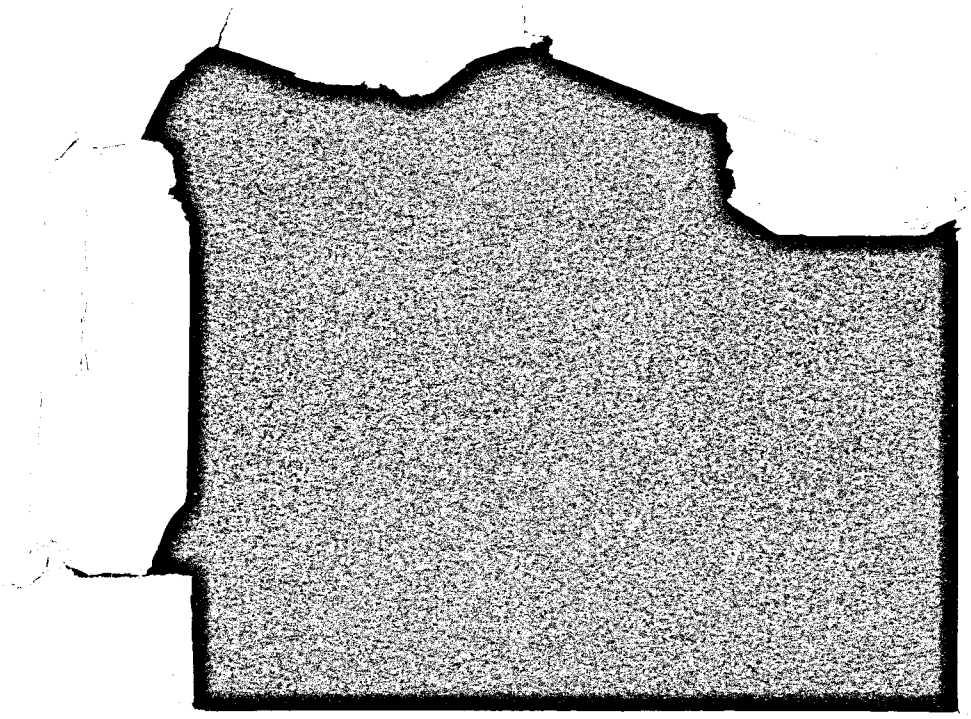
Economic Potential of The Proposed Kokee Project

Hawaii

DEPARTMENT OF ECONOMIC DEVELOPMENT
1124 MILLER STREET • HONOLULU 13, HAWAII



Economic Potential of
The Proposed Kokee Project

TABLE OF CONTENTS

I. GENESIS

The Hawaii Irrigation Authority [1] was created in 1953 by the 27th Territorial Legislature to study and investigate the feasibility of irrigation projects for small-scale farming and to construct and operate those which meet the necessary requirements.

Studies to determine the feasibility of a Kokee Irrigation Project, utilizing the flows of the Kawaikoi and Waiakoali streams for irrigating Kekaha lands owned by or under control of the Hawaiian Homes Commission and the Territory, were authorized on March 5, 1954.

The 28th Legislature in 1955 passed Joint Resolution No. 11 urging and directing the Hawaii Irrigation Authority "to make studies and investigations of the Kawaikoi-Waiakoali area on the Island of Kauai for the purpose of ascertaining its water storage potential for purposes of irrigation, flood control, soil conservation and the generation of hydroelectric power." [2] It further urged and directed the Authority to

---

[1] Later the Hawaii Water Authority, now reorganized into the Land and Water Development Division, Department of Land and Natural Resources.

[2] Kokee Irrigation Project, Island of Kauai, Progress Report, Hawaii Irrigation Authority, 1957. Hereafter referred to as Kokee Irrigation Project.

seek all possible aid and assistance, both technical and financial, from the Federal government.

II. INTRODUCTION

In these critical times of political, economic and social upheavals throughout the world, the highly specialized economy of the State hangs in the balance of world events that may result in many difficulties for the Islands.

In order to make the Islands more nearly self-sufficient in the face of present world conditions and for possible future crises, Hawaii must continually find means of achieving better economic balance, including ways and means for making the Islands more nearly self-sustaining.

A tremendous need exists for the development of Hawaii's potential for growing its own food. In 1960, Hawaii imported more than 119 million pounds of food. Included in this figure were: 69.2 million pounds of fresh fruits and vegetables; 2.6 million pounds of frozen fruits and vegetables; 29.2 million pounds of meat; 9.3 million pounds of butter, cheese and oleo; and 8.9 million pounds of poultry.

Much of this food could be produced in Hawaii, if sufficient water could be made available to develop currently non-productive or low-productive lands.

Additionally, more than 60 million board feet of lumber was imported in 1960 to meet the needs of construction and other industries. More than 66,000 tons of feed and grain and more than 76,000 tons of fertilizer were imported in 1960. Production of even a part of these amounts locally would strengthen the economy of the State and would lessen its dependence upon other parts of the country.

Development of Hawaii's natural resources can do much to meet the ever changing situations. Additional land could be used intensively if supplied with adequate irrigation water, through which a much needed diversification in agricultural production could be achieved, thereby providing assistance to small farmers in the process. The important needs are the selection of feasible projects and the provision of engineering skills to develop the projects.

Vegetables and fruit are grown almost entirely for local consumption, and the amount produced falls far short of the State's needs. Development of additional water resources, directed toward increased local production of food crops, would tremendously improve Hawaii's economic position.

This is particularly true of Kauai, which imports more than 3 million pounds of fresh and frozen foods each year, and where vast areas of State lands could be utilized for diversified farming and grazing.

The proposed Kokee Irrigation Project's immediate service area would encompass approximately 18,800 acres of Hawaiian Home Lands and State lands in the Kekaha-Waimea area, but when the effects of the dam are considered in their broader aspects of flood control, soil conservation and possible hydroelectric power potentials, the total service area covers approximately 110,000 acres, or nearly one third the total area of Kauai! This area includes the whole western end of Kauai, from Waimea town up Makaweli Valley and Olokele Canyon to Mt. Waialeale, and west and north along the Wainiha Pali to the coast.

Historically, the Pacific was crossed as early as 1521 for trade between the Philippines and Mexico. This commerce continued for two centuries without once sighting the Hawaiian Islands. Because of this accident in history, Hawaii was the last important Pacific island area to be discovered (1778); yet, no other island area has developed a modern civilization on a par with the rest of the Western World. The story of this change is in the history of sandalwood, whales, sugar, pineapples, and tourists, accompanied by an ever increasing economic dependence upon the American Mainland. 3/ The change was also accompanied by a decline in the native

---

3/ A Report Recommending Continuing Comprehensive Study of the Water Resources of the Territory of Hawaii, 1951, by William E. Warne, Assistant Secretary of the Interior.

Polynesian population from 300,000 in 1778 to 12,108 in 1950, to approximately 10,000 in 1960, and by the influx of a complex mixture of races which has grown to a population now numbering 632,000.

Because of its close economic ties with the Mainland United States, the population and living standards of Hawaii are heavily dependent on the volume of Mainland dollars the economy can earn. To obtain construction materials, clothes, shoes, cars, industrial equipment, and other items necessary to the maintenance of present standards, Hawaii has four major income producing activities:

1. Defense establishment
2. Sugar
3. Pineapple
4. Tourism

Defense establishment. Defense expenditures in Hawaii rose from $147 million in 1950 to $337 million in 1960. Civilian employment in the defense establishments totaled 24,200 as of June, 1961. The payroll for civilian employees amounted to $119 million in 1960. Members of the armed forces in Hawaii are estimated at 53,000, and the military payroll totaled $147 million in 1960. In addition to these payrolls, the various services spent $107 million in 1960 for purchases and contracts in Hawaii.[4/]

[4/] Bank of Hawaii, Department of Business Research.

Sugar. Agriculture is Hawaii's leading source of non-government revenue and the foundation of her economic structure. Sugar is king of all agricultural products in Hawaii. From a beginning of 2.1 tons in 1835, production has reached over 1 million tons per year. The Hawaiian sugar industry today, represented by 27 separate plantation corporations, was granted a 1960 production quota of 1,052,000 short tons of sugar under provisions of the Sugar Act of 1948. Hawaii has some 224,617 acres of cane land under cultivation. This represents slightly less than 5.5 per cent of the total land area of the State. Approximately 14,000 persons are employed in the sugar industry on a year-round basis.[5/]

Pineapple. Pineapple comes second on the list of Hawaii's agricultural products. From its beginning in 1903 when 1,893 cases of pineapples were packed, the industry has grown by leaps and bounds. Total production of canned pineapples and juice in 1960 was 34,139,097 cases. In 1960, there were nine pineapple companies operating 13 plantations and nine canneries. There were approximately 73,900 acres of land in the State used for pineapple production, with 8,631 persons employed year-round in growing, harvesting and canning the crop, plus seasonal employment of another 15,886 persons.[6/]

[5/] Hawaii Sugar Planters' Association.

[6/] Pineapple Hawaii-Basic Facts, Pineapple Growers of Hawaii, 1961.

Tourism. From an annual level of $6 million in 1946, tourist expenditures rose to $24 million in 1950 and to $131 million in 1960. Tourism thus has recorded the most rapid postwar growth of any major activity of the State. During the "fifties," the average annual increase in visitor arrivals was 20.3 per cent.[7/]

Other agriculture. Cattle raising, beginning in 1793, has become significant and goes a long way in reducing dependence upon imported meat supplies. Although beef and veal production in Hawaii for 1960 was 24.7 million pounds (an increase of approximately 38 per cent in the past 10 years), Hawaii still produces only 55 per cent of the total amount consumed in the State.[8/] The competitive position of Hawaii's beef producers can be improved, but the primary need is for low cost, locally produced stock feed to replace imported feeds and to increase utilization of good grazing lands.

III. NEED FOR WATER RESOURCE DEVELOPMENT

Development of the State's water resources is the principal means in sight by which the needed increase in the production of goods and services in the State can be brought about. For years the economy of the Islands has been

---

7/ Hawaii Visitors Bureau.

8/ Statistics of Hawaiian Agriculture, 1960, Hawaii Cooperative Extension Service, University of Hawaii.

hampered by restricted water. Valiant efforts of individuals, large companies (particularly the sugar plantations), Counties and the State government have done much to meet the growing domestic water needs and the expanding industrial and agricultural requirements. Even with such effort, additional development is badly needed. [9/]

Mechanization in the principal agricultural industries has created a problem of limited job opportunities. Additional farms cannot be developed without additional water. With assured water supplies and with careful planning of crops to meet local consumption needs, present conditions of uncertain supply and quality of fresh produce could be greatly improved.

Many manufacturing processes suggested for Hawaii's expansion into the industrial field require tremendous amounts of water. Investigation of water resource development in the Islands should take into account potential water requirements for industrial expansion.

Additional electric power is a necessary item for future development. New military complexes on Kauai are presently using their own generators and generator vans at Kokee and Barking Sands to furnish approximately 1000 kw of instrumentation, utility and standby power. [10/]

[9/] William E. Warne, Op. Cit.

[10/] Kauai, PMR Space Jewel in the Pacific, Vought Range Systems.

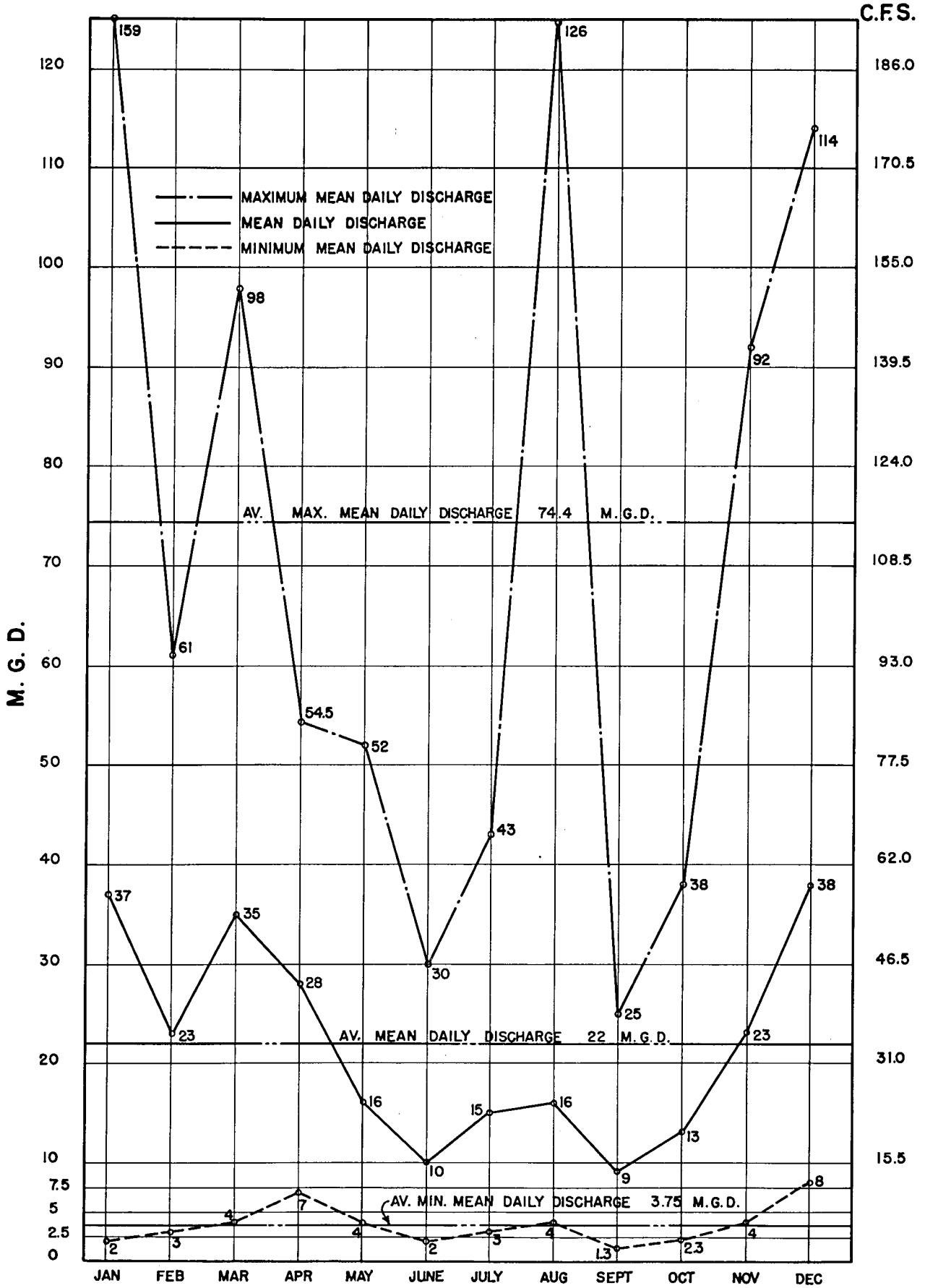
Land and usable water which are not now integrated into the economic machinery of the Islands are clearly the major unused natural resources. The interests of the people of the State require that these idle resources be put to work so that Hawaii's long-run economic situation can be furnished with the underpinnings of stability through greater self-sufficiency.

IV. KOKEE IRRIGATION PROJECT

Need for Project. Kauai has a higher average rainfall than any other island in the State. Mt. Waialeale, where rainfall averages about 460 inches a year, (with a recorded high of 624.1 inches, in 1948) is one of the wettest places on earth. The heavy rainfall on Mt. Waialeale and the adjacent area feeds the Alakai Swamp (approximately 4,000 acres), from which many streams flow to the sea in a pattern similar to the spokes of a wheel. Due to its geological formation, a large percentage of the rainfall in the area of Mt. Waialeale finds its way to the sea as surface flow, causing heavy erosion in the process. This is in contrast to most areas of the State where high rates of rainfall percolation are the rule.

The proposed project area in Kekaha is comparatively dry, with an average rainfall of only 20 inches per year. Since most of this land is owned by the State, any water development project constructed to provide water for this area would be in the interest of the State. Available

KAWAIKOI MEAN DAILY FLOWS, BASED ON 31 YEAR RECORD (1919-1952) COMPARED WITH RANGE IN MAXIMUM AND MINIMUM MEAN DAILY DISCHARGE DURING RECORD PERIOD



information indicates that the best potential water source is the stream flow of the Kawaikoi, Waiakoali and Mohihi streams. 11/

Records of the three streams show extreme variations in stream flow. Impounding dams and reservoirs are required to hold flood flows for use during dry periods in order to make possible a more effective use of the total water supply of these streams.

Proposed Project. Construction of a dam across Kawaikoi Valley in the high precipitation area, at about the 3,400 feet elevation, is proposed. It is believed that this would provide a storage capacity of approximately 5,000 million gallons of water - enough to meet irrigation requirements of homesteads and sugar cane lands of the project area.

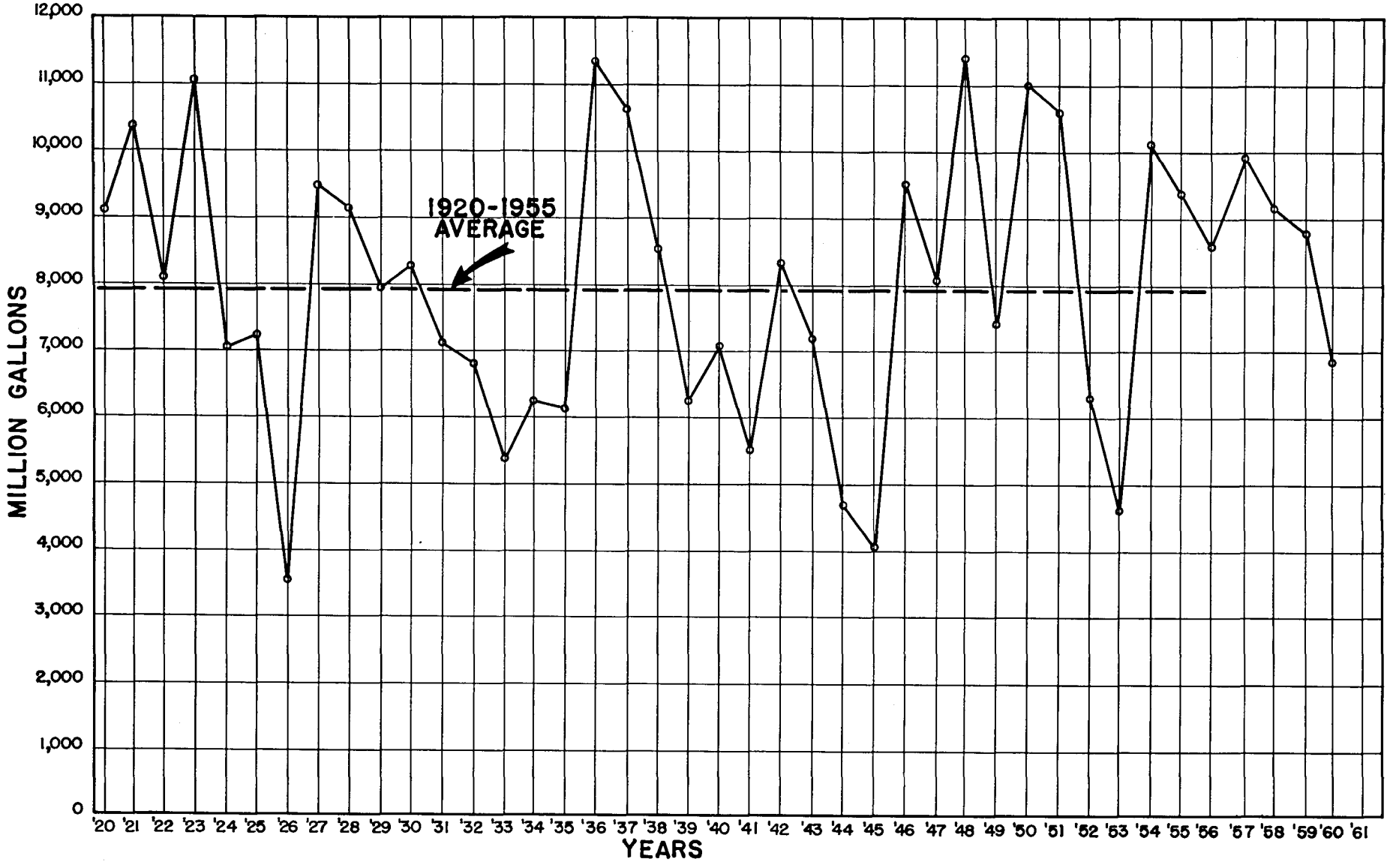
The proposed immediate service area would include the following: 18,800 acres owned by the State, of which 2,500 acres are in sugar cane; 7,700 acres in pasture; and 8,600 acres considered "wasteland" and not now utilized. Of the total 18,800 acres, the Hawaiian Home Lands consist of 15,000 acres and State lands total 3,800 acres. Except for 482 acres withdrawn for homestead purposes and devoted to experimental farming, the 18,800 acres are under lease to Kekaha Sugar Company. 12/

Additionally, the proposed project, when considered in the broader terms of flood control, soil conservation and

---

11/ Kokee Irrigation Project.

12/ Ibid.



1920-1960 average
= 8020 mil. gals.

KAWAIKOI ANNUAL STREAM FLOW, 1920-1955-1960
Water Source Area, Kokee Irrigation Project
Island of Kauai

economic impact to a vast under-developed area of approximately 110,000 acres, demands careful research, thorough planning and development of the natural resources.

Soil Conservation. Existing studies indicate that the soil in much of the area is subject to heavy erosion. [13/] This is especially true of the soils occurring at an elevation of 500 to 2,000 feet. In some areas, erosion has removed as much as 75 per cent of the original top soil and 25 per cent of the subsoil.

Flood Control. Flood control measures to protect Waimea town and adjoining valley from damage due to periodic floods caused by over-flow of the Waimea River are a current problem. The most recent flood which occurred in August, 1959, in conjunction with Hurricane Dot, caused estimated damages totaling $6 million.

A levee was completed by the Territory of Hawaii, terminating some 1,200 feet upstream from the river mouth at a cost of some $700,000. However, the town of Waimea is still vulnerable to flood waters, and a Flood Plain Study for this area by the U.S. Corps of Engineers has been requested. Flood control measures at or near the mouth of the river may help lessen the possibilities of damages to Waimea town, but control of the headwaters of streams flowing into the Waimea River would greatly reduce one of the primary causes of major floods.

13/ Soil and Water Conservation Plan, West Kauai Soil Conservation District.

Hydroelectric Power. A principal consideration in developing the economic well-being on the Island is the desirability of additional electric power. The most promising source of additional electric power at reasonable cost appears to be from a hydro development with the power generated by water collected from the area of high elevation and precipitation.

Deposits of bauxite on the Island offer the best potential for development of natural resources, but large quantities of low-cost power are essential. Another possibility is the manufacture of nitrogen-bearing fertilizer. [14/] In addition, resort development with its accompanying service industries and added domestic requirements will greatly accelerate development of the area. All of these developments require additional electric power at reasonable cost, and a hydroelectric power plant seems to be the only source of economical power.

V. ECONOMIC BACKGROUND

The Kekaha-Waimea district has more land for potential production than any other area on the Island. The coastal

---

14/ Letter Report: Preliminary Investigation Hydroelectric Power Development for Industrial Use on the Island of Kauai, Ford, Davis, Bacon, Inc., 1958.

plain, already in production of various crops, particularly sugar, could lend itself to expansion of sugar and diversified agricultural development. Approximately 15,000 acres in the area lack water but are reported to have potentially productive soil if irrigation projects were completed and adequate water were available. Records show that during World War II, truck crops were raised successfully on lands in the area. With the cessation of the war and the return to normal marketing conditions, diversified crop production in the area was discontinued. 15/

There is, on a long-range basis, a potential for about 12,000 acres in the mauka (uplands) area for development of timber and forests. This use of the land under discussion has many economically significant possibilities. The Puu Ka Pele Forest Reserve and the Pali Kona Forest Reserve demonstrate considerable promise for forest development.

Employment, Business and Industry. Data available on business and industry in the Waimea district indicate approximately nine areas of industrial activity including sugar and related agricultural enterprises. Four agricultural activities, the largest employers in the district, employed approximately 1,390 persons in 1961 and 1,500 six years earlier in 1955, a decline in total persons employed of 110 persons. These

---

15/ Kokee Irrigation Project.

include approximate figures from the following plantations: Kekaha Sugar Company, Waimea Sugar Company, Olokele Sugar Company, and Gay and Robinson.

There are seven concerns in building and construction, two engaged in manufacturing, nineteen in services (eating and drinking places), one concern engaged in transportation, eleven in retail trades, two in insurance and finance, two in professional services, and two in other activities. 16/

Of these employers, the following showed an increase in mumber of employees from 1955 to 1961: Pacific Missile Range, 17/ which employed none in 1955, and employed approximately 74 persons in 1961; Kokee Air National Guard installations, which employed none in 1955, and employed approximately 95 in 1961; Echo Lanes, a bowling establishment, which employed none in 1955 and about 10 persons in 1961; and two garment factories which employed none in 1955 and 22 persons in 1961. The electric company, Waimea Veterans Hospital, and retail stores and other establishments in this category showed no significant change in number of persons employed over the period. General contractors showed a slight increase in

---

16/ An Economic Analysis of Kauai and the Growth Potential of the Planning Areas of Waimea, Hanapepe, Koloa, Lihue, and Kapaa, John Child & Co., 1960. Hereafter referred to as An Economic Analysis of Kauai.

17/ Formerly called Navy Missile Base. Includes Barking Sands and Kokee installations.

employees, while total employment figures showed little, if any, significant change over the period. This demonstrates the probability that while some activities showed decreases in numbers of persons employed, and others increases, employable persons had apparently moved to other employment, or have been absorbed in new enterprises. 18/

VI. ECONOMIC POTENTIAL, FUTURE POPULATION AND EMPLOYMENT

In an analysis of the basic industrial and employment potentials on an Island-wide basis, it appears that there may be some increase in agriculture. The development of residential communities and tourism offer more remote possibilities, but may be an eventuality because of the incentives of fine weather, beaches, generally good living conditions and the policy of making State lands available. The present estimated employment for the area will probably remain static or decline slightly within the next five years. Before 1965, it whould have reached the bottom, and by 1965, should have started to increase. Between 1970 and 1980, it is estimated that State land will be broken out into tourism and that secondary services,

---

18/ An Economic Analysis of Kauai.
State Department of Labor and Industrial Relations.
Hawaiian Sugar Planters Association.
Individual Employers.

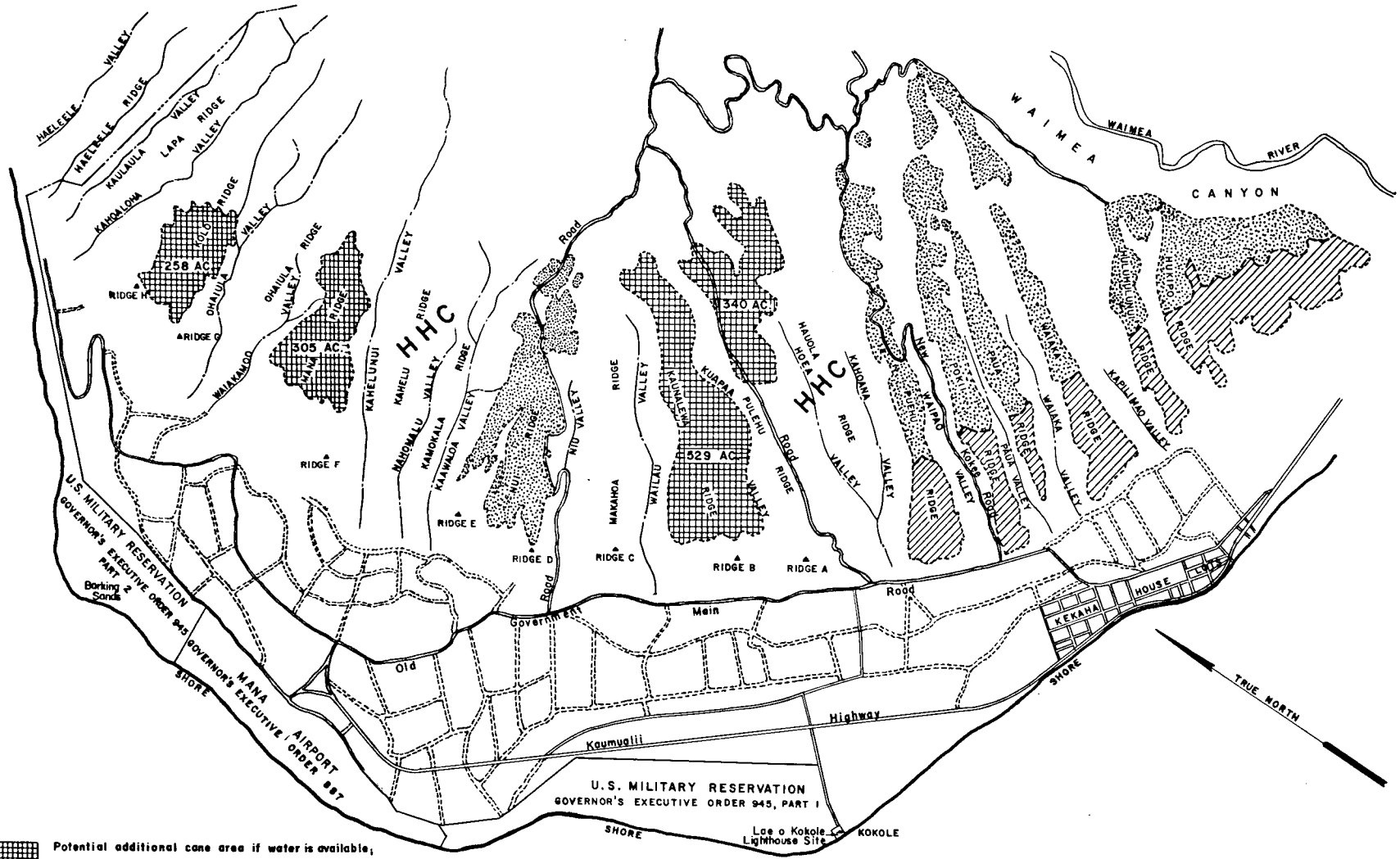
truck farms and other businesses will increase, primarily in the Barking Sands area. 19/

Kekaha Sugar Company Operations. As the primary agricultural entity in the area Kekaha Sugar Company operates under a lease of State lands covering an area of approximately 29,000 acres. Of this, 7,300 acres are in sugar cane; roughly 5,100 acres in the lowland flat areas, irrigated by water from various types of wells and excess drainage, and 2,200 acres in mauka land (upland areas), irrigated by water from mountain sources.

Irrigation water for the 2,200 mauka land comes from two sources. Gravity flow from the present Kokee Ditch System serves 1,600 acres and booster pumps from the Waimea Ditch lifting water 365 feet supply the remaining 600 acres. About 900 kilowatts are required for the booster pumps to deliver 8 million gallons a day. The remaining 21,700 acres lie mainly in the upper land and at present are unproductive due to lack of water. A recent survey of these lands by the Soil Conservation Service classify them roughly as follows:

Land suitable for cultivation	3,500 acres
Land suitable for good pasture development	2,000 acres
Farms on Hawaiian Home Lands	500 acres
Makai (coastal) Sand Flats, Pasture and Waste Lands	2,200 acres
Mauka (upland) Lands for Pasture and Waste Lands	13,500 acres
Total	21,700 acres

19/ An Economic Analysis of Kauai.



Potential additional cane area if water is available; 1,432 acres all in HHC Land.

Upper lands irrigated by booster pumps..... 600 Acres

Kokee Ditch System..... 1600 Acres

Total Acres..... 2200 Acres

KEKAHA SUGAR CO., LTD.

KEKAHA, KAUAI, HAWAII

L.A. FAYE, MANAGER

PLANTATION MAP

OF

KEKAHA SUGAR COMPANY, LIMITED

KEKAHA, WAIMEA, KAUAI, HAWAII

An adequate supply of water from the proposed Kokee Water Development Project would result in the following benefits to the above lands and to the operations of Kekaha Sugar Company from which the State would indirectly benefit:

1. Yields from the 1,600 acres mauka cane lands could be increased by two tons of sugar per acre. With 800 acres harvested annually, sugar production would be increased 1,600 tons a year with an adequate water supply.

2. Gravity flow from the Kokee system to the 7,600 acres supplied by booster pumps would release 900 kilowatts of electric power for other uses. The water now boosted would be diverted to the Mana flats to supplement the present poor quality of water and result in an increase in yields of at least one ton of sugar annually on 1,000 acres, or 1,000 tons of sugar a year. Another 15,000 acres of new mauka land (uplands) could be brought into cane cultivation. With 750 acres harvested annually, production of sugar would be increased by 9,000 tons a year.[20/]

Including these factors relating primarily to the sugar industry, the construction of an irrigation dam will bring economic benefits to the surrounding areas in terms of increased tax benefits to the State, increased rental value of

---

[20/] Kokee Water Development - Economic Benefits to State, L. A. Faye, October 9, 1961. Hereafter referred to as Kokee Water Development.

State lands, availability of water for expansion of industry and farming in the area, and the possibility of hydroelectric power for new industries and domestic purposes. A certain amount of increased permanent employment is foreseen in addition to temporary employment involved in the feasibility studies and the actual dam construction.

VII. ECONOMIC BENEFITS OF PROPOSED KOKEE IRRIGATION DAM

Increased Economic Potential [21]

Predictable Economic Benefits	Estimated Increase in Revenue to State
1. Increased rental on 1,500 acres of cane land from current $2.25 per acre as pasture, to $23 per acre as cane land.	$31,125 per year
2. Sale of irrigation water (at estimated $33-$45 per acre).	
1,500 acres, cane land	$49,00 - $67,000
2,000 acres, general agriculture	66,000 - 90,000
2,000 acres, pasture land	66,000 - 90,000

[21] Kokee Water Development. Department of Economic Development, Research.

Increased Economic Potential (Continued)

Predictable Economic Benefits		Estimated Increase in Revenue to State
3. Increase in tax base for processing tax (2 per cent) based on predictions of increased yields of sugar.		
Increased Yield	Gross Income	
Current Mauka Lands	$ 216,000	
Current Mana Lands	135,000	
New Mauka Lands	1,215,000	
Total	$1,566,000	$31,320

4. Increased rental value of land per lease agreement, based on percentage of gross income from sugar and molasses (currently 5.5 per cent).
5. Increased property taxes on 1,500 acres of land, assessed as cane land rather than pasture.
6. Probable increase in income tax from sugar companies and lessors of farm land and pasture land.
7. Increased rental and tax value of grazing land improved by irrigation.
8. Increased beef production. Soil Conservation report estimates potential animal unit carrying capacity of 7,000 acres of suitable pasture land would increase from present figure of 290 heads in summer months and 673 heads in winter

months, to 3,630 heads in the summer and 6,790 heads in the winter.

9. Increased visitor facilities by the creation of artificial lake covering an area of more than 200 acres.

10. Revenues in utility and manufacturing taxes from hydroelectric plant.

Increased Employment Potential [22]

1. Permanent Employment	Present	Potential
Kekaha Plantation	40	---
40 - 50 new farms (HHL)	40	100
Hydroelectric Plant	9	12
Fish & Game Division	1	3
State Parks System	4	12
2. Temporary Employment		
Feasibility studies	--	0 - 5
Dam construction	--	Up to 300

VIII. FUTURE DEVELOPMENT OF KEHAKA-KOKEE-WAIMEA AREA

Employment. The expected employment increases if the proposed irrigation-hydroelectric dam is built at Kokee would vary from approximately 95 to 165 new permanent jobs, plus up to 300 temporary jobs from the construction of the dam itself.

---

[22] Ibid.

This increase in employment will result in many related benefits in the areas of retail trade, services, construction, plus increased revenues to the State through business and personal income and excise taxes. Even for the 145 additional people employed in the area since 1959 in the Chance-Vought and Air National Guard installations, many of these benefits have already accrued in revitalizing the whole west side of the Island. The services which are not already available for these employees and their dependents will have to be supplied.

Economic Impact. The impact of new jobs in an area expressed in terms of additional population brought into the area, additional households, related jobs, personal income, automobiles, and telephones is shown in the following table. [23]

Economic Impact	100 New Jobs (a)	145 New Jobs (b)	332 New Jobs (c)
Added people in area	427	619	1,418
Added households	131	190	435
Added workers in related jobs	117	170	388
Added automobiles	187	271	621
Added telephones	393	570	1,304
Added personal income annually [24]	$913,000	$1,324,000	$3,033,000

a. Number currently employed by Chance-Vought and Air National Guard at Barking Sands and Kokee.

b. Estimated total new jobs for the area.

c. Average number of temporary jobs for construction of dam.

[23] Based on figures published by Associated Industries of Cleveland.

[24] Based on 1960 per capita income in Hawaii.

Population. As new jobs are created in the area, there will be a corresponding increase in population. Even if employment decreases, there may be some increase in population. A recent Hawaiian Sugar Planters' Association survey shows that although the number of workers in sugar companies has decreased, in many cases the number of persons in the surrounding villages has increased. This can be attributed to the fact that personnel dropped from sugar company employment have been mostly single men or retirees, leaving younger men with growing families on the company payrolls. 25/

In addition, if new jobs become available in an area, the out-migration of young people will decrease...which may help reverse the trend towards a declining population in Kauai.

Population for the combined areas of Kekaha, Waimea and Hanapepe-Eleele for the past, present and future are given in the following table. 26/

25/ Hawaiian Sugar Planters' Association, Medical Advisors Survey, October, 1961.

26/ U. S. Census.
An Economic Analysis of Kauai.
General Plan for the State of Hawaii.

AREA	1950	1958	1960	1970		1980	
				Low	High	Low	High
Kekaha-Waimea	4,227	2,841	3,969	4,734	7,234	5,500	10,500
Hanapepe-Eleele	5,283	5,002	7,046	5,251	9,273	5,400	11,500
Total	9,510	7,843	11,015	9,985	16,507	10,900	22,000

Construction. An increase in construction activity is a foreseeable advantage to new jobs created in the area. In addition to the construction of the dam, there would be an increase in construction of commercial and service facilities, such as service stations, stores, laundries, etc. One garment manufacturer in the area said that he plans to expand, adding about 10 more permanent jobs, but will have to find new quarters in order to accommodate the extra machines and workers.

There will be need for new housing. Even if only half of the persons employed in new jobs require new housing, this will mean a demand for 85 new homes for current employees of Chance-Vought and the Air National Guard, 166 new houses for the anticipated total of 332 employees, plus temporary housing for 50 construction employees and their families. Homes constructed for temporary workers could later be an asset to the community as rental homes for families of military personnel stationed at the Navy's Bonham Field at Barking Sands and the Army Signal Corps station at Kekaha.

Tourism. The General Plan for the State of Hawaii indicates Waimea promises to become the principal gateway to the vast park, vacation and wilderness areas of Kokee. It should also become the principal service center for the more intensive use of land expected in the vicinity of Kekaha and Barking Sands.

If the proposed dam is built at Kokee, there will be a possibility of increased tourist facilities or vacation facilities, with cabins, camp-sites, boating, fishing and concessions. Anticipated employment would be for three to five persons employed by the State Parks Division, with a gradual increase to 10 to 12 persons (based on employment figures of current installations at Kokee). [27/] The number employed in concession activities would depend on the type of concession built. The Fish and Game Division anticipates an increase of one to three employees depending upon whether a fish hatchery would become part of the facilities. [28/]

The Barking Sands beach is one of the finest beaches on the Neighbor Islands. The climate is hot, dry and sunny ...

[27/] James Dunlap, Director, Division of State Parks.

[28/] Kenji Ego, Chief, Bureau of Fisheries Research and Management.

and while the area has not been given a priority in the Visitor Destination Areas Study, its future potential is recognized. [29] A hotel at Barking Sands would serve as a base for tours to the Kokee area, including the Kalalau Lookout.

Based on available figures, [30] if a 100-room luxury hotel were to be built at Barking Sands, employment could reach from 100 to 150. A less expensive hotel facility, with dining room facilities, might employ approximately 45 to 50 persons. Motel type operations offer less opportunity for permanent employment but would contribute tremendously in bringing visitors and vacationers into the area.

IX. SUMMARY AND RECOMMENDATIONS

Summary. Development of water for irrigation purposes is vitally necessary in order to make the Islands more nearly self-sufficient. Irrigation systems which have been previously developed were primarily for the two major agricultural export crops of sugar and pineapple. As

---

[29] General Plan of the State of Hawaii.

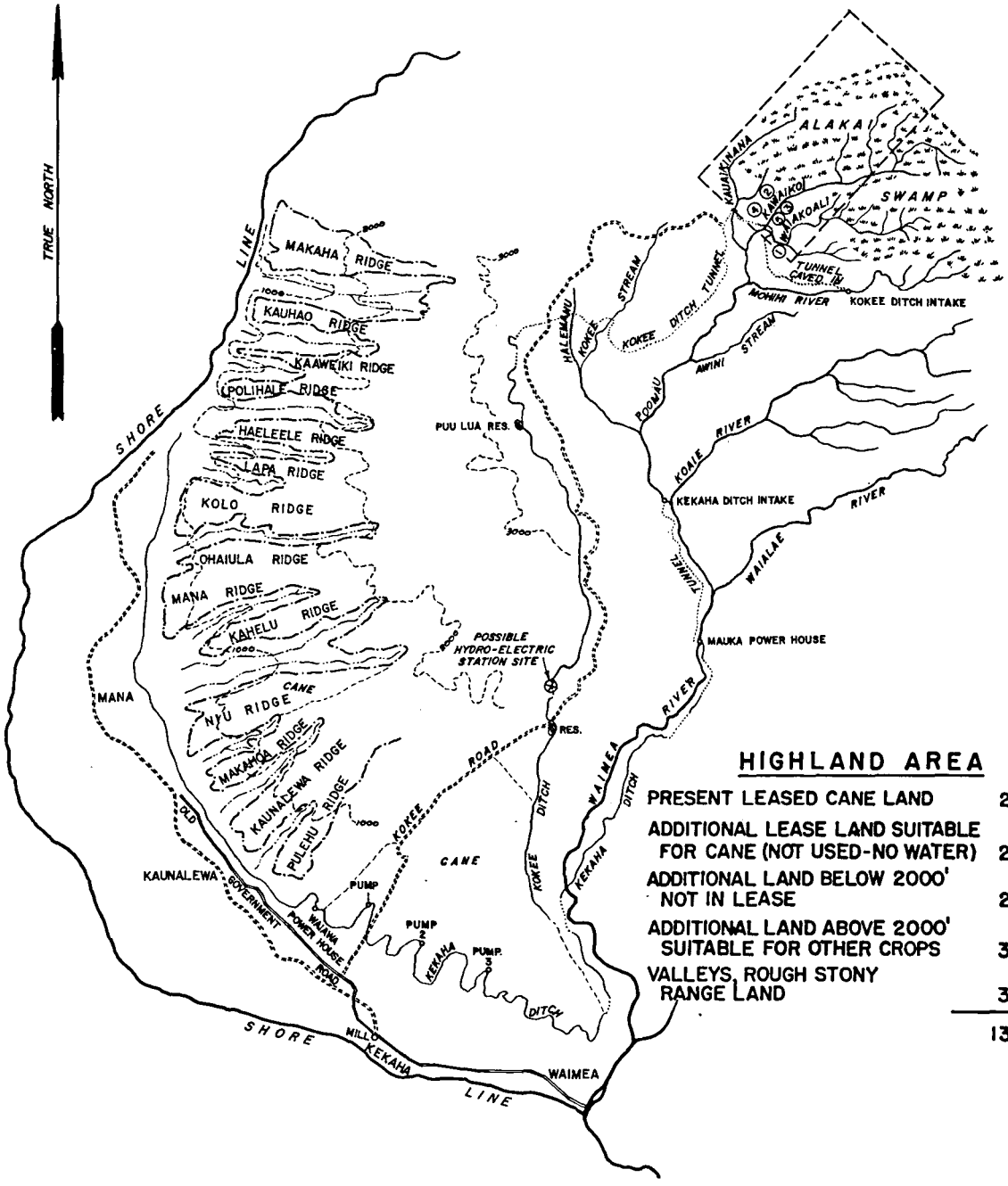
[30] Hotel Management Survey, Kona District, Department of Economic Development, August, 1961.

the major income-producing exports of the State, preference has been given to the growing of these two products. This has resulted in the necessity of importing a large percentage of all other agricultural products for local consumption.

With the geographic location of the State and the uncertainty of the world situation, means must be provided to increase Hawaii's agricultural productivity in diversified crops. Land suitable for agriculture does exist, but cannot be utilized to its fullest potential until such time as adequate water is brought to the land.

The project area is located near the watershed of one of the wettest known areas in the world, extending to extensive acreages owned by the State, which are either not in cultivation, or are being utilized presently for low-productivity activities such as grazing. Because of the low rainfall, averaging 20 inches annually in the project service area, intensive use of the land at this time is precluded. Development of these areas could be realized, provided adequate irrigation water is made available.

The Kokee area has been under study since the 1955 Territorial Legislature directed the Hawaii Irrigation Authority to investigate the feasibility and means for bringing water to the area. Findings have shown that the construction



HIGHLAND AREA

PRESENT LEASED CANE LAND	2,200 Acs.
ADDITIONAL LEASE LAND SUITABLE FOR CANE (NOT USED-NO WATER)	2,000 Acs.
ADDITIONAL LAND BELOW 2000' NOT IN LEASE	2,000 Acs.
ADDITIONAL LAND ABOVE 2000' SUITABLE FOR OTHER CROPS	3,800 Acs.
VALLEYS, ROUGH STONY RANGE LAND	3,500 Acs.
	13,500 Acs.

IRRIGATION SYSTEM

KEKAHA SUGAR CO.

SCALE IN MILES 0 1 2 3 4 5

APPROX. 10.50 MILES - KOKEE DITCH TUNNELS

Nov. 24, 1954

of a dam across Kawaikoi Valley would provide storage capacity capable of supporting more than 2,400 acres of diversified agriculture. The proposed project would also serve the entire western section of the Island in needed flood control and soil conservation measures. Further, the reservoir formed by the dam offers potential for a hydroelectric generating plant.

Another factor in consideration of the construction of such a dam would be the increase in employment that it would afford. Aside from an increase in number of farm workers, cheaper electric power offers potential for industrial enterprises which have been heretofore economically unfeasible.

At the present time, the greatest portion of electric power generated are from high cost, imported fuels. By bringing these costs down, new industries offering additional employment may be introduced.

An economic development potential with added water sources is an expected increase in visitor facilities. Present water development allows only limited expansion in this area. Since tourism is the most expedient means of expanding the economy of Kauai, any activity which will enhance its growth should be seriously considered.

Recommendations. Studies previously conducted indicate the benefits to be derived from development of water resources in the Kokee area. However, further studies on technical, engineering and economic feasibility must be made.

The current need is for an appropriation to cover the costs of an engineering study to provide technical data on the location and structure of the dam and reservoir, and an economic study of the relationship between costs of the project and benefits received.

Building costs for the dam are estimated at between $4.5 and $5 million. Financing the construction of the dam could possibly be worked in conjunction with the Federal Small Reclamation Projects Act, which is empowered to make loans up to $5 million on all Federally approved reclamation projects whose total cost does not exceed $10 million. Under this Act, moneys are loaned at low interest rates over long-term periods.

Federal assistance in the actual development of the dam and distribution systems is dependent upon completion of feasibility studies, and it is strongly recommended that the following specific studies be made:

1. Determination of the water-tightness of the proposed reservoir area.
2. Determination of the suitability for constructing an earth dam across the Kawaikoi Stream.
3. Preparation of a detailed economic feasibility report of the entire project--a report which would investigate and review all phases of this project and would determine the cost-benefit ratio and make appropriate recommendations.