FIREWOOD_IN_AREA + WOODY_DEATH_RATE * CA005700
                        WOODY_VEGETATION_IN_AREA ;                          CA005701
70                   TIME_FOR_WOOD = MAX_PART_OF_TIME_FOR_WOOD *              CA005800
                        ACTUAL_MONTHLY_USE ;                                CA005801
71                   FD = FIREWOOD_DEMAND;                                    CA005900
                /*                                                                    */
                /**********************************************************************/
                /*                                                                    */
                /*      RELATIVE EASE IN WOOD GATHERING FIRST CONSIDERS THE TIME     */ C005990
                /* INVOLVED FOR WOOD COLLECTING WITH AN EVEN WOOD DISTRIBUTION AND   */ C005991
                /* THEN THE AMOUNT OF WOOD PER UNIT AREA IN EACH AREA. THE VARIABLE  */ C005992
                /* A IS USED HERE AND LATER IN THE PROGRAM FOR INTERMEDIATE RESULTS--*/ C005993
                /* IN THIS CASE, THE SUM OF THE RELATIVE EASE QUANTITIES. RELATIVE   */ C005994
                /* EASE VALUES ARE THEN CONVERTED TO VALUES BETWEEN ZERO AND ONE     */ C005995
                /* WHICH SUM TO ONE. THIS PROCESS IS CALLED NORMALIZATION.           */ C005996
                /*                                                                    */
                /**********************************************************************/
                /*                                                                    */
72                   RELATIVE_EASE_IN_WOOD_GATHERING = FIREWOOD_IN_AREA/      CA006000
                        TIME_PER_FIREWOOD_UNIT_IN_AREA ;                    CA006001
73                   A = SUM(RELATIVE_EASE_IN_WOOD_GATHERING) ;               CA006100
74                   RELATIVE_EASE_IN_WOOD_GATHERING =                        CA006200
                        RELATIVE_EASE_IN_WOOD_GATHERING / A ;               CA006201
```

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                /*                                                              */
                /******************************************************************/
                /*                                                              */
                /*      THE NORMALIZED VALUES OF RELATIVE EASE ARE MULTIPLIED BY  */ C006290
                /* FIREWOOD DEMAND TO GET FIREWOOD GATHERED PER AREA AND THIS IS  */ C006291
                /* DIVIDED BY SIZE OF AREA TO OBTAIN PER-UNIT-AREA FIGURES.       */ C006292
                /*                                                              */
                /******************************************************************/
                /*                                                              */
75                    GATHER:FIREWOOD_GATHERED_IN_AREA = FIREWOOD_DEMAND *      CA006300
                /*                                                              */
                /******************************************************************/
                /*                                                              */
                /*      IF FIREWOOD GATHERED IS GREATER THAN THAT AVAILABLE IN THE */ C006390
                /* AREA, MAKE GATHERED EQUAL TO AVAILABLE.                        */ C006391
                /*                                                              */
                /******************************************************************/
                /*                                                              */
                                RELATIVE_EASE_IN_WOOD_GATHERING/SIZE_OF_AREA;   CAC06301
76                          DO I = 1 TO #_AREAS;                                CA006400
77                          IF FIREWOOD_IN_AREA(I)<FIREWOOD_GATHERED_IN_AREA(I) CA006600
78                               THEN FIREWOOD_GATHERED_IN_AREA(I) =            CAC06601
                                 FIREWOOD_IN_AREA(I);                           CAC06602
79                          END;                                                CAC06700
                /*                                                              */
                /******************************************************************/
                /*                                                              */
                /*      CALCULATE THE NUMBER OF MAN-HOURS PER UNIT AREA INVOLVED IN */ CC06790
                /* WOOD GATHERING AND COMPARE THE TOTAL MAN-HOURS TO THAT ALLOTTED. */ C006791
                /* A CORRECTION HAS BEEN MADE FOR WOOD DEPLETION DURING THE MONTH. */ C006792
                /* IF THE TIME NECESSARY IS GREATER THAN THAT ALLOWED, REDUCE THE */ C006793
                /* DEMAND AND DO CALCULATION OVER.                                */ C006794
                /*                                                              */
                /******************************************************************/
                /*                                                              */
80                          FIREWOOD_GATHERING_IN_AREA = FIREWOOD_GATHERED_IN_AREA/( CAC06800
                                 (2*FIREWOOD_IN_AREA-FIREWOOD_GATHERED_IN_AREA)*.5) CAC06801
                                 * TIME_PER_FIREWOOD_UNIT_IN_AREA ;             CAC06802
81                          A = SUM(FIREWOOD_GATHERING_IN_AREA*SIZE_OF_AREA);   CAC06900
82                          IF A > TIME_FOR_WOOD THEN DO;     ;                 CA007000
84                               FIREWOOD_DEMAND=FIREWOOD_DEMAND*(TIME_FOR_WOOD/A); CA007100
85                               GO TO GATHER ;                                 CAC07200
86                          END;                                                CAC07300
```

```
                /*                                                              */
                /******************************************************************/
                /*                                                              */
                /*      CALCULATE THE FIREWOOD FACTOR WHICH CAN NOT BE LESS THAN .2  */ C007390
                /* AND REDUCE THE FIREWOOD BY THE AMOUNT GATHERED.              */ C007391
                /*                                                              */
                /******************************************************************/
                /*                                                              */
87                   FIREWOOD_FACTOR = MAX((SUM(FIREWOOD_GATHERED_IN_AREA *     CAC07400
                         SIZE_OF_AREA)/FD),.2);                                 CAC07401
88                   FIREWOOD_IN_AREA = FIREWOOD_IN_AREA -                      CAC07500
                         FIREWOOD_GATHERED_IN_AREA ;                            CAC07501
                /*                                                              */
                /******************************************************************/
                /*                                                              */
                /*      ADJUSTED USE IS THAT PART OF CAMPING TIME SPENT OTHER THAN   */ C007590
                /* GATHERING WOOD.                                              */ C007591
                /*                                                              */
                /******************************************************************/
                /*                                                              */
89                   ADJUSTED_USE = ACTUAL_MONTHLY_USE - A;                     CAC07600
                /*                                                              */
                /******************************************************************/
                /*                                                              */
                /*      RELATIVE USE IS FIRST CALCULATED AS THE ATTRACTIVENESS OF    */ C007690
                /* EACH AREA. THESE ARE THEN SUMMED AND NORMALIZED.             */ C007691
                /*                                                              */
                /******************************************************************/
                /*                                                              */
90                   DO I = 1 TO #_AREAS;                                       CAC07700
91                        RELATIVE_USE_PER_AREA(I) = BASIC_ATTRACTIVENESS(I)*   CAC07800
                              INTPOL(TRASH_IN_AREA(I),X1,Y1) * INTPOL(          CAC07801
                              GARBAGE_IN_AREA(I),X1,Y1) ;                       CAC07802
92                   END;                                                       CAC07900
93                   A = SUM(RELATIVE_USE_PER_AREA) ;                           CAC08000
94                   DO I = 1 TO #_AREAS;                                       CAC08050
95                        RELATIVE_USE_PER_AREA(I)=RELATIVE_USE_PER_AREA(I)/A;CAC08100
                /*                                                              */
                /******************************************************************/
                /*                                                              */
                /*      ACTUAL USE IN EACH AREA IS EQUAL TO ADJUSTED USE TIMES THE   */ C008190
                /* NORMALIZED RELATIVE USE IN EACH PLUS THE FIREWOOD GATHERING. THIS */ C008191
                /* IS THEN CONVERTED TO UNIT-AREA FIGURES.                      */ C008192
                /*                                                              */
                /******************************************************************/
                /*                                                              */
96                        USE_PER_UNIT_AREA(I)=  RELATIVE_USE_PER_AREA(I) *     CAC08200
                              ADJUSTED_USE / SIZE_OF_AREA(I) +                  CAC08201
                              FIREWOOD_GATHERING_IN_AREA(I);                    CAC08202
```

```
                /*                                                                  */
                /********************************************************************/
                /*                                                                  */
                /*      THE EFFECTS OF USE ARE CALCULATED FROM GRAPHS AND PRINTED IN */ CC08290
                /* A TABLE.                                                         */ C008291
                /*                                                                  */
                /********************************************************************/
                /*                                                                  */
 97                          VANDALISM(I) = INTPOL (USE_PER_UNIT_AREA(I),X4,Y4)* CAC08300
                                 INTPOL(TRASH_IN_AREA(I),X1,Y5) * INTPOL(        CAC08301
                                 PESTS_IN_AREA(I),X2,Y8);                        CAC08302
 98                          TRASH_IN_AREA(I) = TRASH_IN_AREA(I) + INTPOL(       CAC08400
                                 USE_PER_UNIT_AREA(I),X4,Y7) * INTPOL (          CAC08401
                                 TRASH_IN_AREA(I),X1,Y5) * INTPOL (VANDALISM(I) CAC08402
                                 ,X6,Y6);                                        CAC08403
 99                          GARBAGE_IN_AREA(I)=MAX((INTPOL(USE_PER_UNIT_AREA(I) CAC08500
                                 ,X4,Y7) * INTPOL(TRASH_IN_AREA(I),X1,Y5) *      CAC08501
                                 INTPOL (VANDALISM(I),X6,Y6) +                   CAC08502
                                 GARBAGE_IN_AREA(I) - (PESTS_IN_AREA(I) +        CAC08503
                                 ATTRACTIVE_ANIMALS_IN_AREA(I)) * EATING_RATE),  CAC08504
                                 0);                                             CA008505
100                          ATTRACTIVE_ANIMALS_IN_AREA(I) = MAX(0,(INTPOL       CAC08600
                                 (GARBAGE_IN_AREA(I),X1,Y9)+INTPOL(VANDALISM(I) CAC08601
                                 ,X6,YA) + INTPOL (WOODY_VEGETATION_IN_AREA(I), CA008603
                                 X6,YB)));                                       CA008604
101                          PESTS_IN_AREA(I) = MAX(0,(GRASS_IN_AREA(I)*.1+      CAC08700
                                 GARBAGE_IN_AREA(I)*.5 + INTPOL(VANDALISM(I),    CA008701
                                 X6,YC)));                                       CAC08702
102                          FIREWOOD_IN_AREA(I) = WOODY_VEGETATION_IN_AREA(I) * CA008800
                                 (1-INTPOL(VANDALISM(I),X6,YD)) +                CAC08801
                                 FIREWOOD_IN_AREA(I) ;                           CA008802
103                          WOODY_VEGETATION_IN_AREA(I) =                       CACC8900
                                 WOODY_VEGETATION_IN_AREA(I) * INTPOL(VANDALISM CAC08901
                                 (I),X6,YD);                                     CAC08902
104                          GRASS_IN_AREA(I)=MAX(0,(GRASS_IN_AREA(I)*INTPOL(    CAC09000
                                 USE_PER_UNIT_AREA(I),X6,YE) + GARBAGE * .01 -   CAC09001
                                 EROSION_IN_AREA(I) * .01));                     CA009002
105                          EROSION_IN_AREA(I)=EROSION*INTPOL(USE_PER_UNIT_AREA CA009100
                                 (I),X6,YF) * INTPOL(GRASS_IN_AREA(I),X6,YG);    CAC09101
106                     END;                                                     CAC09200
107                     PUT SKIP(2) EDIT (MONTH) (COL(3),F(2));                  CA009250
108                     DO I = 1 TO #_AREAS;                                     CA009300
109                          PUT EDIT (I,ATTRACTIVE_ANIMALS_IN_AREA(I),          CA009310
                                 EROSION_IN_AREA(I),FIREWOOD_IN_AREA(I),         CAC09311
                                 GARBAGE_IN_AREA(I),GRASS_IN_AREA(I),            CAC09312
                                 PESTS_IN_AREA(I),TRASH_IN_AREA(I),              CAC09313
                                 USE_PER_UNIT_AREA(I),VANDALISM(I),              CA009314
                                 WOODY_VEGETATION_IN_AREA(I))(COL(11),F(1),      CAC09315
                                 COL(16),F(7,5),COL(26),F(7,5),COL(36),F(7,5),   CA009316
                                 COL(46),F(7,5),COL(56),F(7,5),COL(66),F(7,5),   CA009317
                                 COL(76),F(7,5),COL(86),F(7,5),COL(96),F(7,5),   CA009318
110                              COL(106),F(7,5));    END;                        CA009319
111                END MONTH_LOOP;                                               CA009400
112           END YEAR_LOOP;                                                     CA009500
```

```
                /*                                                                    */
                /**********************************************************************/
                /*                                                                    */
                /*                        INTERPOLATION PROCEDURE                     */ C009590
                /*                                                                    */
                /**********************************************************************/
                /*                                                                    */
113             INTPOL: PROC(X,XVAL,YVAL) RETURNS (FLOAT DEC);
114             DCL I FIXED BIN INTERNAL, X FLOAT DEC;
115             DCL XVAL(*), YVAL(*);
116               NDIM=DIM(XVAL,1);
117             IF X <= XVAL(1) THEN RETURN (YVAL(1));
119             IF X >= XVAL(NDIM) THEN RETURN (YVAL(NDIM));
121             DO I = 1 TO NDIM;
122               IF XVAL(I) > X THEN DO;
124                   AM = (YVAL(I)-YVAL(I-1))/(XVAL(I)-XVAL(I-1));
125                   C = YVAL(I)-AM*XVAL(I);
126                   RETURN (AM*X+C);
127               END;
128             END;
129             END INTPOL;
```

```
                /*                                                                    */
                /**********************************************************************/
                /*                                                                    */
                /*     PUT_CURVE PROCEDURE                                            */
                /*                                                                    */
                /**********************************************************************/
                /*                                                                    */
130             PUT_CURVE: PROC(H,XVAL,YVAL);
131             DCL XVAL(*), YVAL(*), H CHAR(*) , GRAPH(20,40) CHAR(1);
132             DCL (ISTORE, JSTORE) (20);   /* THIS MAY BE TOO SMALL IN SOME CASES  */
133             NDIM=DIM(XVAL,1);  IF NDIM > 20 THEN DO;
136               PUT SKIP LIST (H, ' TOO SMALL'); RETURN; END; XMIN=XVAL(1);
140             XMAX=XVAL(NDIM); YMAX=YVAL(1); YMIN=YVAL(1); DO II=2 TO NDIM;
144             YMIN=MIN(YMIN,YVAL(II)); YMAX=MAX(YMAX,YVAL(II)); END;
147             XDIV=(XMAX-XMIN)*0.025;  YDIV=(YMAX-YMIN)*0.05; GRAPH(*,*)=' ';
150             NPTS=1;  DO K = 1 TO NDIM; J=CEIL((XVAL(K)-XMIN)/XDIV-0.5);
153             IF J > 40 THEN J=40;  IF J < 1 THEN J=1;
157             I=CEIL ((YMAX-YVAL(K))/YDIV-0.5);
158             IF I > 20 THEN I=20;  IF I < 1 THEN I=1;  ISTORE(K)=I; JSTORE(K)=J;
164             GRAPH(I,J)='*'; END; DO N = 2 TO NDIM;
167             DO J = JSTORE(N-1)+1 TO JSTORE(N)-1;
168             GRAD=(ISTORE(N)-ISTORE(N-1))/(JSTORE(N)-JSTORE(N-1));
169             C = ISTORE(N)-(GRAD*JSTORE(N));
170             I = CEIL (GRAD*J+C);  GRAPH(I,J)='+'; END; END; PUT SKIP(2);
175             DO M = 1 TO 20; IF M=1 THEN PUT SKIP EDIT (YMAX,'+',GRAPH(1,*))
                (COL(20),E(11,4),COL(34),A,COL(35),40 A);
178             ELSE IF M = 20 THEN  PUT SKIP  EDIT (YMIN,'+',GRAPH(20,*))
                (COL(20),E(11,4),COL(34),A,COL(35),40 A);
180             ELSE PUT SKIP EDIT ('|',GRAPH(M,*))  (COL(34),A,COL(35),40 A); END;
182             PUT SKIP EDIT ('+_____________________________________+')
                (COL(35),A);
183             PUT SKIP EDIT (XMIN,XMAX) (COL(35),E(11,4),COL(64),E(11,4));
184             PUT SKIP(2) EDIT (H) (COL(35),A);
185             END PUT_CURVE;
186             END CAMP;                                                  CA009600
```

ATTRIBUTE AND CROSS-REFERENCE TABLE

DCL NO.	IDENTIFIER	ATTRIBUTES AND REFERENCES
	A	AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 73,74,81,82,84,89,93,95
	ACTUAL_MONTHLY_USE	AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 67,68,70,89
	ADJUSTED_USE	AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 89,96
	AM	AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 124,125,126
	ATTRACTIVE_ANIMALS	AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 53,57,57,62,62,66
3	ATTRACTIVE_ANIMALS_IN_AREA	(4)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE) 49,57,99,100,109
	ATTRACTIVENESS_TO_MAN	AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 66,67
3	BASIC_ATTRACTIVENESS	(4)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE) 91
	C	AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 125,126,169,170
1	CAMP	ENTRY,DECIMAL,FLOAT(SINGLE)
	CEIL	GENERIC,BUILT-IN FUNCTION 152,157,170
12	DATA2	STATEMENT LABEL CONSTANT
	DIM	GENERIC,BUILT-IN FUNCTION 116,133
	EATING_RATE	AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 4,99
	EROSION	AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 9,105
3	EROSION_IN_AREA	(4)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE) 49,104,105,109
	FD	AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 71,87

DCL NO.	IDENTIFIER	ATTRIBUTES AND REFERENCES
3	FIGURES_WANTED	AUTOMATIC,UNALIGNED,INITIAL,STRING(1),BIT 13
	FIREWOOD_DEMAND	AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 68,71,75,84,84
	FIREWOOD_FACTOR	AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 6,66,87
3	FIREWOOD_GATHERED_IN_AREA	(4)AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 75,77,78,80,80,87,88
3	FIREWOOD_GATHERING_IN_AREA	(4)AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 80,81,96
3	FIREWOOD_IN_AREA	(4)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE) 49,69,69,72,77,78,80,88,88,102,102,109
	FIREWOOD_PER_MAN_HOUR	AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 5,68
	GARBAGE	AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 53,56,56,65,65,66,104
3	GARBAGE_IN_AREA	(4)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE) 49,56,91,99,99,100,101,109
75	GATHER	STATEMENT LABEL CONSTANT 85
	GRAD	AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 168,169,170
131	GRAPH	(20,40)AUTOMATIC,UNALIGNED,STRING(1),CHARACTER 149,164,171,177,179,180
3	GRASS_IN_AREA	(4)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE) 49,101,104,104,105,109
131	H	PARAMETER,UNALIGNED,STRING(*),CHARACTER 130,136,184
114 *********	I	AUTOMATIC,ALIGNED,BINARY,FIXED(15,0) 121,122,124,124,124,124,125,125
*********	I	AUTOMATIC,ALIGNED,BINARY,FIXED(15,0) 48,49,49,49,49,49,49,49,49,49,49,49,54,55,55,56,56,57,57,58,58,59,59 76,77,77,78,78,90,91,91,91,91,94,95,95,96,96,96,96,97,97,97,97,98,98 98,98,98,99,99,99,99,99,99,100,100,100,100,101,101,101,101,102 102,102,102,103,103,103,104,104,104,104,105,105,105,108,109,109,109 109,109,109,109,109,109,109,109,157,158,159,160,161,162,164,170,171

DCL NO.	IDENTIFIER	ATTRIBUTES AND REFERENCES
*********	II	AUTOMATIC,ALIGNED,BINARY,FIXED(15,0) 143,144,145
113	INTPOL	ENTRY,DECIMAL,FLOAT(SINGLE) 66,66,66,66,66,91,91,97,97,97,98,98,98,99,99,99,100,100,100,101,102 103,104,105,105
132 *********	ISTORE	(20)AUTOMATIC,ALIGNED,BINARY,FIXED(15,0) 162,168,168,169
3	#_AREAS	AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FIXED(2,0) 48,54,55,56,58,63,64,65,76,90,94,108
	#_CAMPSITES	AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 11,39
*********	J	AUTOMATIC,ALIGNED,BINARY,FIXED(15,0) 152,153,154,155,156,163,164,167,170,171
132 *********	JSTORE	(20)AUTOMATIC,ALIGNED,BINARY,FIXED(15,0) 163,167,167,168,168,169
*********	K	AUTOMATIC,ALIGNED,BINARY,FIXED(15,0) 151,152,157,162,163
*********	M	AUTOMATIC,ALIGNED,BINARY,FIXED(15,0) 175,176,178,180
	MAX	GENERIC,BUILT-IN FUNCTION 87,99,100,101,104,145
3	MAX_PART_OF_TIME_FOR_WOOD	AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE) 70
	MIN	GENERIC,BUILT-IN FUNCTION 144
*********	MONTH	AUTOMATIC,ALIGNED,BINARY,FIXED(15,0) 52,67,107
52	MONTH_LOOP	STATEMENT LABEL CONSTANT
3	MONTHLY_USE_PATTERN	(12)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE) 40
*********	N	AUTOMATIC,ALIGNED,BINARY,FIXED(15,0) 166,167,167,168,168,168,168,169,169
*********	NDIM	AUTOMATIC,ALIGNED,BINARY,FIXED(15,0) 116,119,120,121,133,134,140,143,151,166
*********	NPTS	AUTOMATIC,ALIGNED,BINARY,FIXED(15,0)

DCL NO.	IDENTIFIER	ATTRIBUTES AND REFERENCES
		150
	PERSONS_PER_PARTY	AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 10,39
3	PESTS	AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 53,58,58,63,63,66
3	PESTS_IN_AREA	(4)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE) 49,58,97,99,101,109
3	POTENTIAL_MONTHLY_MAN_HOURS	(12)AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 40,67
	POTENTIAL_YEARLY_MAN_HOURS	AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 39,40
130	PUT_CURVE	ENTRY,DECIMAL,FLOAT(SINGLE) 15,16,18,19,21,22,24,25,27,28,30,31,33,34,36,37
3	RELATIVE_EASE_IN_WOOD_GATHERING	(4)AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 72,73,74,74,75
3	RELATIVE_USE_PER_AREA	(4)AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 91,93,95,95,96
3	SIZE_OF_AREA	(4)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE) 41,57,59,75,81,87,96
	SUM	GENERIC,BUILT-IN FUNCTION 41,73,81,87,93
	SYSIN	FILE,EXTERNAL 12
	SYSPRINT	FILE,EXTERNAL 17,20,23,26,29,32,35,43,44,47,49,107,109,136,174,177,179,180,182,183 184
	TIME_FOR_WOOD	AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 70,82,84
3	TIME_PER_FIREWOOD_UNIT_IN_AREA	(4)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE) 72,80
	TOTAL_AREA	AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 41,61,62
	TRASH	AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 53,55,55,64,64,66
3	TRASH_IN_AREA	(4)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE)

DCL NO.	IDENTIFIER	ATTRIBUTES AND REFERENCES
		49,55,91,97,98,98,98,99,109
3	USE_PER_UNIT_AREA	(4)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE) 49,96,97,98,99,104,105,109
3	VANDALISM	(4)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE) 49,97,98,99,100,101,102,103,109
	WOODY_DEATH_RATE	AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE). 7,69
	WOODY_VEGETATION	AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 53,59,59,61,61,66
3	WOODY_VEGETATION_IN_AREA	(4)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE) 49,59,69,100,102,103,103,109
114	X	PARAMETER,ALIGNED,DECIMAL,FLOAT(SINGLE) 113,117,119,122,126
3	X1	(6)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE) 15,21,27,66,66,66,91,91,97,98,99,100
3	X2	(6)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE) 16,22,66,97
3	X3	(6)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE) 18,66
3	X4	(6)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE) 19,24,97,98,99
3	X6	(2)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE) 25,28,30,31,33,34,36,37,98,99,100,100,101,102,103,104,105,105
	XDIV	AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 147,152
	XMAX	AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 140,147,183
	XMIN	AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 139,147,152,183
131	XVAL	(*)PARAMETER,ALIGNED,DECIMAL,FLOAT(SINGLE) 130,133,139,140,152
115	XVAL	(*)PARAMETER,ALIGNED,DECIMAL,FLOAT(SINGLE) 113,116,117,119,122,124,124,125
3	Y1	(6)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE) 15,66,66,66,91,91

DCL NO.	IDENTIFIER	ATTRIBUTES AND REFERENCES
3	Y2	(6)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE) 16,66
3	Y3	(6)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE) 18,66
3	Y4	(6)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE) 19,97
3	Y5	(6)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE) 21,97,98,99
3	Y6	(2)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE) 25,98,99
3	Y7	(6)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE) 24,98,99
3	Y8	(6)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE) 22,97
3	Y9	(6)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE) 27,100
3	YA	(2)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE) 28,100
3	YB	(2)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE) 30,100
3	YC	(2)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE) 31,101
3	YD	(2)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE) 33,102,103
	YDIV	AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 148,157
3	YE	(2)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE) 34,104
3 *********	YEAR	AUTOMATIC,ALIGNED,BINARY,FIXED(15,0) 42,43,45
42	YEAR_LOOP	STATEMENT LABEL CONSTANT
	YEARS_PER_RUN	AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 8,42
3	YF	(2)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE)

DCL NO.	IDENTIFIER	ATTRIBUTES AND REFERENCES
		36,105
3	YG	(2)AUTOMATIC,ALIGNED,INITIAL,DECIMAL,FLOAT(SINGLE) 37,105
	YMAX	AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 141,145,145,148,157,177
	YMIN	AUTOMATIC,ALIGNED,DECIMAL,FLOAT(SINGLE) 142,144,144,148,179
131	YVAL	(*)PARAMETER,ALIGNED,DECIMAL,FLOAT(SINGLE) 130,141,142,144,145,157
115	YVAL	(*)PARAMETER,ALIGNED,DECIMAL,FLOAT(SINGLE) 113,118,120,124,124,125

```
YEARS_PER_RUN=1,
FIGURES_WANTED='1'B
```

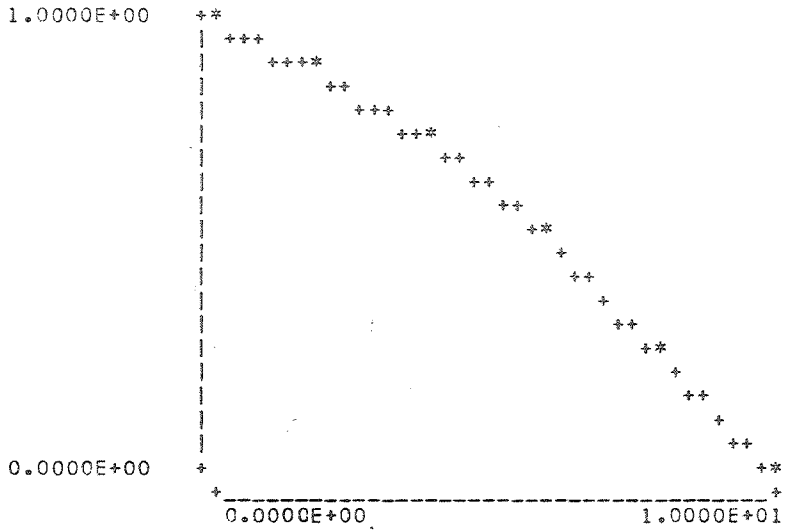

FIG. 1 CHANGE IN ATTRACTIVENESS WITH TRASH, GARBAGE,AND PESTS

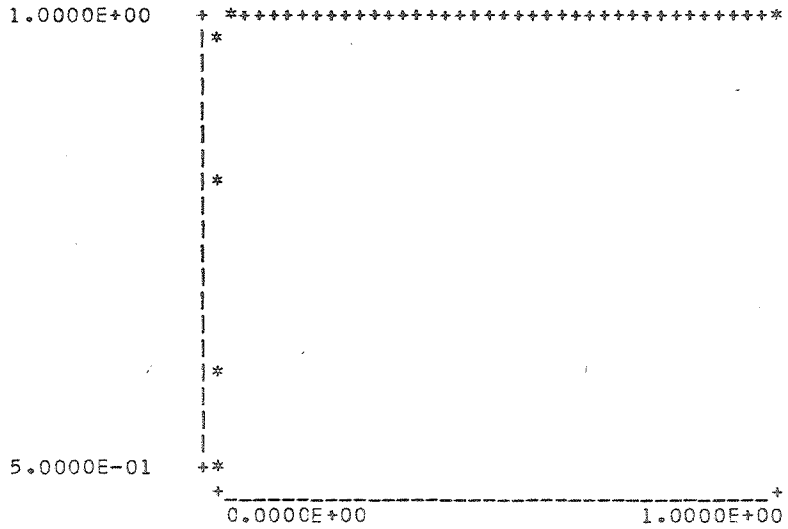

FIG. 2 CHANGE IN ATTRACTIVENESS WITH WOODY VEGETATION

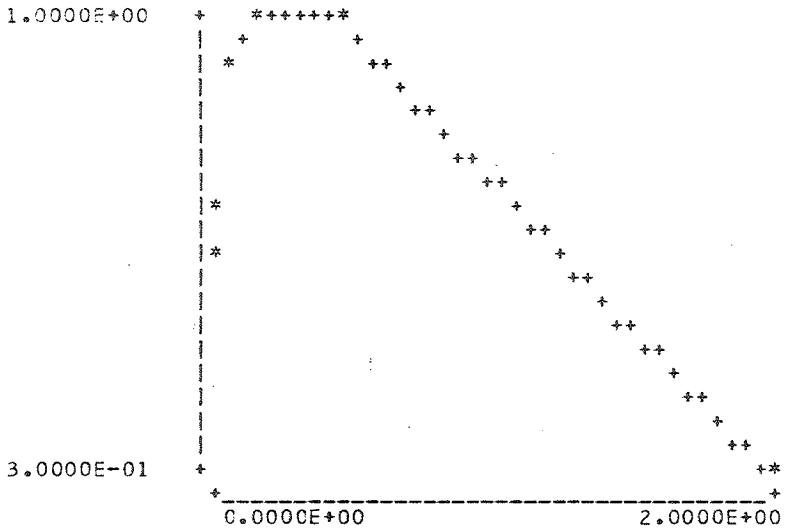

FIG. 3 CHANGE IN ATTRACTIVENESS WITH ATTRACTIVE ANIMALS

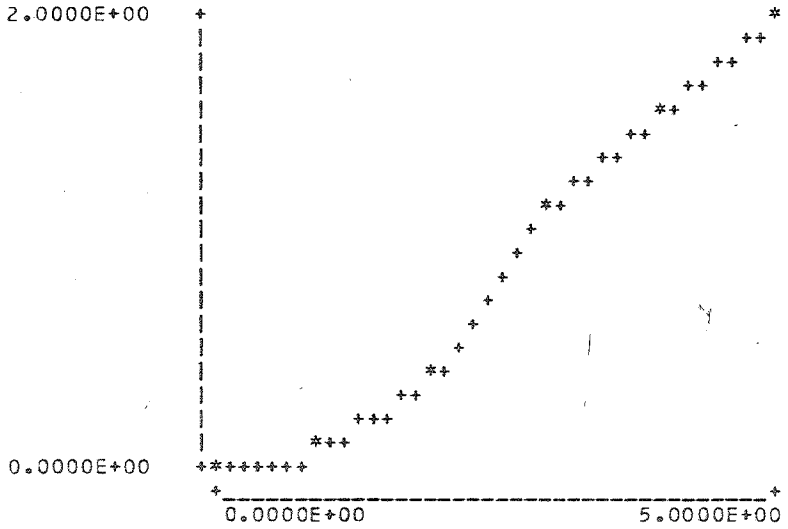

FIG. 4 CHANGE IN VANDALISM WITH USE

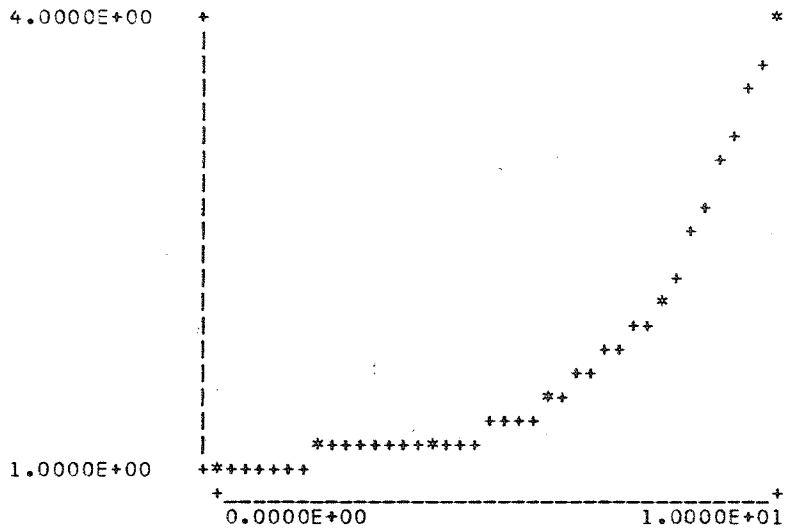

FIG. 5 CHANGE IN VANDALISM AND TRASH AND GARBAGE DEPOSITION WITH TRASH

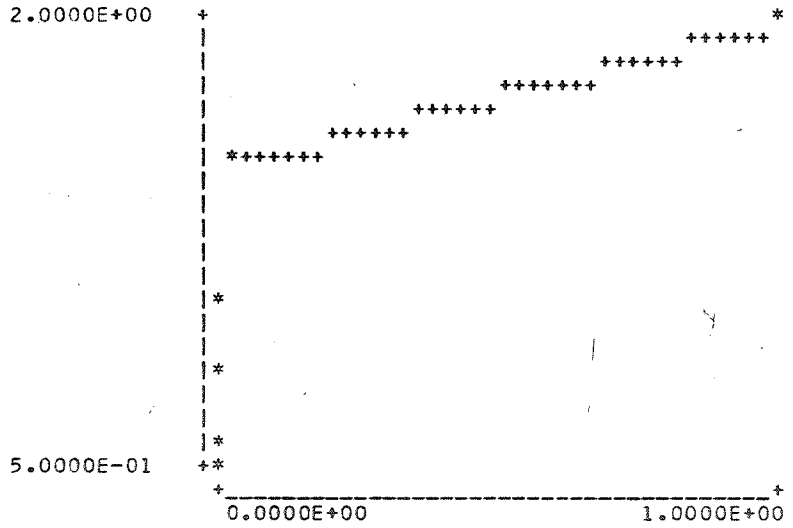

FIG. 6 CHANGE IN VANDALISM WITH PESTS

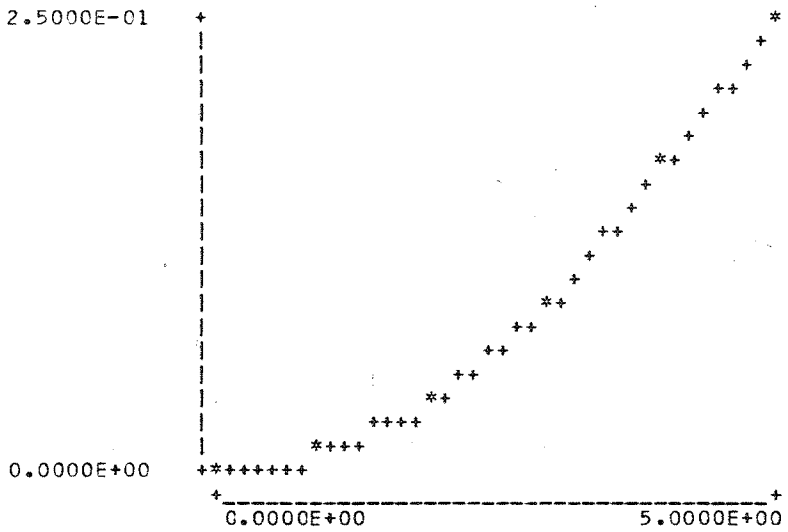

FIG. 7 CHANGE IN TRASH AND GARBAGE DEPOSITION WITH USE

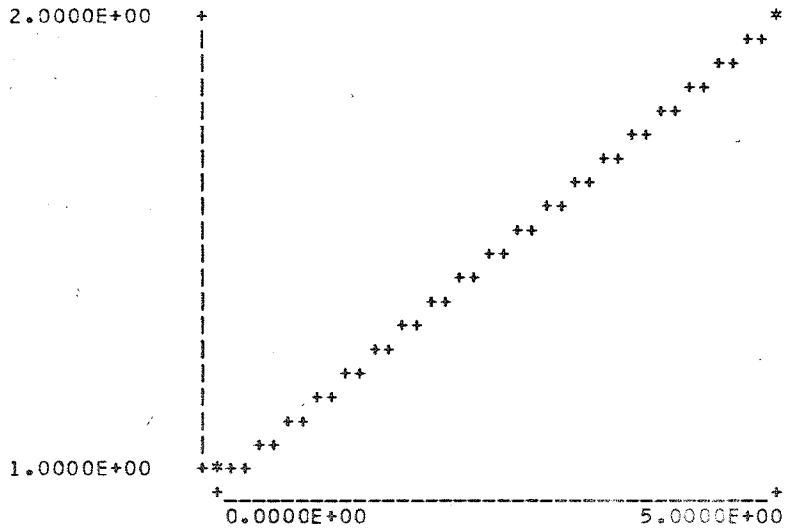

FIG. 8 CHANGE IN TRASH AND GARBAGE DEPOSITION WITH VANDALISM

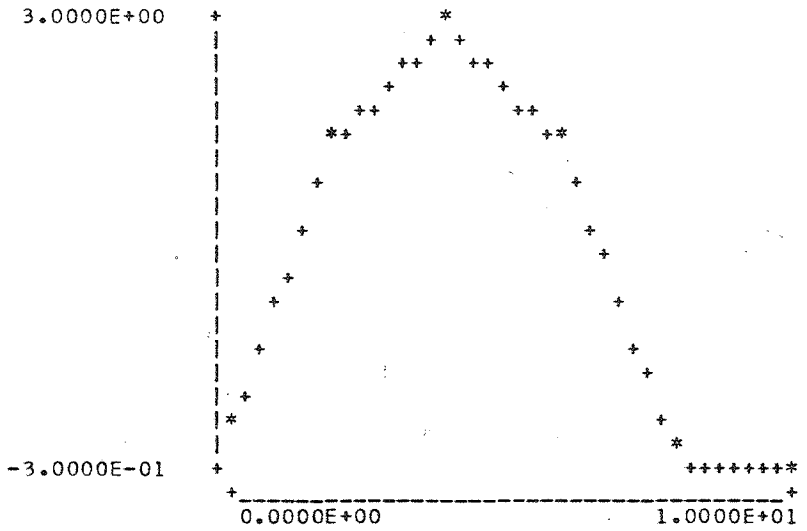

FIG. 9 CHANGE IN ATTRACTIVE ANIMALS WITH GARBAGE

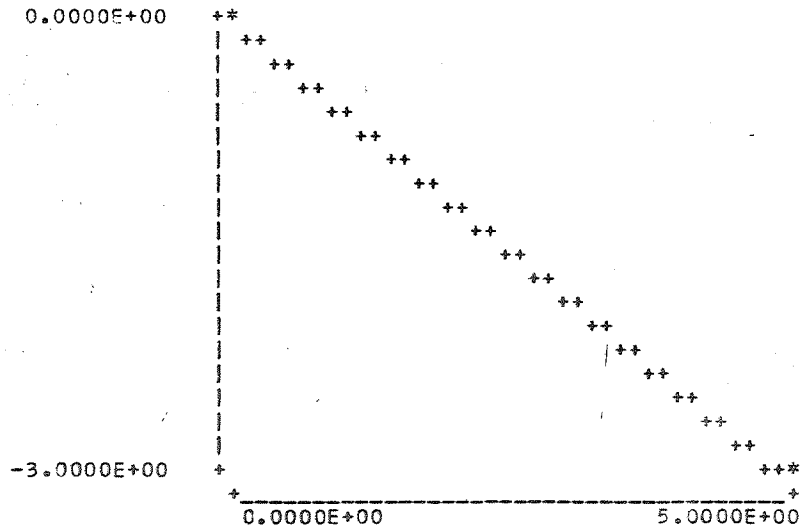

FIG. 10 CHANGE IN ATTRACTIVE ANIMALS WITH VANDALISM

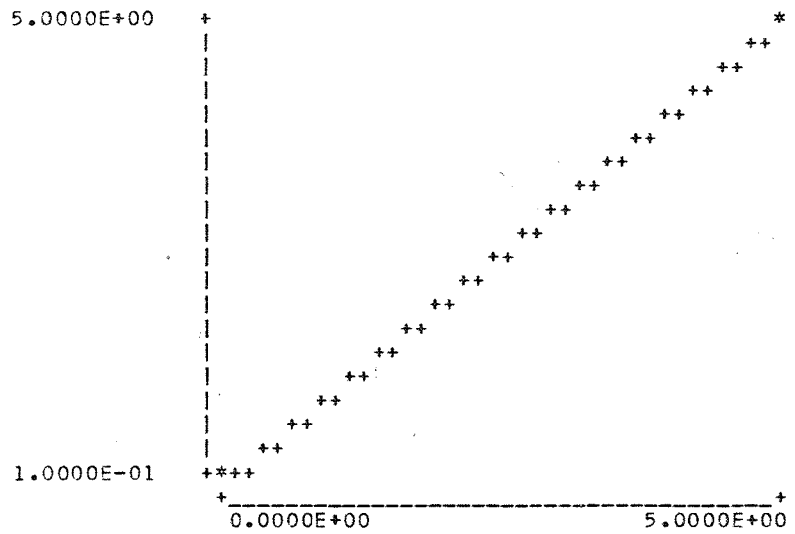

FIG. 11 CHANGE IN ATTRACTIVE ANIMALS WITH WOODY VEGETATION

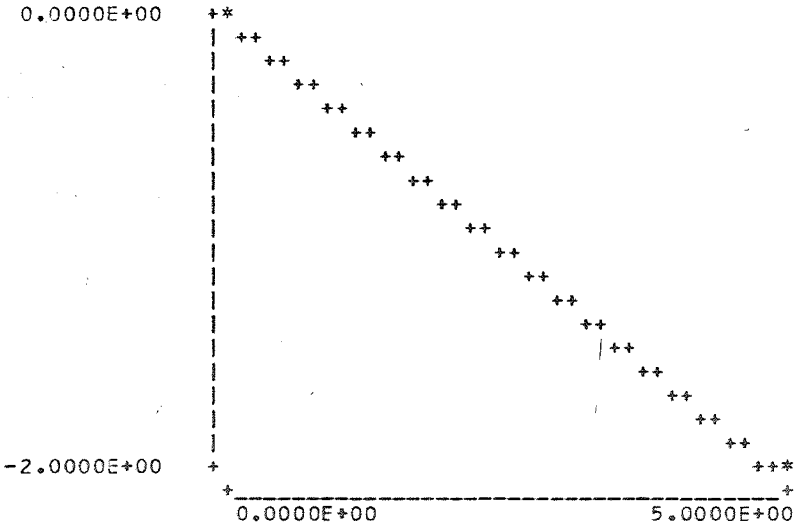

FIG. 12 CHANGE IN PESTS WITH VANDALISM

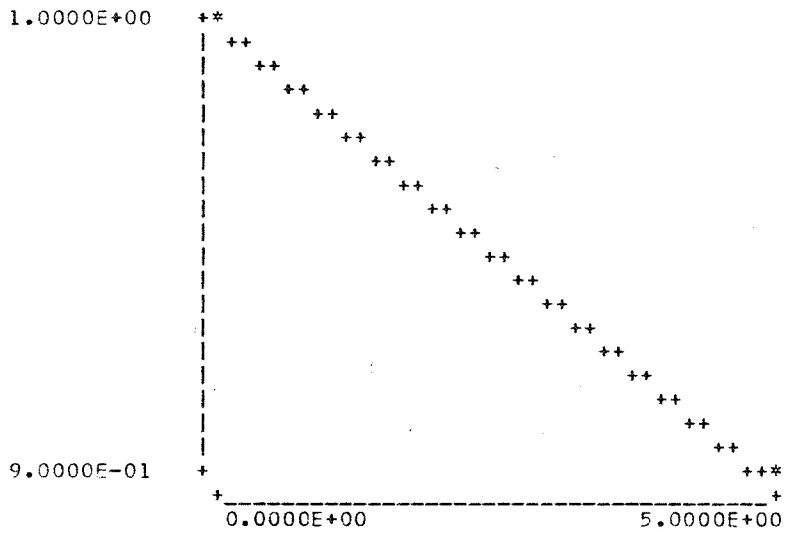

FIG. 13 CHANGE IN WOODY VEGETATION WITH VANDALISM

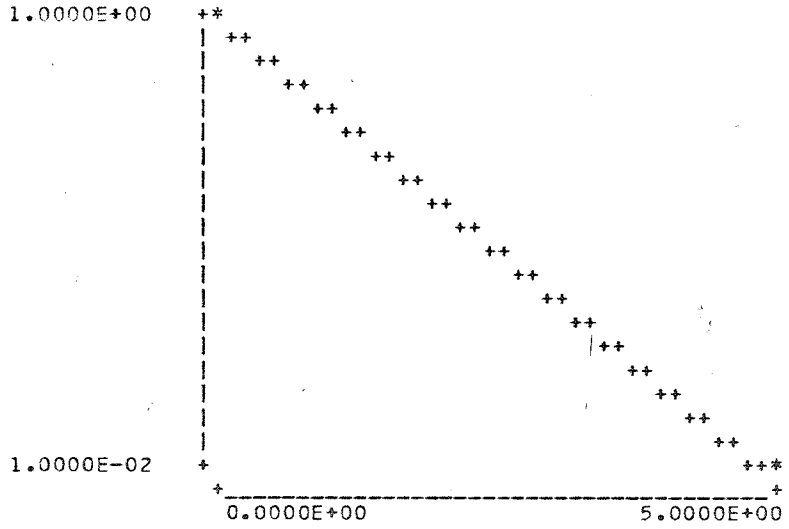

FIG.14 CHANGE IN GRASS WITH USE

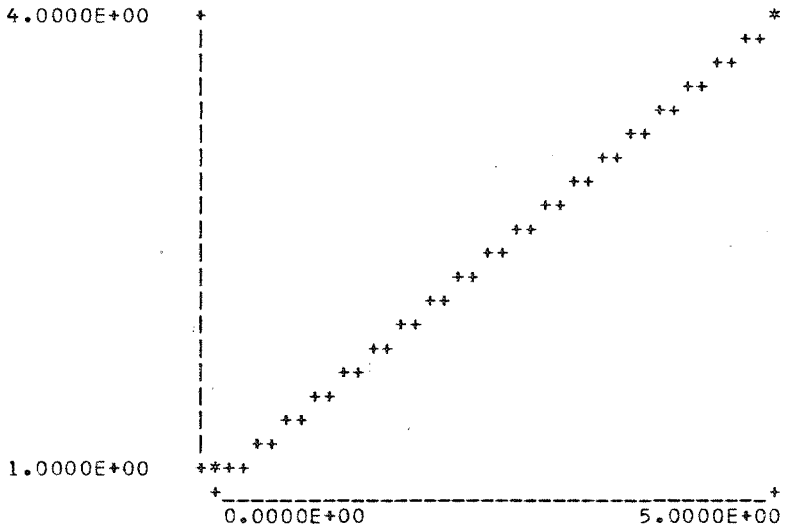

FIG. 15 CHANGE IN EROSION WITH USE

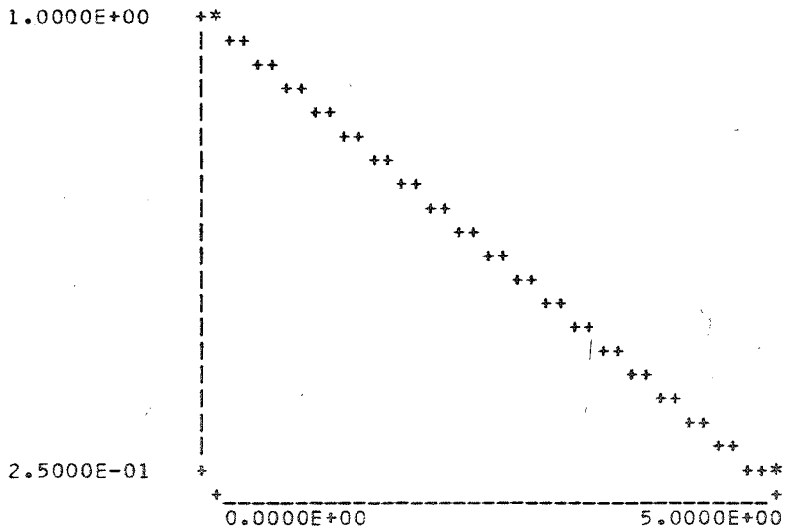

FIG. 16 CHANGE IN EROSION WITH GRASS

YEAR= 1;

MONTH	AREA	ATTRACT ANIMALS	EROSION	FIRE WOOD	GARBAGE	GRASS	PESTS	TRASH	USE	VANDALS	WOODY VEG.
INITIAL	1	0.10000	0.01000	0.00100	0.00000	0.10000	0.01000	0.00000	0.00000	0.00000	0.01000
	2	0.10000	0.01000	0.00100	0.00000	0.10000	0.01000	0.00000	0.00000	0.00000	0.01000
	3	0.30000	0.01000	0.03000	0.00000	0.10000	0.01000	0.00000	0.00000	0.00000	0.30000
	4	0.10000	0.01000	0.00100	0.00000	0.10000	0.01000	0.00000	0.00000	0.00000	0.01000
1	1	0.10434	0.01075	0.00101	0.00000	0.09690	0.00636	0.00152	0.15155	0.00909	0.01000
	2	0.10434	0.01075	0.00099	0.00000	0.09690	0.00636	0.00152	0.15175	0.00911	0.01000
	3	0.38581	0.01120	0.03031	0.00000	0.09540	0.00454	0.00228	0.22750	0.01365	0.29992
	4	0.10953	0.00990	0.00101	0.00000	0.09975	0.00982	0.00008	0.00760	0.00046	0.01000
2	1	0.10460	0.01077	0.00101	0.00000	0.09384	0.00623	0.00306	0.15362	0.00866	0.01000
	2	0.10460	0.01077	0.00099	0.00000	0.09384	0.00622	0.00306	0.15383	0.00867	0.01000
	3	0.38637	0.01123	0.03060	0.00000	0.09093	0.00451	0.00459	0.23060	0.01258	0.29984
	4	0.10952	0.00990	0.00102	0.00000	0.09950	0.00979	0.00015	0.00770	0.00046	0.01000
3	1	0.08389	0.01443	0.00101	0.00000	0.07947	0.00000	0.01080	0.76794	0.04318	0.00999
	2	0.08385	0.01444	0.00092	0.00000	0.07944	0.00000	0.01082	0.76900	0.04324	0.00999
	3	0.34615	0.01674	0.03099	0.00000	0.07006	0.00000	0.01941	1.15266	0.07949	0.29937
	4	0.10842	0.01008	0.00103	0.00000	0.09864	0.00903	0.00054	0.03852	0.00230	0.01000
4	1	0.08702	0.01440	0.00100	0.00000	0.06739	0.00000	0.01845	0.75855	0.03795	0.00998
	2	0.08699	0.01441	0.00086	0.00000	0.06735	0.00000	0.01848	0.75959	0.03800	0.00998
	3	0.35092	0.01669	0.03132	0.00000	0.05411	0.00000	0.03376	1.13796	0.07076	0.29894
	4	0.10845	0.01008	0.00104	0.00000	0.09780	0.00896	0.00092	0.03807	0.00225	0.01000
5	1	0.08701	0.01442	0.00099	0.00000	0.05713	0.00000	0.02610	0.75821	0.03795	0.00997
	2	0.08698	0.01443	0.00081	0.00000	0.05708	0.00000	0.02613	0.75926	0.03800	0.00997
	3	0.35057	0.01672	0.03165	0.00000	0.04176	0.00000	0.04809	1.13688	0.07065	0.29852
	4	0.10845	0.01008	0.00105	0.00000	0.09696	0.00888	0.00130	0.03807	0.00225	0.01000
6	1	0.10068	0.01172	0.00099	0.00000	0.05356	0.00000	0.02914	0.30268	0.01515	0.00997
	2	0.10067	0.01172	0.00079	0.00000	0.05351	0.00000	0.02918	0.30308	0.01517	0.00997
	3	0.37891	0.01265	0.03193	0.00000	0.03784	0.00000	0.05266	0.45361	0.02274	0.29838
	4	0.10926	0.00995	0.00106	0.00000	0.09656	0.00934	0.00145	0.01521	0.00090	0.01000
7	1	0.10061	0.01174	0.00100	0.00000	0.05021	0.00000	0.03220	0.30476	0.01526	0.00997
	2	0.10060	0.01174	0.00078	0.00000	0.05016	0.00000	0.03224	0.30516	0.01528	0.00997
	3	0.37868	0.01267	0.03220	0.00000	0.03430	0.00000	0.05726	0.45668	0.02289	0.29825
	4	0.10925	0.00995	0.00107	0.00000	0.09617	0.00929	0.00161	0.01531	0.00091	0.01000
8	1	0.10062	0.01174	0.00100	0.00000	0.04707	0.00000	0.03526	0.30452	0.01525	0.00996
	2	0.10061	0.01175	0.00077	0.00000	0.04701	0.00000	0.03531	0.30493	0.01527	0.00996
	3	0.37856	0.01268	0.03247	0.00000	0.03107	0.00000	0.06185	0.45627	0.02288	0.29811
	4	0.10925	0.00995	0.00108	0.00000	0.09578	0.00925	0.00176	0.01531	0.00091	0.01000
9	1	0.08690	0.01448	0.00099	0.00000	0.03986	0.00000	0.04294	0.76073	0.03810	0.00996
	2	0.08687	0.01448	0.00072	0.00000	0.03981	0.00000	0.04300	0.76177	0.03816	0.00996
	3	0.34945	0.01678	0.03279	0.00000	0.02393	0.00000	0.07629	1.13969	0.07117	0.29769
	4	0.10844	0.01008	0.00109	0.00000	0.09496	0.00867	0.00214	0.03824	0.00227	0.01000
10	1	0.08711	0.01445	0.00099	0.00000	0.03377	0.00000	0.05054	0.75343	0.03775	0.00995
	2	0.08707	0.01445	0.00068	0.00000	0.03371	0.00000	0.05061	0.75446	0.03780	0.00995
	3	0.35004	0.01672	0.03309	0.00000	0.01842	0.00000	0.09038	1.12817	0.06949	0.29727
	4	0.10846	0.01008	0.00109	0.00000	0.09414	0.00861	0.00252	0.03790	0.00222	0.01000
11	1	0.08713	0.01445	0.00098	0.00000	0.02859	0.00000	0.05814	0.75205	0.03770	0.00994

	2	0.08710	0.01446	0.00064	0.00000	0.02854	0.00000	0.05822	0.75308	0.03775	0.00994
	3	0.34984	0.01672	0.03339	0.00000	0.01415	0.00000	0.10440	1.12555	0.06914	0.29686
	4	0.10847	0.01008	0.00110	0.00000	0.09334	0.00853	0.00290	0.03785	0.00222	0.01000
12	1	0.10523	0.01086	0.00098	0.00000	0.02760	0.00000	0.05965	0.15012	0.00753	0.00994
	2	0.10522	0.01086	0.00064	0.00000	0.02755	0.00000	0.05973	0.15031	0.00754	0.00994
	3	0.38415	0.01132	0.03367	0.00000	0.01335	0.00000	0.10667	0.22456	0.01129	0.29679
	4	0.10953	0.00991	0.00111	0.00000	0.09310	0.00916	0.00297	0.00756	0.00044	0.01000