ALASKA AGRICULTURE STUDY

Economic Evaluation of the Potential for Agricultural Development in Alaska

by
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FOREWORD

Agriculture occupies a relatively minor position in the Alaskan economy today. Its total value of production, slightly over $5 million, is small compared to that of other industries of the state: fisheries - $170 million, mineral production - $80 million, forest products - $70 million. The extent of agricultural employment and value of sales compares more directly with trapping and furs, $5 million, and coal production, $6 million. Local producers consistently account for less than 8 per cent of the consumption in food products grown and processed. Influencing this average, of course, are the many products not grown in Alaska at all, while others, such as milk and fresh potatoes, account for 40 to 50 per cent of the state's annual consumption.

In view of this agricultural experience in Alaska, it is appropriate to inquire what potential, if any, this sector has in the future economy of the state. If there is no potential, future investment in Alaskan agriculture becomes of questionable value, particularly in view of the many alternative investment opportunities. On the other hand, if there are opportunities for developing and expanding agriculture, these need to be defined, so that policy, investments, research and other efforts can be channeled into areas, products and activities that promise appropriate payoffs.

It is to these issues that this report is directed. And it is hoped that it will contribute, even if only as a point of departure, toward a more effective approach to agriculture in Alaska.

* * *

The report was prepared over a period of less than six months under a cooperative agreement between the University of Alaska and the U. S. Department of Agriculture. While the Institute of Social, Economic and Government Research has held the key coordinating and directing function, this report is truly the result of a cooperative effort. On the federal side, maximum support was provided by practically every branch of the United States Department of Agriculture actively concerned with agriculture in Alaska; John O. Gerald of the Economic Research Service acted as project leader for U.S.D.A. The Federal Field Committee for Development Planning in Alaska coordinated participation of the many federal agencies that were concerned with the study. State of Alaska participation was primarily through the Department of Economic Development (Commissioner Frank Murkowski and Deputy Commissioner Everett Buness) and the Department of Natural Resources, Division of Agriculture (Sigmund Restad, Director). Study liaison with the Governor's Office was maintained through Everett Buness. Key support for the project was provided by the Alaska Agricultural Experiment Station with the aid of Alan H. Mick and Horace F. Drury, its former and present director, respectively.

Professor Robert C. Haring, of this Institute, exercised primary responsibility for organizing and directing the study and for preparing the report. Key contributions were made by Professors Charles Marsh and Wayne Burton of the Alaska Agricultural Experiment Station; Dr. Leigh Hammond, consultant to U.S.D.A. for this project; Mr. H. P. Gazaway, Bureau of Indian Affairs; Mr. Mervin Freeman of the University's Cooperative Extension Service. The following research assistants from the Institute of Social, Economic and Government Research contributed their

time and special talents -- Francis Connor, Clem Correia, Eleanor Hungate, Akio Iwasaki, Janice Morrow, and James Sullivan. Too many others helped to permit their assistance to be individually acknowledged, though their contributions did provide substantial support for the project.

Not all persons who participated in the study were afforded the opportunity of review and clearance of this report. A full preliminary draft was reviewed by the following: Commissioner Frank Murkowski, Department of Economic Development; Dr. Horace Drury, Director, Alaska Agricultural Experiment Station; Mr. David Hickok, Planning Officer, Federal Field Committee for Development Planning in Alaska; Professor Charles Marsh, Agricultural Economist, Alaska Agricultural Experiment Station; and Director Sigmund Restad, Division of Agriculture, Department of Natural Resources. Their comments contributed greatly toward producing this revised report.

Victor Fischer, Director
Institute of Social, Economic
and Government Research

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I

PURPOSES

This study is designed as a provisional but comprehensive evaluation of the current situation and economic potential of agricultural development in Alaska. Its broad objectives are as follows--

(1) To define the physical production capacity and agriculture potential in Alaska by region.

(2) To estimate current and expected costs of production for these regions and respective product groups.

(3) To analyze conditions influencing demand for its agricultural products, including foreign markets, and to estimate resident levels of consumption for selected products.

(4) To delineate processing, marketing and logistic costs for these products.

(5) To appraise the competitive position of Alaskan Agricultural enterprises, present and anticipated.

(6) To indicate, when appropriate, the logical public policies toward agricultural development in Alaska, including the more productive types of research.

The study represents the combined efforts of the University of Alaska, the Economic Research Service of the United States Department of Agriculture and many cooperating federal and state agencies. A wide variety of experts and specialists have provided valuable information. In large part, the finished project is a situation analysis which depends principally upon information already available from public sources. This body of information was supplemented liberally by unpublished studies available principally from the Alaska Agricultural

Experiment Station in Palmer, Alaska, and from field interviews. The interviews were for the purpose of evaluating public policies affecting agriculture. Discussions were conducted with farm managers and knowledgable persons concerning agricultural development in order to ascertain alternative points of view. Once these activities were completed, the major function of the study was to place the information in balanced economic perspective, indicating the logical conclusions and implications.

The study is organized into seven chapters, followed by appendixes and bibliography. Chapter II summarizes the study and discusses the conclusions. Chapter III covers the land resources and types of soil in the state. Marketing and the current public policy affecting the producing sector is covered in Chapter IV. Types of farms and products, cost and revenue conditions are examined in Chapter V and VI. In Chapter VII, the concluding chapter, Alaska's agricultural potential, public policy, and development factors are discussed.

II

SUMMARY AND CONCLUSIONS

The development of agriculture in Alaska began, for all practical purposes, with the establishment of the Alaska Agricultural Experiment Station in Palmer and the instigation of the Matanuska Colony in 1935. Even then, restrictive federal land policies curtailed the transfer of agricultural land to private persons. The principal method of land acquisition has been through homesteading, which has led directly to special problems in small average farm size, a large number of non-commercial farmers and a significant extent of absentee ownership. These historical conditions have fostered several types of inefficiency.

A review of the present federal and state land policies and an overall analysis of the supply of agricultural land indicate that there is no significant and overall land shortage. Weather conditions, a poor transportation network and the uncleared condition of much of the suitable land acreage represent barriers to developing many potentially suitable regions. State land disposition regulations positively encourage the development of agricultural enterprises, although borough planning, zoning and tax policies have often been restrictive and unclear.

An evaluation of land capability reveals that Alaska is technically able to produce satisfactory yields of large volumes of marketable crops, and many kinds of farming could be economically profitable. However, in 1967 there were only about 100 commercial farms in the state, none of which compared favorably with the diversified "big business" agricultural

enterprises in other states. A broad agricultural base has not materialized in Alaska, in spite of concentrated investments of both public and private funds, becuase of several limiting factors: soil and climatic conditions which affected crop feasibility; small in-state markets with active price and marketing competition from outside producers; insufficient and expensive financing; and lack of managerial training and background.

As a result, certain types of agriculture were never attempted in a feasible fashion, and other types could not have developed and become self-sustaining. Many of these types of farming and processing, though feasible, probably will depend upon a high degree of initial technical and financial assistance by the federal and state governments.

The largest areas of accessible and productive farm land are found in the Matanuska Valley, Tanana Valley, Kenai area, Kodiak and the Aleutian Islands, and Western Alaska. The vast proportion of commercial farming is found in the Matanuska and Tanana Valleys, and these two areas represent the nucleus for an expansion of the agricultural secotr. In the past decade, Alaskan farm production increased slowly, then declined more recently. Farmers and processors have virtually ceased operations in South-eastern Alaska. A decline in the number of operators and value of product occurred in the Tanana Valley area; ranching in remotely situated areas barely survived.

The sale of Alaskan-produced farm output is restricted to in-state urban and military markets at the present time. In the sale of dairy products and fresh potatoes, Alaskan producers account for 40 to 50 percent of local consumption, with smaller market shares in eggs, beef and fresh

vegetables. Per capita consumption trends and a review of population forecasts reveals that the present and projected demand for food is favorable and will constitute a sufficient local market to justify an expansion in certain types of farming and processing operations. A variety of new types of farming, grazing, slaughtering and processing warrant additional study based upon these estimates of the retail market potential. Sales of agricultural products to other U. S. regions is unlikely, except for specialty products, such as grass seed and seed potatoes. Exports to other countries are very real alternatives that may have a significant effect on livestock operations in the near future.

The costs of farming and processing agricultural output in Alaska were major areas of concern in the study. Available and simulated evidence supports the conclusion that Alaskan agriculture has in many ways been placed at a competitive disadvantage in comparison to other U. S. regions. The most serious cost problems are:

(1) Smallness of operations, limiting economies of scale.

(2) Seasonality and erratic supplies, restricting the extent of annual operations.

(3) Higher relative costs of procuring equipment and supplies for farming as compared with the costs of shipping processed food into the state.

(4) Inefficient and non-complementary transportation rates and services by public and private carriers within the state.

(5) Restrictive credit conditions.

(6) Inability to combine with other farmers for consolidated buying

and selling.

(7) Wide use of inefficient techniques and practices.

Notwithstanding these problems of capital and operating costs that have inhibited growth of agriculture in the state, some kinds of farming and processing are entirely feasible at the present time. A nucleus of successful and efficient farmers and processors does exist. In many instances, the adopting of larger scale operations, although on a smaller scale than observed in many competitor states, would easily permit Alaskan-based farms to compete in local urban markets. Dependable farm inputs for processing operations are occasionally lacking, but this shortcoming is entirely solvable. The wide use of better techniques of farm management is mandatory and would provide sufficient profit incentives to encourage a long term expansion of the agricultural sector.

Agricultural development efforts in Alaska must be concentrated on feasible projects which hold promise of long term survival. It is very probable that by 1985 Alaskan farmers and processors could produce and market 60 to 80 per cent of urban in-state consumption of dairy products, fresh potatoes and eggs. There could be significant market share gains for livestock, certain vegetables, forage crops and feed grains within the decade.

However, farming and ranching in Alaska will not change rapidly or by itself. Time lags are expected in accomplishing detailed cost and marketing studies, in acquiring financing for construction and in attracting managerial talent. All in all, the transformation from the present "primitive" small scale production system to a contemporary and competitive commercial agriculture base should require less than 15 years. This growth

will not occur unless the federal and state governments establish and carry out an intensive, coordinated research and development program. Further, positive governmental regulation, technical assistance and financial support are necessary to the orderly and efficient development of an agricultural industry in Alaska. The most important required governmental actions are:

(1) Investment in public transportation, storage and grading facilities.

(2) Improvement of governmental operated enterprises, such as the Alaska Railroad and Alaska Ferry System, where agricultural commodity rates, services and "exception" status are not conducive to development.

(3) Actions which would lead to tariff reductions for in-state transportation, especially shipments from the more suitable farm areas to the Anchorage and Fairbanks urban markets.

(4) Financial assistance to specific kinds of agricultural enterprises, including corporations, on the basis of larger loan size and longer maturities than have prevailed historically.

(5) Funding of research, technical assistance and information services to the agricultural sector to foster more rapid development.

Agricultural research should be oriented toward the successful development of commercial industry, whether utilizing proven efficient technology from other regions or by experimenting with new methods and techniques. Certain specific types of research are, therefore, absolutely necessary at this time. They include:

(1) Extensive cost evaluation of farming and processing in the state on a product-by-product and regional basis. Surveys should be designed on a basis comparable to projects conducted in other states, with the specific purpose of supplying relevant information for investment decisions.

(2) Where a systems approach to farming-processing-marketing might be taken, the complete costing out of alternative ways of implementing these proposals is essential.

(3) Organization and funding of a "Plant Materials Center" for basic and applied research are necessary, with particular emphasis upon reducing the gap between agricultural research and commercial production.

(4) Studies in marketing practices and transportation rates and modes are needed for very specific public policy recommendations.

(5) Social and cultural research concerning farmers, their background, motivations and ability to adapt to new and more modern forms of agricultural production.

III

RESOURCE ANALYSIS

Land Policy

Federal Land Policies

There are essentially two ways in which public domain lands can be obtained for agricultural production in Alaska. Land can be leased for grazing purposes, or title can be obtained to 160 acre tracts by virtue of the Homestead Act. The Homestead Act allows the transfer of land title from public to private ownership for agricultural purposes only. The land transfer is not free in the sense that there are no costs associated with gaining title. An applicant must meet specific requirements with respect to residence on the land, construction of a dwelling, and clearing and cultivation over a specified period.

Regulations under the Homestead Act and under the various grazing acts provide a basis for the agricultural sector to increase the amount of land in production. Since the Federal Government still owns approximately 90 per cent of the tremendous land areas of Alaska, it superficially would appear that the supply of land for agriculture is ample. However, much of the land within the public domain is unsuited for commercial agricultural production and is presently inaccessible. The time lapse between the application for a homestead and production is "usually two or three years."[1] Finally, homestead sites are limited to 160 acres, which is generally considered to be too small for minimum commercial farming (where the individual gets more than one-half his income from farming).

Homesteading activities increased at a fast pace with the influx of veterans following World War II. The end of the Korean conflict witnessed another, but somewhat smaller, ripple in homestead attempts. Many of

[1] Establishing a Farm in Alaska (Washington, D.C.: United States Department of Interior, Bureau of Land Management 1961), p. 29.

these homestead attempts failed, and large numbers of those who did "prove up" discontinued active farm operations. In 1960, The Census of Agriculture reported only 382 farms in the state. A more detailed examination of these statistics reveals that only some 100 farms were producing commercial quantities of products, while the remainder were "agricultural homesteads" in various stages of development.

An assessment of the successes and failures of farming must take into account the fact that the prime avenue to land acquisition was homesteading. It is readily apparent that a large portion of the homesteaders probably were interested in agriculture only to the degree necessary to "prove up" the land. Once patent to the land was obtained, agricultural activities were often discontinued.

State Land Policies

State land policies unequivocally encourage allocation of land to agricultural use. This is explicitly stated as a goal in the Alaska Statutes.[2] Lands which have been classified as "agricultural" are available for homesteading under state policies which are considerably more lenient than federal homesteading obligations. The potential homesteader can "buy" as much as 640 acres of land, enough to implement efficient farming techniques,[3] at a public auction. The land can be purchased on contract with terms of "10 per cent down and 10 years to pay." The payment can be as little as $50 per year at 5 per cent per annum on un-paid balances. The purchase price can later be reduced by as much as 90 per cent. The homesteader is automatically granted credits for improvements on the land--cultivation, construction of fencing, permanent family dwellings and/or farm buildings, development of wells,

[2]Title 11, Division 1, Chapter 1, Subchapter 3, Sect. 142 and 143.

[3]Ibid. Sect. 142.17.

and construction of access roads.[4] Unlike the federal homesteading regulations, the state regulations do not obligate the homesteader to make any of these improvements; the credits are but incentives.

Additional evidence of the state's policy of encouraging agriculture is found in legislation which was passed by the Fifth Legislature. This authorized the "Commissioner of Natural Resources" to select areas of state land classified as agricultural and contract for the land to be cleared or drained or both at state expense.[5] The land would then be marketed by competitive lease in lots of not less than 320 acres each. State lands may be acquired for agricultural use by an "over-the-counter" sale in the event that land placed at auction is not sold.

Most of the land area in Alaska classified as agricultural has been "selected" and is under the jurisdiction of the state. Therefore, state policies will have a more pronounced effect on the future supply of agricultural lands than will federal policies.

Borough Policies

In addition to the state land classification system, Alaskan boroughs also affect the particular type of use to which much of the potential agricultural land in the state will be allocated. In the Matanuska-Susitna Borough, little or no re-allocation of agricultural land to other economic uses has occurred through Borough zoning or taxation practices. However, such practices will become increasingly important, especially in relation to the orderly expansion of suburban housing in the sprawling Anchorage area. Newly available lands are sold in increasing amounts for recreation purposes.[6] The North Star Borough,

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[4] Ibid. Sect. 143.011

[5] House Bill 289 and amendments.

[6] Established in large part through interviews with the Matanuska-Susitna Borough chairman.

which includes Fairbanks and much of the Tanana Valley agricultural base, has established no particular policy concerning the treatment of agriculture. This condition may be attributable, in large part, to the paucity of commercial farmers and the general absence of population growth pressures on suburban lands in recent years.

Land Resource Review

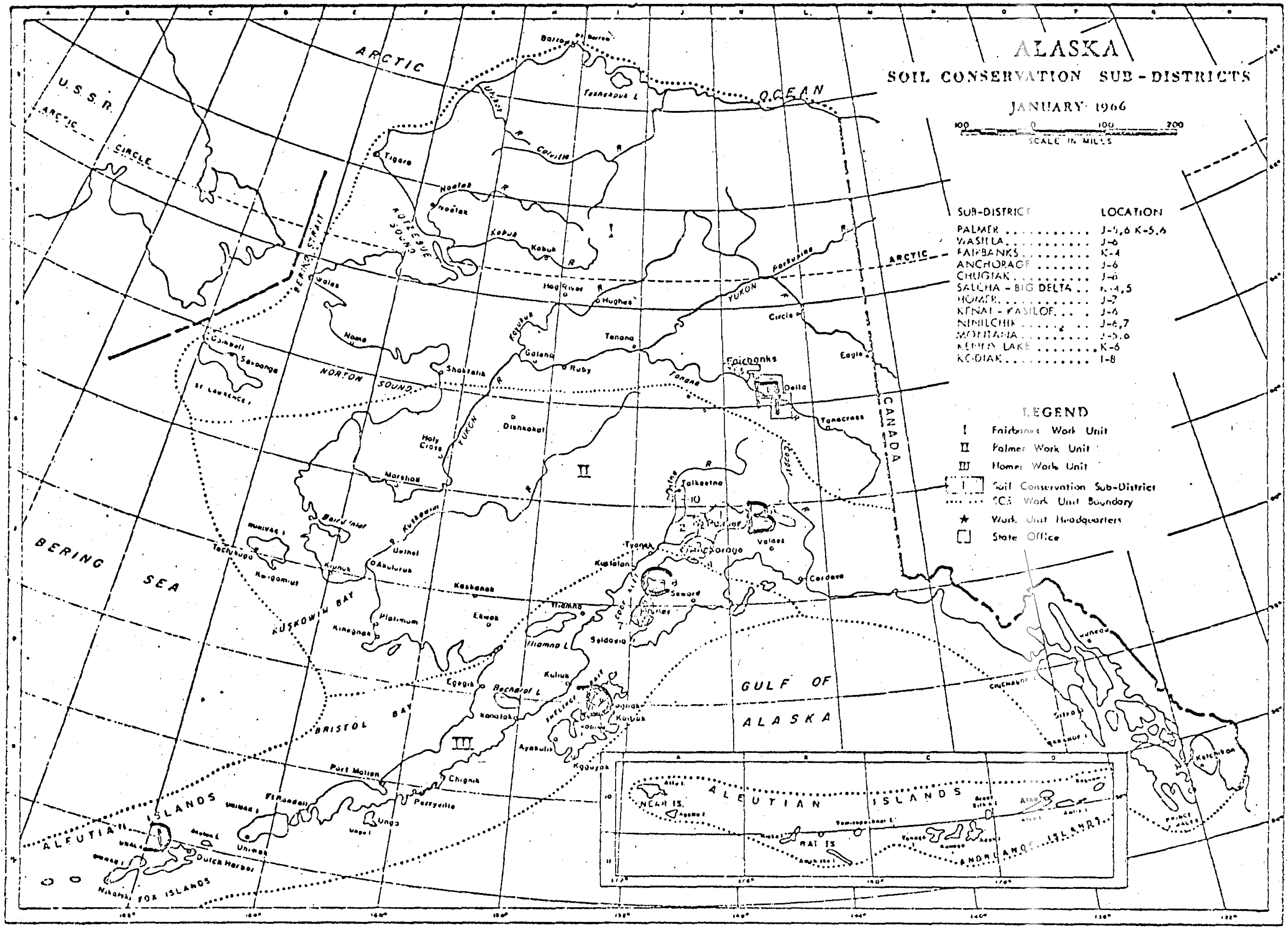
Alaska is unique in that it contains some 375 million acres of land of which less than one per cent is suitable for commercial farming, and not more than two per cent is generally considered suitable for cattle and sheep grazing. The 1964 Census of Agriculture reports approximately 0.6 per cent of the total land area was utilized for farming. However, a major portion of the land reported as farmland actually consisted of grazing lands leased from federal and state governments. Most of that grazing land is situated in the southwestern and western areas. Most of the existing and potential farm lands were concentrated in four major areas of the state. (See Figure 1.) These key agricultural areas are designated as follows--

A. the central Tanana Valley of Interior Alaska,

B. the Matanuska-Susitna area in Southcentral Alaska, and

C. the Western Kenai lowland areas also in Southcentral Alaska.

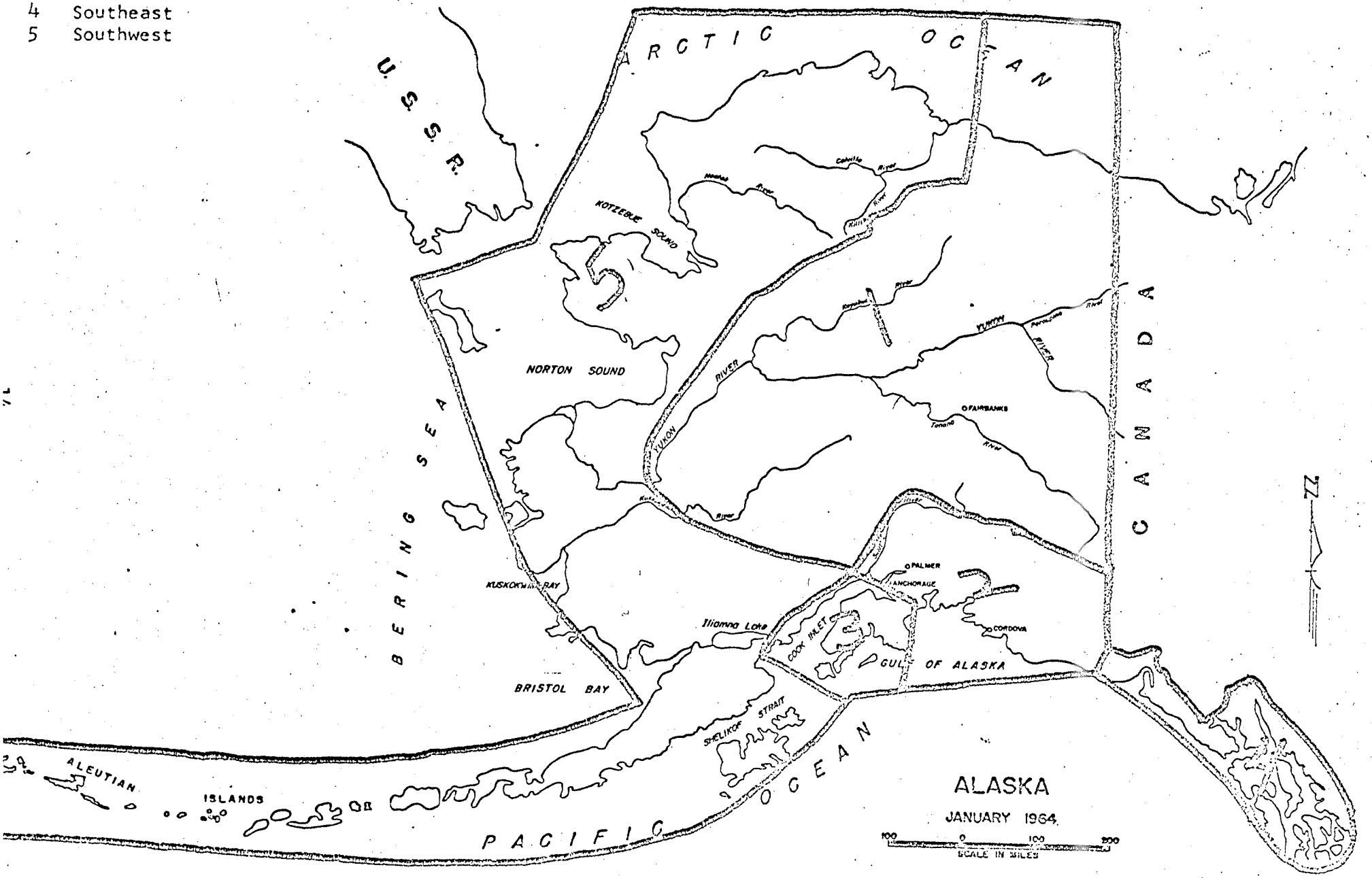
D. Primary grazing areas, exclusive of reindeer, are found on northeastern Kodiak Island, Umnak Island, Unalaska Island, and the southern part of the Kenai lowland area.


ALASKA
SOIL CONSERVATION SUB-DISTRICTS
JANUARY 1966
100 0 100 200
SCALE IN MILES
SUB-DISTRICT LOCATION
PALMER J-5,6 K-5,6
WASILLA J-6
FAIRBANKS K-4
ANCHORAGE J-6
CHUGIAK J-6
SALCHA - BIG DELTA K-4,5
HOMER J-7
KENAI - KASILOF J-6
NINILCHIK J-6,7
MONTANA J-5,6
KENNY LAKE K-6
KODIAK I-8
LEGEND
I Fairbanks Work Unit
II Palmer Work Unit
III Homer Work Unit
Soil Conservation Sub-District
SCS Work Unit Boundary
Work Unit Headquarters
State Office
ARCTIC OCEAN
BERING SEA
GULF OF ALASKA
BERING STRAIT
NORTON SOUND
BRISTOL BAY
ALEUTIAN ISLANDS
CANADA
U.S.S.R.
ARCTIC CIRCLE
YUKON
Barrow
Fairbanks
Delta
Anchorage
Seward
Cordova
Valdez
Juneau
Sitka
Ketchikan
Nome
Kodiak
Dutch Harbor
Port Moller
Tanana
Ruby
Galena
Hughes
Circle
Eagle
Tanacross
Talkeetna
Bethel
Seldovia
Iliamna L
Becharof L
Platinum
Dillingham
Chignik
Perryville
Unga
Unimak
Umnak
Wales
Tigara
Noatak
Kobuk
Colville
Teshekpuk L
Shaktolik
Holy Cross
Marshall
Kuskokwim
Kuskowim Bay
Baird Inlet
Nunivak I
Gambell
Savoonga
St Lawrence I
Cook Inlet
Kodiak
Kaguyak
Ayakulik
Ekwok
Kashanak
NEAR IS.
RAT IS
ANDREANOF ISLANDS
FOX ISLANDS

13

ALASKA CROP AND LIVESTOCK REPORTING DISTRICTS

1 Tanana Valley
2 Matanuska Valley
3 Kenai
4 Southeast
5 Southwest



Land Inventory

Detailed soil surveys have been completed by the Soil Conservation Service in most of the major farming areas. Less detailed surveys are available in a few other remote scattered areas of the state. These surveys identify the soils by name, and the areas occupied by each soil are shown on aerial photographs. Each soil type is classified according to its approximate agricultural "value" and assigned to one of the eight land capability classes.

The standard capability classes are as follows, with annotations pertaining to Alaska--

Class I - soils in this class have few limitations that restrict their use. It is significant that there are no class I soils in Alaska because of the climatic factor.

Class II & III - soils in these classes have limitations that reduce the choice of crops or require special conservation practices, but are suitable for most crops grown in Alaska.

Class IV - soils in this class have severe limitations (steepness, shallowness, or wetness) that make them marginal for cropping.

Class V - this classification is not used in Alaska.

Class VI & VII - soils in these classes are suitable primarily for pasture, range, or woodland.

Class VII - soils in this class cannot be used for commercial plant production, i.e., field crops, and should remain in woodland or whatever natural cover that exists.

The acreage available as farm land in the four major areas described earlier is shown in Tables 1 and 2. The acreage in Classes II, III, and IV has been divided into subclasses which are useful in appraising the agricultural capabilities of the region. For instance Class IIc has primarily a climatic limitation (applicable to all classes) and requires land clearing, breaking, fertilizing and crop rotation. Class IIe requires the same improvements as IIc, but it is subject to erosion. Therefore, simple erosion control measures should be initiated. Class IIs requires the same practices as IIc with an additional requirement of supplemental irrigation. These general practices apply for the subclasses of III and IV soils, but they are necessary in a progressively higher degree. The subclasses IIIw and IVw are wet soils which require smoothing and/or drainage.

The amount of Class II soils in the four areas (Tanana, Matanuska-Susitna, Kenai and Kodiak) is 420,306 acres. There are 487,290 acres of Class III and 465,401 acres of Class IV. These three classes have a cumulative total of 1,372,997 acres. If Class IV soils are excluded as being submarginal for cropping, there are 907,596 acres available for cropland.

There are other scattered areas of potential farm land in Alaska. These include the Kenny Lake region (south of Copper Center), portions of the Chitina Valley, and less accessible but apparently extensive land bordering the Kuskokwim, Yukon, and other major rivers of Interior Alaska. These lands are remote from intra-state markets and generally require vast improvements prior to cultivation. It is estimated that in all these other areas combined, there are approximately 675,000 acres that could be classes II and III, and about 1,500,000 acres that could be assigned to Class IV.

TABLE 1

ESTIMATED ACREAGE TECHNICALLY SUITABLE FOR PRODUCTION AND PROPORTIONATE EXTENT OF SOILS IN DESIGNATED FARMING AND RANCHING AREAS OF ALASKA BY LAND CAPABILITY CLASSES, AS OF JULY, 1967*

	Tanana Valley		Matanuska-Susitna		Western Kenai Lowland		NE Kodiak Island	
Land Class	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
II+	154,798	23	146,280	13	119,228	21		
III	172,616	26	213,660	18	92,825	19	8,189	3
IV	180,568	27	181,560	16	91,143	18	12,130	4
VI	54,646	8	165,050	14	30,133	6	72,281	23
VII	90,178	13	375,960	32	130,785	26	92,171	30
VIII	16,525	3	81,480	7	34,175	7	122,193	40
TOTAL	669,331	100	1,163,990	100	498,489	100	307,207	100

*Areas as outlined in SCS reports and does not include remote areas. Percentages listed refer to the proportion of total land in each area.

+Much of soil areas classified II qualified as Class I, except for only the Alaskan climate.

SOURCE: Soil Conservation Service.

TABLE 2

ACREAGE OF LAND BY SOILS, CAPABILITY CLASSES, PORTIONS OF MAJOR FARMING AND RANCHING AREAS OF ALASKA, AS OF 1967

Land Class		Tanana Valley	Matanuska-Susitna	Kenai	N.E. Kodiak	All Major Regions	Percent of Regions Total
			(ACRES)				
	IIc	89,783	92,156	87,036			
	IIe	41,795	54,124	32,192			
	IIs	23,220					
Sub Total	II	154,798	146,280	119,228		420,306	15.9
	IIIe	48,332	113,240	34,345	3,117		
	IIIs	74,225	94,010	32,489			
	IIIw	50,059	6,410	25,991	5,072		
Sub Total	III	172,616	213,660	92,825	8,189	487,290	18.5
	IVe	39,725	38,128	22,786	2,027		
	IVs	16,251	123,460	10,937	10,103		
	IVw	124,592	19,972	57,420			
Sub Total	IV	180,568	181,560	91,143	12,130	465,401	17.6
	VI	54,646	165,050	30,133	72,281	322,110	12.2
	VII	90,178	375,960	130,785	92,414	689,337	26.1
	VIII	16,525	81,480	34,489	122,193	254,573	9.7
TOTAL All Classes II-VIII		669,331	1,163,990	498,489	307,207	2,639,017	100.0

SOURCE: Soil Conservation Service, USDA.

Potential agriculture production in Alaska might be considered in terms of available acreage from 1.5 to 2.9 million acres, depending upon whether Class IV soils are included in the acreage for cropland. The four major areas, making up from 907,596 to 1,372,997 acres (depending whether Class IV soils are excluded), are the main concern of this study.

Yield Capabilities

In order to estimate the approximate yield potential for the different land classes, existing data from the Soil Conservation Service were used as a principal point of departure. Estimates by knowledgeable people of the yield potential for the different crops were obtained. The results of this effort are shown in Appendix A.

The yield estimates shown in the respective tables were developed on the basis of two alternative levels of managerial performance. Management level I refers to the presently observed management practices which prevail in Alaska. The yields shown in Management level II are based on the wide adoption of the best known technology and cultural practices. All in all, these yield capability estimates represent an important measure of the ability of Alaska to produce agricultural products in competition with other states.

Summary

The overall supply of land which might be utilized for agriculture is relatively large. Although soil types vary substantially from region to region, ample acreage exists which might technically be capable of producing a variety of agricultural products for intra-state markets. Sufficiently high grades of land for commercial agriculture do exist in

Alaska. However, much of the land identified as suitable for agriculture is remotely located and uncleared. Existing farm practices do not fully indicate the agricultural capacity of the state, and are poor indicators of development possibilities.

Public policies influencing the availability of land, whether federal or local, by zoning or taxation, have retarded development of an agricultural base in the state. In particular, the Homestead Act restricted farms to an unrealistically small maximum size. There has been little serious attempt to allocate the more productive lands to agriculture. This has also led to a significant amount of absentee ownership and has encouraged very limited production. Borough taxation and zoning policies have become important factors in and near almost every Alaskan urban market.

IV

DEMAND ANALYSIS

Most of the agricultural products consumed within Alaska are procured from other U.S. regions, with limited re-handling and fairly standardized food retailing occuring within the state. In 1964, food stores reported sales of $64.3 million, which, when combined with commissary sales, amounts to a substantial urban market. Considering the magnitude of this situation, the successful development of a commercial agriculture base is particularly important to the region's economic growth--as an "import substitute" industry.

To a large extent, private industries which have recently developed and prospered in the state procure most of their factor requirements from outside. By implication, a full vertical system of commercial farming, processing and integrated marketing probably will not be constructed successfully within the State in the foreseeable future. On the other hand, certain local market segments for agricultural products are expanding, and particular products and processing may become feasible on a nation-wide scale or for sale to foreign industrial markets.

Intra-State Market

Past and current levels of consumption for particular agricultural products are difficult to estimate. This is attributable in large part to the "mixed" product nature of large scale grocery retailing. Nevertheless,

the consumption patterns of Alaskan households have been surveyed on many representative food items. To a considerable extent these consumption patterns were consistent with national buying propensities and trends. Forecasts of consumption levels for individual regions for 1970 and 1980 were derived directly from population and per capita consumption estimates. These provided rough estimates of the levels of each product category which would be purchased in future years.

For the most part, published population estimates by federal agencies for Alaska have been over optimistic in their appraisal of growth trends. For the year 1985, published population estimates for the state vary from 400 to 500 thousand persons. A very optimistic forecast of 513 thousand persons is used in this report to demonstrate the likely impact of a very favorable local marketing situation on agriculture. (See Table 3.)

Per Capita Consumption

Alaskan consumption patterns differ somewhat from other states in the U.S. Per capita consumption of certain items, such as eggs and potatoes, is higher in Alaska than in the other states. For other items such as beef, pork, and fresh milk, Alaskans consume less per capita than the national average. The lower meat consumption is due very possibly to the wide substitution of considerable quantities of wild game for beef and pork. The per capita consumption estimates used in the projection of future demand are shown in Tables 4 and 5.

Urban vs. Non-Urban Markets

For most products, marketing activites within the state are readily divisible according to the following regions--Southeastern Alaska, served

TABLE 3

ALASKA POPULATION BY CROP REPORTING DISTRICTS,
1960 AND PROJECTIONS TO 1985

Crop Reporting District*	1960	1965	1975	1985
	(thousands of persons)			
1. (Tanana)	51.4	53.6	65.2	83.9
2. (Matanuska)	92.6	111.5	154.9	227.9
3. (Kenai)	9.1	11.1	16.4	26.1
4. (Southeast)	35.4	42.1	59.2	87.6
5. (Southwest)	37.7	44.9	60.3	87.5
TOTAL	226.2	263.2	356.0	513.0

*Shown in Figure 2.

SOURCE: Rampart Project Case I.

TABLE 4

ESTIMATED 1967 PER CAPITA CONSUMPTION OF SELECTED FOOD PRODUCTS IN ALASKA BY CROP REPORTING DISTRICTS, IN UNITS NOTED PER CAPITA

Item	Unit	Region				
		Tanana Valley	Matanuska Valley	Kenai	South-east	South-west
Milk	lb.	260	300	275	300	100
Potatoes, fresh	lb.	150	140	140	115	75
frozen	lb.	20	20	20	15	10
chips & shoestrings	lb.	12	12	12	12	10
Eggs	no.	400	400	400	400	200
Carrots	lb.	7(0.3)*	7(0.3)	7(0.3)	7(0.3)	4(0.1)
Cabbage	lb.	8	8	7	7	4
Cauliflower	lb.	1.5(0.1)	1.5(0.1)	1.5(0.1)	1(0.1)	0.5
Lettuce	lb.	15	15	15	10	5
Brussel sprouts	lb.	0.2(0.1)	0.2(0.1)	0.2(0.1)	0.3(0.1)	0.1
Peas	lb.	0.3(1.5)	0.3(1.5)	0.3(1.5)	0.2(1.5)	0.1
Beets	lb.	0.6	0.6	0.6	0.6	0.3
Celery	lb.	3	3	3	4	2
Green Onions	lb.	1	1	1	1	1
Rhubarb	lb.	0.5(.03)	0.5(.03)	0.5(.03)	0.5(.03)	0.2
Broccoli	lb.	0.5(0.5)	0.5(0.5)	0.5(0.5)	0.5(0.5)	0.2
Cucumbers	lb.	1	1	1	1	0.5
Tomatoes	lb.	6	6	6	6	3
Zucchini	lb.	0.1	0.1	0.1	0.1	0.1
Rutabagas & turnips	lb.	0.2	0.2	0.2	0.2	0.1
Radishes & parsnips	lb.	0.2	0.2	0.2	0.2	0.1
Beef	lb.	85	85	85	90	50
Pork	lb.	35	35	35	45	25
Lamb & mutton	lb.	0.2	0.2	0.2	0.5	0.5
Reindeer	lb.	0.2	0.2	0.2	0.2	10.0
Other meats	lb.	5	5	5	5	25
Wild game	lb.	40	35	35	20	35

*Figures in parenthesis are frozen consumption.

SOURCE: Alaska Agricultural Experiment Station.

TABLE 5

ESTIMATED CONSUMPTION OF SELECTED PRODUCTS IN ALASKA, BY CROP REPORTING DISTRICTS, 1985

Item	Unit	Region: Tanana Valley	Matanuska Valley	Kenai	South-east	South-west	Total All regions
Milk	mil lbs.	21.8	68.4	7.2	26.3	8.8	132.5
Potatoes,							
Fresh	tons	6,292	15,953	1,827	5,037	3,281	32,390
Frozen	tons	839	2,279	261	657	438	4,474
Chips & Shoestrings	tons	503	1,367	156	526	438	2,990
Eggs	mil doz.	2.8	7.6	0.9	2.8	1.5	15.6
Carrots	tons	293.6	797.6	91.4	306.6	175.0	1,664.2
Cabbage	tons	325.6	911.6	91.4	306.6	175.0	1,810.2
Cauliflower	tons	62.9	170.9	19.6	43.8	21.9	319.1
Lettuce	tons	629.3	1,709.3	195.6	438.0	218.8	3,191.0
Brussel Sprouts	tons	8.4	22.8	2.6	13.1	4.4	51.3
Peas	tons	12.6	34.2	3.9	8.	4.4	63.9
Beets	tons	25.2	68.4	7.8	26.3	13.1	140.8
Celery	tons	125.9	341.8	29.7	175.2	87.5	760.1
Green Onions	tons	41.9	113.9	13.2	43.8	43.8	256.6
Rhubarb	tons	21.0	57.0	6.5	21.9	8.8	115.2
Broccoli	tons	21.0	57.0	6.5	21.9	8.8	115.2
Cucumbers	tons	41.9	113.9	13.1	43.8	21.9	234.6
Tomatoes	tons	251.7	683.7	78.3	262.8	131.3	1,407.8
Zucchini	tons	4.2	11.4	1.3	4.4	4.4	25.7
Rutabagas & Turnips	tons	8.4	22.8	2.6	8.8	4.4	47.0
Radishes & Parsnips	tons	8.4	22.8	2.6	8.8	4.4	47.0
Beef	mil lbs.	7.1	19.4	2.2	7.8	4.4	40.9
Pork	mil lbs.	2.9	8.0	.9	3.9	2.2	17.9
Lamb & Mutton	mil lbs.	.017	.046	.005	.044	.044	.156
Reindeer	mil lbs.	.017	.046	.005	.018	.075	.961
Other meat	mil lbs.	1.420	1.140	.130	1.438	1.850	5.978
Wild game	mil lbs.	3.4	8.0	.9	1.8	3.0	17.1

SOURCE: Based on per capita consumption estimates in Table 4.

principally by ocean transportation; the Anchorage and Fairbanks urban markets, served by mixed transportation modes with a variety of logistical alternatives; and the rest of the state, served largely by urban wholesalers in Anchorage and Fairbanks. The net result is that Anchorage and Fairbanks comprise the only feasible urban markets and represent the largest share of population and purchasing power, a condition apparent in Table 3.

Product Types and Markets

There are various products which might be produced in Alaska for which a ready local market can be found. For example, locally produced potatoes are salable within the state, and an increasing degree of competition exists among producers in the Matanuska and Tanana Valleys. Dairy products, eggs and poultry might maintain their market share position in Alaska principally through service proximity and freshness of the local product. (See Chapter V.)

Industrial Markets

The military establishment, through its individual commissaries and "open mess" procurement practices is the major industrial purchaser in Alaska. Sales of certain agricultural products, such as potatoes, are significant. However, the pricing practices among Alaskan producers have occassionally led to severe price competition. As a result, wholesale prices of potatoes have at times been less than or comparable to Idaho wholesale prices. Outside of a very few product examples, knowledge about what and how much the military establishment buys, through what channels of distribution, and of how Alaskan farmers might sell to the military is undocumented and poorly understood.

Foreign Markets

Agricultural opportunities in foreign trade are very real and might become a most significant growth factor in the next decade. The sale of beef and mutton from the Aleutian Islands and the Kodiak Island group to Japanese purchasing groups has been regularly proposed.[1] Accurate cost information is not available concerning the operations of the remote ranches in Alaska, and Japanese Trading Companies rarely divulge the details of their purchasing agreements.

Specialty Products

Seed potatoes, certain seeds and specialty products for research uses elsewhere probably will become an increasingly demanded product group. Usually, these types of products are developed from research and then transferred to commercial growers. An import-export market could be built around them. Additional investigation of the specialty products markets is needed.

At the present time, reindeer meat is considered a specialty product. No large and organized market is found in the United States other than some middle and small-sized northern Alaskan communities. However, commercial sized herds exist and are capable of producing reindeer meat on a sustained yield basis. During the next decade, very dramatic improvements in the processing and handling of reindeer could occur. Correspondingly, intra-state markets might well be exploited to improve living conditions of numerous rural, low-income communities.[2]

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[1] For a current discussion, see Bureau of Reclamation, Livestock Industry in Alaska: Possibilities for an Integrated Livestock Industry on Kenai Peninsula, Kodiak and Adjoining Islands (Juneau, Alaska: U. S. Department of Interior, January, 1967).

[2] For additional details, see Mervin Freeman, "Reindeer" (College: Agriculture Extension Service, University of Alaska, June, 1967).

Logistics

The movement of products to Alaska is of dual concern to commercial farmers. Transportation costs and services represent an important part of factor costs in establishing a going concern. This is especially the case in high weight-to-value commodities, such as feed and many kinds of capital equipment. (See Chapter VI.) The present logistics of food distribution represents the manner in which competitor producers, situated elsewhere in the U.S., compete in Alaska.

Since statehood, the logistical situation has changed rapidly. New tariffs, representing unit prices and quantity breaks, have been re-established at regular intervals. Several longer term trends are apparent in terms of transportation modes and rate adjustments, and also in requirements for in-state storage and warehousing.

Transportation

Shipments of food products to Alaska from food processing and warehousing centers have become more prompt and certain. Costs of transportation have declined across the board in almost every commodity group, with the largest improvements in quantity discounts, i.e., vanloads, plane-loads. The introduction of Sea-Land service in Alaska provided an additional mixed mode (sea/rail, sea/highway) which also has amounted to in-transit storage.[3]

Favorable backhaul rates are readily obtainable. However, most products which might be produced locally could not be sold at competitive prices outside of Alaska, except as noted in specialty products and in foreign trade.

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[3] See R. C. Haring and C. C. Correia, Economic Base of the Fairbanks North Star Borough (College: University of Alaska, 1967), Chapter 7 for particular examples.

Warehousing

Over the past seven to ten years, the urban requirements for independent warehousing in Alaska have changed drastically as improved logistical services were introduced. Fairbanks, for example, has witnessed a decline in the number of warehouses in operation and a general downgrading of the types of storage uses. On the other hand, cold storage space has grown very rapidly, especially in the Anchorage area.

The fixed-based warehouse has been substantially bypassed by mobile storage, such as provided by Sea-Land vans. In addition, more rigid scheduling of shipments has reduced warehousing requirements in food retailing to the extent that storage space in retail stores has been converted to retail floor space in several instances. Overall, the trend in more rapid sales turnover in wholesaling and retailing signifies that Alaskan farmers probably will encounter continued difficulties in marketing their products to local food stores.

Problems in Forming Markets

In the course of the study, several major difficulties in forming in-state markets became readily apparent. They are as follows:

1. Food retailers frequently price Alaskan agricultural products higher than the same products supplied from outside, even though purchase prices of locally produced commodities occassionally were comparable or lower. In other words, retailers have occasionally maintained higher gross margins on Alaskan products and thus discriminated against local producers in the marketplace.
2. Most Alaskan farmers are small and produce little and, therefore, enter the market only now and then. Consequently, they do not represent efficient supplier channels for retail

stores. The retailer has to turn to outside producers to be assured of an adequate and continuous supply. In addition, where farmers are unable to commit themselves in terms of a reliable flow of output, dependable contracts cannot be negotiated.

3. Outside farmers and processors assemble and sell higher grades than labeled minimum specification. Salability of comparable Alaskan products could be improved through sizing and packaging within grading standards.

4. Many retailers, whose financial terms are dictated by outside suppliers, represent slow credit turnover in terms of accounts receivable to farmers within the state. Frequently open account credit, in fact, has amounted to 90 day regular delays.

5. Alaskan food products are not actively promoted through "specials" or sales which would increase their market share.

Summary

A significant share of the urban Alaskan market would support an expanded agricultural base. Regionally aggregated consumption figures, however, are misleading. The market shares held by commercial farmers in other states are reinforced by distribution channels of long standing and improved transportation costs and conditions of delivery. The marketing position of local farmers has become more highly competitive in recent years, and this trend probably will continue.

Comparing the land capability (discussed in Chapter III) with the market segments described in this chapter, many products which could be locally produced and sold are not. Principal factors causing this dichotomy are farm and operating costs, a major concern of Chapter VI.

V

SITUATION ANALYSIS

Introduction

Agricultural activities in Alaska are at an early stage of development. There are few farms and these are smaller in acreage, investment and output than commercial operations in other states. Although some of the problems facing Alaskan farmers are similar to those encountered by small farmers in other areas of the nation, there are some unique difficulties due to extreme temperature varients, long distances from marketing centers, high transportation costs, and limited local markets because of a sparce and scattered population. Overlying problems facing many small farmers today, including those in Alaska, are insufficient acerage, lack of scale economies in production and inability to price competitively due to managerial inefficiency.

Overview of Production

Milk, eggs and potatoes are the three most important agricultural commodities in Alaska in terms of output value and have, over the past 15 years, accounted for 85 per cent of the total agricultural sales in the state. Milk sales surpassed the value of any other locally produced agricultural commodity during this period. In 1953, milk provided about one-third of the value of production. From 1954 to 1966, milk accounted

for 38 to 44 per cent of the value of output. Potatoes are the second most important commodity in terms of statewide production value and have accounted for an average of about 16 per cent of the production value over the past 15 years. The third most important item, eggs, accounted for about 8.6 per cent of total production value during the 1953-67 period. In terms of physical volume, egg production has fluctuated between 298,500 dozen in 1953 and 862,500 dozen in 1966. Since a higher portion of production is sold, in comparison to other commodities, eggs have accounted for approximately 11 per cent of total agricultural sales.

In 1966, both hay and eggs surpassed potatoes in production value, but it is doubtful that this indicates a new trend. Egg sales in particular probably will decline since a rather siezable farm unit ceased operations in August, 1967. (See Tables 6 and 7.)

The Matanuska Valley is the leading agricultural area in the state and in 1966 produced about 69 per cent of the total value of agricultural production, as shown in Table 8. The Tanana Valley is second, with 12 per cent of the total production value in 1966, followed by the Southwest area with 10 per cent and the Kenai Peninsula with 8 per cent. A regional breakdown of crop production and acreage in use is presented in Appendixes B and C. It is noted that essentially all of the agricultural output in the Southwest area was livestock and livestock products, with slightly over 50 per cent ($238,000) attributable to reindeer operations.

In the Matanuska Valley

The Matanuska Valley is characterized by a perdominance of commercial farming operations. All but one of the commercial Grade A dairy farms in the state, more than half of the commercial potato producers, and two of the three large commercial egg producers are located in the Valley at this time. During 1966, 10,490 acres or 66.2 per cent of the total acreage in crops in Alaska, were located in the Matanuska.

TABLE 6

VALUE OF PRINCIPAL AGRICULTURAL PRODUCTS SOLD IN ALASKA

1953-1966

(Thousands of Dollars)

Year	Milk	Eggs	Ranch Furs	Wool	Reindeer Meat	Other Livestock Products	Potatoes	Other Vegs.	Total
1953	1,016	274	57	38	NA*	161	836	235	2,617
1954	1,204	306	37	30	NA*	141	635	206	2,559
1955	1,290	292	56	44	NA*	177	520	172	2,551
1956	1,509	315	70	46	NA*	151	958	209	3,258
1957	1,620	334	50	59	NA*	186	842	249	3,340
1958	1,604	375	20	48	138	214	680	268	3,350
1959	1,771	424	50	62	135	228	578	264	3,512
1960	2,078	454	31	49	132	203	712	196	3,855
1961	2,318	424	-	54	136	184	761	199	4,076
1962	2,276	400	-	63	139	326	635	232	4,071
1963	2,218	369	-	97	137	275	582	196	3,874
1964	2,129	342	-	105	180	322	1,043	204	-
1965	2,053	590	-	111	183	376	756	189	-
1966	1,881	661	-	123	168	457	546	200	-

*Not available.

SOURCE: Alaska Crop and Livestock Reporting Service: a cooperative function of U.S. Department of Agriculture, Statistical Reporting Service; Alaska Division of Agriculture; Alaska Experiment Station.

TABLE 7

VALUE OF AGRICULTURAL COMMODITIES PRODUCED IN ALASKA,
1955, 1960, 1965, and 1966

(Thousands of dollars)

Commodity	1955	1960	1965	1966
CROPS:				
Oats	43.3	118.9	41.0	42.0
Barley	27.6	190.0	86.0	140.0
Silage, grain	234.0	368.0	357.0	288.0
Silage, grass	33.7	108.0	86.0	72.0
Hay, grain	118.9	96.0	54.0	115.0
Hay, grass	214.5	536.0	360.0	558.0
Potatoes	520.4	723.0	799.0	546.0
Cabbage	22.6	31.0	37.0	31.0
Carrots	43.3	49.0	33.0	51.0
Lettuce	53.8	78.0	98.0	96.0
Other vegetables	52.0	39.9	29.0	30.0
Sub Total - Crops	1,364.1	2,337.9	1,980.0	1,969.0
LIVESTOCK AND POULTRY PRODUCTS:				
Milk	1,374.0	2,162.0	2,053.0	1,953.0
Eggs	322.9	464.0	590.0	677.0
Beef and veal	127.2	144.0	294.0	417.0
Poultry meat	66.8	26.0	22.0	18.0
Pork	41.8	62.0	94.0	81.0
Mutton and Lamb	5.4	6.2	12.0	19.0
Wool	43.8	50.0	11.0	123.0
Sub Total - Livestock Products	1,981.9	2,914.2	3,176.0	3,278.0
TOTAL ALL COMMODITIES	3,346.0	5,252.0	5,156.0	5,247.0

SOURCE: Alaska Agricultural Statistics 1953-1966, USDA - SRS and Alaska Division of Agriculture.

TABLE 8

REGIONAL DISTRIBUTION OF THE VALUE OF AGRICULTURAL PRODUCTION IN ALASKA, 1966

(in percent)

Region	Crops	Livestock & Poultry	All Agriculture Production
Tanana Valley	17	9	12
Matanuska Valley	75	66	69
Kenai Peninsula	7	9	8
Southeast	*	*	1
Southwest	1	15+	10
Five Region Total	100	100	100

*Less than one half percent.

+This percentage includes $238,000 for Reindeer meat which was not includes in Table .

SOURCE:

TABLE 9

CROPLAND UTILIZATION BY AREAS - 1966

CROPS PLANTED	Tanana Valley Acres	Matanuska Valley Acres	Kenai Penin. Acres	South-east Acres	South-west Acres	Alaska Total Acres	% of 1965 %
COMMERCIAL VEGETABLES							
Potatoes	285	410	28	2	5	730	91
Cabbage	13	20	1	*	1	35	100
Carrots	9	24	1	1	*	35	140
Lettuce	9	55	1	*	*	65	108
Other Vegetables 1/	16	21	2	*	1	40	100
FEED CROPS							
All Oats	430	900	130	-	40	1,500	83
All Barley	500	1,130	70	-	-	1,700	81
Other Grains	20	30	-	-	-	50	50
Grain Mixtures	450	2,750	250	50	-	3,500	83
TOTAL ACRES PLANTED	1,732	5,340	483	53	47	7,655	84
GRASSLAND HARVESTED							
Seeded Grass	1,270	5,000	700	90	40	7,100	125
Native Grass	210	150	580	90	70	1,100	92
TOTAL LAND IN CROPS	3,212	10,490	1,763	233	157	15,855	99
Percent of State Total	20.2	66.2	11.1	1.5	1.0	100.0	-

1/ Includes radishes and celery.

* Small amount, combined to avoid disclosure of individual operations.

Value of farm production in the Matanuska Valley in the decade 1954 to 1964 varies from 69 to 72 per cent of the state's total, excluding the value of reindeer meat, furs, and greenhouse production. In 1965 the Matanuska Valley's share of the state's farm and ranch output dropped to 66 per cent from a high of 72 per cent in 1964, due largely to a reduction of 12 per cent in value of milk and 20 per cent in value of potatoes produced. This compared with a reduction of only 9 per cent for milk and 7 per cent for potatoes in the value of the state's total production of these two commodities.

In the Tanana Valley

The Tanana Valley is the second largest farming area in terms of production and sales. During 1966, 3,212 acres or 20.2 per cent of the total acreage cropped were in the Tanana area. The area is characterized by a mixture of commercial and part-time farmers.

Dairy farming has declined in recent years and was associated with financial difficulties of a non-agricultural type. At present, one commercial Grade A dairy remains in the area. Farming emphasis is on potatoes, vegetables, forage and grain crops.

The Tanana valley produced from 13 to 18 per cent of the value of the state's farm output during 1953-1965, rising to a high of 18 per cent in 1965. In that year Tanana Valley farmers increased production of milk and potatoes--the two leading commodities from Alaska's farms, while the state totals of these two products declined substantially from the previous year. For the preceding 12 years of the period under study, farm production shares from the Tanana Valley varied 13 to 17 per cent of the state's agricultural outpue, an average of 15.6 per cent for the 13-year period.

In the Kenai Area

In the Kenai Peninsula most farms are small and are in the very earliest stages of development. Much of the food produced is locally consumed. There are dairy cows, beef, swine and poultry as well as smaller crop farms. Much of the area south of the Kasilof River is covered by dense native grasses and vegetation, offering good potential summer grazing. Winter grazing is considered highly impractical due to damp cold weather, heavy snow and low feeding value of winter vegetation. Some native grass is cut for winter feed. Most farms are part-time operations and there are no commercial dairy farms. The number of beef ranches have declined recently, but the number of cattle have remained about the same. There is only one small commercial egg producer that sells little to other Alaskan communities. A few part-time vegetable-potato farms continue in operation.

Except for 1965, production from Kenai Peninsula farms constituted only from 4 to 7 per cent of the value of the total agricultural output of the state. In 1965, Kenai area's share of the state's agricultural value of production rose to 9 per cent. For the 13-year period, 1953-1965, the Kenai area's share of the state's total output averages 5.9 per cent.

In Southeastern Alaska

The largest geographic change in the state's agricultural base in the 1953-1965 period occurred in Southeast Alaska. Production declined steadily from 10 per cent of the state's farm output in 1953 to only 3 per cent in 1963-1965. Dissolution of nearly all of the commercial egg production in the area, along with reduced milk production, accounted for the substantial decline in the agricultural base of the Southeast area.

The sale and disposition of all commercial milking herds during 1966 caused a further reduction in the area's share of farm production. In 1966, only about 1.5 per cent of the total cropped acres in the state were located in Southeastern.

At Kodiak and the Aleutian Island Groups

Stock raising (sheep and cattle) is the leading agricultural enterprise on Kodiak and the Aleutian Islands. Natural vegetation and grasses provide seasonal and even year-long grazing, although supplemental feeding is recommended. Most of the Aleutian Islands are grass-covered and treeless, but some are unsuitable for the raising of commercial livestock. Herd expansion is limited not by rangeland, which is ample, but by lack of winter feed and high transportation costs, coupled with unsatisfactory marketing opportunities. Wool is successfully shipped and sold to domestic buyers. Some beef is shipped to Anchorage, however; local consumption still provides only a small market. The Kodiak Island group maintained the steadiest level of Alaska's farm production, 3.1 per cent over the period 1953-1965.

Structure of the Industry

The comparative position of agriculture in Alaska is also represented by the number and acreage of farms, their capital size, production characteristics and managerial organization.

Number and Size of Firms

Depending upon the source, approximately 350 farms have sold produce of commercial value during the period 1960-1966. Many of these

farm units are very small, and a few are also sporadic in production and isolated. Consequently only 100 farm enterprises were classified commercial farming. Average farm size and related characteristics are shown in Table 10.

This information, when compared with the Pacific Northwestern region of the United States, clearly indicates that average farm size is too small for optimal production efficiency. As a result, the more efficient or better-known types of farm management and technology have not been applied. This position is supported by the average revenues per farm and apparent yields to invested capital, a matter explored in greater detail in Chapter VI.

Employment in Alaskan agriculture is mostly by owner-operated farms, which hire seasonal workers at harvest time. Approximately 60 per cent of farm workers were reported as "family workers." Farm wage rates in Alaska during 1966 averaged well above those of any other state. Alaska's farm wages in December of 1966 averaged $400 per month with house, $300 per month with board and room, $16 per day without board and room, and $2.10 per hour without board and room. For the most part, the relatively high costs of farm labor represented a minimum wage for part-time seasonal summer employment in Alaska, shown in Table 11. The labor cost situation is aggravated by seasonal employment increases in almost every community at the very time when farm labor is needed. California's farm wage rates are closest to Alaska's; however, in December of 1966 hourly wage rates in Alaska exceeded those in California by 8 to 11 and 36 per cent, respectively.

Quasi-Agricultural Operations

Agriculture, as it is generally viewed in the United States, is comprised of commercial farming of diversified crops and livestock on a

TABLE 10

SELECTED CHARACTERISTICS OF FARMING

(in acres, unless otherwise indicated)

	Tanana Valley	Matanuska Valley	Kenai Peninsula	Southeast Area	Kodiak Island	Alaska Total
Number of Farms	77	176	58	27	29	367
Land in Farms	13,606	39,715	6,623	2,623	804,764	867,331
Average Size of Farm	177	226	114	97	27,750	2,363
Cropland Harvested	2,559	10,369	569	348	497	14,342
Cropland Pasture	315	1,221	543	292	1,994	4,365
Idle Cropland	1,678	2,359	904	23	308	5,272
Woodland Pastured	353	2,029	588	211	39,105	42,286
Other Woodland	6,075	18,791	2,202	333	40,639	68,040
Other Pasture	328	1,854	553	982	499,213	502,930
Land Clared Since 1950	3,221	5,242	737	59	379	9,638
Woodland Suitable for Clearing	5,378	12,691	2,010	320	725	21,124

SOURCE: U.S. Department of Commerce, Census Bureau, Census of Alaska Agriculture by Areas--1960.

TABLE 11

NUMBER OF PERSONS WORKING ON ALASKAN FARMS FOR SELECTED MONTHS 1966

Month	Family Workers	Percent of Total	Hired Workers	Percent of Total	Total Workers
January	500	83	100	17	600
March	500	83	100	17	600
June	700	64	400	36	1,100
September	600	43	800	57	1,400
December	500	83	100	17	600
Annual Average	575	62	350	32	925

SOURCE: U.S. Department of Agriculture, Statistical Reporting Service; Alaska Division of Agriculture; Alaska Experiment Station.

TABLE 12

VALUE OF AGRICULTURAL PRODUCTION IN ALASKA

1953-1965

Year	Total Value of Production	Commercial Cash Receipts	Value Used in Farm and Home
1953	$3,284,000	$2,617,000	$ 667,000
1954	3,097,000	2,559,000	538,000
1955	3,402,000	2,551,000	851,000
1956	4,239,000	3,258,000	981,000
1957	4,398,000	3,340,000	1,058,000
1958	4,676,000	3,350,000	1,326,000
1959	5,124,000	3,512,000	1,612,000
1960	5,437,000	3,855,000	1,582,000
1961	5,704,000	4,076,000	1,628,000
1962	5,827,000	4,071,000	1,756,000
1963	5,415,000	4,039,000	1,376,000
1964	5,827,000	4,406,000	1,421,000
1965	5,386,000	4,301,000	1,085,000

SOURCE: Alaska Crop and Livestock Reporting Service: a cooperative function of the U.S. Department of Agriculture, Statistical Reporting Service; Alaska Division of Agriculture; Alaska Experiment Station.

large scale production basis. Although it is extremely unlikely that production in Alaska will reach these magnitudes in the foreseeable future, the state may be capable of "agriculture fringe" activities which would incorporate the best known use of vast land resources. Considerations of this type are:

1) reindeer herding, processing and marketing;[1] and

2) processing of food products which grow "wild," i.e., natural harvest.

From the evidence available, it is reasonably apparent that the commercial reindeer harvest could be increased in two ways; namely, by increasing the harvest from existing herds and by establishing grazing areas in presently underutilized sections of western Alaska. Both of these expansion proposals are difficult to implement. The major problems appear to be--

(a) lack of profit-motivated interests among existing herd owners, once a "suitable" living standard is attained.

(b) meager storage and processing facilities, which deter regular shipments to urban markets.

(c) lack of trainable Native persons interested in reindeer herding, even with certain long term unemployment as an alternative.

Farm Failures

Since 1962, the number of commercial farm units in Alaska has gradually declined because of financial difficulties. The decrease in the number of

[1] It is noted that, in the much longer term musk oxen might be of commercial value in this respect.

farming operations has not been associated with the growth of surviving competitors, but instead with a new loss of productive units.

The dispersed locations of Alaska's small farm units create certain special problems of inefficiency usually not encountered in competitor states. These problems are: an inability to coordinate joint procurement of supplies, notably feed, and dissimilar logistical problems among farmers which effectively prohibit creation of marketing cooperatives, except in the Matanuska and Tanana Valley areas.

Many of Alaska's farmers are part-time operators, and their sporadic efforts suggest that non-farm income will continue to represent their major form of employment. The commercial farmers, who are principally dependent upon farming for a livelihood, face a difficult manangerial situation. Little specialization of farm work has occurred, and each operator tends to be responsible for every portion of the commercial operations, including processing, packaging, transportation, credit, etc. By implication, "smallness" of the farm unit imposes an excessive managerial burden. Coupled with other features of the occupation, this results in short supply of farm owners and managers. A review of the age distribution of farm operators shows that the first generation of commercial farmers, mostly near retirement age, have been unable to attract younger managers to operate their units. Environmental conditions also have discouraged in-migration of competent farmers. Specifically, a harsh climate, inadequate access roads and public facilities, such as schools, churches and hospitals, have discouraged location in sparsely settled areas.

The feasibility of producing crops and livestock in Alaska is definitely established in terms of "ceiling" prices, in this case the

prices (delivered in Alaska) set by outside farm units. The recent revolution in transportation costs has worked to the net disadvantage of Alaskan producers in this regard due principally to declining freight rates. For example, in the case of milk, transportation price cuts have appeared almost exclusively in inter-urban routes. Conversely, most freight costs among smaller and outlying Alaskan communities have not changed materially. Remote ranchers are competitively less "well off" logistically. In the case of dairy products, air freight rates from Seattle to Fairbanks were reduced in 1965 to 6-3/4 cents per pound on shipments in excess of 20,000 pounds. For practical purposes, this placed local dairies in the position of having to keep controlling operating costs within 6-3/4 cents of the Seattle per pound wholesale price.

The cost conditions affecting the feasibility of various kinds of agriculture and size of farm units (technology) are discussed in Chapter VI.

VI

COST OF PRODUCTION AND PROCESSING

Introduction

Information about costs-of-doing business in Alaska is scarce and extremely difficult to acquire. In this regard, data about Alaskan farms and ranches are no exception. A number of surveys has been completed in specific locations and for selected crops. Of these surveys, the most notable are those of farms situated in the Matanuska Valley concerning dairying, hay and silage crops, and, to a limited extent, vegetables. All in all, these surveys were not conducted on a highly comparable basis, but they do represent a reasonably thorough cross-section of commercial farms. The current state of knowledge about costs of farming in Alaska is, therefore, extremely limited in certain areas. As a result, first approximation estimates of what "could exist" are taken from studies conducted outside the state. These studies provide a considerable insight into what kinds of farming might be feasible in Alaska. However, the information and observations are not strictly comparable and easily transferable to Alaska.

Costs in Farming

The Alaska production cost situation for seven commodity groups is summarized in Table 13. These cost estimates are based on current farm size, level of technology and present management practices. Farm units were designated classes I, II and III upon the basis of size of operations.

TABLE 13

AVERAGE COST OF PRODUCING SELECTED COMMODITIES IN 1965 COMPARED WITH COSTS ATTAINED BY SELECTED GOOD MANAGERS AND ANTICIPATED COSTS THAT MIGHT BE ATTAINED BY IMPROVED FARM ORGANIZATION AND BETTER FARM PRACTICES*

Commodity	1965 Costs Average	1965 Costs Best	Cost Goal 1980
Milk . . . . . .cwt.	$ 8.62	$ 7.00	$ 6.50
Potatoes* . . . . . .cwt.	2.40	2.03	1.54
Barley . . . . . ton	61.78	54.95	44.25
Oat-Pea Silage . . . ton	12.66	10.00	7.80
Brome Grass			
Establish Stand . .acre	55.79	45.01	40.00
Green Chop . . . . ton	7.63	7.00	6.50
Hay . . . . . ton	42.00	35.00	30.00
Silage . . . . . ton	17.18	12.00	7.95
Eggs . . . . . .doz.	.69	.55	.47
Hogs*+. . . . .lb. dressed	.55	.49	.40

* Costs listed would give a full return to all resources committed with the exception of return to management.

\+ Cost through storage.

*+ Budgeted estimate. See, Burton, Wayne E., "Hog Production in Alaska; Some Economic Aspects", Misc. Circ. AAES, Palmer, June 1964.

SOURCE: Note cites and professional concensus.

Table 14 shows whatever cost economics of scale have actually materialized in recent years. It is especially important that nearly 60 per cent of the operating expenses, namely for feed, seed and fertilizer, was spent for purchases from outside of Alaska. The absence of a broad-based agricultural sector is reflected in the small degree of specialization and trading within the farming community. To a certain extent, dairy operations are more self-sufficient and produce their own feed.

Cost Comparisons

Conservative and minimum capital requirements for six general categories of farm enterprise are shown in Table 15. It is apparent that many of the farm units reported in Table 14 are much smaller than the specified minimum size. Their costs of operating very probably were excessive.

Comparisons were made of studies conducted by other states for several farm commodities. For example, the cost of producing barley in North Carolina (excluding land cost and operators' labor) is $27.65 per ton. This compares to $40.89 in Alaska. A study by the University of Idaho estimated the cost of producing potatoes at $1.20 per hundred weight at 20 acres of potatoes per farm. As farm size (potato acreage) increased to 300 acres, production costs dropped to $.90 per hundred weight.[1] Alaska is becoming more competitive at $2.40 per hundred weight (30 acres), and local producers might grow potatoes in greater abundance.

[1] Withers, R. V., "Potato Production Costs," Bulletin 447, Idaho Agricultural Experiment Station.

TABLE 14

ANNUAL FARM OPERATING EXPENSES OF FIFTEEN DAIRY FARMS

MATANUSKA VALLEY, ALASKA - 1965

Item	Group I	Group II	Group III	Mean	% Farm Cash Expenses
Farms No.	7	5	3	15	
Cash expenses					
Hired labor . . . . . $	519.36	1,156.70	6,856.88	1,999.31	6.10
Feed purchased . . . . $	7,713.01	14,663.45	25,187.76	13,524.77	41.30
Seed & fertilizer . . . $	3,245.67	2,929.05	13,864.06	5,263.89	16.07
Machine hire & haul . . $	926.35	1,919.57	2,728.43	1,617.84	4.94
Supplies . . . . . $	364.62	256.37	1,557.80	567.17	1.73
Repairs, improvements . $	1,173.35	1.142.55	3,238.82	1,576.18	4.81
Veterinary & breeding . $	482.22	559.00	635.26	538.42	1.64
Gas, oil, fuel . . . . . $	888.28	1,698.14	1,593.03	1,299.10	3.97
Taxes . . . . . $	670.25	589.14	1,753.52	859.87	2.63
Insurance . . . . . $	583.64	729.58	1.320.94	779.75	2.38
Interest . . . . . $	688.79	1,978.42	4,315.08	1,840.59	5.62
Electricity & phone . . $	823.47	885.10	1,735.88	1,026.50	3.13
Rent . . . . . $	119.29	731.60	2,658.33	831.20	2.54
Miscellaneous . . . . . $	535.54	527.08	3,017.77	1,029.17	3.14
Sub-total . . . . . $	18,733.84	29,755.75	79,463.58	32,753.76	100.00
Unpaid expenses . . . . . $	3,756.54	3,718.00	6,033.97	4,183.18	
Total expenses . . . . . $	22,490.38	33,473.75	76,497.55	36,936.94	
Milk produced . . . . . cwt.	2,626	3,532	9,422	4,284	
Cost per cwt.* . . . . . $	8.56	9.48	8.12	8.62	

* Cost of production per cwt. pounds of milk does not include a return to equity or a return to operator's labor and management.

SOURCE: AAES survey.

TABLE 15

MINIMUM SIZE, PRODUCTION AND CAPITAL REQUIREMENTS

FOR A PAYING ALASKAN FARM, AS OF 1967

Type Enterprise	Size	Volume of Production	Approximate Total Investment
Dairy	40-60 cows	400,000-600,000 gallons of milk	$100,000-$125,000
Poultry	12,000-15,000 hens	300,000-400,000 dozen eggs	$100,000-$125,000
Potato	30-40 acres	300-400 tons	$75,000-$100,000
Grain	300-500 acres	300-500 tons	$75,000-$100,000
Vegetable	30-40 acres	150-200 tons	$50,000-$75,000
Beef	250-300 crop acres	150-200 head sold	$100,000-$150,000

SOURCE: Leo M. Loll, A Study of Technical and Economic Problems - State of Alaska. (College: University of Alaska, 1967), and updated by A.A.E.S. personnel.

The inter-state differences in production costs of potatoes are probably small enough over larger acreage units to encourage more aggressive marketing by Alaskan producers.

Financing

A major force of production is an adequate source of low cost funds. Financing tends to be especially expensive and in short supply in developing regions where limited experience exists concerning what will prosper and where funds from retained earnings are not yet available.

The financing of Alaskan farms was examined in 1960.[2] Since then, severe economic difficulties have arisen. The 1960 report indicated the amount and type of financing which supported commercial farming. Information concerning subsequent developments in financing was obtained by interview.

Farm credit in 1960 had improved considerably over earlier periods, and roughly corresponded to increases recorded in the outputs of the various product sectors. The forecasted funding requirements of $500,000 and $750,000 annually to support the Alaskan agricultural base after that time did not materialize.

Major arguments supporting more liberal credit are as follows:

(1) Loan terms are inadequate with short maturity and excessive rates.

(2) The maximum size of loans is too small for efficient production, and loans are smaller than generally permitted in other states under similar credit circumstances.

(3) It is practically impossible to finance new businesses, or refinance a "going concern" at a markedly increased level of new investment.

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[2] A. D. Saunders, "Financing Alaska's Farms" (Palmer: Alaska Agricultural Experiment Station, May, 1965).

(4) Financing alternatives to Alaskan farmers are now fewer and less conducive to growth of commercial operations than those that prevail in other states.

The major lending institutions and average loan size are summarized in Tables 16 and 17. Since 1960, several changes have occurred, notably a reduction of commercial bank participation and an increase in funding by the Alaska Agricultural Revolving Loan Fund and through Rural Electric Cooperatives. The outstanding volume of $4.2 million reported in the survey for 1960 was comparatively small, and the average size of loans suggests that overall funding of farm operations was very small. In the main, considering the extent of federally sponsored loan participation, funding appears to have been in short supply. It is readily apparent that new farms of an efficient scale or a major capital improvement program could not have occurred under the borrowing policies which must have prevailed.

The position of the financial institutions and government lending agencies is defensible on several grounds. These are--

(a) The financial risks of high-cost farm operations in Alaska are considerably higher than for other U. S. regions. Accordingly, private credit, such as insurance company financing, is relatively unimportant. Additionally, such loans require very close supervision.

(b) Due to the risk situation described above and the extremely "lax" business practices (notably poor records and laxity in contracting), some loans must be principally of a "self liquidating" nature, or tied to real estate in which the mortgage value is a relatively small percentage of the anticipated resale value of the property.

TABLE 16

AVERAGE INDEBTEDNESS OF 93 ALASKA FARMS AND HOMESTEADS IN 1960

Kind of Debt	Homestead Only	Commercial Farms Dairy	Vegetable	Poultry	General	All
Real estate	None	$25,146	$6,409	$10,970	$4,923	$17,668
Chattel	$1,843	13,408	1,961	4,065	3,278	9,178
Unsecured	431	3,938	788	5,695	844	2,932
Total	$2,274	$42,492	$9,158	$20,730	$9,045	$29,778

SOURCE: A. Dale Saunders, "Financing Alaska's Farms," (Palmer: Alaska Agricultural Experiment Station, May, 1964).

TABLE 17

PRINCIPAL SOURCES OF FARM CREDIT IN ALASKA IN 1960

Source	Volume (in $1000s)	Share (Per Cent)
Farmers Home Administration	906	21.4
Alaska Rural Rehabilitation Corporation	594	14.0
Alaska Agricultural Revolving Loan Fund	582	13.8
Federal Land Bank Association	675	15.9
Commerical Banks	824	19.5
Other*	650	15.4
Total	$4,231	100.0

* Estimated

SOURCE: A. Dale Saunders, "Financing Alaska's Farms," (Palmer: Alaska Agricultural Experiment Station, May, 1964).

(c) Since Alaska has been a highly confined, if not nearly closed, region for local production possibilities, an overexpansion of credit would be economically self-defeating. Alternatively stated, the funding of too many producers merely allows them to compete with one another, and this results in a decline in local selling prices. Therefore, lenders ought to "protect" existing borrowers and accounts by not financing new entry and expansion.

On balance, the arguments supporting liberal credit and those defending the restrictive practices are only partially applicable and valid. In this regard, credit conditions are both a contributor to and a result of the present "plight" in the agriculture sector. The Alaska Agricultural Revolving Fund did begin lending in longer term maturities and larger loan sizes. Although it would have been difficult to forecast, the recent risk experience of this fund is unsatisfactory and cannot continue. The loan policy changes were entirely appropriate, although difficult to implement in an investment portfolio so small (a mere $1.5 million in 1967).

Larger long term loans are necessary for Alaskan producers to become effective competitors. By implications, this type of funding also is a prerequisite to growth in the processing industry. Publicly supported investment portfolios must, of course, be protected in terms of financial risks undertaken.[3] Protection of the public interest could and should be established through the quality of the portfolio rather than new restrictions in maturity and amount.

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[3] The question is especially pertinent due to a recent provision which allows the Teachers Retirement Fund to invest in agricultural credit through the Alaska Agricultural Revolving Loan Fund.

Processing

At present, processing of agricultural products in Alaska is extremely limited. (Milk processing is an exception. In spite of recent economic difficulties, a favorable price-cost situation exists for its long-term survival.) Feasibility studies for each potentially significant type of processing plant in Alaska would be highly useful. The prospects and outlook for processing presented in this report were obtained in large part by utilizing cost studies from other states. To a considerable extent, comparative cost conditions in competitor agricultural regions will govern selling prices in Alaska.

Agricultural processing involves rather heavy initial investment in buildings and equipment. Therefore, less than full utilization of the plant capacity results in strong upward pressures on cost per unit of output. Over relevant volumes, unit costs decline as output expands. Any potential Alaskan processor would face serious problems of production scheduling in this regard. The short growing season, particularly for vegetables, would allow only a very short operating season. The extent of the local market (rate of consumption) places limits on the rate of output. Of course, plants in other states are affected by peak seasons also, and many of them shift from one crop to another throughout the year.

Similarly, in Alaska, plant flexibility is necessary in order to utilize slack time. Sales of these "finished goods" to export markets and other states would permit larger operations and encourage more advanced technology and additional economies of size. To the extent that intra-state marketing permits, larger capacity plants are both necessary and desirable.

There are only a few detailed studies with particular emphasis on farming pertaining to factor cost differences between Alaska and the

other states. Consulting engineers and construction company personnel indicated that construction costs of processing plants would be approximately 40 to 50 per cent more in Alaska than in the Seattle area. In addition, agricultural and non-agricultural labor costs are 40 to 50 per cent higher in Alaska than in other states. However, a more critical development problem exists in terms of a regional shortage of skilled manpower.

The types of processing plants which meet Alaskan needs were simulated through studies of processing costs in other states. The magnitude of the local market was used to forecast the size of economies of scale which might be realized in Alaska. Resulting cost estimates were not adjusted to Alaskan factor price levels, and such an adjustment would merely shift overhead and operating cost estimates upward.[4] In the main, the preliminary examination of market economies and corresponding size in processing provided a realistic view of the prospects for successful processing within the state.

Dairying

The one agricultural commodity which is processed in Alaska is milk. Processing plants which had operated in the Southeast, Tanana Valley, Kenai Peninsula and Kodiak have gone out of business. The industry has "shaken down" to two operations of significance, both situated in Anchorage. As of November, 1967, these plants operated at nearly 80,000 pounds per eight-hour day. At that rate, they utilize available local milk and significant bulk shipments from out of state.[5]

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[4] For a working out of the cost impact on Alaskan businesses, see R. C. Haring, Prices and Costs in the North Star Borough, Alaska (College: University of Alaska, 1965).

[5] Cf. W. E. Snyder, "A 60-Day Survey of Milk Production and Milk and Dairy Products Marketing in Alaska," Mimeo. Report, Alaska Department of Natural Resources, 1964.

The current cost situation, including the crops utilized as inputs, is depicted in Tables 18 to 23. The large processing capacity in relation to local production suggests that additional local supplies might be procured in lieu of shipments in bulk. A greater utilization of processing plants could be established by acquiring a larger share of the in-state retail consumption.

In examining a New England study of dairies, the cost per quart dropped from $.057 in a plant with 6,000 quarts per hour capacity to $.029 in a 100,000 quart per hour plant. This is a differential of $.028 per quart (or about $1.30 per hundred weight), a matter shown in Table 19. Total milk production in Alaska in 1965 was 20.5 million pounds, and projected consumption for 1985 amounts to 132.5 million pounds of milk. If local processors are able to maintain or expand the current share of the market, then 1985 production would justify larger and more efficient processing, although still not as large as that observed in support of other major metropolitan areas.

Transportation developments represent a major uncertainty, and have aggravated price competition in the local market. For example, bulk tanks containing about 38,000 pounds of milk each have been shipped to Anchorage at a freight rate of $2.79 per hundred weight.

Eggs and Stewers

Most of Alaskan egg production, amounting to 766,600 dozen in 1965, was graded and packed by individual small growers. (See Chapter IV.) This production represented about 10 per cent of the annual consumption, which is estimated at 15.6 million dozen annually by 1985.

Economies in production are most apparent in the full utilization of production facilities. The relationship between the size of the grading and packing operation and costs per case is shown in Table 24. In

TABLE 18

CAPITAL INVESTMENT, FIFTEEN DAIRY FARMS,

MATANUSKA VALLEY AREA, ALASKA - 1965

Item	Per Farm	Per Cow	Per cwt. of milk	Percent of total
	(dollars)	(dollars)	(dollars)	(percent)
Land & buildings . . .	78.988.51	1,744.83	18.44	64.67
Machinery & equipment .	15,468.27	341.69	3.61	12.67
Livestock	18,524.73	409.21	4.32	15.17
Other	9,152.93	202.19	2.14	7.49
Total	122,134.44	2,697.92	28.51	100.00

SOURCE: Alaska Agricultural Experiment Station.

TABLE 19

MILK: THE RELATIONSHIPS BETWEEN PLANT SIZE

PROCESSING COSTS (NEW ENGLAND AREA)

Plant Capacity* (Quarts/day)	Annual Output+ (mil. qts.)	Total Cost ($/qt.)
6,000	1.6	.057
20,000	5.4	.039
50,000	13.5	.032
100,000	27.0	.029

* Assuming 2.15 pounds per quart, the daily volumes in thousands of pounds would be 12.9, 43.0, 107.5, and 215.0 respectively and the annual outputs in million pounds would be 3.4, 11.6, 29.0, and 58.1, respectively.

+ Based on five day per week.

SOURCE: Webster, Fred, et al, "Economies of Size in Fluid Milk-Processing Plants," Bulletin 636, Agricultural Experiment Station, University of Vermont, Burlington, June 1963.

TABLE 20

TRENDS IN ALASKA'S DAIRY INDUSTRY, 1954-1966
WITH PROJECTED MARKET, EFFICIENCY AND PRODUCTION GOALS
FOR 1975 AND 1985

Items compared		Mean for period-- 1954-56	1964-66	Projection 1975	1958	Note
Market projection						
Population & estimates . . .	thousands	--	176.0	237.6	299.2	2
Increase in population . . .	per cent	--	100	135	170	1
Milk consumption, trends and goals						
Per capita goals	per cent	--	100	110	120	3
Produced and required. . . .	1000 cwt	130.6	208.0	308.9	424.3	4
Land and cattle input trends and goals						
Crop yield goals	per cent	96	100	115	130	5
Tilled land utilized	acres	8,450	12,850	16,608	20,109	6
Milk per acre.	cwt	15.5	16.2	18.6	21.1	7
Cow production goals	per cent	81	100	112	120	8
Cows 2 years and over. . . .	number	1,833	2,367	3,139	4,022	9
Per cow per year	cwt	71.2	87.9	98.4	105.5	10
Feed base per cow.	acres	4.6	5.3	5.2	4.9	11

(1) Population trend developed and published in 1964 by Alaska Department of Labor.
(2) 1965 Railbelt population x Line 1 values.
(3) Assumes improved competitive production and market status for local milk.
(4) 1964-66 mean production divided by 1965 population times value in Line 3. Represents total disappearance, not quantities sold which will be some 5 per cent less.
(5) Arbitrary goals based on assumed adoption of better crop varieties, better fertilizer management, and innovations such as feeding fermented barley.
(6) Projection is Line 4/Line 7.
(7) Historical trend is Line 4/Line 6. Projection is 1964-66 base x goals in Line 5.
(8) Represents assumed improvement in production per cow per year, rate diminishing with time.
(9) Projected cow population is Line 4/Line 10.
(10) Total production (Line 4/Line 9) for historical periods. Projection is 1964 base x goals (Line 8).
(11) 1954-56 feed base was not adequate to supply all roughage, about a fourth being imported in that period. Values are Line 4/Line 6.

TABLE 21

AVERAGE COST PER HEIFER RAISED AND

PLACED IN MILKING HERD, MATANUSKA VALLEY, 1966*

Cost Item	Weighted Ave. for All Calves in Sample
First 2 Months	
Milk Replacer	$ 12.12
Whole Milk	4.68
16% Dairy Ration	1.85
Calf Starter & Manna	4.73
Hay	2.50
TOTAL for 2 Months	$ 25.88
2 Months - 6 Months	
Calf Starter	$ 3.31
16% Dairy Ration	22.68
Hay	18.42
	$ 44.41
6 Months - Freshening	
16% Dairy Ration	$ 82.20
Hay	108.55
Silage	68.70
Pasture	24.90
	$284.35
TOTAL Feed Costs	$354.64
Other Costs	
Labor	$156.16
Buildings	20.58
Bedding	16.71
Vet. & Medicine	1.04
Breeding	9.10
Insurance	2.59
Interest	26.27
Misc. Cost	3.92
	$236.37
Adjustment for Culled Heifers	$ 5.19
TOTAL Costs Per Heifer	$585.82

* Purposefully selected sample of dairy farms where replacement heifers are raised. Sample included over 20 per cent of current dairy producers.

SOURCE: Alaska Agricultural Experiment Station.

TABLE 22

AVERAGE TOTAL COSTS PER ACRE FOR PRODUCING OAT-PEA SILAGE ON EIGHT DAIRY FARMS, MATANUSKA VALLEY, 1966

Item	Average
Oat-Pea acres per farm	54
Production per acre (tons)	5.95
Land and Materials	
Seed - Oats	$ 5.90
Peas	3.74
Vetch	.84
Fertilizer	19.01
Charge for land	12.09
Sub-Total:	$41.58
Raising Crop	
Plow	$ 3.93
Disk-Harrow	2.81
Cultipack-Drill-Fertilize	5.03
Sub-Total:	$11.77
Harvesting Crop	
Chopping	$ 8.95
Hauling	7.04
Sub-Total:	$15.99
Return to Capital	$ 5.94
Total Cost of Production	$75.28
Total Cost Per Ton	$12.66

SOURCE: Alaska Agricultural Experiment Station.

TABLE 23

AVERAGE TOTAL COSTS PER ACRE FOR PRODUCING

BARLEY ON NINE DAIRY FARMS, MATANUSKA VALLEY, 1966

Item	Average
Barley acres per farm	70.28
Production per acre (tons)	1.328
Land and Materials	
Seed	$ 8.22
Fertilizer	19.75
Spray Materials	2.51
Land (per acre)	11.89
Return to Capital	4.87
Sub-Total:	$47.24
Raising Crop	
Plowing	$ 4.49
Disk-Harrow	2.46
Cultipack-Drill-Fertilize	3.49
Spraying	1.25
Sub-Total:	$11.69
Harvesting Crop	
Combine or Bind & Thrash	$14.27
Hauling	2.71
Drying	6.14
Sub-Total:	$23.12
Total Cost of Production	$82.05
Total Cost Per Ton	$61.78

SOURCE: Alaska Agricultural Experiment Station.

that example, the cost differential between the small and large plant operating at full capacity is $.57 per case, or 1.9 cents per dozen. The differential between 80 per cent capacity and full capacity ranges from $.22 to $.38 per case (or .7 to 1.27 cents per dozen).

If Alaskan producers captured an increasing market share, the 1985 consumption requirements of 15.6 million dozen (520,000 cases) would permit processing capacity growth to larger plants and new entry into this area of local poultry farming. However, it is unlikely that the very largest plants, depicted in Table 24, would appear in the foreseeable future.

By and large, poultry feed is shipped to Alaskan processors. The possibility of an Alaska-based feed supply is very real, and feed processing facilities now exist within the state. Transportation costs from Seattle to Anchorage are $1.64 per hundred weight for feed. By implication, it requires 4.3 pounds of feed to produce a dozen eggs. Transportation value embodied in those 4.3 pounds is 7.1 cents. However, the present cost of shipping a dozen eggs is 6.6 cents. Obviously, this places local producers at a very real logistical disadvantage. Moreover, it costs approximately $1.00 more to purchase a five-month old bird delivered in Alaska than it does in other states. The net result of these logistic expenses is approximately a $.05 per dozen comparative cost disadvantage of locally produced eggs. Conversely, local eggs are usually more fresh. However, there is an important question as to whether consumers will continue to pay a premium for local brand eggs.

Old hens are culled from the laying flocks, and represent the only poultry meat of any significance which is processed in Alaska. This by-product is a necessity of poultry farming, and the slaughter of overmature hens, sold as stewers, encounters no transportation cost disadvantages. Of course, small flock size limits efficiency in slaughtering. The 1985 projected demand of 25.7 million pounds would require a slaughter of only 6.9 million birds, and would justify very meager economies of size.

TABLE 24

THE RELATIONSHIP BETWEEN EGG PLANT CAPACITY AND COST OF GRADING AND PACKING OPERATIONS, 1966

Plant Capacity (cases/hour)	Annual Output (thousand cases)			Total Cost (dol/case)		
	Full cap.	90% cap.	80% cap.	Full cap.	90% cap.	80% cap.
20	33.7	30.4	27.0	2.52	2.69	2.90
40	67.5	60.8	54.0	2.21	2.34	2.50
80	135.0	121.6	108.0	2.08	2.20	2.35
160	270.0	234.2	216.0	1.99	2.10	2.25
320	540.0	486.4	432.0	1.95	2.05	2.17

SOURCE: Peeler, R. J. Jr., and R. A. King, "In-Plant Costs of Grading and Packing Eggs." A. E. Series No. 166. Department of Agricultural Economics, North Carolina State University, August 1963.

TABLE 25

SELECTED ECONOMIC RELATIONSHIPS BETWEEN FEEDLOT CAPACITY TOTAL INVESTMENT COST AND TOTAL NONFEED COST OF DRY-LOT CATTLE FEEDING OPERATIONS, SOUTHWEST UNITED STATES, 1965

Feedlot Capacity (head)	Investment Cost (thous. dol.)	Total Nonfeed Cost (dol./head)
300	22.5	58.56
600	44.4	50.41
1,000	60.3	43.34
2,000	104.3	41.96
5,000	196.8	38.10
10,000	310.1	36.60
15,000	426.8	36.04

SOURCE: Williams, Willard F., and J. I. McDowell, "Costs and Efficiency in Commercial Dry-lot Cattle Feeding." Processed Series P-509, Oklahoma State University, 1965.

Feedlot and Commercial Slaughtering

Until very recently, the beef processing situation in Alaska involved slaughter and marketing by individual small ranchers who produced only about 3 per cent of annual consumption in 1965. There is no integrated livestock marketing and feedlot slaughter system in the state, but very real improvements appeared in 1966-1967, placing the likelihood of such a surplus well beyond the feasibility study stage of development.

The prospects for establishing a complete livestock industry on the Kenai Peninsula was examined in depth by the Bureau of Reclamation in a January, 1967 report.[6] This report estimated very marginal prospects for growing, feeding and slaughtering beef in the Kenai-Kodiak area. In spite of that conclusion, a diversified fishery and animal processing plant was constructed on Kodiak. Preliminary reports indicate success.

The usual effects of feedlot size on cost of feeding are shown in Table 25. Since the scale of production specified in Tables 25 and 26 are in excess of state-wide consumption estimates, much smaller slaughter house operations are appropriate. At this time, such operations are feasible. At Alaskan prices, the construction costs would probably amount to an additional 40 to 50 per cent initial investment. Unit operating costs of slaughtering are not as responsive to output rate as the feedlot operations, a matter shown in Table 27. However, the 6.42 cents per pound shipping charge for a beef carcass between Seattle and Anchorage does not allow much of a differential with which to compensate for high factor prices in Alaska.

Certain areas of the Kenai Peninsula and Kodiak Island, identified in Chapter III, have good grazing lands. The projected demand for 1985 indicates a need for about 75,500 beef carcasses (550 pounds each).

[6] Livestock Industry in Alaska, Possibilities for an Integrated Live-Stock Industry on Kenai Peninsula, Kodiak and Adjoining Islands (Juneau: U.S. Department of Interior, January, 1967).

TABLE 26

INVESTMENT COST OF SIX MODEL CATTLE SLAUGHTERING PLANTS, SOUTHWEST UNITED STATES, 1966

Plant Size (head/hr.)	Building Costs (thous.dol.)	Land Costs (thous.dol.)	Equipment Cost (thous.dol.)	Total Investment (thous.dol.)	Annual Cost (thous.dol.)
20	154.0	3.1	146.9	304.0	22.4
40	240.1	5.6	265.2	510.9	37.7
60	333.3	8.1	326.1	667.5	49.2
75	401.1	9.8	426.7	837.6	61.8
90	484.2	11.9	477.3	937.4	71.7
120	658.3	15.7	633.1	1,307.1	96.2

SOURCE: Frangmann, John R. and B. T. Kuntz. "Economics of Size in Southwestern Beef Slaughter Plants." Bulletin B-648 Oklahoma State University, April 1966.

TABLE 27

INFLUENCE OF PLANT SIZE AND CAPACITY OF OPERATIONS ON SLAUGHTER COST FOR SIX MODEL PLANTS, SOUTHWEST UNITED STATES

Plant Size (head/hr.)	Annual Output* (thous. head)	Percent of Capacity 90 (dol./head)	100 (dol./head)
20	40.8	7.52	7.23
40	81.6	7.47	7.16
60	122.4	7.02	6.74
75	153.0	7.14	6.84
90	183.6	7.18	6.89
120	244.8	7.29	6.98

* Assumes 255 eight hour days per year.

SOURCE: Frangmann, John R. and B. T. Kuntz. "Economics of Size in Southwestern Beef Slaughter Plants." Bulletin B-648 Oklahoma State University, April 1966.

Problems of production, assembly, processing and distribution will make it difficult for Alaska to produce a significant share of prime and choice beef for local markets. However, the production potential for "good" grades of beef is favorable, and the development of larger slaughter facilities imminent.

Vegetables

Several recent proposals to organize a vegetable processing facility remain dormant due principally to a lack of necessary investment capital. The vegetable production statistics, reflecting 905 acres planted in 1966, reveal a major reason why Alaska has failed to attract investments in vegetable processing. A very reliable scheduled source of raw product in rather large quantities is the overriding determinant of plant feasibility. Perhaps, production and processing operations could expand together. However, a production-processing feasibility analysis of considerable depth and detail would be necessary.[7]

For example, a study of producing and processing vegetables in a seven county area of southeastern North Carolina indicated that 2,000-3,000 acres of vegetables annually would be required to make either a canning or freezing operation economically feasible.[8] Current Alaskan production is inadequate to support a processing plant of that type. On the other hand, there is sufficient local consumption to utilize the

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[7] However, the following unpublished reports represent an important research effort on this topic: A. D. Saunders, "Feasibility of Processing Potatoes," (Palmer: Alaska Agricultural Experiment Station, 1966-1967); C. L. Wellington, "A Brief Look at Processing Peas" (Palmer: Alaska Agricultural Experiment Station, 1962); and L. C. Martin, "Report on Processing Possibility for Potatoes" (Palmer: U.S.D.A.-A.M.A., 1964).

[8] Leigh H. Hammond, et al., "The Feasibility of Producing and Processing Certain Vegetables in Southeastern North Carolina" (Raleigh: North Carolina State University, 1967).

entire output of a vegetable processing operation. A multiple product plant is still another processing alternative, but it is one which requires original study.

Conclusions

The cost of production, processing and marketing locally produced agricultural products represent the major factors controlling the development of an agricultural base in the state. From the information gathered and presented earlier, the following conclusions are readily apparent. For summary purposes, they are as follows--

(1) In almost every crop and livestock category examined, factor costs (as reported to exist or simulated) were higher in Alaska than in competing farm regions. For the most part, the high factor costs situation was attributable to sharp seasonal restrictions imposed by the climate, relatively expensive imported factors of production, and smallness of operations.

The cost spread between Alaskan and competitor operations in certain product categories is small enough to justify an immediate examination. In others, the spread is large enough to discourage serious additional study. Continued feasibility is apparent on a cost-wise basis in dairying, potato farming, eggs, and,in certain instances and locations, ranching. Vegetable farming will continue to prosper on a highly seasonal basis, and the potential of certain crops, notably peas, might justify a significant processing industry.

(2) Specialty areas, such as commercial reindeer herding, are potentially very important,and crude cost estimates indicate they could survive on a greatly expanded production schedule by selling to intra-state markets. Serious obstacles exist

in expanding production. However, a favorable production-marketing opportunity will continue to exist.

(3) In farming, but particularly in processing, the smallness of output has resulted in extremely inefficient practices, high operating costs and low returns to farmers. The principal causes of inefficiency are probably seasonality (low annual rate of utilization), and smallness of scale (lack of size economies). These conditions have been the major proximate causes of industry-wide declines in farm receipts and the recently observed reduction in the number of farm units. Larger farm units and processing facilities, properly financed and managed, could profitably survive serving Alaskan urban markets. These commercial-sized operations should not be constructed at the "optimal very large scale" of production.

(4) The logistical situation in Alaska recently has operated to the regular detriment of its agricultural sector. First and foremost, more efficient transportation has been introduced between metropolitan areas of the U.S. and Anchorage and Fairbanks. Intra-state improvements in transportation have been relatively fewer and less important. Thus, rate changes caused a worsening of comparative costs to local producers.

In this regard, Delta Junction is, in a "logistic sense," as distant from the Anchorage and Fairbanks markets as Seattle. Remotely situated farms and ranches are at still greater cost disadvantages which are not overcome by "free" land or low grazing prices.

(5) Geographic dispersion of farm units has discouraged both procurement and marketing combinations (including cooperatives) which might otherwise have effectively improved price-cost positions.

(6) Farm financing by non-govermental financial institutions has been meager, very short term and expensive. In a developing region, these conditions are not unusual, but they definitely have restricted growth of the more successful operators. Governmentally supported financing simply does not exist on a scale comparable to other U.S. regions. This is readily attributable to poor financial risk experience and lack of information on most aspects of operating business in Alaska.

(7) The types of agricultural financing presently available in Alaska are conducive to non-corporate forms of farm enterprise. Repeated instances have arisen of financial discrimination favoring non-corporate farming, and the condition has materially discouraged growth of larger scale, corporate operations. This situation represents a serious barrier to the development of efficient commercial farming in the state.

(8) Management techniques in use, even considering farm size and plant limitations, have resulted in higher overhead and operating costs than need have occurred.

Certain other conclusions were apparent although published evidence supporting them is meager or non-existent. These are summarized as follows--

(a) A "management gap" exists in which few young and talented persons have been attracted to agriculture in Alaska. It is more profitable for these persons to enter agriculture in other U.S. regions.

(b) It often has been suggested that the present group of farmers, with a few notable exceptions, are not interested in profitable farming, demonstrate limited proficiency and knowledge and have come to possess attitudes (including their motivations in coming to Alaska) which are not conducive to economic development. This type of criticism is substantially applicable to more than one-half of the some 300 farms listed in the recent Census. Considerable caution should be exercised in appraising this condition for it is more likely to be a symptomatic result of the "marginal" nature of many Alaskan farming operations than its proximate cause.

VII

AGRICULTURAL POTENTIAL, PUBLIC POLICY AND DEVELOPMENT FACTORS

Introduction

In previous chapters, the development of Alaskan agriculture was discussed. Major problems and particular new avenues of expansion were explored. However, certain overriding questions remain substantially untouched. Is an expanding agricultural base necessary for growth of the region? If reasonable growth might be attained, what would it cost? Are there any major secondary benefits of agricultural research and development to the state and national economy? In this chapter, those questions are explored. The region's potential is stated, along with recommendations for public policy and direction of research.

Potential of Agriculture in Alaska

From the evidence available it is apparent that the harsh climate and soil conditions limit the types of crops which can be grown at competitive prices. New products and methods of farming which might be suitable to the unusual environment have not been introduced or have produced nothing of long term importance. In some 30 years of development, the amount of tillable land has expanded slowly. Land clearing is delayed by slow drying; short, cool growing seasons and slow bacterial action in the soil. The economic performance of farms and existing processors, while admirable in certain respects, is largely disappointing in terms of contributing to a viable and balanced growth of the state-wide economy. All in all, many types of agriculture simply will not develop and become self-sustaining, and even

those that might prosper may depend upon an initially high degree of technical and financial assistance. Those commercial projects and geographic areas which might prosper are the overriding concern of this section of the report.

The following are some of the prospects and conditions for agricultural development:

(1) Except for remotely situated herding based principally upon rural village sales, demand for agricultural land will be restricted to the very highest soil classes. Forestry and recreational uses and even "no use" may be the "best use" for the less productive soil types.

(2) Farms and ranches which succeed will be situated near rapid, dependable transportation for receiving inputs in economic lot sizes and for selling to in-state urban markets. Farmers and small processors located at remote places with uncertain logistic support will continue to be "marginally" successful.

(3) Larger sized commercial farms and the introduction of additional processing plants will evolve within a limited but viable agricultural sector. These will develop along a fairly narrow range of crops and livestock when dependable volumes of output can be assured.

(4) The industry will continue to import many factors of production, such as capital goods and particular types of chemical fertilizers. Therefore, many processed goods will not be produced within the region. In this respect, additional forward vertical integration is anticipated in serving in-state markets, specifically processing, assorting and packaging systems.

(5) Certain specialty products and small firms will continue to exist as in the past, with little improvement in techniques of production or incentive to change. This "fringe" of firms will remain substantially immune to whatever occurs in the commercial side of the industry.

(6) Farming will need to be so organized as to adapt to ever changing and more competitive conditions.[1]

In dairy products, potatoes and eggs, Alaskan farmers and processors could eventually produce and market 60 to 80 per cent of urban in-state consumption. This goal is reasonably attainable by 1985. In livestock, certain vegetables, grasses and feed grains, significant market share gains are expected within the decade.

Local markets for the key product groups surveyed are now large enough to justify an expansion of output. Existing Alaskan producers have been unable to accomplish this due to an inability to reduce production costs to a level that is competitive with other U.S. regions. Farming and ranching in Alaska will not change rapidly or by itself. Time lags are expected in accomplishing detailed cost and marketing studies, in acquiring financing for construction and in attracting managerial talent. All in all, a transformation from a "primitive" small scale production system to a contemporary and competitive commercial agriculture base should be accomplished expeditiously, certainly in less than 15 years. Forcing growth rapidly and skipping traditional "stages" of growth, new problems may arise. However, by adapting the techniques of farming and processing from other regions, and importing critical manpower, a feasible transition can be made.

No growth prospect will be fulfilled at all unless the federal and state governments implement and coordinate an intensive research and development program. A small nucleus of progressive farmers have survived economically in Alaska, some of them reporting substantial earnings from

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[1] See Karl A. Fox, Farming, Farmers and Markets for Farm Goods: Essays on the Problems and Potentials of American Agriculture (New York: Committee for Economic Development, Supplementary Paper No. 15, 1962).

commercial farming. Other farmers represent, for the most part, the backward technology and obsolete farming which is the facet of Alaskan agriculture that represents a major "gap" in development. In recommending a rapid or "forced" transition to modern and competitive commercial farming, some rather drastic policy changes and economic measures are prescribed.

Public Policies Conducive to Growth

Establishing a conducive environment for the orderly and efficient development of an agricultural industry at this time requires special and positive governmental regulation, technical assistance and financial support. The governmental policies and underlying philosophy in this matter have been aptly stated:

> The government has the primary responsibility for providing the essential elements of the infrastructure required for an efficient marketing system: a good transport system, particularly a network of arterial and feeder roads; public storage to supplement private storage; a market information system; and a commodity grading system.[2]

As a relatively new developing region of the United States, the State of Alaska lacks many kinds of social overhead capital that are conducive to economic development in private industry. In large part, this lack of public institutions and facilities supporting agriculture stems directly from the unique land ownership situation which existed prior to statehood. Vast areas of reasonable quality farm land remain uncleared and inaccessible. Although this type of land is evidently not in short supply at this time, investments of this type are necessary prior to the introduction of processing plants, which require volumes of farm output much larger than currently available.

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[2] David Hapgood (ed.), Policies for Promoting Agricultural Development (Cambridge: Massachusetts Institute of Technology, January, 1965), p. 80.

Investment in public transportation, storage and grading facilities and technical assistance are necessary for the development of a broad range of private industries, including agriculture.

When made in the past, federal investment has not been fully effective. Thus, while the Alaska Railroad apparently was designed to "help" open up and develop Interior Alaska, in fact its rates on agricultural products almost always deter the marketing of farm output within the state. As a consequence, trucking acquires almost all of the meager volume of transactions which occur annually.

Similar criticism is applicable to the intra-state costs of shipping agricultural products on the Alaska Ferry System, i.e., especially the Kodiak-Seward route. At present, Alaska is the only state without express statutes providing at least partial rate exemptions for agricultural commodities. The state and federal governments, by the very nature of owning and operating facilities of this type, in fact represent "government in business" to a degree much greater than observed in other states. Accordingly, their pricing practices, nature of facilities and extent of services should be thoroughly examined in terms of influencing the orderly and successful development of private industry. Corresponding and complementary changes in their regulatory controls over industry are appropriate as well.

The state and federal governments can achieve drastic changes through their powers to regulate industries, especially those concerned with processing costs and logistics. An unrealistic barrier to development exists in the form of transportation costs within the state. For practical purposes, interstate traffic is handled over vast distances at a much smaller cost per pound than for in-state traffic at much shorter distances. Although

economies of scale in transportation obviously exist, rate reductions are long overdue in this area. Voluntary tariffs, of the type prevailing in Alaska, will not bring about the needed changes. Occasionally, opportunities for agricultural sales within the state are stifled by unrealistic local rates.

Public policy changes are needed in land disposition, especially by increasing the maximum acreage size for land sales and leasing, to encourage the development of farming units on larger tracts of suitable agricultural land. However, a special tax treatment is not recommended.

Private financial institutions have been unable to underwrite and coordinate the financing of large scale agriculture in Alaska. A significant group of farm operators is now seriously underfinanced and, therefore, unable to expand to an efficient scale of production because of administratively dictated "loan limits." Most of these same enterprises would qualify for an expansion on the basis of demonstrated managerial capacity and economic feasibility of their expansion programs. Commercial farming operations of the type proposed will require sizable permanent financing. Loans at less than the prevailing market rates, with maturities in excess of 20 years, are necessary to stimulate the initial development of processing industries. On short and intermediate term credit, private lenders would be expected to accept a position of "loan participation," especially when placed in the position of preferred risk. In addition, inventory financing and substantial working capital loans are appropriate for farm enterprises throughout each vertically integrated farm and processing system.

The approval of more liberal credit should be predicted upon and restricted to those enterprises which qualify in terms of managerial capacity. These loans must fall well within the purview of the guidelines for development established earlier in terms of soil classes and locations, feasible product groups and a necessary scale of operations.

The absence of marketing intermediaries in Alaskan agriculture is even more serious than the present paucity of legitimate processors. Food wholesaling and warehousing exists almost exclusively in support of sales between outside farmers and local stores. Selling groups serving local producers appeared in the last several years in the Matanuska Valley and probably will expand their marketing influences. As larger scale processing systems develop, complementary marketing institutions must appear to distribute the output efficiently. Research on marketing channels, including military procurement, and the types of logistical assistance needed to support a growing industry remain, for the most part, neglected areas of study.

Direction of Research and Development

Few areas of potential development require the directed and concentrated research support of the federal government to the degree warranted in Alaskan agriculture. The economic plight of farming in Alaska is widespread in every major commodity-producing group. Land tenure and government agency policy questions appear at every turn and cast considerable doubt upon whether the agriculture sector could have been highly successful in the past.

Improvements in farming and agricultural processing would complement allied private industries throughout the state, many of which have encountered similar cost problems. However, significant amounts of new research are required at each stage of implementation. The justification for government spending in this particular area, as opposed to private industry research, is well set forth in the following analysis:

> Investment by the federal government in research and development has certain features which distinguish it in degree and perhaps in kind from most other investment activities. One is the pervasive influence of uncertainty...(R)esearch and development programs attempting to create what has never been contrived before for adaptation to an ever-changing environment face uncertainties of exceptional magnitude. A second distinguishing variable is the degree to which governmental research and development programs has as a primary objective political and other intangible benefits difficult to translate into the convenient terms of a monetary common denominator...The real difficulty is that in most areas of government research and development there exists no actual or potential market to impute through the price mechanism...Some kind of non-market system of benefit imputation or estimated is required. Third, research and development investment decisions often encompass important "tradeoffs" that have few close parallels in non-research activities.[3]

Within these policies, agricultural research should be oriented largely toward the successful development of commercial industry, whether by transfer of technology from other regions or experimenting with new method and techniques. In this regard, the following position is appropriate:

> The research program should have as its main focus the solution of problems and the development of new scientific and technological information that would have an immediate bearing on agricultural production. With such a focus of objectives no distinction need be made between fundamental and applied research. The scientists should have the freedom and encouragement to probe into the fundamentals of a question when necessary, but the program generally would be heavily field and problem oriented.[4]

In reviewing the production problems confronting commercial agriculture, certain specific types of research are absolutely necessary at this time. They are as follows-

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[3] Frederick M. Scherer, "Government Research and Development Programs," in Robert Dorfman (ed.), Measuring Benefits of Government Investments (Washington: Brookings Institution, 1963), pp. 12-13.

[4] David Hapgood, op. cit., p. 97.

(1) Surveys of particular farm operations, such as potato production and processing, must be made on a basis comparable to similar projects accomplished in other states and their subregions. The surveys would possess a high value for managerial decisions, especially in attracting new investment.

(2) Farming should be considered in more broad economic perspective and as a part of an overall production-processing-consumer system. Feasibility projects should be traced out in terms of "costing" each alternative, especially those pertaining to different levels of production and technology. Experimentation and exploration with new techniques of production represent one of the most seriously needed kinds of research. Of particular benefit would be a "Plants Materials Center," which could examine such current proposals as the supply and manufacturing aspects of fish protein production or the potential impact of limestone supplies that could be available to agriculture as a by-product with the introduction of a cement manufacturing plant in the Anchorage area. Experimentation is especially appropriate in range management on vast areas of special soil subclasses and in low cost forage production. Such a "Center" is the logical organization and vehicle which would reduce the "gap between agricultural research and commercial production.

(3) Management and record services and much of the basic accounting data on agricultural enterprises are dificient. Alaskan farmers receive limited information pertaining to the economic environment in which they operate.

(4) Marketing and logistics research are required, especially in the areas of transportation and consumer preferences for Alaskan-

processed food products. The entire subject of efficient techniques of marketing to Alaskan distribution channels warrants extensive examination.

(5) To a large extent, earlier discussion ignored the possible transition of existing farmers into a more advanced form of commercial agriculture. The transition would involve important and fundamental changes in attitudes and values and reorientation of farmers and those who work with them.

Public spending in research and development must, of course, yield benefits in due time. Whether readily quantifiable or not, every attempt should be made to estimate the indirect benefits attributable to a regional research program in agriculture. If agriculture will not develop on an expanding commercial scale without large and active research and development programs, then by implication the pace of actual development in the next two decades will be the major indicator of program effectiveness.

APPENDIX A

ESTIMATED YIELD POTENTIALS BY LAND CAPABILITY CLASS FOR TWO LEVELS OF MANAGEMENT

TABLE 1

ESTIMATED YIELD POTENTIAL BY LAND CAPABILITY CLASS FOR TWO LEVELS OF MANAGEMENT,* MATANUSKA-SUSITNA AREA OF ALASKA, 1967

Land Class	Barley		Oats		Perennial Forage+	
	Mgt. I	Mgt. II	Mgt. I	Mgt. II	Mgt. I	Mgt. II
	(cwt/a)		(cwt/a)		(tons/a-dry)	
IIc	19-22	29-30	21-22	29-32	2-3	3.5-4.5
IIe	19-22	29-30	21-22	29-32	2-3	3.5-4.5
IIs	(no class II's land in the area)					
Subtotal						
IIIe	17-19	26-28	19-21	28-32	2.0-2.5	3.5-4.0
IIIs	17-19	26-28	18-19	26-30	2.0-2.3	3.0-3.3
IIIw					2.0-2.5	3.0-3.5
Subtotal						
IVe	14-17	20-22	17-19	24-26	1.5-2.0	2.5-3.0
IVs	12-14	16-18	14-17	16-20	.7-1.5	2.5-3.0
IVw					.7-15	2.5-3.0
Subtotal						
IV						
VII						
VIII						
Total						

*Management level I is comparable to current levels of attainment while Management level II assumes utilization of currently available technology and cultural practices.

+Yield estimates for forage crops are stated on a dry matter basis and can be converted as follows: hay - DM x 1.22, Silage - DM x 4.0, and haylage - DM x 2.0.

TABLE 1 (continued)

Land Class	Oat/Oer. Forage		Rye Grass Forage		Potatoes-Fresh		Potatoes-Process	
	Mgt. I (tons/a-dry)	Mgt. II	Mgt. I (tons/a-dry)	Mgt. II	Mgt. I (cwt/a)	Mgt. II	Mgt. I (cwt/a)	Mgt. II
IIc	1-2	4-5	4-5	300	480	250	400	
IIe	1-2	4-5	4-5	300	480	250	400	
IIs								
IIIe	1-2	4-5		4-5	180	260	160	240
IIIs	.7-1.5	3-4		3-4	150	170	100	130
IIIw	.7-1.5	3-4		3-4	100	100	60	60
IVe	.7-1.5	2.5-3.5	2.5-3	2.5-3.5				
IVs	.5-1.0	2.0-3		2.3				
IVw								
VI								
VII								
VIII								

TABLE 1 (continued)

Land Class	Carrots		Lettuce		Cabbage-Fresh		Cabbage-Process	
	Mgt. I	Mgt. II	Mgt. I	Mgt. II	Mgt. I	Mgt. II	Mgt. I	Mgt. II
	(cwt/a)		(cwt/a)		(cwt/a)		(cwt/a)	
IIc	180	300	270	360	400	600	500	800
IIe	150	280	200	250	400	500	450	600
IIs								
IIIe			150	175	360	420	360	420
IIIs			50	100	250	330	250	330
IIIw								
IVe								
IVs								
IVw								
VI								
VII								
VIII								

TABLE 1 (continued)

Land Class	Barley (high moisture) Mgt. I (cwt/a-day)	Barley (high moisture) Mgt. II (cwt/a-day)	Green Peas-Process Mgt. I (cwt/a)	Green Peas-Process Mgt. II (cwt/a)	Spinach Mgt. I (cwt/a)	Spinach Mgt. II (cwt/a)	Summer Squash Mgt. I (cwt/a)	Summer Squash Mgt. II (cwt/a)
IIc		38-40	40	60	100	140	200	400
IIe		38-40	40	60	80	120	200	400
IIs								
IIIe		32-34	35	40			180	300
IIIs		32-34	25	30			180	300
IIIw								
IVe		28-30	20	30			150	250
IVs		20-22						
IVw								
VI								
VII								
VIII								

TABLE 1 (continued)

Land Class	Rhubard							
	Mgt. I	Mgt. II	Mgt. I	Mgt. II	Mgt. I	Mgt. II	Mgt. I	Mgt. II
	(cwt/a)							
IIe	500	700						
IIe	400	600						
IIs								
IIIe	450	600						
IIIs	150	300						
IIIw	100	200						
IVe	100	200						
IVs	50	100						
IVw	100	200						
VI								
VII								
VIII								

TABLE 2

ESTIMATED YIELD POTENTIAL BY LAND CAPABILITY CLASS
FOR TWO LEVELS OF MANAGEMENT,
TANANA VALLEY AREA OF ALASKA, 1967

Land Class	Barley		Oats		Perennial Forage		Barley (high moisture)	
	Mgt. I (cwt/a)	Mgt. II	Mgt. I (cwt/a)	Mgt. II	Mgt. I (tons/a-dry)	Mgt. II	Mgt. I (cwt/a-dry)	Mgt. II
IIc	17-20	26-27	19-20	38-32	2-3	3-4	38-40	
IIe	17-20	26-27	19-20	28-32	2-3	3-4	38-40	
IIs	17-20	26-27	19-20	28-32	2-3	3-4	38-40	
IIIe	15-18	23-25	17-19	28-32	2-2.3	3-3.5	32-34	
IIIs	15-18	23-25	16-17	26-30	2-2.3	2.5-3.0	32-34	
IIIw					2-2.5	2.5-3.0		
IVe	13-16	20-22	15-17	24-26	1.5-2	2.0-2.5	28-30	
IVs	11-13	15-17	13-16	16-20	.7-1.5	2.0-2.5	20-22	
IVw					.7-1.5	2.0-2.5		
VI								
VII								
VIII								

TABLE 2 (continued)

Land Class	Oat/Pea Forage Mgt. I (ton/a-dry)	Oat/Pea Forage Mgt. II (ton/a-dry)	Rye Grass Forage Mgt. I (tons/a-dry)	Rye Grass Forage Mgt. II (tons/a-dry)	Potatoes-Fresh Mgt. I (cwt/a)	Potatoes-Fresh Mgt. II (cwt/a)	Potatoes-Process Mgt. I (cwt/a)	Potatoes-Process Mgt. II (cwt/a)
IIc	1-2	3.2-4.0	3.2-4.0		210	340	175	280
IIe	1-2	3.2-4.0	3.2-4.0		210	340	175	280
IIs	1-2	3.2-4.0	3.2-4.0		210	340	175	280
IIIc	1-2	3.2-4.0	3.2-4.0		126	180	110	170
IIIs	.7-1.5	2.5-3.5	2.5-3.5		110	120	70	90
IIIw	.7-1.5	2.5-3.5	2.5-3.5		70	70	45	45
IVc	.7-1.5	2.0-3.0	2.0-3.0					
IVs	.5-1.0	1.5-2.5	1.5-2.5					
IVw								
VI								
VII								
VIII								

TABLE 2 (continued)

Land Class	Carrots		Lettuce		Cabbage-Fresh		Cabbeage-Process	
	Mgt. I (cwt/a)	Mgt. II	Mgt. I (cwt/a)	Mgt. II	Mgt. I (cwt/a)	Mgt. II	Mgt. I (cwt/a)	Mgt. II
IIc	160	270	220	310	340	510	425	680
IIe	135	250	170	215	340	425	380	510
IIs	135	250	170	310	340	425	380	510
IIIe			125	150	310	360	310	360
IIIs			45	85	215	280	215	280
IIIw								
IVe								
IVs								
IVw								
VI								
VII								
VIII								

TABLE 2 (continued)

Land Class	Green Peas-Process		Spinach		Summer Squash		Rhurbarb	
	Mgt. I	Mgt. II	Mgt. I	Mgt. II	Mgt. I	Mgt. II	Mgt. I	Mgt. II
	(cwt/a)		(cwt/a)		(cwt/a)		(cwt/a)	
IIc	32	48	100	140	220	440	425	595
IIe	32	48	80	120	220	440	340	510
IIs	32	48			220	440	340	510
IIIe	28	32			200	330	380	510
IIIs	20	24			200	330	130	255
IIIw							85	170
IVe	16	24			165	275	85	170
IVs							42	85
IVw							85	170
VI								
VII								
VIII								

TABLE 3

ESTIMATED YIELD POTENTIAL BY LAND CAPABILITY CLASS
FOR TWO LEVELS OF MANAGEMENT,
WESTERN KENAI LOWLANDS, ALASKA, 1967

Class	Barley (high moisture) Mgt. I (cwt/a)	Barley (high moisture) Mgt. II (cwt/a)	Oat Forage Mgt. I (ton/a-dry)	Oat Forage Mgt. II (ton/a-dry)	Timothy Forage Mgt. I (tons/a-dry)	Timothy Forage Mgt. II (tons/a-dry)	Oat/Pea Forage Mgt. I (tons/a-dry)	Oat/Pea Forage Mgt. II (tons/a-dry)
IIc	15	30	.5-1.5	2-3	1-2	2-4		4-6
IIe	15	30	.5-1.5	2-3	1-2	2-4		4-6
IIs			No II's in this area					
IIIe	15	30	.5-1.5	2-3	1-2	2-4		4-6
IIIs	15	30	.5-1.5	2-3	.75-1.5	1.5-3.0		3-5
IIIw	10	20				1.5-3.0		3-5
IVe			.5-1.0	1.5-2.5	.75-1.5	2.0-3.0		2.5-3.5
IVw	10	20						
VI								
VII								
VIII								

TABLE 3 (continued)

Land Class	Native Grass Forage Mgt. I (tons/a-dry)	Native Grass Forage Mgt. II (tons/a-dry)	Potatoes-Fresh Mgt. I (cwt/a)	Potatoes-Fresh Mgt. II (cwt/a)	Potatoes-Process Mgt. I (cwt/a)	Potatoes-Process Mgt. II (cwt/a)	Lettuce Mgt. I (cwt/a)	Lettuce Mgt. II (cwt/a)
IIc	.75-1.5	1.5-2.5	150	300	110	250	270	360
IIe	.75-1.5	1.5-2.5	150	300	110	250	200	250
IIs	No II's in this area							
IIIe	.75-1.5	1.5-2.5	200	250	150	180		
IIIs	.75-1.5	1.5-2.5	200	230	150	180		
IIIw								
IVe	.75-1.5	1.2-2.5						
IVs	.75-1.5	1.5-2.5						
IVw								
VI								
VII								
VIII								

TABLE 3 (continued)

Land Class	Carrots		Cabbage-Fresh		Cabbage-Process		G. Peas-Process	
	Mgt. I (cwt/a)	Mgt. II	Mgt. I (cwt/a)	Mgt. II	Mgt. I (cwt/a)	Mgt. II	Mgt. I (cwt/a)	Mgt. II
IIc	100	200	400	600	500	800	20	50
IIe	75	180	400	500	450	600	20	50
IIs	No II's in this area							
IIIe			360	420	360	420	15	20
IIIs			250	330	250	330		
IIIw								
IVe								
IVs								
IVw								
VI								
VII								
VIII								

TABLE 4

ESTIMATED YIELD POTENTIAL BY LAND CAPABILITY CLASS
FOR TWO LEVELS OF MANAGEMENT,
NORTHEAST KODIAK ISLAND, ALASKA, 1967

Land Class	Barley (high moisture) (tons/a-dry)		Perennial Forage (tons/a-dry)		Native Grass Forage (tons/a-dry)		Potatoes (cwt/a)	
	Mgt. I	Mgt. II	Mgt. I	Mgt. II	Mgt. I	Mgt. II	Mgt. I	Mgt. II
II	No class II land in the area							
IIIe	10-12	15-20	1.5-2.5		.5-1.0	1-2	100	200
IIIs	No III's in this area							
IIIw			1.0-2.0		.5-1.0	1-2		
IVe	10-12	15-20	1.5-2.0		.5-1.0	1-2		
IVs	10-12	15-20	1.0-2.0		.5-1.0	1-2		
IVw	No IVw's in this area							
VI								
VII								
VIII								

APPENDIX B

TABLE 1. PRICE INDEXES FOR AGRICULTURAL COMMODITIES IN ALASKA, 1959 BASE YEAR

TABLE 2. AGRICULTURAL COMMODITY PRICES IN ALASKA

PRICE INDEXES FOR AGRICULTURAL COMMODITIES IN ALASKA, 1959 BASE YEAR

	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
Milk														
Tanana	100.4	97.4	100.6	99.9	103.9	97.6	100.0	129.3	108.4	119.4	123.3	98.9	103.3	91.4
Matanuska	95.5	97.6	98.1	95.5	95.8	93.3	100.0	101.0	101.8	90.9	89.3	84.2	86.6	90.8
Kenai	120.0	120.0	109.5	126.5	128.4	100.0	100.0	106.4	102.4	108.9	105.0	93.3	92.7	140.0
S.E.	91.5	91.6	80.0	87.1	102.2	99.6	100.0	110.1	106.0	100.0	93.9	90.1	92.9	110.1
S.W. & W.	169.3	171.4	171.0	168.8	168.8	96.7	100.0	171.7	161.8	190.4	n.a.	n.a.	n.a.	n.a.
Eggs														
Tanana	147.2	123.6	118.0	113.5	103.4	106.7	100.0	106.7	96.6	98.9	97.8	96.6	95.5	96.6
Matanuska	103.5	98.8	100.0	103.5	103.5	100.0	100.0	102.4	91.8	94.1	92.9	91.8	88.2	88.2
Kenai	117.6	117.6	110.6	117.6	103.5	117.6	100.0	102.4	90.6	94.1	94.1	95.3	90.6	92.9
S.E.	123.8	125.0	107.5	113.8	112.5	106.2	100.0	100.0	91.2	93.8	91.2	92.5	95.0	93.8
S.W. & W.	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	90.0	87.0	88.0	93.0	96.0	95.0
Beef														
Tanana	92.7	88.9	98.2	77.8	81.8	88.9	100.0	95.1	106.9	115.8	103.8	94.2	88.0	104.2
Matanuska	100.8	96.5	90.8	99.8	77.5	100.0	100.0	97.2	114.2	117.0	103.8	94.8	94.8	93.8
Kenai	122.5	115.0	107.5	92.5	82.5	100.0	100.0	98.2	112.5	113.2	110.5	102.0	108.0	115.5
S.E.	112.5	125.0	100.0	100.0	87.5	87.5	100.0	97.8	105.8	107.0	101.2	100.0	95.5	n.a.
S.W. & W.	100.0	100.0	95.0	115.2	102.5	100.0	100.0	104.2	119.5	108.0	110.8	101.0	104.5	111.8
Pork														
Tanana	136.4	138.2	104.6	117.3	155.5	138.2	100.0	103.7	103.2	113.6	103.7	99.8	115.2	126.3
Matanuska	98.5	72.4	73.5	119.8	100.8	89.5	100.0	100.5	99.5	104.8	87.8	97.2	111.8	130.0
Kenai	116.0	100.0	84.0	76.0	72.0	100.0	100.0	86.4	80.0	83.6	82.4	83.6	104.4	113.0
S.W. & W.	66.7	78.7	83.3	83.3	86.7	100.0	100.0	166.7	166.7	n.a.	n.a.	n.a.	n.a.	n.a.
Poultry														
Tanana	135.8	124.7	104.0	93.6	83.8	116.8	100.0	116.2	99.6	165.3	96.2	87.7	64.9	59.4
Matanuska	122.9	125.9	105.4	94.2	73.1	104.8	100.0	88.2	99.6	94.4	72.7	60.2	49.4	52.6
Kenai	133.2	115.1	128.7	117.2	117.4	110.4	100.0	105.6	93.9	101.1	86.2	74.9	56.4	45.4
S.E.	187.5	187.5	155.0	137.5	115.0	100.2	100.0	105.5	107.0	n.a.	91.0	92.5	70.0	65.8
S.W. & W.	100.0	100.0	94.0	100.0	80.0	90.5	100.0	100.0	111.2	114.2	112.4	83.4	60.0	66.6
Wool														
Kenai	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	100.0	69.7	69.4	90.6	81.5	108.7	94.9	101.8
S.W. & W.	90.9	75.8	89.6	90.7	109.1	100.0	100.0	72.7	72.5	87.1	105.8	110.5	96.5	104.0
Lamb														
Kenai*	98.0	100.0	98.4	100.0	100.0	100.0	n.a.	130.0	111.8	120.0	166.6	123.0	106.6	120.0
S.W. & W.	100.0	100.0	94.0	100.0	80.0	94.0	100.0	100.8	111.0	109.2	107.2	99.0	84.6	80.0

*1958 Base Year

Table 1. - contd.

	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
Reindeer														
S.W. & W.	n.a.	n.a.	n.a.	n.a.	n.a.	87.5	100.0	100.0	93.2	94.5	99.5	108.2	102.0	85.0
Potatoes														
Tanana	99.8	93.6	83.6	130.7	94.4	59.1	100.0	91.2	79.2	76.0	75.7	109.1	88.5	69.6
Matanuska	97.9	83.0	64.6	99.2	99.2	73.0	100.0	94.4	99.6	86.1	75.6	139.1	104.5	91.0
Kenai	130.2	131.3	71.2	108.2	104.4	99.6	100.0	123.3	114.1	100.8	86.1	145.0	146.0	145.6
S.E.	91.5	98.3	63.5	65.2	73.5	70.0	100.0	100.0	75.0	58.3	70.0	n.a.	n.a.	100.0
S.W. & W.	n.a.	n.a.	n.a.	n.a.	n.a.	70.0	100.0	100.0	75.0	58.8	52.8	80.0	80.0	70.0
Cabbage														
Tanana	85.0	70.0	73.7	90.0	90.0	40.0	100.0	121.6	77.8	95.6	n.a.	100.0	117.8	123.1
Matanuska	64.7	56.4	34.7	55.7	55.8	83.3	100.0	59.7	71.9	75.8	65.0	72.9	107.7	87.8
Kenai	69.4	75.0	63.5	50.0	66.7	80.6	100.0	83.3	62.5	83.3	66.7	83.3	116.7	111.1
Lettuce														
Tanana	222.8	148.2	185.1	125.0	110.2	208.3	100.0	129.2	108.6	121.4	77.3	118.1	134.4	134.1
Matanuska	100.6	83.8	61.8	90.0	83.2	183.1	100.0	86.5	87.4	97.7	62.4	92.1	103.3	104.6
Carrots														
Tanana	81.6	82.1	78.8	78.6	176.1	86.6	100.0	58.9	59.5	84.2	71.9	73.7	104.8	106.0
Matanuska	80.0	67.4	87.7	60.3	76.9	108.5	100.0	57.3	104.2	98.2	77.6	95.3	118.2	116.1
Kenai	56.6	45.0	51.8	47.2	50.0	103.4	100.0	n.a.	62.5	58.4	43.8	58.4	83.4	75.0
Other Veg.														
Tanana	878.0	1557.9	2731.7	73.4	272.0	147.5	100.0	111.7	121.2	149.9	104.2	110.2	123.6	149.2
Matanuska	204.7	52.2	52.4	46.0	125.9	104.3	100.0	77.4	70.7	77.1	53.5	62.4	67.7	76.3
Kenai	37.7	314.9	41.2	75.7	80.0	98.9	100.0	42.4	42.4	44.0	40.2	45.2	52.8	60.3
S.E.	n.a.	n.a.	n.a.	n.a.	48.5	96.2	100.0	45.8	45.8	45.8	45.8	n.a.	n.a.	n.a.
S.W. & W.*	n.a.	n.a.	n.a.	n.a.	n.a.	75.9	n.a.	100.0	100.0	150.0	115.0	125.0	150.0	150.0
*1960 Base Year														
Oats														
Tanana	111.1	111.1	100.0	110.0	122.2	100.0	100.0	111.1	111.1	104.9	116.4	234.7	100.0	93.3
Matanuska	146.7	133.3	133.3	107.1	119.0	107.1	100.0	109.8	114.3	106.9	105.0	101.4	97.6	96.9
Kenai*	123.0	89.6	123.0	90.4	102.2	100.0	n.a.	90.6	94.4	80.5	100.0	100.0	n.a.	100.0
*1958 Base Year														
Lettuce														
Kenai	62.5	104.7	84.4	80.0	62.5	94.0	100.0	n.a.	n.a.	66.6	37.5	62.5	75.0	83.4
S.E.	909.1	1152.3	562.7	568.2	431.8	909.1	100.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
Barley														
Tanana	116.0	116.7	110.7	111.6	122.2	105.3	100.0	108.0	112.0	98.9	104.2	93.8	93.3	91.1
Matanuska	116.7	117.0	116.3	116.5	104.6	104.6	100.0	103.2	113.7	98.8	94.2	92.3	91.9	93.2
Kenai*	n.a.	108.1	63.1	90.1	112.6	n.a.	n.a.	100.0	112.6	126.1	96.8	98.6	101.4	99.1
*1960 Base Year														
Grain Hay														
Tanana	75.0	81.2	62.5	62.5	81.2	100.0	100.0	93.8	68.8	67.7	85.9	63.9	64.5	55.0
Matanuska	91.6	83.3	83.3	83.3	100.0	100.0	100.0	108.3	92.5	86.8	81.1	89.0	80.0	82.0
Kenai	133.8	133.8	133.8	121.6	133.8	124.5	100.0	178.9	158.1	158.1	145.9	134.7	126.5	145.9
S.W. & W.	n.a.	n.a.	n.a.	n.a.	n.a.	100.0	100.0	111.1	114.3	100.0	100.0	83.3	n.a.	n.a.
Grass Hay														
Tanana	94.3	n.a.	87.0	94.3	120.2	101.2	100.0	120.3	105.8	98.4	90.3	87.0	91.5	87.0
Matanuska	83.8	n.a.	99.8	83.8	84.0	100.2	100.0	125.7	114.8	109.3	97.1	100.6	106.1	98.6
Kenai*	83.0	n.a.	83.0	75.5	83.0	100.0	26.9	113.3	105.7	98.0	88.6	89.4	96.3	112.8
S.E.	85.5	n.a.	76.0	n.a.	n.a.	102.6	100.0	114.0	123.5	114.0	105.2	101.3	n.a.	n.a.
S.W. & W.	n.a.	n.a.	n.a.	97.9	n.a.	n.a.	100.0	137.1	137.1	137.1	127.3	137.1	n.a.	n.a.
*1958 Base Year														
Grain Silage														
Tanana	80.0	82.1	80.0	80.0	80.0	100.0	100.0	92.6	88.0	80.0	80.0	80.0	80.0	77.2
Matanuska	109.7	100.0	103.0	100.0	93.9	100.0	100.0	100.8	105.4	94.8	97.5	91.6	94.8	89.4
Kenai	100.0	100.0	90.0	100.0	87.5	100.0	100.0	100.0	98.0	87.7	85.0	87.5	92.0	90.0
S.E.	100.0	133.3	100.0	133.3	133.3	100.0	100.0	111.1	114.6	110.5	106.7	106.7	110.3	133.3
S.W. & W.	n.a.	n.a.	n.a.	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	n.a.
Grass Silage														
Tanana	n.a.	n.a.	80.0	80.0	80.0	100.0	100.0	88.0	88.0	80.0	80.0	80.0	80.0	77.0
Matanuska	100.0	n.a.	100.0	100.0	93.7	100.0	100.0	102.4	107.6	96.6	93.0	92.2	95.0	89.4
Kenai	125.0	n.a.	100.0	100.0	90.0	100.0	100.0	100.0	96.4	88.3	82.3	87.5	91.8	90.6
S.E.	133.3	n.a.	n.a.	133.3	133.3	100.0	100.0	115.5	115.1	109.3	104.3	106.7	116.3	106.7
S.W. & W.	n.a.	n.a.	n.a.	n.a.	n.a.	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Straw														
Tanana	n.a.	n.a.	n.a.	n.a.	n.a.	99.6	100.0	112.1	103.2	99.6	92.5	87.7	n.a.	n.a.

SOURCE: U. S. Department of Agriculture, Agricultural Statistical Tables, by Crop Reporting District, 1953-1966, Washington, D. C., 1967.

APPENDIX B - TABLE 2

Agricultural Commodity Prices in Alaska

MILK (dollars per hundred pounds)

	Tanana	Matanuska	Kenai	S.E.	S.W. & W.
1953	11.04	10.75	12.00	9.97	11.85
1954	10.71	10.99	12.00	9.98	12.00
1955	11.07	11.05	10.95	8.72	11.97
1956	10.99	10.75	12.65	9.49	11.82
1957	11.43	10.79	12.84	11.14	11.82
1958	10.74	10.51	10.00	10.86	6.77
1959	11.00	11.25	10.00	10.90	7.00
1960	14.22	11.37	10.64	12.00	12.02
1961	11.92	11.46	10.24	11.56	11.33
1962	13.14	10.24	10.89	10.90	13.33
1963	13.56	10.06	10.50	10.24	n.a.
1964	10.88	9.48	9.33	9.82	n.a.
1965	11.36	9.75	9.27	10.13	n.a.
1966	10.05	10.23	14.00	12.00	n.a.

EGGS (dollars per dozen)

	Tanana	Matanuska	Kenai	S.E.	S.W. & W.
1953	1.31	0.88	1.00	0.99	1.00
1954	1.10	0.84	1.00	1.00	1.00
1955	1.05	0.85	0.94	0.86	1.00
1956	1.01	0.88	1.00	0.91	1.00
1957	0.92	0.88	0.88	0.90	1.00
1958	0.95	0.85	1.00	0.85	1.00
1959	0.89	0.85	0.85	0.80	1.00
1960	0.95	0.87	0.87	0.80	1.00
1961	0.86	0.78	0.77	0.73	0.90
1962	0.88	0.80	0.80	0.75	0.87
1963	0.87	0.79	0.80	0.73	0.88
1964	0.86	0.78	0.81	0.74	0.93
1965	0.85	0.75	0.77	0.76	0.96
1966	0.86	0.75	0.79	0.75	0.95

Table 2. - contd.

BEEF & VEAL (dollars per pound)

	Tanana	Matanuska	Kenai	S.E.	S.W. & W.
1953	o.417	0.403	0.490	0.450	0.400
1954	0.400	0.386	0.460	0.500	0.400
1955	0.442	0.363	0.430	0.400	0.380
1956	0.350	0.399	0.370	0.400	0.461
1957	0.368	0.310	0.330	0.350	0.410
1958	0.400	0.400	0.400	0.350	0.400
1959	0.450	0.400	0.400	0.400	0.400
1960	0.428	0.389	0.393	0.391	0.417
1961	0.481	0.457	0.450	0.423	0.478
1962	0.521	0.468	0.453	0.428	0.432
1963	0.467	0.415	0.442	0.405	0.443
1964	0.424	0.379	0.408	0.400	0.404
1965	0.396	0.363	0.432	0.382	0.418
1966	0.469	0.375	0.462	n.a.	0.447

PORK (dollars per pound)

	Tanana	Matanuska	Kenai	S.E.	S.W. & W.
1953	0.592	0.394	0.580	n.a.	0.400
1954	0.600	0.314	0.500	n.a.	0.472
1955	0.454	0.294	0.420	n.a.	0.500
1956	0.509	0.479	0.380	n.a.	0.500
1957	0.675	0.403	0.360	n.a.	0.520
1958	0.600	0.358	0.500	n.a.	0.600
1959	0.434	0.400	0.500	0.500	0.600
1960	0.450	0.402	0.432	n.a.	1.000
1961	0.448	0.398	0.400	n.a.	1.000
1962	0.493	0.419	0.418	n.a.	n.a.
1963	0.450	0.351	0.412	n.a.	n.a.
1964	0.433	0.389	0.418	n.a.	n.a.
1965	0.500	0.447	0.522	n.a.	n.a.
1966	0.548	0.520	0.565	n.a.	n.a.

Table 2. – contd.

LAMB & MUTTON (dollars per pound)

	Tanana	Matanuska	Kenai	S.E.	S.W. & W.
1953	0.473	0.644	0.490	n.a.	0.500
1954	0.470	n.a.	0.500	n.a.	0.500
1955	0.467	n.a.	0.492	n.a.	0.470
1956	0.422	n.a.	0.500	n.a.	0.500
1957	0.428	n.a.	0.500	n.a.	0.400
1958	n.a.	n.a.	0.500	n.a.	0.500
1959	n.a.	n.a.	n.a.	n.a.	n.a.
1960	n.a.	n.a.	0.650	n.a.	0.504
1961	n.a.	n.a.	0.559	n.a.	0.555
1962	n.a.	n.a.	0.600	n.a.	0.546
1963	n.a.	n.a.	0.833	n.a.	0.536
1964	n.a.	n.a.	0.615	n.a.	0.495
1965	n.a.	n.a.	0.533	n.a.	0.423
1966	n.a.	n.a.	0.600	n.a.	

POULTRY (dollars per pound)

	Tanana	Matanuska	Kenai	S.E.	S.W. & W.
1953	0.653	0.617	0.590	0.750	0.500
1954	0.600	0.632	0.510	0.750	0.500
1955	0.500	0.529	0.570	0.620	0.470
1956	0.450	0.473	0.519	0.550	0.500
1957	0.403	0.367	0.520	0.460	0.400
1958	0.562	0.526	0.489	0.401	0.452
1959	0.481	0.502	0.443	0.400	0.500
1960	0.559	0.443	0.468	0.422	0.500
1961	0,479	0.500	0.416	0.428	0.556
1962	0.795	0.474	0.448	n.a.	0.571
1963	0.463	0.365	0.382	0.364	0.562
1964	0.422	0.302	0.332	0.370	0.417
1965	0.312	0.248	0.250	0.280	0.300
1966	0.286	0.264	0.201	0.263	0.333

Table 2. - contd.

WOOL (dollars per pound)

	Tanana	Matanuska	Kenai	S.E.	S.W. & W.
1953	n.a.	n.a.	n.a.	n.a.	0.500
1954	n.a.	n.a.	n.a.	n.a.	0.417
1955	n.a.	n.a.	n.a.	n.a.	0.493
1956	n.a.	n.a.	n.a.	n.a.	0.499
1957	n.a.	n.a.	n.a.	n.a.	0.600
1958	n.a.	n.a.	n.a.	n.a.	0.550
1959	n.a.	0.550	0.552	n.a.	0.550
1960	n.a.	0.500	0.385	n.a.	0.400
1961	n.a.	n.a.	0.383	n.a.	0.399
1962	n.a.	n.a.	0.500	n.a.	0.479
1963	n.a.	n.a.	0.450	n.a.	0.582
1964	n.a.	n.a.	0.600	n.a.	0.608
1965	n.a.	n.a.	0.524	n.a.	0.531
1966	n.a.	n.a.	0.562	n.a.	0.572

REINDEER (dollars per pound)

	Tanana	Matanuska	Kenai	S.E.	S.W. & W.
1953	n.a.	n.a.	n.a.	n.a.	n.a.
1954	n.a.	n.a.	n.a.	n.a.	n.a.
1955	n.a.	n.a.	n.a.	n.a.	n.a.
1956	n.a.	n.a.	n.a.	n.a.	n.a.
1957	n.a.	n.a.	n.a.	n.a.	n.a.
1958	n.a.	n.a.	n.a.	n.a.	0.350
1959	n.a.	n.a.	n.a.	n.a.	0.400
1960	n.a.	n.a.	n.a.	n.a.	0.400
1961	n.a.	n.a.	n.a.	n.a.	0.373
1962	n.a.	n.a.	n.a.	n.a.	0.378
1963	n.a.	n.a.	n.a.	n.a.	0.398
1964	n.a.	n.a.	n.a.	n.a.	0.433
1965	n.a.	n.a.	n.a.	n.a.	0.408
1966	n.a.	n.a.	n.a.	n.a.	0.340

Table 2. - contd.

POTATOES (dollars per hundred pounds)

	Tanana	Matanuska	Kenai	S.E.	S.W. & W.
1953	6.77	5.23	6.20	5.49	n.a.
1954	6.35	4.43	6.25	5.90	n.a.
1955	5.67	3.45	3.39	3.81	n.a.
1956	8.86	5.30	5.15	3.91	n.a.
1957	6.40	5.30	4.97	4.41	n.a.
1958	4.01	3.90	4.74	4.20	7.00
1959	6.78	5.34	4.76	6.00	10.00
1960	6.18	5.04	5.87	6.00	10.00
1961	5.37	5.32	5.43	4.50	7.50
1962	5.15	4.60	4.80	3.50	5.88
1963	5.13	4.04	4.10	4.20	5.28
1964	7.40	7.43	6.90	n.a.	8.00
1965	6.00	5.58	6.95	n.a.	8.00
1966	4.72	4.86	6.93	6.00	7.00

CABBAGE (dollars per hundred pounds)

	Tanana	Matanuska	Kenai	S.E.	S.W. & W.
1953	8.50	7.76	8.33	7.20	n.a.
1954	7.00	6.77	9.00	9.65	n.a.
1955	7.37	4.16	7.62	8.00	n.a.
1956	9.00	6.68	6.00	8.00	n.a.
1957	9.00	6.69	8.00	7.00	n.a.
1958	4.00	10.00	9.67	10.21	n.a.
1959	10.00	12.00	12.00	n.a.	n.a.
1960	12.16	7.16	10.00	n.a.	n.a.
1961	7.78	8.63	7.50	n.a.	n.a.
1962	9.56	9.10	10.00	n.a.	n.a.
1963	n.a	7.80	8.00	n.a.	9.00
1964	10.00	8.75	10.00	n.a.	10.00
1965	11.78	12.92	14.00	n.a.	14.28
1966	12.31	10.54	13.33	n.a.	14.28

Table 2. -- contd.

CARROTS (dollars per hundred pounds)

	Tanana	Matanuska	Kenai	S.E.	S.W. & W.
1953	11.42	8.86	11.32	12.00	n.a.
1954	11.50	7.47	9.00	n.a	n.a.
1955	11.04	9.72	10.35	14.70	n.a.
1956	11.00	6.68	9.50	14.50	n.a.
1957	24.66	8.52	10.00	8.00	n.a.
1958	12.12	12.02	20.67	10.00	n.a.
1959	14.00	11.08	20.00	n.a.	n.a.
1960	8.25	6.35	n.a.	n.a.	n.a.
1961	8.33	11.55	12.50	n.a.	n.a.
1962	11.79	10.88	11.67	n.a.	n.a.
1963	10.07	8.60	8.75	n.a.	n.a.
1964	10.32	10.56	11.67	n.a.	n.a.
1965	14.67	13.10	16.67	n.a.	n.a.
1966	14.84	12.86	15.00	16.00	n.a.

LETTUCE (dollars per hundred pounds)

	Tanana	Matanuska	Kenai	S.E.	S.W. & W.
1953	26.74	14.50	12.50	20.00	n.a.
1954	17.78	12.09	20.94	25.35	n.a.
1955	22.21	8.91	16.88	12.38	n.a.
1956	15.00	12.98	16.00	12.50	n.a.
1957	13.23	12.00	12.50	9.50	n.a.
1958	25.00	26.40	18.80	20.00	n.a.
1959	12.00	14.42	20.00	n.a.	n.a.
1960	15.50	12.48	n.a.	n.a.	n.a.
1961	13.03	12.60	n.a.	n.a.	n.a.
1962	14.57	14.09	13.33	n.a.	n.a.
1963	9.28	9.00	7.50	n.a.	n.a.
1964	14.17	13.28	12.50	n.a.	n.a.
1965	16.13	14.90	15.00	n.a.	n.a.
1966	16.09	15.09	16.67	n.a.	n.a.

Table 2. - contd.

OTHER VEGETABLES (dollars per hundred pounds)

	Tanana	Matanuska	Kenai	S.E.	S.W. & W.
1953	n.a.	41.10*	10.00	n.a.	n.a.
1954	n.a.	10.49	n.a.	n.a.	n.a.
1955	n.a.	10.52	10.94	n.a.	n.a.
1956	n.a.	9.23	20.10	n.a.	n.a.
1957	30.85	25.28	21.24	10.59	n.a.
1958	16.73	20.95	26.25	20.98	7.59
1959	11.34	20.08	26.54	21.82	n.a.
1960	12.67	15.54	11.25	10.00	10.00
1961	13.75	14.20	11.25	10.00	10.00
1962	17.00	15.48	11.67	10.00	15.00
1963	11.82	10.74	10.67	10.00	11.50
1964	12.50	12.52	12.00	n.a.	12.50
1965	14.02	13.60	14.00	n.a.	15.00
1966	16.92	15.32	16.00	n.a.	15.00

OATS (dollars per hundred pounds)

1953	5.00	6.16	6.15	n.a.	n.a.
1954	5.00	5.60	4.48	n.a.	n.a.
1955	4.50	5.60	6.15	n.a.	n.a.
1956	4.95	4.50	4.52	n.a.	n.a.
1957	5.50	5.00	5.11	n.a.	n.a.
1958	4.50	4.50	5.00	n.a.	n.a.
1959	4.50	4.20	n.a.	n.a.	n.a.
1960	5.00	4.61	4.53	n.a.	n.a.
1961	5.00	4.80	4.72	n.a.	n.a.
1962	4.72	4.49	4.25	n.a.	n.a.
1963	5.24	4.41	5.00	n.a.	n.a.
1964	n.a.	4.26	5.00	n.a.	n.a.
1965	4.50	4.10	n.a.	n.a.	n.a.
1966	4.20	4.07	5.00	n.a.	n.a.

Table 2. - contd.

BARLEY (dollars per hundred pounds)

	Tanana	Matanuska	Kenai	S.E.	S.W. & W.
1953	5.22	5.02	n.a.	n.a.	n.a.
1954	5.25	5.03	4.80	n.a.	n.a.
1955	4.98	5.00	2.80	n.a.	n.a.
1956	5.02	5.01	4.00	n.a.	n.a.
1957	5.50	4.50	5.00	n.a.	n.a.
1958	4.74	4.50	n.a.	n.a.	n.a.
1959	4.50	4.30	n.a.	n.a.	n.a.
1960	4.86	4.44	4.44	n.a.	n.a.
1961	5.04	4.89	5.00	n.a.	n.a.
1962	4.45	4.25	5.60	n.a.	n.a.
1963	4.69	4.05	4.30	n.a.	n.a.
1964	4.22	3.97	4.38	n.a.	n.a.
1965	4.20	3.95	4.50	n.a.	n.a.
1966	4.10	4.01	4.40	n.a.	n.a.

GRAIN HAY (dollars per ton)

	Tanana	Matanuska	Kenai	S.E.	S.W. & W.
1953	60.00	54.95	55.00	45.00	n.a.
1954	65.00	50.00	55.00	50.00	n.a.
1955	50.00	50.00	55.00	45.00	n.a.
1956	50.00	50.00	50.00	n.a.	n.a.
1957	65.00	60.00	55.00	n.a.	n.a.
1958	80.00	60.00	51.19	60.00	60.00
1959	80.00	60.00	41.11	n.a.	60.00
1960	75.00	65.00	73.53	n.a.	66.67
1961	55.00	55.48	65.00	n.a.	68.57
1962	54.17	52.06	65.00	n.a.	60.00
1963	68.75	48.64	60.00	n.a.	60.00
1964	51.11	53.43	55.38	50.00	50.00
1965	51.58	48.00	52.00	n.a.	n.a.
1966	44.00	49.17	60.00	n.a.	n.a.

Table 2. - contd.

GRASS HAY (dollars per ton)

	Tanana	Matanuska	Kenai	S.E.	S.W. & W.
1953	65.00	50.00	55.00	45.00	n.a.
1954	n.a.	n.a.	n.a.	n.a.	n.a.
1955	60.00	59.52	55.00	40.00	n.a.
1956	65.00	50.00	50.00	n.a.	50.00
1957	82.81	50.08	55.00	n.a.	n.a.
1958	69.74	59.78	66.24	54.01	n.a.
1959	68.92	59.65	n.a.	52.62	51.05
1960	82.93	74.96	75.08	60.00	70.00
1961	72.94	68.50	70.00	65.00	70.00
1962	67.83	65.21	64.93	60.00	70.00
1963	62.22	57.92	58.67	55.38	65.00
1964	60.00	60.00	59.23	53.33	70.00
1965	63.08	63.29	63.81	n.a.	n.a.
1966	60.00	58.79	74.74	n.a.	n.a.

GRAIN SILAGE (dollars per ton)

	Tanana	Matanuska	Kenai	S.E.	S.W. & W.
1953	20.00	21.94	20.00	15.00	n.a.
1954	20.52	20.00	20.00	20.00	n.a.
1955	20.00	20.99	18.00	15.00	n.a.
1956	20.00	20.00	20.00	20.00	20.00
1957	20.00	18.78	17.50	20.00	20.00
1958	25.00	20.00	20.00	15.00	20.00
1959	25.00	20.00	20.00	15.00	20.00
1960	23.14	20.17	20.00	16.67	20.00
1961	22.00	21.07	19.49	17.19	20.00
1962	20.00	18.96	17.54	16.57	20.00
1963	20.00	19.50	17.00	16.00	20.00
1964	20.00	18.33	17.50	16.00	20.00
1965	20.00	18.96	18.40	16.54	20.00
1966	19.30	17.89	18.00	20.00	n.a.

Table 2. - contd.

GRASS SILAGE (dollars per ton)

	Tanana	Matanuska	Kenai	S.E.	S.W. & W.
1953	n.a.	20.00	25.00	20.00	n.a.
1954	n.a.	n.a.	n.a.	n.a.	n.a.
1955	20.00	20.00	20.00	n.a.	n.a.
1956	20.00	20.00	20.00	20.00	n.a.
1957	20.00	18.74	18.00	20.00	n.a.
1958	25.00	20.00	20.00	15.00	20.00
1959	25.00	20.00	20.00	15.00	20.00
1960	22.00	20.49	20.00	17.33	20.00
1961	22.00	21.52	19.28	17.27	20.00
1962	20.00	19.32	17.66	16.40	20.00
1963	20.00	18.60	16.46	15.64	20.00
1964	20.00	18.43	17.50	16.00	20.00
1965	20.00	19.00	18.35	17.44	20.00
1966	19.25	17.88	18.12	16.00	20.00

APPENDIX C

PRODUCTION FIGURES FOR SELECTED ALASKAN AGRICULTURAL PRODUCTS

1953-1966

(Figures are based on data obtained from the Alaska Agricultural Experiment Station, Palmer, Alaska, and are drawn by crop and livestock reporting districts as shown in Figure 2 on page 14.)

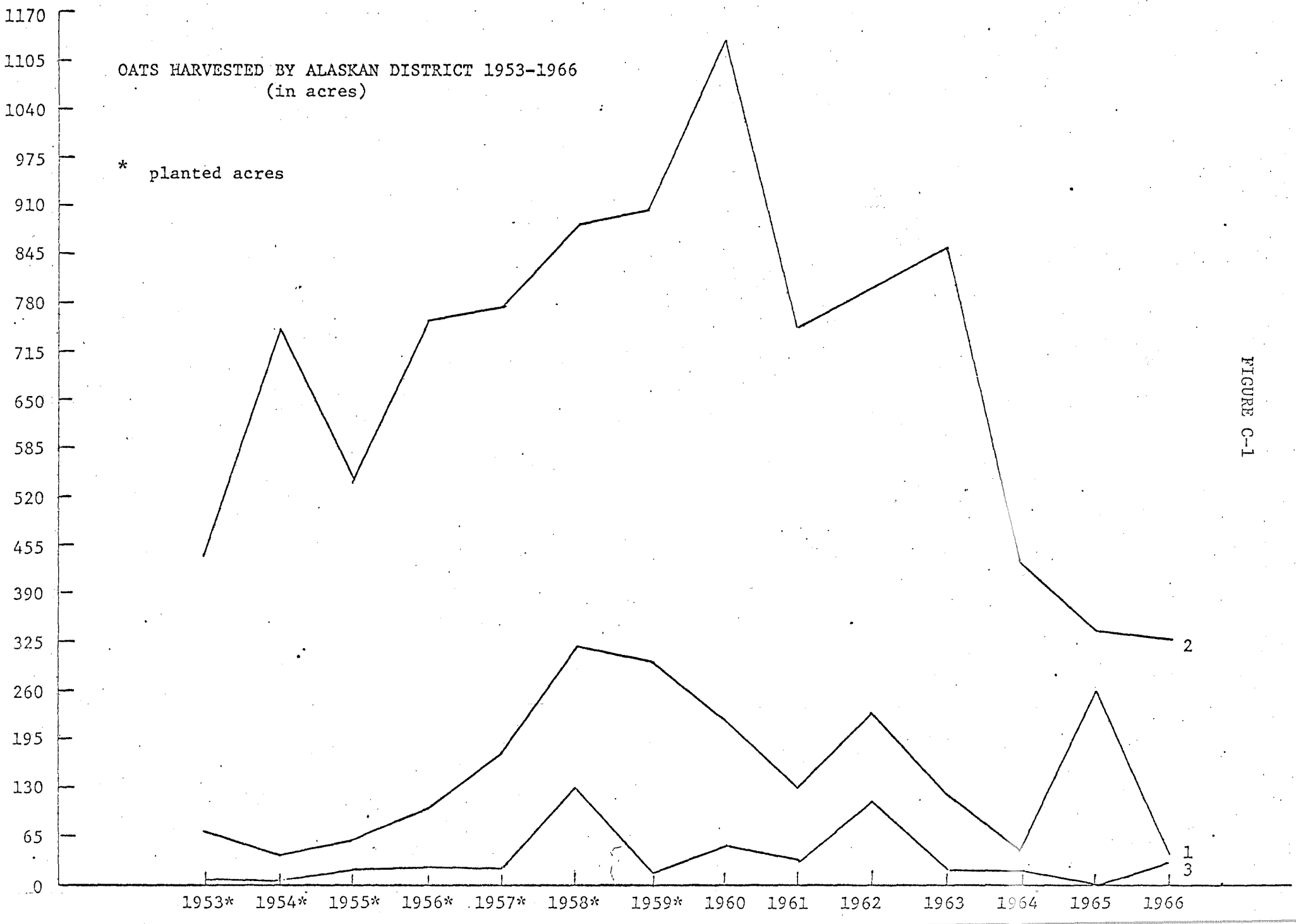
OATS HARVESTED BY ALASKAN DISTRICT 1953-1966
(in acres)
* planted acres
1170
1105
1040
975
910
845
780
715
650
585
520
455
390
325
260
195
130
65
0
1953*
1954*
1955*
1956*
1957*
1958*
1959*
1960
1961
1962
1963
1964
1965
1966
2
1
3

FIGURE C-1

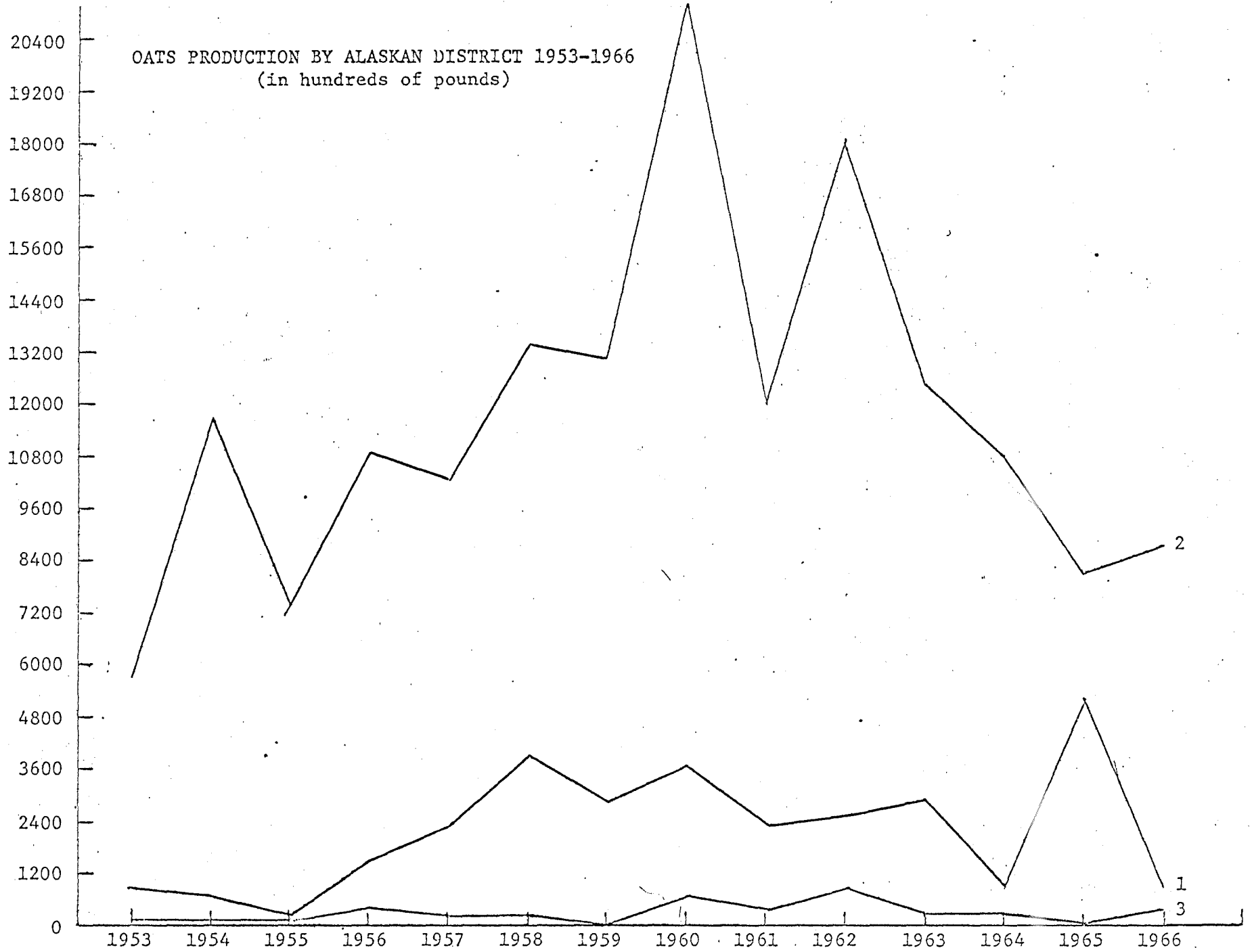
OATS PRODUCTION BY ALASKAN DISTRICT 1953-1966
(in hundreds of pounds)
20400
19200
18000
16800
15600
14400
13200
12000
10800
9600
8400
7200
6000
4800
3600
2400
1200
0
1953
1954
1955
1956
1957
1958
1959
1960
1961
1962
1963
1964
1965
1966
1
2
3

FIGURE C-2

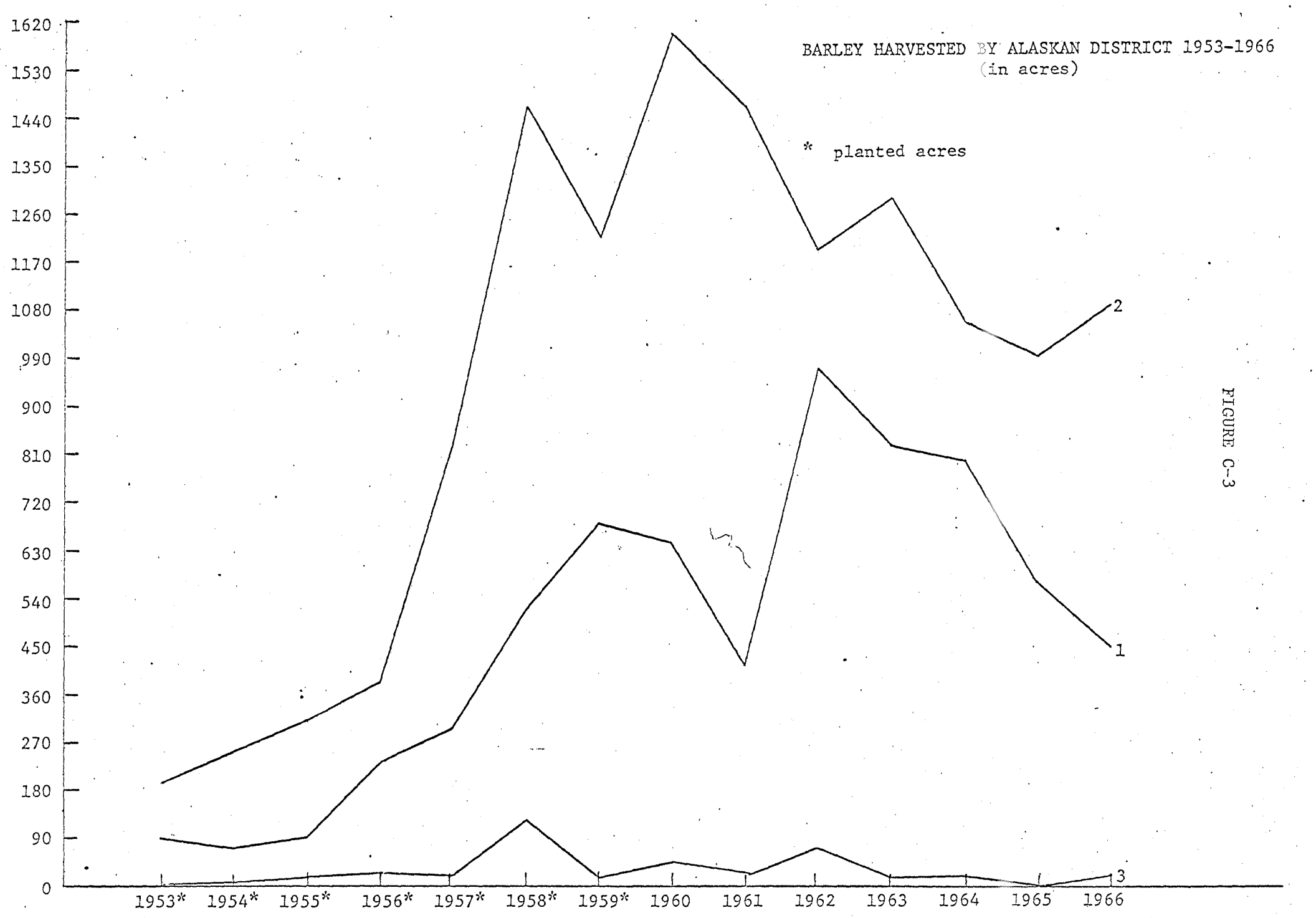
BARLEY HARVESTED BY ALASKAN DISTRICT 1953-1966
(in acres)
* planted acres
1620
1530
1440
1350
1260
1170
1080
990
900
810
720
630
540
450
360
270
180
90
0
1953*
1954*
1955*
1956*
1957*
1958*
1959*
1960
1961
1962
1963
1964
1965
1966
1
2
3

FIGURE C-3

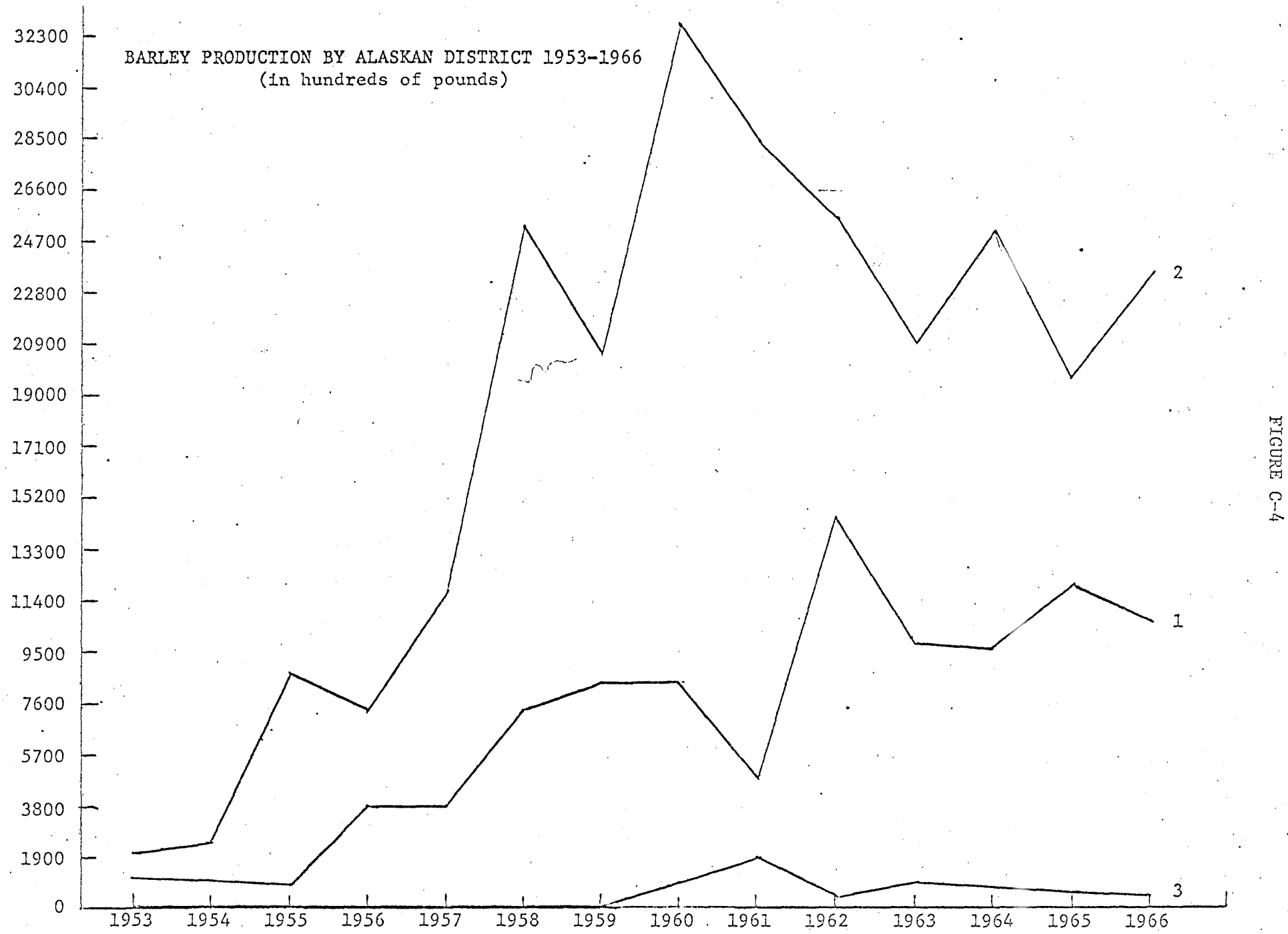
BARLEY PRODUCTION BY ALASKAN DISTRICT 1953-1966
(in hundreds of pounds)
32300
30400
28500
26600
24700
22800
20900
19000
17100
15200
13300
11400
9500
7600
5700
3800
1900
0
1953
1954
1955
1956
1957
1958
1959
1960
1961
1962
1963
1964
1965
1966
1
2
3

FIGURE C-4

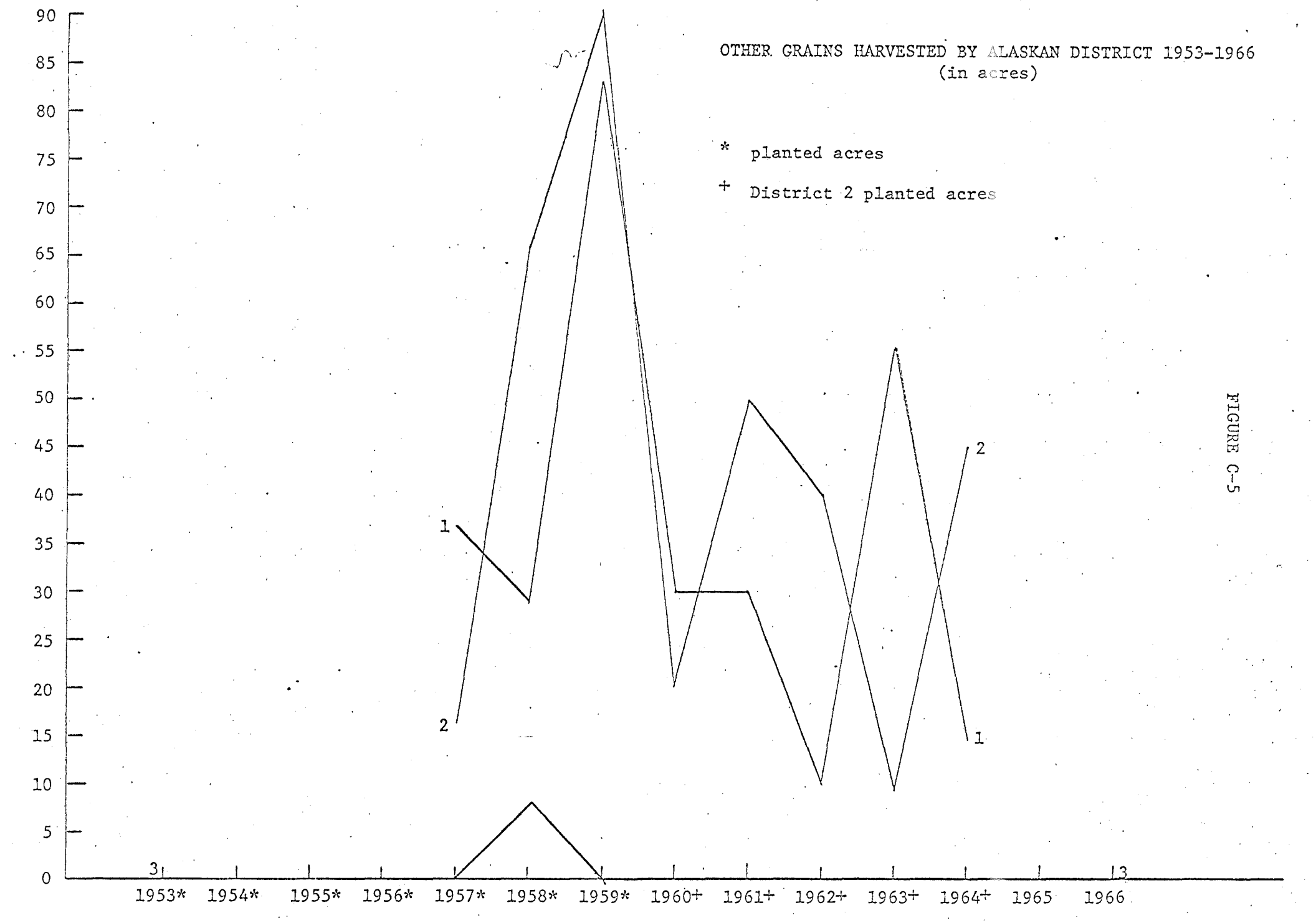
OTHER GRAINS HARVESTED BY ALASKAN DISTRICT 1953-1966
(in acres)
* planted acres
+ District 2 planted acres
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
1953*
1954*
1955*
1956*
1957*
1958*
1959*
1960+
1961+
1962+
1963+
1964+
1965
1966
1
2
3

FIGURE C-5

OTHER GRAIN PRODUCTION BY ALASKAN DISTRICT 1953-1966
(in hundreds of pounds)

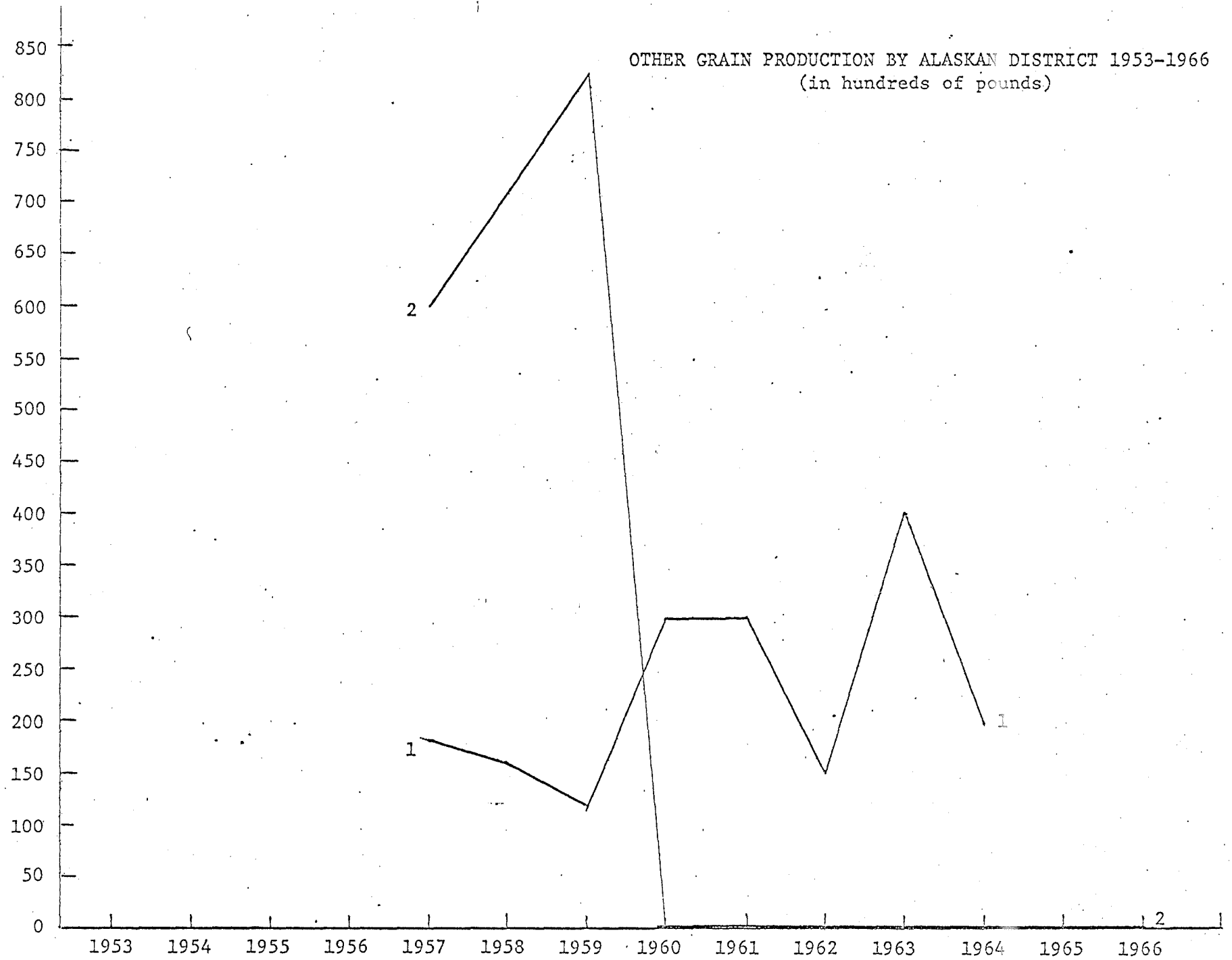

FIGURE C-6

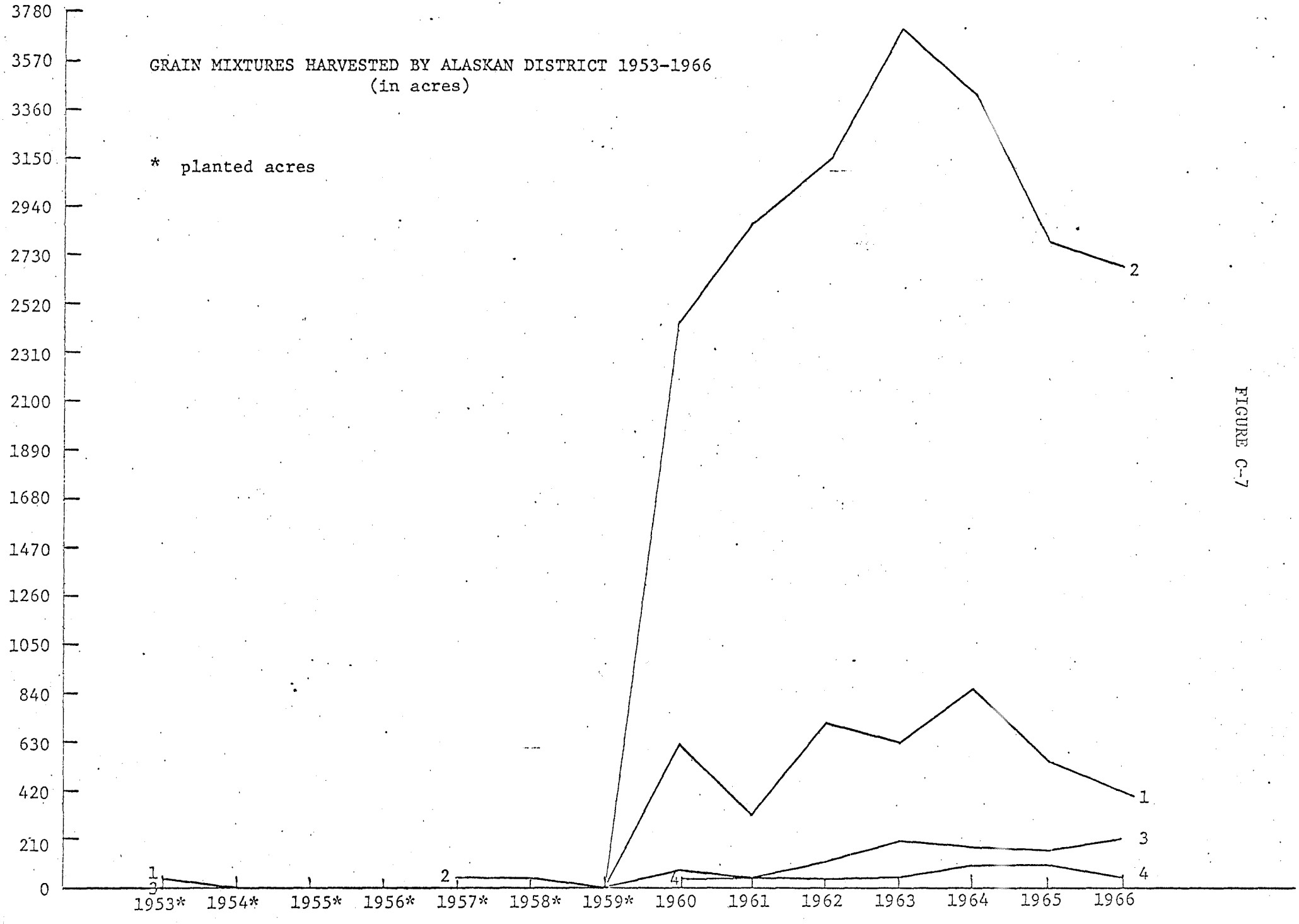
GRAIN MIXTURES HARVESTED BY ALASKAN DISTRICT 1953-1966
(in acres)
* planted acres
3780
3570
3360
3150
2940
2730
2520
2310
2100
1890
1680
1470
1260
1050
840
630
420
210
0
1953*
1954*
1955*
1956*
1957*
1958*
1959*
1960
1961
1962
1963
1964
1965
1966
1
2
3
4

FIGURE C-7

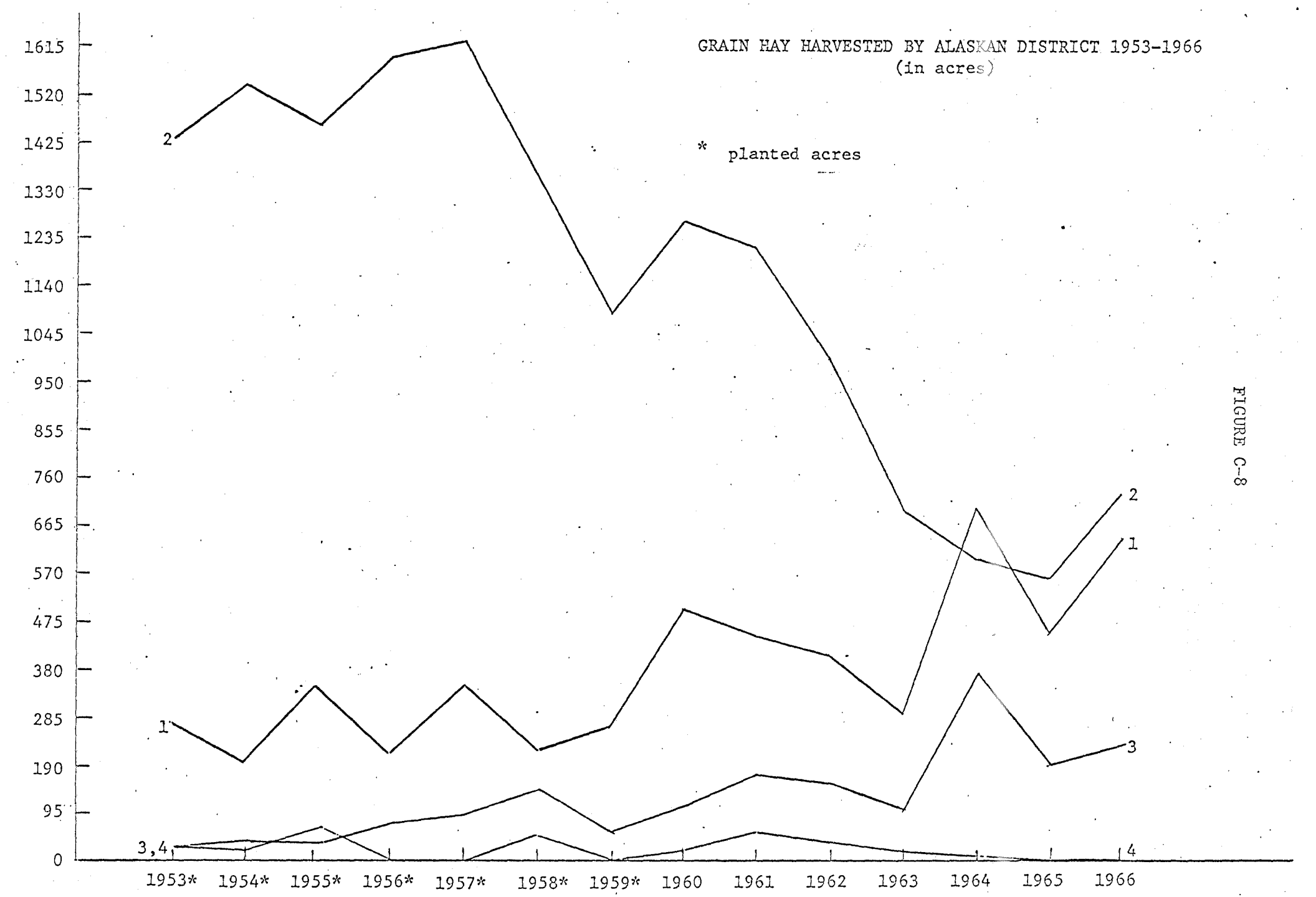
GRAIN HAY HARVESTED BY ALASKAN DISTRICT 1953-1966
(in acres)
* planted acres
1615
1520
1425
1330
1235
1140
1045
950
855
760
665
570
475
380
285
190
95
0
1953*
1954*
1955*
1956*
1957*
1958*
1959*
1960
1961
1962
1963
1964
1965
1966
1
2
3,4
1
2
3
4

FIGURE C-8

GRAIN HAY PRODUCTION BY ALASKAN DISTRICT 1953-1966
(in tons)

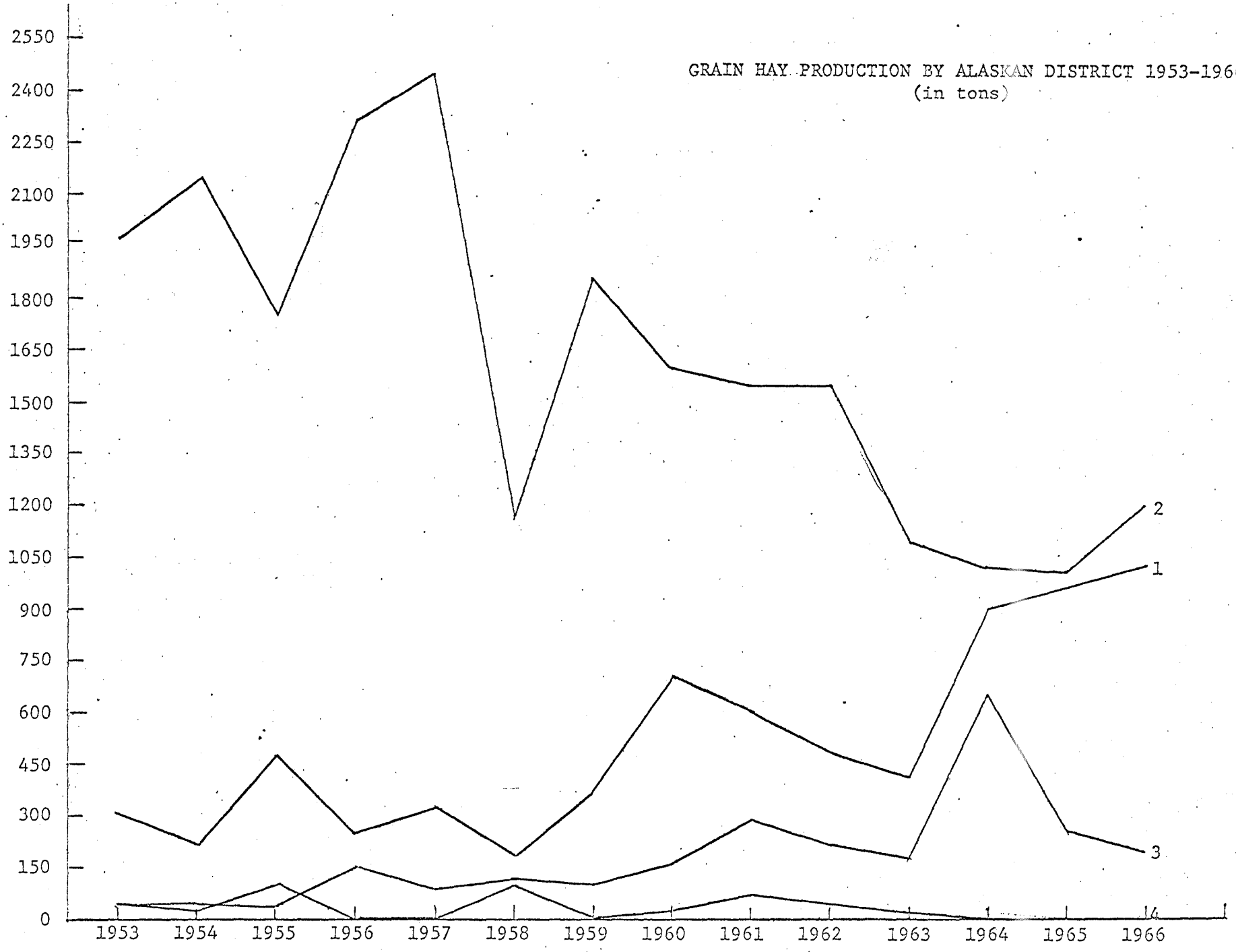

FIGURE C-9

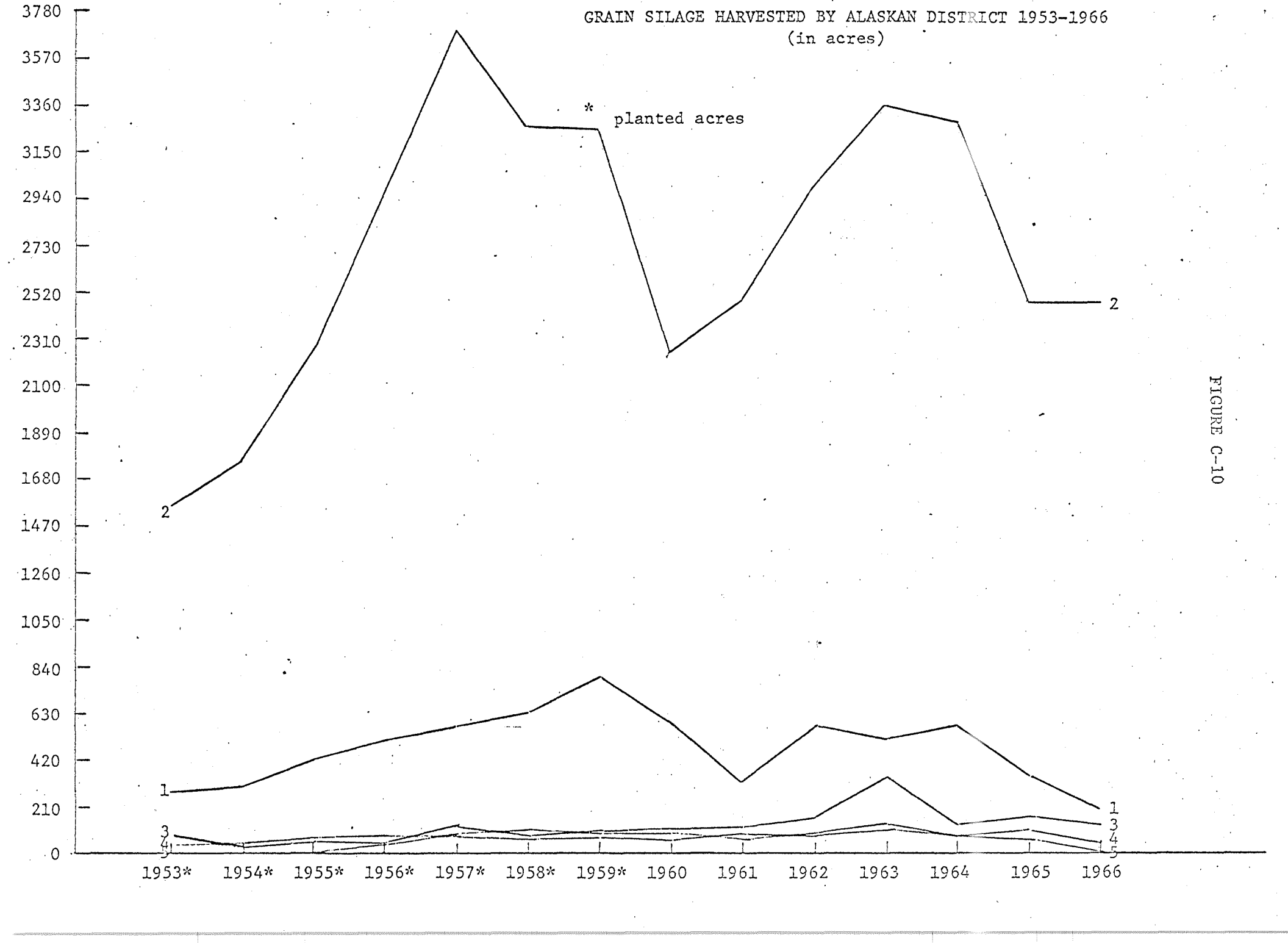
GRAIN SILAGE HARVESTED BY ALASKAN DISTRICT 1953-1966
(in acres)
* planted acres
3780
3570
3360
3150
2940
2730
2520
2310
2100
1890
1680
1470
1260
1050
840
630
420
210
0
1953*
1954*
1955*
1956*
1957*
1958*
1959*
1960
1961
1962
1963
1964
1965
1966
1
2
3
4
5

FIGURE C-10

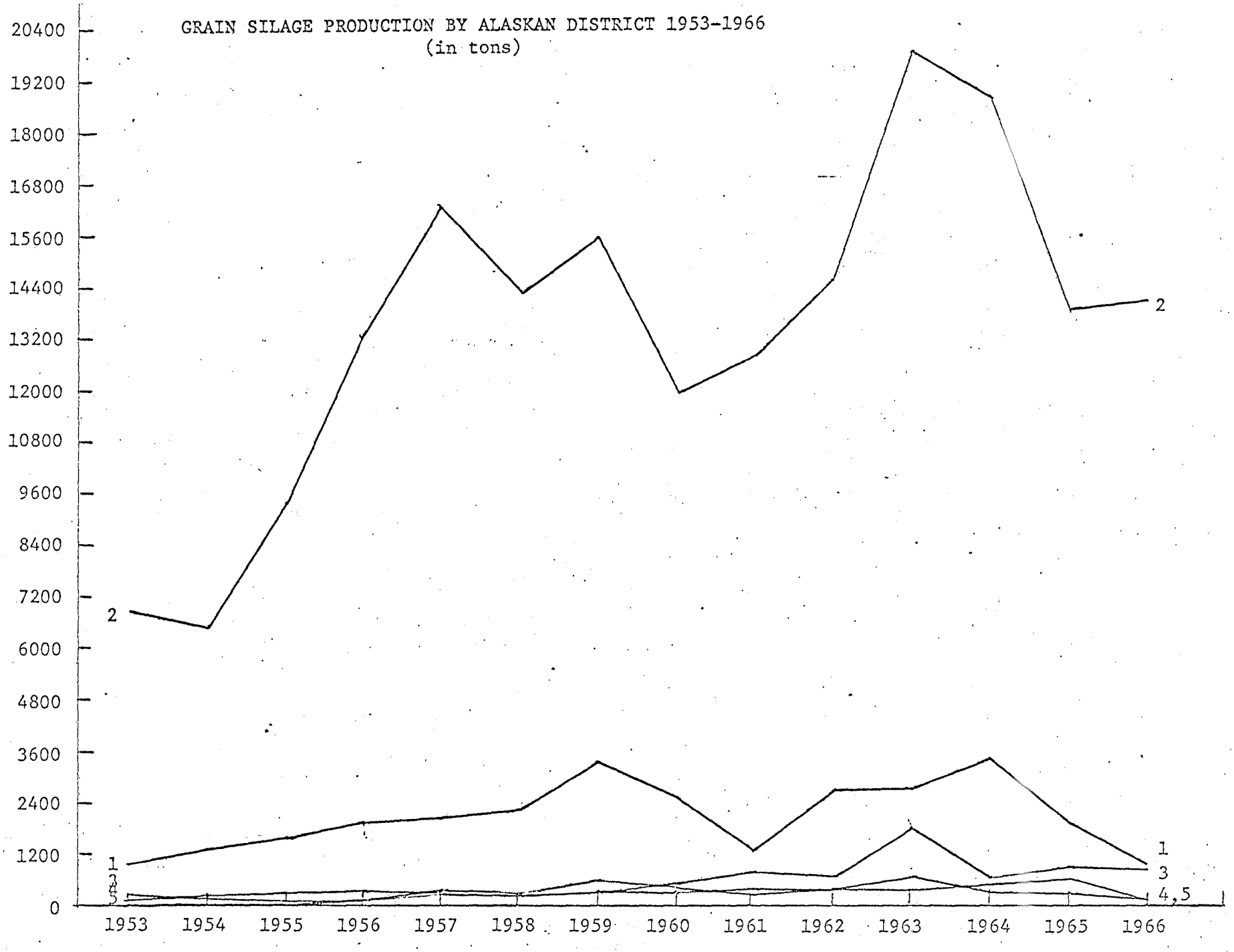
GRAIN SILAGE PRODUCTION BY ALASKAN DISTRICT 1953-1966
(in tons)
20400
19200
18000
16800
15600
14400
13200
12000
10800
9600
8400
7200
6000
4800
3600
2400
1200
0
1953
1954
1955
1956
1957
1958
1959
1960
1961
1962
1963
1964
1965
1966
2
2
1
3
4,5
1
3
5

FIGURE C-11

STRAW PRODUCTION BY ALASKAN DISTRICT 1953-1966
(in tons)

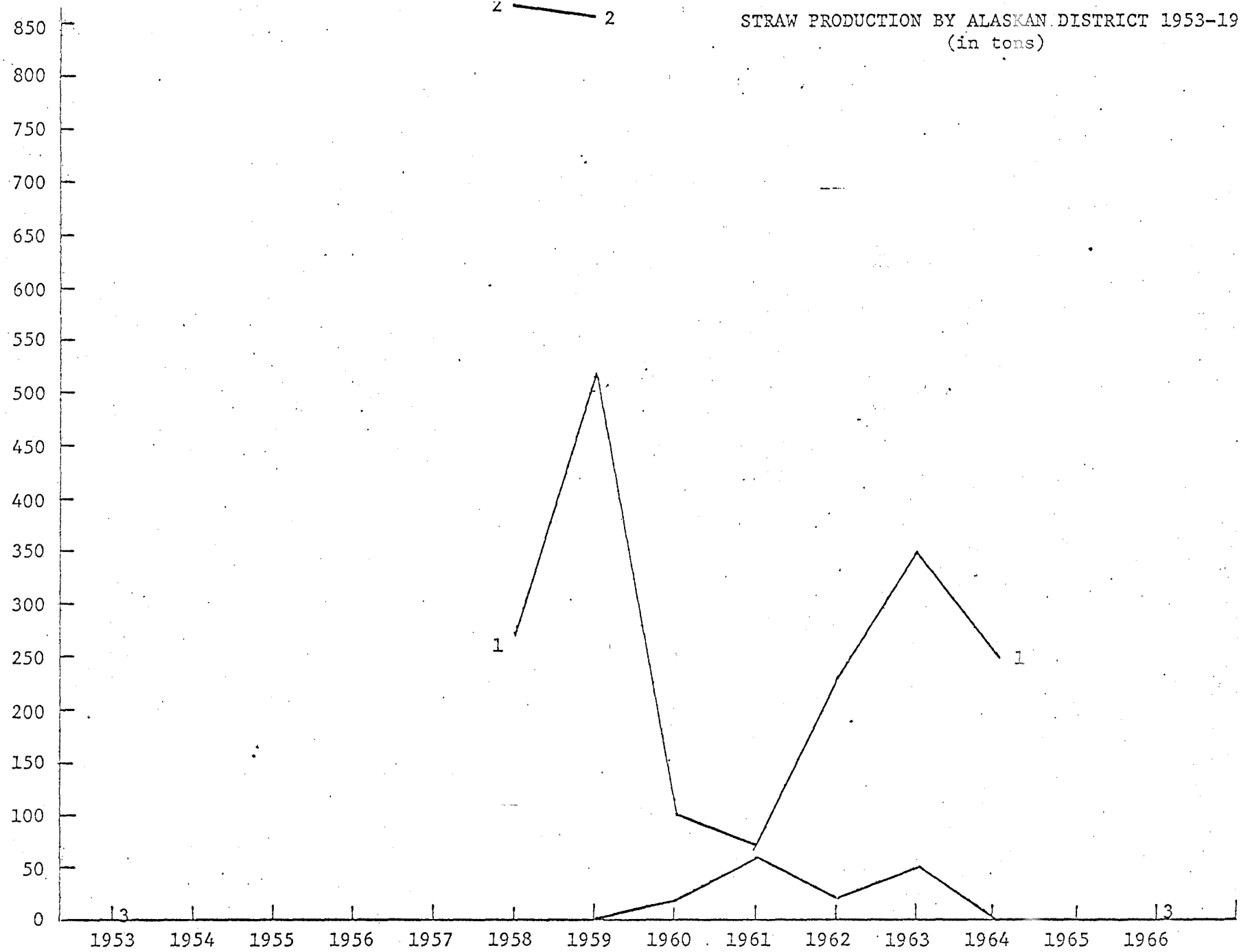

FIGURE C-12

NATIVE GRASS HAY HARVESTED BY ALASKAN DISTRICT 1957-1966
(in acres)

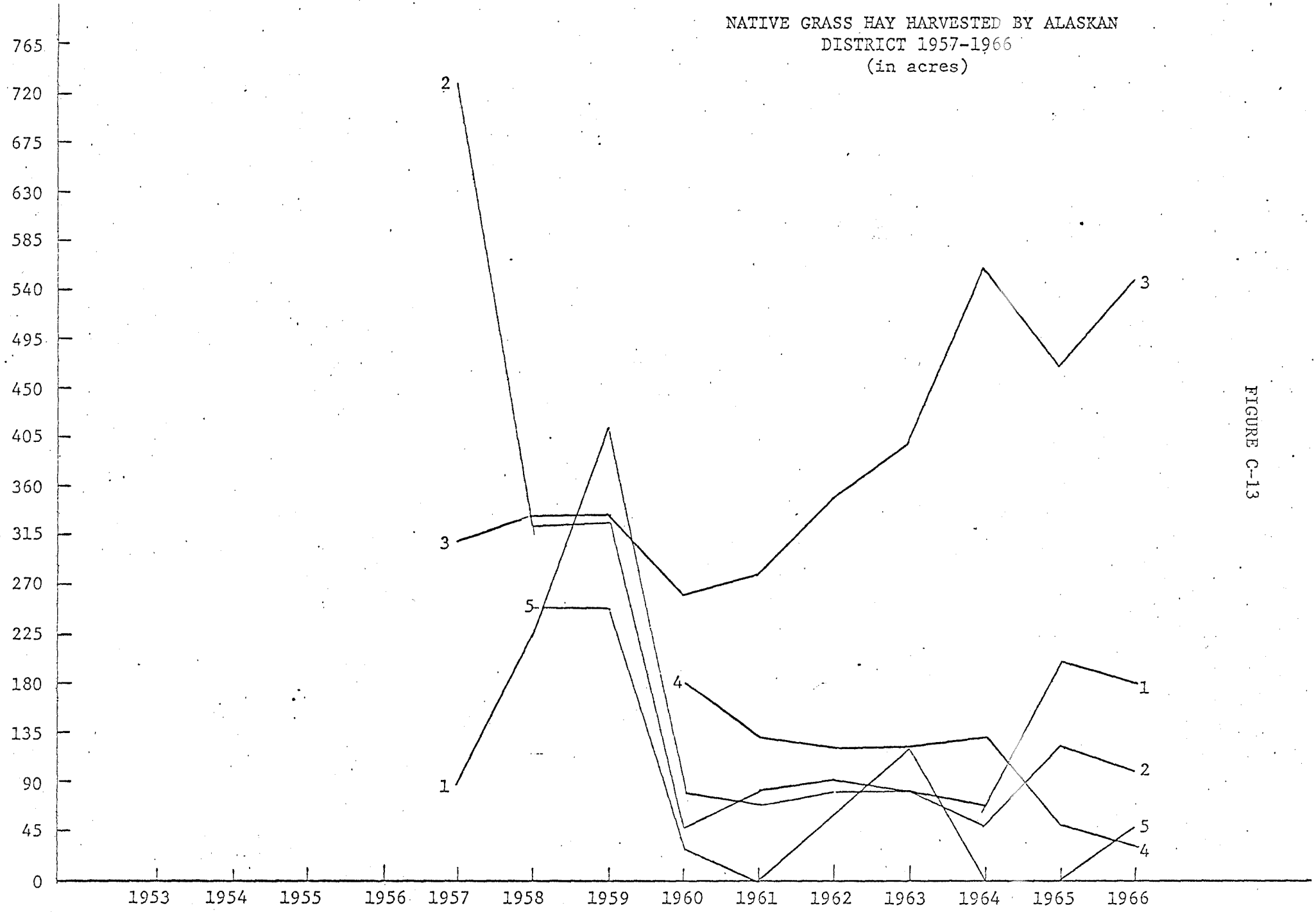

FIGURE C-13

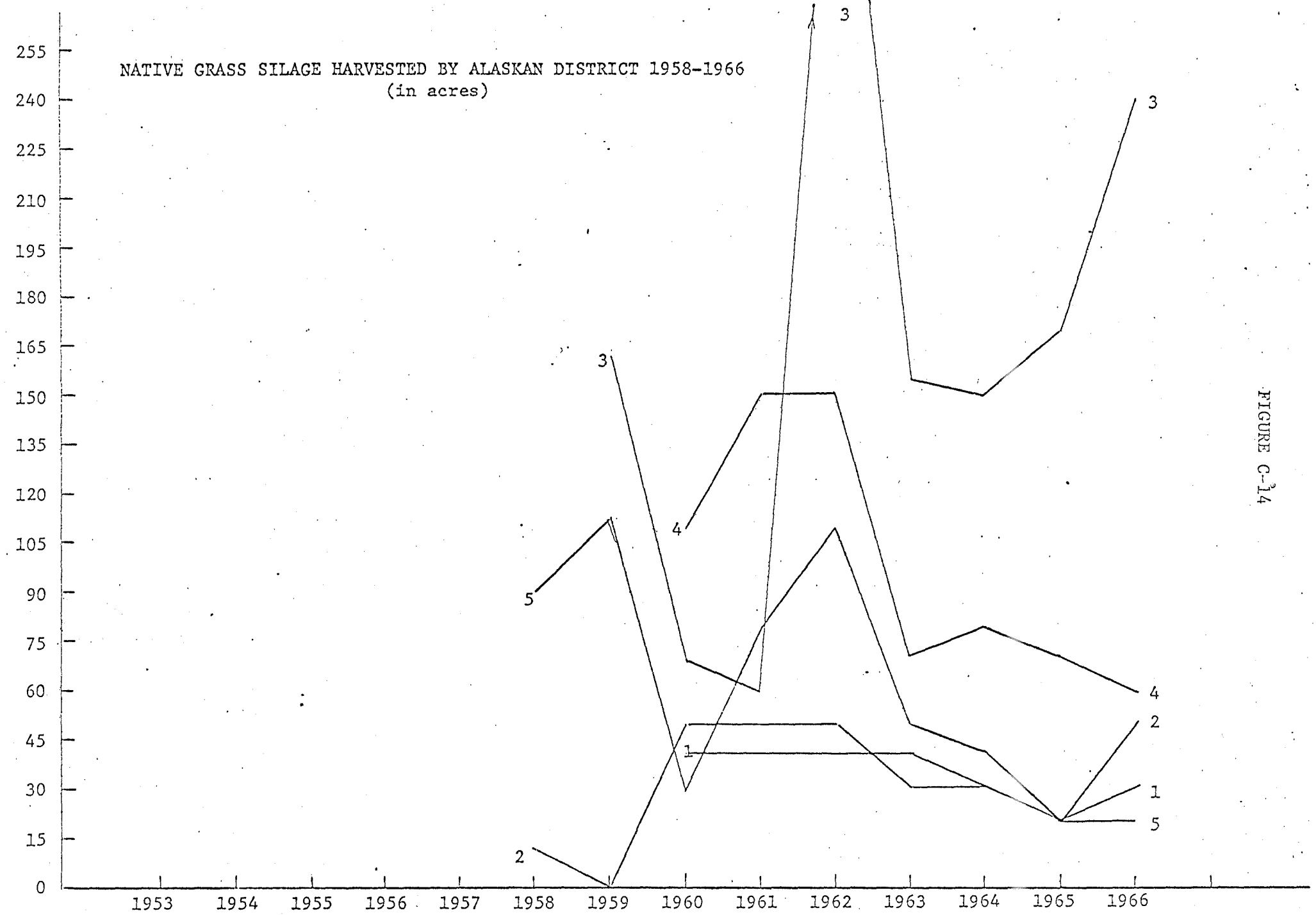
NATIVE GRASS SILAGE HARVESTED BY ALASKAN DISTRICT 1958-1966
(in acres)
255
240
225
210
195
180
165
150
135
120
105
90
75
60
45
30
15
0
1953
1954
1955
1956
1957
1958
1959
1960
1961
1962
1963
1964
1965
1966
3
3
3
4
5
4
2
1
1
5
2

FIGURE C-14

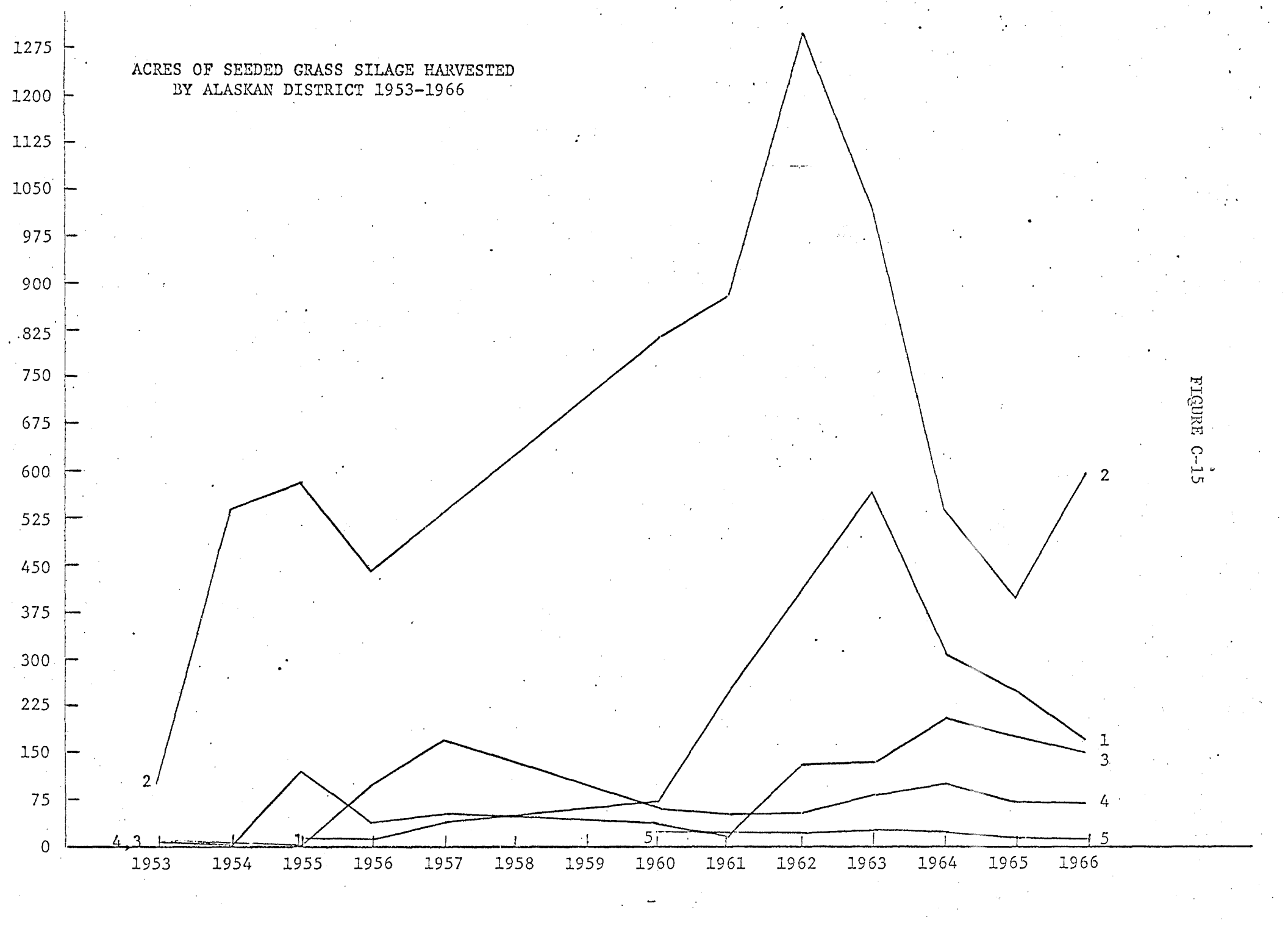
ACRES OF SEEDED GRASS SILAGE HARVESTED
BY ALASKAN DISTRICT 1953-1966
1275
1200
1125
1050
975
900
825
750
675
600
525
450
375
300
225
150
75
0
1953
1954
1955
1956
1957
1958
1959
1960
1961
1962
1963
1964
1965
1966
1
2
3
4
5

FIGURE C-15

SEEDED GRASS HAY HARVESTED BY ALASKAN DISTRICT 1953-1966
(in acres)

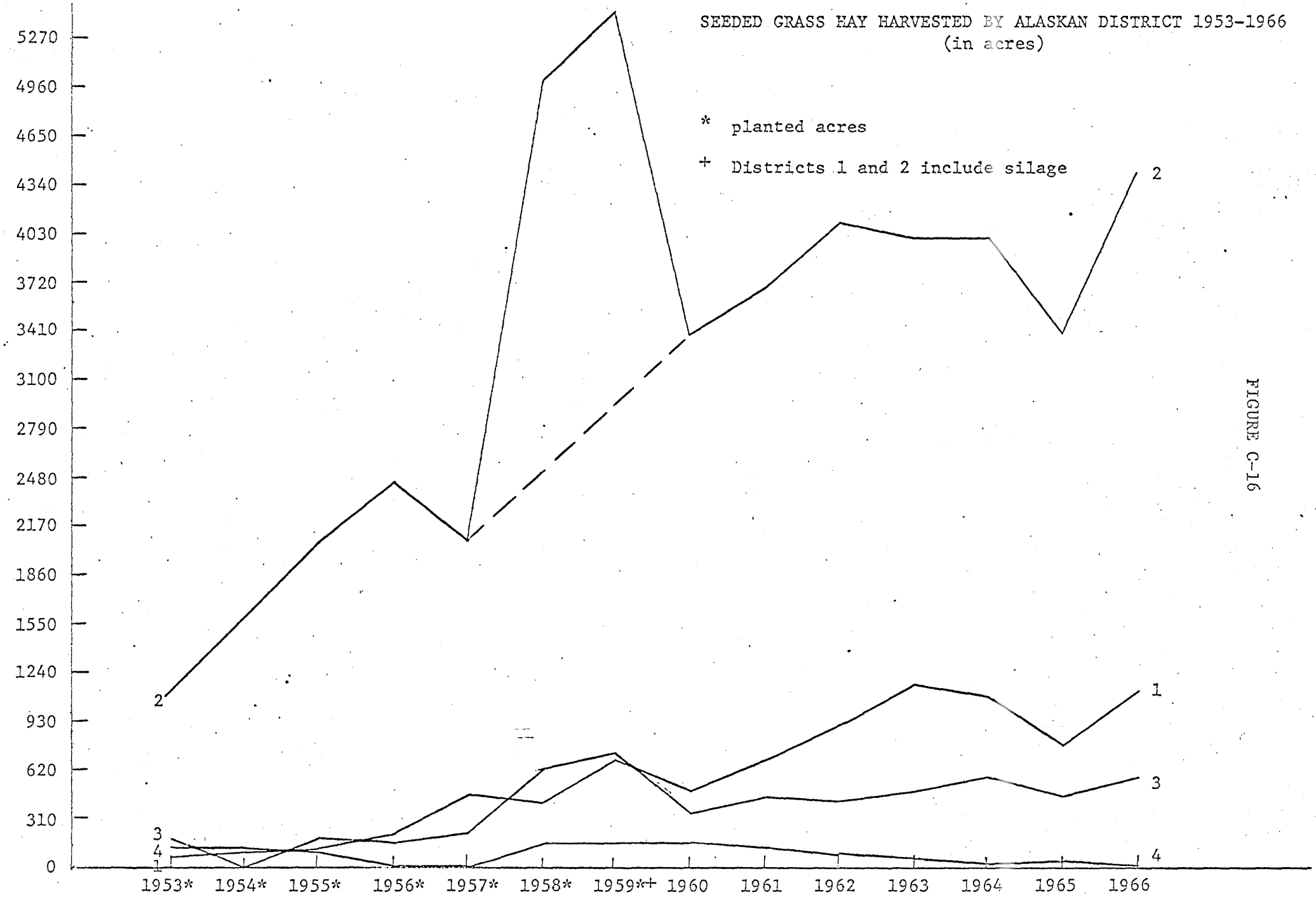

FIGURE C-16

GRASS HAY PRODUCTION BY ALASKAN DISTRICT 1953-1966
(in tons)

* no estimate made

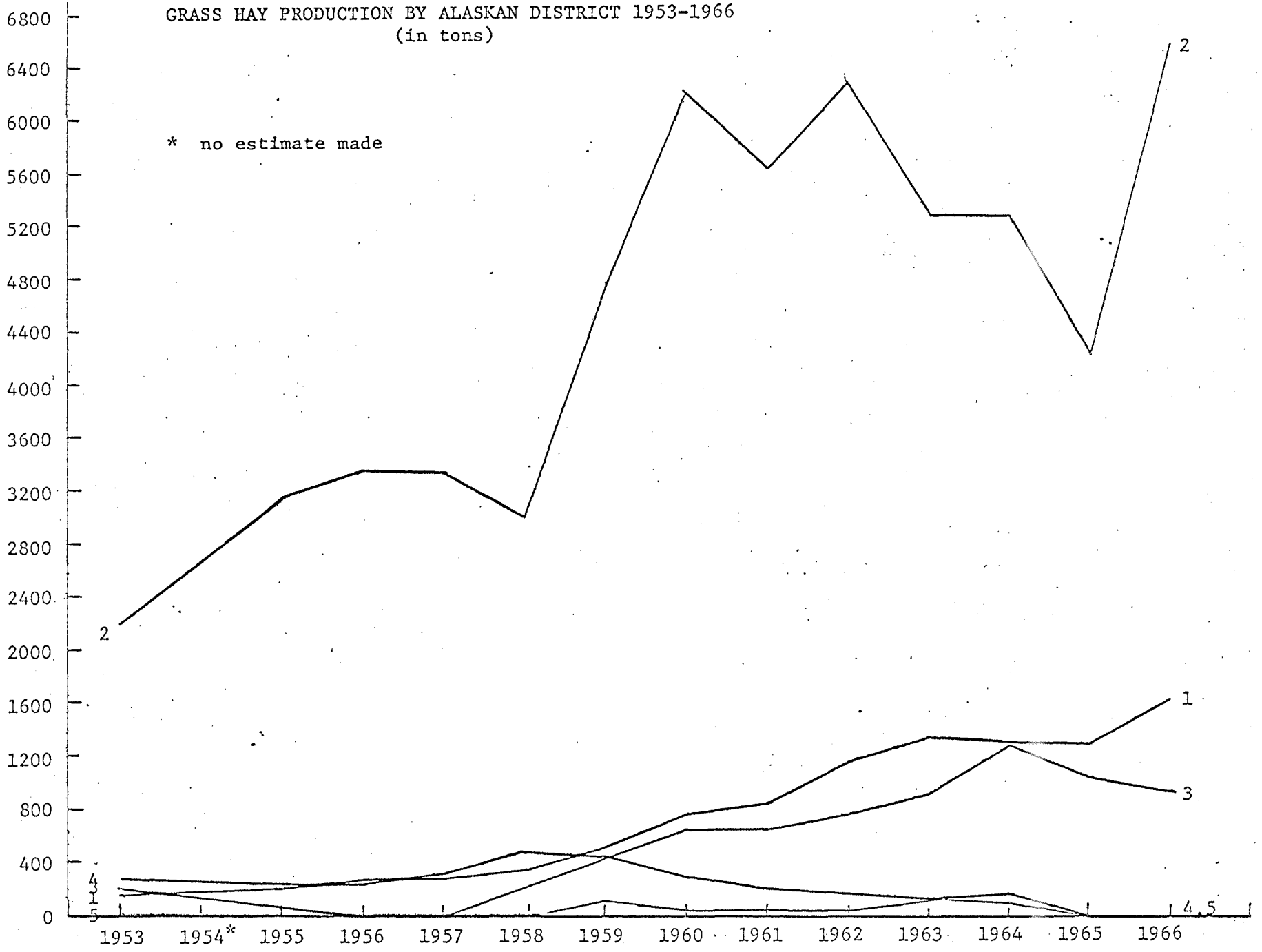

FIGURE C-17

GRASS SILAGE PRODUCTION BY ALASKAN DISTRICT 1953-1966
(in tons)

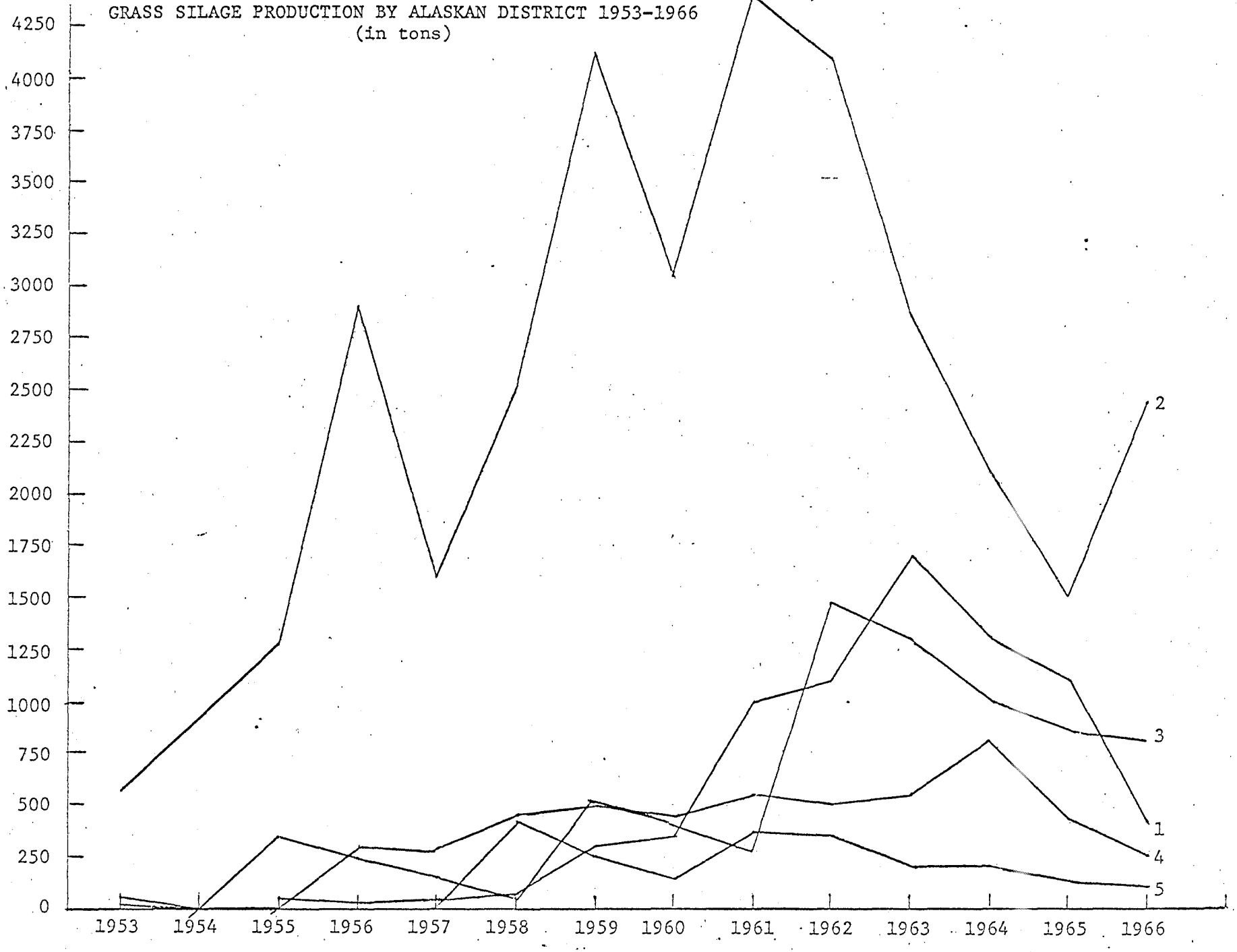

FIGURE C-18

POLLOCK PRODUCTION BY ALASKAN DISTRICT 1953-1966
(in hundreds of pounds)

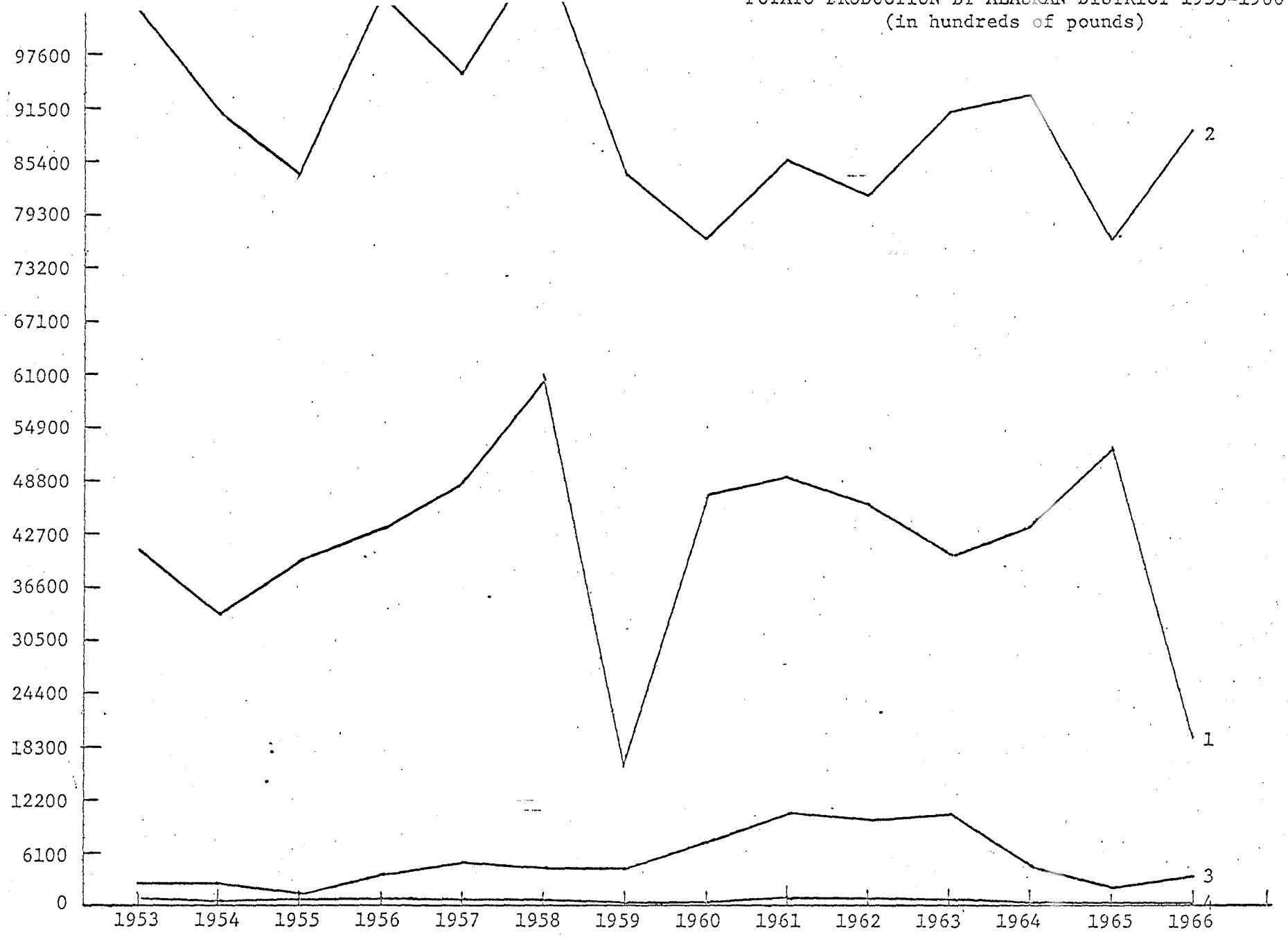

FIGURE C-19

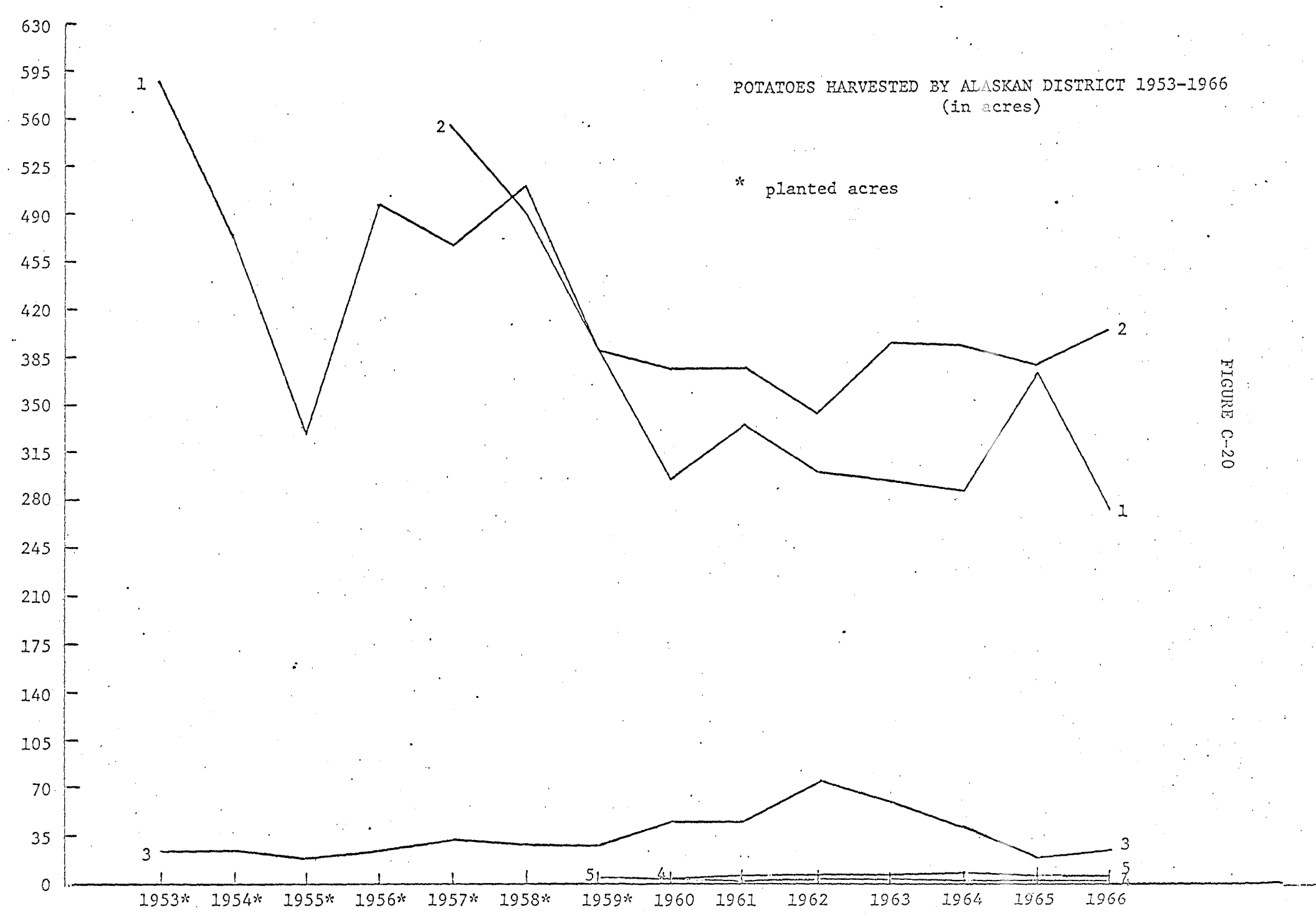
POTATOES HARVESTED BY ALASKAN DISTRICT 1953-1966
(in acres)
* planted acres
630
595
560
525
490
455
420
385
350
315
280
245
210
175
140
105
70
35
0
1
2
3
1953*
1954*
1955*
1956*
1957*
1958*
1959*
1960
1961
1962
1963
1964
1965
1966

FIGURE C-20

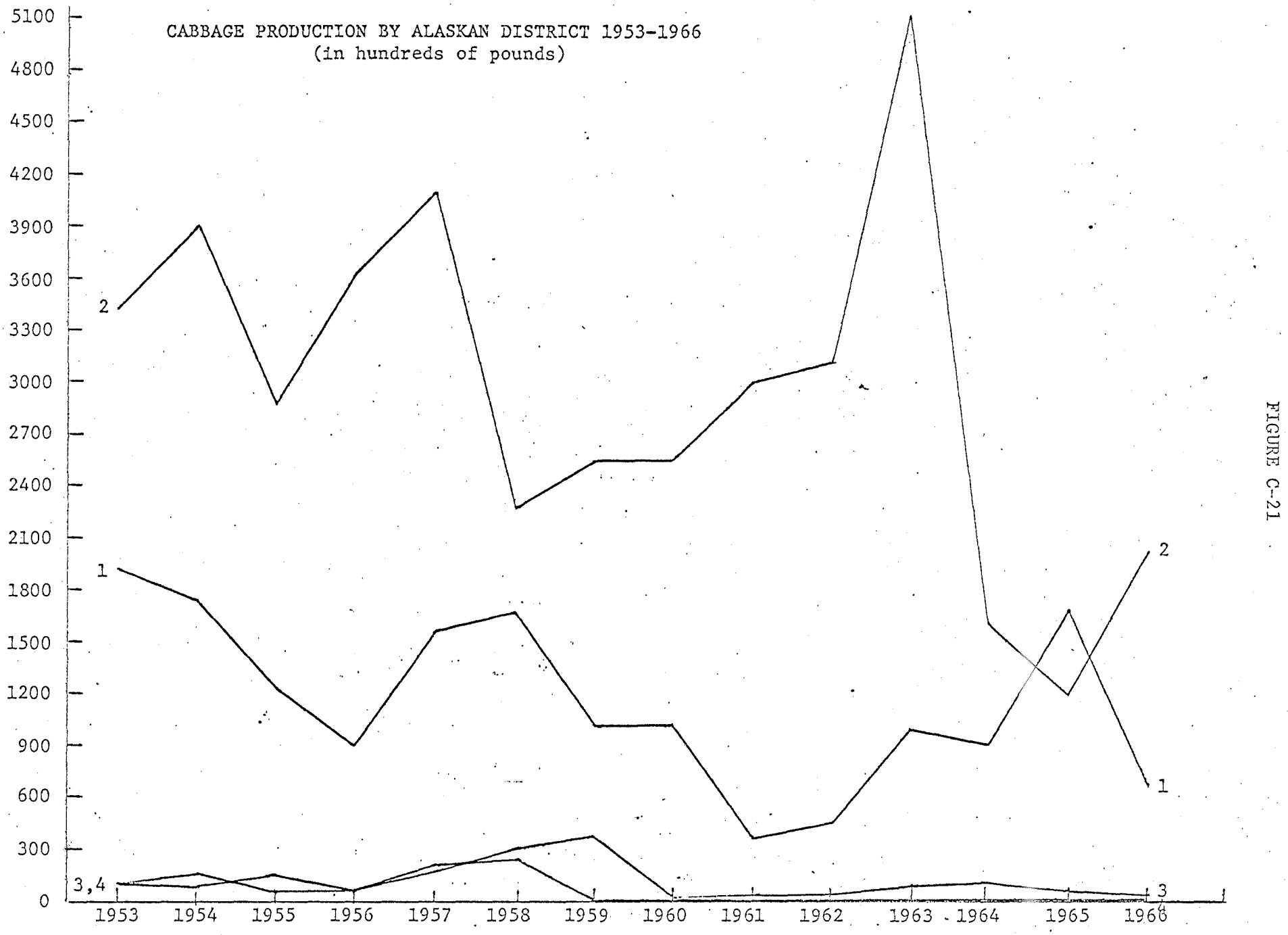
CABBAGE PRODUCTION BY ALASKAN DISTRICT 1953-1966
(in hundreds of pounds)
5100
4800
4500
4200
3900
3600
3300
3000
2700
2400
2100
1800
1500
1200
900
600
300
0
1953
1954
1955
1956
1957
1958
1959
1960
1961
1962
1963
1964
1965
1966
1
2
3,4
2
1
3
4

FIGURE C-21

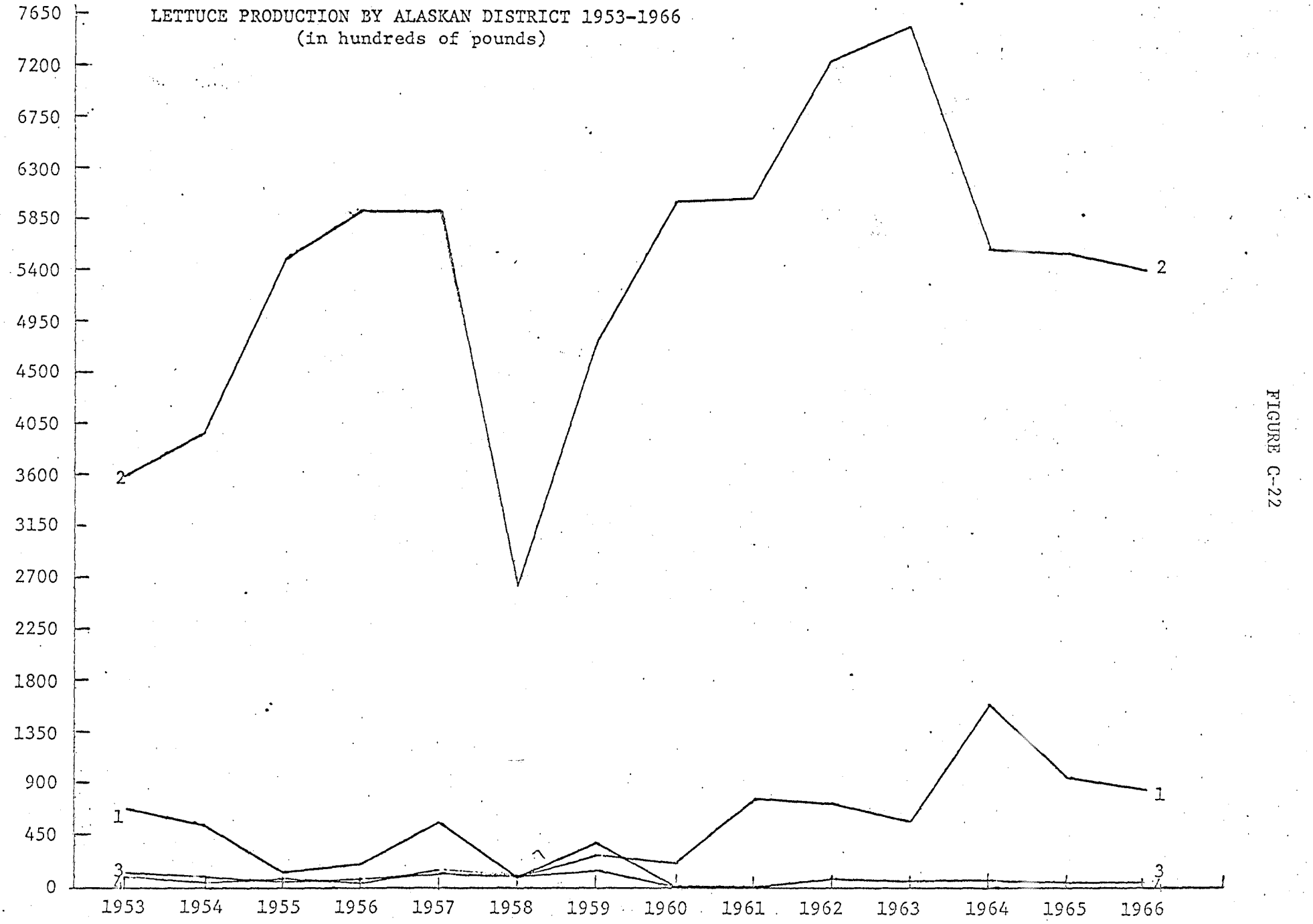
LETTUCE PRODUCTION BY ALASKAN DISTRICT 1953-1966
(in hundreds of pounds)
7650
7200
6750
6300
5850
5400
4950
4500
4050
3600
3150
2700
2250
1800
1350
900
450
0
1953
1954
1955
1956
1957
1958
1959
1960
1961
1962
1963
1964
1965
1966
1
2
3

FIGURE C-22

CARROT PRODUCTION BY ALASKAN DISTRICT 1953-1966
(in hundreds of pounds)

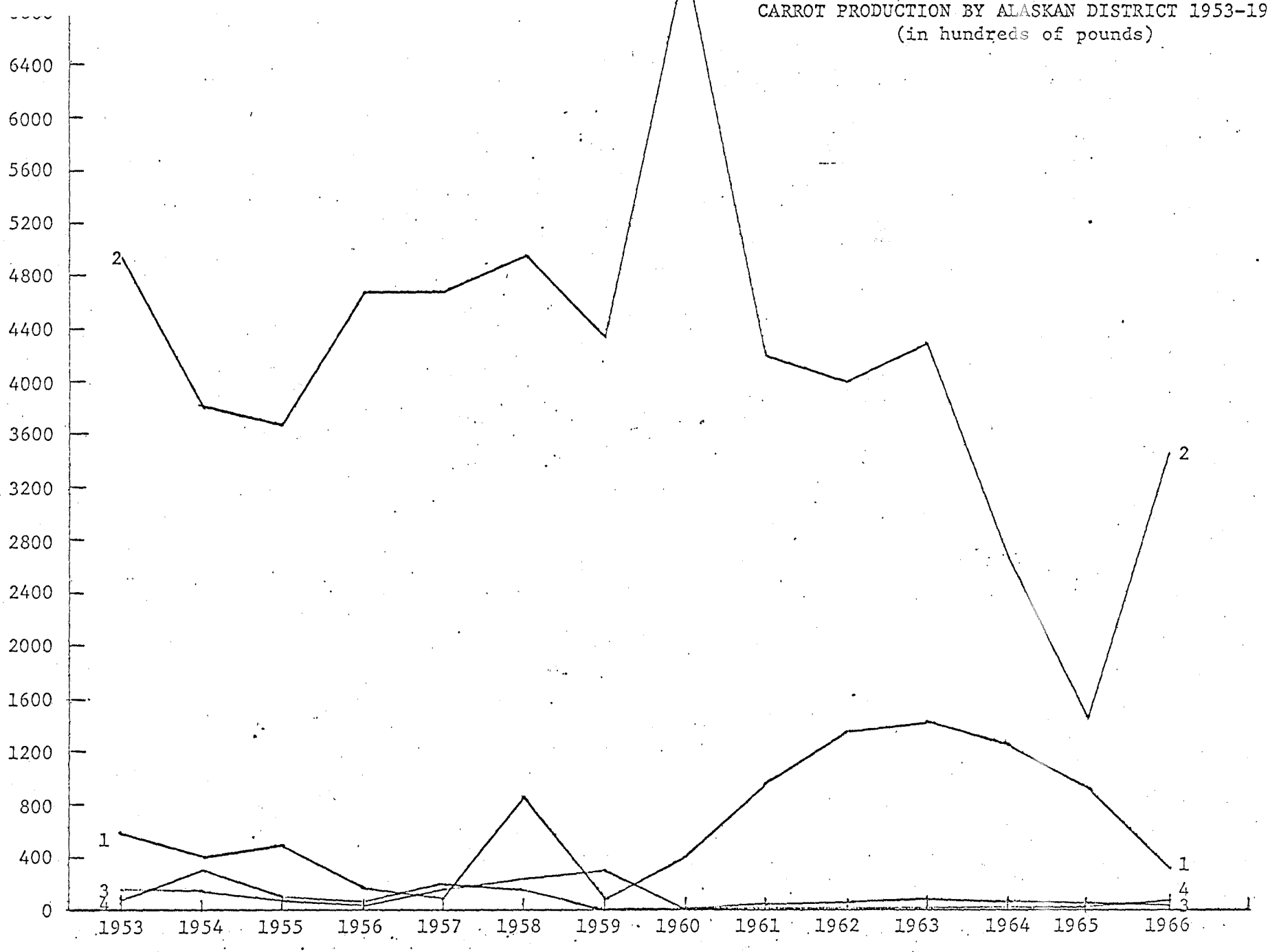

FIGURE C-23

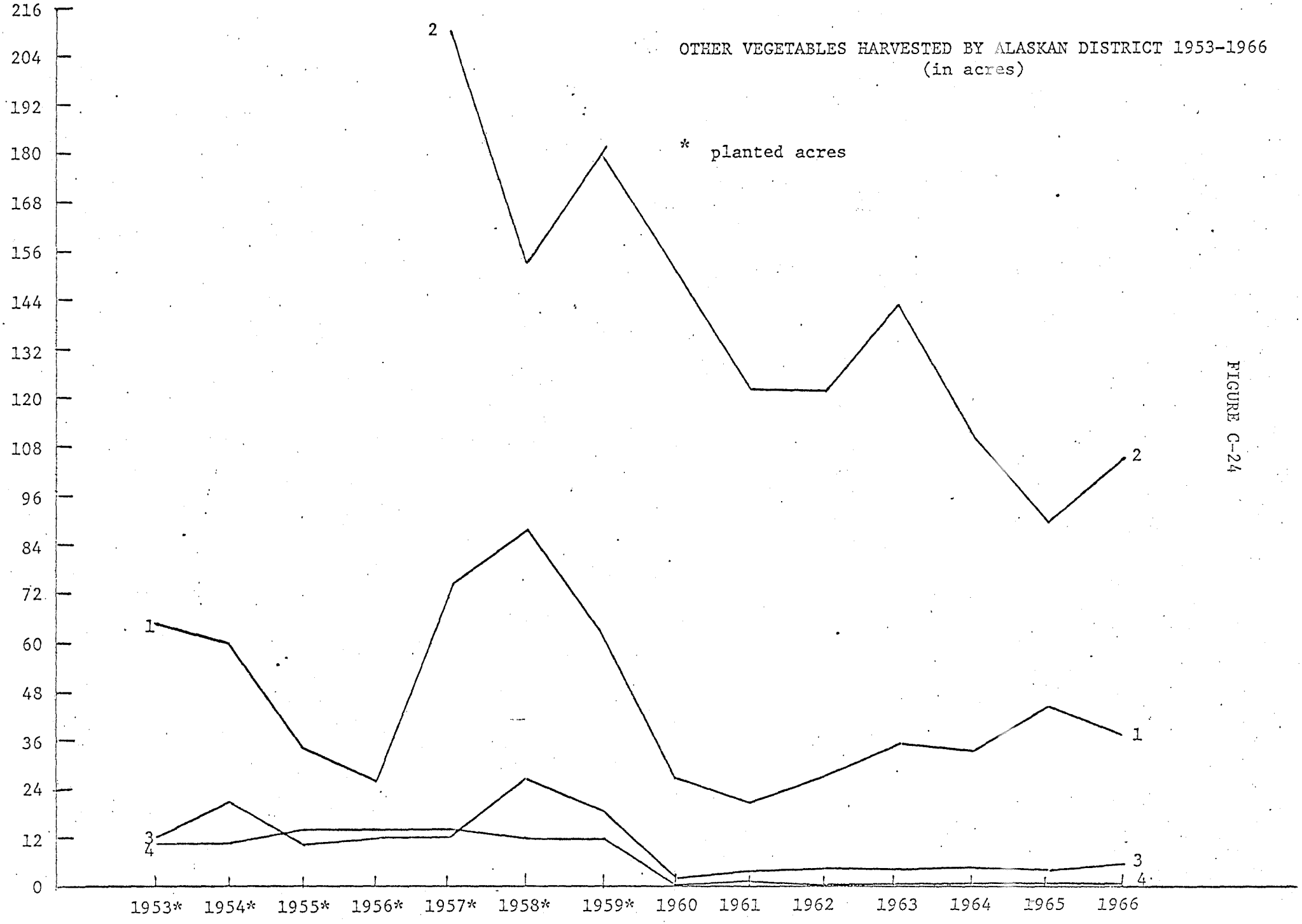
OTHER VEGETABLES HARVESTED BY ALASKAN DISTRICT 1953-1966
(in acres)
* planted acres
216
204
192
180
168
156
144
132
120
108
96
84
72
60
48
36
24
12
0
1953*
1954*
1955*
1956*
1957*
1958*
1959*
1960
1961
1962
1963
1964
1965
1966
1
2
3
4

FIGURE C-24

OTHER VEGETABLE PRODUCTION BY ALASKAN DISTRICT 1953-1966
(in hundreds of pounds)

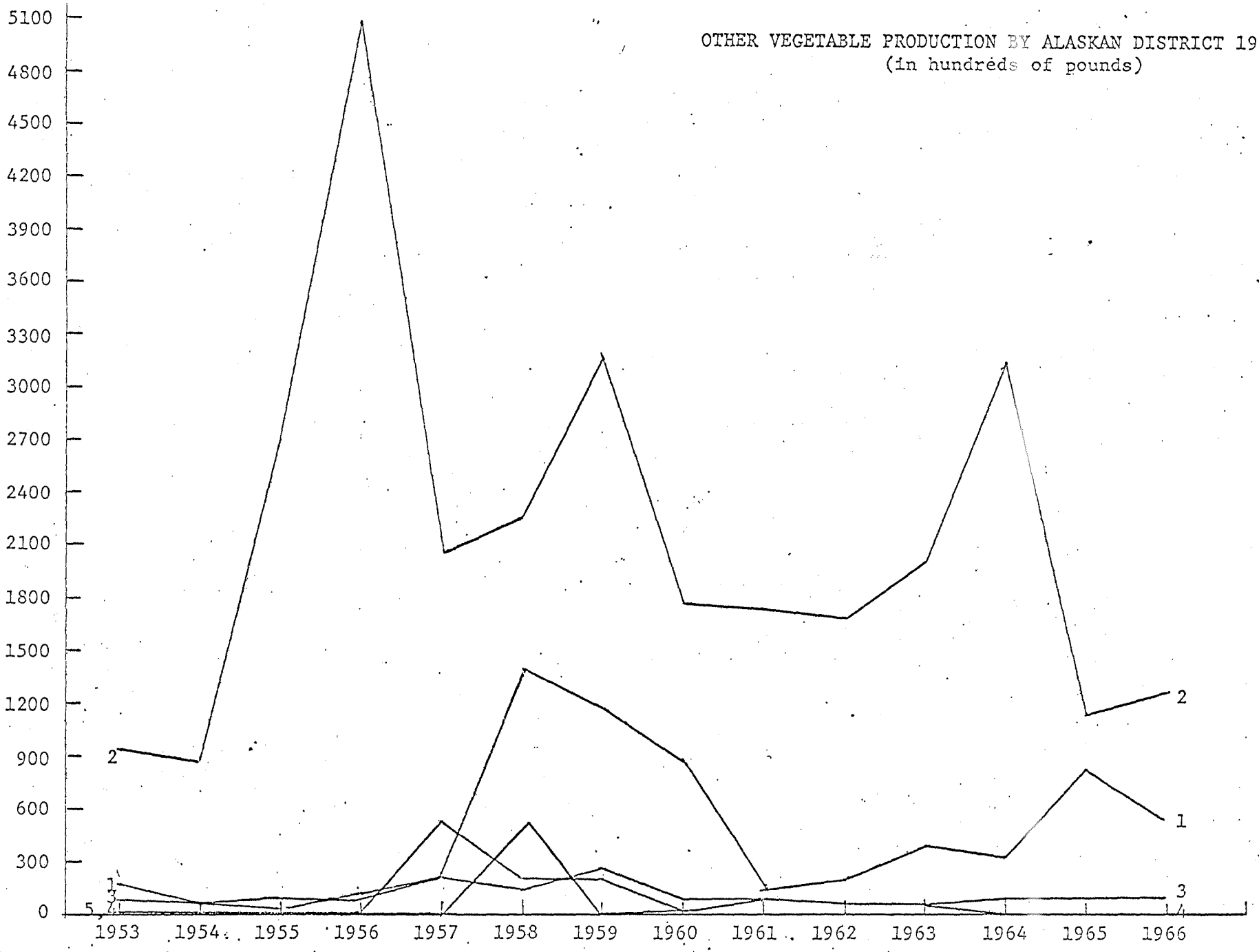

FIGURE C-25

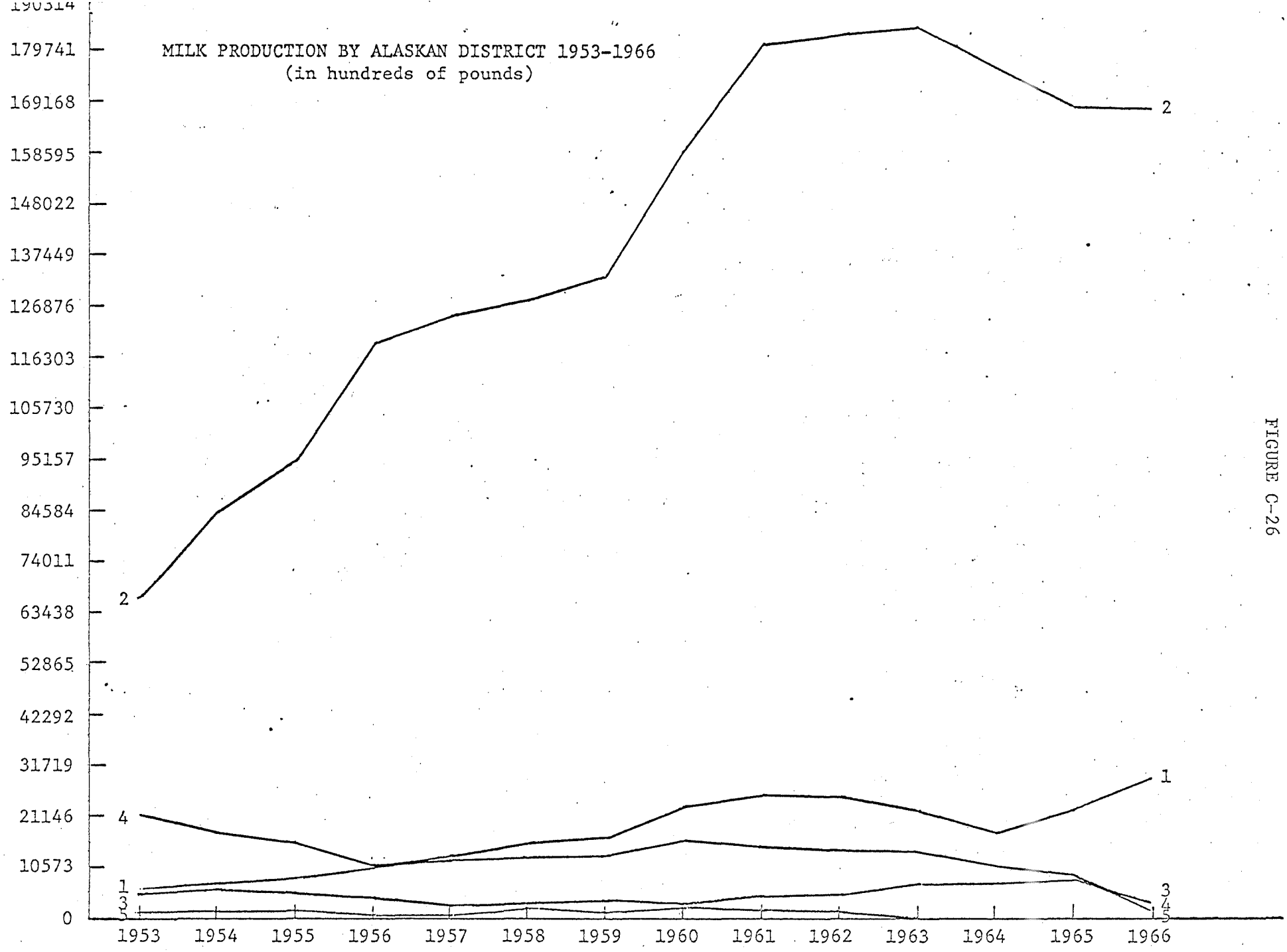
MILK PRODUCTION BY ALASKAN DISTRICT 1953-1966
(in hundreds of pounds)
190314
179741
169168
158595
148022
137449
126876
116303
105730
95157
84584
74011
63438
52865
42292
31719
21146
10573
0
1953
1954
1955
1956
1957
1958
1959
1960
1961
1962
1963
1964
1965
1966
1
2
3
4
5

FIGURE C-26

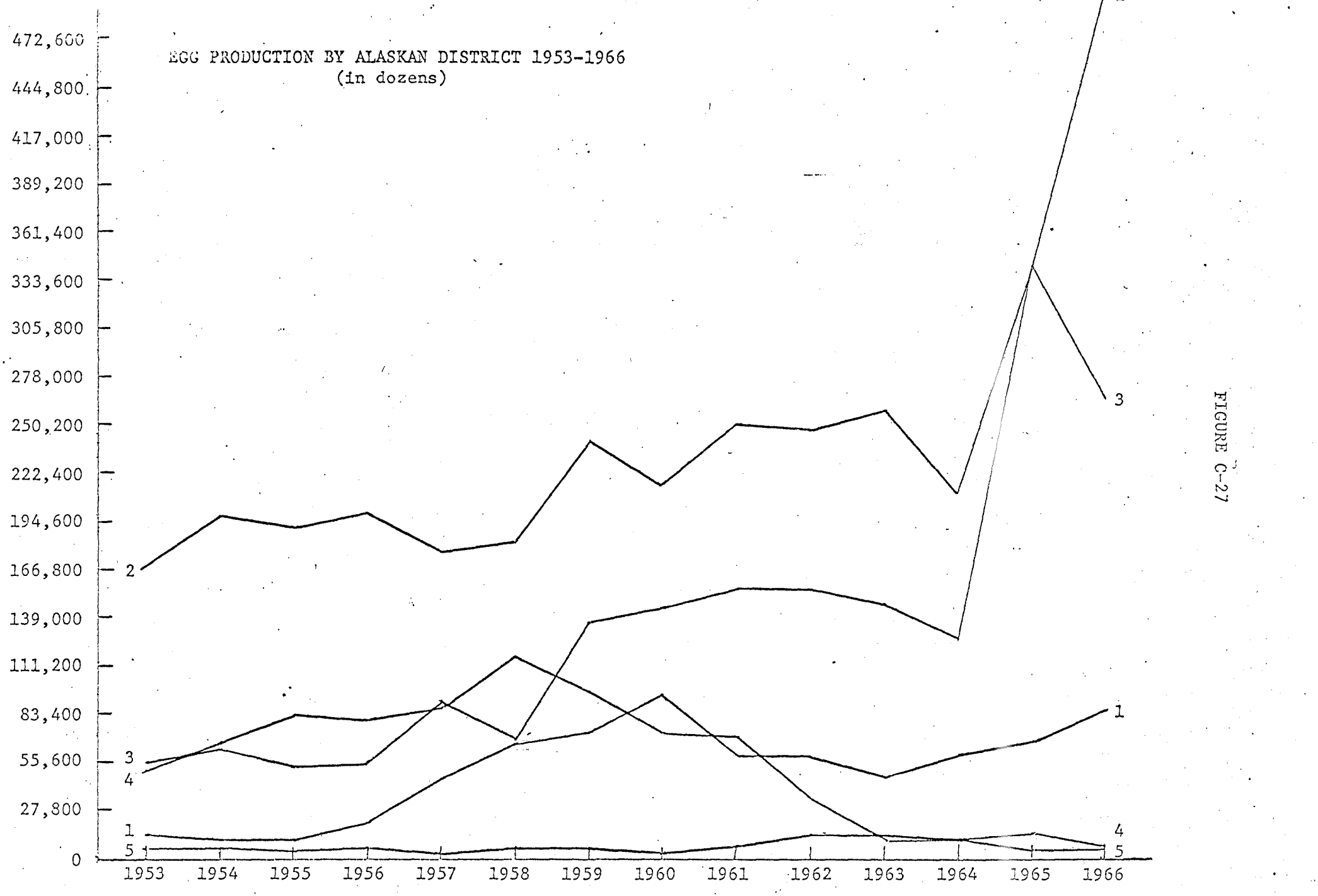
EGG PRODUCTION BY ALASKAN DISTRICT 1953-1966
(in dozens)
472,600
444,800
417,000
389,200
361,400
333,600
305,800
278,000
250,200
222,400
194,600
166,800
139,000
111,200
83,400
55,600
27,800
0
1953
1954
1955
1956
1957
1958
1959
1960
1961
1962
1963
1964
1965
1966
1
2
3
4
5

FIGURE C-27

POULTRY PRODUCTION BY ALASKAN DISTRICT 1953-1966
(in hundreds of pounds)

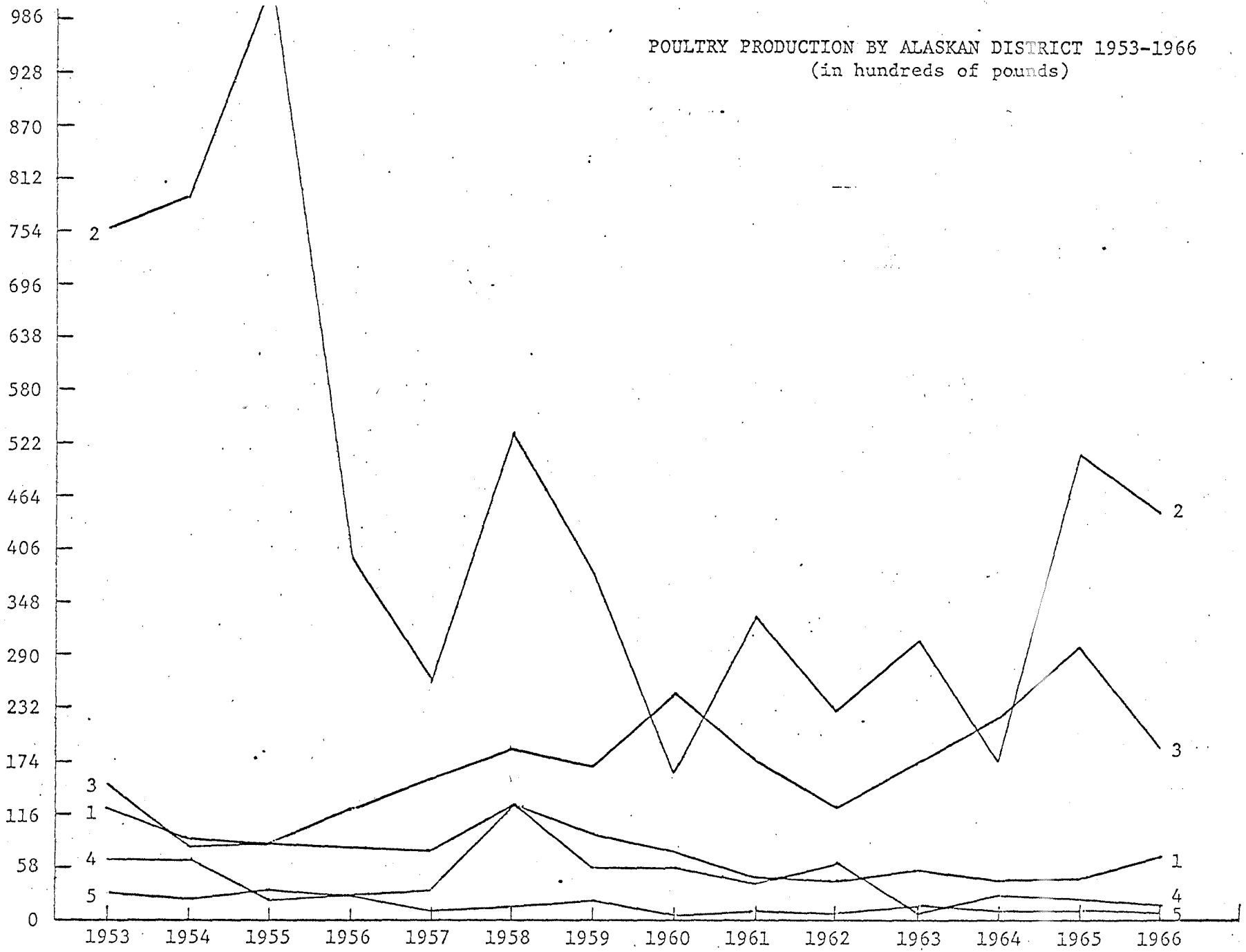

FIGURE C-28

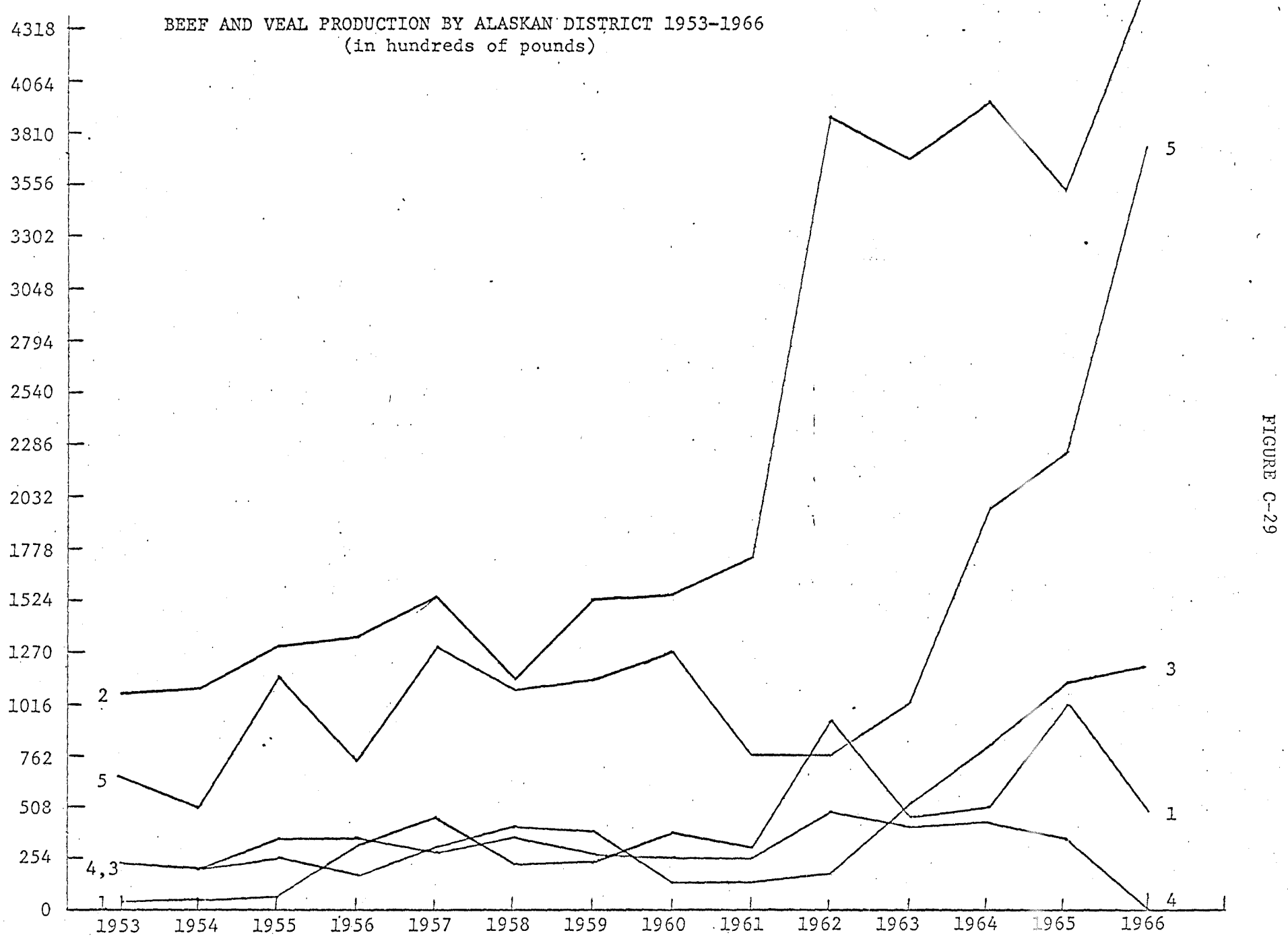
BEEF AND VEAL PRODUCTION BY ALASKAN DISTRICT 1953-1966
(in hundreds of pounds)
4318
4064
3810
3556
3302
3048
2794
2540
2286
2032
1778
1524
1270
1016
762
508
254
0
1953
1954
1955
1956
1957
1958
1959
1960
1961
1962
1963
1964
1965
1966
5
3
2
5
1
4,3
1
4

FIGURE C-29

PORK PRODUCTION
BY ALASKAN DISTRICT 1953-1966
(in hundreds of pounds)

FIGURE C-30

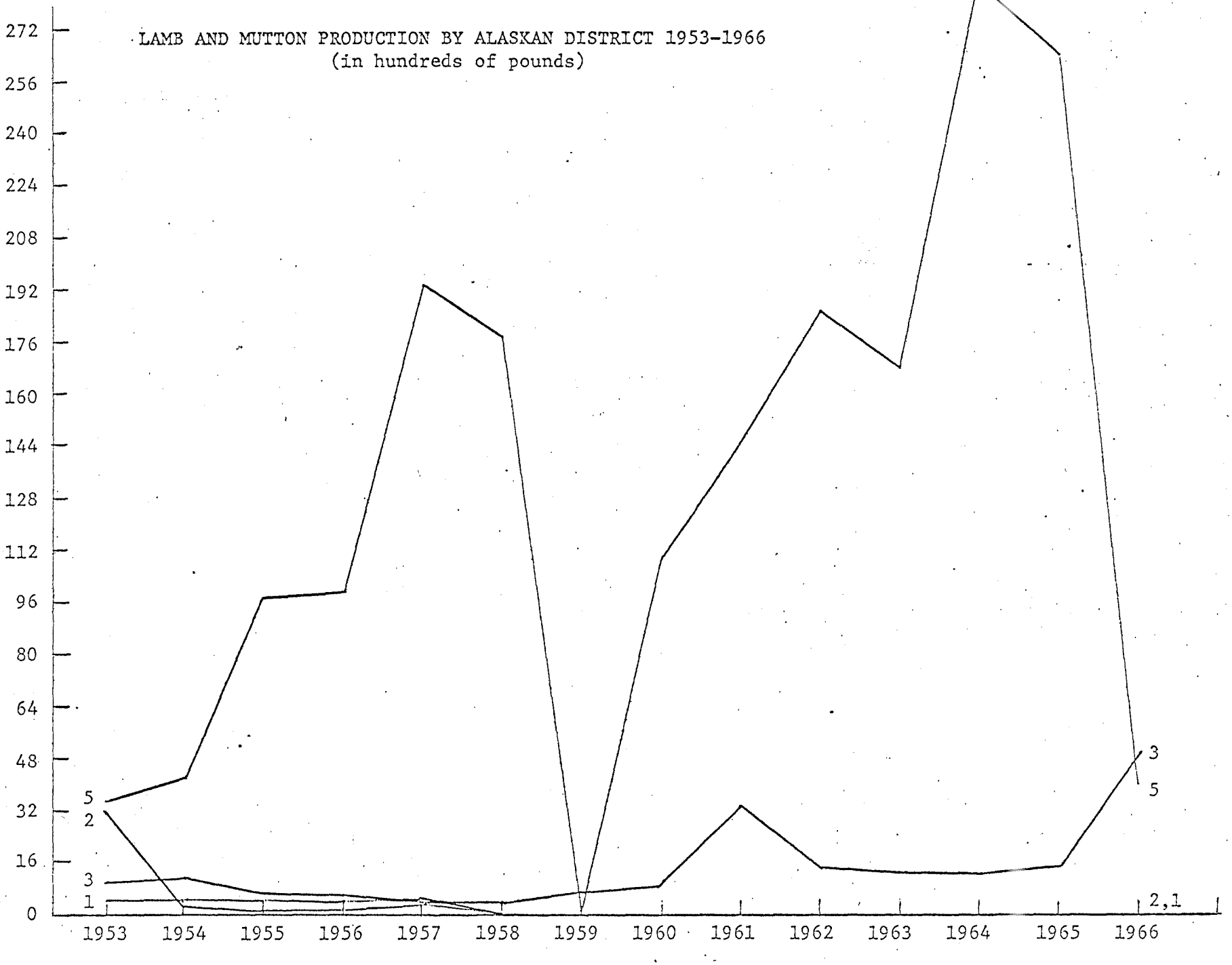
LAMB AND MUTTON PRODUCTION BY ALASKAN DISTRICT 1953-1966
(in hundreds of pounds)
272
256
240
224
208
192
176
160
144
128
112
96
80
64
48
32
16
0
1953
1954
1955
1956
1957
1958
1959
1960
1961
1962
1963
1964
1965
1966
5
2
3
1
3
5
2,1

FIGURE C-31

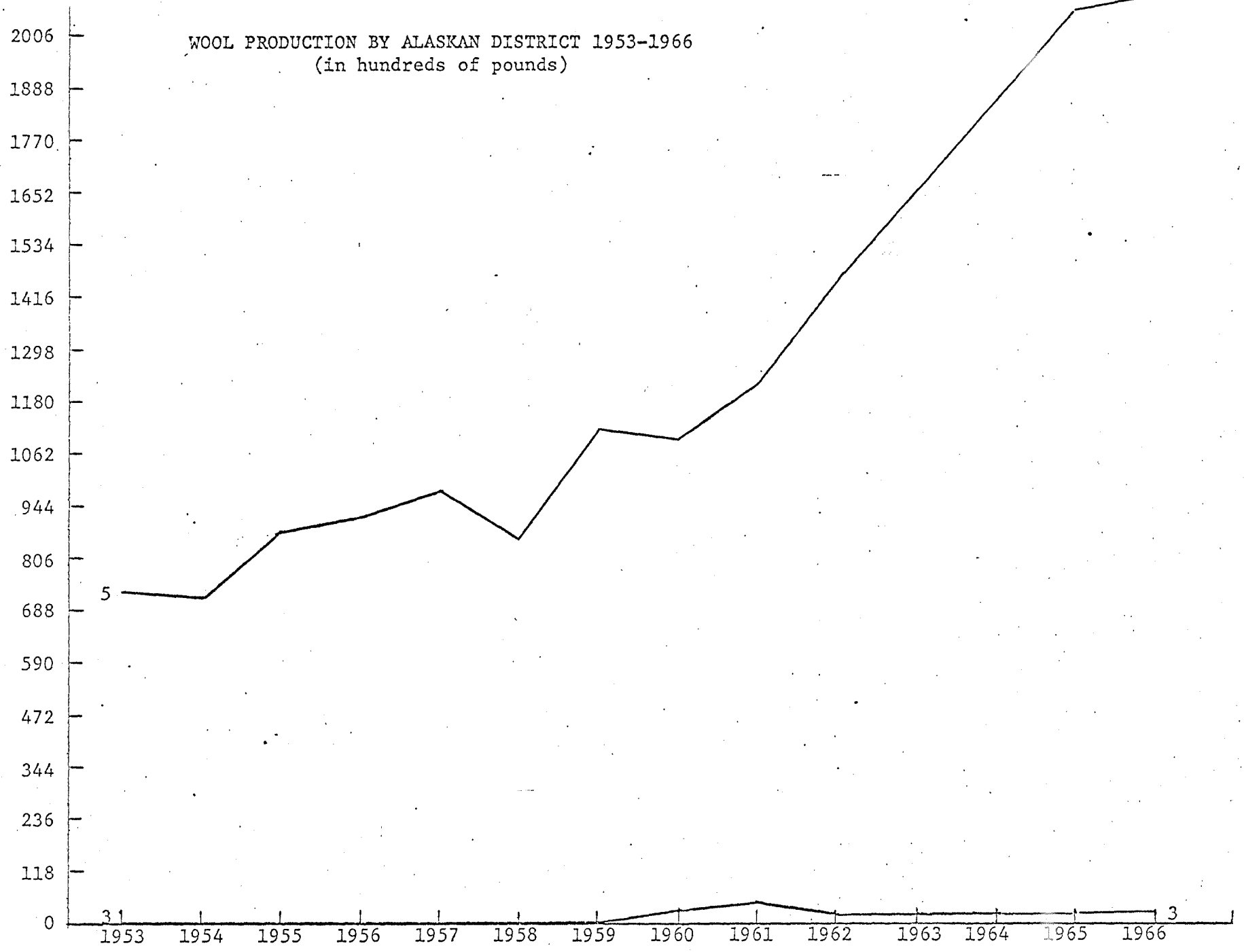
WOOL PRODUCTION BY ALASKAN DISTRICT 1953-1966
(in hundreds of pounds)
2006
1888
1770
1652
1534
1416
1298
1180
1062
944
806
688
590
472
344
236
118
0
5
3
1953
1954
1955
1956
1957
1958
1959
1960
1961
1962
1963
1964
1965
1966

FIGURE C-32

APPENDIX D

AVERAGE TOTAL COSTS PER ACRE FOR PRODUCING BROMEGRASS ON EIGHT DAIRY FARMS, MATANUSKA VALLEY

APPENDIX D

AVERAGE TOTAL COSTS PER ACRE FOR PRODUCING

BROMEGRASS ON EIGHT DAIRY FARMS, MATANUSKA VALLEY

Budget A — Cost of Establishing Stand

Item		Average
Bromegrass Acres Per Farm		106.3
Production Per Acre (tons)		-
Land & Materials		
Establishing stand (seed)		$ 5.97
Fertilizer		22.24
Spray		.38
Charge for land		12.55
	Sub-total:	$41.14
Raising Crop		
Plow		$ 3.23
Disk-Harrow		3.95
Cultipack-Drill-Fertilize		4.29
Spraying		.12
	Sub-total:	$11.59
Return to Capital Investment		3.06
Total Cost of Production		$55.79
Average Life of Stand (yrs.)		4.94
Average Cost Per Year		$11.30

Budget B — Green Chop

Item		Average
Bromegrass Acres Per Farm		106.3
Production Per Acre (tons)		10.88
Land & Materials		
Establishing stand		$10.38
Fertilizer		45.15
Fence		1.00
Spray		-
Charge for Land		12.70
	Sub-total:	$69.23
Raising Crop		
Fertilizing		$ 2.32
	Sub-total:	$ 2.32
Harvesting Crop		
Chopping		7.23
	Sub-total:	$ 7.23
Return to Capital Investment		4.17
Total Cost of Production		$82.95
Average Cost Per Ton		$ 7.63

Budget C — Permanent Pasture

Item		Average
Bromegrass Acres Per Farm		106.3
Production Per Acre		-
Land & Materials		
Establishing Stand		$11.50
Fertilizer		34.34
Fence		3.10
Spray		-
Charge for land		12.25
	Sub-total:	$61.19
Raising Crop		
Clip		$ 1.07
Fertilizing		1.80
	Sub-total:	$ 2.87
Return to Capital Investment		$ 2.91
Total Cost of Production		$66.97

Budget D — Hay & Silage

1. Hay

Item		Average
Bromegrass Acres Per Farm		106.3
Production Per Acre (tons)		3.255
Land & Materials		
Establishing Stand		$ 7.88
Fertilizer		25.23
Charge for land		8.37
	Sub-total:	$41.48
Raising Crop		
Fertilizing		$ 1.68
	Sub-total:	$ 1.68
Harvesting Costs		
Mowing-Conditioning		$ 3.65
Rake		1.84
Bale		15.90
Hauling		8.33
	Sub-total:	$29.72
Return to Capital Investment		$ 4.19
Total Cost of Production		$77.07
Average Cost Per Ton		$34.17

Budget D — Hay & Silage

2. Silage

Item		Average
Bromegrass Per Farm		106.3
Production Per Acre (tons)		3.67
Land & Materials		
Establishing Stand		$ 8.25
Fertilizer		25.54
Charge for Land		8.94
	Sub-total:	$42.73
Raising Crop		
Fertilizing		$ 1.58
	Sub-total:	$ 1.58
Harvesting Costs		
Mow & Chop		$ 5.92
Hay Bind or Windrow		2.04
Hauling		6.70
	Sub-total:	$14.66
Return to Capital Investment		$ 4.10
Total Cost of Production		$63.07
Average Cost Per Ton		$17.18

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ALASKA AGRICULTURE STUDY

Economic Evaluation of the Potential for Agricultural Development in Alaska

by
Robert C. Haring et al

Prepared under Cooperative Agreement
between
University of Alaska
and
United States Department of Agriculture

(Contract No. 12-17-05-2-373)

Institute of Social, Economic and Government Research
University of Alaska
College, Alaska 99701

November 1967

Copy No._____

FOREWORD

Agriculture occupies a relatively minor position in the Alaskan economy today. Its total value of production, slightly over $5 million, is small compared to that of other industries of the state: fisheries - $170 million, mineral production - $80 million, forest products - $70 million. The extent of agricultural employment and value of sales compares more directly with trapping and furs, $5 million, and coal production, $6 million. Local producers consistently account for less than 8 per cent of the consumption in food products grown and processed. Influencing this average, of course, are the many products not grown in Alaska at all, while others, such as milk and fresh potatoes, account for 40 to 50 per cent of the state's annual consumption.

In view of this agricultural experience in Alaska, it is appropriate to inquire what potential, if any, this sector has in the future economy of the state. If there is no potential, future investment in Alaskan agriculture becomes of questionable value, particularly in view of the many alternative investment opportunities. On the other hand, if there are opportunities for developing and expanding agriculture, these need to be defined, so that policy, investments, research and other efforts can be channeled into areas, products and activities that promise appropriate payoffs.

It is to these issues that this report is directed. And it is hoped that it will contribute, even if only as a point of departure, toward a more effective approach to agriculture in Alaska.

* * *

The report was prepared over a period of less than six months under a cooperative agreement between the University of Alaska and the U. S. Department of Agriculture. While the Institute of Social, Economic and Government Research has held the key coordinating and directing function, this report is truly the result of a cooperative effort. On the federal side, maximum support was provided by practically every branch of the United States Department of Agriculture actively concerned with agriculture in Alaska; John O. Gerald of the Economic Research Service acted as project leader for U.S.D.A. The Federal Field Committee for Development Planning in Alaska coordinated participation of the many federal agencies that were concerned with the study. State of Alaska participation was primarily through the Department of Economic Development (Commissioner Frank Murkowski and Deputy Commissioner Everett Buness) and the Department of Natural Resources, Division of Agriculture (Sigmund Restad, Director). Study liaison with the Governor's Office was maintained through Everett Buness. Key support for the project was provided by the Alaska Agricultural Experiment Station with the aid of Alan H. Mick and Horace F. Drury, its former and present director, respectively.

Professor Robert C. Haring, of this Institute, exercised primary responsibility for organizing and directing the study and for preparing the report. Key contributions were made by Professors Charles Marsh and Wayne Burton of the Alaska Agricultural Experiment Station; Dr. Leigh Hammond, consultant to U.S.D.A. for this project; Mr. H. P. Gazaway Bureau of Indian Affairs; Mr. Mervin Freeman of the University's Cooperative Extension Service. The following research assistants from the Institute of Social, Economic and Government Research contributed their

ERRATA

for

Alaska Agriculture Study Economic Evaluation for Agricultural Development in Alaska

(Contract No. 12-17-05-2-373)

by

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Institute of Social, Economic and Government Research
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The bar under a line number indicates the number of lines from the bottom of the page.

Page	Line No.	
1	3	Its broad objectives are listed as follows.....
2	2	interviews were conducted for the purpose of.....
2	3	Discussions were held with farm.....
3	8	Commercial farmers and a significant degree of.....
3	6	policies have often been restrictive or unclear.
4	3	funds, because of several limiting factors:
4	9	the nucleus for an expansion of the agricultural sector.
5	2	forecasts reveal that the present.....
5	7	agricultural products to other U.S. regions are unlikely.....
7	11	commodity rates, services and "exemption" status.....
11	6	authorized the "Commissioner of Natural Resources to.....
11	8	or drained or both at state expense."[5]
15	12	are no Class I soils in Alaska.....
16	4	These lands are remote from intra-state markets and generally require improvements.....
21	6	the magnitude of sales, the successful.....
21	4	Intra-State Markets

Page	Line No.	
22	2	representative food items. To a considerable extent,
22	9	agencies for Alaska have been over-optimistic.....
23	Table 3	remove parentheses in district designations.
26	6	However, the pricing practices among Alaskan producers have occasionally
27	9	Seed potatoes, certain grass seeds.....
27	6	For a current discussion of livestock capability, see Bureau of Reclamation,.....
29	7	even though purchase prices of locally produced commodities occasionally
30	1	stores. The retailer must turn.....
33	12	probably will decline since a rather sizable farm unit.....
36	1	Source: Table 7 and Alaska Agricultural Experiment Station.
37	Table 9	Source: as in Tables 7 and 8.
40	10	still provides only an insufficiently small market.
44	para 2	delete 3 lines representing item (c) and replace with (c) lack of a credit and cash economy in these areas, as opposed to prevailing quasi-barter business arrangements.
45	2	competition, but instead with a net loss.....
46	6	most freight costs between Anchorage and Fairbanks and among smaller outlying.....
46	5	placed local dairies in the position of having to control
47	10	first approximation estimates of what "could exist" were taken from studies
52	5	A major factor of production.....
52	11	The major arguments supporting more liberal credit are listed as follows:
52	2	A. D. Saunders, "Financing Alaska's Farms," (Palmer:
55	9	effective competitors. By implication, this type.....
56	6	outlook.....obtained, in large
56	7	part, by.....
57	14	In Dairying
58	10	containing.....each are being shipped.....
58	8	In Eggs and Stewers
66	4	about 3 percent.....1965.
66	7	system well beyond.....development.

Page	Line	
66	15	Table 25. Since.....Tables 25 and 26 is
68	6	In Vegetables
69	9	apparent. For summary.....are listed as follows.....
77	7	changes in.....appropriate as well.[3]
77	Footnote	[3]Cf. Morris Chertkov, Federal Regulations of Transportation in Alaska, (Anchorage: Federal Field Committee for Development Planning in Alaska, August, 1967), ch. 1-3
78	5	The approval.....should be predicated upon.....
80	5	They are listed as follows-
81	8	logical organization.....the "gap" between
83-96		Add page numbers in sequence to Appendix A
97-111		Add page numbers in sequence to Appendix B
112-144		Add page numbers in sequence to Appendix C
145-150		Add page numbers in sequence to Appendix D
151-156		Add page numbers in sequence to Bibliography