PROJECTION OF CHANGES IN LAND USE IN A RAINFOREST AREA OF COSTA RICA

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ABSTRACT

An estimate of the carrying capacity is made for an area of rainforest in Bahia Drake on the Osa Penninsula, Puntarenas Province, Costa Rica for a human population supported on a technology which is primarily shifting agriculture, but which also includes some cash cropping. Colonists had been arriving from 1946 to the 1963 survey date in an exponentially increasing rate. If 1963 trends continue, all land would be cleared in 1977, at which time the population density would be 45.6 persons/km^2 of useable land. Of the shifting agriculture sector, 71.5% of the land is fallow while 28.5% is farmed. Fallowing time is estimated at a minimum of six years. Regressions and projections are developed for all crops and for the total area of cleared land. Considering the nature of the data, the regressions used in the projection of the total cleared area appear reasonably reliable within their ranges (alphas are 0.0000 and R^2 values are 0.86 for the number of families and 0.58 for the cleared area predictions). Regressions for the individual crops, however, explain little of the variance despite high significance levels attained. Assumptions of the carrying capacity model are discussed and suggestions for further improvements are made.

I.) INTRODUCTION:

The present study attempts to project land use trends in a rainforest area of the Osa Penninsula in Southwestern Costa Rica with a mind to improving on an estimate of the carrying capacity of the area for human populations supported on a primarily shifting agriculture technology.

My original study of the carrying capacity (Fearnside, 1973) includes descriptions of the location and terrain of the study area, and the four regions into which I divided the total area: Rincon, Playa Blanca, Sirena, and Drake. A brief table of population and area information for the four regions is included here as Appendix IX.

The farmers in the area are not shifting agriculturalists in cultural background, but rather are colonists who have immigrated to the area from other parts of Costa Rica or from Nicaragua in recent years. Costa Rican census reports classed the area as "uninhabited" in the 1930's (Waibel, 1939) the oldest family now in the area claims to have arrived in 1927, and the oldest family in Drake, the most populous region, arrived in 1946. Newcomers to slash-and-burn agriculture such as these can be expected to have land use patterns differing greatly from patterns of older cultures which have developed their techniques through generations of cultural evolution. The increasing prominance of colonization of rainforest areas throughout Latin America makes this a particularly timely area of study (cf. Jorgenson, 1972).

There are two principal uses to which land use projection information might be put: (1) in refining the estimates of the carrying capacity, and (2) in providing the basis for subsequent studies of the changes to be expected as a result of increased population pressure. The first of these uses could be of special importance were I.P.C.A., the Costa Rican Government agency responsible for colonists, to take an interest in regulating immigration to the area.

A representative definition of carrying capacity from the shifting agriculture literature is that of Allan (1949):

> The maximum number of persons that can be supported in perpetuity on an area, with a given technology and set of consumptive habits, without causing environmental degredation.

Carrying capacity determinations for shifting agriculture systems in the literature are generally of two types: those where the population

is assumed to be at or over the carrying capacity, and those in which the population is presumed to be below the carrying capacity at the time of the study. Where the carrying capacity has been exdeeded, some indication of either inadequate food production or environmental degredation can be found and linked to a population level which can be taken as a maximum possible level for the carrying capacity. Examples of this type include Hunter's (1966) study in Ghana where outmigration as indicated by changed sex ratios gave an indication of when the carrying capacity had been reached, and Vermeer's (1970) classic study in Nigeria where a shortened fallow period indicated that the carrying capacity had been exceeded.

In cases where the population is assumed to be below the carrying capacity, the calculations are made by estimating the production of certain crops, the fallow and farmed times, and the area of land available for the population. Variations of this approach have been used by Carneiro (1966) and by myself (Fearnside, 1973), among others.

The assumptions used in making this kind of before-the-fact prediction of what the carrying capacity will be are dangerous indeed; worse still, these assumptions are usually not clearly recognized and stated by authors in the field, as has been aptly pointed out by Street (1969). The assumptions used by me in my original set of carrying capacity estimates for the Osa Penninsula are listed in Appendix I.

There is some evidence that each of these assumptions may not be warrented; this is also presented in Appendix I, together with potential checks and remedies for these assumptions.

The present study deals with assumptions 14 and 15 in the Appendix I list: that there is no effect on the proportion of land allotted to each crop from changes in the size of each family and that there is no effect from changes in the numbers of families in each age class. It is hoped that these two assumptions could be reduced to the less-restrictive one that the proportions of each crop stay the same within each age group as the carrying capacity is approached. Projections are made on the assumptions that: (1) arrival of new families follow 1963 trends, (2) no families leave the area, and (3) land clearing rates follow 1963 trends.

It should be noted, however, that the finite amount of land available in the area necessitates that the 1963 arrival and land clearing trends cannot long continue. If a future survey of the Drake farmers were to reveal deviations from the projections of this study, the present study

would be of value in highlighting the changes. Barring evidence to the contrary, deviations from these trends could best be explained as results of population pressure.

II.) METHODS AND MATERIALS:

The data for the study was obtained partly from interviews which I conducted as part of a study entitled "An Estimate of the Carrying Capacity of the Osa Penninsula for Human Populations Supported on a Shifting Agriculture Technology," (Fearnside, 1973), which was done under the sponsorship of the Organization for Tropical Studies, San Jose, Costa Rica in August, 1972. The balance of the data comes from a survey conducted in 1963 by Osa Productos Forestales, the lumber company which owns the land. I am endebted to Oscar Breilly, chief engineer for the Company in Rincon, for allowing me access to this invaluable source of information.

A description of the methods used in collecting the data can be found in the original paper.

III.) DATA AND RESULTS:

The data and results are presented as tables and graphs in the following appendices:

Appendix II: table of regression equations developed for Drake

Appendix III: explanation of abbreviations

Appendix IV: table of land use from 1963 Osa Productos Forestales survey

Appendix V: plots of the numbers and logarithms of the numbers of families arriving in Drake vs. the year of arrival

Appendix VI: Projection of the number of families arriving in Drake to 1982

Appendix VII: projection of the total cleared hectares in Drake to 1982

Appendix VIII: projection of hectares and proportions of each crop to 1982 for observations made in Drake in February

IV.) DISCUSSION:

A.) PROBLEMS WITH THE DATA:

The original carrying capacity estimates were made for the entire Eastern side of the Osa Penninsula. In the present study the four

regions into which the study area had been subdivided were compared before pooling the data for an estimate for the entire area. The large differences in land-use patterns between the areas were immediately apparent. The data presented in Appendix IV shows this clearly. Most striking was the relatively low reliance in pasturing in Drake as compared, for example, to Sirena. My own observations in Rincon and Sirena also confirmed the presence of great differences between areas. It was therefore decided to restrict the analysis to the cases from the Drake area, reducing the sample size from 143 to 99.

The sample size was also reduced somewhat by the presence of missing data. Missing information is indicated in Appendix IV by the symbol "-0.0". Depending on which pieces of information are considered, sample sizes range from 72 to 94.

A further problem was apparent from the presence of observations from different times of year. Strong correlations were found between the month of the observation and numbers of hectares of the various non-perennial crops such as rice, beans, and maize, together with the total number of hectares of "occupied" (farmed) land and the number of hectares fallow. Apparently, land was recorded as fallow if the observation was taken between the harvesting and planting times for a particular crop. The majority of the observations had been taken either in February or October. For non-perennial crops the information from February and October was analyzed separately, and observations from other months were not considered. This reduced the sample size for regressions involving these crops to 46 for February and 37 for October.

B.) CHOOSING THE REGRESSION MODEL:

Stepwise regression revealed both the number of years of occupancy and the number of persons in a family as significant predictors of the total hectares of cleared land when the significance levels of added variables was held at 0.20 and deleted variables at 0.25. The multilinear regression equation including both years of occupancy and number of persons (Eqn. 3 in Appendix II) explains a greater proportion of the variance in the data than does the corresponding simple linear regression equation using only the number of years of occupancy as a predictor. (Eqn. 2 in Appendix II). The standard error is slightly raised by the inclusion of a second variable, and the two-variable equation does have a smaller sample size and a lower value for the F-statistic. In both

cases the significance attained is phenomenal at 0.0000.

It would appear from the greater proportion of variance explained by the multilinear equation (0.89 vs. 0.58), that the two-variable equation should be used to predict the land clearing. However, a problem is encountered in trying to predict values for the second variable: the number of persons per family. One would expect the family size to follow some sort of quadratic trend, increasing at first and then leveling off with age. A quadratic equation for predicting the number of persons in a family from the years of occupancy (eqn. 4 in Appendix II) is significant only at the 0.3 level. To make matters worse, the multiple correlation coefficient (R^2) is a miniscule 0.03. The best fit for the 74 data points was actually obtained from a fifth order polynomial! This was rejected immediately as a biological absurdity, however, as it results in negative family sizes after a few years.

In view of the difficulty of predicting family size from the years of occupancy, it was decided to revert to the somewhat less desireable simple linear regression model for making the projections. These projections could undoubtedly be improved upon in the future by the addition of more variables.

C.) RELIABILITY OF THE REGRESSION EQUATIONS:

The number of families arriving in Drake from 1946 to 1962 follows a near-perffect logarithmic curve. This is plotted in Appendix V, and is described by Equation I in Appendix II. The high (0.86) R^2 and F-statistic values and the low standard error and significance make this a very convincing relation indeed. The sample size of only 14 is not as large as one would like, but is the best possible under the circumstances.

The regression used for predicting the total area of land cleared from the years of occupancy (Eqn. 2 in Appendix II) is not as convincing as might have been hoped. On the plus side, it has a high F-statistic value and a 0.0000 significance level, as well as a low standard error - a critically important factor in narrowing the width of the tolerance band around the regression line. On the other hand, it explains only 58% of the variance in the data.

Most of the remaining 15 regression equations shown in Appendix II show a common problem: they have microscopic values of R^2 despite their high significance. Of these only five explain more than 30% of the variance in the data ($R^2 > 0.30$) : the hectares of bananas from the

years of occupancy, and the total "occupied" (farmed) land and total fallow land from the years of occupancy for both February and October observations. Such small values for R^2 indicate a high variability in the data and mean that very little faith can be placed in the resulting predictions. The high significance values obtained are probably an artifact of the sample size.

Even ignoring the tenuous nature of many of the regression equations, extreme care must be taken in extrapolating these into the future, as there is no guarantee that the relations will not change outside the range of the regression.

D.) THE MEANING OF THE REGRESSIONS:

If one can ignore the multitude of reasons for distrusting the regression equations outlined in the previous section and in the list of assumptions in Appendix I, the regression equations and the projections made from them have important implications for the future of the area. The projected total hectares of land cleared shown both graphically and in tabular form in Appendix VII indicates the total area of 21809 hectares of potentially useable land in Drake will be cleared sometime in 1977, at which time the population density would be 45.6 persons/km^2 of useable land using the observed 1963 average family size of 6.213 persons. This cannot actually be considered a value for the carrying capacity for reasons explained under assumption 20 in Appendix I, among others, but nevertheless it agrees well with the estimates of 35.5 persons/km^2 and 57.9 persons/km^2 obrained for the Drake area using the original study for consumption-yield data and present land use respectively. This is also in agreement with such classic estimates in the literature as Carneiro's (1956) estimate of 38 persons/km^2 for an Indian population carrying capacity in Brazil. Comparisons with published estimates for other areas has limited value, however, as estimates vary depending on the calculation method used, the assumptions, and the fertility of the area from as low as 10 persons/km^2 (Hance, 1968 & Linton 1961-62) to several hundred persons/km^2 (Hunter, 1966 & Vermeer, 1970).

In any case, be the projections accurate in detail or not, they indicate convincingly that the area will fill to and beyond its carrying capacity within the next few years, if it hasn't reached that elusive number already. Since the changes that occur as a population approaches its carrying capacity are critically important, this area is ideally suited as a site for studying these changes.

The finding that the number of new families arriving in Drake is growing at an exponential rate implies that the proportions of the total population in each age class remains constant. As long as this exponential rate holds, there is no need to include an allowance for the varying numbers of persons in families in each age class, as this would not alter the predicted land use behavior of the population as a whole. This finding lends credence to the assumption that no such changes occur (assumption no. 15 in Appendix I). This would nolongerhold, however, were the trends up to 1963 not to continue into the future.

The proportions of land allotted to each crop shown in Appendix VIII have important implications. The proportions for observations taken in February are probably most meaningful, as all of the major crops are being grown at this time of year. In February 55.2% of the total amount of land that has been cleared is fallow while 44.8% is farmed. Of the farmed portion, 5.6% is in rice, 4.6% in beans, 39.4% in maize, 7.2% in cacao, 30.8% in bananas, 8.7% in pasture and 2.9% in other crops. Of the farmed portion, 49.6% is allotted to non-perennial crops, while 50.4% is allotted to perennial crops. Of the total cleared area this represents 22.2% in non-perennial crops and 22.6% in perennial crops.

If the area under perennial crops is excluded from the analysis, as seems most reasonable in evaluating the shifting agriculture sector of the system, the ratio reduces to 71.5% fallow to 28.5% farmed land. This places the system on the borderline of what is called "shifting cultivation." Were 30% to be farmed, for example, it would place it in the category of "semi-permanent cultivation" of Nye and Greenfield (1962).

The 71.5% fallow to 28.5% farmed ratio has important implications for the fallowing time. If the farmed time on this land is two years, as it was for the farmers inteviewed in the bottomland area of Sirena, then this approximately 3:1 ratio would indicate a fallow period on the order of six years were the individual families not continuing to expand their holdings by clearing new land for non-perennial crops. Since they apparently are continuing to clear more land for this purpose, the six-year value would represent a minimum, and the actual fallow time would probably be longer than this. This is somewhat more realistic than the three-year fallow period the interviewed Sirena farmers claimed to have used, but it is probably still far shorter than the 10 - 20 year fallows common in long-standing shifting agriculture-based rainforest cultures (Ruthenberg, 1971).

E.) ON CHOOSING A VALUE FOR ALPHA:

In choosing a minimum acceptable level of reliability for a prediction such as this, one must consider the use to which the prediction will be put, and the consequences of making a faulty prediction. If the prediction of carrying capacity were to be used by the Costa Rican Government agency responsible for colonists in setting policies which would effect, say, the number of families immigrating to the area, the consequences would be immediate and quickly felt. Were the carrying capacity to be overestimated for such a purpose, the results would probably include a lowering of the already minimal standard of living of the people, erosion and other degredation of the environment in the farmed area, and increasing problems of squatters spilling over into areas which the Government may wish to protect from agriculture, such as the adjacent National Forest. The consequences of underestimating the carrying capacity in such a situation would probably include the potential for allowing the gradual raising of the standard of living of the people already present in the area. This would also force the prospective immigrant to remain in some other part of the country, where he would most likely have a somewhat lower individual standard of living, but on the plus side would probably cause less environmental degredation than he would as a slash-and-burn farmer where the carrying capacity had been exceeded.

Since the consequences of overestimating the carrying capacity are severe, especially when compared with the consequences of underestimating it, any government planners using such estimates should take care to set policies which would result in population levels sufficiently below the carrying capacity figure to fall outside of a tolerance interval which has a $(1 - \alpha)\%$ probability of including the actual carrying capacity. The target set by the planner would, of course, have its own tolerance interval; the population figure taken as the target by the planner should be sufficiently low that these two intervals do not overlap.

An additional possible use of the projections is in future esoteric studies of the changes in land use practices that accompany the reaching and passing of the carrying capacity. To the extent that the consequences of error in such studies are less severe, larger values of alpha should be used.

F.) WHAT COMES NEXT:

As indicated in the "potential checks and remedies" column in Appendix I, many additional things could be done to improve on the

estimate. Some of these include: an assessment of environmental degredation through completion of the analysis on the soil samples already collected and the collection of others, especially in Drake; more interviews to provide information for a correction for the input from hunting and gathering, as well as information on the means and variances of the yields from fields of various ages and on various land-quality classes, plus better information on fallowing times. Such a survey could also check for density dependent effects (as in assumptions 11, 12, & 13 of Appendix I). A new survey of arrival trends would allow assumptions 14 and 15 to be altered, as had been planned in the present study. Further manipulations of the present model could easily produce a variety of scenarios with different assumptions about the immigration rate; the most obvious and easiest of these would be to assume no further immigration after a given date and project the subsequent changes in land use. More sophistocated models of carrying capacity allowing for changes in the technology and the standard of living, among other things, are needed, as well as the incorporation of critically important stochastic terms.

V.) CONCLUSIONS:

The following conclusions can be made for the Drake Region from the present study:

1.) All conclusions are extremely tenuous due to the low proportion of the variance in the data explained by most of the regression equations developed.

2.) The usefulness of the conclusions is further limited by the long and crippling list of assumptions which must be made about the system.

3.) Further caution is necessary due to the inherent weakness of projections made by extrapolation beyond the range of the data in hand.

4.) Given the continuation of 1963 trends and other assumptions, all farmable land in the Drake Region should be cleared in 1977.

5.) Given the continuation of 1963 trends and other assumptions, the population density should be 45.6 persons/km^2 in 1977 at the time when all land is cleared.

6.) Given the continuation of 1963 trends and other assumptions, the proportions of families in each age class will remain constant.

7.) Given the continuation of 1963 trends and other assumptions, the proportion of land allotted to each crop should remain constant.

8.) Considering only the portion of land either fallow or being farmed with non-perennial crops, the fallow land in February represents 71.5% , and land farmed in non-perennial crops represents 28.5%.

9.) Given the two-year farmed time used in Sirena applies to Drake, this corresponds to a fallowing period of at least six years.

10.) Suggestions are made for further improvements on the carrying capacity estimate.

VI.) APPENDICES:

APPENDIX I : LIST OF ASSUMPTIONS OF THE CARRYING CAPACITY ESTIMATE

ASSUMPTION	REASONS FOR DOUBT	POTENTIAL CHECKS AND REMEDIES
1.) no error in observations	a.) Squatters might be motivated to misrepresent the size of holdings to representatives of the landowner. b.) In a few cases where the lumber company surveyed holdings, wide discrepancies with the claims of farmers were found. c.) Interviewed farmers often contradict themselves.	Aerial surveys could help greatly in checking biases such as these.
2.) no environmental degredation from present fallowing schedule.	a.) Fallowing times are much shorter than in most rainforest shifting agriculture-based cultures which have had longer to equilibrate with the environment. b.) The fallowing cycle has not had time to run long enough for obvious degredation effects to be observed. c.) In other parts of the world with similar climates, fallowing cycles of this length result in severe degradation.	Soil samples were taken in fields of varying ages and in adjacent undisturbed rainforest at the farms I examined in Rincon and Sirena. The Costa Rican agricultural agency which promised to analyze the samples has not yet supplied the results, however. The results of these analyses, and the collection of more samples, would permit assessment of degredation
3.) Input from hunting and gathering does not affect the carrying capacity	Amazon Indian tribes are often considered to be limited by game rather than crop production. However, here one would expect somewhat less effect as the cultural tie to hunting is less.	Information on the amount and kinds of game eaten was collected in my interviews in Rincon and Sirena. The sample size is small, and the variance great, however. If this could be accurately quantified, a correction could then be made by adding to the required land per capita the amount that would be

APPENDIX I, CONTINUED:

ASSUMPTION	REASONS FOR DOUBT	POTENTIAL CHECKS AND REMEDIES
3.) continued		needed to grow bananas which would be fed to pigs to compensate for the reduced game from hunting at the carrying capacity.
4.) Consumption habits will remain the same as the carrying capacity is approached.	a.) One would expect "luxury" items to be eliminated as land becomes limiting. b.) At the same time, increased ease of trade could result in new consumption habits. The skyrocketing business of the recently-opened Rio Claro Pulparia in Sirena is testamony to this.	An adjustment for changing consumption habits could be added to the carrying capacity model.
5.) Farming technology will remain the same as the carrying capacity is approached	Many cultures have been observed to change their farming technology in response to population pressure. This is described in Boserup (1965).	An adjustment for changing technology should be added to the carrying capacity model.
6.) No reduction in yield occurs as more marginal land is put into production.	Poorer land generally produces lower yields, and can be expected to be exploited last.	Some correction was made for this in distinguishing between "hills" and "bottomland" in the original carrying capacity estimate. A fuller breakdown and more observations are needed.
7.) No increases in environmental degredation occur as more marginal land is put into production	Environmental degredation on marginal land has often been observed in other places.	Again, a fuller breakdown of land quality is needed.
8.) No change in fallow and farmed times occurs as population pressure mounts.	This is often not the case (cf. Vermeer, 1970).	No relation between population densities and fallowing was found in the four regions (see Appendix IX). However, some of the areas have few families, four areas are not enough, and the effect may only be present at higher densities.

APPENDIX I , CONTINUED:

ASSUMPTION	REASONS FOR DOUBT	POTENTIAL CHECKS AND REMEDIES
9.) No change in fallow and farmed time occurs in more marginal land not yet in production.	It would seem reasonable to expect a longer fallow to be necessary if environmental degredation is to be avoided.	Some correction has been made for this in the original estimate in the distinction between "hills" and "bottomland". The sample size is small, a finer breakdown of land qualities is needed, and information is needed specific to the Drake area.
10.) No density dependent changes in crop yields occur (from increased pests, etc.)	a.) This is often not the case, as has been pointed out by Janzen (1970 & 73). b.) Insects were preventing the cultivation of beans in the lowlands at Sirena.	Quantification of probabilities of insect outbreaks under different conditions is an area crying for study.
11.) No effect on the proportion of land allotted to each crop occurs from putting more marginal land into production.	Different crops were observed in the "hills" and "bottomland" in Sirena.	Again, a finer breakdown of data by land-quality class is needed.
12.) No effect is shown on the proportion of land allotted to each crop from greater ease of marketing cash crops.	Farmers often mention difficulty of getting cash crops to market. A larger population could be expected to lure the Puntarenas-based "lancha" to stop more often.	Predictions of this would be tenuous and hard to separate from other factors, unfortunately.
13.) No effect on the proportion of land allotted to each crop from increasing population density is shown,	One would expect an increase in starch crops as population pressure mounts.	More study in this area is needed. The population density information in Appendix IX, unfortunately, is inadequate, as explained under assumption no. 8.
14.) No effect on the proportion of land allotted to each crop occurs from changes in the size of each family.	One might expect larger families to be able to grow more labor-intensive crops.	See text.

APPENDIX I, CONTINUED:

ASSUMPTION	REASONS FOR DOUBT	POTENTIAL CHECKS AND REMEDIES
15.) No effect on the proportion of land allotted to each crop occurs due to changes in the numbers of families in each age class.	One might expect newly-arrived families to concentrate on subsistence crops, and older ones to produce more cash crops.	See text.
16.) The standard of living at the time of the 1963 survey is the one on which a carrying capacity estimate should be based.	The Costa Rican Government may well have goals for raising the standard of living above this level.	Scenarios could be constructed assuming various standards of living.
17.) All of the land in the area not classed as "swamps, beaches and rivers" should be devoted to agriculture.	a.) Some additional land not in this category may be unsuitable for farming. b.) It may be desireable to bar agriculture from some of the land included in the study area. Part of a National Forest is in the area.	Scenarios could be constructed assuming agriculture is barred from certain areas, and/or certain additional proportions are unsuitable for farming.
18.) The carrying capacity is a constant value and does not change through time.	There are many changes which could alter the carrying capacity, including violation of the assumptions on consumption habits, standard of living, technological change, and degredation.	In addition to the allowances suggested under assumptions 2,4,5,&16 , all such effects should be incorporated into a dynamic model of carrying capacity.
19.) An adequate estimate of the carrying capacity is obtained from the mean values of land holdings, fallow times, yields, etc.	The importance of a reserve food supply which the farmer can tap in a bad year, such as the reserve of game in the forest, may be critical in making the present system viable.	Allowance must be made for the variance in crop yields and probabilities of failure. The compensating reserves and "surplus" production in "normal" years must be incorporated as a part of the estimate. A stochastic model for carrying capacity must be developed.

APPENDIX I, CONTINUED:

ASSUMPTION	REASONS FOR DOUBT	POTENTIAL CHECKS AND REMEDIES
20.) The "present land use" method, which is analogous to calling "carrying capacity" the 45.6 persons/km^2 figure for the population density at the time that all useable land is projected to be cleared, assumes that the individual families are not expanding their holding for planting with annual crops. The supply of fallow land is sufficient to maintain the population without drawing on a supplement of new, previously unused land.	a.) Interviewed farmers were clearing more land for cultivation yearly. b.) High land-clearing rates were observed in the 1963 survey data.	Figures from this method could only be converted to meaningful carrying capacity values (given the other assumptions) if a correction were made for the equivalent input of the new land.

It should be noted that the regressions and projections have statistical assumptions in addition to these biological ones. Some of these are discussed in the text.

APPENDIX II : TABLE OF REGRESSION EQUATIONS DEVELOPED FOR IRAKE

EQN. NO.	DESCRIPTION	EQUATION	N	R^2	F	STD. ERROR	SIGNIFICANCE
DEMOGRAPHIC INFORMATION AND LAND CLEARING:							
1.)	Number of families arriving (Y) from the year of arrival (X).	$\text{Log}_e Y = -400.51 + 0.20559 X$	14	0.85822	72.636	0.45079	0.0000
2.)	Total hectares of cleared land (Y) from the number of years of occupancy (X)	$Y = 2.2403 X$	94	0.5795	128.17	0.19789	0.0000
3.)	Total hectares cleared (Y) from the years of occupancy (X_1) and the number of persons in the family (X_2)	$Y = 1.8063 X_1 + 0.79296 X_2$	71	0.8851	78.258	0.55226	0.0000
4.)	Number of persons in a family (Y) from the number of years of occupancy (X)	$Y = 5.4591 + 0.24824 X - 0.0067187 X^2$	74	0.03275	3.2062	3.2061	0.3067
PERENNIAL CROPS:							
5.)	Hectares of pasture (Y) from the no. of years of occupancy (X_1) and the number of persons in the family (X_2)	$Y = 0.07009 X_1 + 0.03038 X_2$	69	0.0655	4.2383	0.09177	0.0185
6.)	Hectares of pasture (Y) from the number of years of occupa ncy (X)	$Y = 0.090913 X$	91	0.0504	4.7740	0.0416	0.0315
7.)	Hectares of bananas (Y) from the number of years of occupancy (X)	$Y = 0.32106 X$	91	0.3907	57.697	0.0754	0.0000

APPENDIX II, CONTINUED:

EQN. NO.	DESCRIPTION	EQUATION	N	R^2	F	STD. ERROR	SIGNIFICANCE
PERENNIAL CROPS, CONTINUED:							
8.)	Hectares of cacao (Y) from the number of years of occupancy (X)	Y = 0.07532 X	91	0.3907	18.152	0.0754	0.0001
9.)	Hectares of other crops (Y) from the number of years of occupancy (X)	Y = 0.030655 X	91	0.1249	12.847	0.0085	0.0005
NON-PERENNIAL CROPS FROM OBSERVATIONS IN FEBRUARY:							
10.)	Hectares of rice (Y) from the number of years of occupancy (X)	Y = 0.05817 X	46	0.0981	4.5559	0.0276	0.0383
11.)	Hectares of beans (Y) from the number of years of occupancy (X)	Y = 0.047725 X	46	0.1921	10.70	0.0146	0.0021
12.)	Hectares of maize (Y) from the number of years of occupancy (X)	Y = 0.41096 X	46	0.2408	14.268	0.1088	0.0021
13.)	Total hectares of "occupied" (farmed) land (Y) from the number of years of occupancy (X)	Y = 1.0443 X	46	0.5396	52.732	0.1438	0.0000
14.)	Hectares fallow (Y) from the number of years of occupancy (X)	Y = 1.2849 X	46	0.3837	28.018	0.24275	0.0000

APPENDIX II, CONTINUED:

EQN. NO.	DESCRIPTION	EQUATION	N	R^2	F	STD. ERROR	SIGNIFICANCE
	NON-PERENNIAL CROPS FROM OBSERVATIONS IN OCTOBER:						
15.)	Hectares of rice (Y) from the number of years of occupancy (X)	Y = 0.042368 X	37	0.1449	6.1009	0.01715	0.0184
16.)	Hectares of maize (Y) from the number of years of occupancy (X)	Y = 0.15188 X	37	0.1413	5.9245	0.0624	0.0200
17.)	Total hectares of "occupied" (farmed) land (Y) from the number of years of occupancy (X)	Y = 0.74368 X	37	0.4273	26.861	0.14349	0.0000
18.)	Hectares of fallow land (Y) from the number of years of occupa ncy (X)	Y = 1.3270 X	37	0.4294	27.089	0.25496	0.0000

APPENDIX III: EXPLANATION OF ABBREVIATIONS

The following abbreviations are used in the tables and graphs in Appendices IV - IX:

Region: refers to the four regions into which the total study area was divided; 1 = Rincon, 2 = Drake, 3 = Playa Blanca, 4 = Sirena.

Family: refers to the family identification number from the 1963 Osa Productos Forestales survey.

Persons: Refers to the number of persons listed in the the 1963 survey; if only one person was listed this was treated as a missing value.

Yrsocc: the number of years the family has occupied the site

Riceha: the number of hectares of rice

Beanha: the number of hectares of beans

Maizeha: the number of hectares of maize

Cacaoha: the number of hectares of cacao

Bananaha: the number of hectares of bananas

pastureh: the number of hectares of pasture

otherha: the number of hectares of other crops. This is mostly fruit, but also includes some manioc, pineapple, sugarcane, and other crops.

Totalocc: the total hectares of "occupied" (ie. farmed) land

Fallowha: the total hectares of fallow land

Totclear: the total hectares of land ever cleared.

Monthobs: The month in which the observation was taken

Arrival: the year in which the family arrived.

Ricehpc: hectares per capita of rice

Beanhpc: hectares per capita of beans

maizehpc: hectares per capita of maize

cacaohpc: hectares per capita of cacao

Bananhpc: hectares per capita of bananas

Basthpc: hectares per capita of pasture

Otherhpc: hectares per capita of other crops

Occhpc: Hectares per capita of "occupied" (farmed) land

APPENDIX III, CONTINUED:

Fallohpc: hectares per capita of fallow land

Clearhpc: hectares per capita of cleared land

clehpcpy: hectares of land cleared per capita per year of occupancy

Riceprop: the proportion of the "occupied" (farmed) land planted in rice

Beanprop: proportion of the occupied (farmed) land in beans

Maizepro: proportion of the "occupied" (farmed) land in maize

Cacaopro: proportion of the "occupied" (farmed) land in cacao

Bananapr: proportion of the "occupied" (farmed) land in bananas

Pastprop: proportion of the "occupied" (farmed) land in pasture

Otherpro: proportion of the "occupied" (farmed) land planted in other crops

Fallowpt: the proportion of the total cleared area which was fallow.

Predarr: the predicted number of families arriving in a given year

Familarr: the actual number of families which arrived in a given year.

Familpre: the number of families present in the region in a given year

Logfamar: the natural logarithm of the number of families arri ving in a given year.

Logfampr: the natural logarithm of the number of families present in a given year.

missing values are indicated by the symbol "-0.0".

APPENDIX IV: TABLE OF LAND USE FROM 1963 OSA PRODUCTOS FORESTALES SURVEY

RINCON:

REGION FALLOHA FALLOHPC	FAMILY FOTCLEAR CLEARHPC	PERSONS MONTHSHS CLEMPCPY	YRSOCC ARRIVAL RICEPROP	RICEHA RICEHPC BEANPROP	BEANHA BEANHPC MAIZEPRO	MAIZEHA MAIZEHPC CACAOPRO	CACAOHA CACAOHPC BANANAPR	BANANAHA BANANHPC PASTPROP	PASTUREH PASTHPC OTHERPRO	OTHERHA OTHERHPC FALLOWPT	TOTALOCC OCCHPC
1.0000	1.0000	13.000	8.0000	0.	0.	.75000	.25000	5.0000	5.0000	0.	11.000
26.000	31.000	7.0000	1955.0	0.	0.	.57692 -1	.19231 -1	.38462	.38462	0.	.84615
1.5385	2.3846	.27000	0.	0.	.66182 -1	.22727 -1	.45455	.45455	0.	.64516	
1.0000	2.0000	5.0000	37.000	0.	0.	0.	.25000	1.0000	0.	1.2500	2.5000
17.500	20.000	7.0000	1926.0	0.	0.	0.	.50000 -1	.20000	0.	.25000	.50000
3.5000	4.0000	.10811	0.	0.	0.	.10000	.40000	0.	.50000	.87500	
1.0000	3.0000	-0.	-0.	0.	0.	0.	0.	1.0000	5.0000	0.	6.0000
0.	6.0000	6.0000	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	0.	0.	0.	0.	.16667	.83333	0.	0.	

DRAKE:

2.0000	4.0000	3.0000	1.0000	0.	0.	0.	0.	0.	0.	0.	0.
10.000	10.000	2.0000	1962.0	0.	0.	0.	0.	0.	0.	0.	0.
3.3333	3.3333	3.0000	-0.	-0.	-0.	-0.	-0.	-0.	-0.	1.0000	
2.0000	5.0000	2.0000	1.0000	0.	0.	0.	0.	1.5000	0.	0.	1.5000
0.	1.5000	2.0000	1962.0	0.	0.	0.	0.	.75000	0.	0.	.75000
0.	.75000	.75000	0.	0.	0.	0.	1.0000	0.	0.	0.	
2.0000	6.0000	2.0000	8.0000	0.	0.	0.	0.	1.0000	0.	0.	1.0000
3.0000	4.0000	2.0000	1955.0	0.	0.	0.	0.	.50000	0.	0.	.50000
1.5000	2.0000	.25000	0.	0.	0.	0.	1.0000	0.	0.	.75000	
2.0000	7.0000	-0.	1.0000	0.	0.	0.	0.	1.5000	0.	0.	1.5000
0.	1.5000	2.0000	1962.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	0.	0.	0.	0.	1.0000	0.	0.	0.	
2.0000	8.0000	3.0000	8.0000	0.	0.	1.0000	0.	0.	0.	0.	1.0000
1.0000	2.0000	2.0000	1962.2	0.	0.	.33333	0.	0.	0.	0.	.33333
.33333	.66667	.66667	0.	0.	1.0000	0.	0.	0.	0.	.50000	
2.0000	9.0000	7.0000	14.000	0.	0.	1.0000	0.	.50000	0.	1.5000	3.0000
17.000	33.000	2.0000	1949.0	0.	0.	.14286	0.	.71429 -1	0.	.21429	.42857
2.4286	4.2857	.30612	0.	0.	.33333	0.	.16667	0.	.50000	.56667	
2.0000	13.000	20.000	12.000	0.	0.	1.0000	6.0000	2.0000	0.	0.	9.0000
61.000	70.000	2.0000	1951.0	0.	0.	.50000 -1	.30000	.10000	0.	0.	.45000
3.0000	3.5000	.29167	0.	0.	.11111	.66667	.22222	0.	0.	.87143	
2.0000	11.000	-0.	.50000	2.0000	0.	.50000	0.	0.	0.	0.	2.5000
0.	2.5000	2.0000	1962.5	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	.80000	0.	.20000	0.	0.	0.	0.	0.	
2.0000	12.000	8.0000	7.0000	1.0000	1.0000	1.0000	0.	1.0000	0.	0.	4.0000
0.	4.0000	2.0000	1956.0	.12500	.12500	.12500	0.	.12500	0.	0.	.50000
0.	.50000	.71429 -1	.25000	.25000	.25000	0.	.25000	0.	0.	0.	
2.0000	13.000	12.000	.84000	.50000	0.	1.0000	0.	.50000	0.	0.	2.0000
0.	2.0000	2.0000	1962.2	.41667 -1	0.	.83333 -1	0.	.41667 -1	0.	0.	.16667
0.	.16667	.14541	.25000	0.	.50000	0.	.25000	0.	0.	0.	
2.0000	14.000	5.0000	3.0000	.50000	0.	1.0000	0.	.50000	0.	0.	2.0000
0.	2.0000	2.0000	1960.0	.10000	0.	.20000	0.	.10000	0.	0.	.40000
0.	.40000	.13333	.25000	0.	.50000	0.	.25000	0.	0.	0.	
2.0000	15.000	6.0000	5.0000	2.0000	0.	0.	.50000	0.	0.	1.5000	5.0000
0.	5.0000	2.0000	1958.0	.33333	0.	0.	.83333 -1	0.	0.	.25000	.83333
0.	.83333	.16667	.40000	0.	0.	.10000	0.	0.	.30000	0.	
2.0000	15.000	7.0000	4.0000	0.	0.	0.	.25000	.50000	.50000	.75000	6.0000
2.0000	6.0000	2.0000	1959.0	0.	0.	0.	.35714 -1	.71429 -1	.71429 -1	.10714	.85714
.28571	1.1429	.23571	0.	0.	0.	.41667 -1	.83333 -1	.83333 -1	.12500	.25000	
2.0000	17.000	5.0000	1.3300	1.0000	1.0000	1.0000	0.	1.0000	0.	0.	5.0000
0.	5.0000	2.0000	1961.7	.20000	.20000	.20000	0.	.20000	0.	0.	1.0000
0.	1.0000	.73154	.20000	.20000	.20000	0.	.20000	0.	0.	0.	
2.0000	13.000	13.000	1.0000	0.	0.	2.0000	0.	1.0000	0.	0.	3.0000
5.0000	8.0000	2.0000	1962.0	0.	0.	.20000	0.	.10000	0.	0.	.30000
.50000	.80000	.80000	0.	0.	.66667	0.	.33333	0.	0.	.62500	
2.0000	19.000	13.000	3.0000	0.	2.0000	8.0000	1.5000	2.0000	.50000	.50000	15.000
0.	15.000	2.0000	1960.0	0.	.15385	.61538	.11538	.15385	.38462 -1	.38462 -1	1.1538
0.	1.1538	.31462	0.	.16333	.53333	.10000	.13333	.33333 -1	.33333 -1	0.	
2.0000	20.000	11.000	8.0000	0.	0.	0.	0.	4.0000	3.0000	0.	7.0000
4.0000	11.000	2.0000	1955.0	0.	0.	0.	0.	.36364	.27273	0.	.63636
.36364	1.0000	.12500	0.	0.	0.	0.	.57143	.42857	0.	.36364	
2.0000	21.000	8.0000	8.0000	0.	0.	22.000	0.	2.0000	0.	0.	24.000
11.000	35.000	2.0000	1955.0	0.	0.	2.7500	0.	.25000	0.	0.	3.0000
1.3750	4.3750	.35000	0.	0.	.91667	0.	.83333 -1	0.	0.	.31429	
2.0000	22.000	-0.	8.0000	0.	2.0000	15.000	.50000	5.0000	0.	.50000	23.000
17.000	40.000	2.0000	1955.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	0.	.66957 -1	.65217	.21739 -1	.21739	0.	.21739 -1	.42500	
2.0000	13.000	-0.	5.0000	0.	0.	3.0000	0.	0.	0.	0.	3.0000
5.0000	8.0000	2.0000	1958.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	0.	0.	1.0000	0.	0.	0.	0.	.62500	
2.0000	24.000	2.0000	.75000	0.	0.	0.	0.	2.0000	0.	0.	2.0000
0.	2.0000	2.0000	1962.3	0.	0.	0.	0.	1.0000	0.	0.	1.0000
0.	1.3333	1.3333	0.	0.	0.	0.	1.0000	0.	0.	0.	
2.0000	25.000	-0.	12.000	0.	0.	0.	0.	4.0000	0.	0.	4.0000
0.	4.0000	2.0000	1951.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.

-0.	-0.	-0.	0.	0.	0.	0.	1.0000	0.	0.	0.	
2.0000	26.000	9.0000	12.000	3.0000	1.0000	7.0000	0.	14.000	0.	0.	25.000
5.0000	10.000	2.0000	1951.0	.33333	.11111	.77778	0.	1.5556	0.	0.	2.7778
.55556	3.3333	.27778	.12000	.40000 -1	.28000	0.	.56000	0.	0.	.16667	
2.0000	27.000	10.000	2.0000	2.0000	0.	1.0000	0.	1.5000	0.	0.	4.5000
6.5000	11.000	2.0000	1961.0	.20000	0.	.10000	0.	.15000	0.	0.	.45000
.65000	1.1000	.55000	.44444	0.	.22222	0.	.33333	0.	0.	.59091	
2.0000	28.000	9.0000	.50000	0.	0.	0.	0.	2.0000	0.	0.	2.0000
0.	2.0000	2.0000	1962.5	0.	0.	0.	0.	.22222	0.	0.	.22222
0.	.22222	.44444	0.	0.	0.	0.	1.0000	0.	0.	0.	
2.0000	29.000	-0.	2.0000	0.	0.	0.	0.	1.0000	0.	0.	1.0000
3.0000	4.0000	2.0000	1961.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	0.	0.	0.	0.	1.0000	0.	0.	.75000	
2.0000	30.000	10.000	2.0000	0.	0.	0.	0.	6.0000	0.	0.	6.0000
2.0000	6.0000	2.0000	1961.0	0.	0.	0.	0.	.60000	0.	0.	.60000
.20000	.60000	.40000	0.	0.	0.	0.	1.0000	0.	0.	.25000	
2.0000	31.000	5.0000	6.0000	0.	0.	0.	0.	3.0000	0.	0.	3.0000
7.0000	10.000	2.0000	1955.0	0.	0.	0.	0.	.60000	0.	0.	.60000
1.4000	2.0000	.25000	0.	0.	0.	0.	1.0000	0.	0.	.70000	
2.0000	32.000	6.0000	1.0000	1.5000	0.	0.	0.	.50000	0.	0.	2.0000
0.	2.0000	2.0000	1962.0	.25000	0.	0.	0.	.83333 -1	0.	0.	.33333
0.	.33333	.23333	.75000	0.	0.	0.	.25000	0.	0.	0.	
2.0000	33.000	7.0000	1.0000	3.0000	0.	1.0000	0.	0.	0.	0.	4.0000
0.	4.0000	2.0000	1962.0	.42857	0.	.14286	0.	0.	0.	0.	.57143
0.	.57143	.57143	.75000	0.	.25000	0.	0.	0.	0.	0.	
2.0000	34.000	-0.	3.0000	4.0000	0.	0.	0.	0.	0.	0.	4.0000
0.	4.0000	2.0000	1963.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	1.0000	0.	0.	0.	0.	0.	0.	0.	
2.0000	35.000	6.0000	5.0000	0.	0.	0.	.25000	1.0000	1.0000	0.	2.2500
5.7500	8.0000	2.0000	1956.0	0.	0.	0.	.41667 -1	.16667	.16667	0.	.37500
.95833	1.3333	.23667	0.	0.	0.	.11111	.44444	.44444	0.	.71875	
2.0000	36.000	4.0000	.53000	0.	1.0000	0.	0.	0.	0.	0.	1.0000
0.	1.0000	2.0000	1962.4	0.	.25000	0.	0.	0.	0.	0.	.25000
0.	.25000	.43103	0.	1.0000	0.	0.	0.	0.	0.	0.	
2.0000	37.000	7.0000	4.0000	0.	1.0000	9.0000	0.	.50000	0.	.50000	11.000
0.	11.000	2.0000	1959.0	0.	.14286	1.2857	0.	.71429 -1	0.	.71429 -1	1.5714
0.	1.5714	.33286	0.	.90909 -1	.81818	0.	.45455 -1	0.	.45455 -1	0.	
2.0000	38.000	8.0000	4.0000	0.	.50000	4.0000	.50000	1.0000	0.	0.	1.0000
0.	1.0000	2.0000	1959.0	0.	.16667	1.3333	.16667	.33333	0.	0.	.33333
0.	.33333	.83333 -1	0.	.50000	4.0000	.50000	1.0000	0.	0.	0.	
2.0000	39.000	-0.	5.0000	0.	0.	0.	0.	1.0000	0.	0.	1.0000
0.	1.0000	2.0000	1958.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	0.	0.	0.	0.	1.0000	0.	0.	0.	
2.0000	40.000	-0.	5.0000	0.	0.	2.0000	0.	1.0000	0.	0.	3.0000
9.0000	12.000	2.0000	1958.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.

-0.	-0.	-0.	0.	0.	.66667	0.	.33333	0.	0.	.75000	
2.0000	41.000	9.0000	4.0000	0.	1.0000	1.0000	2.5000	1.5000	0.	.50000	6.5000
3.5000	10.000	2.0000	1959.0	0.	.20000	.20000	.50000	.30000	0.	.10000	1.3000
.70000	2.0000	.53000	0.	.15385	.15385	.38462	.23077	0.	.76923 -1	.35000	
2.0000	42.000	-0.	5.0000	0.	0.	0.	.50000	4.0000	0.	0.	4.5000
5.5000	4.0000	2.0000	1958.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	0.	0.	0.	.11111	.88889	0.	0.	1.3750	
2.0000	43.000	2.0000	3.0000	1.0000	0.	1.0000	0.	.50000	0.	.50000	3.0000
1.0000	4.0000	2.0000	1960.0	.50000	0.	.50000	0.	.25000	0.	.25000	1.5000
.50000	2.0000	.66667	.33333	0.	.33333	0.	.16667	0.	.16667	.25000	
2.0000	44.000	3.0000	1.0000	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	2.0000	1962.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	
2.0000	45.000	4.0000	1.0000	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	2.0000	1962.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	
2.0000	46.000	2.0000	3.0000	0.	.50000	0.	1.0000	1.0000	0.	.50000	3.0000
9.0000	12.000	2.0000	1960.0	0.	.25000	0.	.50000	.50000	0.	.25000	1.5000
4.5000	6.0000	2.0000	0.	.16667	0.	.33333	.33333	0.	.16667	.75000	
2.0000	47.000	5.0000	2.0000	0.	.50000	.50000	0.	.50000	0.	.50000	2.0000
2.0000	4.0000	2.0000	1961.0	0.	.10000	.10000	0.	.10000	0.	.10000	.40000
.40000	.80000	.40000	0.	.25000	.25000	0.	.25000	0.	.25000	.50000	
2.0000	48.000	4.0000	6.0000	0.	.50000	2.0000	0.	1.0000	0.	0.	3.5000
6.5000	10.000	2.0000	1957.0	0.	.12500	.50000	0.	.25000	0.	0.	.87500
1.6250	2.5000	.41667	0.	.14286	.57143	0.	.28571	0.	0.	.65000	
2.0000	49.000	6.0000	8.0000	0.	.50000	1.0000	0.	1.0000	8.0000	0.	10.500
14.500	25.000	2.0000	1957.0	0.	.83333 -1	.16667	0.	.16667	1.3333	0.	1.7500
2.4167	4.1667	.69444	0.	.47619 -1	.95238 -1	0.	.95238 -1	.76190	0.	.58000	
2.0000	50.000	7.0000	4.0000	0.	1.0000	3.0000	1.5000	2.0000	0.	.50000	8.0000
12.000	20.000	2.0000	1959.0	0.	.14286	.42857	.21429	.28571	0.	.71429 -1	1.1429
1.7143	2.8571	.71429	0.	.12500	.37500	.18750	.25000	0.	.62500 -1	.60000	
2.0000	51.000	-0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
23.000	21.000	2.0000	1963.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	1.0000	
2.0000	52.000	4.0000	3.0000	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	17.000	13.000	1960.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	4.2500	1.4167	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	
2.0000	53.000	6.0000	1.0000	0.	0.	7.5000	0.	1.5000	0.	0.	9.0000
0.	9.0000	10.000	1962.0	0.	0.	1.2500	0.	.25000	0.	0.	1.5000
0.	1.5000	1.5000	0.	0.	.83333	0.	.16667	0.	0.	0.	
2.0000	54.000	-0.	3.0000	0.	0.	0.	0.	2.0000	0.	0.	2.0000
1.0000	3.0000	13.000	1960.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	0.	0.	0.	0.	1.0000	0.	0.	.33333	
2.0000	55.000	5.0000	17.000	0.	0.	0.	0.	0.	0.	0.	0.
15.000	15.000	10.000	1960.0	0.	0.	0.	0.	0.	0.	0.	0.

3.0000	3.0000	.17647	-0.	-0.	-0.	-0.	-0.	-0.	-0.	1.0000	
2.0000	56.000	6.0000	1.0000	0.	0.	1.0000	0.	0.	0.	0.	1.0000
1.5000	2.5000	13.000	1962.0	0.	0.	.16667	0.	0.	0.	0.	.16667
.25000	.41667	.41667	0.	0.	1.0000	0.	0.	0.	0.	.60000	
2.0000	57.000	-0.	1.0000	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	2.5000	14.000	1962.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	
2.0000	58.000	-0.	3.0000	0.	0.	8.0000	0.	0.	0.	0.	8.0000
7.0000	15.000	13.000	1963.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	0.	0.	1.0000	0.	0.	0.	0.	.46667	
2.0000	59.000	-0.	2.0000	0.	0.	0.	0.	1.0000	0.	.25000	1.2500
.75000	2.0000	13.000	1961.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	0.	0.	0.	0.	.80000	0.	.20000	.37500	
2.0000	60.000	8.0000	13.000	4.0000	0.	0.	0.	9.0000	2.0000	1.0000	16.000
14.000	33.000	13.000	1960.0	.50000	0.	0.	0.	1.1250	.25000	.12500	2.0000
1.7500	3.7500	.26666	.25000	0.	0.	0.	.56250	.12500	.62500 -1	.46667	
2.0000	61.000	-0.	15.000	0.	0.	3.0000	1.0000	1.0000	0.	0.	5.0000
3.0000	8.0000	10.000	1960.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	0.	0.	.80000	.20000	.20000	0.	0.	.37500	
2.0000	62.000	3.0000	4.0000	0.	0.	0.	0.	3.0000	3.0000	0.	6.0000
6.0000	12.000	13.000	1959.0	0.	0.	0.	0.	1.0000	1.0000	0.	2.0000
2.0000	4.0000	1.0000	0.	0.	0.	0.	.50000	.50000	0.	.50000	
2.0000	63.000	6.0000	1.2500	0.	0.	0.	0.	8.0000	0.	0.	8.0000
2.0000	13.000	10.000	1961.0	0.	0.	0.	0.	1.3333	0.	0.	1.3333
.33333	1.6667	1.3333	0.	0.	0.	0.	1.0000	0.	0.	.20000	
2.0000	64.000	2.0000	3.0000	0.	0.	0.	.25000	3.0000	0.	0.	3.2500
36.750	40.000	10.000	1960.0	0.	0.	0.	.12500	1.5000	0.	0.	1.6250
18.375	20.000	0.66667	0.	0.	0.	.76923 -1	.92308	0.	0.	.91875	
2.0000	65.000	13.000	8.0000	0.	0.	0.	0.	8.0000	0.	0.	8.0000
0.	8.0000	10.000	1959.0	0.	0.	0.	0.	.80000	0.	0.	.80000
0.	.80000	.13333	0.	0.	0.	0.	1.0000	0.	0.	0.	
2.0000	66.000	6.0000	8.0000	0.	0.	.50000	5.0000	0.	0.	0.	5.5000
14.000	19.500	10.000	1958.0	0.	0.	.83333 -1	.83333	0.	0.	0.	.91667
2.3333	3.2500	.43625	0.	0.	.90909 -1	.90909	0.	0.	0.	.71795	
2.0000	67.000	6.0000	2.0000	0.	0.	.50000	0.	0.	0.	0.	.50000
2.5000	3.0000	13.000	1961.0	0.	0.	.83333 -1	0.	0.	0.	0.	.83333 -1
.41667	.50000	.23000	0.	0.	1.0000	0.	0.	0.	0.	.83333	
2.0000	68.000	8.0000	2.0000	0.	0.	.50000	0.	.50000	0.	0.	1.2500
2.7500	4.0000	13.000	1961.0	0.	0.	.62500 -1	0.	.62500 -1	0.	0.	.15625
.34375	.50000	.23000	0.	0.	.40000	0.	.40000	0.	0.	.68750	
2.0000	69.000	8.0000	.92000	0.	0.	1.0000	0.	1.2500	0.	1.0000	3.2500
0.	3.2500	9.0000	1962.1	0.	0.	.12500	0.	.15625	0.	.12500	.40625
0.	.40625	.44193	0.	0.	.30769	0.	.38462	0.	.30769	0.	
2.0000	70.000	7.0000	1.0000	0.	0.	0.	0.	3.0000	0.	0.	3.0000
3.0000	6.0000	13.000	1962.0	0.	0.	0.	0.	.42857	0.	0.	.42857

.42857	.85714	.85714	0.	0.	0.	0.	1.0000	0.	0.	.50000	
2.0000	71.000	4.0000	-0.	0.	0.	0.	.25000	.50000	0.	0.	.75000
1.2500	2.0000	13.000	-0.	0.	0.	0.	.62500 -1	.12500	0.	0.	.18750
.31250	.50000	-0.	0.	0.	0.	.33333	.66667	0.	0.	.62500	
2.0000	72.000	6.0000	2.0000	1.0000	0.	3.0000	0.	4.0000	0.	.50000	8.0000
0.	8.0000	13.000	1961.0	.16667	0.	.50000	0.	.66667	0.	.83333 -1	1.3333
0.	1.3333	.66667	.12500	0.	.37500	0.	.50000	0.	.62500 -1	0.	
2.0000	73.000	5.0000	2.0000	0.	0.	0.	1.2500	1.5000	0.	1.2500	3.0000
0.	3.0000	13.000	1961.0	0.	0.	0.	.25000	.30000	0.	.25000	.60000
0.	.60000	.30000	0.	0.	0.	.41667	.50000	0.	.41667	0.	
2.0000	74.000	5.0000	4.0000	0.	0.	0.	0.	1.5000	0.	.25000	1.7500
3.2500	5.0000	13.000	1959.0	0.	0.	0.	0.	.30000	0.	.50000 -1	.35000
.45000	1.0000	.29970	0.	0.	0.	0.	.85714	0.	.14286	.65000	
2.0000	75.000	8.0000	4.0000	0.	0.	.25000	0.	5.0000	0.	.75000	6.0000
2.0000	8.0000	13.000	1959.0	0.	0.	.31250 -1	0.	.62500	0.	.93750 -1	.75000
.25000	1.0000	.25000	0.	0.	.41667 -1	0.	.83333	0.	.12500	.25000	
2.0000	76.000	10.000	1.0000	0.	0.	0.	0.	2.0000	0.	.50000	2.5000
5.5000	8.0000	10.000	1962.0	0.	0.	0.	0.	.20000	0.	.50000 -1	.25000
.55000	.40000	.80000	0.	0.	0.	0.	.80000	0.	.20000	.68750	
2.0000	77.000	10.000	4.0000	0.	0.	0.	1.5000	5.5000	.50000	3.0000	10.500
30.500	41.000	13.000	1959.0	0.	0.	0.	.15000	.55000	.50000 -1	.30000	1.0500
3.0000	4.1000	1.0250	0.	0.	0.	.14286	.52381	.47619 -1	.28571	.74390	
2.0000	78.000	11.000	3.0000	0.	0.	0.	0.	2.0000	3.0000	0.	5.0000
2.0000	7.0000	10.000	1960.0	0.	0.	0.	0.	.18182	.27273	0.	.45455
.18182	.63636	.21212	0.	0.	0.	0.	.40000	.60000	0.	.28571	
2.0000	79.000	6.0000	10.000	.50000	0.	1.0000	0.	2.0000	0.	0.	3.5000
36.500	45.000	10.000	1958.0	.83333 -1	0.	.16667	0.	.33333	0.	0.	.58333
6.0833	6.6667	.66667	.14286	0.	.28571	0.	.57143	0.	0.	.91250	
2.0000	80.000	-0.	5.0000	0.	0.	2.0000	.50000	1.0000	0.	0.	3.5000
6.5000	13.000	10.000	1958.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	0.	0.	.57143	.14286	.28571	0.	0.	.65000	
2.0000	81.000	-0.	6.0000	0.	0.	0.	.25000	0.	0.	.25000	.50000
10.000	10.500	13.000	1957.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	0.	0.	0.	.50000	0.	0.	.50000	.95238	
2.0000	82.000	5.0000	7.0000	0.	0.	0.	4.0000	3.0000	0.	0.	7.0000
16.000	17.000	13.000	1956.0	0.	0.	0.	.80000	.60000	0.	0.	1.4000
2.0000	3.4000	.41571	0.	0.	0.	.57143	.42857	0.	0.	.58824	
2.0000	83.000	-0.	5.0000	0.	0.	2.0000	.25000	4.0000	0.	0.	6.2500
3.7500	13.000	10.000	1956.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	0.	0.	.32000	.40000 -1	.64000	0.	0.	.37500	
2.0000	84.000	2.0000	4.0000	0.	0.	1.0000	0.	.50000	0.	0.	1.5000
3.5000	5.0000	10.000	1955.0	0.	0.	.50000	0.	.25000	0.	0.	.75000
1.7500	2.5000	.62500	0.	0.	.66667	0.	.33333	0.	0.	.70000	
2.0000	85.000	5.0000	2.0000	0.	0.	0.	0.	.50000	.50000	0.	1.0000
5.0000	6.0000	10.000	1951.0	0.	0.	0.	0.	.10000	.10000	0.	.20000

3.0000	3.0000	.17647	-0.	-0.	-0.	-0.	-0.	-0.	-0.	1.0000	
2.0000	56.000	6.3333	1.0000	0.	0.	1.0000	0.	0.	0.	0.	1.0000
1.5000	2.5000	13.000	1962.0	0.	0.	.16667	0.	0.	0.	0.	.16667
.25000	.41667	.41667	0.	0.	1.0000	0.	0.	0.	0.	.60000	
2.0000	57.000	-0.	1.0000	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	2.5000	14.000	1962.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	
2.0000	58.000	-0.	3.0000	0.	0.	8.0000	0.	0.	0.	0.	8.0000
7.0000	15.000	13.000	1958.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	0.	0.	1.0000	0.	0.	0.	0.	.46667	
2.0000	59.000	-0.	2.0000	0.	0.	0.	0.	1.0000	0.	.25000	1.2500
.75000	2.0000	13.000	1961.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	0.	0.	0.	0.	.80000	0.	.20000	.37500	
2.0000	60.000	8.0000	13.000	4.0000	0.	0.	0.	9.0000	2.0000	1.0000	16.000
14.000	33.000	13.000	1958.0	.50000	0.	0.	0.	1.1250	.25000	.12500	2.0000
1.7500	3.7500	.26846	.25000	0.	0.	0.	.56250	.12500	.62500 -1	.46667	
2.0000	61.000	-0.	15.000	0.	0.	3.0000	1.0000	1.0000	0.	0.	5.0000
3.0000	8.0000	10.000	1960.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	0.	0.	.60000	.20000	.20000	0.	0.	.37500	
2.0000	62.000	3.0000	4.0000	0.	0.	0.	0.	3.0000	3.0000	0.	6.0000
6.0000	12.000	10.000	1959.0	0.	0.	0.	0.	1.0000	1.0000	0.	2.0000
2.0000	4.0000	1.0000	0.	0.	0.	0.	.50000	.50000	0.	.50000	
2.0000	63.000	6.0000	1.2500	0.	0.	0.	0.	8.0000	0.	0.	8.0000
2.0000	13.000	10.000	1961.0	0.	0.	0.	0.	1.3333	0.	0.	1.3333
.33333	1.6667	1.3333	0.	0.	0.	0.	1.0000	0.	0.	.20000	
2.0000	64.000	2.0000	3.0000	0.	0.	0.	.25000	3.0000	0.	0.	3.2500
36.750	13.000	10.000	1960.0	0.	0.	0.	.12500	1.5000	0.	0.	1.6250
18.375	23.000	0.0000	0.	0.	0.	.76923 -1	.92308	0.	0.	.91875	
2.0000	65.000	13.000	8.0000	0.	0.	0.	0.	8.0000	0.	0.	8.0000
0.	8.0000	10.000	1955.0	0.	0.	0.	0.	.80000	0.	0.	.80000
0.	.80000	.13333	0.	0.	0.	0.	1.0000	0.	0.	0.	
2.0000	66.000	6.0000	8.0000	0.	0.	.50000	5.0000	0.	0.	0.	5.5000
14.000	19.500	10.000	1955.0	0.	0.	.83333 -1	.83333	0.	0.	0.	.91667
2.3333	3.2500	.43625	0.	0.	.90909 -1	.90909	0.	0.	0.	.71795	
2.0000	67.000	6.0000	2.0000	0.	0.	.50000	0.	0.	0.	0.	.50000
2.5000	3.0000	13.000	1961.0	0.	0.	.83333 -1	0.	0.	0.	0.	.83333 -1
.41667	.50000	.23000	0.	0.	1.0000	0.	0.	0.	0.	.83333	
2.0000	68.000	8.0000	2.0000	0.	0.	.50000	0.	.50000	0.	0.	1.2500
2.7500	4.0000	13.000	1961.0	0.	0.	.62500 -1	0.	.62500 -1	0.	0.	.15625
.34375	.50000	.23000	0.	0.	.40000	0.	.40000	0.	0.	.68750	
2.0000	69.000	8.0000	.92000	0.	0.	1.0000	0.	1.2500	0.	1.0000	3.2500
0.	1.2500	9.0000	1962.1	0.	0.	.12500	0.	.15625	0.	.12500	.40625
0.	.40625	.44153	0.	0.	.30769	0.	.38462	0.	.30769	0.	
2.0000	70.000	7.0000	1.0000	0.	0.	0.	0.	3.0000	0.	0.	3.0000
3.0000	6.0000	13.000	1962.0	0.	0.	0.	0.	.42857	0.	0.	.42857

.42857	.85714	.85714	0.	0.	0.	0.	1.0000	0.	0.	.50000	
2.0000	71.000	4.0000	-0.	0.	0.	0.	.25000	.50000	0.	0.	.75000
1.2500	2.0000	13.000	-0.	0.	0.	0.	.62500 -1	.12500	0.	0.	.18750
.31250	.50000	-0.	0.	0.	0.	.33333	.66667	0.	0.	.62500	
2.0000	72.000	6.0000	2.0000	1.0000	0.	3.0000	0.	4.0000	0.	.50000	8.0000
0.	8.0000	10.000	1961.0	.16667	0.	.50000	0.	.66667	0.	.83333 -1	1.3333
0.	1.3333	.66667	.12500	0.	.37500	0.	.50000	0.	.62500 -1	0.	
2.0000	73.000	5.0000	2.0000	0.	0.	0.	1.2500	1.5000	0.	1.2500	3.0000
0.	3.0000	10.000	1961.0	0.	0.	0.	.25000	.30000	0.	.25000	.60000
0.	.60000	.30000	0.	0.	0.	.41667	.50000	0.	.41667	0.	
2.0000	74.000	5.0000	4.0000	0.	0.	0.	0.	1.5000	0.	.25000	1.7500
3.2500	5.0000	13.000	1959.0	0.	0.	0.	0.	.30000	0.	.50000 -1	.35000
.45000	1.0000	.23000	0.	0.	0.	0.	.85714	0.	.14286	.65000	
2.0000	75.000	8.0000	4.0000	0.	0.	.25000	0.	5.0000	0.	.75000	6.0000
2.0000	8.0000	10.000	1959.0	0.	0.	.31250 -1	0.	.62500	0.	.93750 -1	.75000
.25000	1.0000	.23000	0.	0.	.41667 -1	0.	.83333	0.	.12500	.25000	
2.0000	76.000	13.000	1.0000	0.	0.	0.	0.	2.0000	0.	.50000	2.5000
5.5000	8.0000	10.000	1962.0	0.	0.	0.	0.	.20000	0.	.50000 -1	.25000
.55000	.40000	.26000	0.	0.	0.	0.	.80000	0.	.20000	.68750	
2.0000	77.000	10.000	4.0000	0.	0.	0.	1.5000	5.5000	.50000	3.0000	10.500
30.500	41.000	13.000	1959.0	0.	0.	0.	.15000	.55000	.50000 -1	.30000	1.0500
3.0000	4.1000	1.0250	0.	0.	0.	.14286	.52381	.47619 -1	.28571	.74390	
2.0000	78.000	11.000	3.0000	0.	0.	0.	0.	2.0000	3.0000	0.	5.0000
2.0000	7.0000	10.000	1960.0	0.	0.	0.	0.	.18182	.27273	0.	.45455
.19162	.63636	.21212	0.	0.	0.	0.	.40000	.60000	0.	.28571	
2.0000	79.000	6.0000	10.000	.50000	0.	1.0000	0.	2.0000	0.	0.	3.5000
36.500	43.000	10.000	1953.0	.33333 -1	0.	.16667	0.	.33333	0.	0.	.58333
6.0833	6.6667	.63667	.14286	0.	.28571	0.	.57143	0.	0.	.91250	
2.0000	80.000	-0.	5.0000	0.	0.	2.0000	.50000	1.0000	0.	0.	3.5000
6.5000	13.000	10.000	1958.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	0.	0.	.57143	.14286	.28571	0.	0.	.65000	
2.0000	81.000	-0.	6.0000	0.	0.	0.	.25000	0.	0.	.25000	.50000
10.000	10.500	13.000	1957.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	0.	0.	0.	.50000	0.	0.	.50000	.95238	
2.0000	82.000	5.0000	7.0000	0.	0.	0.	4.0000	3.0000	0.	0.	7.0000
14.000	17.000	13.000	1956.0	0.	0.	0.	.80000	.60000	0.	0.	1.4000
2.0000	3.4000	.43571	0.	0.	0.	.57143	.42857	0.	0.	.58824	
2.0000	83.000	-0.	5.0000	0.	0.	2.0000	.25000	4.0000	0.	0.	6.2500
3.7500	13.000	10.000	1958.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	0.	0.	.32000	.40000 -1	.64000	0.	0.	.37500	
2.0000	84.000	2.0000	4.0000	0.	0.	1.0000	0.	.50000	0.	0.	1.5000
3.5000	5.0000	10.000	1957.0	0.	0.	.50000	0.	.25000	0.	0.	.75000
1.7500	2.5000	.62500	0.	0.	.66667	0.	.33333	0.	0.	.70000	
2.0000	85.000	5.0000	2.0000	0.	0.	0.	0.	.50000	.50000	0.	1.0000
5.0000	6.0000	10.000	1951.0	0.	0.	0.	0.	.10000	.10000	0.	.20000

1.3000	1.2500	.63000	0.	0.	0.	0.	.50000	.50000	0.	.83333		
2.0000	86.000	2.0000	5.0000	0.	0.	0.	0.	2.0000	0.	0.	5.0000	
5.3000	13.000	10.000	1956.0	0.	0.	0.	0.	1.0000	0.	0.	2.5000	
2.5000	5.0000	1.3333	0.	0.	0.	0.	.40000	0.	0.	.50000		
2.0000	87.000	6.0000	3.0000	0.	0.	0.	0.	1.7500	0.	0.	1.7500	
2.0000	4.0000	9.0000	1960.0	0.	0.	0.	0.	.29167	0.	0.	.29167	
.93333	.66667	.22222	0.	0.	0.	0.	1.0000	0.	0.	.50000		
2.0000	88.000	3.0000	7.0000	0.	0.	0.	0.	1.0000	0.	.12500	1.1250	
7.3750	8.5000	10.000	1956.0	0.	0.	0.	0.	.33333	0.	.41667 -1	.37500	
2.4999	2.8333	.49676	0.	0.	0.	0.	.88889	0.	.11111	.86765		
2.0000	89.000	8.0000	8.0000	0.	0.	5.0000	0.	0.	10.000	0.	15.000	
30.000	45.000	10.000	1959.0	0.	0.	.62500	0.	0.	1.2500	0.	1.8750	
3.7500	5.6250	.70313	0.	0.	.33333	0.	0.	.66667	0.	.66667		
2.0000	90.000	7.0000	7.0000	0.	0.	6.0000	1.2500	3.0000	0.	0.	10.250	
3.7500	14.000	10.000	1958.0	0.	0.	.85714	.17857	.42857	0.	0.	1.4643	
.53571	2.0000	.26571	0.	0.	.58537	.12195	.29268	0.	0.	.26786		
2.0000	91.000	-0.	-0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
23.000	23.000	10.000	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	1.0000		
2.0000	92.000	3.0000	6.0000	0.	0.	0.	0.	0.	0.	0.	0.	0.
5.0000	5.0000	9.0000	1957.0	0.	0.	0.	0.	0.	0.	0.	0.	0.
1.6667	1.6667	.27778	-0.	-0.	-0.	-0.	-0.	-0.	-0.	1.0000		
2.0000	93.000	-0.	5.0000	0.	0.	0.	0.	0.	0.	0.	0.	0.
2.0000	2.0000	9.0000	1958.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	1.0000		
2.0000	94.000	-0.	5.0000	0.	0.	0.	0.	.25000	0.	.25000	.50000	
6.0000	6.5000	9.0000	1958.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	
-0.	-0.	-0.	0.	0.	0.	0.	.50000	0.	.50000	.92308		
2.0000	95.000	-0.	1.0000	0.	0.	4.0000	0.	0.	0.	0.	4.0000	
0.	4.0000	10.000	1962.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	
-0.	-0.	-0.	0.	0.	1.0000	0.	0.	0.	0.	0.		
2.0000	96.000	2.0000	6.0000	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	
-0.	10.000	10.000	1957.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	
-0.	15.000	2.5000	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.		
2.0000	97.000	4.0000	2.0000	0.	0.	.50000	.25000	2.2500	0.	.50000	3.5000	
4.5000	4.0000	10.000	1961.0	0.	0.	.12500	.62500 -1	.56250	0.	.12500	.87500	
1.1250	2.0000	1.0000	0.	0.	.14286	.71429 -1	.64286	0.	.14286	.56250		
2.0000	98.000	6.0000	.50000	0.	0.	.50000	0.	.75000	0.	.25000	1.5000	
1.2500	2.7500	9.0000	1962.5	0.	0.	.62500 -1	0.	.93750 -1	0.	.31250 -1	.18750	
.15625	.34375	.06750	0.	0.	.33333	0.	.50000	0.	.16667	.45455		
2.0000	99.000	4.0000	.33000	.50000	0.	.25000	0.	1.2500	0.	0.	2.0000	
0.	2.0000	9.0000	1962.7	.12500	0.	.62500 -1	0.	.31250	0.	0.	.50000	
0.	.50000	1.0152	.25000	0.	.12500	0.	.62500	0.	0.	0.		
2.0000	100.00	-0.	3.0000	0.	0.	0.	0.	3.0000	16.500	.50000	20.000	
0.	20.000	10.000	1960.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	
-0.	-0.	-0.	0.	0.	0.	0.	.15000	.82500	.25000 -1	0.		
2.0000	101.00	3.0000	-0.	0.	0.	0.	0.	.50000	0.	0.	2.5000	
.50000	3.0000	10.000	-0.	0.	0.	0.	0.	.16667	0.	0.	.83333	
.16667	1.0000	-0.	0.	0.	0.	0.	.20000	0.	0.	.16667		
2.0000	102.00	3.0000	.75000	0.	0.	0.	0.	0.	0.	0.	0.	
1.5000	1.5000	9.0000	1962.3	0.	0.	0.	0.	0.	0.	0.	0.	
.50000	.50000	.56667	-0.	-0.	-0.	-0.	-0.	-0.	-0.	1.0000		

PLAYA BLANCA:

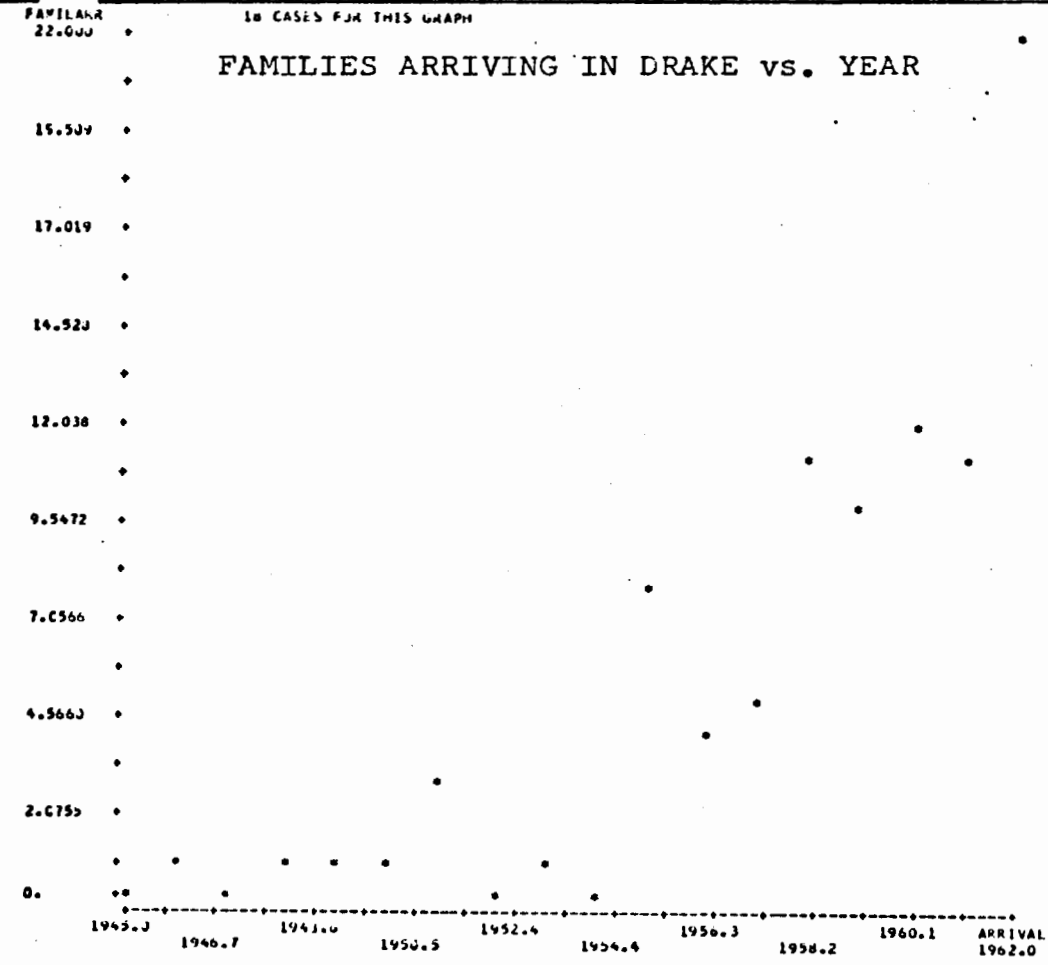
3.0000	133.00	13.000	25.000	0.	0.	0.	0.	18.000	0.	2.0000	50.000	
16.000	60.000	2.0000	1933.0	0.	0.	0.	0.	1.3846	0.	.15385	3.8462	
.76923	4.6154	.13462	0.	0.	0.	0.	.36000	0.	.40000 -1	.16667		
3.0000	104.00	-0.	10.000	0.	0.	.50000	0.	1.5000	0.	.50000	3.0000	
7.0000	10.000	2.0000	1933.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	
-0.	-0.	-0.	0.	0.	.16667	0.	.50000	0.	.16667	.70000		
3.0000	105.00	8.0000	20.000	0.	.50000	.50000	0.	8.0000	15.000	0.	24.000	
8.0000	12.000	2.0000	1943.0	0.	.62500 -1	.62500 -1	0.	1.0000	1.8750	0.	3.0000	
1.0000	4.0000	.20000	0.	.20833 -1	.20833 -1	0.	.33333	.62500	0.	.25000		
3.0000	106.00	9.0000	13.000	0.	1.0000	1.0000	0.	5.0000	10.000	1.0000	18.000	
32.000	32.000	2.0000	1950.0	0.	.11111	.11111	0.	.55556	1.1111	.11111	2.0000	
3.5556	3.5556	.42735	0.	.55556 -1	.55556 -1	0.	.27778	.55556	.55556 -1	.64000		
3.0000	107.00	-0.	13.000	0.	0.	1.0000	0.	10.000	4.0000	0.	15.000	
15.000	30.000	2.0000	1950.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	
-0.	-0.	-0.	0.	0.	.66667 -1	0.	.66667	.26667	0.	.50000		
3.0000	108.00	4.0000	2.0000	0.	1.0000	.50000	.50000	2.0000	20.000	0.	24.000	
51.000	75.000	2.0000	1961.0	0.	.25000	.12500	.12500	.50000	5.0000	0.	6.0000	
12.750	18.750	9.3750	0.	.41667 -1	.20833 -1	.20833 -1	.83333 -1	.83333	0.	.68000		
3.0000	109.00	-0.	18.000	0.	.50000	7.0000	0.	5.0000	15.000	.50000	22.000	
15.000	37.000	2.0000	1945.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	
-0.	-1.	-0.	0.	.22727 -1	.31818	0.	.22727	.68182	.22727 -1	.40541		
3.0000	110.00	5.0000	6.0000	0.	0.	0.	.25000	3.0000	0.	0.	3.2500	
6.7500	10.000	2.0000	1957.0	0.	0.	0.	.50000 -1	.60000	0.	0.	.65000	
1.3500	2.0000	.33333	0.	0.	0.	.76923 -1	.92308	0.	0.	.67500		
3.0000	111.00	-0.	6.0000	0.	0.	0.	.25000	3.5000	0.	.25000	5.5000	
2.5000	8.0000	8.0000	1957.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	
-0.	-0.	-0.	0.	0.	0.	.45455 -1	.63636	0.	.45455 -1	.31250		
3.0000	112.00	17.000	15.000	0.	0.	0.	0.	0.	0.	0.	0.	
8.5000	8.5000	2.0000	1944.0	0.	0.	0.	0.	0.	0.	0.	0.	
.50000	.50000	.33333 -1	-0.	-0.	-0.	-0.	-0.	-0.	-0.	1.0000		
3.0000	113.00	-0.	13.000	0.	0.	0.	1.5000	0.	0.	0.	1.5000	
3.5000	5.0000	2.0000	1953.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	
-0.	-0.	-0.	0.	0.	0.	1.0000	0.	0.	0.	.70000		

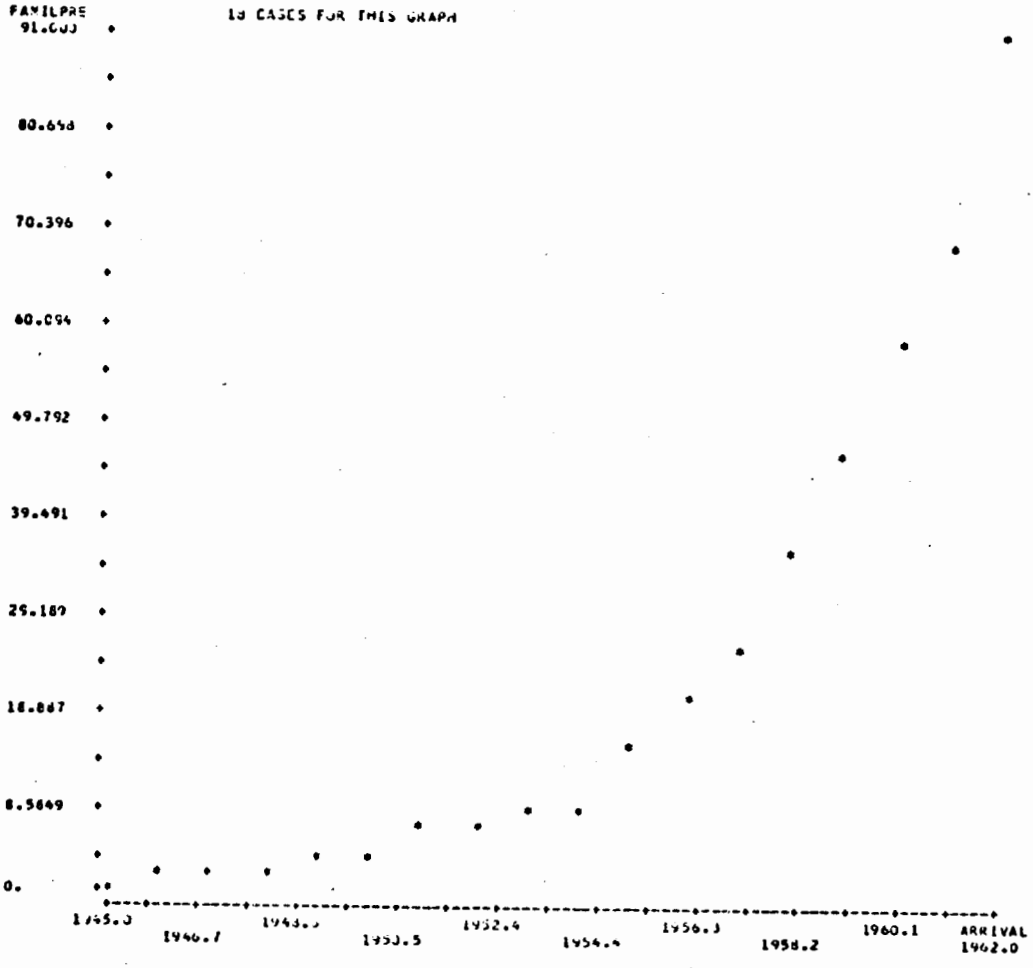
3.0000	114.00	7.0000	6.0000	-0.	-0.	-0.	-0.	-0.	-0.	0.	-0.
-0.	43.000	6.0000	1957.0	-0.	-0.	-0.	-0.	-0.	-0.	0.	-0.
-0.	5.7143	.85238	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	
3.0000	115.00	-0.	1.0000	0.	0.	0.	0.	2.0000	8.0000	0.	10.000
25.000	39.000	6.0000	1962.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	0.	0.	0.	0.	.20000	.80000	0.	.71429	
3.0000	116.00	7.0000	15.000	0.	0.	0.	1.0000	1.0000	15.000	1.0000	18.000
22.000	40.000	6.0000	1960.0	0.	0.	0.	.14286	.14286	2.1429	.14286	2.5714
3.1429	5.7143	.83095	0.	0.	0.	.55556 -1	.55556 -1	.83333	.55556 -1	.55000	
3.0000	117.00	4.0000	-0.	0.	0.	0.	.50000	1.0000	0.	0.	1.5000
33.500	35.000	6.0000	-0.	0.	0.	0.	.12500	.25000	0.	0.	.37500
8.3750	8.7500	-0.	0.	0.	0.	.33333	.66667	0.	0.	.85714	
3.0000	118.00	5.0000	8.0000	0.	0.	0.	0.	.50000	4.0000	.50000	5.0000
4.0000	9.0000	2.0000	1955.0	0.	0.	0.	0.	.10000	.80000	.10000	1.0000
.80000	1.0000	.22500	0.	0.	0.	0.	.10000	.80000	.10000	.44444	
3.0000	119.00	7.0000	3.0000	0.	0.	0.	0.	3.0000	0.	0.	3.0000
7.0000	10.000	2.0000	1960.0	0.	0.	0.	0.	.42857	0.	0.	.42857
1.0000	1.4286	.47619	0.	0.	0.	0.	1.0000	0.	0.	.70000	
3.0000	120.00	3.0000	4.0000	0.	0.	0.	.25000	2.0000	0.	.25000	2.5000
15.000	17.500	2.0000	1959.0	0.	0.	0.	.83333 -1	.66667	0.	.83333 -1	.83333
5.0000	5.8333	1.6667	0.	0.	0.	.10000	.80000	0.	.10000	.85714	
3.0000	121.00	2.0000	21.000	0.	0.	0.	0.	0.	5.0000	0.	5.0000
10.000	15.000	2.0000	1962.0	0.	0.	0.	0.	0.	2.5000	0.	2.5000
5.0000	7.5000	.35714	0.	0.	0.	0.	0.	0.	1.0000	0.	.66667
3.0000	122.00	3.0000	11.000	0.	0.	0.	0.	2.0000	0.	0.	2.0000
10.000	12.000	2.0000	1962.0	0.	0.	0.	0.	.66667	0.	0.	.66667
3.3333	4.0000	.35304	0.	0.	0.	0.	1.0000	0.	0.	.83333	
3.0000	123.00	2.0000	12.000	0.	1.0000	0.	0.	1.0000	2.0000	0.	10.000
20.000	30.000	3.0000	1961.0	0.	.50000	0.	0.	.50000	1.0000	0.	5.0000
10.000	15.000	1.2500	0.	.10000	0.	0.	.10000	.20000	0.	.66667	
3.0000	124.00	5.0000	11.000	0.	0.	0.	0.	7.0000	13.000	0.	20.000
7.0000	27.000	6.0000	1962.0	0.	0.	0.	0.	1.4000	2.6000	0.	4.0000
1.4000	5.4000	.47691	0.	0.	0.	0.	.35000	.65000	0.	.25926	
3.0000	125.00	12.000	8.0000	0.	0.	0.	0.	3.5000	5.0000	.50000	9.0000
11.000	27.000	6.0000	1959.0	0.	0.	0.	0.	.29167	.41667	.41667 -1	.75000
.91667	1.6667	.23833	0.	0.	0.	0.	.38889	.55556	.55556 -1	.55000	
3.0000	126.00	14.000	12.000	0.	0.	0.	0.	2.0000	10.000	0.	12.000
28.000	40.000	8.0000	1961.0	0.	0.	0.	0.	.14286	.71429	0.	.85714
2.0000	2.8571	.23810	0.	0.	0.	0.	.16667	.83333	0.	.70000	
3.0000	127.00	-0.	4.0000	0.	0.	0.	0.	0.	0.	0.	0.
5.0000	5.0000	7.0000	1959.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	1.0000	
3.0000	128.00	9.0000	16.000	0.	0.	0.	0.	3.0000	96.000	0.	99.000
3.0000	102.00	8.0000	1960.0	0.	0.	0.	0.	.33333	10.667	0.	11.000
.33333	11.333	.02963	0.	0.	0.	0.	.30303 -1	.96970	0.	.29412 -1	
3.0000	129.00	4.0000	10.000	0.	0.	1.0000	0.	1.0000	0.	0.	2.0000
10.000	12.000	8.0000	1963.0	0.	0.	.25000	0.	.25000	0.	0.	.50000
2.5000	3.0000	.33000	0.	0.	.50000	0.	.50000	0.	0.	.83333	
3.0000	130.00	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	8.0000	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	
3.0000	131.00	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	8.0000	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	
3.0000	132.00	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	8.0000	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	
3.0000	133.00	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	8.0000	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	
3.0000	134.00	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	8.0000	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	
3.0000	135.00	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	8.0000	9.0000	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	

SIRENA =

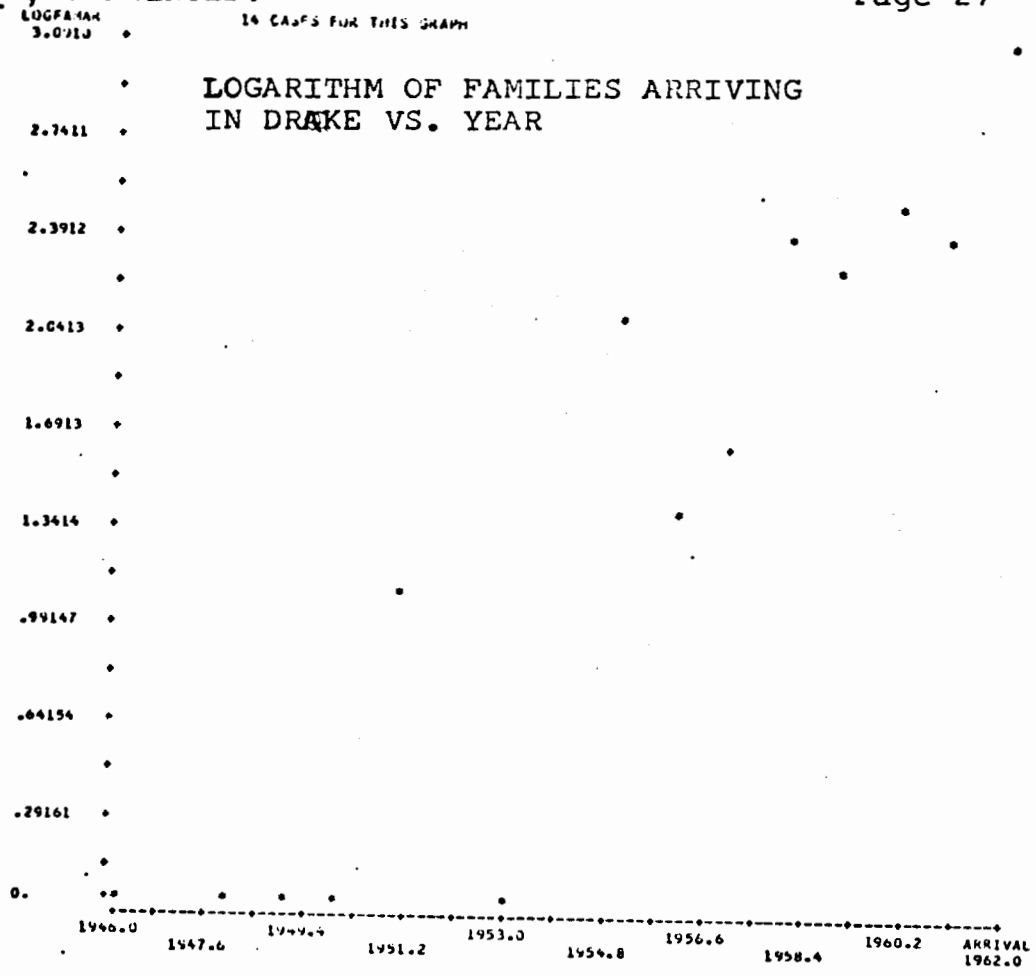
4.0000	136.00	13.000	5.0000	2.0000	0.	.50000	4.0000	5.0000	10.000	.25000	22.500
6.0000	26.000	6.0000	1958.0	.20000	0.	.50000 -1	.40000	.50000	1.0000	.25000 -1	2.2500
.60000	2.6000	.52000	.36889 -1	0.	.22222 -1	.17778	.22222	.44444	.11111 -1	.23077	
4.0000	137.00	6.0000	3.0000	8.0000	1.0000	3.0000	1.0000	12.000	12.000	1.0000	37.000
28.000	66.000	2.0000	1955.0	1.3333	.16667	.50000	.16667	2.0000	2.0000	.16667	6.1667
4.8333	11.000	1.3750	.21622	.27027 -1	.81081 -1	.27027 -1	.32432	.32432	.27027 -1	.43939	
4.0000	138.00	-0.	.33000	0.	0.	0.	0.	1.5000	0.	0.	1.5000
1.0000	2.5000	8.0000	1962.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	0.	0.	0.	0.	1.0000	0.	0.	.40000	
4.0000	139.00	-0.	2.0000	0.	0.	0.	0.	.50000	0.	.50000	1.0000
7.0000	8.0000	8.0000	1961.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	0.	0.	0.	0.	.50000	0.	.50000	.87500	
4.0000	140.00	-0.	7.0000	0.	0.	0.	0.	5.5000	0.	1.0000	6.5000
0.	6.5000	2.0000	1956.0	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
-0.	-0.	-0.	0.	0.	0.	0.	.84615	0.	.15385	0.	
4.0000	141.00	2.0000	6.0000	0.	0.	0.	0.	6.7500	0.	.50000	7.2500
5.0000	12.250	8.0000	1957.0	0.	0.	0.	0.	3.3750	0.	.25000	3.6250
2.5000	6.1250	1.0250	0.	0.	0.	0.	.93103	0.	.68966 -1	.40816	
4.0000	142.00	3.0000	13.000	1.0000	3.0000	0.	1.0000	0.	3.0000	0.	8.0000
40.000	48.000	2.0000	1953.0	.33333	1.0000	0.	.33333	0.	1.0000	0.	2.6667
13.333	16.000	1.6000	.12500	.37500	0.	.12500	0.	.37500	0.	.83333	
4.0000	143.00	2.0000	7.0000	0.	0.	0.	.25000	1.0000	0.	2.7500	4.0000
19.000	23.000	2.0000	1956.0	0.	0.	0.	.12500	.50000	0.	1.3750	2.0000
9.5000	11.500	1.6429	0.	0.	0.	.62500 -1	.25000	0.	.68750	.82609	

APPENDIX V: PLOTS OF FAMILIES ARRIVING IN DRAKE vs. YEAR OF ARRIVAL

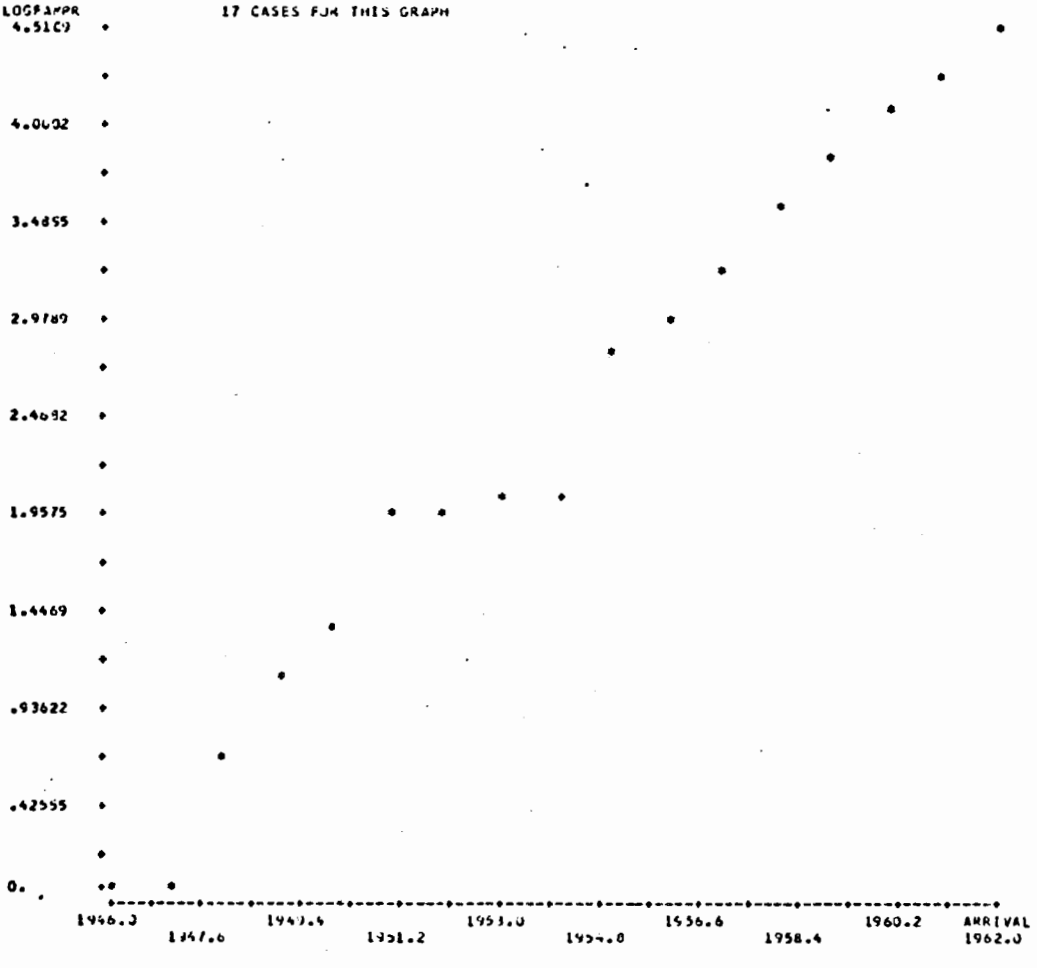




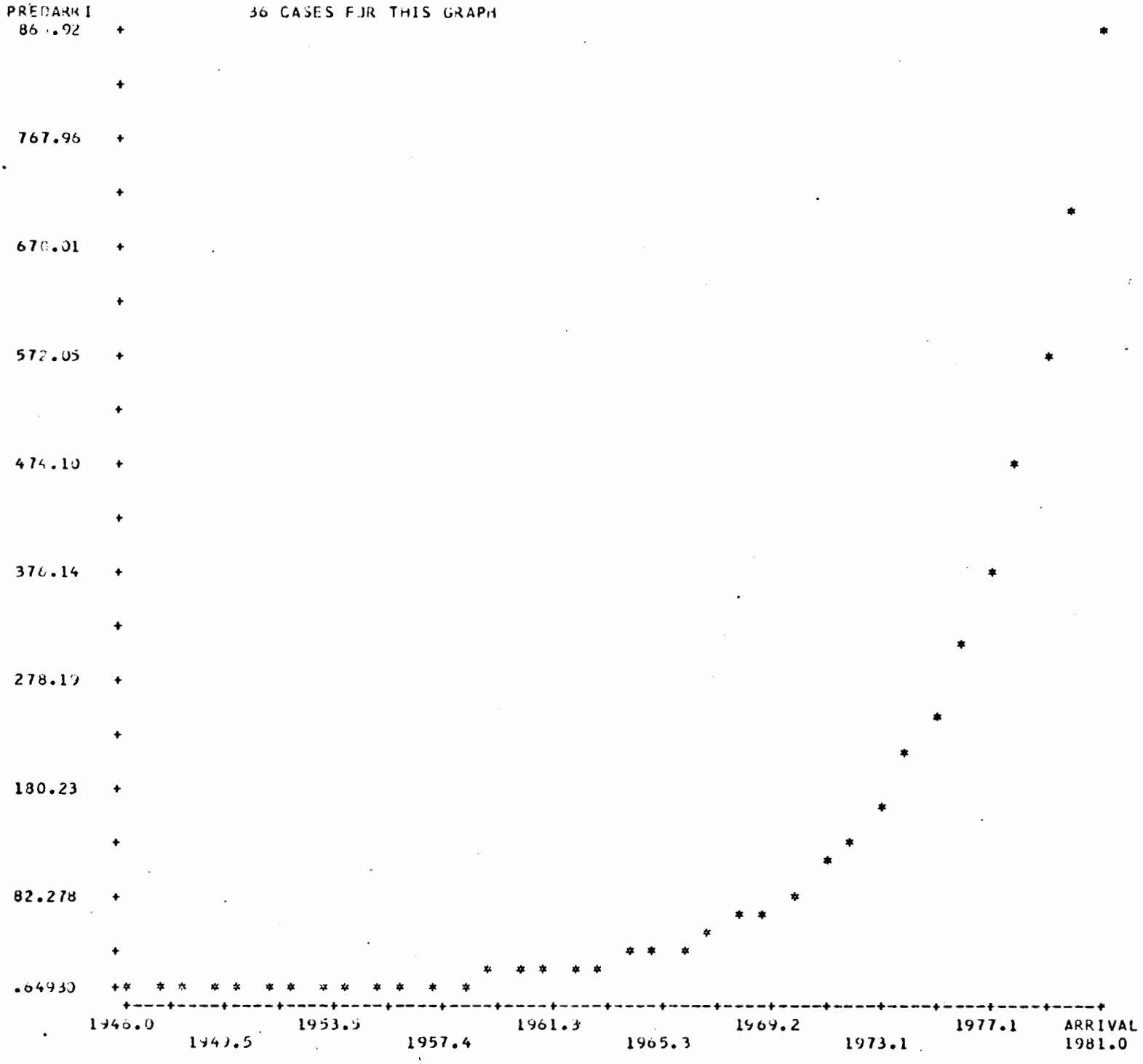
LOGARITHM OF FAMILIES ARRIVING IN DRAKE VS. YEAR



LOGARITHM OF FAMILIES PRESENT IN DRAKE VS. YEAR



APPENDIX VI: PROJECTION OF THE NUMBER OF FAMILIES ARRIVING IN DRAKE TO 1982



APPENDIX VI, CONTINUED

actual arrival data

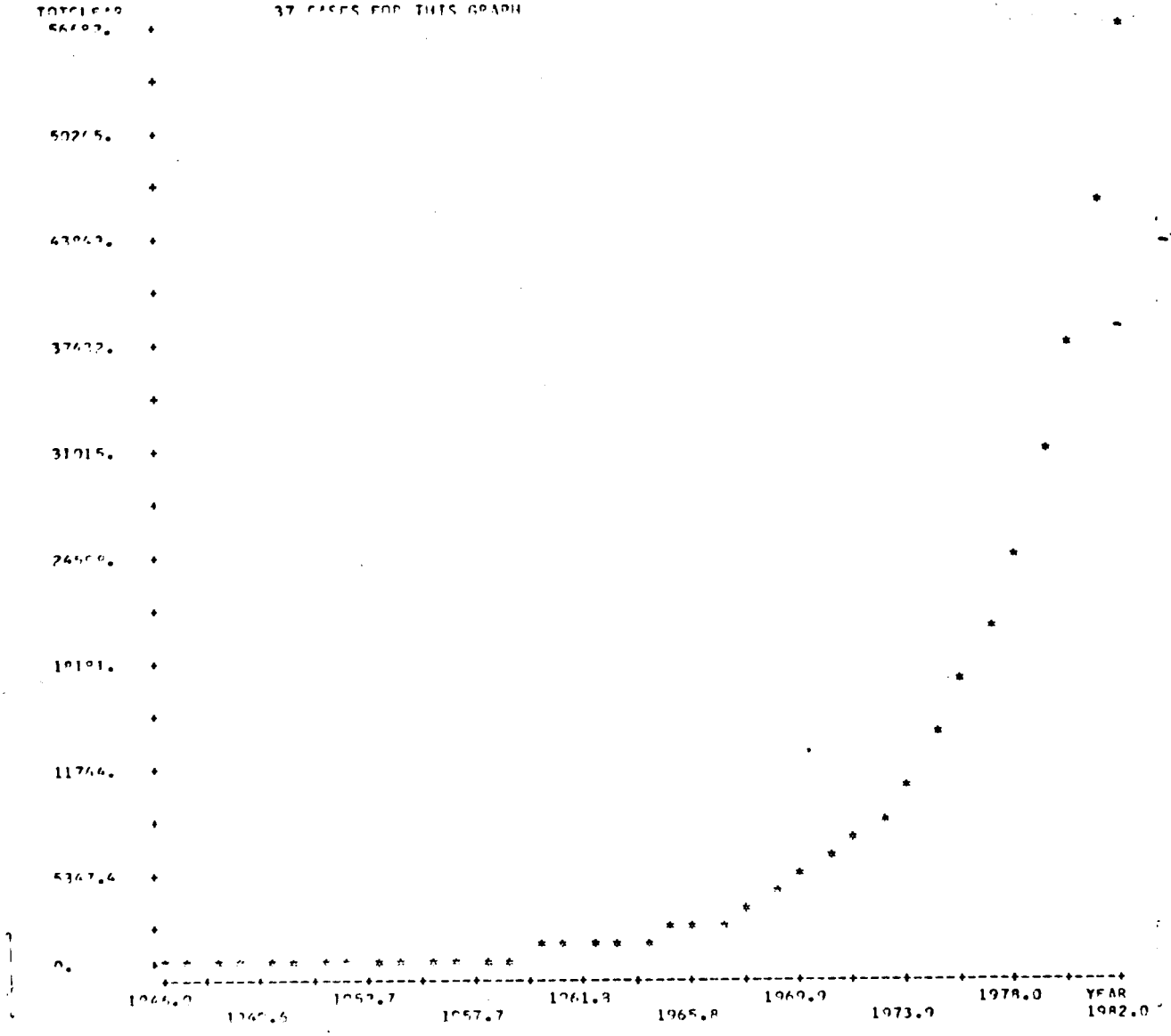
ARRIVAL	FAMILARR	FAMILPRE
1945.0	0.	0.
1946.0	1.0000	1.0000
1947.0	0.	1.0000
1948.0	1.0000	2.0000
1949.0	1.0000	3.0000
1950.0	1.0000	4.0000
1951.0	3.0000	7.0000
1952.0	0.	7.0000
1953.0	1.0000	8.0000
1954.0	0.	8.0000
1955.0	8.0000	16.000
1956.0	4.0000	20.000
1957.0	5.0000	25.000
1958.0	11.000	36.000
1959.0	10.000	46.000
1960.0	12.000	58.000
1961.0	11.000	69.000
1962.0	22.000	91.000

projected values

ARRIVAL	PRELOGAR	PREDARRI
1946.0	-.43136	.64930
1947.0	-.22627	.79750
1948.0	-.20680 -1	.97933
1949.0	.18491	1.2031
1950.0	.39050	1.4777
1951.0	.59609	1.8150
1952.0	.80168	2.2293
1953.0	1.0073	2.7381
1954.0	1.2129	3.3631
1955.0	1.4184	4.1307
1956.0	1.6240	5.0735
1957.0	1.8296	6.2316
1958.0	2.0352	7.6539
1959.0	2.2408	9.4009
1960.0	2.4464	11.547
1961.0	2.6520	14.182
1962.0	2.8576	17.417

year	predlogar	predarr
1963.0	3.0632	21.395
1964.0	3.2688	26.279
1965.0	3.4743	32.277
1966.0	3.6799	39.644
1967.0	3.8855	48.693
1968.0	4.0911	59.807
1969.0	4.2967	73.458
1970.0	4.5023	90.224
1971.0	4.7079	110.82
1972.0	4.9135	136.11
1973.0	5.1191	167.18
1974.0	5.3247	205.34
1975.0	5.5302	252.21
1976.0	5.7358	309.77
1977.0	5.9414	380.48
1978.0	6.1470	467.32
1979.0	6.3526	573.99
1980.0	6.5582	705.00
1981.0	6.7638	865.92

APPENDIX VII : PROJECTION OF TOTAL CLEARED HECTARES IN DRAKE TO 1982



YEAR	TOTCLEAR	YEAR	TOTCLEAR
1946.0	0.	1966.0	2166.1
1947.0	2.2403	1967.0	2771.5
1948.0	6.7209	1968.0	3550.4
1949.0	13.442	1969.0	4510.1
1950.0	24.643	1970.1	5717.3
1951.0	40.325	1971.0	7232.2
1952.0	60.488	1972.0	9287.0
1953.0	87.372	1973.0	11954.
1954.0	123.98		
1955.0	167.54	1974.0	15297.
1956.0	217.91	1975.0	19402.
1957.0	276.52	1976.0	24373.
1958.0	347.41	1977.0	30322.
1959.0	429.35	1978.0	37357.
1960.0	501.43	1979.0	45726.
1961.0	741.53	1980.0	55678.
1962.0	925.24	1981.0	66319.
1963.0	1145.3	1982.0	77633.
1964.0	1422.4		

APPENDIX VIII PROJECTION OF HECTARES AND PROPORTIONS OF EACH CROP TO 1982 FOR OBSERVATIONS MADE IN DRAKE IN FEBRUARY

YEAR BEANSPROP	WICERA MAIZEPRO	BEANHA CACAOPRO	MAIZEHA BANANAPR	CACAOHA PASTPROP	BANANAHA OTHERPRO	PASTUREH FALPROTC	OTHERHA OCCPROTO	TOTOCCHA	FALLOWHA	TOTCLEAR	RICEPROP
1946.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	-0.
-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.				
1947.0	.58920 -1	.47720 -1	.41096	.75350 -1	.32106	.90910 -1	.30660 -1	1.0443	1.2849	2.3292	.56421 -1
.45496 -1	.39353	.72154 -1	.30744	.87054 -1	.29359 -1	.55165	.44835				
1948.0	.17675	.14317	1.2329	.22506	.96318	.27274	.91960 -1	3.1329	3.8547	6.9876	.56417 -1
.45659 -1	.39353	.72157 -1	.30744	.87057 -1	.29353 -1	.55165	.44835				
1949.0	.35300	.28635	2.4658	.45211	1.9264	.54548	.18393	6.2658	7.7094	13.975	.56338 -1
.45700 -1	.39353	.72155 -1	.30745	.87057 -1	.29355 -1	.55165	.44835				
1950.0	.44809	.52497	4.5206	.82887	3.5317	1.0000	.33720	11.487	14.134	25.621	.56419 -1
.45701 -1	.39354	.72157 -1	.30745	.87055 -1	.29355 -1	.55166	.44834				
1951.0	1.3405	.85905	7.3973	1.3563	5.7791	1.6364	.55179	18.797	23.128	41.925	.56419 -1
.45701 -1	.39354	.72155 -1	.30745	.87056 -1	.29355 -1	.55165	.44835				
1952.0	1.5907	1.2846	11.096	2.0345	8.6686	2.4546	.82768	28.196	34.692	62.888	.56416 -1
.45702 -1	.39353	.72154 -1	.30744	.87055 -1	.29355 -1	.55165	.44835				
1953.0	2.2078	1.8613	16.027	2.9387	12.521	3.5456	1.1955	40.728	50.111	90.839	.56418 -1
.45701 -1	.39351	.72154 -1	.30743	.87056 -1	.29353 -1	.55165	.44835				
1954.0	3.1815	2.5771	22.192	4.0690	17.337	4.9093	1.6554	56.392	69.384	125.78	.56418 -1
.45703 -1	.39353	.72154 -1	.30744	.87057 -1	.29355 -1	.55165	.44835				
1955.0	4.3009	3.4939	30.000	5.5007	23.437	6.6366	2.2378	76.234	93.798	170.03	.56417 -1
.45703 -1	.39353	.72155 -1	.30744	.87056 -1	.29354 -1	.55165	.44835				
1956.0	5.7149	4.6293	39.863	7.3091	31.143	8.8185	2.9735	101.30	124.64	225.94	.56416 -1
.45699 -1	.39351	.72153 -1	.30743	.87053 -1	.29353 -1	.55165	.44835				
1957.0	7.4624	6.0411	52.192	9.5697	40.774	11.546	3.8932	132.63	163.18	295.81	.56416 -1
.45699 -1	.39352	.72153 -1	.30743	.87054 -1	.29354 -1	.55164	.44836				
1958.0	9.6624	7.8269	67.397	12.358	52.653	14.910	5.0274	171.26	210.72	381.98	.56419 -1
.45702 -1	.39354	.72159 -1	.30744	.87061 -1	.29355 -1	.55165	.44835				
1959.0	12.314	9.9745	85.890	15.749	67.101	19.001	6.4069	218.26	268.54	486.80	.56419 -1
.45700 -1	.39352	.72157 -1	.30744	.87057 -1	.29354 -1	.55164	.44836				
1960.0	15.554	12.599	108.49	19.893	84.759	24.001	9.0929	275.68	339.21	614.89	.56420 -1
.45702 -1	.39354	.72160 -1	.30745	.87061 -1	.29356 -1	.55166	.44834				
1961.0	19.501	15.797	136.03	24.941	106.27	30.092	10.147	345.66	425.29	770.95	.56417 -1
.45701 -1	.39354	.72155 -1	.30744	.87057 -1	.29355 -1	.55164	.44836				
1962.0	24.332	19.710	169.73	31.120	132.60	37.547	12.660	431.29	530.65	961.94	.56417 -1
.45703 -1	.39354	.72156 -1	.30745	.87057 -1	.29354 -1	.55165	.44835				
1963.0	30.224	24.482	210.82	38.655	164.70	46.638	15.726	535.71	659.14	1194.8	.56419 -1
.45703 -1	.39353	.72157 -1	.30744	.87058 -1	.29355 -1	.55165	.44835				
1964.0	37.412	30.305	260.96	47.848	203.87	57.729	19.466	663.12	815.89	1479.0	.56418 -1
.45701 -1	.39353	.72156 -1	.30744	.87057 -1	.29355 -1	.55165	.44835				
1965.0	46.190	37.415	322.18	59.075	251.71	71.275	24.033	818.71	1007.3	1826.0	.56418 -1
.45700 -1	.39352	.72156 -1	.30745	.87058 -1	.29355 -1	.55164	.44836				
1966.0	56.913	46.101	396.97	72.789	310.14	87.821	29.613	1008.8	1241.2	2250.0	.56417 -1
.45699 -1	.39351	.72154 -1	.30743	.87055 -1	.29355 -1	.55164	.44836				
1967.0	69.992	56.696	488.20	89.517	381.41	108.00	36.418	1240.6	1526.4	2767.0	.56418 -1
.45700 -1	.39352	.72154 -1	.30744	.87055 -1	.29355 -1	.55164	.44836				
1968.0	85.958	69.629	599.56	109.94	468.42	132.64	44.726	1523.6	1874.6	3398.2	.56418 -1
.45700 -1	.39352	.72158 -1	.30744	.87057 -1	.29355 -1	.55164	.44836				
1969.0	105.46	85.425	735.58	134.88	574.68	162.73	54.872	1869.3	2299.9	4169.2	.56417 -1
.45699 -1	.39351	.72155 -1	.30743	.87054 -1	.29354 -1	.55164	.44836				
1970.0	129.32	104.75	902.01	165.39	704.70	199.55	67.288	2292.2	2820.3	5112.5	.56417 -1
.45698 -1	.39351	.72153 -1	.30743	.87056 -1	.29355 -1	.55165	.44835				
1971.0	158.54	128.42	1105.8	202.77	863.94	244.64	82.492	2810.1	3457.6	6267.7	.56418 -1
.45699 -1	.39351	.72158 -1	.30744	.87057 -1	.29356 -1	.55165	.44835				
1972.0	194.30	157.39	1355.3	248.51	1058.8	299.80	101.10	3444.0	4237.1	7681.1	.56417 -1
.45700 -1	.39352	.72157 -1	.30743	.87050 -1	.29355 -1	.55163	.44837				
1973.0	238.14	192.90	1661.0	304.52	1297.7	367.41	123.91	4220.8	5192.2	9413.0	.56421 -1
.45702 -1	.39353	.72147 -1	.30745	.87047 -1	.29357 -1	.55160	.44840				
1974.0	291.82	236.42	2035.8	373.21	1590.5	450.30	151.86	5172.7	6364.4	11537.	.56415 -1
.45705 -1	.39357	.72150 -1	.30748	.87053 -1	.29358 -1	.55165	.44835				
1975.0	357.65	289.71	2495.2	457.42	1949.4	551.92	186.14	6339.8	7799.2	14139.	.56413 -1
.45697 -1	.39358	.72151 -1	.30749	.87056 -1	.29361 -1	.55161	.44839				
1976.0	438.37	355.09	3058.6	560.69	2384.6	676.52	228.16	7771.1	9560.1	17331.	.56410 -1
.45692 -1	.39359	.72151 -1	.30685	.87056 -1	.29360 -1	.55161	.44839				
1977.0	537.37	435.24	3749.4	687.31	2929.2	829.31	279.65	9526.0	11719.	21245.	.56411 -1
.45693 -1	.39360	.72151 -1	.30750	.87058 -1	.29356 -1	.55161	.44839				
1978.0	658.79	533.58	4595.9	842.64	3591.2	1016.7	342.78	11679.	14368.	26047.	.56408 -1
.45687 -1	.39352	.72150 -1	.30749	.87054 -1	.29350 -1	.55162	.44838				
1979.0	807.78	654.25	5634.0	1033.2	4402.8	1246.7	420.26	14320.	17617.	31937.	.56409 -1
.45688 -1	.39344	.72151 -1	.30746	.87060 -1	.29348 -1	.55162	.44838				
1980.0	990.58	802.30	6908.8	1267.0	5397.0	1528.8	515.32	17561.	21604.	39165.	.56408 -1
.45686 -1	.39342	.72149 -1	.30733	.87057 -1	.29345 -1	.55161	.44839				
1981.0	1214.9	983.93	8472.7	1554.0	6618.1	1875.0	632.00	21537.	26496.	48033.	.56410 -1
.45686 -1	.39340	.72155 -1	.30729	.87059 -1	.29345 -1	.55162	.44838				
1982.0	1490.2	1206.9	10392.	1906.1	8117.3	2299.9	775.21	26418.	32501.	58919.	.56409 -1
.45685 -1	.39337	.72152 -1	.30726	.87058 -1	.29344 -1	.55162	.44838				

APPENDIX IX: SUMMARY OF POPULATION AND AREA INFORMATION FOR THE FOUR REGIONS OF THE OSA PENNINSULA:

REGION	ESTIMATED 1963 POPULATION OF FARMERS	TOTAL LAND AREA (hects)	USEABLE LAND AREA (hects)	PERSONS PER KM^2 USEABLE LAND (1963)
Rincon	27	16835	16599	0.1627
Playa Blanca	231	4148	4025	5.7471
Sirena	37	22809	20587	0.1797
Bahia Drake	615	21880	21809	2.8249
TOTAL	910	65672	63020	1.5898

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