

PRELIMINARY

POST-WAR PLANS

For

ARIZONA AGRICULTURE

Arizona Agricultural Post-War Planning Committee
of the
Arizona State Resources and Planning Board

February, 1944



Arizona Agricultural Post-War Planning Committee
of the
Arizona State Resources and Planning Board

Appointed by Gov. Sidney P. Osborn

Governor Sidney P. Osborn (ex-officio).

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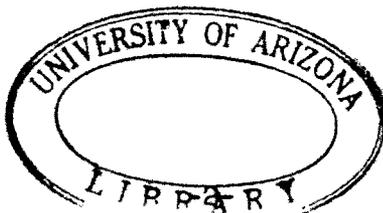
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SUMMARY
OF
PRELIMINARY POST-WAR PLANS FOR ARIZONA AGRICULTURE

This summary was approved on February 1, 1944, by the Arizona Agricultural Post-War Planning Committee, membership of which is shown on the opposite page.

Detailed reports on the subjects outlined in this summary were prepared by subcommittees named by the Committee Chairman and by specialists who assisted them. A reasonable attempt was made to have all pertinent points and all recommendations included in the detailed reports set forth in the summary.

Since it was impossible for the committee of the whole to carefully review the detailed reports it should be understood that any recommendation contained in them which inadvertently was not included in the summary has not had the approval of the committee as a whole.

The various parts of this report will be found in the following order both in the summary and in the more detailed discussion which follows:

- I.--INTRODUCTION.
- II.--DEVELOPMENT AND CONSERVATION OF PHYSICAL RESOURCES.
- III.--ADJUSTMENTS IN AGRICULTURAL PRODUCTION DURING THE DEMOBILIZATION PERIOD.
- IV.--MARKETING AND DISTRIBUTION PROBLEMS IN THE DEMOBILIZATION PERIOD.
- V.--OPPORTUNITIES FOR SETTLEMENT ON LAND AFTER THE WAR (INCLUDING MILITARY LAND).
- VI.--TENURE PROBLEMS AND THEIR SOLUTION AFTER THE WAR.
- VII.--CREDIT.
- VIII.--SOCIAL SECURITY.
- IX.--RURAL HEALTH SERVICES AND FACILITIES.
- X.--POST-WAR HOUSING AND EQUIPMENT.
- XI.--RURAL ELECTRIFICATION.
- XII.--NUTRITION.
- XIII.--SURPLUS MILITARY SUPPLIES AND EQUIPMENT.
- XIV.--AGRICULTURAL INDUSTRIAL RELATIONS AND RURAL INDUSTRIES.

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I.--INTRODUCTION

George Washington is reported to have said, "In time of peace prepare for war". The reverse of this statement at present seems to fit conditions; In time of war prepare for peace. When swords finally are beaten back into plowshares, we shall face many new and difficult problems. Few realize the enormous task of preparing for the demobilization and post-war periods. Farm and industrial production have been greatly altered and increased to meet war needs. The occupations and places of abode of millions of our people have been changed. Our national resources of fertility, oil and metals of necessity have been depleted and often squandered. Millions of our young people, now in the armed services, will return. Billions of dollars' worth of war materials and equipment will be available for peacetime use. After the war, agriculture and industry must be ready with well-planned programs for reconstruction.

This report of the Arizona Agricultural Post-War Planning Committee is a preliminary statement as requested by the Secretary of Agriculture. It attempts to answer some of these questions by covering the subjects outlined at the Milwaukee Conference as adequately as is possible with the information now available, attempting to look forward, in most cases, to from 12 to 18 months. We all realize that a high national income is essential to maintain full employment and to service the tremendous national debt. We also realize that farmers serve city workers who must be employed at good wages to be good customers. Rural and urban prosperity are interrelated in many ways. Farmers are also interested in foreign markets which in peace times normally take about 10 per cent of their commodities. We must plan to use our natural resources wisely and, where depleted, restore them by productive management. This is especially true of our forested areas and our range lands. Where fertility has been lost from our tilled fields, fertilizers, green manure crops, and proper rotations must quickly be put into operation. Besides production and marketing problems, farmers also are interested in improving living standards; good rural schools and libraries for their children, access to modern health services, hospitals and clinics, comfortable housing with access to electricity for lighting and power purposes, and late information regarding health and dietary needs. These, and many other things, must be taken into consideration in planning for the post-war needs of our farmers and ranchers.

Some of the material presented in this report will doubtless also appear in the final report of this Committee which probably will be submitted to our Governor and to the Secretary of Agriculture on or about the time hostilities cease.

II.--DEVELOPMENT AND CONSERVATION OF PHYSICAL RESOURCES

Relationships. The forest, range, and cropland resources of Arizona are closely interrelated.

Forest lands furnish a wealth of timber products and employment while yielding most of the water so vital to irrigation agriculture.

The range lands, including forest range lands, support a vast livestock enterprise that ranks among the leading wealth producing industries of the state. As a rule the forested uplands are grazed in the summer, the lower non-forest ranges year-long or seasonably, preferably under a rotational or deferred system of management.

Low down in the broad fertile valleys, where soils and climate are favorable, are located the large irrigation reservoirs and agricultural developments. Streams serve as life lines between the high, water yielding, mountain areas and the irrigation reservoirs, but they are also carriers of silt from eroding areas and may develop serious flood problems without the natural streamflow regulation afforded by the vegetative cover of forest and range lands.

The adoption of conservation measures as an integral part of all land use practices will not only stabilize farming and ranching enterprises and increase production from the land, but preserve the state's natural resources for its future generations.

A.--CROP AND PASTURE LAND

Situation and Trends. But little more than one per cent of Arizona's land is used for agricultural crop production; seven-eighths is irrigated; one-eighth dry land farmed.

Most of the irrigated land receives water from storage reservoirs and stream diversions, yet 200,000 acres are dependent entirely upon ground water for irrigation. The majority of the remaining irrigated acreage uses supplemental water pumped from ground water basins.

Increased demand for food and fiber and higher prices for farm commodities with the beginning of World War II have resulted in the development of thousands of acres of additional pump water irrigated and new dry farm land.

A trend from alfalfa to cotton in Arizona's southern irrigated valleys during the early war years is now reversing itself. This will check extreme soil fertility depletion but increase irrigation water requirements as will the increased planting of irrigated pastures.

One-third of Arizona's cropland requires the application of one or more soil and water conservation practice if they are to remain permanently productive. Nearly an additional one-third requires the refinement

and more diligent application of cultural, soil management and conservation practices now used.

Between five and ten per cent of the state's cultivated land is unsuitable for permanent crop production. This submarginal land should be retired to pasture or other less intensive use. Frequently, within a given farm unit, better land is available for cultivation.

Objectives and Major Problems. To insure safe use of cropland to the limit of its productive capability and availability of water, through land leveling, use of efficient irrigation, crop rotation and soil building practices, noxious farm weed, crop disease and rodent control, land drainage and leaching where necessary and feasible, improvement and rehabilitation of irrigation structures and facilities, application of adapted wind and water erosion control practices on dry farm land and the retirement of submarginal cropland to less intensive use.

In the attainment of these objectives the work of the College of Agriculture of the University of Arizona is invaluable. More field research and demonstrations of irrigation and conservation practices are urgently needed.

Farmers are intensifying soil and water conservation operations on their land through state soil conservation districts. The program of these districts justifies support from local and state government. Restrictive measures of the state law prohibit some operations necessary to protect farm land from flood water and erosion losses.

Arizona's irrigation water supplies are limited. During most years thousands of acres are inadequately supplied, in periods of protracted drought, most of the irrigated acreage is short of water in varying degree. Ground water supplies are increasingly overdrawn. Abandonment of developed acreage appears inevitable.

The major irrigation water storage and diversion structures are permanent and reasonable adequate for the lands they serve. Many, smaller, have been improved but little since pioneered 50 to 70 years ago.

Uncontrolled flood waters destroy land and crops in some part of the state nearly every year.

Action Program. Specific recommendations of actions and projects to facilitate the state's conservation program on cropland during the post-war period follow:

1. The adoption of a state ground water code.
2. The adjudication of all existing water rights.
3. A reconsideration of the State Soil Conservation Districts Enabling Act to determine the need of permitting the inclusion of range

and watershed lands within districts in order to more effectively meet soil and water conservation and flood control problems.

4. Increased field research and demonstrations of irrigation and soil and water conservation practices by the College of Agriculture in cooperation with agencies of the U. S. Department of Agriculture. Additional funds and personnel are required for this work.

5. Completion of soil and conservation surveys of agricultural lands of the state undertaken cooperatively by the Agricultural Experiment Station and agencies of the U. S. Department of Agriculture.

6. Resumption of flood control surveys and planning by the U. S. Departments of War and Agriculture.

7. Appropriation of state funds for engineering surveys in cooperation with the Federal Government to determine the most feasible, complete, multiple-purpose, self-liquidating Colorado River water developments.

8. A program of conservation practice application, irrigation system and facilities improvement and rehabilitation to be undertaken by land owners and operators.

9. A list of equipment, possibly surplus to military needs, for use in essential conservation operations.

B.--RANGE LAND

Significance. Range lands, including forested range, comprise about 85 per cent or 61,660,000 acres of the total land area of Arizona. These lands are characterized by the predominance of publicly controlled lands, 65 per cent being under Federal jurisdiction and 12 per cent state lands. The raising of livestock constitutes one of Arizona's chief industries, which in 1942 yielded over 35 million dollars. In addition to the contribution of forage essential to livestock production, much of the higher elevation range lands are important water-yielding areas. The lower elevational ranges are the significant source of silt. The degree and manner of livestock use on these range areas bear a direct relationship to forage and water yield, soil erosion, sedimentation, and flood hazards.

Situation and Trends. Much has been accomplished by the range conservation programs during the past several years and parts of the range have recovered or are improving. Still, in general, an unsatisfactory condition exists. There is need of a form of management which will bring about improvement in the range. This in turn will benefit the dependent livestock industry.

No one knows what the situation will be at the end of the war, but it is certain that in order to prevent a repetition of the chaotic

conditions and range abuse which followed the first World War a general reduction of livestock numbers is imperative on all overstocked ranges.

Objectives and Major Problems. The primary objectives include: (1) To secure and maintain the highest practicable production of range forage. (2) To secure and maintain the highest practicable livestock production. In order to obtain these major objectives, it is necessary to (1) arrest accelerated erosion and restore plant vigor, since soil is the basic resource and vegetation is the protective mantle; (2) to recognize the multiple-use characteristics of the land resource. Furthermore, attainment of the major objectives will require needed adjustments brought about in a democratic manner through agricultural research, education, and extension. Private initiative must be encouraged but in the case of public lands major responsibility for improvement of range conditions rests with the agency concerned.

The major problems existent on range lands are: (1) Degree of range use--animal numbers must be balanced with a fluctuating forage supply. From the range standpoint heavy use results in decreased yields of forage, accelerated erosion, and increase of noxious plants. From an animal nutrition viewpoint too many animals means most of the range forage is required for body maintenance and little or none is left for production. (2) Consolidating of public lands to facilitate better management. (3) Revegetation--most range areas can be restored through natural means; however, many localized areas will require artificial reseeding or mechanical control. (4) Noxious plants--on many range areas mechanical or chemical control must be resorted to in order to increase forage production and provide a more protective cover. (5) Water--development of new water and rehabilitation of many watering places are necessary to secure proper livestock distribution. (6) Fencing is necessary for proper management. (7) Wildlife--a system of grazing use that provides for good range and watershed conditions will at the same time provide for improved environmental conditions for wildlife. (8) Predatory animals, range forage-destroying rodents and rabbits must be controlled.

Each of the aforementioned major problems, together with other related problems, requires additional information through range research.

Action Plans.

1. Complete management plans as a basis for adjustments.
2. Through a training and educational program prepare for demonstrational work, to effect stocking reductions and seasonal-use changes where necessary.
3. Complete needed range improvements and recommended range rehabilitation programs, including the control of pests, noxious plants, and predators.

4. Effect land exchanges to consolidate both public and private interests for better management and control.

5. Step up range research as a basis for better range management and as a means of demonstrating improved range-management practices or methods to land administrators and stockmen, and intensify study of related problems such as wildlife, flood control, upland game birds, waterfowl, and fish.

Action programs, utilizing surplus labor, are justified for the following classes of projects: reseeding; water development; fencing; control of noxious plants, rodents, and predators; wildlife developments, such as stream improvement, dams, and ponds; surveys and plans; roads; stock trails; and range fire control.

C.--FOREST LAND

Significance. Arizona forest lands total 19,629,000 acres, or more than one-fourth of the area of the state. These lands have and will, if used properly, play a significant part in the welfare of the state. This includes more than wood in its various forms. Forest lands serve in watershed protection, prevention of erosion, regulation of stream flow and water delivery. They furnish forage for livestock, a home for wildlife, and offer unlimited opportunities for recreation. In general, forest lands cannot be used successfully for any other form of agriculture.

Situation and Trends: From a timber production standpoint, there is sufficient timber to maintain present logging for the next 30 to 50 years. But careful management is needed to insure continuing supplies to meet future needs of an expanding population.

From the standpoint of watershed protection, until recently trends in watershed conditions over the state as a whole have been downward. A definite improvement has occurred on only a relatively small per cent of the area. Erosion, sedimentation, and flood control are major watershed problems of Arizona and will continue to be matters of foremost concern in the post war era.

As regards forested ranges--many parts are in good to satisfactory condition but on the whole the trend of range condition and grazing capacity is in a downward swing and undoubtedly will remain so until the post-war period.

Forest recreation has doubled during the past decade and was increasing through 1940. Various wartime restrictions, however, have on the whole resulted in a subnormal situation, although certain areas close to population centers have shown an increase. Forest recreation during the post-war period should resume its high place in the social and economic value of the state and even exceed its use of pre-war days.

Forest wildlife demands, in the way of hunting and fishing, have increased during recent years. In line with this few game populations have increased during the same period. Nevertheless, in general there is adequate breeding stock of big game species and brood stock of upland game birds to provide for a still larger harvest. But facilities for management and use of wildlife are needed to make the most of this resource and to correlate it properly with other forest land uses.

Objectives and Major Problems. The broad objective of the use of Arizona forest lands remains as it has in the past, i.e., to maintain the forest land area in the highest possible production for the benefit of the dependent people consistent with proper land use practices, recognizing the multiple uses and services of the lands.

The major problems in furthering this broad objective include:

1. A greater recognition and appreciation of the values of the several uses and services of the forest land resource.
2. Bringing about the right use of the forested lands, giving proper recognition to the several uses and services. This would include working out adjustments and corrective measures to halt erosion and soil depletion, and bring about recovery and improvement of the resources.
3. Provision in the way of manpower and facilities for the extension of present-known good management principles and practices to all forest lands.
4. Improvement in transportation, utilization, and other facilities to make available and reduce the cost of the several forest products to the dependent people.
5. Provision for additional information in the use of the several forest land values and services, including the extending of such information to the people concerned.

Action program. Inasmuch as nearly all the forested lands of the state are publicly owned the responsibility for proper management and use of the lands rests squarely with the public and the administrative agencies concerned in cooperation with the users. Accordingly, the conservation and use of forest lands constitute a bona fide and worth-while field for public works. This work is of a nature as to utilize excess labor and equipment in periods of depression such as may occur sometime in the post-war period, or reduce to a minimum in periods of greater economic activity as at the present.

Needed action programs for forest land cover the following classes of projects:

Physical Improvements.

Construction of roads and trails to facilitate use and movement of the various forest products.

Fire hazard reduction.

Fences, water developments, and stock trails to aid livestock grazing and increase forage availability.

Mechanical structures, such as stream-bottom fencing, dams, and terracing, for aid in watershed protection.

Improvement and utilization projects for further water development.

Repair, improvement, and construction of camp grounds and other recreational facilities.

Building and other installations needed in the administration of the lands and for research activities.

Other. Timber stand improvement; forest planting; range reseeding; pest and predator control; noxious plant control; resource surveys and construction of maps; and development of natural lakes and ponds and construction of propagation sites for wildlife.

III.--ADJUSTMENTS IN AGRICULTURAL PRODUCTION DURING THE DEMOBILIZATION PERIOD.

Status of Crop Acreage and Livestock Numbers in 1944:

In 1944, it appears that crop acreage in Arizona will be proportioned about as follows: one-fifth in tree fruits and nuts, truck crops and flax and sugar beets for seed; one-fifth in winter grains; two-fifths in alfalfa; and one-fifth or a little more in cotton.

Desirable Long-term Objectives in Agricultural Adjustment In Arizona:

1. Maintenance of one-third of Arizona irrigated land in alfalfa is a desired objective from the standpoint of soil conservation.
2. Continuance of about one-third of the acreage in tree fruits and nuts, commercial truck crops, and winter grains.
3. The reduction of cotton acreage from about one-third in the historic period mentioned, to possibly one-fifth or less in the next few years.
4. The selection of a desirable and profitable cash crop, or cash crops, amounting in total acreage to about 100,000 to replace a similar acreage of cotton.

5. A continued utilization of almost the entire acreage farmed in 1943 and 1944 for crop production.

6. A combination of crops, the total irrigation water requirements for which will not exceed the water requirements of the crops grown in the five-year period, 1935-39.

7. Maintenance of range livestock in such restricted numbers that range cover will not be reduced. Where cover has been depleted by overgrazing, the stocking rate should be such as to permit recovery.

8. Continued feeding of cattle and sheep on valley pasture and in pens in sufficient numbers to utilize roughage and feed grains produced.

Action Suggested for Immediate Post-War Period Of Eighteen Months:

Progress should be made in the direction of the long-term objectives mentioned above. Specific adjustments desirable include:

1. A 10 per cent increase in vegetable acreage over 1944.

2. Larger production of dairy products than those produced in 1944.

3. A reduction in alfalfa acreage from two-fifths of the irrigated cropland to about one-third, in the interests of conserving irrigation water.

4. Adjustment of crop production in pump irrigation areas to such an acreage that no further lowering of the water table will result.

5. A stabilization in the relationship between feeder cattle and fat cattle prices so that feeding will be profitable, this also applies to dairy and poultry production.

6. A reduction in hog numbers.

7. A reduction in flax acreage in Yuma Valley.

8. One of the important measures needed to arrive at the foregoing objectives, although the matter is too broad to be completed within an 18-month period, has to do with the selection of a substitute for cotton. It appears that a canvass of the crops needed on a national basis and which can be grown in Arizona as a cash crop, or cash crops, to substitute for cotton is a desirable part of an action program. Such a replacement crop or crops should utilize no more water per acre than cotton and should return, if possible, as much net profit to the farmer as did cotton in the 16-year period preceding 1944. A substitution by some other crop for cotton on 100,000 acres would be likely to release hand labor rather than to require more of it. The substitute crop, on the other hand, might require a new type of equipment for production and

harvesting. Conversion of the remaining 100,000 acres of cotton to a mechanical rather than a hand labor harvest basis may be desirable in order to place cotton producers in a stronger competitive position. Such a development would further reduce the seasonal labor demand in the state.

IV.--MARKETING AND DISTRIBUTION PROBLEMS IN THE DEMOBILIZATION PERIOD.

The present list of problems is mainly confined to those which arise from wartime changes in Arizona's patterns of production and distribution and which can be alleviated by the action of Federal and state governments or by organized groups of producers. Certain of these problems are contingent upon the smoothness with which industrial reconversion is conducted nationally, but more particularly in Arizona and Southern California. Others may be anticipated in some degree, regardless of the level of domestic purchasing power.

Some of Arizona's most critical marketing and distribution problems in the demobilization period are as follows:

American-Egyptian Cotton:

Problem. Reduction of the supply of American-Egyptian cotton from its present level of around 100,000 bales annually to a figure consistent with probable post-war consumption.

Recommendations.

1. Discourage plantings for the next two years by limiting production to 30,000 acres annually, and by reducing the support price to the minimum required by the Steagall Amendment--90 per cent of parity.
2. Liquidate U. S. Government holdings of foreign cotton through sales and distribution outside of the United States.
3. Survey the possibility of extending the post-war domestic market for American-Egyptian cotton as speedily as possible while domestic mills are still consuming unusually large quantities of this type. Its competitive potentialities against Egyptian cotton and against synthetic fibers should be re-evaluated in light of changes in utilization and acceptance which may have occurred during the war.

Irrigated Upland Cotton:

Problem. Establishment of adequate domestic and foreign outlets for Arizona and California Upland Cotton, the bulk of which formerly went to Japan.

Recommendations.

1. Ask the appropriate agencies to survey the political and economic problems involved in re-establishing outlets for Arizona and California cotton in the domestic and foreign markets after the war.

Dairy Products:

Problem. Readjustment of the Arizona dairy industry to a probable reduction in local demand for Grade A milk. This will involve re-establishing local brands of butter in the Arizona market and opening the Los Angeles market to Arizona sweet cream and other products.

Recommendations.

1. Preparation of a plan by the governments of Arizona and California and the City of Los Angeles to provide for the free flow of Arizona dairy products into the Los Angeles area on a competitive basis. In particular, the pre-war Los Angeles regulation that only Grade A cream be used in the manufacture of ice cream should not be reinvoled after the war. This is especially important to Arizona since it will quite clearly lose population in the demobilization period, while Los Angeles area is likely to continue its pre-war trend of increase.

Arizona Grapefruit:

Problem. Promotion of increased consumer acceptance of Arizona grapefruit in both fresh and processed form.

Recommendations.

1. Continue the existing marketing agreement to maintain a uniform quality of fruit in the fresh market.

2. Standardize the quality and flavor of Arizona grapefruit juice and canned segments.

3. Advertise in the area west of the Rocky Mountains in order to gain preference for the higher citric acid content and more tart flavor of Arizona grapefruit.

Alfalfa:

Problem. Provision of adequate outlets for Arizona's greatly increased production of alfalfa--which now occupies 35 to 40 per cent of her irrigated land. This is mainly a problem of population and level of demand for beef, milk, and lambs in Southern California during the demobilization period.

Beef Cattle:

Problem. Demobilization of price supports, ceilings, subsidies, and government stocks in such a way as to avoid a sudden and catastrophic break in prices and panic rushes to reduce livestock numbers. This problem must be handled on a national basis and must allow for the competitive relation of pork products and beef. However, Arizona derives one-fourth of its agricultural income from cattle and ships about two-thirds of its production to other states, so it will be vitally affected by the national livestock marketing programs.

Recommendation. Ration point values should be decreased immediately in order to make higher consumption possible.

Distribution of Essential Foods:

Ask the Office of Defense Transportation to cooperate with the Office of Distribution in anticipating increased military demands on transportation in Arizona as the weight of the war shifts to the Pacific and in assuring adequate facilities for transporting foodstuffs within Arizona and into neighboring states.

In addition there are certain problems which are very important but upon which the committee feels unable to make specific recommendations at this time.

Market Information for Small Producers:

Prompt distribution of market information to smaller producers in a simple and usable form. Most of the desired information may already be published in various reports of the Federal-State Market News Service. It is possible that a special report could be compiled which would cut across commodity lines and cover the particular markets of interest to Arizona producers. The content of this report would have to be based on requests of Arizona growers and industry committees.

Commodities Produced in Isolated Areas:

Provide better storage and transportation facilities to permit the orderly marketing of potatoes and other semi-perishable commodities grown or produced in isolated areas. This problem existed before the war but may have been aggravated by the increased production of war crops, notably potatoes. The committee feels that such facilities should be provided and managed by cooperative organizations of the producers themselves, and that producers should be given practical advice and support by cooperatives already established.

V.--OPPORTUNITIES FOR SETTLEMENT ON LAND AFTER THE WAR
(INCLUDING MILITARY LAND).

The opportunities for settlement on new lands in Arizona following the war are confined almost entirely to lands which may be brought into cultivation under new irrigation projects or extension of old projects.

New lands available for settlement implies (1) that settlement of such land is desirable and (2) that sponsoring agencies recommend settlement. The soundness of such a policy is open to question because of the uncertain nature of the agricultural situation following the war.

Two important recommendations are: (1) That a careful survey and study of the important proposals for the use of Colorado River water in the southern part of the state be made and that a portion of the funds derived from the sale of Colorado River power be made available for use with federal funds by the Bureau of Reclamation for such studies. (2) That careful selection of prospective settlers on public lands be made and that a definite "on the job" training program for ex-service men tentatively selected for settlement be undertaken.

No surplus military land of a range character in Arizona offers opportunities for settlement. Such land as may be situated in present or future irrigation areas should be regulated as to settlement.

The replacement of present owners in the immediate post-war period may offer settlement opportunities for approximately 800 families.

Breaking up of large land holdings is not recommended in view of the marked trend toward large size farms in the area.

Surplus military lands purchased or leased from range operators should be offered first to the former owner or lessee; second, to an adjacent operator; and third, to new operators in adequate operating units.

Classification of selected irrigation proposals in Arizona indicates a total of 83,000 acres for development, of which 75,500 acres are in the "A" classification and 7,500 in the "B" classification. A total of 240 new farms of 160 acres each could be provided, while 135 farms now established would benefit from developments.

If there is added to the above, acreage which it is believed will be developed on Indian reservations, the total number of possible new farms would be 510 instead of the 240 indicated above.

VI.--TENURE PROBLEMS AND THEIR SOLUTION AFTER THE WAR.

Public Lands:

1. It is recommended that measures be taken to expedite the exchange of lands in public ownership so as to simplify the tenure pattern and reduce the number of public agencies necessary for the private enterpriser to deal with.
2. The land-user should be regulated in his use of the land so as to conserve and protect the land and maintain its value.
3. Charges for the use of public lands should be consistent with the rentals of comparable lands in private ownership.
4. Leases should be drawn up to fit individual enterprises as to number of livestock and type of farming or ranching to be practiced; a renewable clause should provide for at least one year's notice in advance; livestock enterprises should be granted leases for a period of years, 10 years being suggested as desirable; rental rates based on prices and yields might provide a sliding scale of returns through good and bad years and Indian lands should be rented either with improvements already installed, or with more rigid specifications and supervision for the construction of improvements by tenants.

Mixed Ownership. It is recommended that private lands mixed with public lands be transferred among the agencies involved, and public lands likewise, so as to consolidate holdings and simplify administration. Some of these transfers can be made under present laws, but it may be advisable to add laws so as to speed up these land transfers.

Privately-Owned Farm Lands:

1. Although ownership of farms operated is emphasized as a desirable goal in Arizona agriculture, it is recommended that purchase of farms for owner-operation be delayed in the instance of new operators coming into agriculture whether from other civilian pursuits or from the armed forces. It is strongly recommended that newcomers undergo a period of apprenticeship in irrigated farming in the area in which they desire to settle, preferably serving as hired men working for successful operators. When ready to undertake the operation of a farm it is recommended that they rent land, using their resources to provide adequate equipment for the enterprise. Ownership may come later when the price of land has been adjusted to its long-time earning capacity.

2. The farm rental agreement should provide that the system of farming be profitable but non-exploitive; that a fair division of income be made between landlord and tenant through good and bad years; that reasonable assurances be made to the tenant as to possession of the farm for a number of years with adequate notice of termination; that compensation be made for the unexhausted value of improvements agreed upon and

made by tenant upon termination of the lease; that compensation be provided for disturbance of the tenant without cause and to the landlord for deterioration caused by the tenant; that in all cases the lease be written simply and clearly and properly witnessed; and that a minimum term of three years be recommended.

3. It is recommended that an intensified educational program be started now to acquaint landlords and tenants with desirable lease provisions and the need for flexible arrangements to meet changing conditions as they may come.

4. An advisory service to returning veterans and to war workers who desire to farm should be set up so as to acquaint them with desirable leasing arrangements and to advise them about getting started in agriculture.

5. Recognizing that some discharged veterans and war industry workers may prefer to become owner-operators of farm tracts, but that these individuals may be ill-equipped to compete successfully with trained farmers, it is recommended that an effort be made, either through county agricultural agents or through an extension of the state vocational education system, to train and advise new operators. It is also recommended that the easy purchase of farm units by these new owner-operators be facilitated through a system of low down payments and of minimum interest rates, setting up additional governmental machinery to handle these risks only after existing facilities have been used to the utmost.

Purchase Agreements. Purchase contracts should carry a provision allowing the purchaser to discharge his obligation as soon as able and not compelling payments over a stipulated period of time; however, purchase of farm land should be on a deed and mortgage basis instead of on purchase contracts. The repayments should be on a variable basis such as required under the Bankhead-Jones Farm-Tenant Act in order to collect higher payments when income is high and give the purchaser an opportunity to retain his farm when farm prices are low by not having to meet fixed payments.

Small-scale Farms. An intensive educational program on the serious consequences of too small farms should be started now. The help of local people can be especially enlisted in preventing an increase in the numbers of these uneconomic units. This should apply especially to the discouragement of unsound settlement promotions.

Suburban Settlement in Rural Areas. It is recommended that rural zoning be employed to control and direct settlement in subdivisions and other territory adjacent to larger centers. Zoning might be used in extending certain public utilities into farming areas.

VII.--CREDIT.

Three types of financing are involved; first, the use of commercial credit through the various types of credit agencies already available; second, the use of a partial subsidy or subsidized credit in cases where the service performed can never be expected to repay its full cost; and, third, a complete subsidy or grant.

Among objectives that will require subsidized credit may be included rehabilitation work for returning service men, land settlement plans, and some forms of industry rehabilitation. Direct grants or subsidies may be required for relief and for certain forms of education and training, and public health.

The emphasis placed upon these three types of financing depends on the will of the people and will be influenced by the economic outlook at the particular time; for naturally less subsidy is required to accomplish the same objectives in prosperous times than in times of depression. Where subsidy is necessary the social objectives should be considered in relation to the long-term welfare, including a consideration of the public tax burden due to the war. If plans are pressed too fast the cost will be excessive and waste inevitable.

Returning service men will be particularly anxious to get away from discipline and regulation. In order to win popular approval, as much of the post-war program as possible should be carried out by means of credit rather than subsidy.

There are now many more agencies serving agriculture and more types of credit available to farmers than ever before. Even should there be a recession of considerable magnitude, the present credit institutions are in sound enough condition to provide almost all the financial needs of agriculture.

It is coming to be recognized that it is unfair to agriculture to expect it to provide a place for all those who find it impossible to make a living in town. If the post-war adjustment problem of agriculture is only to help those returning from war industries and from the armed services who understand farming and desire to return to the farm, the task should not be very difficult and, in fairness to agriculture, these are the only ones who should be placed on farms. So far the history of resettlement and directed land colonization schemes has been extremely disappointing, whether they were undertaken by the government, the states, or private enterprise. The problems of resettlement and colonization are especially difficult after a war, for men unsuited to farming and knowing little or nothing of it, are likely to be attracted by the idea of a bonus free land, and then when placed in a colony are likely to resent supervision and to find cooperation difficult and irksome.

After the war, a period of receding land values is to be expected, and colonization under these conditions is even more hazardous than usual both for the project and the individual.

Extensive colonization will be necessary on the large United States Reclamation Service projects such as the Central Valley Project in California, the Grand Coulee Project in Washington, the Gila Project in Arizona, etc., and when they are opened for settlement the creation of a financial institution to help the settlers and direct the settlement will be vitally necessary. Its functions should be to finance the development of farms to the point where existing credit agencies can take over.

So many credit agencies are already in existence for the service of agriculture that the question has been raised whether a regrouping of agencies providing related types of service, should not be made to avoid duplication and provide closer cooperation. Possibly an effort should be made to group credit agencies according to subsidized and commercial credit. In this way credit policies could be more easily and clearly defined and repayment programs enforced.

In the past few years much attention has been given to the conservation of natural resources and the question has often been raised as to whether credit institutions can help by inserting restrictive clauses in their mortgages and contracts. Unless all credit institutions agreed to this practice it would work an undue hardship on those that did, and it is questionable whether very much would be accomplished in any case. Much can be accomplished in improving farm practices and in maintaining farm fertility if the banker gives proper advice and the borrower has confidence in him.

To summarize, there is plenty of credit and there seems to be almost enough credit agencies to supply the needs for a broad program of post-war development, but the most important aspect of the credit problem is coordination of the planning agencies with the credit institutions that must serve them.

VIII.--SOCIAL SECURITY.

It is recommended that the subject of social security with special reference to old age and survivors insurance and unemployment compensation be made a matter of careful examination and analysis by a committee representing the operating agriculture of the state and other parties concerned and that the present planning subcommittee postpone all recommendations respecting the proposed social security legislation until after it has studied the report of the agricultural committee.

IX.--RURAL HEALTH SERVICES AND FACILITIES.

The State of Arizona is interested in the promotion of better health for rural people. It recognizes that many of the economic ills of farm people result from physical ills. For a great many years Arizona has been a resort state with a continual influx of people suffering from respiratory diseases, particularly tuberculosis. This has created a serious health problem. The return of men and women in the armed services from all parts of the world where they have been exposed to injury and diseases, particularly of the tropics, constitutes an additional health problem.

The rural population of Arizona comprises approximately two-thirds of the state's population (1940 census). Seventeen per cent of this rural population is Indian.

The majority of physicians are concentrated in the larger towns and cities. 1*

The situation with regard to dental services is more acute. 2/

Except in concentrated areas of population the ratio of physicians to population falls below that recommended by the American Medical Association for periods of war, namely, 1:1500.

Hospital facilities are extensive, but their utilization is limited by location and restrictions in service. 3/

There are public health units in six of the fourteen counties.

A safe water supply, disposal of human and animal waste, adequate screening and a safe food supply are basic to health. 5/

It may be deduced from reports that the greatest health problems in Arizona are: venereal disease, tuberculosis, and infant mortality.

Arizona has the highest infant mortality rate in the United States. It has the highest death rate for tuberculosis in the United States. Five per cent of the young men in Arizona were rejected for military service because of tuberculosis. The average for the United States was one per cent. Arizona has the highest rate of incidence of syphilis for the white race in the United States. 4/

Many rural families are economically unable to pay for medical and dental services.

*Numbers in brackets refer to references listed at the close of Chapter IX in the body of the report.

Measures That Might Be Taken To Solve Problems:

Following the review of health services to rural families, it is the recommendation of this committee that an organized system of Health Service be developed for Arizona to assure an opportunity for adequate service to rural areas (insofar as possible equivalent to that for urban areas).

The following health services which need redistribution or amplification to make health services for rural people readily available are presented for consideration:

Medical Care. Improve effectiveness by better distribution of rural physicians; utilize a state advisory distribution committee; utilize nurses to serve patients under physician's direction.

Improve quality of medical care by supplying: dispensary facilities (health centers) in small towns; laboratory and X-ray facilities (central); records and supplies at health center.

Improve utilization of hospitals. To do this it may be necessary to effect reciprocity with the Indian Service for the use of facilities and to organize cooperative use of hospitals previously limited to special groups. Hospitals to be so organized and operated that all well qualified physicians may serve on the staff.

Dental Care To Extend Service. Utilize a state advisory distribution committee; rural communities to provide equipment at health center; consider complete dental care for all school children; with tax support.

Public Health Preventive Service.* Establish full time county or district health units to cover all rural Arizona; develop complete communicable disease control program.

To Accomplish This It Is Recommended That:

Legislation be enacted to support an adequate health program; someone be assigned to the State Public Health Service to assist communities with the organization of health programs; a sanitary engineer for rural sanitation be added to the staff of the State Department of Public Health; central water and sewerage disposal systems be extended in rural areas; protected water supplies and flush toilets where possible be provided on individual farms; there be a mosquito and fly breeding control program; the sanitary control of milk be placed under the State Department of Health (with personnel trained in milk production and sanitation); a course in rural sanitary engineering be offered by the

*In the expansion of public health services, plans for the utilization of physicians, dentists, nurses, sanitariums, etc. available from the military, need to be ready prior to their discharge.

University; veterinary service be extended to all counties; a safety engineer be added to the staff of the Extension Service; facilities and services in the field of preventative medicine be available to all doctors and free to all patients and all doctors.

Nutrition. The committee firmly believes that nutrition is the most important factor in health and recommends every development of improved nutrition.

Health Education. Utilize the services of all agencies to further the health educational program.

Ways And Means:

Methods must be adapted to communities; local leadership is essential; customary "fee-for-service" private practice arrangements inadequate in many rural areas; prepayment hospital service (Blue Cross) could be developed for hospital financing; prepayment medical service will help both physician and patient; nursing service to be financed in part by taxation; indigent care by taxation; migratory and other non-resident indigent cared for by Federal funds.

X.--POST-WAR HOUSING AND EQUIPMENT.

Situation and Problems:

Nearly 5,000 farm dwellings are in need of major repairs or remodeling. It is estimated that 2,500 new houses will be constructed to replace old houses and to put houses on new units. No specific data is available on farm buildings other than dwellings. Farm buildings need repair and replacement in approximately the same proportion as the rural dwellings. A conservative estimate of the total labor needed to construct new farm buildings and repair existing buildings is 1,500 men for one year.

There is a definite need for improving the domestic water supply on many of the farms. The 1940 census shows 16,285 of the total dwellings did not have water within 50 feet. (This is a large number even if we deduct the 8,200 Indian farms.)

In 1940, 9,542 of the 26,392 occupied dwellings had electricity. Through REA many more farm dwellings in the southeastern part of the state now have electricity.

The amount of equipment purchased will depend to a very great extent on the extension of electricity to farms. It is estimated that 5,000 to 6,000 each of the following items will be purchased in the first two years after the war, if available: refrigerators, stoves, radios, electric irons, sewing machines, washing machines and sets of furniture.

Varied quantities of the following items will be in demand: 2,000 to 3,000 mangles, 2,000 to 3,000 coolers, freezing units sufficient to provide 6,000 to 7,000 lockers, and 1,000 to 2,000 pressure cookers.

Recommendations:

1. That utilities, water, electricity, sewerage and gas line be extended to areas adjacent to cities to encourage a better type of housing. Too many rural slums have and are developing near cities due to the fact that people who can afford better homes do not build because of lack of these facilities.
2. That areas adjacent to cities be zoned to prevent shack towns and rural slums. An example of this situation is the present inadequate housing under construction on over-valued land south of Phoenix.
3. Research in farm housing design. That is, that a rural architecture be developed which includes the things farm families want and need; ample storage space, accessible front doors, kitchens placed so that they are not thoroughfares, running hot and cold water, electricity, central heating plant and cooling plant in southern areas, sewerage disposal away from the house, kitchen with sink and drain, bathroom with toilet, wash basin, shower and tub.
4. Standardization of design and pre-fabrication; (assembly-line type of production for small economic units).
5. Extension of electricity to rural areas. This extension of REA where electricity is not now available is needed so rural women can have the necessary household equipment; farm type freezer lockers, refrigerators, washers, mangles, vacuum sweepers, and irons.
6. That farmstead water be developed which is adequate and safe and under pressure so flush toilets can be provided. That when possible and feasible central water systems be developed.
7. That farmers be encouraged to provide adequate housing for their steady men.
8. That farmers be encouraged to construct at least minimum housing for the seasonal laborers needed.
9. That competent farmers on uneconomic units be assisted to purchase additional land so the farm income will be sufficient to support minimum adequate housing.
10. That farmers on small farms be provided with credit to finance needed housing.

XI.--RURAL ELECTRIFICATION.

With modern methods of construction there are no reasons why a large number of farms and rural communities of this state should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased crop and livestock production for home use and for commercial markets, thus increasing the real income of the farmers. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards.

At present, about 41 per cent of Arizona farms, including ranches and Indian farms have central station service. This represents a tremendous advance in the short period of 8 years since 1935, when 29 per cent of Arizona farms enjoyed electric service. However, there are approximately 40,000 rural farms and non-farm dwelling units in the state, including small towns, isolated ranches and Indian farms, without electric service. The possibility of expansion of power lines to serve a large number of farms immediately after the war and during the long range period is great. There are, however, some isolated communities, farms, and ranches, which will have to depend upon their own home power plants for electric power, as the construction of power lines to serve these would not be feasible.

The estimates of additional rural electrification needs and costs between now and the end of the war, the transition period immediately following the war when materials and labor become available for intensified construction and for the post-war program of rural electrification are as follows:

1. Between now and end of war:

Service drops, farmstead wiring, farm and home equipment and plumbing.	\$	8,620	2,800 man hrs.
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2. Transition Period:

305 miles line construction, 709 potential customers, farmstead wiring, farm and home equipment, and plumbing.	763,700	185,500	" "
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3. Long-time Post-War Period:

21,163 miles line construction, 23,396 potential customers, farmstead wiring, farm and home equipment, and plumbing.	<u>22,071,000</u>	<u>5,774,200</u>	" "
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TOTAL	\$22,843,320	5,962,500	" "
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The purpose of this section of the Arizona State Report is to report and describe the present status of rural electrification in the immediate and long-range post-war period so that the following objectives may be attained for the state as a whole:

1. Extension of central station electric service at low cost non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available.

2. Optimum application of electricity to farm production and farm family living.

3. Optimum use of electricity in rural communities for economic, cultural, and social advancement.

4. Use of electric power for development of rural industries whenever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

XII.--NUTRITION.

Food Production and Consumption:

1. With possible increased demand for foods of high energy content and high biological protein value special provision should be made for protective foods such as milk, eggs, citrus fruits and vegetables.

2. The pinto and frijole bean should be continued as the basis upon which an adequate diet is planned for the majority of the population on low income.

3. Food distribution should be regulated so that protective foods such as citrus fruits shall be made available as many months of the year as possible in areas which do not grow them throughout the year.

4. Plan locally grown produce to supplement scarcities of protective foods and where justified encourage family cows and chickens.

Family Income and Expenditure For Food:

1. Study food patterns and habits of population groups and compare with accepted standards.

2. Data are needed on family income and part spent for food; what foods and how much are produced, purchased and consumed by urban and rural families of varying size, composition and racial habits.

3. Analyze present buying habits and type of information concerning foods that should be available at the place of purchase.

4. Provide legislation that would (1) result in greater satisfaction from the food dollar such as compulsory grade labeling, (2) better enforcement of weights and measures, (3) protect the consumer's health and purse by prohibiting adulteration and misbranding of foods manufactured or processed and sold within the state, (4) provide stricter regulation of sanitary conditions for food processing and setting of standard sizes for packaged foods so price advantage of larger quantities could be more easily computed.

Determination of Nutritional Status In Public Health:

Facilities in health clinics should be extended for clinical analyses of blood and urine and other nutritional tests.

Nutrition Education in a Community:

1. The public should be made aware of the importance of nutrition education to everyone.

2. Information should be adapted to the particular group concerned.

3. An informed individual should feel responsibility for teaching others.

4. The public should be made aware of the importance of having the school lunch program available to all children.

5. A nutrition course should be required for all in higher education and incorporated as an important part of the health program at the elementary level, beginning with the first grade, with support by a proper supervisory staff to help the classroom teachers set goals and adapt teaching aids to various age levels.

6. Homemaking teachers should be engaged to teach homemaking subjects to the full extent of their time instead of subjects for which they are not prepared.

7. Educational work of all agencies should be correlated especially at the adult level.

School Lunch Program:

1. The school lunch should be made an integral part of the elementary and high school health program available to all.

2. It should be produced and served under accepted standards of sanitation and supported by state and local legislation to the extent that it is always nutritionally adequate by carrying its quota of the day's requirement.

3. Educate the parent, public and school authorities concerning this program.

4. In providing food, include conservation of seasonal abundance at community and commercial processing plants, use of intrastate exchange and increased local production.

5. Include basic training in administration of school lunch as a part of the home economics curriculum at the higher levels.

Nutrition of Industrial Workers:

Place all cafeterias and other food units under plant management on a nonprofit basis and under the supervision of a dietitian who will (1) increase nutritional value of meals served at the plant and decrease overhead, (2) advise employees and their families on intelligent buying and dietary planning in order to raise the level of inadequate diets with natural foods and supplement with vitamin concentrates only in special cases, (3) educate by means of classes, demonstrations, posters, the plant newspaper and pamphlets, (4) encourage the use of fortified food products where advisable such as enriched flour and bread, iodized salt, and vitamin A fortified margarine.

Nutritional Research:

1. There will be a tendency to swing from the popular or applied

type of research now restricted to a certain extent to problems of immediate concern to that of a more fundamental and basic type.

2. New vitamins and other essential nutrients will be discovered and their interrelationship investigated.

3. New methods of assay and more exact information concerning human dietary requirements will be sought.

4. Emphasis should be placed, from the nutritional point of view, upon food quality rather than mass production of mediocre quality.

5. Further investigation should be made of the effect on vitamin content by food processing methods such as dehydration and storage, quick freezing, large quantity cooking, use of pressure sauce pans and electrical cooking by means of induction or high frequency waves.

6. Closer interdepartmental planning should be organized and projects kept flexible in nature to permit shifting of endeavor to attack problems not foreseen at the time of planning.

XIII.--SURPLUS MILITARY SUPPLIES AND EQUIPMENT

Owing to wartime restrictions it has not been possible to keep up adequate repair or replacement of agriculture equipment and supplies. Consequently, at the end of the war the demand for these goods will be great. This will be manifest in two ways, (1) replacements for necessary going pursuits and (2) equipment and supplies for needed and worthwhile additional pursuits. Necessary work projects of a public-benefit character are considered an especially appropriate type of enterprise for use of surplus military equipment.

In order to continue uninterruptedly necessary agriculture enterprises during the post-war period, therefore, appropriate amounts of surplus military supplies and equipment must be apportioned to agriculture. The extent of these is outlined in the accompanying tabulations.

In disposing of surplus military supplies and equipment, it is recommended that:

1. All usable supplies and equipment be put to use and not destroyed.

2. They be apportioned through responsible agencies at reasonable costs, care being exercised to avoid excessive profit to some, discrimination and unfair distribution policies to others.

XIV.--AGRICULTURAL INDUSTRIAL RELATIONS AND RURAL INDUSTRIES.

The establishment of industries is made possible by power facilities, capital, transportation, and raw materials. Most industries developed in rural communities will be small; the majority will be engaged in processing raw materials of the area. Rural industries easily applicable to Arizona, some of which are already established, include: cotton gins, small textile plants, saw mills, box factories, woodworking mills, alfalfa mills, citrus packing plants.

Labor problems will become less acute because of the improvement in travel facilities. Returning service men will be seeking new frontiers. One such new frontier may be found in the development of rural industries.

Transportation problems are dependent upon the type of industry to a large extent, but truck transportation will provide a convenient answer to this problem. Furthermore, transportation of the finished product is likely to be less expensive than transportation of the raw material.

The most encouraging factor in the probable industrial development of Arizona is in connection with the new sources of electric power. Arizona has access to 17.6 per cent of the total energy generated at Boulder Dam. This output may be added to the output of numerous other hydro-electric developments. By combined effort and purchasing ability, farms and industries can enjoy electricity in areas where it could not be economically obtained otherwise.

CHAPTER II.--DEVELOPMENT AND CONSERVATION OF PHYSICAL RESOURCES.

This chapter was compiled by the following subcommittee; A. F. Kinnison, Soil Conservation Service, Chairman; Cecil Miller, State Farm Bureau; O. C. Williams, State Land Commissioner; Raymond Price, Southwest Forest & Range Experiment Station.

A.--CROP AND PASTURE LAND

Situation and Trends:

Slightly more than one per cent of the land area in the state is devoted to farming, yet this resource embraces one of the leading industries of the state and provides a livelihood for thousands of people. The 1940 U. S. Census shows 11,822 farms reporting 525,974 acres of crop land harvested in the 1939 crop season. In addition, there were 43,683 acres of crop failure, 161,475 acres idle or fallow, and 104,092 acres devoted to irrigated pasture, a total of 835,324 acres devoted to the production of crops and irrigated pasture.

Irrigated Land. Seven-eighths of Arizona's total cropland, or nearly 700,000 acres are devoted to irrigated crop production. Most of this lies in the alluvial valleys of the Gila, Salt, Verde, Santa Cruz, and Colorado Rivers. These lands are relatively level and of widely variable soil types, loams being predominant. While the majority of the state's irrigated land is supplied gravity water from storage reservoirs or by direct stream diversion, some 200,000 acres are dependent solely upon pumped ground water and most of the remaining acreage has a supplemental pump water supply.

High prices and increased demand for agricultural production has caused an increase in acreage of irrigated land, primarily through increased pumping facilities. While the soil is deep and productive in most of the new areas, the limitations and depletion of ground water supplies will force the retirement of much if not all of the expanded acreage.

Approximately 28,000 acres of irrigated cropland lies in relatively small farms scattered throughout the northern part of the state, some lying within the Navajo and Hopi Indian Reservations. This acreage is relatively steep land of more variable soil types, much of which is shallow.

Dry Farm Land. An estimated 100,000 acres in Arizona are devoted to dry land agriculture. This is located in the northern part of Arizona in higher rainfall areas. A large portion of it is within the Navajo and Hopi Indian Reservations. Other important areas are located in Coconino County; near Showlow, Aripine, and Heber, in Navajo County; and near Vernon, Greer, and Alpine in Apache County.

Increased goals with satisfactory prices for agricultural crops, principally of beans and potatoes, has led to an increase of some 2,000 to 5,000 acres of cultivated dry farm land. Much of this acreage is unsuited to permanent crop production because of steepness of slope, shallow soil and uncertainty of adequate precipitation.

Size of Farms. The dry farm area is divided into farms more commonly from 160 to 500 acres in size. Some larger units and many of smaller acreage are operated in conjunction with range livestock production to supply supplemental feed for livestock grazed on range and forest lands. The irrigated farms in the outlying irrigated areas such as Chino Valley, the Upper Verde, the Winslow-Springerville area, San Simon, Whitewater Draw, and along the San Pedro are predominantly small in size. A limited amount of water or of suitable land, opportunities for part-time industrial employment and various other factors account for the small units in these areas. In the Upper Gila Valley, along the Santa Cruz, and elsewhere the irrigated farms are on the average larger. Although the restrictions under reclamation projects such as in the Salt River and Yuma Valleys limit the size of farms under one ownership, there are numerous quite large corporation and individually operated units. High capital investment and operating costs, efficient mechanization, and industrial type farming operations have been responsible for trends toward larger operating units in the lower irrigated valleys of the state.

The type of agriculture or crop grown will to a large extent determine the most economical size of farm. A citrus orchard of 20 to 40 acres may be an adequate unit, whereas where feed and fiber crops are grown, 160 acres constitutes a near minimum economic unit. The relatively higher cost of pump irrigation water has resulted in the production of cash crops and a minimum of crop diversification in areas limited to water from this source.

Condition of Crop and Pasture Lands. Demands for the production of war crops caused a shift from alfalfa, the state's chief soil building crop, to cotton and other soil depleting crops. Limitations on availability of commercial fertilizer together with a shortage of labor for the application of available barnyard manure has resulted in a partial depletion of soil fertility in many areas. There is now a definite trend replacing cotton with alfalfa which will result in improved soil fertility but at the expense of an increased water requirement.

The larger irrigation districts, because of organization, availability of war prisoner labor, and other factors have been able to maintain their facilities in relatively good condition. Improvements have been limited due to shortage of materials and other restrictions. The small mutual ditch companies, which ordinarily accomplished their maintenance through a division of labor among members, are not in such a fortunate position. Lack of available labor has been the most important contributing factor to deferred maintenance and improvement. Facilities, are, therefore, in a much poorer condition than at the beginning of the war.

Due to reduced labor requirements in handling the crop, there has been a definite tendency to increase pasture plantings.

Land Development. The reclamation of additional acreage on the Yuma Mesa now in progress represents the largest single new land development in the state during the war period. However, in various sections principally irrigated by pumping there has been significant increases in cultivated acreages. Examples of this are found in Deer Valley, Queen Creek, along the Upper Santa Cruz, and in the Eloy-Maricopa area. Due to decreasing ground water supplies there is already a trend toward retiring a portion of the pump developments. In the dry farm area between 2,000 and 5,000 acres of new land have been brought into cultivation.

Problems and Remedies:

Objectives. To maintain and develop the cropland resources within the state it will be necessary or advisable:

A.--For Irrigated Lands

1. To rehabilitate and maintain irrigation reservoirs, diversion structures, main irrigation distribution systems and farm laterals.
2. To promote, through land leveling and the use of efficient irrigation practices, the conservation of soil, water, and soil fertility to insure the safe use of land to the limit of its productive capabilities and availability of water.
3. To encourage where economically feasible, the drainage and leaching of land that can be made suitable for agricultural use through this means.
4. To promote improvement and maintenance of soil fertility through crop rotations and the use of green manure and cover crops supplemented by the application of barnyard manure and commercial fertilizers as required.
5. To promote the control and eradication of noxious farm weeds, crop plant diseases, and destructive rodents.
6. To encourage the production of new, adapted crops of improved strains or varieties of crops through crop and seed selection and certification.
7. To promote the planting of irrigated pasture on farm lands adapted to its use to encourage more economical feed production and diversified farming.

8. To develop additional land where sufficient water is provided for its permanent use as irrigated cultivated land.

9. To retire land that is submarginal, due to excessive slope, or of low productive capability in order that water now used by such land can be made available to land more suitable for cultivation.

B.--For Dry Farm Lands

1. To promote the application of proper cultural practices together with wind and water erosion control practices so as to secure maximum production through conservation.

2. To promote the use of land to its highest productive capabilities, retiring and revegetating submarginal crop lands for the production of livestock feed, substituting other land within a farm unit more suitable for cultivated crop production.

3. To promote the control and eradication of noxious farm weeds, crop plant disease, and destructive rodents.

Agricultural Practices. In general the agricultural practices in the larger irrigation districts are good, although refinement in the use of irrigation water would result in more efficient use of existing supplies. There is a need of more intensive control measures of rodents and noxious weeds. Good crop rotations are the rule. Large as well as small units utilize services of custom tillage and harvesting operators.

In the smaller irrigation districts, on the outlying dry farm land and in other local areas, the lack of equipment, suitable demonstrations and understanding and interest of the people has resulted in the use of relatively poor farming and conservation practices. These are indicated by poor crop rotations, single cropping, untimely tillage, waste of irrigation water, accelerated erosion, and other factors that tend toward lower crop yields, and the prevalence of noxious weeds and destructive rodents.

Conservation problems and Remedies. The conservation of water presents a problem on all irrigated lands in the state, more serious on steeper irrigated lands due to loss of soil and soil fertility. The topography of the land, the texture of the soil, the amount of and intensity of rainfall or application of irrigation water, the character of the crop cover, and the cultural practices applied are all factors affecting soil losses through erosion.

Approximately 250,000 acres of irrigated land and 30,000 acres of dry farm land require the application of one or more important conservation measures if they are to remain highly productive. The application of more simple measures will improve the productivity of an additional 100,000 to 200,000 acres.

The most needed conservation measures on irrigated land include land leveling, irrigation system improvement, more efficient application of irrigation water, adjusted gradient and length of irrigation runs and the adoption of improved soil building practices.

The releveled of irrigated fields and irrigation borders is an especially important and widely needed conservation practice. This work can best be done during a between-crops period and will constitute a relatively long-time program. When completed, cropland so treated will produce higher crop yields at a saving of labor and irrigation water.

On dry farm land, a large portion of which lies in relatively low rainfall areas, the problem of water conservation is of prime importance. The natural rainfall, if retained on the land, is none too adequate for crop production. Practices that promote retention of water also reduce runoff and consequent water erosion. Contour cultivation, construction of terraces, crop residue management, and strip cropping are all measures that will promote the conservation of the resource and improve crop yields.

Erosion damage to croplands from flood water along streams as it carries away parts of farms and washes across the land, and from headcuts caused by waste irrigation water, is a prevalent, widespread condition which will lend itself to appropriate remedial measures to be applied in a post war period. Bank protection, diversion, and/or detention of flood waters, gully control, installation of soil saving dikes and similar practices are needed for this type of conservation work.

Soil fertility can be improved and maintained through more suitable crop rotation, the application of barnyard and commercial fertilizers, and the production and use of green manure and cover crops. The loss of soil fertility through leaching and erosion can be reduced by the adoption of appropriate conservation practices.

It is recognized that each farm presents distinctive management and conservation problems due to differences in soil characteristics, water supply, type of farming enterprise, and the managerial ability and financial status of the operator. A farm conservation program must therefore be developed primarily by the operator himself and be based on a field by field, farm by farm study that takes into account past use, present conditions, and future production capabilities of the land. Progress on the cropland conservation program can be greatly accelerated when labor, materials, and other facilities become more readily available after the war.

Land Use Adjustments. There are from 20,000 to 50,000 acres of land now cultivated that are not suitable for permanent farming. These include dry farm lands of excessive slope, shallow soils, or for some other reason are submarginal, and irrigated lands with insufficient water,

high soil or water salinity or are otherwise of low productive capability. In many instances land more suitable for permanent farming use is available. It would appear advisable to retire and revegetate submarginal lands and to develop suitable additional adjacent land where possible. Each individual area will present a different problem.

The development of new irrigated land other than that to replace retired land, will be dependent upon the availability of future water supplies. It is recommended, however, that new developments recognize all necessary erosion and flood control measures at the time the land is reclaimed from the desert; further, that development be based upon the productive capability of the land.

Soil Conservation Districts. There are 13 state soil conservation districts organized and operating in widely distributed farming communities of the state. These embrace more than 120,000 acres of farm land. Interested farm groups indicate the probable formation of an additional 10 to 12 districts in the next 3 years. Since soil conservation districts are legal subdivisions of the state government, they serve as a means of coordinating the efforts of farmers in attacking their soil and water conservation and land use problems. They are empowered by the State Soil Conservation Districts Law through cooperation between land owners and local, state, or federal agencies to conduct operations for natural resource conservation.

Neither county or state governments support district conservation work. The existing law does not allow for voluntary inclusion of other than cultivated lands. In many instances protection of farm lands from flood and erosion damage is dependent upon work or structures on range and watershed lands above. Such work is prohibited under the existing law. Often the land under question is range land owned or controlled by resident land owners within a soil conservation district.

A study of the present state enabling act should be jointly undertaken by irrigated land owners, irrigation organization officials, and range and watershed land users to determine its adequacy in meeting the conservation needs of the state without injury to the interests of any group dependent upon the land and water resource.

Research and Field Studies. Through the University of Arizona Agricultural Experiment Station and its experimental farms much valuable information on crop production, fertilizer practices, duty of irrigation water, plant disease control, and many other problems, is developed and disseminated through the Arizona Agricultural Extension Service. This type of work is invaluable to the State's agriculture and should be continued and expanded.

Additional study, information, and demonstration are needed on:

1. Efficient use of irrigation water.
2. Application of green manure and cover crops.

3. Improved cultural practices such as crop residue management, subsoiling, subsurface tillage, etc.
4. Improved varieties and strains of crops.
5. Control of noxious weeds, diseases and rodents.

Water Supplies and Development. Water is available to agriculture in Arizona as direct precipitation for the production of vegetative cover and dry land crops on watershed areas, as stream or flood water flow diverted or stored for irrigation and range livestock, or as infiltrated ground water for pump irrigation. Irrespective of source or use, it constitutes an inseparable unit limited quantitatively by physical factors chiefly climate and topography.

Water rather than land is the limiting factor in the maintenance and expansion of Arizona's agricultural industry. Its use for irrigated agriculture is limited to the principal river basins of the state, i.e., the Gila and its principal tributaries, the Little Colorado, and the Colorado direct.

The major irrigation project developments of the state provide adequate storage, diversion, and distribution facilities for the lands they serve. Yet heavy flood damages frequently occur on some of these areas since highly improved irrigated farms, urban and industrial developments now occupy former natural flood plains with little or no provision for retardation, diversion, or passing flood water originating on watershed lands above.

Many smaller cooperative and mutual irrigation enterprises, diversions, storage and distribution systems throughout the state have been improved but little since they were pioneered 50 to 70 years ago. Annual maintenance of temporary diversions and headings damaged by numerous flood flows is a continual drain on limited resources of relatively low income water users.

In some areas of the state present irrigation water supplies are inadequate to irrigate sufficient land to support the fixed, dependent population. Additional storage facilities are needed on several segments of the Little Colorado River basin, improvement of facilities to prevent excessive water losses are required on Granite Creek in Yavapai County, and the Upper Gila Valley water supply requires stabilization through storage of decree water. Most of these needs, among others, are the subject of water conservation and utilization project surveys by the Bureau of Reclamation of the Department of Interior.

Ground water supplies for irrigation are increasingly overdrawn in several important agricultural areas of Southern Arizona. Neither present utilization or further development of this water resource is subject to control under state water laws. Except as some present pump irrigated acreage is retired from production, or supplemental gravity water is available, abandonment of several thousand acres of highly productive land is inevitable.

Water management problems in Arizona should be approached on a drainage basin basis if complete economic development and use of available water is attained and if the state's agricultural industry and irrigation facilities are stabilized and protected from deterioration. Only through this approach can mutual understanding be attained by all classes of water users on the interrelationships and interdependency between watershed areas and irrigated agricultural areas.

Future water developments for agricultural use in Arizona should 1) provide for a supplemental supply as required for existing developed areas, 2) develop new irrigation projects on lands close to the source of the water supply, and 3) permit the reclamation of new lands within the body of existing irrigated areas.

Additional irrigation water should be made available only to land of high potential productive capability and which can be prepared for efficient irrigation at a relatively low cost. Such supply will come principally from the state's allocation of Colorado River water. The quantity available is now or shortly will be definitely known. At no time in the future can the state expect additional water from any source. Plans for the use of this water, therefore, should consider the maximum feasible multiple-use projects that will most completely serve the needs of the state's present and future population.

Flood water essential through diversion or storage for the state's irrigated agriculture requires control to reduce and ultimately eliminate excessive soil erosion, sedimentation of streams and reservoirs, and damage to agricultural land and improvements, urban, utility, transportation, and industrial property. This will require flood water and silt detention structures on the major streams and tributaries, minor water flow retardation and erosion control structures on critical flood source areas, the maintenance of adequate vegetative cover on watershed lands, the construction and maintenance of flood water channels on numerous ephemeral streams, flood water protection dikes, stream bank erosion control, and related practices.

Additional field experimentation is required to determine irrigation practices best adapted to the many soil types and crops of the state for the most economical and conservative use of irrigation water in sustained maximum crop production.

An urgent need exists for more widespread educational and field demonstrational work by the State Extension Service on irrigation, soil and water conservation practices.

The completion of overall surveys and plans for flood control on Arizona's river basins by the Departments of War and Agriculture, interrupted by the war, is essential for the initiation of flood control operations except upon a local emergency basis.

Action Plans and Projects:

Legislation required to facilitate the full development and protection of the state's land and water resources should include:

1. The enactment of a ground water code and the adjudication of all existing water rights.
2. Appropriation of state funds logically from current revenues from Colorado River developments for use by the state in undertaking engineering surveys in cooperation with the Federal Government to determine the most feasible, complete, multiple-purpose, self-liquidating developments for the utilization of additional Colorado River water.
3. A joint study of the State Soil Conservation Districts Enabling Act should be undertaken by the several classes of land and water users to determine its adequacy in meeting the state's soil and water conservation and resource development problems.

The rapid completion of soil and conservation surveys of agricultural areas of the state jointly undertaken by the Department of Agriculture and the State Experiment Station is required to provide an intelligent guide to the land users in the application of soil and water conservation practices.

A preliminary list of conservation practice needs, flood control, erosion control and irrigation facilities development and improvement projects is presented as a supplement to this report. This work in the aggregate will be included in the programs of various local and state groups and agencies such as mutual water companies and associations, irrigation districts, and soil conservation districts. Work should start on urgently needed rehabilitation and protection projects as soon as labor, equipment, and materials are available in the early demobilization period. Land owners and local agencies will finance the majority of this type of work and plans for a number of projects are complete. Conservation practice programs requiring a longer period for application will be progressively undertaken by land owners as conditions permit. Larger developments in flood control and reclamation will no doubt be planned and undertaken cooperatively between Federal and State agencies of government. Survey and planning work on these should now be in progress.

A list of equipment most urgently needed in undertaking soil and water conservation programs in the state and which may possibly be available as surplus to later military requirements has been prepared for inclusion in another section of the state report.

CONSERVATION IMPROVEMENTS FOR CROP AND PASTURE LAND

Class of Improvements	Units		Ratio of Labor Cost To Total Cost (PerCent)			Employment (in Years)		
	Acres, Miles, Feet, etc.		Non-Federal	Federal (Tech (Ser-vice))	Total Labor	Non-Federal Labor	Federal Labor 1/	Total Labor
Activities	Crop Lands Include Irrigated Pastures		Non-Federal	Federal (Tech (Ser-vice))	Total Labor	Non-Federal Labor	Federal Labor 1/	Total Labor
Contour Cultivation	50,000 acres	xx	Not	computed	(Normal Farm Oper.)			
Crop Residue Mgt.	10,000 "	xx	"	"	"	"	"	"
Crop Rotations	225,000 "	xx	"	"	"	"	"	"
Green Manure	100,000 "	xx	"	"	"	"	"	"
Strip Cropping	50,000 "	xx	"	"	"	"	"	"
*Weed Control	400,000 "	48	2	50	192	8	200	
*Rodent Control	350,000 "	48	2	50	84	3	87	
Terraces	2,400 miles	32	3	35	61	6	67	
Subsoiling	25,000 acres	33	2	35	7	1	8	
*Gully Control	2,000 "	38	5	43	190	25	215	
*Stream Bank Protection/Channelization	200 miles	35	5	40	1,050	150	1,200	
Windbreak	500 acres	38	2	40	7	1	8	
*Drainage	30,000 "	30	5	35	450	75	525	
Irr. Pasture	20,000 "	20	0	20	29	1	30	
*Irr. Imp. Systems	10 proj.	31	4	35	106	12	118	
*Flood Control	6 "	37	4	41	505	56	561	
Subjugation ^{2/} / _{3/}	50,000 acres	35	5	40	875	125	1,000	
Seeding Retired Land	50,000 "	25	0	25	31	1	32	
Land Leveling	300,000 "	32	3	35	1,890	210	2,100	
*Irr. Structure (Field)	140,000 "	45	5	50	945	105	1,050	
TOTAL					6,422	779	7,201	

10 to 15 per cent can be accomplished during the demobilization period.

*Practices that will lend themselves to use of surplus labor.

1/ Mostly technical services.

2/ Subjugation to replace retired acreages usually within same farm units.

3/ Estimates for subjugation of land under Colorado River development have not been included.

B - RANGE LAND

Situations and Trends

1. The Range Resource

Size, location, and control. Range lands, including forested range, comprise about 85 percent, or 61,660,000 acres, of the total land area of Arizona. Extensive areas are used year long, seasonally, or excluded from grazing.

The land status of Arizona is characterized by the predominance of publicly controlled lands, consequently extensive areas of range are subject to some form of public administration, 65 percent being under Federal jurisdiction, and 12 percent State lands.

Major uses and benefits. The raising of livestock constitutes one of Arizona's chief industries, which in 1942 yielded over 35 million dollars. Although the major use of the range areas is for the grazing of domestic livestock, big game and other wildlife year by year yield an ever-increasing return from the viewpoint of both recreation and economic consideration.

During the 10-year period 1932-41 the average number of cattle in the State was 911,000 head. For the same period, there were 890,000 head of sheep and 250,000 head of goats (chiefly for mohair).

Significance of range ownership. With nearly 80 percent of the land under some form of public jurisdiction, major responsibility for administration and improvement rests with the public and the administrative agency concerned. Although much has been accomplished by the various public agencies in land exchange, there still remains much to be done in blocking out areas suitable for management.

2. Range Values and Dependencies

Climate. The climate of Arizona is typically continental, covering a temperature range from sub-tropical in the low, hot valleys to sub-arctic on the higher mountain crests. The variations in elevation and rainfall are indicated in Table 1.

Vegetation and soils. Because of the major variations in climate, which are often found within relatively small areas, there are correspondingly great changes in the character of the vegetation. Furthermore, because of the wide variation in climate, erosion conditions, and use as well as diversity of parent material, the soils are as variable as the vegetation.

Table 1.— Vegetation-rainfall-use relationships^{1/}

Types	Pct. of total area	Elev. range Feet	Yearly rain-fall Inches	Prominent species	Period of use		
FOREST 33%				Firs Spruces Pines Aspen Gambel oak	Mountain muhly Ariz.fescue Pine drop- seed		
	Douglas-fir	8	6,000-12,000	21-35		Summer	
	Yellow pine						
	Pinon	17	5,000-7,000	12-15	Pinon Junipers Algerita	Bluestem Blue grama Galleta	Year long
	Juniper				Turbinella oaks Sumacs	Under cover of	Year long
	Chaparral	8	4,000-5,500	13-16	Algerita Manzanita Cliff rose	perennial grasses	Year long
	Short grass (Plains)	15	4,500-6,500	10-14	Blue grama Galleta Threeawn grasses Sacaton	Winterfat Soapweed Rabbitbrush Snakeweed	Year long
	Mesquite grass (Desert)	10	3,200-5,000	14-18	Curly-mesquite Emory oak Mesquite Tobosa Threeawn grasses	Gramas Hairy Slender Rothrock Black Sacaton	Year long
	Sagebrush	6	2,500-5,000	7-9	Sagebrush Yucca	Blackbrush Blue grama	Winter
	Paloverde	11	500-3,500	3-11	Paloverde Prickly- pears Bursage Catclaws Mesquite	Chollas Sahuaro Ocotillo Rothrock grama	Not de- pendable for year- long use.
Cacti						Use pri-	
Creosotebush				Creosotebush Saltbushes		marily in winter and	
Saltbush, in- cluding mes- quite	11 25	137-3,000	3-11	Sixweeks Alfilaria Indianwheat	gramas	spring.	

^{1/} Adapted from Univ. of Ariz. Tech. Bul. 68.

Watershed and dependent irrigated lands. Much of the higher elevation range lands in the State, in addition to the contribution of forage essential to livestock production, are also the source of water. On the other hand, the lower altitudinal ranges are important silt-contributing areas. Arizona's economy, which is based largely on irrigation agriculture, range livestock, production of electric power, mining, lumber, and recreation, is characterized by a pattern of land relationships wherein comparatively small areas of water-consuming lands are dependent upon extensive tracts of water-yielding lands. Uncontrolled flow from range lands causes severe annual flood damage to irrigation systems, municipalities, highways, railroads, and other public and private property. The degree and manner of livestock use on these range areas bears a direct relationship to water yield, soil erosion, sedimentation, and flood hazards.

Value of livestock industry. Before the war, in 1937, income from livestock and livestock products in Arizona amounted to \$20,639,000, or 38 percent of the total income of \$53,793,000, with the price index 114 (using 100 as the average of prices from August 1909 to July 1914). During the war year of 1942, the income from the livestock industry amounted to about 35 million dollars, or about one-third of the total cash income from Arizona farms and ranches. Of this amount, about 30 million dollars were realized from the sale of cattle and calves, less cost of feeder cattle brought in from outside the State. Exact marketing figures on sheep and lambs are not available. But in 1942 the total wool clip was $4\frac{1}{2}$ million pounds valued at 34 cents per pound.

3. Range Use

Ever since the earliest days of the industry, the raising of livestock has generally been a large-scale enterprise. The principal reason for this in the cattle industry is due to the relatively large acreage required to support a cow year long. In the sheep industry, an additional factor enters the picture—predatory animals; because of this the herder system is required, which is not economic for bands of less than 1,000 sheep. Because of the preponderance of publicly owned or controlled lands, together with the extensive acreage required for an economical ranching enterprise, it is not unusual for a ranch operator to require varied governmental lands in addition to his private holdings.

4. Condition of the Range and Improvements

In the range areas the susceptibility of soils to erosion is affected largely by grazing and other land uses, topography, vegetational protection, rainfall, soil texture, and other factors. A broad classification of soils according to susceptibility to erosion and deterioration indicates that 97 percent of the range area is subject to deterioration. In addition to careful management on the whole area, some mechanical control will be needed for local areas.

Conservation programs conducted since the early 1930's, through the AAA, Soil Conservation Service, Forest Service, Grazing Service, State Land Department, Arizona Extension Service, and others, have contributed to more general appreciation of the nature and extent of the range problem. Overuse on extensive areas in the decades previous to and in many instances since that time has resulted in deterioration of the range resource with its attendant prevalence of unpalatable and undesirable plants replacing the more desirable ones, and a reduced plant cover resulting in accelerated sheet and gully erosion with loss of fertile topsoil.

Many range improvements have been installed by ranchers under the AAA program in cooperation either with the Soil Conservation Service or Forest Service, or Grazing Service, or at their own expense entirely. On Federally controlled land a great many improvements have been installed by CCC camps and other emergency public works. Due to the war and the consequent shortage of labor, materials, equipment, and supplies, adequate maintenance has not been possible and additional needed improvements have, in general, not been possible. While much of this work does not seriously affect immediate production, it is definitely needed and should receive high priority in the post-war period.

Situation at end of war. The situation at the end of the war, as it will affect the livestock industry in Arizona, is dependent on a number of factors. Foremost among these are: (1) length of the war; (2) domestic and export demand for meat and other livestock products; (3) livestock population; (4) status of lend-lease at end of war; (5) speed of demobilization and its effect on employment; (6) rate of reorientation of industry from war materials to consumer goods; (7) establishment and maintenance of "floors" on prices; (8) individual rancher's financial encumbrances. No one knows what the situation will be and most anything can happen. For example, with the tremendous numbers of livestock now on hand for the country as a whole, a widespread reduction in the demand for livestock products accompanied by lowering of price levels could have disastrous results. It is safe to say that the ranch operator whose management and policy of stocking permit the most efficient production will be in the most enviable position at the end of the war. It is certain, too, that in order to avoid a repetition of the chaotic conditions and range abuse which followed the first World War, a general over-all reduction in livestock numbers is imperative.

Problems and Remedies

1. Objectives

The primary objectives to be attained in connection with the range problems and their remedies are as follows:

1. To secure and maintain the highest practicable production of range forage.
2. To secure and maintain the highest practicable livestock production.

In order to obtain these two major objectives, it is necessary:

3. To retain or encourage establishment of more desirable forage species on each range area.
4. To maintain the highest plant vigor possible in the course of grazing.
5. To check or prevent excessive erosion or water run-off.
6. To recognize the multiple-use characteristics of the land resource for grazing, watersheds, recreation, wildlife, water power, and timber.

In the attainment of the objectives stated above, the following principles should be closely adhered to:

1. Needed adjustments should be made in a democratic manner with the help and guidance of agricultural research, education, and extension.
2. Encourage private initiative. However, in the case of public lands, major responsibility for improvement of range conditions rests with the agency concerned.
3. Secure closer cooperation between the various agencies as well as between these agencies and the range users.

2. Range and Use Problems

Degree of range use. The management goal on range lands in most cases is identical with that on watersheds and is attained only when grazing use is conservative.

During the past half century too heavy grazing combined with recurrent drought has resulted in extensive areas of range deterioration characterized by accelerated erosion and lowered grazing capacity. Overstocking and consequent overgrazing have been due in large measure to a number of reasons; principal among these were: (1) lack of reliable information on what constitutes proper use and grazing capacity; (2) laxity or slowness on the part of federal agencies to enforce needed reductions because of the human problem involved; (3) lack of information in the past on the economics of moderate versus heavy stocking; (4) public land laws and policies of the past; (5) tendency to think in terms of numbers (a carry-over from methods of marketing in the past), rather than in terms of pounds of livestock production; (6) tendency to carry animals over and gamble with the weather and the market; and (7) over-optimism as to the grazing capacity.

In order to place the livestock industry on a sustained basis yielding a maximum return of meat and livestock products, it is imperative that accelerated erosion be stopped and plant vigor restored. The means of bringing this about are clear; first, livestock numbers must be balanced with the range forage and feed resource; second, range improvements must be planned and executed; third, management facilitated; and fourth, attainment of any necessary shifts in season of use or kinds of livestock.

Revegetation. Because of the present costs and uncertainties involved in artificial reseeding, it is fortunate that the big job in revegetation can be brought about by natural means. That is, adjustment of livestock numbers to the point where Nature can do the job. Here and there throughout the State are numerous instances of moderate grazing use. These areas serve as valuable demonstrations of careful range supervision and husbandry.

There are, however, many critical areas where natural revegetation is slow and uncertain even with total protection from livestock. These are the areas where the original plant cover has become markedly thin and the fertile topsoil has largely disappeared. Such areas are extensive and in many cases resort will no doubt have to be made to mechanical measures and artificial means of revegetation. Furthermore, much experimental work yet remains to be done in order to determine practical methods of reseeding, suitable species, and desirable exotic species. Water-spreading areas are limited by soil, available water, topography, and established water rights. But there is need in certain suitable areas of mechanical erosion-control structures such as water-spreading and gully-control installations, and particularly head-cut drop structures.

Noxious plants. There are many kinds of poisonous plants in Arizona such as burroweed, pingue, whorled milkweed, locoweed, and wild tobacco which each year may cause heavy financial losses as well as reduced meat production through actual death loss or lowered physical condition and reduced marketing weights, or they may limit grazing use. Each of these poisonous plants presents separate and distinct problems in control.

By far the most persistent and pressing problem on millions of acres of grassland in the Southwest is the invasion of shrubs of little or no value as forage for livestock. This invasion has been accompanied by accelerated erosion and reduced grazing capacity. This gradual invasion of choice grassland ranges has many impacts. To the Nation as well as the State, it has meant a decreased potential for producing meat and livestock products, and hence reduced effectiveness in waging the war.

The question of whether or not noxious shrub control will pay has been demonstrated in the case of mesquite. Results of mesquite control have been spectacular on infested areas of what was formerly open grassland. In 1943, 3 years following control, areas where mesquite was killed produced about 400 pounds of forage per acre, whereas the check or nontreated areas produced only about 60 pounds of forage per acre. What might be done in range improvement with mesquite control no doubt might also be accomplished with other noxious plants.

Water. Water is indispensable not only to livestock but to proper range management. Development of stock water should be dependent on abundance of forage, kind of livestock, flow of natural water, and season of use. Construction of reservoirs should be carefully planned so that there is not a gross wastage of water. Often deep, small charco types of reservoirs will provide sufficient water for range use purposes without storing large amounts of water that would otherwise flood tobosa, sacaton, or other grass swales. All things considered, however, stock-water development offers a worth while post-war enterprise both as to labor requirements and utilization of surplus military equipment.

Fencing. Fencing range lands, together with water development, is essential for proper management. Fencing can be used to obtain proper distribution and seasonal use, and thereby secure higher livestock production as well as facilitate conservation of the range resource.

Wildlife. A system of grazing use that provides for good range and watershed conditions will at the same time provide for improved environmental conditions for wildlife, particularly big game and upland game birds. Depletion of vegetational cover has resulted in accelerated erosion which has muddied streams and in many cases impaired the permanency of stream flow. These changes, together with increased temperature of the water, have resulted in great reduction of trout and other game fish populations.

Other needs. Range forage-destroying rodents and rabbits must be given further study and control measures taken where needed. Likewise, particularly in the sheep-growing section and areas supporting big game, predatory animal control needs to be carried on and intensified in the period immediately following the war.

3. Right Use of the Range

A use of the range resources that is designed to secure and maintain the highest production of range forage and livestock production will at the same time encourage the establishment of more desirable forage plants, protect and maintain plant vigor, and provide the best vegetational cover for erosion control. Seasonal use of both yearlong and seasonal ranges through deferred and rotation systems of grazing should be considered as an effective means of promoting increased plant vigor and assisting in natural revegetation. Maintenance of reserve forage cushions the operator during drought periods and at the same time protects him against having to sell short on a poor market. Furthermore, reserve forage results in a mulch on the ground which increases moisture penetration by as much or more than 20 percent. A 20-percent increase in effective penetration of moisture on most ranges will produce 50 percent additional forage for livestock production.

To obtain the maximum livestock production correct numbers of livestock must be balanced with range forage supplies. An animal first uses feed to maintain its body weight and perform the necessary physiological functions. Additional forage is required for increased body weight, growth, reproduction, and milk production. Maintenance requirements on properly managed ranges account for approximately 70 percent of the feed consumed. On heavily stocked ranges the percentage of forage needed to meet the bare maintenance requirements of the herd is increased, thus leaving little or none of the forage crop for production. Light calf and lamb crops, light calves and lambs, and light wool clips are indicators of inefficient use of range forage.

Each ranching unit presents a separate and distinct problem, conditions vary, and yet the same general principles of range and livestock management apply to all ranches. Summarizing these briefly: (1) a management plan which fits the individual rancher's needs and the needs and limitations of his soil, water, and vegetational resources;

(2) conservative stocking; (3) constant observation of the range; (4) proper distribution of livestock by water, fences, herding, and salt; (5) critical culling; (6) yearly marketing; (7) selection of good sires; (8) controlled breeding; (9) careful range husbandry of livestock; and (10) avoidance of over-investment and keeping out of debt.

4. Indicated Adjustments in Livestock Numbers and Management Practices

The recent drought of 1942-43, combined with excellent market prices, resulted in an over-all reduction in livestock numbers. Cattle numbers are about the same. But due to labor shortages and changes in ownership, many ranches have turned from sheep raising to the growing of beef cattle. The result has been a downward trend in sheep numbers and consequent readjustment in cattle numbers.

Although there are many ranch units in the State that are properly stocked, it is safe to say that there are few ranges which are definitely understocked. Many borderline cases exist where adjustments in management or kind of livestock grazed would solve the problem of bringing livestock numbers into balance with the range forage crop. Unfortunately, however, there still exists much overstocking of both private and publicly administered lands. In some cases drastic changes will have to be made for the good of the land as well as the future of the livestock industry. In some cases total protection for a period of years may be necessary to stop accelerated erosion and restore plant vigor. In other cases a shift in the kind of livestock or season of use will result in long-time benefits.

5. Adjustments in Land Ownership and Range Use

Much has been done in recent years to solidify range holdings so that the operator has firm control of the grazing. The State has done much along this line. Possible future adjustments may also be made by "land for land" exchange so that both privately and publicly owned lands may be consolidated and more effectively managed.

6. Range Research

As knowledge of the complicated relationship between grazing use, climate, soils, and vegetation increases, vision of the problem involved likewise widens, and the need for worthwhile range research has almost unlimited scope. Among some of the more pressing problems where information is meager or where further study is apparent are:

- (a) Production economics of range land conservation.
- (b) Livestock production and breeding practices.
- (c) Proper time for marketing livestock.
- (d) Range condition and use standards for the principal plant types.

(e) Intensive survey of range and soil condition based on criteria which will depict actual condition and trend.

(f) Suitability of various vegetational types to seasonal and year-long use by different kinds and classes of livestock.

(g) Reseeding practices and study of exotic species.

(h) Control of livestock losses from poisonous plants.

(i) Noxious plant control, including surveys to determine where control is needed.

(j) Controlled burning of range lands for elimination of undesirable plants.

(k) Erosion control and water-spreading devices.

(l) Suitable methods of rodent and rabbit control.

(m) Studies of multiple land use including range, watersheds, timber, game, and recreation.

Action Plans and Programs

1. Action Proposals

(a) Complete management plans as a basis for adjustments.

(b) Through a training and educational program prepare for demonstrational work, to effect stocking reductions and seasonal-use changes where necessary.

(c) Complete needed range improvements and recommended range rehabilitation programs, including the control of pests, noxious plants, and predators.

(d) Effect land exchanges to consolidate both public and private interests for better management and control.

(e) Step up range research as a basis for better range management and as a means of demonstrating improved range-management practices or methods to land administrators and stockmen, and intensify study of related problems such as wildlife, flood control, upland game birds, waterfowl, and fish.

2. Capital Improvements for Arizona Range Lands

Detailed post-war plans for the development and conservation of Arizona range lands are being prepared by all interested agencies. The following listing summarizes for all agencies the estimated developments and management improvements required for the post-war period.

CAPITAL IMPROVEMENTS FOR RANGE LAND

Activities	Units				Ratio of Labor to Cost (Pct.)				Employment Man Years				Approx. percent for demobilization period	
	On Govt. Land U.S.D.A.	On Govt. Land Other Federal	On Govt. Land State & Local	On Private Land	On Govt. Land U.S.D.A.	On Govt. Land Other Federal	On Govt. Land State & Local	On Private Land	On Govt. Land U.S.D.A.	On Govt. Land Other Federal	On Govt. Land State & Local	On Private Land		Totals
Reseeding (acres)	143,000	1,411,500	227,000	500,000	43	70	35	35	370	1160	238	525	2293	20%
Water dev. (units)	3,000	3,060	510	1,040	70	70	35	35	954	1742	178	364	3238	30%
Fencing (miles)	4,000	7,180	1,930	3,900	70	70	60	60	840	1175	405	819	3239	30%
Noxious plant control (acres)	50,000	272,000	122,000	234,000	60	60	60	60	93	160	73	140	466	30%
Rodent & predator control (acres)	1,450,000	1,822,200	348,000	708,000	69	75	50	50	93	170	26	53	342	40%
Erosion control (acres)	*	340,000	225,500	484,500	-	60	40	40	-	260	180	357	797	20%
Erosion special projects	xxx	xxx	4	6	-	-	67	67	-	-	278	343	621	20%
Wildlife dev. (units)	*	*	*	*	-	-	-	-	-	-	-	-	-	-
Surveys and plans	9,867,000	11,920,000	8,000,000	8,000,000	88	90	90	90	125	150	100	100	475	20%
Stock trails (miles)	xxx	862	xxx	xxx	-	65	-	-	-	80	-	-	80	20%
Driveway posting "	xxx	323	xxx	xxx	-	70	-	-	-	5	-	-	5	100%
Roads, new (miles)	*	1,000	xxx	xxx	-	50	-	-	-	370	-	-	370	10%
Bridges	xxx	6	5	14	-	50	50	50	-	30	25	70	125	20%
Fire control	*	9,920,567	xxx	xxx	-	80	-	-	-	15	-	-	15	100%
Lookout towers	*	13	xxx	xxx	-	50	-	-	-	20	-	-	20	100%
Tel. & power line (miles)	15	595	xxx	xxx	60	65	-	-	5	85	-	-	90	40%
Adm. & Research buildings and impvts. (units)	1	xxx	1	xxx	50	xxx	50	xxx	50	xxx	25	xxx	75	60%

* See Section C - Forest Land

MAINTENANCE OF IMPROVEMENTS FOR RANGE LAND

Activities	Units				Ratio of Labor to Cost (Pct.)					Employment Man. Years					Approx. percent for demobilization period
	On Govt. Land U.S.D.A.	On Govt. Land Other Federal	On Govt. Land State & Local	On Private Land	On Govt. Land U.S.D.A.	On Govt. Land Other Federal	On Govt. Land State & Local	On Private Land	On Govt. Land U.S.D.A.	On Govt. Land Other Federal	On Govt. Land State & Local	On Private Land	Totals		
Water development (units)	600	400	xxx	xxx	70	70	xxx	xxx	20	15	xxx	xxx	35	100	
Fencing (miles)	1,830	3,000	xxx	xxx	70	70	xxx	xxx	20	35	xxx	xxx	55	100	
Noxious plant control (acres)	5,000	27,200	12,200	23,400	80	80	80	80	10	55	25	45	135	20	
Rodent & predator control (acres)	150,000	180,000	34,800	70,800	61	70	50	50	6	8	3	4	21	20	

C - FOREST LAND

Forest land is a ranking resource of Arizona, occupying about one-third of the area of the State.

Products of the forests have played a significant part in the present development and welfare of the State. These include more than wood in its various forms. Forest cover serves in protecting the soil of watersheds, in preventing erosion, in regulating stream flow, and assuring maximum supplies of reasonably silt-free water to farms, cities, and industries. Forest ranges are a vital link in the important year-round livestock grazing industry. The forests also furnish a home for wildlife and offer almost unlimited opportunities for recreation. In general, these lands cannot be used successfully for any other form of agriculture. Moreover, experience and Research have demonstrated that these forest land values can be maintained through proper use.

Forest land use and conservation likewise are necessary for a balanced future State economy. Continued production and harvesting of timber forage, and game, and the improvement in soil protection and water yield, recreation and other related services of the forest will contribute much wealth and happy diversified life for many people. But, like a farm or a ranch, forests to be productive and an asset involve the investment of capital, much of which will be non-recurrent, and a source of additional wealth.

Forest expenditures also provide useful employment. This is of such a nature as to utilize excess labor and equipment in periods of depression or reduced to a minimum in periods of greater economic activity. Thus, needed capital investment in forest lands offers a further balance in the State economy and constitutes a fertile field for public works.

The Forest-Land Resource

Forest is the climax vegetation type on 19,629,000 acres. This is approximately 27 percent of the area of the State and, in size, is second only to the open-range resource. Forests cover the higher mountain masses and extend, in general, from the northwest corner to the southeast corner of the State, and touch or lie within relatively close proximity to most of the enterprises of the State.

Situations, Trends, Objectives, and Major Problems

To adequately appraise the significance, trends, objectives, major problems, and needed action programs of forest lands it is necessary to consider the several multiple uses and services.

Timber Production

The forests of Arizona may be grouped into two broad types—woodland and saw timber. The woodlands consist of one or more of five species of juniper, one or more of three species of pinon, and one or more of thirteen species of oak usually found at elevations of 4,000 to 7,000 feet. The major uses of the woodland forest, from the standpoint of the timber crop, are fuel, fencing material, and human food in the form of pinon nuts. It also supplies food for livestock and game.

The saw-timber type consists of over 80 percent ponderosa pine (on a volume basis) and generally occurs above 7,000 feet elevation; Douglas-fir, white and corkbark fir, Engelmann and blue spruce, and white pine make up the remainder of the type. The saw-timber type supplies the raw materials for the important sawmilling industry. Fuel wood is also a by-product.

Area, ownership, and condition. Ownership of Arizona forests is nearly all public. Except for the 3,740,000 acres within the National Forests, an exact division of the woodland forests is not available. The division of the saw-timber forests is as follows:

Table 1: Land Status of Arizona's Saw-Timber Forest Lands

<u>Ownership</u>	<u>Acres</u>	<u>Percent</u>
National Forest	3,099,000	64.9
Indian Reservations	1,465,000	30.7
Public Domain	19,000	0.4
National Park	110,000	2.3
State	33,000	0.7
Private	48,000	1.0
<u>Totals</u>	<u>4,774,000</u>	<u>100.0</u>

As indicated below, the area of commercial saw-timber forest lands is three-fourths of the total saw-timber area.

Table 2 - Commercial Forest - Saw Timber

<u>Forest condition classes</u>	<u>Ownership Classes</u> ^{1/}					<u>Total Acres</u>
	<u>National Forest</u>	<u>Indian Reservation</u>	<u>Private</u>	<u>State</u>		
	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>		
Old growth	1,660,000	1,111,000	26,000	-		2,797,000
Cut-over	670,000	104,000	8,000	28,000		810,000
<u>Totals</u>	<u>2,330,000</u>	<u>1,215,000</u>	<u>34,000</u>	<u>28,000</u>		<u>3,607,000</u>
Satisfactory restocking	637,000	94,000	4,000	25,000		760,000

^{1/} Saw timber on national parks, while largely commercial, is withdrawn from commercial use.

For woodlands the commercial area is only slightly more than one-fifth of the total woodland area.

Forest drain and timber growth. As shown in the following table, drain on the saw-timber forests consists of mortality and commodity use. At the present, mortality is high because of the large amount of old growth virgin stands, but will decline as these nongrowing or slow growing ripe stands are cut over and replaced by those of younger, vigorous stands. Drain due to cutting fluctuates with economic conditions, but as shown has averaged 116,200,000 board feet during the past 16 years. This cut exceeds growth but is necessary to open up the virgin forests. At the present, growth is slow and production low, being estimated at 2 percent or an average of 50 board feet per acre per year on cut-over lands and somewhat less on lands which have not been logged. Under intensive management, growth can be increased to as high as 150 board feet per acre on the better areas. The present virgin stand is adequate to continue present cutting during the next 30 to 50 years, but careful management is needed to insure continuing supplies to meet future needs of an expanding population.

Drain from woodland forests also consists of live trees cut for commercial use and mortality. That due to commercial use is concentrated on localized available stands. Mortality, while large, is partly salvaged, principally for use as fuel. As a whole, growth exceeds drain. Although possible to increase this growth rate, other economic considerations such as the relative low value of the lands and the products prohibit.

Annual Drain and Growth in Arizona	
Table 4: Saw-timber Commercial Forests	
	Saw timber M ft. B.M.
<u>Drain</u>	
Timber cut	116,200
Mortality	200,000
<u>Growth</u>	
Gross (includes virgin stands)	300,000
Net (includes virgin stands)	100,000
<u>Potential growth under good management</u>	300,000

Timber requirements. Local requirements for forest products vary with economic conditions. On the average, approximately half of the saw-timber products produced remain in the State. Additional supplies are shipped in to augment the remaining local supply. For example, in 1940 out of production of 138,625 M feet 74,935 M feet remained in the State and, in addition, 54,846 M feet were shipped in. Normally, shipments to other States exceed the in-shipments. Products from the woodland type, with the exception of pinon nuts, are used within the State and for the most part within trucking distance of the place of harvesting.

Nature and magnitude of forest and wood processing industries: At present there are 40 mills drawing their raw material supplies from the saw-timber type, 38 of which were actively operating in 1943. These mills cut on an average 116 million board feet per year, furnishing yearlong employment to 2,000 people. Part-time employment materially increases this figure. They constitute the primary industries for such towns as Flagstaff and McNary, and furnish employment and add value to many rural towns and settlements as well as other population centers such as Phoenix, where the products are further processed and used. All these industries are dependent on the timber grown within the State, and because of the large amount of available virgin stands and ownership controls their future is assured. Present war conditions haven't affected the industry materially as regards total cut; restrictions of labor for some operations have offset increased production of others. However, due to war construction, use of forest products has increased as has the volume secured from other timber producing regions.

Extent of forest practice. Being largely publicly owned, most of the forest lands are under management. This varies from intensive forest practice in commercial saw-timber areas to extensive management, largely protection, in woodland areas. Although utilization of forest lands has increased during the present war period, because of the ownership control, the increase has been in line with good forest practices.

Objectives and major problems. The major objective of forest land management from a timber production standpoint is to maintain the available forest land area in the highest possible production consistent with proper use. This means as much high grade timber and timber products as possible consistent with good forest practices within reasonable cost. The principles of good timber management practices include:

1. Adequate protection against fire, disease, insects and rodents.
2. Conservative cutting by proper methods, including brush disposal, in order to insure an adequate growing stock at all times.
3. Cutting at sufficiently short intervals to salvage dying trees and to maintain a good growth rate.
4. Stand improvement among young trees designed to eliminate stems of low quality and to prune and otherwise favor those of high potential value.

The major problems in bringing about good forest land management include:

1. Extension of the present known management principles and practices to all available timber stands. This involves additional manpower and attendant facilities.
2. Improvement in transportation and utilization facilities to reduce the cost to the consumer.
3. Consolidation of the few remaining scattered saw-timber tracts under public ownership.

4. Development of improved management and utilization of the woodland forests.

5. Increased knowledge, through research; and demonstration, through extension, of what constitutes better forest practices.

An important feature of research is the application of findings in actual management of experimental areas and the appraisal of results by long-time records.

Action Program. Inasmuch as practically all the forest lands of the State are in some form of public ownership, they are a public responsibility and therefore constitute a bona fide and worth while field for public works. Such a program, from the timber production standpoint, would cover the following classes of projects.

1. Physical Improvements

a. Utilization roads and landing fields to facilitate the movement of forest products and of men and equipment for fire protection and cultural work.

b. Fire hazard reduction.

c. Buildings and installations used in administration and research activities.

2. Timber Culture

a. Stand Improvement. Overdense groups of young trees are opened up mainly by removing diseased or inferior trees and thus giving more room for the better ones. Selected stems are pruned by removing limbs to a height of 17 feet in order to provide one clear log. It is estimated that 2 man-days per acre can be profitably expended on this class of work, and thus the saw-timber forests could furnish full-time employment for 500 men over a period of 3 years.

b. Planting. Areas on which the native forest has been destroyed by cutting and fire to such extent that natural restocking cannot be expected in the near future may be reforested by planting young trees or seeds. This class of work consumes a tremendous volume of manpower; fortunately, the acreage in Arizona requiring artificial reforestation is not large.

3. Surveys and Maps

Forest surveys would determine for all forest land the types, volume, and character of timber by legal subdivisions or other units. Saw-timber stands would be further classified as to age, diameter, rate of growth, and progress of restocking. Detailed maps are made in connection with such surveys.

The size and requirements for these work projects, broken down into broad land ownerships, are outlined in the attached tabulations.

Watershed Protection

Water is generally considered the "lifeblood" of Arizona and the Southwest. The future of the State, particularly that of agriculture, is dependent to a large extent on the amount of available and usable water supplies.

Most of the forest lands are water-contributing and water-yielding areas, constituting the watersheds which are of most vital importance to the State. They include lands covered by commercial timber forests and woodland forests with mixed grass and brush vegetation.

The beneficial effect of forest and other vegetation in regulating stream flow and preventing erosion may well represent greater values than the timber crop or other forest uses combined. This is especially so on forest watersheds adjacent to centers of population and agriculture and industrial development. The function of a suitable forest cover in keeping the water of springs and reservoirs clear for use and holding the soil on the land is universally recognized.

Irrigation is the ranking use for water and the requirements for the State, on the basis of 3 to 5 acre-feet of water per acre, are estimated at between 2 and 2½ million acre-feet. Investments estimated at nearly \$43,000,000 in the Salt River Project alone have been made in storage structures and related developments in the use of water for irrigation. The utility and continued use of these structures are dependent upon sustained supplies of reasonably silt-free water from the watersheds. Domestic and industrial uses, as well as hydroelectric power, are also vital, although less spectacular uses of water. Hence, forest land conservation and development from the standpoint of water protection alone is a public responsibility and an important and essential field for public works.

Watershed conditions and trend. Erosion, sedimentation, and flood control are major watershed problems of Arizona and will continue to be matters of foremost concern in the post-war era.

It is estimated that accelerated erosion is present on a very large percentage of the State, much of which has reached a serious stage. The great bulk of the silt-producing area lies at low elevations (below 4,500 feet), but even in the higher mountains management of the lands came too late to prevent serious damage and administrative agencies are still striving to meet the restoration problem.

Until recently trends in watershed conditions over the State as a whole have been downward. It is estimated that the decline in vegetation has taken place over a large part of the watershed area with a definite improvement occurring on only a relatively small percent of the area. Because of the stage of depletion, however, changes are so gradual and natural recovery so slow as to make it unlikely that the present physical condition of the watersheds will materially change between now and the post-war period.

Objectives and major problems. The major objective of forest lands from the standpoint of watershed protection is maintenance and restoration, where depleted, of forest or other suitable types of plant cover, and development and retention of fertile soils on the slopes of the watersheds through proper use and management. The justification for such an objective lies in the fundamental importance of watersheds adequately covered with vegetation in furnishing (1) suitable and adequate water supplies for domestic use, irrigation, power, and industry, and (2) best and cheapest natural means of regulating stream flow and controlling run-off, sedimentation, and floods.

The major problem in bringing about effective watershed protection is the harmonizing of watershed values with other forest land uses and services, particularly the use of the forest range by domestic livestock and big game and the utilization of the timber resource. Adequate fire protection is also a major problem. Other problems include:

1. Need for soil stabilization, reduction of erosion, and curtailment of sedimentation and floods through restoration and maintenance of adequate plant cover.

2. Need for water improvements pertaining to the further development and more efficient utilization of water supplies.

3. Need for more adequate knowledge of water behavior, plant and soil requirements, and the effect of management practices on soil stability and means of restoring deteriorated watershed cover.

Action Program: Inasmuch as the protection of watershed values is dependent upon the proper management of other forest land uses, such values are major considerations in all forest land work projects.

In addition, a public works program from the standpoint of watershed protection would include the following classes of projects:

1. Land Management Soil Conserving Projects

- a. Use adjustments. This program will require adjustments in present land use where deterioration is in process. In some cases it may require closures in localized areas in the interest of watershed protection.

- b. Mechanical structures such as (1) protection fencing of stream bottoms of small eroded areas, (2) retardation dams and silt detention reservoirs for equalizing flood flows and desilting water, (3) soil stabilization structures near headwaters of erosion channels and active gullies, (4) terracing and contouring for retarding rapid run-off to facilitate percolation, and (5) protective structures such as channel lining, deflective dams, revetments, retaining walls, and catchment basins.

2. Water Developments, i.e., improvement and utilization projects restricted mainly to upper basin areas (large structures for irrigation, power, and flood control not included). Such projects would include the development of water supplies and water stabilization for many isolated settlements and communities. They would also include water developments for livestock, recreation, wildlife, and other uses.

3. Basic Watershed Research. This would include equipment and facilities necessary in the further determination of water behavior, plant and soil requirements, and the effects of various land use practices on the quantity, quality, and behavior of run-off and soil stabilization.

The size and requirements for these projects are outlined in the attached tabulations.

Forest Range

The gross forested range in Arizona totals nearly 19 million acres, most of which is grazed during some part of the year by over half the cattle and most of the sheep of the State. The forested range also has an important bearing on the management and use of much of the non-forest range.

About one-fourth of the forested range is grazed from 3 to 5 months in the summer. Most of the remainder is used yearlong, although parts are restricted largely to winter. The bulk of the forested range is Federally controlled. The remainder is State and private.

Situation and trends. In general the summer range, largely in the saw-timber type, is in fair to good condition, although forage depletion to varying degrees prevails on many key areas, such as meadows and openings in the timbered areas. Increase and growth of ponderosa pine reproduction has resulted in decreased grazing capacity and a resultant downward trend in rate of stocking.

In the woodlands, which cover over three-fourths of the forest range, yearlong grazing is the common practice. Here range conditions vary from poor to excellent, but on the whole are unsatisfactory. In spite of a fair covering of blue grama, forage production in most years is low. This is due primarily to poor plant vigor and to the killing out by overgrazing of the choice perennial grasses. Some of the present poor conditions in the northern and central part of the State are the result of juniper invasion. In these areas range conditions and livestock production have been sharply downward during the past several years.

On many browse ranges the perennial grasses, high in forage value and soil protection, are scarce or entirely lacking. As a result erosion has set in causing heavy siltation in irrigation reservoirs, as well as causing damage to the land resource.

In the oak savanna woodlands of the southern part of the State range conditions on the whole are generally fair to good. But here again exist many localized sore spots and some ranching units are unsatisfactory.

On the whole, the trend of range condition and grazing capacity of forested ranges is in a downward swing and undoubtedly will remain so into the post-war period.

Since most of the forest range is publicly controlled, the responsibility for improvement of range conditions by adjustment of livestock numbers, adherence to good range principles, and installation of improvements rests squarely with the public and the designated administrative agency in cooperation with the users.

Objectives and major problems. The broad objectives of forest range management are to utilize the forage crop for the benefit of the livestock industry consistent with the requirements of the other uses and service of the land. Since productive soil is the basic land resource, it is of prime importance to halt accelerated loss of soils through restoration of suitable plant cover. This, in turn, will reduce floods, minimize erosion, and make available more and better quality of range forage for greater and more economical livestock production.

In meeting these objectives, the major problems include the following:

1. Bringing about a recognition and appreciation of the present generally unsatisfactory range conditions. The importance of range has been seriously underestimated and often entirely overlooked. The general public does not understand the value of range or the extent to which it has been neglected and abused. Many administrators and stockmen have been too close and too much a part of all that has happened to fully grasp the results, trends, and causes. Changes in the range have often been insidious and too obscure to attract attention until depletion is far advanced.

2. Bringing about the right use of the range. This includes the adjustments of livestock numbers to grazing capacity, the extension of proper range management practices and the installation of improvements to aid in arresting accelerated erosion, restoring plant cover and improving plant vigor. It also includes working out a better balance between winter and summer ranges, involving the integration and use of crop and pasture lands.

3. Need for additional information regarding range use and range livestock production. More information is needed in appraising values of forest range and livestock production in terms of other forest land uses, including the following: range condition criteria for different types of mountain ranges; practical methods for checking range forage utilization; practical methods of controlling noxious plants growing on the range; methods of control of juniper where it is encroaching on the range; the refinement of management practices for more economic livestock production and practical methods of range reseeding.

Action Program: From the standpoint of forest range conservation and development, a public works program would include the following classes of projects:

1. Physical Improvements

a. Fences to facilitate proper seasonal use and protection of deteriorated areas.

b. Water developments to improve livestock distribution.

c. Construction of stock trails to aid utilization and increase forage availability.

d. Facilities and installations in administrative and research activities.

2. Range Reseeding

Improvement of forage cover through the sowing and planting of desirable forage species.

3. Pest and Predator Control

Minimizing the present over-use of range areas by control of rodents and other pests.

4. Noxious Plant Control

Eradication and control of poisonous and other noxious plants.

5. Surveys and Plans

Completion of range resource appraisals together with development of plans and correcting unsatisfactory conditions and bringing about needed adjustments.

The size and requirements of these projects are incorporated in the tabulation attached to the Range Lands section.

Forest Recreation

Climate, scenery, good roads, space, multiple attractions, facilities, and large numbers of visitors add up to recreation. A large part of these Arizona wonders are found in her extensive forest lands. Here especially are the cool, green, better-watered areas so attractive to people in the summer. Here also are areas of winter snowfall necessary for winter sports as well as other natural attractions.

The Grand Canyon National Park and some 15 National Monuments have superlative recreational values and drawing power for visitors. The treatment of these special recreation areas, from a post-war works program viewpoint, will be covered in a separate report.

Arizona's pre-war income from recreation was considered equal to that received from any other source. This income came directly and indirectly from the millions of tourists and local recreationists. In the National Forests alone prior to the war, approximately 600,000 recreationists and 2 million travelers took advantage of these resources yearly. About 80 percent of the approximately 500,000 population of Arizona reside within picknicking distance of the National Forests. Thus, forest recreation is not only "part and parcel" of the resident population, but also constitutes a thriving State enterprise.

Situation and trends. It is estimated that the recreation business has doubled during the past decade and was still increasing through 1940. Forest land use also has kept pace with this growth through better road construction, developing systematic maintenance of wildlife populations, and development of additional recreational areas and facilities. Despite this rapid growth, except for holiday peaks, facilities, on the whole, were considered adequate at that time for all recreationists.

Currently, due to wartime restrictions, there has been a big reduction in numbers of out-of-State recreation visitors. In some of the more remote areas, tourist trade is almost nil, and winter season visitors are scarce. However, certain of the recreation areas close to population centers are reporting heavier use than in pre-war times and a number of the better "close-in" guest ranches report that business is excellent. The over-all picture indicates that recreation use is way under normal. It is believed that this condition will prevail until after the war. But recreation during the post-war period should resume its high place in the social and economic values of the State and even exceed that of pre-war days, requiring commensurate expenditures for needed maintenance and repair of present run-down facilities and the construction of additional equipment and facilities.

Objectives and major problems. The major objective is to make the recreation resources available to the public to the extent consistent with other uses; the attainment of this objective necessitates the continued development and maintenance of the facilities needed for the convenience of the people visiting the out-of-door recreation attractions and enough policing to protect the areas and to safeguard the public health.

Major problems in attaining this objective include:

1. Provisions for adequate finances and facilities for the maintenance and repair of present recreational equipment and structures and construction of needed additional structures and facilities. Such structures and facilities should be kept in harmony with the forest environment.
2. Working out an over-all coordinated plan and development of policies between all interests wherein recreational values will receive proper recognition along with other forest land values.
3. Provision for advance planning of recreational facilities, including provision for recreational facilities for all income groups.
4. Provision for adequate study of the forest recreation problems and requirements for the development of adequate recreational methods and facilities, particularly from the standpoint of the forest environment.

Action Program. Inasmuch as recreation is a public enjoyment and benefit, it is also a public responsibility and important field for public works. Like other forest land uses, forest recreation will benefit in some degree from most all forest land work projects. In addition, public works from a forest recreational standpoint would include such projects as:

1. Physical Improvements

- a. Campground facilities, including water developments, sanitation, fireplaces, tables, etc.
- b. Roads, trails, waysides, vista points, etc.
- c. Organization camps.
- d. Fire hazard reduction and clean-up.
- e. Recreation signs.

2. Planning - Use Studies Surveys and Maps

Recreation surveys and lay-out plans needed before improvement work is undertaken. Would include survey of potential water supply and a sanitation survey to determine effect of proposed uses on health of people living downstream.

The size and requirements of these work projects are outlined in the attached tabulations.

Forest Wildlife

The key to the existence of wild animals is a suitable environment or habitat. Therein lies the importance and value of forested lands for wildlife. Big game, small game, and upland game birds abound in the forests and are a natural part and product of the forest environment. Fish are also found in the lakes and mountain streams. Almost all the forested lands of the State contribute in some way to wildlife production. On the National Forests alone there are about 10 million acres of "open" huntable land.

Wildlife resources, in turn, contribute much to the economic welfare and social well-being of the State. It is estimated that the harvesting of fish and game crops, a large part of which centers on forest lands, constitutes a business totaling about \$5,500,000 annually. This business is important to the economy of rural communities. The health promoting and character building recreational values are intangible, but nonetheless important.

Situation and trends. The demand for hunting and fishing has increased during recent years, largely because of population increase and the more ready access to game through improved transportation facilities. In line with this, few game populations have increased during this same period. Nevertheless, in general there is adequate breeding stock of big game species and brood stock of upland game birds to provide for a still larger harvest notwithstanding the fact that a large part of the annual increase of game is taken by predatory animals. Good management calls for a sharp curtailment of predators in order that more game will be made available to hunters.

Some conflict exists in a few localized areas between wildlife and other forest land uses, particularly present stocking and grazing practices by domestic livestock. This is brought about by change in composition of plant life and consequent modification of the environment through overgrazing and is reflected to a varying degree on all forms of wildlife, including upland game birds. Soil erosion and siltation, other results of overgrazing, also affect fishing waters.

Objectives and major problems. Wildlife management will be correlated with other forest land uses and services. In this the broad objective of forest wildlife management is to provide suitable and adequate populations of wildlife for harvesting, enjoyment, and preservation consistent with the other multiple uses and services of the lands. Under this objective, rare species will be preserved and increased, harvesting of surplus wildlife will be continued on a sustained basis, and people will continue to enjoy and obtain satisfaction from this resource.

The major problems include:

1. Provision for adequate financing to make wildlife management possible.
2. The production and protection of desirable populations of game species, including adequate predator control consistent with other uses of the land.
3. The rehabilitation, development, and maintenance of a suitable plant cover and environment through the reduction of livestock and game competition and of soil erosion.
4. Through cooperation with the State Game Commission, the working out of suitable seasons, bag limits, and regulations for harvesting wildlife so as to provide adequate and suitable hunting and fishing room for all.
5. The obtaining of information of wildlife numbers, trends, and requirements, and the development of principles of management and harvesting through adequate surveys and research.

Action Program. Except for special areas managed primarily for wildlife, most of the work projects for forest wildlife conservation and development are a part of other forest land conservation projects, particularly those relating to proper use and harvesting of the forest range resource and of watershed protection. Some more or less special projects for wildlife conservation and development would include the following classes of projects:

1. Physical Improvements

- a. Cabins and facilities for use in game management work.
- b. Fenced areas for study plots and special water developments.
- c. Buildings and installations for research activities.

2. Water and Stream Improvements

- a. Fencing for stream bottoms of high value to habitat improvement.
- b. Stream and lake surveys to determine food conditions in order that proper stocking policies can be established.
- c. Development of natural lakes and pond sites.
- d. Construction of propagation sites and areas for fish and other wildlife.

3. Predator Control. In cooperation with the Fish and Wildlife Service.

4. Game Surveys. In cooperation with the State Game Commission and the Fish and Wildlife Service.

The size and requirements for these work projects are outlined in the attached tabulations.

CAPITAL IMPROVEMENTS FOR FOREST LAND

Activities	Units		Ratio of labor to cost (percent)				Employment, man-years				Approx. percent for demobilization period	
	On Govt. Land U.S.D.A.	Other Federal Land	On Govt. Land State & Local	On Private Lands	On Govt. Land U.S.D.A.	On Govt. Land Other Federal	On Govt. Land State & Local	On Private Lands	On Govt. Land Other Federal	On Govt. Land State & Local		On Private Lands
Fire hazard reduction	105,300(a)	2,500(a)			89	90			74	9.5		83
Fire control impvts. & developments	463 units	36 units			51	60			106	151		83
Timber pest control	52,000(a)	1,000(a)			95	90			50	1		33-1/3
Timber stand impvt.	282,500(a)				96				1445			37
Forest planting	31,800(a)	2,000(a)			75	95			285	3		37
Forest recreation	1690 units	61 units			62	85			820	8.5		33-1/3
Adm. & Research bldgs. & improvements	320 units				50	60			308	4		54
Research hdqtrs.	806 mi. ²				50				72			54
1 unit												
Range impvts. ^{2/}												
Wildlife developments	120 units	37 units	19 units ^{2/}		63	75	65		190	18.5	1054	28
Resource surveys	4/	1,096,245			88	90			125	10		35
Aerial & topographic surveys	5/				62				586			35
Watershed treatment	900 sq.mi.	30 units			77	70			1420	239		33-1/3
		650,000(a)										
Development roads and trails	5,531 mi.	531 mi.			46	50			1950	196		40
Forest highways	952 mi.				46				6440			40
Forest cruise	30,000 sq.mi.				88				330			20
Stream improvement	425 units	30 mi.			65	90			300	8		28
		92(a)										
Community water dev.	4 units				50				40			33-1/3
Exhibits and material					20				122			75

1/Adm. telephone lines
 2/Range improvement included in Range Land section
 3/Comprehensive units
 4/Range surveys, 15,400 sq.mi.; timber surveys, 5,370 sq.mi.; Aerial surveys, 19,000 sq.mi.; topographic, 17,750 sq.mi.

MAINTENANCE OF IMPROVEMENTS FOR FOREST LAND

Activities	Units	Ratio of Labor to Cost (Percent)				Employment Man Years				Approx. Percent for Demobilization Period	
		On Govt. Land U.S.D.A.	On Govt. Land Other Federal	On Govt. Land State & Local	On Private Lands	On Govt. Land U.S.D.A.	On Govt. Land Other Federal	On Govt. Land State & Local	On Private Lands		
Wildlife impvts. Range impvts. ^{1/}	On Govt. Land U.S.D.A.	64				2				Totals	
Timber management	Maint. of sale areas	100				2					
Recreation impvt.	Maint. of impvts. Campgrounds & impvt.	50				2					
Fire control impvts.	Detection & suppression Maint. of control impvt.	80				16					Recurrent annually
		88				80					
		62				2					
Adm. & Research impvts.	Structures, communication lines ^{2/} Operating projects	85				20					
	32	91				42					
Water resource impvt.	Watershed treatment	77				30					
	15 sq.mi.	70				11					
Forest highways	Highways, 400 mi. Dev. roads & trails	70				162					
	6,000 mi. For. dev. roads ^{3/}	70				228					
	3,088 mi.	60									

^{1/}Range improvements included in Range Land Section.

^{2/}128 structures, 2,200 mi. telephone lines and fences.

^{3/}Non-recurrent preventive maintenance.

CHAPTER III.--ADJUSTMENTS IN AGRICULTURAL PRODUCTION DURING THE DEMOBILIZATION PERIOD.

This chapter was compiled by the following subcommittee: Dr. George W. Barr, University of Arizona, Chairman; O. M. Lassen, State Agricultural Adjustment Agency; Carl P. Heisig, Bureau of Agricultural Economics.

The following assumptions were used in preparing this report, as suggested by the Department of Agriculture: The war in Europe will end in 1944. The war with Japan will be concluded by 1945. Initial demobilization of part of the army will take place in the first six months after the end of the war in Europe but the Navy will still be expanding. By the close of 1946, the military establishment will be approaching a continuing peacetime level but will still comprise a large force in all branches of the service. The heaviest load of supplementary food relief will come after the first six months after the end of the war in Europe. The year of greatest relief shipments will be 1945. By 1946, European relief will be at a much lower level but this will be offset in part by Asiatic relief. Domestic demand in the United States will remain high in 1945 and 1946, with consumer demand even higher than during wartime as wartime controls are released. The world fat and oil requirements will be reduced somewhat by 1946.

Adjustments Needed in Arizona in the 18-Month Period, from a National Viewpoint

These points were deducted from statement by the United States Department of Agriculture on national requirements;

1. The need for agricultural production in Arizona will be as great in 1945 as now.
2. All lands should be kept producing in 1945, provided water is available.
3. Grains: While no change is indicated from the national point of view, local demands would indicate an increase in acreage.
4. Hay: National demand for increased production appears to apply to Arizona also because of the probable continued demands for dairy products, although it is recognized that large expansion of hay acreage in Arizona in 1943 and 1944 will result in large increase in hay production in 1945 without additional plantings.
5. Flaxseed: A 25 per cent reduction.
6. American-Egyptian cotton: A reduction to 40,000 acres.
7. Upland cotton: National request is for about the same amount. Arizona adjustment possibly could be slightly upward because of replacement of long-staple cotton by upland cotton.
8. Vegetables: Nationally, it is indicated that an increase in fresh, luxury vegetables is desirable as Victory gardens are abandoned, although transportation problems on the West Coast in this 18-month period might interfere with movement of Arizona vegetables eastward.
9. Dairy products: Nationally, an increased production is indicated. This, it appears, would apply to Arizona.
10. Fat cattle: The national picture seems to indicate a continued restricted fattening program until more grain becomes available.
11. Sheep and lambs: No change indicated.
12. Chickens: A reduction below the 1944 goals, because feed may not be available.

Historic Adjustments in Arizona

Figure 1 shows the adjustment in farm acreage under irrigation over a period of years, from 1928 to 1943. The area represented on the chart embraces 90 per cent of irrigated lands in Arizona. In the sixteen years shown on the chart, cotton has constituted one-third of the crop acreage, and another one-third of the acreage has been cropped to alfalfa. The remaining one-third has been in winter grains, truck crops, and tree fruits and nuts. By the end of 1944 it appears that the crop acreage will be proportioned about as follows: One-fifth in tree fruits and nuts, truck crops and flax and sugar beets for seed; one-fifth in winter grains; two-fifths in alfalfa, and the balance in cotton, which on account of rough calculations may amount to a little more than a fifth of the acreage.

Figure 1.

If Figure 1 is missing in this copy, it can be provided by the University of Arizona from Agricultural Experiment Station Bulletin 192, page 3.

Cropland:

Because of lowering water tables, labor difficulties, and price-cost relationships, several thousand acres of land in the pump districts of Pinal County and other areas were left idle in 1943. It is expected that more of this will occur during the next two years, in view of the fact that there appears to be little prospect for further increases in cotton prices. Only a minor acreage of new land will be developed in time for the 1945 crop year. The total acreage of land in crops is, therefore, indicated as declining from 796,000 acres in 1943 to 784,000 acres in 1945.

Cotton:

One of the major items in land use in Arizona is acreage of cotton. Acreage planted to cotton declined sharply from 1942 to 1943 and is expected to decline further in 1944 and 1945. Labor problems, relatively more profitable alternative crops, and other factors are responsible. The wartime demand for American-Egyptian cotton has already slackened and it is assumed that in 1945 no more than the pre-war acreage of about 40,000 acres will be needed.

Upland Cotton:

Upland cotton is in a more favorable position, but other crops such as alfalfa and sorghums appear to be in a stronger competitive

position in some areas of the State and are expected to replace a part of the cotton acreage. Upland cotton will replace American-Egyptian cotton on many acres, but even so there is indicated to be a slight reduction, to 100,000 acres in 1944. It is suggested that a somewhat larger acreage be planted in 1945.

Grains:

Arizona is a deficit grain-producing area. The estimated needs of livestock for feed grains in the 1943-44 feeding year are about 135,000 tons, whereas only about 100,000 tons of grains were produced, including wheat. Additional tonnages for flour-milling purposes will be used. Curtailment of livestock production nationally in 1944 and 1945 is predicated primarily on a prospective shortage of feed grains, with much of the reserve stocks being consumed by the end of this year.

A strong demand for feed grains, therefore, is anticipated, with proportionately favorable prices to feed-grain producers. At ceiling levels the feed grains, particularly sorghums, can compete effectively with cotton in some areas, and especially when two crops of grain such as winter barley and sorghums can be produced the same year.

A considerable increase in sorghum acreage and a moderate increase in barley acreage relative to 1943 can be anticipated in 1945 and will be desirable from the standpoint of need.

Alfalfa:

An increase of about 15 per cent in acreage of alfalfa occurred from 1942 to 1943, much of it at the expense of cotton. This was in response to the high prices prevailing for alfalfa hay and pasture beginning in 1942, together with a less favorable situation in cotton production because of labor difficulties and relatively smaller price increases. A further expansion of 40,000 acres is indicated for 1944. This would provide 275,000 acres of alfalfa, or nearly two-fifths of the total acreage of irrigated land in crops. These figures on alfalfa acreage refer to total land producing alfalfa and not to the actual acreage harvested for hay as reported by the Bureau of Agricultural Economics. Such a proportion is considered desirable from the standpoint of soil fertility maintenance.

Production from this acreage would provide for some expansion in dairy production and some increase in beef and sheep feeding over the past year or two.

Expansion of alfalfa acreage much beyond one-third of the irrigated acreage probably is undesirable. Water requirements of alfalfa are relatively high compared with such crops as grains and cotton. Too much expansion in high water requirement crops would make it necessary to reduce the total acreage of land irrigated, inasmuch as the amount of irrigation water is rather definitely limited.

Truck crops:

In this discussion of truck crops, acreage reported by the Bureau of Agricultural Economics is used, which set of figures is not as complete as the figures used by the University of Arizona in its Experiment Station Bulletin No. 192.

About 56,000 acres of fresh commercial vegetables were grown in 1943. Production goals for 1944 call for a moderate increase, particularly in the more needed vegetables. Fresh vegetables from the national standpoint are assumed to have a rising demand, as luxury vegetables become more prominent in the post-war picture and as some consumers discontinue victory gardening.

In view of these considerations, an increase to 62,000 acres of fresh vegetables is indicated for 1945.

Availability of transportation facilities and provision of sufficient shock may be problems that will adversely affect the situation after the war in Europe ends but while the war in the Pacific is still in full progress.

Livestock numbers:

Under the assumed conditions for 1945, a continued strong demand by consumers for meats and livestock products should prevail. Livestock production up to the point of full utilization of available feed supplies would, therefore, be indicated. Feed supplies, however, will be limited nationally in 1945, so that large inshipments of feed grains and commercial by-products cannot be depended upon for Arizona. Adjustments in livestock numbers and production from 1943 to 1945 are indicated in Table 3.

Dairy cows:

Because dairy cows utilize feed effectively and the demand for dairy products, particularly fluid milk, can be expected to remain strong, some expansion in cow numbers would be desirable. Feed-milk price relationships must be favorable, however, for such an expansion.

Range cattle and sheep:

The consensus of opinion is that numbers of beef cattle on January 1, 1943, were greater than the normal carrying capacity of the ranges of the State. A reduction in numbers has occurred during 1943 because of drought conditions in some areas, so that maintenance of numbers at present levels is probably desirable.

Sheep numbers probably can be maintained also at 1943 levels.

Cattle and sheep and lambs on feed:

An increase in alfalfa acreage by 1945 would make possible some increase in animal feeding operations, both in pens and on alfalfa pasture, if feed-meat price relationships are favorable. California markets for beef and lamb should continue to be strong. Arizona can increase its feeding operations without increasing range cattle and sheep numbers within the State by drawing upon feeder stock in New Mexico and Mexico.

Hogs and poultry:

The high price of feed grains can be expected to exercise a deterring effect upon production of these livestock. A reduction below 1942 for spring sows for farrowing in 1943 has already occurred. A continued reduction in hog numbers to pre-war levels is indicated. Similar forces will be operative with poultry, so that the sharp expansion in poultry numbers should level off. Egg production in 1945 is indicated at about 1944 expected levels.

Problem of Achieving 1945 Production Pattern

Agricultural production problems in the first year after the war in Europe ends may be expected to be of similar nature to those faced during the war period, though in many instances of lesser intensity. Many commodities used by farmers in production can be made more plentiful by then, some surplus military supplies and equipment adapted to farm use can be made available, fertilizer supplies will be

more plentiful, and some easing in the general farm labor shortage can be expected as partial demobilization and reconversion of industry gets under way.

Farm labor:

With the production pattern prevailing that is indicated in Tables 1 and 3, cotton acreage will be materially reduced even from the smaller 1943 crop. Seasonal labor demand will thus be much modified, and more timely harvesting of cotton can be anticipated.

Farm machinery:

With a continued stepping up in the allocations for manufacture of most items of farm machinery, no difficulty should be experienced in 1945 in obtaining most items. The major question as to availability will be in the case of crawler-type tractors and farm trucks.

Very few new trucks will be available to farmers in 1944 and an acute shortage of farm transportation may continue into 1945. Release of surplus army trucks of adapted types for purchase by farmers in the early demobilization period should be extremely important. Such release would fill in the gap between now and the time when truck manufacturing concerns can get back into commercial production.

In this connection, it is possible that the Army will be releasing barbed wire and other fencing material. Much of this could be used to advantage on Arizona farms.

Crawler-type tractors are in much the same situation as trucks. A relatively heavy replacement need will prevail in 1945 because so few have been available for purchase by farmers in the past two years. Again, surplus Army tractors of proper size could fill a definite need in the early demobilization period.

Only limited tests of the adaptability of Army jeeps to farm work have been made. The jeep does not appear to be well adapted to plowing because of insufficient power, or to row-crop cultivation because of its low (8-inch) axle clearance. The jeep should be quite useful on a farm, however, for light hauling and possibly for light field work such as harrowing, planting, mowing hay, etc.

Estimates of the number of trucks and tractors needed in 1945 are shown in Table 4. A very rough estimate of the number of jeeps that Arizona farmers might be expected to have use for in case they can be obtained at reasonable prices are also indicated.

TABLE I - Estimates of use of cropland, 1945 with comparisons,
Arizona

Use of cropland	Acres	Reported for 1943 1/	1944 goals 2/	1945 3/
Column	1	2	3	4
		1,000 acres	1,000 acres	1,000 acres
Corn, all	Planted	37	40	40
Grain sorghums, all	do.	54	70	68
Cotton, all upland	Planted	109	136	110
Cotton, American Egyptian or Sea Island	do.	96	44	40
Irish potatoes	do.	7	7	7
Beans, dry edible	do.	15	17	12
Processing vegetables, total 4/	do.	-	-	-
Fresh vegetables, total 4/	Harvested	56	60	62
Other intertilled crops, total	do.	20		15
Adjustment for multiple use 5/		35		40
Total cropland used for inter- tilled crops 6/		360		304
Oats	Planted	27	30	25
Barley	do.	99	114	115
All wheat	do.	29	25	30
Oats for grain	Harvested	9		9
Barley for grain	do.	52		70
Flaxseed	Planted	23	23	20
Other close-growing crops	Harvested	5		5
Adjustment for multiple use 5/		32		40
Total cropland used for close- growing crops 6/		151		155
Hay, all tame--except soybean, cowpea, peanut and small grain hay	Harvested	220		260
Hay, all tame	do.	278	305	320
Seeds, hay and cover crop, all	do.	31		35
Rotation (cropland) pasture		65		65
Adjustment for multiple use 5/		31		35
Total cropland used for sod crops 6/		285		325
Total cropland used for crops 6/		796		784
Summer fallow)			
Idle cropland)	153		165
Total cropland 6/		949		949
Other plowable pasture		175		175
Wild hay	Harvested	4		4
Other land in farms		24,523		24,523
Total land in farms (1940 Census)		25,651		25,651

1/ By the Bureau of Agricultural Economics except as otherwise indicated.
2/ Records of State War Board (where applicable).

- 3/ See narrative for assumptions with respect to 1945 estimate.
- 4/ Commercial crop.
- 5/ In making the adjustment for multiple use of land by crops within the same group or in two or more groups, the first use within the crop year is considered to be the primary use.
- 6/ Total acres used for crops is less than the sum of the acreages of individual crops to the extent that two or more crops were, or will be, harvested from the same land during the year.

TABLE 2 - Estimates of crop yields per acre, 1945 with comparisons,
Arizona

Crop	Acreage	Unit	Yield per acre	
			Probable on maximum acreage 1/	Probable in 1945 2/
Column	1	2	3	4
			<u>Units</u>	<u>Units</u>
Corn, all	Planted	Bu.	10.5	
All sorghums for grain	Harvested	do.	27.0	
All sorghums for silage	do.	Ton	9.0	
All sorghums for forage	do.	do.	1.7	
All upland cotton	Planted	Lb.	520.0	475.0
American Egyptian or Sea Island cotton	do.	do.	285.0	200.0
Irish potatoes	do.	Bu.	183.3	
Beans, dry edible	do.	Lb.	450.0	
Oats for grain	Harvested	Bu.	27.6	
Barley for grain	do.	do.	29.0	
Winter wheat	Planted	do.	20.8	
Flaxseed	Planted	do.	19.0	
Alfalfa seed	Harvested	bu.	2.73	3.10
Hay, all tame	Harvested	Ton	2.25	

1/ Taken from 1943 State report on wartime production capacity (Form 2, Column 6).

2/ Yields for only those crops for which the yield per acre is expected to differ significantly from those entered in Column 3.

TABLE 3 - Estimates of production of livestock and livestock products, 1945, with comparisons, Arizona.

Item of livestock and livestock products	Unit	Reported	Estimated for		
		for 1943 <u>1/</u>	1944	1945	1946
Column	1	2	3	4	5
		1,000 units	1,000 units	1,000 units	1,000 units
<u>On farms January 1:</u>					
Horses, mules and colts	Number	79	78	77	76
Cattle and calves, all	do.	911	875	850	850
Cows kept for milk, 2 yrs. +	do.	51	52	53	55
Other cows, 2 years +	do.	444	425	415	415
Sheep and lambs, all	do.	748	748	748	748
Ewes, 1 year +	do.	546	546	546	546
Hens and pullets	do.	674	750	750	750
			Reported <u>1/</u> or Estimated for 1943	Estimated for 1945	
			<u>1,000 units</u>	<u>1,000 units</u>	
<u>During year:</u>					
Sows farrowed, spring <u>2/</u>	do.		9	6	
Sows farrowed, fall <u>3/</u>	do.		9	6	
Chickens raised <u>4/</u>	do.		1110	1050	
Commercial broiler production	do.		750	600	
Turkeys raised	do.		90	85	
Milk cows, average during the year	do.		49	51	
Milk produced	Pound		248,000	280,000	
Eggs produced	Dozen		6,500	7,000	
Cattle put on feed <u>5/</u>	Number		189	200	
Sheep and lambs put on feed <u>5/</u>	do.		20	15	
Average weight hogs sold or butchered <u>6/</u>	Pound		212	212	

- 1/ By the Bureau of Agricultural Economics except as otherwise indicated.
2/ December 1 (of previous year) to June 1.
3/ June 1 to December 1.
4/ Excluding commercial broilers.
5/ Twelve-month period beginning on October 1. Animals put on irrigated pasture or pen fed.
6/ Weight in pounds instead of 1,000 pounds.

TABLE 4 - Estimated number of specified types of equipment that will be on farms in 1944 and additional number that would be needed for attainment of 1945 production, with comparisons, Arizona.

Kind of equipment	On farms for use in 1943	Expected	Additional number needed in 1945	
		to be on farms for use in 1944	To replace worn out equipment	To increase total of equipment in use
Column	1	2	3	4
	Number	Number	Number	Number
Tractors, total	5700	5900	575	300
Wheel type	4800	5030	475	200
Grawler type	900	870	100	100
25 hp. or smaller	450	440	50	50
26 to 60 hp.	405	390	45	45
Over 60 hp.	45	40	5	5
Trucks, total	4500	4300	1000	325
1.5 tons or smaller <u>1/</u>	xxx	xxx	900	300
Over 1.5 tons <u>1/</u>	xxx	xxx	100	25
Jeeps	xxx	xxx	1000 <u>3/</u>	1500
Other equipment				
Mowing machines (Tractors)	2300	2500	250	400
Side-delivery rakes <u>2/</u>	900	920	100	600
Pick-up balers	520	540	50	200

1/ Rated load capacity.

2/ Rough estimate.

3/ For replacement of pick-up trucks.

CHAPTER IV.--MARKETING AND DISTRIBUTION PROBLEMS IN
THE DEMOBILIZATION PERIOD.

This chapter was compiled by the following subcommittee:
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Council.

1. American-Egyptian Cotton

Some basic information on American-Egyptian cotton is presented in tables 1, 2, and 3. From 1925 to 1939 United States consumption of American-Egyptian cotton was fairly stable at 15 to 20 thousand bales annually. United States consumption of Egyptian varieties fell from 220 thousand bales in 1925-1929 to 60 thousand in 1935-39. Domestic consumption of American-Egyptian increased sharply in 1941 due to: (1) threatened curtailment of imports from Egypt, and (2) heavy military requirements for cotton fabrics with high tensile strength. Figures on imports and consumption of Egyptian cotton have not been released since 1940, but the August 1 carry-over has remained about constant, 38 thousand in 1940, 45 thousand in 1941, 39.4 thousand in 1942, and 38.1 thousand in 1943. This would seem to indicate that substantial imports and consumption have taken place otherwise stocks would have been severally depleted. U. S. consumption of all foreign cotton combined--Egyptian, Brazilian, Peruvian, and other--was 170 thousand bales from August 1942 to July 1943, compared with an average of 139 thousand in 1935-39.

Monthly consumption of American-Egyptian cotton reached a peak of 4,951 bales in March 1942 and since that time has fallen off to an average of 3,575 bales in August-October 1943. At this rate 1943 ginnings will exceed 1943 disappearance by 24 thousand bales. At the present rate of disappearance, the supply of 104 to 116 thousand bales (1943 ginnings plus carry-over on August 1) would last until the spring of 1946 assuming no plantings at all in 1944 and 1945. Almost the entire 1943 crop in Arizona is being purchased by Commodity Credit Corporation, also a considerable percentage in New Mexico and Texas.

Another factor affecting the outlook for the crop in Arizona is the big new acreage in New Mexico and Texas. Unlike Arizona, Texas increased the acreage from 23 thousand in 1942 to 28 thousand in 1943, and might be a competitor for the reduced domestic market after the war.

In view of these conditions it is important that stocks, both government and private, of American-Egyptian cotton be liquidated in an orderly fashion during the next two or three years, and that plantings be discouraged during this period (see recommendations). One

by-product of the American-Egyptian situation will be a considerable excess capacity in roller gins, which cannot be easily reconverted to saw gins for Upland cotton. Since the outlook for Upland cotton does not indicate expansion, fully half of the roller gin capacity will have to be written off by the owners or carried by an increased charge for ginning the reduced production of American-Egyptian.

2. Irrigated Upland Cotton

According to trade estimates, about 75 percent of the Upland cotton produced in Arizona and California used to be exported to Japan. It is generally accepted that little or no rainbelt cotton is exported from California ports, even the bulk of Texas and New Mexico irrigated cotton moves through Gulf ports or to domestic mill points. Hence table 4 can be taken to indicate, within rather narrow limits, the proportion of California and Arizona cotton which formerly went into export channels. There are no statistics on the proportion of this cotton which went to Japan, but trade sources agree that the great bulk of it did.

COC loan rates also reflect the pre-war dependence of Arizona and California cotton on foreign outlets (table 5). In 1940 and 1941 basic loan rates at Los Angeles were even higher than at Atlantic ports. Rates at other California and Arizona points were based on Los Angeles or San Francisco minus freight. In 1942 and 1943 loan rates at Phoenix and Bakersfield were more than a cent lower than at Carolina points, and were apparently based upon rates in domestic mill centers minus freight.

Western irrigated cotton has always taken a discount at domestic mill points below rainbelt cotton of the same grade and staple. Before the war COC loan rates on staples longer than one inch were much lower for irrigated than for rain-grown cotton. For Middling 1 1/8 inch the premium over 15/16 inch was 1.5 cents for rain-grown cotton and only .6 cents for irrigated. For 1 5/32 inch the premiums were 2.45 cents and 1 cent respectively. In the 1942 and 1943 programs this alleged discrimination against irrigated cotton has been removed. Hence the loan rates at eastern consuming centers are now identical for irrigated and rain-grown cotton of the same grade and staple. Until about August 1943 market prices were far enough above loan rates to permit irrigated cotton to move into domestic consumption at discounts of a cent or more below rain-grown cotton (table 6). ^{1/} Since August, however, the market has begun to lean on the loan rates, and the market price of irrigated cotton has gone as much as .8 cents below the loan rate.

If prices of rain-belt cotton continued at or near the loan rates, irrigated cotton cannot flow into consumption on a competitive basis, but will pile up in government hands. Hence, it would seem desirable

^{1/} These discounts were as follows, on Middling 15/16 inch: 1942-43 - 1.15 cents; August 6, 1943 - 1.13 cents; November 26, 1943 - .8 cents.

for western growers to accept a discount in government loan rates of perhaps a cent a pound to encourage domestic consumption of irrigated cotton. This would prevent the piling up of large stocks of this particular type, and would relieve western growers of too complete dependence on Oriental outlets during the demobilization period. Some sources feel that domestic mills have become more familiar with irrigated cotton in the last two years and would consume the entire supply at a one cent discount. Mill operators still assert that this discount is justified because of greater waste and more "neps" in the irrigated cotton.

3. Readjustment of the Arizona Dairy Industry

The following figures show some significant facts about the Arizona dairy industry:

Year	Total milk produced	Sold to dairies as milk	Other methods of sale and farm use
	Million pounds	Million pounds	Million pounds
1938	219	88	131
1939	230	92	138
1940	230	104	126
1941	241	115	126
1942	247	124	123

All of the increase in dairy production is accounted for by increased sales of fluid milk. Producers have added the equipment and taken the extra pains necessary to produce Grade A milk to help supply the increased military and civilian population, as well as the increased buying power of the latter. The dairy industry as a whole has been less profitable than other feed-consuming enterprises, so expansion of dairy production as a whole was only moderate up to 1942, and has declined during 1943. But within the industry Grade A milk has been the most profitable outlet for feed, and churn cream the least. Consequently, there has been a large expansion in the production of Grade A milk and a drastic reduction in the production of butter. One large producer asserts that Arizona butter production is now scarcely one-third of the pre-war level.

With the liquidation of most of the military installations and some of the defense plants, it is probable that Arizona will be unable to absorb the present output of Grade A milk. At that time it will be necessary to increase butter production and to reestablish local brands in the Arizona market. At present, between the reduced production in Arizona and the set-aside order, Colorado distributors have allegedly taken over a large part of the Arizona market and

a strong advertising campaign may be necessary to restore the premiums formerly obtained by certain Arizona brands. Production of other manufactured dairy products--for which Arizona has always been a deficit area--can probably be restored to pre-war levels and even increased. A new outlet may be found in the shipment of sweet cream for manufacture to Los Angeles, provided that certain Los Angeles regulations are relaxed. The regulation limiting ice cream manufacture to Grade A cream has been relaxed during the war. If Los Angeles continues to grow in population, Arizona should become a necessary and welcome contributor to the Los Angeles supply of manufacturing cream and other products.

4. Arizona Grapefruit

Just before the war Arizona grapefruit brought on-tree returns in the neighborhood of five dollars a ton--considerably below the level necessary to maintain the industry in sound condition. The marketing agreement in effect since 1941 has kept small sizes and low grades off the fresh market and diverted about 45 percent of the production into processed forms. Current prices are exceptionally high, but the demobilization period will probably witness a return to more normal levels.

Arizona ships about 50 percent of her fresh grapefruit to California, and this market is protected by inspection laws which effectively exclude Texas fruit. Utah, Colorado, Oregon, Idaho, and Washington take perhaps 35 percent; and the remaining fresh fruit goes to midwestern points after the Texas season is virtually ended. The main problem for Arizona fresh grapefruit appears to be the popularity of its more tart flavor in the area west of the Rockies. The marketing agreement should help to obtain consumer acceptance of the rather uniform qualities now shipped. Table 7 indicates both the problem and the possibility of extending Arizona fresh fruit and marketings in this area.

Another problem is that of flavor promotion and quality standardization of Arizona canned grapefruit juice. Unless Arizona growers can build up consumer preference for the flavor (and trade marks or labels) of the Arizona product, the local industry is likely to be buried under the increased production of grapefruit, both fresh and canned, from Texas and Florida. Promotional activities may improve the relative position of Arizona grapefruit in the demobilization period.

In 1942 with free prices Arizona grapefruit sold at roughly one dollar a box below Texas grapefruit on the same weight basis. This is probably representative of normal pre-war differentials. In 1943, with market demand pressing against ceiling prices, this differential was eliminated. In the normal course of events the old differential would probably reassert itself after the war. However, at the present time consumers are accustomed to pay the same price for Arizona and Texas grapefruit, and judicious advertising at this time may permanently modify the pre-war differentials.

Table 7. * Grapefruit: Prices of Arizona and Texas grapefruit in Portland and Seattle, price per box 1942 and 1943 ^{1/}

Market and Year	Arizona		Texas	
	65 pound box	80 pound basis	regular 80 pound box	pink 80 pound box
	Dollars	Dollars	Dollars	Dollars
Portland				
Jan.-May 1942	2.09	2.57	3.70	-
Jan.-May 1943	3.27	4.03	3.84	4.64
Seattle				
Jan.-May 1942	2.20	2.71	^{2/} 3.73	-
Jan.-May 1943	3.32	4.09	4.24	-

^{1/} Average of Wednesday prices (mid-ranges) for the periods indicated.

^{2/} Average of regular and pink.

5. Distribution of Essential Foods During Demobilization Period.

Arizona has several important industries which are highly vulnerable in the demobilization period. If government stocks of copper at the war's end are large, as many as twenty thousand workers and their dependents might be stranded by an abrupt termination of military demand. Several large defense plants in the Phoenix area are expected to curtail operations. The civilian employees attached to air bases and other installations will also be liable to separation on short notice. The gravity of these problems will depend on the demand for labor, particularly in California civilian industries and service occupations. The problem of stranded workers may fall more directly upon the War Manpower Commission, United States Employment Service, and unemployment insurance benefits. However, plans for direct distribution of basic and protective foods should be held in readiness to fill gaps in these programs. Such plans should be geared as closely as possible to maintaining the consumption of local products which are highly dependent in the short run upon the buying power of these stranded workers.

The school lunch program should be expanded during the demobilization period as rapidly as materials, construction labor, and satisfactory personnel become available. Current figures on the Federal school lunch program show 141 out of an Arizona total of 460 schools participate in the program. The enrollment in participating schools is 47,000, compared with a total of 115,000 in May 1943. Of the 47,000 students in participating schools, 29,000 actually take advantage of the school lunch. A survey is currently being made of the costs of facilities and operations in 30 Arizona schools, and the results should be available in the near future. Expansion of

school lunch programs, both Federal and other, appears to have wide public support in Arizona. Apart from its nutritional and educational benefits, expansion of the school lunch program will increase the stability of the local dairy, poultry, and citrus industries during the demobilization period. On the surface it appears that perhaps 40,000 or 50,000 additional children could be brought into the school lunch program if facilities and personnel were made available. An effort is now being made to obtain state legislation specifically authorizing the use of school funds for personnel and equipment to operate school lunch programs. Existing legislation governing the use of school funds does not specifically mention these uses, and has been narrowly interpreted to exclude them.

Purchase of surpluses of perishable commodities for direct distribution to schools and other institutions may become necessary during the demobilization period. Distribution of such commodities should be determined not simply by the willingness of an institution to accept them but also by the relative abundance or scarcity of the same commodities in the area in which the institution is located. In the past it is asserted that surpluses have been piled upon surpluses in some localities.

6. - 7. Alfalfa and Livestock

High prices for alfalfa and serious difficulties with cotton, labor shortages and inefficiency, insect damage, and a gloomy market outlook for American-Egyptian cotton have induced big increases in alfalfa acreage since 1942. The general magnitude of the increase would be from 200 thousand acres in 1942 to 250 thousand in 1944. New plantings in California have also been extensive. The possible outlets for this alfalfa are (1) increased feeding of dairy cattle, (2) increased pasture feeding of beef cattle, sheep and lambs, (3) shipment of alfalfa meal to midwestern markets, (4) shipment of hay to the Los Angeles milkshed. The relationships of these outlets during the demobilization period cannot be forecast at present. Similarly the problem of demobilizing government regulations on livestock and meats cannot be analyzed at the present time, particularly at the state level. However, the basic trend of population growth in California seems to favor the prosperity of Arizona hay and livestock enterprises, after if not during demobilization.

According to Census estimates, between April 1, 1940 and March 1, 1943 the civilian population of Arizona increased by 90 thousand; Los Angeles and San Diego areas 230 thousand; and the San Francisco area 280 thousand; or a total of 700 thousand. At pre-war levels of consumption these people would demand roughly 150 thousand head of beef cattle annually and 100 thousand additional dairy cows for fluid milk, plus some manufactured dairy products. This would place a combined demand upon California and Arizona cropland for about 250 thousand acres of alfalfa over the level of 1940.

It seems probable that California will hold this increase of pop-

ulation through the demobilization period. Too sudden a reduction in aircraft and shipyard employment may precipitate a buying power problem for Arizona's entire hay and livestock economy. In the post war replacement boom, however, the demand for Arizona hay, livestock, and dairy products due to this increased population should be much stronger than before the war. Over the next decade the increase of population in California may amount to considerably more than its acquisitions during the war.

8. - 9. Market Information and Marketing Facilities in Isolated Areas

Information is not at hand to give a full presentation of these problems in terms of areas, number of growers, and quantities of produce involved. Farm organizations and established cooperatives should take the initiative in defining these problems more exactly in cooperation with the groups in need of facilities and information. Only when the needs have been more accurately defined will it be possible to work out satisfactory measures to meet them.

Table 1. - Long staple cottons: Annual consumption in the United States 1925-1943

Crop Year	American- Egyptian	Egyptian	Sea Island	Total
	Running bales	Running bales	Running bales	Running bales
Av. 1925-29	15,000	220,000	1,200	235,200
1930-34	14,000	91,000	500	105,500
1935-39	17,000	60,000	1,800	78,800
1940	26,937	60,884	3,270	91,091
1941	47,031	<u>1/</u>	4,281	<u>1/</u>
1942	47,783	<u>1/</u>	5,664	<u>1/</u>
1943	<u>2/</u> 43,000			

1/ Consumption of Egyptian cotton not reported due to war.

2/ Annual rate August - October 1943.

Table 2. - American-Egyptian cotton: Ginnings, disappearance, carry-over, and supply 1938-43

Crop Year	Ginnings	Disappearance	Carry-over <u>1/</u>	Supply
	Running bales	Running bales	Running bales	Running bales
1938	20,503	18,818	10,289	28,362
1939	26,826	21,564	13,681	37,115
1940	32,325	27,351	15,695	46,006
1941	57,329	47,031	24,859	73,624
1942	73,808	49,783	<u>2/</u> 36,657	98,667
1943	67,000	<u>3/</u> 43,000		<u>2/</u> 104,000

1/ Stocks as reported by Census.

2/ May be as much as 12,000 bales too low. Supply on August 1, 1942, minus disappearance up to August 1, 1943, gives carry-over of 48,864 and supply of 116,000 bales.

3/ Annual rate August-October 1943. Trend in consumption is downward.

Table 3. - American -Egyptian cotton: Acreage harvested in Arizona, New Mexico, and Texas 1939-1943

Crop year	Arizona	New Mexico	Texas	U. S.
	Acres	Acres	Acres	Acres
1939	41,000	-	-	41,000
1940	65,000	-	-	68,000
1941	101,000	19,200	15,600	136,100
1942	129,000	26,600	23,000	180,700
1943	96,000	20,900	28,000	145,900

Table 4. - Cotton: Production in California and Arizona and exports from San Francisco and Los Angeles 1935-36 - 1939-40

Year	Production California and Arizona ^{1/}	Exports from L.A. and San F. customs districts	Ratio exports to Production
	Running bales	Running bales	Running bales
1935-36	355	317	89.3
1936-37	592	531	89.7
1937-38	1,039	613	59.0
1938-39	599	388	64.8
1939-40	617	561	90.9
Average	640	482	75.3

^{1/} Excluding American-Egyptian varieties.

Table 5. - Cotton, Middling 15/16 inch: Government loan rates at specified markets 1940-43

Year	Los Angeles	Phoenix	Memphis	Savannah
	Cents per pound	Cents per pound	Cents per pound	Cents per pound
1940	9.80	9.55	9.06	9.40
1941	14.85	^{1/}	14.17	14.54
1942	^{1/}	16.55	17.22	17.62
1943	^{1/}	18.59	19.26	19.66

^{1/} Not given in sources used.

Table 6. - Cotton, Middling 15/16 inch: Comparison of spot market prices and government loan rates at specified markets 1942 and 1943

	South- eastern	South Central	South- western	Average 10 rainbelt markets	Western irrigated
	Cents per pound	Cents per pound	Cents per pound	Cents per pound	Cents per pound
Market prices					
Av. 1942-43	20.41	20.02	19.90	20.14	18.33
Aug. 6, 1943	21.03	20.41	20.24	20.61	18.82
Nov. 26, 1943	19.78	19.17	19.02	19.38	17.92
Loan rates					
1942	17.61	17.18	17.10	17.33	16.67
1943	19.65	19.22	19.14	19.37	18.71
Premium of market over loan rate					
1942-43	2.80	2.84	2.80	2.81	1.66
Aug. 6, 1943	1.38	1.19	1.10	1.24	.11
Nov. 26, 1943	.13	- .05	- .12	.01	- .79

CHAPTER V.--OPPORTUNITIES FOR SETTLEMENT ON LAND AFTER THE WAR
(INCLUDING MILITARY LAND).

This chapter was compiled by the following subcommittee:
Ian A. Briggs, University of Arizona, Chairman. O. C. Williams,
State Land Commissioner; Philip Greisinger, Bureau of Agricultural
Economics.

The opportunities for settlement of new lands in Arizona following the war are predicated almost entirely upon the development of additional lands under irrigation. Some such areas are now being developed and irrigation facilities provided. Plans are well formulated for the development of certain other specific areas while the major part of the total area which will be developed ultimately has not been determined upon definitely. There will be a small amount of land available for settlement shortly after the war is ended but a considerable part of the settlement will be delayed pending the actual development of the different projects.

Making new lands available for settlement through federal, state and local agencies certainly implies that settlement of such lands is desirable and is recommended. It goes even further in that it places the agencies involved in the position of promoting settlement. The soundness of such a policy is open to question in view of the clouded outlook for agriculture in the long-time program following the war. The development of lands under high land value and high cost conditions and the establishment of new settlers unfamiliar with farming practices in the irrigated Southwest with relatively small equities in land and improvements, might prove disastrous under conditions of deflation or unfavorable tariff policies. Surpluses of agricultural products had disastrous effects within the past decade and marked increases in such products under long haul marketing conditions in Arizona could affect adversely the whole agricultural economy of established farming areas.

Perhaps it is fortunate that actual farming on many of the new irrigation projects proposed for Arizona will be delayed for a number of years, possibly until national and international conditions have assumed a more definite outlook. Ample provision for determining the irrigation possibilities of the State should be made as recommended below but all public agencies should be careful to avoid painting too rosy a picture of the new irrigation projects as the promised land for returned soldiers.

An analysis of the postwar settlement possibilities and problems on new lands in Arizona defines two definite needs which must be met positively if the greatest good to the State and to the settlers is to be accomplished. These are:

- (1) The need for a factual survey and study of the important proposals for use of Colorado River water in the southern part of the State. Proposed developments are of such magnitude that proper surveys will be both costly and time consuming but they must be made to assure proper use of water available as well as the possible development of hydroelectric power. The suggestion that a portion of the funds derived from Boulder Dam

power to be used with federal funds for surveys and other studies is strongly recommended. Smaller projects of acknowledged feasibility should be pushed rapidly and the same is true of the first unit of the Gila Project for which the main canal and much of the lateral system is well completed.

(2) The need for careful selection of settlers on government lands with possible selection of those on private lands the value which is derived for the most part from the publicly developed water supply. It is recommended that consideration be given to the matter of actually training settlers through an apprentice work period of one year during which the settler would be paid wages for actual work performed on a project within the State. No definite plan is here suggested although the plan followed by the Goodyear Tire and Rubber Company at the Southwest Cotton Company, Litchfield Park, is worthy of study. The proposed apprentice shop training period should be waived in the case of those who possess the required experience.

The experience on many irrigation projects is that three or more farmer settlers acquire and lease a given farm before it passes into what might be termed satisfactory farmer ownership. Any effort which will reduce this turnover is well worth while in money savings to the settlers and to the State, to say nothing of the savings in time required for developments and the effects upon the settlers themselves. The interested state and federal agencies have definite responsibilities to oncoming settlers, but they have the added responsibility of seeing that heavy investments of public moneys are protected. The greater the development of the land by public agencies, the greater is this responsibility.

Settlement Under Specific Conditions

1. Surplus military land areas

No surplus military land of a strictly range character offers any possibility for settlement. It is recommended that range tracts released be first offered to original owners, possibly at the purchased price; it should be offered to other adjacent stockmen before being offered to any other possible buyers. Other surplus military land areas, to the extent to which they may become a part of irrigation projects, should be opened to settlement in the same manner as other public land. If such areas had been acquired from private sources, such owners should have prior consideration in the purchase of such lands, provided he qualifies as a farmer on that particular land.

2. Established agricultural areas

a. Replacement of retiring farmers.

To the extent that such replacement might be by soldier settlers, such new owners should receive proper consideration from such organizations as the Federal Land Bank, Production Credit Corporation, and like agencies. The possibilities of soldier settlement under such conditions are not considered very great due to high land values, but from the standpoint of new farmers in Arizona in the immediate postwar period, replacement of present farmers offers by far the greatest possibilities. For example, the percentage of farmers who are 65 years old or older is 10.8

percent in Colorado. It is our opinion that the percentage is less than that figure in Arizona due to the rapid settlement and heavy turnover of lands during the past 20 years. A tentative estimate of 8 percent is suggested; this would indicate that the number of farmers who might retire in Arizona is approximately 800. The present trend by which the total number of small farms is actually decreasing through consolidation of holdings would indicate that the number of farms to be made available by retirement of present farmers is somewhat less than the number of retiring farmers.

b. Intensification and land improvement.

No recommendation is made for further intensification as this relates to size of land holdings inasmuch as there is a definite trend toward larger rather than smaller-sized farms. The place of the subsistence farmer or part-time farmer in Arizona is questionable. Such subsistence farming may be limited to units of less than three acres in which case the units are not classed as farms at all.

c. Additional families on existing farms as laborers or operators.

There are distinct opportunities in this field. Wartime labor problems have focused attention to the need for a certain amount of permanent labor on larger farms. Too often a good farmer accustomed to using day labor only has expanded his holdings to 200 acres or more without providing any adequate housing for labor with the result that he has found himself without help entirely. Such farms could well support an additional small house suitable for a permanent all-year foreman-laborer. If such facilities also permitted the occupant to keep a cow and possibly some chickens, a desirable type of man with a family would be attracted. It is suggested that such an arrangement is a possible step to farm ownership more feasible under agricultural conditions in the State than is farm tenancy on a farm too small for economic operation. At least some such foreman-laborers might well come from an apprentice training group previously suggested.

3. New land development areas.

New land development areas in Arizona are limited almost entirely to irrigation developments. Such areas as are in need of either drainage or clearing are in conjunction with present or prospective irrigation projects. Some slight increase in dry farm areas might be accomplished but this is dependent upon improvement of farming practices and methods for such areas. Extension of such areas is very questionable.

A study of the irrigation projects now under construction and the many others proposed at various times is being made by a representative of the Bureau of Agricultural Economics. At this date upon the basis of conferences with many people, offices and agencies, and of a study of available published and unpublished reports, a preliminary tabulation and evaluation of the status and feasibility of selected irrigation proposals were made. Exact conclusions from such a survey are impossible but the possibilities of irrigation development within a period of 18 months from the cessation of hostilities with Germany are suggested in Table 1.

Table 1.--Preliminary Summary Classification of Selected Irrigation Proposals in Arizona 1/

Classification of proposals <u>2/</u>	Acres proposed for irrigation development				Estimated No. of farms to benefit (3)	
	Total acreage involved	Primarily to benefit lands now irrigated	Primarily to water lands now unirrigated To benefit going farms	To provide new farms	Going farms	New farms
	Acres	Acres	Acres	Acres	Number	Number
A	68,000	-----	-----	68,000	-----	200
B	<u>14,500</u>	<u>4900</u>	<u>2100</u>	<u>7,500</u>	<u>135</u>	<u>40</u>
Total	82,500	4900	2100	75,500	135	240

1/ Compiled from published reports and information contributed by many people, offices and agencies, including the U. S. Bureau of Reclamation, Farm Security Administration, Arizona State Land Department, Colorado River Commission, Department of Agricultural Engineering and Department of Agricultural Economics and Rural Sociology, University of Arizona, and State Committee on "Opportunities for Settlement on Lands After the War," Tucson, Arizona, January 24, 1944.

2/ Definitions of the classes are as follows:
 Class A. Land proposed for irrigation already included in projects which may be under construction or authorized for construction and which most likely could be made available for settlers and farmers.
 Class B. Irrigation proposals which have been investigated and judged by information available appear to merit irrigation development.

(3) Does not include farms on Indian lands.

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CHAPTER VI.--TENURE PROBLEMS AND THEIR SOLUTION AFTER
THE WAR.

This chapter was compiled by the following subcommittee: Dr. E. D. Tetreau, University of Arizona, Chairman; H. E. Selby, Bureau of Agricultural Economics; Fred Campbell, Farm Security Administration.

Land tenure pattern in Arizona

A general idea of the land tenure pattern in Arizona may be obtained by comparing the numbers of acres under public and private ownership. Of a total land area of 72 million acres, over 47 million acres is under Federal ownership. State agencies administer an additional 9 million acres, leaving a little over 13 million acres in private ownership. This is only 18 per cent of the total area of the State. See Table 1.

Table 1.--Ownership of Lands in Arizona

	Acres	
Land in Federal ownership		
Indian Reservations	19,224,717	a
National Forests	11,464,905	a
Other Federal Lands	<u>17,125,460</u>	a
Total Federal Lands	47,815,082	
Land in State ownership	10,692,429	b
ownership unknown	1,263,031	
Land in private ownership	<u>12,920,658</u>	a
	72,691,200	

a Land Ownership in Eleven Western States, Philip Greisinger, B.A.E., U.S.D.A., Berkeley, California, March, 1943.

b Thirty-first Annual Report of the State Land Commissioner, July 1, 1942 - June 30, 1943, O. C. Williams, Commissioner.

By far the greater part of land in private ownership is unreclaimed desert land. Only about 750,000 acres of this land is in crops grown under irrigation, all but 50,000 acres being in five counties--Graham, Maricopa, Pima, Pinal, and Yuma. The importance of these small areas under irrigation in the economy of the State is seen, however, when one remembers that from 80 to 85 per cent of the total value of agricultural products in 1943 (see Arizona Agriculture 1944, George W. Barr) came from this 750,000 acres. The total value, something over 120 million dollars, equals the value of all metals produced by Arizona's mines during the same year. On the other hand, it must be remembered that water for irrigation lands comes largely from areas of higher elevation, areas largely under Federal ownership. Also, the importance of Federal leadership in the reclamation of desert lands is a matter of common knowledge throughout Arizona and looms large in any plans for the future expansion of Arizona's irrigated agriculture. Nevertheless, the productivity of Arizona's agriculture rests squarely upon private ownership in irrigated land.

As to agricultural uses of lands in public ownership, cattle and sheep ranching as private enterprises make up the remainder of the picture in which irrigated farming occupies so large a place. It is in this connection that the mixed pattern of Federal, State, railroad, and absentee individual ownership gives rise to problems that are especially difficult for the individual operator.

Public and private lands are in spots greatly in need of re-arrangement in the interests of better land use and more efficient administration. The profile of productivity rises sharply with reclamation under Federal leadership, followed by private ownership and enterprise.

Tenure problems

Tenure problems are not likely to be the consequence of tenure conditions alone. Their roots begin in other conditions and their adjustment must needs be part of other adjustments aimed at the untangling of other problems. Nevertheless, it is possible to isolate certain problems as mainly related to tenure conditions.

Problems rising out of the mixed ownership pattern of range lands have already been suggested. Operators often find themselves compelled to deal with several public and private agencies in securing range on which to graze livestock in areas suitable to their needs. Some exchanges of parcels and blocks of land would simplify the tenure pattern and ease the difficulties of the enterpriser. It is a matter of immediate concern that measures be taken to expedite the exchange of lands so as to simplify this tenure pattern.

Other problems rise out of the application and enforcement of the acreage limitation provisions of the Federal reclamation law. Still other problems center around the size of holdings. Any kind of homestead tax exemption applied as a remedy for tenure conditions leads to a new set of problems, certainly no less difficult than tenure. Jumping from the "tenure" frying pan into the "tax" fire might create more difficulties than it would cure. Graduated taxes on larger holdings in a state whose area is largely used by ranching enterprises and whose animal unit capacity varies so widely from southeast to northwest seems not so much a way to solve as a way to create problems.

Some of Arizona's most obvious tenure problems grow out of a more general problem, namely, the limited area of good irrigated farming land, and the present inaccessibility of water supplies for further farming developments. This leads to difficulties in applying acreage limitations since the vigorous and enterprising operator soon runs up against the limits set by law. If he is to expand further he must reclaim new lands outside the project within which the limitations apply, or he must resort to devices which circumvent the law in order to get land to meet his requirements. This scarcity of irrigated farming land, together with acreage limitations, tends to rather severely limit expansion among the best farmers and thence affects the operation of competition. The law favors smaller and often less efficient farmers while at the same time necessary economic costs tend to push out the inefficient and let in the more able enterprisers. This makes for some considerable turnover of small farms. The extreme variations in land

leasing agreements found in the best irrigated areas point not only to differences in the costs of water and the productivity of irrigated lands, but also to variations in the experience, working capital, and ability of farm operators seeking land to rent. It may be said that able operators compete for good land during slack times as well as during times of rising prices but the poorer farmers compete largely during slack times. During good times many of the less able operators are drawn off into city industries where high wages prevail, only to return to farming when wages come down. Likewise high industrial wages make for labor scarcity on farms, while depressions send idle laborers back to the farm for shelter and subsistence. The limited area of good irrigated farming lands tends to intensify competition in buying lands during prosperous times and limits expansion among the best farmers; while in poorer times there is not enough land to go around among the good, bad, and indifferent operators who are then to be found in agriculture. During these times, however, the good operators need not bid high for the land and poor operators can not.

Purchase contracts with "stiff" payments over a rather short period are not so much a matter of concern as long-term contracts for land purchased at high prices. The equities that seem large enough now will disappear entirely during the course of a long-term contract if land values decline to some extent. Purchase contracts with heavy payments over a short term are not so likely to result in buyers' equities melting away.

Many tenure problems that revolve around the fear of inflated land prices would disappear with the emergence of balanced governmental budgets and an assured stabilization of the dollar. Inflationary governmental measures drive nonfarmer buyers landward, thus increasing competition for farm lands and further boosting the price of land while further depressing the value of dollars.

Long-term objectives

Long-term objectives in Arizona land tenure should determine the tenor of short-term goals such as are needed to postwar tenure programs. It seems certain, for example, that the desirable long-term objective for much of Arizona's range and forest land, now in large part under Federal control, would be predominant public ownership and management, in the interests of the future of ranching enterprises in the area. In contrast to this, the objective for reclaimed lands, suitable for farming under irrigation, is private ownership and management, once the productive capacity of the land has been determined. In the first instance exchange of certain lands and the acquisition of other lands might facilitate public management of grazing lands and benefit cattle growers in a given area, although any move to enlarge the size of the public domain at the expense of private property in land will be generally and strongly opposed. Arrangements to consolidate public holdings without enlarging the public domain would be more advisable.

Security of tenure as an objective, while desirable under many conditions, is in danger of being overemphasized in connection with the general emphasis on security. Security and stability of tenure which lock up land and human resources into preconceived patterns are not to be commended. They interfere too greatly with freedom of action

and of self-determination, which, in themselves, constitute long-term objectives of inestimable value. A more constructive objective in Arizona agriculture might be stated in terms something after this fashion: a certain flexibility in the conditions of tenure that permits the most effective use of land resources consistent with conservation and productivity. This would permit the best farmers to have access to the best land. As to the stability of institutions in rural Arizona, a point which is generally set forth as an argument supporting stability of tenure, it is desirable insofar as the institutions are effective and progressive. It should be remembered that institutions easily become ends in themselves and thus defeat the objective of a good and desirable life. Likewise, the ideal of a high standard of living is practically constructive if its realization day by day does not result in the consumption of income that should be applied to the reduction of farm debt and the assurance of future independence. Moreover, objectives such as an equitable distribution of income may lead to ideologies whose core is a social order in which status is supreme, the sort of a system which is far indeed from the idea of democracy. Income distribution should be tied to efficiency in production or to the level of services rendered and not to some notion of egalitarianism akin to the notion of patronage. Why should we cull out boarders in a flock of hens or a herd of cows and put a premium on them in the human family? Equalization of opportunity is another thing, and stands foremost among long-term objectives in a democracy.

The period immediately following the cessation of hostilities

When hostilities cease land will without question be selling at good prices but no one can say what these prices will be. Some observers think that land prices are levelling off now and that the threat of proposed measures to tax capital gains and to take the profits out of land sales will be effective in keeping prices levelled off. Others find considerable evidence to support their expectation of further increases in land prices. Talk of controlled prices has not been effective in preventing wage increases and continued spending. The value of the dollar is likely to be further depressed. So, these observers say, how can land prices stay where they are while other values appear so unstable and while everyone with money to invest wants to buy land?

Some irrigated lands have doubled in price since 1937, the steepest rises coming since early 1942. There is a real danger that a number of purchasers of land, during the period following the cessation of hostilities, may incur obligations calling for payments that cannot be met without a continuation of good crops at very high prices. Just what we can do to prevent that kind of venture in a free country is not clear to be seen. Obviously we can sound a warning note about land bought at war prices and paid for under postwar conditions. That is about all.

Rather than to incur obligations that are likely to end in failure, young men and others who wish to take up farming after the war is over might do well to consider several alternative ways of getting into the occupation. Many returning soldiers and war workers who desire to farm should be encouraged to rent or to work for a successful farmer

as a hired hand rather than buy, because of the inflated land values which now prevail and will undoubtedly continue for several years. In this way these men will have a chance to try their skill as farmers without risking their savings on high-priced land. When they are ready to venture they will be able to operate larger farms with their limited capital by investing it in equipment rather than putting it into high-priced land. After a few years, land prices may well become more reasonable and it may then be advantageous for these men to become owner-operators.

There is a trend, it must be said, which points to a decrease in the numbers of farms that will be available for rent at the end of the war. Nevertheless, a possible source of farms for rental are those farms now operated by men who have wished to retire but did not do so because of the war. Some of these farms will go to sons or other relatives of the present operators. There should be some farms available for other prospective operators, however.

In some instances, however, the facilitating of acquisition of farm tracts may be desirable. Training and advice might be furnished new owner-operators through county agricultural agents or through an extension of state vocational education programs to meet the peacetime agricultural situation.

Another point about the immediate postwar period is the fear that service men and war workers will rush away from cities and industrial centers and bid for a piece of land, thus providing a market for promoters of settlement schemes, colonizers, etc. Dangers at this point are probably more shadowy than real. Without question, many men drawn from remote rural areas will return to these areas for a short time after demobilization but few will return to stay. The factory workers will seek out new industrial jobs which will take them back to urban areas and returned veterans will tend to crowd to large towns and cities. Only to a limited extent will returning veterans seek a foothold on the land. Those who do will include the sons of operators who have land and capital to give the young man a start or who are ready to retire and turn the farm over to the young man. Grave dangers may appear in "easy terms" land settlement promotion but these will find few customers until a serious recession or depression drives men from cities back to the land. Moreover, are we not told that our postwar debts will require of us a producing and earning capacity that can be realized only in a highly industrialized and urbanized economy? The year of heaviest migration farmward in the 30's saw our national income fall below 50 billions. Back-to-the-land movements do not occur during years of high national income.

It would seem that graver dangers reside in possible governmental programs of action during the period immediately following the cessation of hostilities than in private land settlement schemes. At a time when public spending should be cut to the bone and possibly even totally discontinued, we are in danger of undertaking vast programs involving the lending of millions when credit should be sharply curtailed. There are signs that this may finally dawn upon men in responsible places. The new FSA Administrator said on December 14, last, "I expect this work to be put on a sound, practical basis and to be directed by the head as well as by the heart."

Also, the fact remains that easy credit is not what the poor man or any other man now needs. It is exactly what he does not need. Instead of borrowing he should be saving.

What is likely to take place in farm tenure between now and the cessation of hostilities?

Trends of the past several years seem to indicate a number of things about the tenure of farm lands. First, farms owned and operated by corporations are at a standstill as to size and number. On the other hand, commercial farms, individually owned have somewhat increased in numbers and many have added acres to their former size, that is, since 1940. This may be said of farming lands and of enterprises such as dairies to some extent. Other agricultural enterprises of commercial size such as cattle feeding have not fared as well but there has been some recovery of late. Family farms (commercial farms) have tended to whittle down to a size of operations suited to the operator and whatever family help he can command. He has reduced his acres in many instances to the number he holds as an owner, releasing additional rented acres. He doesn't keep a hired man, partly because of the frequent turnover in men, partly because the extra costs do not pay for the kind of enterprise he operates. Another class of producers which has curtailed farming operations is the part-time farmer. The trend, in times of very high industrial wages is toward a greater diversion of human labor into industry and toward a reduction of the total part-time farming effort. Of course, the exceptional part-time farmer has increased his farm production and his industrial earnings, but he is by no means the rule. However, it must not be forgotten that hundreds of small gardens, small poultry flocks of a dozen or 25, and family cows, have added to the family diet of hundreds of urban and suburban families the vegetables, milk, and eggs, that spell better nutrition and higher real income. But these are not likely generally to be found during a postwar period.

With the drastic decrease in the numbers of laborers available for work on farms, there are some instances of larger commercial farms being broken up and leased out to tenant operators. This has been especially true of large cotton farms that have not converted to alfalfa, grain and other crops.

As the war effort at home and abroad slackens with the defeat of Germany, larger commercial farms will find the labor stringency lessened somewhat, but not to the extent of the volume of returning man power, a disproportionate amount of which will go to the cities. However, operators who have hitherto kept one year-round man but who have recently cut down operations and gotten along without, will, in the instance of the more vigorous operators, resume their usual scale of operations when men become available again. Older operators will, in many cases, continue their war-curtailed operations without added help, or will rent their land, or possibly sell out, particularly if land prices continue to be favorable. It would be a mistake, on the other hand, to assume that seasonal laborers will again be available in the numbers, or to any extent like the numbers, known during the 1930's. Probably farm labor supplies have suffered a permanent dislocation and Arizona agriculture will face many years of relative labor scarcity. That is not a bad thing for seasonal laborers, and it may be a good thing for Arizona agriculture, in the long run.

With the falling off of cotton acreage on Arizona farms it might be thought that tenant farming would be reduced and percentages of tenancy cut down accordingly. It is not clear that this will happen. More than likely much of the cut in cotton acreages will be made on owner and tenant operated farms having a sufficient water supply to permit an increase in alfalfa plantings. Out in the water-deficient areas, however, cotton will continue to be an important crop and it is not at all improbable that in these areas cotton tenancy might increase somewhat. Again, the scarcity of laborers available for seasonal labor in the cotton, encourages the breaking up of some larger cotton acreages into family-sized operating units and leasing them to small operators who have accumulated some working capital and who prefer to farm rather than to work in the city industries. This will tend to hold the percentage of tenants up.

Mixed pattern of ownership

The net impact of the forces operating to transfer land from the public domain to other types of ownership has resulted in varying patterns of ownership of land by individuals, private corporations, and by county, state, and federal units of government. The granting of alternate sections of land to the railroads resulted in a 'checkerboard' pattern of ownership on each side of the main railroad routes. The various acts of Congress which granted lands to the State resulted in its ownership of scattered tracts, difficult to administer effectively. In Arizona, tax-delinquent lands revert to the counties. These lands are scattered, with difficult problems of administration. The Federal government owns about 48 million acres of land, some of which is in small blocks inter-mingled with lands of other owners.

In many cases, private ownerships intermingled with public lands add to the difficulties of management of both types of land. Forest fires are sometimes attributed to the brush-burning activities of isolated farmers in forested areas, and ranchers in many cases are guilty of grazing livestock on lands other than their own without payment of fees.

There is need for the transfer of these various lands among the agencies and private interests involved so that their holdings might be consolidated and the lands of each more effectively administered. Some of these transfers are possible under existing legislation. It may be advisable to have some further legislation to expedite other transfers. Land unsuited to development by private individuals should be so classified and where such lands are now owned by government agencies, they should be retained in public ownership. This applies particularly to lands that are chronically tax-delinquent. Continuous programs for acquisition of such lands by public agencies are desirable.

Mixed ownership is essentially a long-time problem. There are already indications, however, that in the post-war period there will be a demand for small farms by some of the present war workers. This development, if permitted to proceed in haphazard fashion, could result in further development of mixed ownerships with conflicting interests. Enabling legislation will be required before individual counties can make desirable applications of rural zoning to prevent aggravation of this problem.

Leasing publicly-owned lands

Over 85 per cent of the land area of Arizona is publicly owned. Important considerations are involved in leasing these lands out for private enterprise.

The state owns several million acres of land, much of which is leased to individuals for ranching purposes. The leasing arrangements for this land should serve both the interests of the lessee and the public. Some of the state land should be in private ownership. The land laws should be reviewed and, if necessary, changed to permit the transfer to individuals under conditions that will permit them to make most effective use of the land. In some cases it will be desirable for the State Land Department to exchange lands with other agencies to block up its holdings before sale to private individuals, in order that the unit sold be large enough for economical operation.

The Federal and State Governments control approximately 60,000,000 acres of land. A number of agencies are involved in this control. Where the need exists, the lands of various agencies should be exchanged so that holdings are blocked up. Then the individual rancher may be in a position to deal with only one or two agencies.

Certain general considerations should be kept in mind in the leasing of publicly owned lands:

1. The land-user should have a considerable degree of security in his continued use of the land whether by lease or by permit. Tenants on Indian Reservation lands have not had satisfactory security under present leasing arrangements.

2. The land-user should be so regulated in his use of the land so that he practices proper conservation measures in order that the public interest in the land is protected and the value of the land maintained.

3. Charges for the use of public lands, either through rentals or grazing permits, should be consistent with the value of comparable lands in private ownership.

It will be desirable that certain of these lands continue to be leased. The following suggestions may prove helpful in their administration. Changes in Federal and State statutes would be required before some of these suggestions could be put into effect.

1. Leases should be drawn up to fit the individual enterprise with requirements as to the number of livestock and the type of farming or ranching to be practiced written into the leases.
2. Particularly on Indian lands there should be more rigid specifications and supervision for construction of improvements (buildings and fences) by the tenants, or even better, the Indian Service should provide suitable and adequate improvements.
3. A renewable clause providing at least one year of advance notice should be included.

4. A leasing period of several years, perhaps as many as 10 years, with provision for renewal for livestock enterprises should be provided.
5. Sliding scale rental rates based both on prices and yields should be included to cushion the effect of fluctuating prices and possible bad crop years.

Leasing arrangements for farming lands

While some reduction in the amount of tenancy in Arizona's irrigated areas may well serve as a long-term objective, it is anticipated that there may be some increase in tenancy during the interval before the close of hostilities in Europe and during the period immediately afterward.

Improved leasing arrangements can serve as one means of solving the immediate problems associated with tenancy. The rental arrangement should make provisions for the following,

1. A profitable but nonexploitive system of farming. Too many tenant farms do not carry the livestock needed for a well-rounded farm program.
2. A fair division of income between the landlord and tenant in both good and poor years.
3. Reasonable assurance to the tenant that he may have possession of the farm for a period of years and that he will be given adequate notice when the lease is to be terminated.
4. A written lease which states simply and clearly the important items of the agreement, and is properly witnessed.
5. Compensation of the tenant upon termination of his lease for unexhausted value of improvements that he has made to the farm, provided they have been agreed upon.
6. Compensation for disturbance of the tenant without cause.
7. Compensation to the landlord for deterioration caused by the tenant.

In the immediate postwar period, some cash rentals may be too high if prices decline from their present levels. It would be well now for tenants and landlords to be thinking of desirable adjustments to make with various price levels so that they may be ready to carry on mutually satisfactory relationships after the war.

An intensified educational program, starting now, to acquaint landlords and tenants with the desirability of lease provisions such as those indicated above, and the need for flexible arrangements in leases to meet changing economic conditions after the war, would be helpful. An advisory service to returning war veterans and to war workers who desire to rent farms, acquainting them with desirable leasing arrangements would be of much assistance to them.

Mortgage and purchase contract terms

A problem that has grown in importance, in that it probably contributes to insecurity of tenure, is that of mortgage and purchase contract terms. An analysis of the data supplied by the Land Market Activity Study of the Bureau of Agricultural Economics, U.S.D.A., indicates that 18 per cent of all transfers of farm land in Maricopa County in the 33-month period, January 1, 1941 to September 30, 1943, involved the use of purchase contracts. This is a much greater use of purchase contracts than has been the case in other counties in the study. The average for all twelve counties in the Western Region is 6 percent. Property is now being transferred at prices much above the level of two years ago. Also, many purchase contract balances represent two-thirds of the price of the property and are to be paid back in periods as short as five years. With such short repayment periods, even a moderate decline in prices after the war will cause these buyers difficulty in meeting their obligations. The fault is not so much with the short-term contract as the weight of the burden of debt. Prices paid for the land are high. Farmers on encumbered farms would be helped by a purchase provision allowing the purchaser to discharge his obligation as soon as able and not compelling payments over a stipulated period of time. Also, provision should be made that foreclosure action will not be taken as long as the debtor retains a record as a competent farmer and sets aside a reasonable share of income to apply to the principal indebtedness.

The family-size farm

Census figures on size of farm in Arizona give anything but a clear picture of the situation as to the family-size farm. Some 8,000 Indian farms are the first complicating feature in the picture and the presence of scores of family-size farms of from 200 to 1,000 acres in size make more trouble for the agricultural statistician. Several thousand part-time farms may be left out of the picture. Also, the supposedly large number of farms covering "thousands of acres." These are few in irrigated areas. The statistics include ranches and other holdings not in irrigated areas.

How came this family-size farm of from 200 to 1,000 acres to be so important in Arizona? Take a case in a pumping area in Pinal County. The young farmer, in his late 30's, operated in 1943 a farm of 780 acres, 320 of which he owns. The year before he operated 1,100 acres which he cut down because of labor shortages, especially in the cotton harvest. He came to Arizona from Oklahoma in 1937, picked cotton, and got a job as a tractor driver with some responsibilities as a foreman. The farm owner for whom he worked was a woman who needed a dependable year-round man. In 1940 he got a 50-50 lease on the woman's 320 acres of land. The following year he farmed a section of land. By 1942 he had added to this, making a total of 1,100 acres. He is a cotton grower and when he reduces this crop, he turns to grains and sorghums. Factors in his career are: industry, trustworthiness, and willingness to take risks; government support of cotton prices; financing made available by cotton companies; and a retiring land owner.

Many family-size farms are too small, leaving out of account the many part-time farms in Arizona. These farms require especially the development of cooperative associations to gain for them the marketing advantages comparable to large-scale operations, and to secure the services of labor-saving equipment that is too costly for individual ownership.

An intensive educational program on the serious consequences of too small-scale farms should be started now, and the help of local people solicited in preventing an increase in these uneconomic units. Local people can be of big help in this problem because frequently the farm seeker consults them but does not ask for help from other sources. Well-informed local people can do much to discourage unsound settlement on farm units that are too small to support a family adequately.

Tenure and water supply

Assurance of an adequate water supply is necessary in irrigated areas if the operator is to enjoy to the highest degree his rights to the land. Since water, not land, is the limiting factor in production in such areas as the Casa Grande Valley, assurance of permanent water supplies are necessary before farmers invest in homes on the land, and other permanent improvements. Some 280,000 acres of private lands not yet in farm units create a hazard to the water rights of owners of land that are now developed. If owners of non-farm lands were to drill wells and irrigate their lands, the underground water supplies would be depleted for all farmers in the pumping areas of the valley. Additional lands controlled by the State of Arizona totalling 160,000 acres, scattered throughout this valley form are likewise a hazard to developed farms. However, the eventual addition of gravity water from other than currently active sources would greatly change the situation. Among other effects, groundwater reserves would be built up and much of the danger to developed lands would be removed.

Conflict of rural and urban interests

Suburban settlers who want to own a small place in the country, but who work in the city, present certain tenure problems. These people frequently make extra demands for roads, schools and other public services, including relief when urban employment is slack. The extension of suburban settlement into farming areas has resulted in many cases in premature subdivision of land with resultant excessive taxation of farm land for local government costs and disruption of farming. This problem could be materially increased after the war because of the tremendous increase in population which has occurred due to the war and the residential development that is likely to ensue.

Rural zoning offers a device for directing settlement in the most desirable way and for control of unwarranted subdivision. Desirable enabling legislation and zoning ordinances should be studied now so that they can be enacted before the settlement takes place.

CHAPTER VII.--CREDIT

This chapter was compiled by the following subcommittee:
Chas. H. West, Farm Credit Administration, Chairman; Edward J.
Rowell, Farm Security Administration.

The first step in postwar planning is to set up a program with broad objectives worked out in sufficient detail to be generally understood and accepted. The second step is to provide the organization and the agencies that are to be responsible for carrying out the various phases of the plan. The third step is the financing through which the program is brought to life and made to operate. A sound financial program must give proper emphasis to each phase of the postwar plan and should be so arranged as to return the greatest possible value per dollar expended.

Three types of financing are involved; first, the use of commercial credit through the various types of credit agencies already available; second, the use of a partial subsidy or subsidized credit in cases where the service performed can never be expected to repay its full cost: and, third, a complete subsidy or grant.

Many objectives of postwar planning can be attained at comparatively little cost by the use of existing commercial credit agencies. These objectives include most of the adjustments from war to a domestic economy, including the disposal of surplus army equipment and materials and of many manufacturing facilities after the war.

Among objectives that will require subsidized credit may be included rehabilitation work for returning service men, land settlement plans, and some forms of industry rehabilitation. Direct grants or subsidies may be required for relief and for certain forms of education and training and public health, and other measures where the return to the government is not expected to be made in a direct financial form but in the indirect form of improved public health and welfare and increased tax paying ability.

The emphasis placed upon these three types of financing depends on the will of the people and will be influenced by the economic outlook at the particular time, for naturally less subsidy is required to accomplish the same objectives in prosperous times than in times of depression. Where subsidy is necessary the social objectives should be considered in relation to the long-term welfare, including a consideration of the public tax burden due to the war, (and of the rate at which education is assimilated and the people are willing to support the measures advocated). If plans are pressed too fast the cost will be excessive and waste is inevitable.

During a war, extensive regulation and supervision of business is necessary, but once peace is declared the majority of the people will be eager to get away from government controls and regulations and resume the normal practices of business under free enterprise.

to both the government and the individual and a feeling of bitterness and resentment on the part of the very men it was sought to aid. If colonization is undertaken at all, it should be done on strictly economic lines. It would be far more equitable to give a service man a direct bonus and permit him to spend it his own way, than to lead him into a land colonization scheme to which he may be temperamentally unsuited. The greatest service the government could perform for the returning service man would be to direct him into the vocation to which he is best suited.

There are certain inherent hazards in buying any farm land. Even experienced farmers make mistakes in judging the quality of land, especially in an unfamiliar area. Many failures have resulted from paying too much for a piece of land and from buying at the wrong time. Usually the acquiring of a farm takes the savings of a lifetime, and to purchase on a receding market is to invite failure.

After this war, a period of receding land values is to be expected, and colonization under these conditions is even more hazardous than usual both for the project and the individual.

Many of the resettlement projects operated under the direction of the Farm Security Administration have not been particularly successful from an economic standpoint, but this may be due to the fact that the originators were often not as interested in the economic outcome as in the social objectives and rehabilitation features. Some valuable experience has been gained, and it has been proved that it is impossible to make a successful farm operator out of anyone who comes along, regardless of his capacity and knowledge of farming. It should be realized by now that not every man is capable of becoming a land owner or of earning a living at farming, even with careful direction and supervision. There are many who are capable of farm labor but not of ownership, and others who could better earn their living in some other way. Enough experience has been gained to demonstrate the folly of attempting to establish returned service men immediately as farm owners. It would be far wiser to let them serve out a period of apprenticeship as tenants to test their ability and to enable them to acquire confidence. Later they could be helped to ownership by the Farm Security Administration or some other government agency.

Experience has shown the extreme difficulty of successful land colonization even with the most capable and determined settlers. If land settlement is to be undertaken and is to be a financial success, both for the agency and the settler, careful selection of settlers is vital.

The dissatisfaction of Congress and of many farm leaders with the past accomplishments and objectives of the Farm Security Administration in this field has recently been indicated, and as a result it is no longer empowered to do this type of financing, however some agency must be entrusted with this work and its objectives and policies should be clearly defined.

It is questionable whether a colonization program will be necessary to place those returning service men who should be in agriculture

supplemental assistance in order to exist. Putting such men on farms does not solve the unemployment problem, and would, if carried too far, eventually ruin agriculture for those now engaged in farming as a business, by lowering prices and disrupting markets for farm products. It is coming to be recognized that it is unfair to agriculture to expect it to provide a place for all those who find it impossible to make a living in town.

The following quotations from the testimony of Secretary Wickard at the hearing on postwar planning bring out this point:

"Others feel that agriculture should act as a labor reservoir, releasing workers for industry in boom times, and providing food and shelter for them -- without cost to industry -- when factories close down. In community after community, state after state, farmers have opposed this idea. Farmers are not willing for agriculture to be made the dumping ground for industrial unemployment. Either we must keep city industries going full blast so there will be no serious unemployment problem, or the industrial unemployed must be provided for through adequate social security programs, public-work programs, or other relief measures. In bad times as well as good, the industrial segment of our population must be assured adequate income from nonfarm sources."

If the postwar adjustment problem of agriculture is only to help those returning from war industries and from the armed services who understand farming and desire to return to the farm, the task should not be very difficult and, in fairness to agriculture, these are the only ones who should be placed on farms. A large proportion of former farmers returning from the war will naturally go back to their own homes and take up farming where they left it, either to work at acquiring their parents' farms or to buy land in the vicinity. Many of these will need no other assistance than the credit available to them in their own community. This is the simplest and most economic form of rehabilitation. The problem of land for such farmers is comparatively simple, for many of the farms with nonresident owners or that have been bought by city investors as a hedge against inflation and because of the high war earnings of agriculture, will be put on the market at reasonable prices when the war is over, or at any rate will be available for leasing. Much of the farm land temporarily used by the Army and Navy will also go back to private ownership. In spite of the fact that so much of the demand for farms by returning service men can be met effectively through the credit facilities offered by the Farm Security Administration, the Farm Credit Administration, the commercial banks, insurance companies, etc., there has been some talk of an extensive program of directed farm settlement for service men. This would be unfortunate in many ways, but if land settlement is undertaken on a large scale, an institution should be set up for the purpose. So far the history of resettlement and directed land colonization schemes has been extremely disappointing, whether they were undertaken by the government, the states, or private enterprise. The problems of resettlement and colonization are especially difficult after a war, for men unsuited to farming and knowing little or nothing of it, are likely to be attracted by the idea of a bonus free land, and then when placed in a colony are likely to resent supervision and to find cooperation difficult and irksome. The result is financial loss

to both the government and the individual and a feeling of bitterness and resentment on the part of the very men it was sought to aid. If colonization is undertaken at all, it should be done on strictly economic lines. It would be far more equitable to give a service man a direct bonus and permit him to spend it his own way, than to lead him into a land colonization scheme to which he may be temperamentally unsuited. The greatest service the government could perform for the returning service man would be to direct him into the vocation to which he is best suited.

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on farms. The rehabilitation loans of the Farm Security Administration, and Federal Land Bank and Commissioner loans and other types of credit already available should be sufficient for this purpose.

Extensive colonization will, however, be necessary on the large United States Reclamation Service projects such as the Central Valley Project in California, the Grand Coulee Project in Washington, the Gila Project in Arizona, etc., and when they are opened for settlement the creation of a financial institution to help the settlers and direct the settlement will be vitally necessary. Its functions should be to finance the development of farms to the point where existing credit agencies can take over.

The financing should be directed along strictly economic lines and an effort made to get as much for the land as it is worth, considering the difficulties of the settler and the hazards of the venture. Settlement of such projects is a much more difficult problem than that of taking over and subdividing a tract of developed land in a region where the agriculture is already established. Project construction costs are high and considerable subsidy will be involved in the building of farms. It will be very difficult to avoid putting an undue burden on the individual settlers, particularly if, as has been suggested, each settler is to develop his own farm from the bare land by his own efforts. If the Reclamation Service built the farm units itself, afterwards having them appraised and selling them to settlers at appraised values, the need for a financial institution to take charge of the land settlement could be avoided and the credit needs of the settler supplied by the existing credit agencies.

So many credit agencies are already in existence for the service of agriculture that the question has been raised whether a regrouping of agencies providing related types of service, should not be made to avoid duplication and provide closer cooperation. Possibly an effort should be made to group credit agencies according to subsidized and commercial credit. In this way credit policies could be more easily and clearly defined and repayment programs enforced.

The first postwar problem that faces agriculture is that of disposing of the agricultural land acquired by the government for war purposes and no longer needed. The War and Navy Department organizations for the purchase of these lands are still in existence and can now be used to good advantage to dispose of them.

Another important postwar problem for agriculture is that of placing returned service men and war industry workers on farms. This has already been discussed in part. There seems to be plenty of credit and sufficient types of credit agencies available to handle this problem, which is principally one of coordinating the efforts of the various credit agencies with those of the agency seeking to place men on farms. The most pressing need appears to be some agency charged with the responsibility of determining the man's desires, capacity, and experience, and helping him into the particular field of activity that most appeals to him and to which he is best suited. This may involve considerably more than finding the particular financial agency to help him.

In the past few years much attention has been given to the conservation of natural resources and the question has often been raised as to whether credit institutions can help by inserting restrictive clauses in their mortgages and contracts. Unless all credit institutions agreed to this practice it would work an undue hardship on those that did, and it is questionable whether very much would be accomplished in any case.

Conservation of natural resources is principally a matter of education. No credit institution would long continue to finance a man who made a practice of exploiting the fertility of his farm. Only in times of emergency is a farmer tempted to exploit his farm to pay his debts. These emergencies may be caused by accident, illness, or weather conditions, all entirely beyond the farmer's control. In case of drought, for example, he may be forced to over-graze his range or pasture to save his livestock, but generally speaking he knows he must maintain his property if he intends to continue to operate it. A restraining clause in the mortgage would not be enforced in such emergencies and therefore would be of no benefit and would only antagonize the borrower. Much can be accomplished in improving farm practices and in maintaining farm fertility if the banker gives proper advice and the borrower has confidence in him.

One important natural resource that is particularly subject to exploitation is timber, and this is decreasing at an alarming rate. It is claimed that one factor responsible for this situation is inadequate credit. Logging companies often do a very unsatisfactory and wasteful job of cutting timber simply because their operations are not coordinated with any plan of reforestation, but in Arizona, with most saw timber in the hands of public agencies, the credit problem as it relates to reforestation is of little importance.

The Farm Credit Administration has the authority to make agricultural loans on wood lots and timber property, but these are usually made to small land owners. So far the demand for this type of credit has been small, but it is increasing and studies are in progress to determine the basis on which this type of loan may be made in different sections of the country. As experience is gained it would seem wise to extend this credit service to the large industrial users of timber who may be interested in reforestation. This would, of course, necessitate some amendments to the Farm Credit Act.

To summarize, there is plenty of credit and there seems to be almost enough credit agencies to supply the needs for a broad program of postwar development, but the most important aspect of the credit problem is coordination of the planning agencies with the credit institutions that must serve them.

CHAPTER VIII.--SOCIAL SECURITY

This chapter was compiled by the following subcommittee: Dr. E. D. Tetreau, University of Arizona, Chairman; Walter McKain, Bureau of Agricultural Economics; Edward J. Rowell, Farm Security Administration.

The first part of this report is a brief summary of the provisions of the present Social Security Act and of proposals for new social security legislation for farm people. Following that there is a short discussion of the extent to which the proposed legislation would affect Arizona farmers, after which come the recommendations.

What the Present Social Security Act Provides

The present Social Security Act has 10 major parts providing 3 classes of benefits. The classes are: (1) insurance programs for which contributions are made by covered individuals, their employers, or both, and from which benefits are received as rights; (2) relief programs based on proved need, but for which no contributions are made by individuals; and (3) health and welfare services.

The major parts of the insurance programs are the Old-Age and Survivors Insurance, and Employment Security, under which unemployment insurance is of particular interest. The former system is the only one administered in its entirety by the Federal government.

Old-Age and Survivors Insurance pays monthly old age benefits as a matter of right to "fully insured" workers and their wives and young children. The retired workers and their wives must be 65 or more years of age. Benefits are also paid to aged dependent parents of deceased workers who were "fully insured." Ultimately a minimum of 40 quarters of coverage will be sufficient to establish the "fully insured" status. A "quarter of coverage" is a calendar quarter in which at least \$50 were earned in covered employment. Survivors' benefits are granted to dependents of persons who died "currently insured." A "currently insured" person is one who has at least 6 quarters of coverage in which he earned \$50 or more in the last 12 calendar quarters preceding his death.

The Old-age and Survivors Insurance is supported by contributions from both employers and employees. Each now pays an amount equal to 1 percent of the employee's wages below \$3,000 a year. The monthly payments made under the Old-Age and Survivors Insurance to retired workers or to his dependents are based primarily upon the "average monthly wage"^{1/} in covered employment. Payments are ordinarily suspended if he resumes regular gainful employment, and are resumed again upon cessation of such employment.

Unemployment Compensation partly insures workers in covered occupations against short term unemployment. Benefits are paid weekly. The principal source of support of the State systems is from employer contributions. Although a few States require employee contributions

^{1/} The "average monthly wage" is, as a general rule, calculated by dividing the total wages paid to the worker by the total number of months in which he could have earned wages under the program.

also. The Federal tax on employers for its part of the program is now equal to 3 percent of pay rolls, but credit is given for up to 90 percent of employers' contributions to State unemployment compensation systems. The Federal government pays the administrative costs of the system out of its tax on payrolls. Employers of fewer than 8 workers are not covered unless the State laws require them to be; one State places the lower limit at 3. Present State laws differ concerning waiting periods, amounts of weekly benefits, and length of time during which benefit payments are made.

Relief Programs

The three public assistance programs provide money for (1) old-age assistance, (2) the needy blind, and (3) aid to dependent children. In each of the systems, the states make and carry out their own plans. If these plans conform to certain standards set by the Social Security Act, the Federal government makes grants to supplement state payments to the individuals aided and to pay part of the administrative expenses.

Recipients of old-age assistance must be at least 65 years of age and prove their need. Each state defines need, and the amounts of aid to be given, with the consequence there are variations from state to state. The federal government furnishes half of the payments to individuals provided its half is not over \$20 per month. The state governments may, and in some instances do, give a recipient more.

The needy blind receive aid under provisions similar to those for the needy aged, except that no age limit is imposed. The federal government makes a grant to states, matching payments to individuals up to as much as \$20 per month.

Needy dependent children under the age of 16 years receive aid carried out on the same principles. The federal government contributes up to half of \$18 per month for the first child in a home, and up to \$12 for each additional child. The state pays the remainder. Individuals make no contributions to these 3 relief programs. They are financed by general taxation by the states and federal government. Aid is given only when need is proved. And in some states adult applicants for aid must prove also that they are without hope of help from relatives.

Health and Welfare Services

Health and Welfare Services comprise child-welfare, services for crippled children, maternal and child-health services, retraining for disabled workers, and public health. These are all operated by states with federal cooperation and financial aid. Rural areas as well as cities are included in the work of these organizations.

Proposals for Extension of Program to Farm People

The Wagner-Murray-Dingell bill, S. 1161 and H.R. 2861, introduced on June 3, 1943, includes proposals for an extension of Old-Age and Survivors Insurance and a new medical program for all gainful workers, including farmers and their hired labor. A farmer would receive the following benefits:

1. Medical, hospital, and laboratory services for himself and family.

2. Upon retiring after age 65 a minimum pension of \$20 a month, with extras for dependents, up to a maximum of \$120 a month. A similar pension if permanently disabled.
3. In case of death at any age a pension for family dependents.

The proposed tax under these programs for farmers is at the rate of 7 percent of the market value of their services, with a minimum payment of \$10.50 to a maximum of \$210 a year. Both labor income from farming and wages earned will be credited toward benefits. Income of \$150 in a year will qualify for certain benefits and up to a maximum of \$3000, above which no taxes are to be paid.

The proposed program would cover many employees in such quasi-agricultural fields as packing, processing, and marketing of farm products, where administrative procedures and problems differ little from those now in effect. The largest farms would be liable for substantial payments as employers, and they also do not differ greatly from other seasonal establishments already covered. The larger family farms will be liable for moderate amounts as employers, but will be well able to meet their contributions and will receive substantial benefits. It has been proposed that the lowest income farmers be exempted by the establishment of minimum below which no taxes will be collected. (But these are the ones who need the coverage!)

How Would These Proposals Affect Arizona Farmers?

When these proposals are considered in connection with Arizona agriculture the question of their application to farm laborers is a matter of first consideration. Hired laborers constitute an important part of the man-power on Arizona farms. Just about 4,500 of Arizona's 10,000 farmers (omitting Indian farms) report one or more hired laborers. Not all of these would be required to make pay roll reports since a number of them keep only one hired man and other administrative devices would probably be used to handle the records of their laborers. On the other hand, some 2,000 farms and ranches report a value of farm products sold, traded, or used by the farm household, in 1939, amounting to 31 million dollars out of a State total of 42 million. It seems clear that these 2,000 farms and ranches producing 75 per cent of the value of Arizona's annual farm production would have to make extensive and frequent pay roll reports for they employ many laborers, some of them for peak seasons, others the year around. Also, these 2,000 farms, all of which had an annual production valued at \$4,000 or higher in 1939, constitute 20 per cent of Arizona's 10,000 (non-Indian) farms, while in the nation as a whole farms on this level of production constitute less than 5 per cent of the whole. These figures suggest that the impact of the proposed social security legislation would be considerably different in Arizona than it would be in the majority of other states.

These employers of farm laborers will be affected in another way. Many of them, in season, employ large numbers of casual day laborers who frequently are not known by name. Making pay rolls for these laborers, especially miscellaneous workers who come and go even throughout a short season, staying but a day or two is an impossible task. I mean it is impossible if requirements upon employers are to be kept within the bounds of reason.

There are devices proposed to care for these casual workers which are similar to those used in some European countries prominent among which is a stamp system. According to this the farmer would register as an employer at the nearest post office, purchase special old-age and survivors insurance stamps, and when the worker is paid his wages the farmer would paste stamps of the proper denomination into the stamp book, deducting one-half of the cost from the worker's wage as his share of the social security tax. The stamps would indicate the amount to be credited to the laborer's account.

When we consider pay roll reports plus other devices necessary to handle the casual labor situation, and when one remembers the geometric rate at which government forms multiply, and when one contemplates the prospect of ever-changing procedures, it seems reasonable to give pause in a committee like this, and to consider what the implications for farmers might be.

The first four sections of this report are taken verbatim from a memorandum prepared in September, 1943, entitled Proposals to Provide Social Security for Farm People, by C. C. Taylor, B.A.E., U.S.D.A.

CHAPTER IX.--RURAL HEALTH SERVICES AND FACILITIES

This chapter was compiled by the following subcommittee: Miss Jean M. Stewart, University of Arizona, Chairman; Dr. Ethel M. Thompson, University of Arizona; Dr. E. D. Tetreau, University of Arizona; Walter McKain, Bureau of Agricultural Economics; Mrs. Lorine Craft, Farm Security Administration.

A. Background of the general situation relating to rural health-care facilities in Arizona.

The State of Arizona is interested in the promotion of better health for rural people. It recognizes that many of the economic ills of farm people result from physical ills. For a great many years, Arizona has been a resort state with a continual influx of people suffering with respiratory diseases, particularly tuberculosis; and this has created a serious health problem.

The return of men and women from the armed services from all parts of the world who have been exposed to injury and disease, particularly of the tropics, will constitute an additional health problem in Arizona.

Note: The period, 1940, was selected for study. The situation if unsatisfactory during this peace period of relative economic prosperity will have been intensified during the war period by the withdrawal into the armed services of health personnel.

The rural population of Arizona comprises approximately 2/3 of the state's population (1940 census). Approximately 17% of this rural population is Indian. Medical services and facilities for Indians are distinct from those for the rest of Arizona. Negroes comprise approximately 3% of the rural non-farm population and 1.2% of the rural farm.

1. Number and ratio of physicians and other professional personnel to population.

The majority of physicians are concentrated in larger cities and towns. On a county basis, the ratio of doctors to population falls below that of the peacetime average for the U. S. of 1:750 to 800 persons. Except in concentrated areas of population, it falls below that recommended by the American Medical Association for periods of war, namely 1:1500.

(1) (See Table I)

From 1940 to 1943, the number of registered physicians in the state decreased approximately 25% (475 to 352). The situation with regard to dental service is more acute. (2)

2. Hospital facilities.

Hospital facilities by number are extensive. Their availability is reduced by: (a) location, (b) segregation to specific services. In many instances, hospitals are located in isolated areas (company and Indian hospitals). On the other hand, many hospitals are concentrated in larger

Note: Numbers in brackets at end of sections refer to references listed at the close of this chapter.

cities and towns (Winslow, Phoenix, Tucson) making distances to service great for many rural families.

A second factor in limiting the utilization of hospital facilities is the segregation of hospitals for specific services (tuberculosis, race, company employees, specific income groups, veterans, etc.) The lack of availability to doctors of hospital and diagnostic facilities results in a failure to attract young doctors to locate in rural areas. Certain hospitals in Arizona are not being utilized. (3) (See Table III and map)

3. Public health facilities and personnel.

There are health units in only 6 of the 14 counties. Established units include directors, public health nurses, sanitarians and clerks. Some units are inadequately staffed and equipped. Funds are not sufficient to cover the public health needs of all persons in the state. Service has been concentrated rather than scattered so that more complete and adequate service could be given the area served. (4) (See Map)

4. Rural environmental sanitation.

A safe water supply, disposal of human and animal waste, adequate screening against flies and mosquitoes and a safe food supply are basic to health. There are 13 rural communities with a population of 500 or more without a centralized water system; 40 of 500 population or more without any community sewerage system; 75% of individual rural water supplies are inadequately protected against contamination.

Privies are insanitary and a health menace. Homes are inadequately screened. The adequate disposal of animal waste is a major problem.

The best protection the public has against an unsafe milk supply is in incorporated cities with strict ordinances. Meat inspection is available to only two counties. All meat slaughtered for home consumption within the state outside of these areas is consumed without inspection. (5)

5. Health conditions and availability of medical and related services.

- a. General health conditions as revealed by mortality and morbidity data and by special surveys.

It may be deduced from the statistics that the greatest health problems in Arizona are: infant mortality, tuberculosis and venereal disease. (6)

Infant Mortality

The infant mortality rate in Arizona is the second highest in the United States. In 1942 it varied from a low of 44.3 per thousand live births in Yavapai County to a high of 177.1 in Apache County, with an average of 75.3.

Tuberculosis

Whereas the influx of financially solvent tubercular persons has

somewhat diminished, this is not true of indigent groups. People on relief level continue to come in. Our "home-grown" crop of infected youngsters is high. The rate for tuberculosis in Arizona, 166.2 per one hundred thousand population, is the highest in the United States. It compares with a rate of 43.5 for the country as a whole.

The examination of young men between the ages of 20 and 38 for the armed forces has given a measure of the health of the United States. For the country as a whole, 1% examined were rejected because of tuberculosis. For Arizona, the figure was 5%.

Venereal Diseases

Every man coming up for examination under the Selective Service was required to have a blood test for syphilis. It should be of interest to know that the white rate for Arizona was the highest in the United States. For all races this varied from 56 to 107 for each 1000 examined, the rate for the state being 76.

There are 12 public health clinics for the treatment of venereal diseases. All physicians reporting cases are supplied free drugs and remuneration for their services.

Gonorrhoea is generally conceded as being three times as prevalent as syphilis.

B. Measures that might be taken to solve problems.

It is recommended that an organized system of health service be developed for Arizona to assure an opportunity for adequate service to rural areas (insofar as possible equivalent to that of urban).

The committee has discussed and presents for consideration the following health services, which need redistribution or amplification to make health for rural people more readily attainable: medical care, nursing, hospitalization, dental care, public health preventive service, nutrition, health education.

1. Medical Care

Improve effectiveness of rural physicians by:

a. Distribution of physicians to rural districts in a ratio of 1:1500 population through a committee of the Arizona Medical Association and lay representatives of farm people and the Arizona Department of Health.

b. Use of nursing service to supplement and increase the effectiveness of the doctor.

c. Use of health centers (small, compact) for nurse and doctor to provide adequate facilities.

Improve the quality of the medical care by supplying:

- a. Dispensary facilities (health centers) in small towns.
- b. Laboratory and Xray facilities (central).
- c. Records and supplies at health center.

2. Dental Care

Improve the effectiveness of the dentists by:

a. Distribution of dentists in a ratio of 1:600 families through a committee of the Arizona Dental Association, lay representatives of farm people and the Arizona Department of Health.

b. Provision of modern dental equipment by the community, portable when necessary.

c. Recommend that complete dental care be provided all children through the age of fifteen, on a tax supported basis.

(Experience has shown that this procedure is highly beneficial to the dental profession.)

3. Public Health Preventive Service

Note: It is recommended that in the expansion of public health services, experienced personnel and military equipment be made available. Plans for the utilization of physicians, dentists and nurses available from the military need to be ready prior to their discharge.

a. It is recommended that the Public Health Department be provided sufficient funds to extend local Public Health Units on a county or district basis over the state, adequately housed, equipped and with personnel sufficient to serve on a group or individual basis. It is recommended that legislation be accomplished that will support an adequate health program.

b. To fit the plan for medical and nursing care into a district or county full-time public health unit. It is advisable that someone on the staff of the State Public Health Service should be assigned to the work of assisting communities with the organization of health programs.

It is recommended that when health centers are established nurses assigned to health centers be supervised by the Public Health Service when adequate supervision is not all ready provided.

c. One Public Health Nurse for each health center.

d. Full prenatal and well-baby clinic program.

e. Full immunization program for all preventable diseases occurring in area.

f. Full diagnostic laboratory service. Full diagnostic Xray service.

g. Complete T. B. diagnosis and case finding program, organized along the lines recommended by the National Tuberculosis Association of the U.S.P.H.S.

h. Complete venereal disease diagnosis and case finding program.

i. These services and facilities be made available to all doctors and free to all patients and all doctors.

j. Extend the installation of centralized water and safe sewerage disposal systems in rural areas. Provide individual farms with a protected water supply and with a pressure system so that flush toilets would be possible.

Have a mosquito and fly breeding control program. Provide adequate screening. Provide knowledge and technical help for the disposal of animal waste.

k. The committee recommends consideration of the development of a short course in rural sanitary engineering by the University.

l. That a safety engineer be added to the staff of the Extension Service.

m. The sanitary control of milk be placed under the State Department of Health. (With personnel trained in milk sanitation and production.)

n. Veterinary service be extended to all counties.

o. That a sanitary engineer for Rural Sanitation be added to the staff of the State Department of Public Health.

4. Nursing

a. Utilization of public nursing facilities in organized form (as outlined under 1).

b. Provision of working headquarters-

Health Center--

- (1) Bed for temporary and emergency care
- (2) Emergency supplies
- (3) Phone, desk and records
- (4) Loan supplies, such as special sick room equipment and home delivery kits

c. Provision of transportation - station wagon, ambulance.

d. Adequate supervision (as outlined under 3 b)

5. Hospitalization

a. Utilization of present unused hospitals and hospitals which are not being utilized to their capacity. To do this it may be necessary to effect reciprocity with the Indian Service for the use of facilities.

b. Organized cooperative use of hospitals previously limited to special groups.

c. Provision of transportation to hospitals. Ambulance, road - air.

d. Hospitals to be so organized and operated that all well qualified physicians may serve on staff.

6. Nutrition

This item is of equal importance to all other services combined-- either treatment or preventive--in the reduction of disease. It depends on: (1) education, (2) natural circumstances, (3) in a variable degree, on income.

7. Health Education

a. Advantage should be taken of all opportunities for furthering the health education program, utilizing all educational agencies: public schools, Extension Service, etc.

C. Suggested ways and means

1. The plans presented require ways and means. These are variable and depend on community attitudes. The committee believes that for the long term development of health, local leadership is necessary.

The committee believes financing may be arranged in several ways and presents for consideration the following:

(Typical fee-for-service may not be adequate for good rural service)

a. Prepayment hospital service (Blue Cross) should be considered for providing hospitalization. Over 11,000,000 members in U.S.A. This is a voluntary system.

b. Prepayment medical care (Arizona Physicians' Service) would play an important role in helping establish doctors in rural areas. Prepayment medical care is of great importance to protect family financial stability. (Michigan Medical Service has 440,000 members.)

c. Several plans are operating in rural areas with a combination of prepayment care with government support, allowing free choice of physician, and maintaining limitation on incomes, a matter of importance to private practitioners of medicine.

d. Nursing service to be provided by Visiting Nurses Association or by taxation.

e. Health centers to be provided by taxation.

f. Full tax supported system - through County Hospitals.

g. Full tax supported system - through Health Department.

h. Development of Central Hospital Service with transportation of patients and doctors and nurses, in Medical Trade Areas.

Hospital supported by community

Contribution, or Bonds -- for building
Blue Cross Plan -- for current expenses
Tax support -- care of indigent

Doctors -- serving on hospital staff, but private practitioners, open staff

Nurses -- In-patient service
Out-patient service
Public Health Service
Home Nursing

Hospital to have out-patient department

Transportation service - Ambulance available for all in area.

D. Capital improvement and use of surplus military supplies in connection with health

In rural areas where there are not enough people or the income of the family is not sufficient to support a doctor or hospital, the committee recommends the consideration of the advantage of establishing a health center. The center would comprise at least three rooms with provision for heating and cooling, running water and flush toilets.

If the community is more than 25 miles from the maternity services of an approved hospital, delivery services should be provided for at the center. A telephone would be required and an ambulance--possibly a station wagon, equipped and convertible to an ambulance. Equipment for dental service should be provided.

Each health center would have the full-time services of a nurse. One doctor and one dentist could serve three health centers. The nurses will offer clinic service and make home calls and arrange for consultation with the doctor. Prenatal and postnatal services would be available.

It has been estimated by the committee that there is need for the establishment of at least six such units in Arizona, located as follows: Cochise County, 1; Gila, 1; Greenlee, 1; Maricopa, 1; Mohave, 1; Navajo, 1.

Because of scattered population and the lack of dental service at the present date, there is a need for a greater number of dental units, distributed as follows: one to each of the following counties, Apache, Cochise, Coconino, Gila, Greenlee, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai and Yuma; two in Graham County; and four to Maricopa County, making a total of eighteen units in all. In practically every instance, mobile units would be of greater service than stationary units.

There would be the need for the construction or conversion of six three-room buildings for health centers, complete with necessary facilities and eighteen dental units. The estimate of the equipment appears in the section entitled, "Surplus Military Supplies and Equipment."

ARIZONA: MEDICAL DOCTOR POPULATION RATIO, 1940 AND 1943

County	Population 1943, official Census Bureau Estimate based on ration book 2	M.D.'s 1943	Population per M. D.	Population 1940, U.S. Census	M.D.'s 1940	Population per M.D.	Population per private practitioner under 65	Dentists 1940	Veterinarians 1940	Veterinarians 1943
Apache	20,567	6	3,428	24,095	9	2,677	3,012	1	0	0
Cochise	34,454	16	2,153	32,434	31	1,046	1,247	11	1	1
Cocouino	17,194	12	1,433	18,770	14	1,341	1,877	5	0	0
Gila	27,766	13	2,136	23,867	11	2,170	2,652	4	0	0
Graham	10,190	4	2,548	12,113	10	1,211	1,730	2	0	0
Greenlee	15,075	6	2,513	8,698	7	1,243	1,740	2	0	0
Maricopa	208,646	150	1,391	185,193	215	866	1,076	59	17	12
Mohave	7,484	5	1,497	3,591	10	859	859	2	0	0
Navajo	26,813	5	5,363	25,309	12	2,109	2,531	0	0	0
Pima	86,952	82	1,060	72,838	120	607	714	30	5	5
Pinal	52,094	16	3,256	23,841	11	2,622	3,205	6	0	0
Santa Cruz	8,429	6	1,405	9,482	8	1,185	1,355	2	0	0
Yavapai	22,572	14	1,612	26,511	23	1,153	1,473	8	0	1
Yuma	40,520	10	4,052	19,326	14	1,380	1,487	3	1	2
State	\$78,756	345	1,678	497,068	495 ^{4/}	1,004	1,227	135	24	21

1/ From "P and A" data. Office of Community War Services, San Francisco.
 2/ From U. S. Public Health Service--photostat table--excludes 120 M. D.'s, on full time appointment. Includes 146 M. D.'s with practice limited to specialty.
 3/ From USPHS.
 4/ "P and A" reported 475 state total.

TABLE II

ARIZONA

NURSES

COUNTIES	PUBLIC HEALTH NURSES* 1943					BY COUNTY OR DISTRICT	REGISTERED NURSES**
	Clinic	Field	School Nurses	Indian Service	Mater- nity H.		1943
Apache	0	0	0	0	0	Dist. (1) Maricopa	251
Cochise	1	7	2	0	0	Dist. (2) Pima Pinal Santa Cruz	234
Coconino	0	2	1	0	0		
Gila	0	1 ^{/1}	3	1	0	Dist. (3) Cochise	48
Graham	0	0	2	0	0	Dist. (4) Gila Graham Greenlee	14
Greenlee	0	0	2	0	0		
Maricopa	5	18 ^{/2}	23 ^{/3}	0	0	Dist. (5) Yavapai Mohave Coconino	38
Mohave	0	0	1	2	0		
Navajo	0	0	2	4	2	Dist. (6) Navajo Apache	10
Pima	4	10 ^{/4}	6	2	0		
Pinal	0	1	3	5 ^{/2}	0	Dist. (7) Yuma	22
Santa Cruz	0	2	1	0	0		
Yavapai	0	(2 Co. Ass'ts. 1 City)	6	0	0		
Yuma	1	3 (1 AWHA)	1	1	0		

* Figures Furnished by the Arizona State Department of Health

** Figures Furnished by Nurses Registry, Tucson, Arizona

^{/1} County Nurse

^{/2} 5 Social Service and Private

^{/3} 21 Full Time, 2 Part Time

^{/4} 4 A.W.H.A., 1 Social Security and Welfare and Anti T.B., 3 Red Cross

^{/5} Indian Service Nurses, located Pinal, serve Maricopa County

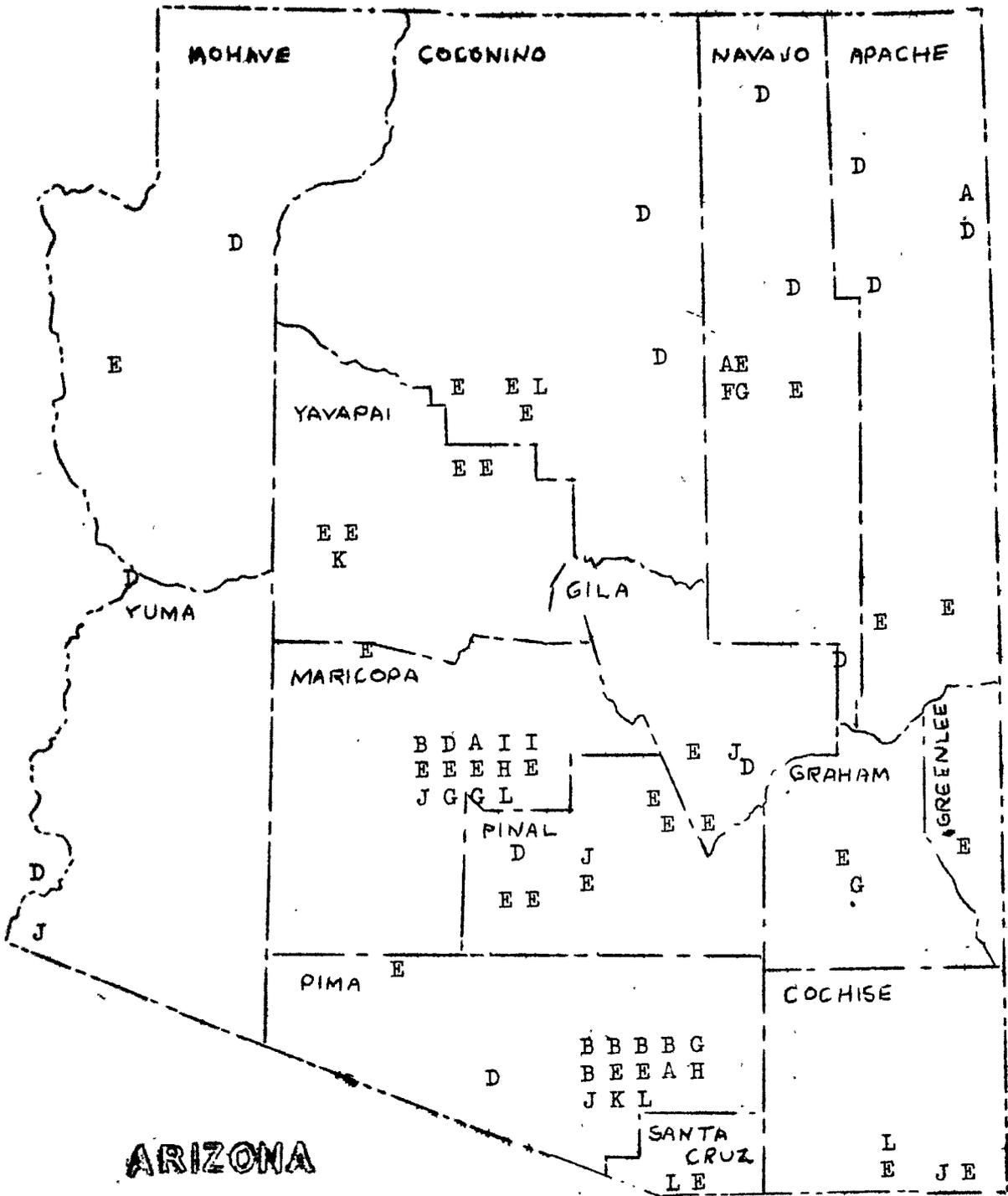
TABLE III
HOSPITAL FACILITIES IN ARIZONA - JANUARY, 1944

County	INDIAN		WHITE								
	General	Tuber- culosis	General	County	State	Veterans Admin.	Tuber- culosis	Emergency	Maternity	Crippled Children	
Apache	3	1	1	0	0	0	0	0	0	0	
Cochise	0	0	2	1	0	0	0	0	0	0	
Cocconino	2	0	3	0	0	0	0	0	0	0	
Gila	1	0	2	1	0	0	0	0	0	0	
Graham	0	0	1	0	0	0	0	0	0	0	
Greenlee	0	0	1	0	0	0	0	0	0	0	
Maricopa	1	1	4	1	2*	0	1	0	2	1	
Navajo	2	2	2	0	0	0	0	1	1	0	
Pima	1	1	3	1	0	1	5	0	1	1	
Pinal	1	0	5	1	0	0	0	0	0	0	
Yavapai	0	0	3	0	0	1	1	0	0	0	
Yuma	2	0	0	1	0	0	0	0	0	0	
Mohave	1	0	1	0	0	0	0	0	0	0	
Santa Cruz	0	0	1	0	0	0	0	0	0	0	
TOTALS	14	5	29	6	2	2	7	1	4	2	

* (One tubercular and one mental hospital)

** Incomplete

DISTRIBUTION OF HOSPITAL FACILITIES



T. B. HOSPITALS

HOSPITALS

- A INDIAN
- B PRIVATE
- C VETERAN

- D INDIAN
- E GENERAL
- F EMERGENCY
- G MATERNITY
- H CRIPPLED CHILDREN

- I STATE
- J COUNTY
- K FEDERAL
- L HEALTH CENTER

REFERENCE INDEX

- (1) MEDICAL DOCTORS - Population ratio 1940 and 1943 - Series of tabulations, State and County, prepared for the American Public Health Association by U.S.P.H.A. based on material secured by the American Medical Association and supplied to the National Roster of Professional and Technical Personnel. (Checked by Executive Secretary of Arizona Medical Association, January, 1943. Suggest a further reduction of total figure for 1944 by 10%.)
- (2) DENTISTS - Figures taken from a survey being conducted by the Community War Services--Federal Security Agency.
- (3) HOSPITAL FACILITIES IN ARIZONA - American Medical Association Register, supplemented by local inquiry.
- (4) PUBLIC HEALTH UNITS - Personnel and Facilities - Morbidity and mortality statistics - As reported by the Director, Local Health Administration, Arizona State Department of Health.
- (5) RURAL SANITATION - From recommended considerations for planning post-war Rural Sanitation - Director Sanitary Engineering Division, Arizona State Department of Health.

CHAPTER X.--POST-WAR HOUSING AND EQUIPMENT.

This chapter was compiled by the following subcommittee: M. R. Howard, Farm Security Administration, Chairman; Dr. E. D. Tetreau, University of Arizona; O. M. Lassen, Agricultural Adjustment Agency; Howard R. Baker, University of Arizona; Mrs. Lorine Craft, Farm Security Administration; A. Earl Taber, War Food Administration.

Rural housing has never been adequate and the rural housing in Arizona is no exception. War conditions plus the years of depression preceding the war have resulted in farm housing being in much worse condition than at any previous time.

With only very limited new construction and with only the indispensable repairs since the start of the war, the first need is to restore farm housing to its pre-war level. However, post-war planning should go far beyond the pre-war level.

In preparing this report, all farm buildings and utilities such as electricity, domestic water systems and sanitation are included as farm housing.

Accurate figures are not available and estimates on the housing needs are extremely difficult to make. There has been insufficient time to obtain actual figures from farmers. The subcommittee on housing has used the 1940 census and has discussed the problem of post-war housing with a number of well informed people.

Classification of Farms

The 18468 farms in the 1940 census are classified: 4584 adequate farms; 9584 inadequate farms; 2600 adequate part-time tracts; and 1700 inadequate part-time tracts. Although the breakdown is not available, it is apparent that most of the 8200 Indian farms are included in the inadequate farms.

There has been some trend toward consolidation of farms since 1940 which has eliminated some of the adequate farms as well as some of the inadequate farms. At the same time, there has been some increase in the number of part-time tracts particularly near the larger cities. Many of the inadequate farms have become adequate due to higher farm incomes. However, this will continue only as long as prices remain high.

As a whole, the number of farms in 1944 has probably changed very little from the number in 1940. The following estimates have been used: Adequate farms 5000; inadequate farms 9000; adequate part-time tracts 3000; and inadequate part-time tracts 1500 or a total of 18500 farms.

Inadequate Farms: The 1940 Census shows 9584 inadequate farms in Arizona. Undoubtedly, most of the 8200 farms operated by Indians and other non-whites are included in this classification. As the Indian farms are under the jurisdiction of the Indian service, it appears that post-war planning for this group will be carried on by that agency.

It is agreed that no post-war housing plans should be made for inadequate farm units. On the other hand, the solution of the problem of these inadequate farm units is definitely a job for the Post-War Planning Committee.

Steps should be taken to eliminate the uneconomic farm units by one of the following methods:

1. Encourage farmers on inadequate units to work with other farmers in developing community service centers to provide many of the services that are impossible for small operators to provide individually. Some of these services are:

- Canning home products
- Freezing units
- Repair shops
- Tractors and other equipment
- Sires
- Slaughter house
- Livestock feeding pens

(Mr. I. D. Klommandson, Head of Vocational Agricultural Education, has developed plans for such centers, and has several started.)

2. Assist farmers to form associations or informal groups to acquire tractors, trucks, equipment, sires and other services that are too expensive for many of the small farm operators to own individually but are essential for the operation of the farms.
3. In areas of small units, the emphasis of agricultural education should be toward developing and successfully operating these small units rather than on more extensive general farming.
4. Assist capable farmers to obtain adequate units by changing to a more intensive type of agriculture where possible. Develop unused land in uneconomic units by leveling or providing, increased water where water is available.
5. Assist farmers to purchase sufficient additional land either from larger tracts or by consolidating uneconomic units. A farm enlargement program of this type would require long-time financing at a low rate of interest provided by the State or Federal Government.

6. Encourage capable farmers who cannot obtain an economic unit by one of the methods above to locate in other farm areas or in newly developed projects.
7. Encourage the farmers on uneconomic units who are not capable operators to attempt to obtain off-farm employment or obtain employment in industry. Through the adjustments listed above, it appears that at least half of the inadequate units now operated by other than Indian farmers can be made into adequate units, and be considered in the plans for post-war housing.

Farm Dwellings

The 1940 census shows 32163 farm dwellings with 26396 of these occupied. The need for better housing, even in 1940, is emphasized by the fact that 13005, or nearly half of the occupied dwellings had more than 1.5 persons per room. Also, 5886 of the total rural dwellings, or 18%, were in need of major repairs. It is interesting to note that the number of dwellings in need of major repairs in Apache and Navajo counties is relatively low, compared to the other counties, 9.5% and 13.6% respectively, which indicates that the census enumerators did not consider that the Indian homes, though inadequate, needed repairs.

No breakdown is available for the rural dwellings by classifications of farms; therefore, it has been necessary to estimate the numbers of rural dwellings for each classification, which are: Adequate farms 10,000; Inadequate farms 11,600; Adequate part-time tracts 3200; and inadequate part-time tracts 1,600 or a total of 26,400.

It is estimated that 50% of the farms and inadequate part-time units, 75% of the adequate part-time units, and 90% of the inadequate farms have minimum adequate housing. (The high percentage shown for the inadequate farms is due to the fact that no consideration is being given in this report to the Indian farms.) This makes a total of 18700 rural dwellings that are adequate and need only normal repairs.

Nearly 5000 farm dwellings are in need of major repairs or remodeling. These are divided into the farm classifications as follows: Adequate farms 3000; inadequate farms 800; adequate part-time tracts 650; and inadequate part-time tracts 500.

New construction of farm dwellings has been practically at a stand still during the war. It is estimated 2150 new houses will be constructed to replace old houses and on new units. These are divided into: Adequate farms 2000; adequate part-time units 150.

Farm Buildings

No specific data is available on farm buildings other than dwellings. Farm buildings need repair and replacement in approximately the same proportion as the rural dwellings. Farm buildings in the main agricultural areas of Arizona are of more simple construction and require much less material than in most other states.

Materials Required

Many factors must be considered in determining the materials for the post-war housing -- the availability of pre-fabricated houses, use of native material, availability of houses and material from War Housing Projects and Relocation Centers, and availability of movable houses, especially for renters and on part-time units. The construction of houses and fixtures will undergo very radical changes in the post-war period.

Sufficient information is not available at this time to attempt to make an estimate as to the quantities of materials or the cost. It is recommended that a great deal of study be given to this problem in preparation for more complete planning later.

Labor Required For Farm Buildings

It is difficult to estimate the Labor required for the post-war farm building for the same reasons as it is impossible to estimate the materials. Until the type of construction can be determined, the labor needed cannot be estimated. Some of the work on farm dwellings and most of the work on other farm buildings will be done by the farmers and their steady men. A conservative estimate of the total labor needed to construct new farm buildings and repair existing buildings is 1500 men for one year.

Household Equipment

Most household equipment has not been available for about two years. Many families had very poor equipment when the war started. Therefore, every farm family will want to purchase some items and many will purchase all the major items of household equipment and furniture as soon as it is available when the war is over.

The amount of equipment purchased will depend to a very great extent on the extension of electricity to farms. In 1940 there were 9542 of the 26396 occupied dwellings with electricity. Through the R.E.A. Cooperative many more farm dwellings in the Southeastern part of the state now have electricity.

It is anticipated that 5000 to 6000 each of the following items will be purchased in the first two years after the war, if available: Refrigerators, stoves, radios, electric irons, sewing machines, washing machines, and sets of furniture. Varied quantities of the following items will be in demand: 2000 to 3000 mangles, 2000 to 3000 coolers, freezing units sufficient to provide 6000 to 7000 lockers, and 1000 to 2000 pressure cookers.

Domestic Water

There is a definite need for improving the domestic water supply on many of the farms. The 1940 census shows 16285 of the total dwellings did not have water within 50 feet. If the 8200 Indian farms are

deducted there is still a very large number. Again the extension of electricity will improve this situation.

Various means should be available to assist farmers in correcting the water problem. One means is group action where water has to be diverted or pumped from large wells. A group of approximately 40 farmers in Coconine County solved this problem in 1937 by forming an Association and obtaining a loan to pipe water to their farms. Another group of 99 at Eagar have completed arrangements for supplying well water to their farmsteads from a central well. Some farmers need assistance to develop small wells for farmstead water.

Financing Farm Housing

Financing of needed housing will not be a problem on the larger farms. Many of the farmers will have the funds for this building. Those who do not have funds will probably experience little difficulty in obtaining financing through commercial channels.

Many of the farmers on the small adequate units and many of the part-time operators will need long time credit of 10 to 20 years at a low interest rate.

Farm Labor Housing

Two distinct types of housing exist for farm labor in Arizona. Due to the size of many of the farms and ranches, one or more houses are provided for the manager, foreman, irrigators, milkers and other steady workers. These houses range from very small houses to good sized modern bungalows comparable to the owner's houses on family type farms.

The other type of housing is required for the seasonal agricultural workers necessary for the cotton and to some extent for other crops. The housing for seasonal workers ranges from tents and one room cabins, to adequate two room apartments built of adobe or concrete. Although good labor housing is provided on some farms, there are many others that have no labor housing.

The labor housing on farms has been supplemented by the construction of three labor camps and four mobile camps. These camps, providing minimum housing, for approximately 1500, are operated by the Federal Government.

Individual farmers and associations of farmers have constructed labor centers to obtain the labor of Italian War Prisoners. These usually consist of tents or barracks, feeding facilities and central sanitation facilities.

It is impossible to make a worthwhile estimate as to the amount of additional labor housing that will be needed in the Post War period. It is apparent now that the acres planted to long staple cotton will be much less in 1944 than it was in 1943, due to lack of price support, insects and difficulty in obtaining labor to harvest the 1943 crop. There appears to be a definite intention on the part of farmers to change from cotton to feed crops.

The trend will undoubtedly will result in an increase in the number of the better labor homes for the steady farm workers. Consideration should be given to the following possibilities in this development:

1. Encourage farmers to consider their labor housing needs and provide adequate housing for their steady men.
2. Determine the availability and resale value of houses on war projects. There is certain to be many houses available from this source. The number will depend on the Post War plans of the industries.
3. Consider the availability of movable houses for use where the type of agriculture has not yet been stabilized. Example -- the present shift from cotton to feed crops. Movable houses may also be the best answer for rented land. Considerable experimenting has been carried on with movable houses during the war period.
4. The National Housing Administration has thousands of trailers now in use in war centers. The need for these will end when the war is over. These trailers might be obtained by farmers for labor housing.

To meet the need for housing seasonal labor, consideration should be given to the following:

1. Encourage farmers to construct at least minimum housing for the seasonal laborers needed.
2. Continue operation of the Labor Center until neighboring farmers have had an opportunity to provide minimum housing.
3. Utilize the government operated mobile units where there is a lack of housing. Consider the need and desirability of increasing this type of housing either by a governmental agency or associations of farmers.
4. Consider the availability of trailers from Federal Housing projects for use with mobile units. Further develop the camps constructed for war prisoners to provide tents, cabins or small apartments for seasonal labor families.
5. Determine the availability of barracks and houses from war projects and War Relocation centers for moving to farms to be converted into suitable housing for labor families.

Special Problems

Consideration should be given to extending utilities, particularly water and sewage lines, to areas adjacent to cities to encourage a better type of construction on adequate part-time tracts. This might be well to be considered as a public works project financed by the Federal Government.

Too many rural slums have developed near cities due to the fact that people who can afford better homes do not build because of the lack of facilities.

There is a definite need for zoning adjacent to cities to prevent shack towns and rural slums. An example of this situation is the present inadequate housing under construction on over-valued land south of Phoenix.

ARIZONA

HOUSING - RURAL POPULATION

County	Total Co. Population 1940	Rural Pop. 1940	Occupied Units		Units need-ing Nat. Dep.	Electricity in Drilling	Units with		Units with no toilet or privy				
			Total Occu-pied	Persons per floor			no water within 50 feet	Percent					
Apache	3120	3587	3269	2776	84.9	535	9.5	143	2.6	5139	91.9	4986	89.2
Cochise	1076	1421	1297	213	16.4	179	12.5	389	28.1	120	8.8	22	1.5
Coconino	1509	2180	1890	1216	71.9	359	16.4	177	8.3	1782	81.7	1491	68.3
Gila	595	677	625	303	48.4	49	7.2	66	10.0	277	40.9	228	33.6
Graham	676	1127	1072	383	35.7	442	39.2	257	23.3	396	35.1	56	4.9
Greenlee	239	320	311	85	27.3	170	53.1	71	22.5	125	39.0	4	1.2
Maricopa	4632	10222	9403	3574	38.0	1721	16.8	6008	59.9	2822	27.6	427	4.1
Mohave	373	398	398	128	36.2	145	36.4	38	9.6	121	30.4	29	7.2
Naveajo	2448	3946	2640	2035	77.0	537	13.6	177	4.6	3510	88.9	3319	84.1
Pima	932	1343	1071	439	40.9	238	17.6	411	31.2	640	47.5	321	23.8
Pinal	1309	2100	2073	1113	53.6	856	40.7	623	30.2	972	46.2	103	4.9
Santa Cruz	174	329	299	63	21.0	49	14.8	84	25.8	14	4.2	7	2.1
Yavapai	715	1138	973	159	16.3	165	14.4	415	37.2	190	16.8	51	4.4
Yuma	670	1375	1320	518	39.2	441	32.0	665	49.4	171	12.4	69	5.0

18468 32163 32163 26396 13005 40% 5886 9524 16285 11113

Source: - 1940 Housing Census

		Adequate Farms	Adequate Part-time Tracts	Inadequate Farms	Inadequate part-time tracts	TOTAL
Number Units	1940	4584	2600	9584	1700	18468
Number Units	1944	5000	3000	9000	1500	18500
Low having minimum adequate housing		50% 2500	75% 2250	90% 8100	50% 500	
needing major repairs or remodeling		30% 1500	20% 600	7% 630	30% 300	
needing new construction		20% 1000	5% 150	3% 270	20% 200	

CHAPTER XI.--RURAL ELECTRIFICATION.

This chapter was compiled by the following subcommittee:
Roland M. Gaver, Rural Electrification Administration, Chairman;
Donald L. Hitch, University of Arizona.

Throughout the world, postwar agriculture will be an electro-agriculture. This is indicated by the fact that there are already a number of countries in Europe and Asia where nearly 100 percent of the farms are electrified, and by the further fact that already several hundred applications of electricity have been developed for farm use.

With modern methods of construction many public spirited citizens feel that with the National Postwar programs to insure full employment at wage levels commensurate with American living standards, there are no reasons why every farm and rural community of this great country should not have electric power with all its conveniences. As a matter of fact the wide availability of electric power in rural areas will be basic to the achievement of full employment. Because of its necessity to modern technology, widespread rural electrification and the availability of electricity at low rates will go far towards supporting plans for full employment and a high national income.

While here in America rural electrification is now only 40% complete, it will no doubt increase rapidly immediately after the war. At present, about 41.2% Arizona farms have central station electric service. However, this represents a tremendous advance in the short period of 8 years since 1935, when only 29.6% Arizona farms enjoyed that advantage.

Electricity on the farm is no longer a luxury but has become a necessity for efficient farm production and management, and for better farm living. It saves time and labor and money. Its effective use is reflected through increased production for home use and for commercial markets, thus increasing the real income of the farmer. The rapid extension of rural electrification after the war will provide work during the transition period from a wartime to a peacetime economy for hundreds of thousands of men who will no longer be needed in the armed services or in war production. Rural electrification will be an important factor in helping the many discharged soldiers returning to farms to have modern farm production facilities essential to good living standards. It also makes possible the modernizing of rural community facilities and services for better health, better education, better recreation, and the development of new rural industries.

Specifically, in Arizona, Postwar expansion of rural electrification will be of paramount importance to the welfare of the large rural population and therefore of the state. It will help the State of Arizona to maintain its rightful place in our national economy.

It is the purpose of this section of the Arizona state report to describe the present status of rural electrification in the state and to indicate the place and the scope of rural electrification in the immediate and long-range postwar periods so that the following objectives may be attained for the state as a whole.

1. Extension of central station electric service at low cost, non-discriminatory rates to all rural communities and farms as soon as materials and manpower become available;
2. Optimum application of electricity to farm production and farm family living;
3. Optimum use of electricity in rural communities for economic, cultural, and social advancement;
4. Use of electric power for development of rural industries wherever feasible, to provide greater employment opportunities and more cash income for people in the rural areas of the state.

A. Present Situation

1. Status of rural electrification on farms, rural non-farms and rural establishments.

Total number farms	18,468	a/
Total farms with electric service	7,600	b/
Percent of farms electrified	41%	b/
Total rural farm dwelling units	32,163	a/
Total rural farm dwelling units with electric service	9,524	a/
Percent rural farm dwelling units with electric service	30%	a/
Total rural non-farm dwelling units	62,038	a/
Total rural non-farm dwelling units with electric service	43,902	a/
Percent rural non-farm dwelling units with electric service	72%	a/
Total rural farm and non-farm dwelling units without electric service	40,118	a/ c/
(a total of 878 additional consumers have been served by REA financed systems since the 1940 census)		
Total miles of REA financed lines in state of Arizona	618	
(as of October 31, 1943)		
Total consumers served by REA financed systems in Arizona	1,305	
(as of October 31, 1943)		

a/ 1940 Census

b/ REA - 1943 report

c/ Difference in totals due to those not reporting in census

2. The percentage of electrical equipment ownership on REA financed systems in the Western area of the U.S. having an average service experience of 16 months, as reported in a survey made in 1941 is as follows:

<u>Equipment</u>	<u>Percent Owning</u>
Iron	91.1
Radio	89.6
Washing Machine	53.7
Refrigerator	51.6
Toaster	35.7
Hot Plate	20.4
Vacuum cleaner (floor)	18.4
Motor up to 1 HP	14.4
Coffee Maker	14.4
Water systems and pump jacks	14.0
Cream separator	8.4
Poultry lighting	6.9
Range	6.8
Brooder	3.8
Roaster	3.0

As this survey reveals, newly connected REA members, who are often unacquainted with the uses and value of electricity, are keeping up the pace of more experienced consumers in the use of electrical equipment.

While these figures indicate that the greatest expenditure is made for labor-saving equipment in the home, the State averages show that in specialized farming areas appropriate production farm equipment is being used on about one-fourth of the electrified farms.

With greater emphasis placed on production farm equipment such as, water systems, milking machines, milk coolers, poultry lighting etc., and with the availability of long term financing and group purchase of electrical equipment, a marked increase will undoubtedly result in the use of production farm equipment.

3. Status of Plumbing and Water Systems

The 1940 census shows the status of plumbing and water systems to be as follows:

Rural Farm Dwelling Units:

	Percent
With running water	26.6
With flush toilet	17.3
With bathtub or shower	18.9

A modern water and sewage disposal system is probably the greatest single benefit electricity can bring to a farm home.

A modern bathroom not only provides comfort and convenience but helps in guarding the health of the farm family.

Water under pressure provides fire protection and increases farm income by providing plenty of drinking water for livestock and poultry at all hours. A pressure irrigation system will assure the farm family of an ample supply of garden vegetables in addition to providing sufficient water for certain crops in times of drought.

B and C. Estimate of Immediate and Long-Range Rural Electrification Needs and Costs.

The attached table covers the estimate of the man-hours and dollar cost of electrifying a total of 26,464 rural establishments which might be served under present standards of feasibility.

These totals are as follows:

	<u>Man-hours</u>	<u>Cost</u>
Line construction	4,311,150	\$14,019,200
Farmstead Wiring	666,750	2,221,620
Farm & Home Equipment		4,794,500
Plumbing	984,600	1,808,000
Totals	5,962,500	\$22,843,320

It is estimated that approximately 13,000 unserved rural establishments in Arizona can be served only under broadened standards of feasibility. These establishments represent approximately 33% of the total unserved rural establishments and are located in the more sparsely settled areas which constitute about 50% of the total area of the state.

Estimate of additional rural electrification needs and costs between now and the end of the war, the transition period immediately following the war when materials and labor become available for intensified construction and for the postwar program of rural electrification under the terms of the President's letter of May 22, 1943. (Does not include generation and transmission facilities.)

ARIZONA

Periods	Line Construction	Potential Consumers	Farmstead Wiring	Farm & Home Equipment	Plumbing	Totals
Between now and end of war - (Potential U-1-c connections)	Miles - 0 (Service Drops) Cost - \$3,500 Man-hrs. - 1,750	35	Cost - \$2,620 Man-hrs. - 1,050	Cost - \$2,500	No Purchases considered in this period	Cost - \$8,620 Man-hrs. - 2,800
Transition Period: all allotments under stop order and applications on file.	Miles - 305 Cost - \$228,800 Man-hrs. - 61,000	709	Cost - \$103,000 Man-hrs. - 30,800	Cost - \$273,000	Cost - \$128,000 Man-hrs. - 78,300	Cost - \$763,700 Man-hrs. - 185,500
Potential connections along existing lines.	Cost - \$30,900 Man-hrs. - 15,400	309	The costs and man-hrs. of labor during this period also includes estimates for potentials along existing lines and all expenditures which will be made by present consumers (total 1305) and U-1-c connections (total 50).			
Long-time Postwar Period	Miles - 21,163 Cost - \$13,756,000 Man-hrs. - 4,233,000	25,396	Cost - \$2,116,000 Man-hrs. - 634,900	Cost - \$4,519,000	Cost - \$1,680,000 Man-hrs. - 906,300	Cost - \$22,071,000 Man-hrs. - 5,774,200
Remaining unserved establishments which can be served under present standards of feasibility	Man-hrs. - 4,233,000	13,000	These estimates also take into consideration the purchases which will be made during this period by those consumers which it is estimated will be connected during the Transition Period, and all U-1-c connections.			
Remaining unserved establishments which can be served only under broadened standards of feasibility.						
Totals	Cost - \$14,019,200 Man-hrs. - 4,311,150	39,449	Cost - \$2,221,620 Man-hrs. - 686,750	Cost - \$4,794,500	Cost - \$1,808,000 Man-hrs. - 984,600	Cost - \$22,843,320 Man-hrs. - 6,962,500

D. Potential Benefits of Area Coverage Rural Electrification.

Achievement of the potential benefits of rural electrification is dependent primarily on the application of the principle of area coverage and the accompanying resultant lower construction costs. This principle has been recognized by leaders in rural electrification as of extreme importance. Using that principle, electric service may be brought on an economic basis to substantially every farm within an area. That principle permits mass production methods to be followed so that construction and distribution costs may be absorbed by both large and small consumers.

From the foregoing statistical summaries related to line construction and requirements for farm equipment and household appliances the direct benefits of a program of rural electrification may be measured in a relative manner by total costs. Direct labor only enters into these costs estimates. The ratio of direct to indirect labor in a program of rural electrification is approximately four to one, based on experience of the Rural Electrification Administration. This experience also indicates that farmers and other consumers during the first year after energization purchase wiring, plumbing and other electrical equipment in an amount nearly equal to the cost of the lines. Thus, on this basis, the total overall program proposed herein would result in a total expenditure of nearly \$23,000,000.

Specifically for the estimate of the approximately 4 million man hours work involved in direct labor for construction of lines, it is estimated that about 16 million man hours of work would be required for the indirect labor. Indirect labor would include work involved in mining, processing, transporting and manufacturing of poles, conductors, transformers, line and generating equipment, and the processing and the manufacturing of the tremendous volume of electrical household and farm equipment that would be purchased by consumers after the facilities were constructed. For that part of the program for which estimates are presented above, it is estimated that some 6 million man hours of labor would be required.

As indicated in the foregoing part of this report, the rural electrification proposed herein will go far toward supporting plans for full employment and high national income. Thus, tangible evidence is seen in the above with respect to direct measurable benefits, even though they may be only potential and contingent upon a program of area coverage rural electrification. So long as rural electrification programs are carried out on the present self-liquidating basis, the measurement of benefits against costs is not a problem and as a consequence no subsidization or grants-in-aids have been considered.

The National Resources Planning Board has recognized the intangible and general public benefits coming from rural electrification under a program of areal coverage of REA. Its report states, "The most

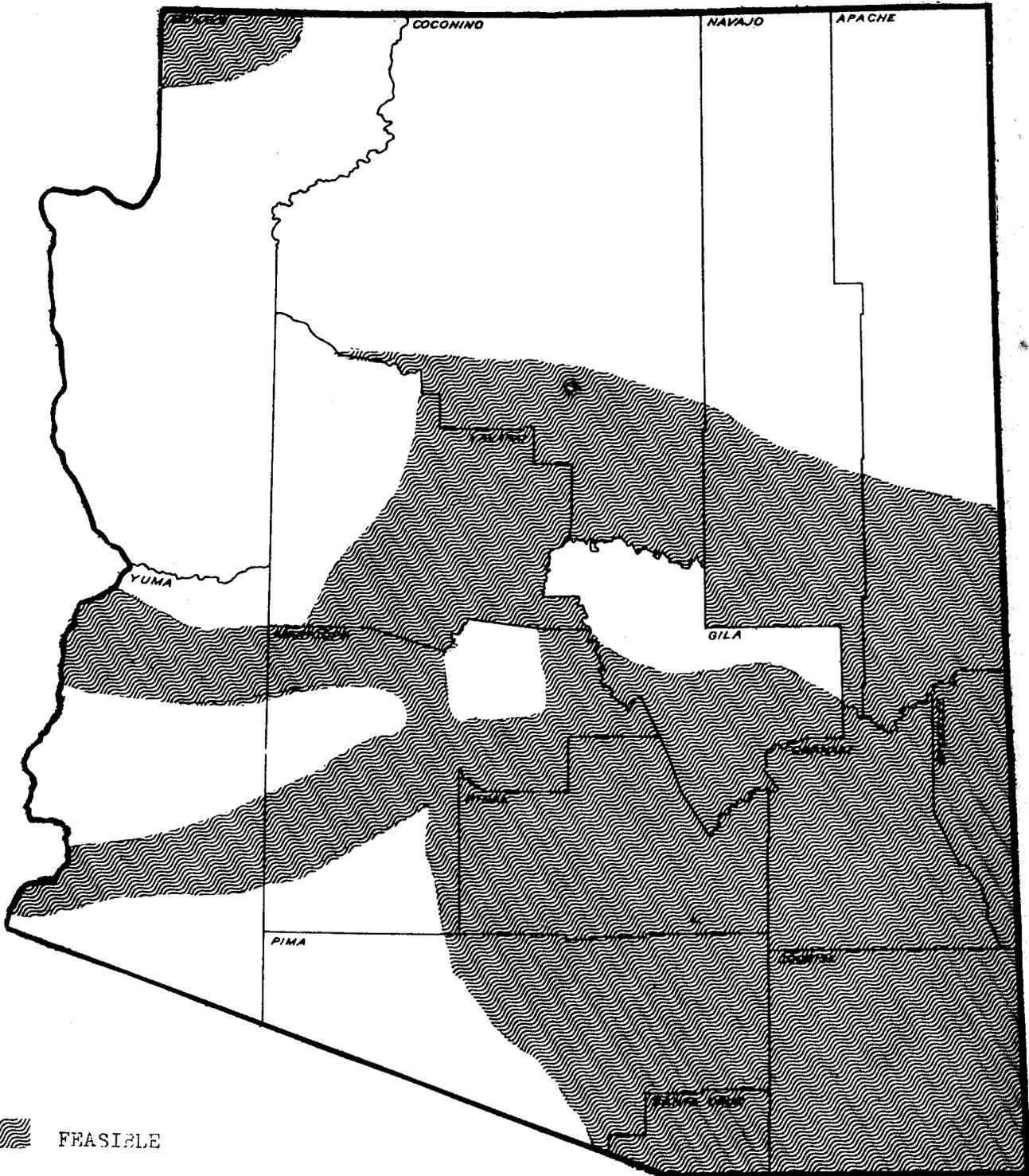
widespread of the intangible public benefits of rural electrification is its general contribution to the social and physical well-being of rural America . . . The effects of electric power on health are substantial because it makes possible modern plumbing, refrigeration, running water, the bathtub and the inside toilet - all of which are important contributions to sanitation . . . Electric lights in home and school will help to save the eyes of many rural children." The value of this program will also be reflected in the contribution to general farm economy and the "real farm income by making possible increased production for home use and for the commercial market. The applications of electric power to productive farm operations has just begun."

New rural industries and the possibilities of industrial decentralization are intangible but general public values considered by the National Resources Planning Board. "The possibilities of industrial decentralization which rural electrification holds out is also considered by many people as an economic and social benefit of great potential significance . . . availability of electric power in rural areas certainly tends to remove an obstacle to the greater dispersion of industrial activity . . . Experience to date indicates that there has been a substantial increase in the number of industrial and commercial consumers of power on REA-financed systems."

"Still another general benefit," continues the report, "which rural electrification shares with many other programs, is its stimulus to employment and economic activity in periods of depression. It will be remembered that the REA program was inaugurated in 1935 with funds from an emergency relief appropriation before being placed on a different legislative and financial basis in the following year. In considering this aspect of rural electrification, it is important to consider that a very high proportion of the employment is off-site employment in the manufacture and transportation of materials. Only about 20 percent is direct employment in line building. Thus, a given amount spent on rural electrification will provide considerably more employment in industry than in the rural areas where the lines are built."

The question may arise as to the extent of expanding or contracting a self-liquidating program of rural electrification according to general economic conditions: Farmers who want electric service may feel that so long as they are paying for the service, which they feel is basically essential to modern farm production and farm living, they should be able to secure rural electrification when they want it. Again, the above report has brought together the combined views of all interested groups and individuals on this matter in recognition that the program must be tempered by the needs of the economy as a whole and "that extreme variations in the magnitude of such a program from year to year are not desirable. When general public benefits are substantially equal, perhaps the greatest use of that 'accordion principle' in public works activity should be reserved for programs in which the direct government contribution is high."

A R I Z O N A



Total area of state - 113,909 sq. mi. Approximate area unfeasible to serve under present standards of feasibility 56,500 sq. mi. Percent area unfeasible to serve under present standards of feasibility, approx. 50%.

Total unserved rural estabs. 39,240. Approx. number estabs. unfeasible to serve under present standards of feasibility, 13,000. Percent estabs. unfeasible to serve under present standards of feasibility, approx. 33%.

CHAPTER XII.--NUTRITION

This chapter was compiled by the following subcommittee:
Dr. Ethel M. Thompson, University of Arizona, Chairman; Miss
Jean M. Stewart, University of Arizona.

1. The Need For a Planned Nutrition Program.

A high rate of mortality over a period of years is usually accompanied by a high incidence of malnutrition. Wherever deficiency diseases are widespread and conspicuous, there also will be found a dietary which fails to meet nutritional requirements. This is evident in the most susceptible groups such as infants, nursery, preschool and adolescent boys and girls, pregnant and nursing women, and low income workers.

National dietary standards

In 1941 national dietary standards were defined for the first time for people of all ages by a group of leading nutritionists of this country. These standards were stated quantitatively for each nutrient where sufficient knowledge concerning requirements are known and in turn expressed in terms of food.

These national dietary standards were accepted by representatives of the United Nations at its conference on Food and Agriculture in 1943 as the ultimate objective for the population of each country. It was recognized at this conference that in every country malnutrition was prevalent in too large a proportion of its people and that there was need in each country for a national nutrition program to improve the nutritional status of its population.

National Nutrition Program

In 1941 a national nutrition program was planned and is now being put into effect with the help of its National Advisory Committee. Coordination of national and local activities is now being established through state councils and local food committees which interpret and make effective the recommendations of the Advisory Committee under the leadership of Mr. M. L. Wilson, Chief, Nutrition Programs Branch, War Food Administration. An executive secretary was made available for the first time to the Arizona Nutrition Council in December 1943 by support from federal funds.

We recognize that in the southwest as in other regions of this country, there is present today too high a proportion of early deficiency states with their lowered resistance to disease and consequent impairment of human efficiency. Even with the development and increasing effectiveness of the national program, it is not expected that there will be any well defined or clear-cut change in the nutritional status within the state. There will continue to be the same types of deficiency with change in degree only.

The extent to which the people of a region are nutritionally deficient is not simply the result of abundance of one kind of food and scarcity of another. Improvement is dependent upon a number of factors over a period of long-time planning, with coordinated programs in food production and consumption, education, and community service in public health.

Food production and consumption

With the anticipated demands of other countries from which food reserves will have been withdrawn and of non-agricultural areas of this country, there will have to be a short-term period of adjustment with emphasis on high calorie foods and those with a high biological value of protein. It is possible this adjustment may be necessary even though today, in the country as a whole, we are far from producing all the protective foods such as citrus fruits and milk needed to meet the national dietary standards for the entire population. It has been estimated that if every individual in this country today were to follow these standards, production of citrus fruits and milk would have to be increased from 50 to 100 percent over that of 1939. An increase in locally produced foods for local consumption no doubt will be necessary at this time.

Distribution of food supplies in Arizona is by no means adequate at present and in analyzing the dietary problem of not only the low income group but also the high, it is believed that in many areas the extent and severity of deficiencies bear a definite relationship to seasonal variation in food supply and distribution. Even before the war in some districts in Arizona certain of the protective foods were never available on the market and were never grown there. In one Arizona town the source of its supply has been entirely dependent upon canned products. The successful selection then of the kinds of canned fruits and vegetables within the limitation set by rationing becomes a major consideration for the homemaker or serious ascorbic acid deficiencies develop.

In the many districts where pinto and frijole beans are widely used, the people in low income groups are better protected nutritionally than those in the same income group in regions where refined high carbohydrate foods form the basis of the diet. Because of amounts eaten, these beans contain a good supply of vegetable protein, an important contribution of factors of the B complex, phosphorus, iron and some calcium, whereas refined rice, wheat, cornmeal, sugar and syrups are non-protective, as they fail to carry but a small fraction of their share of minerals and vitamins. Restriction in consumption of sugar and meat has caused the Arizona homemaker in many areas to use more dairy products, meat substitutes and fresh fruits and vegetables, with a consequent improvement in the dietary.

The homemaker herself has produced more food than ever before and no doubt shall continue to do so as long as the purchase price of garden produce remains high. Before the war, there were summer gardens in the farming areas of the counties having higher altitudes and large commercial gardens in the irrigated valleys. The threat of food scarcities, higher prices and transportation restrictions combined to create an interest in home gardens. According to the University Extension Service of the University of Arizona, they increased 80% in 1942 over the previous year, with 10% to 15% over that of 1942. More family cows have been purchased than ever before and a poultry flock for each farm or ranch has become common.

2. Family Income and Expenditure for Food

With the return of army and navy personnel and their families and shifts in population between urban and suburban areas a program in nut-

rition, to be of value, must be based upon a study of food supply and demand and of food patterns and habits present in population groups as compared to accepted standards.

The University of Arizona Extension Service made a study a few years ago of some 300 family food budgets covering a period of one week but the data were itemized by homemakers, many of whom were entirely unfamiliar with the procedure involved in budgeting incomes. In this study the only purpose was to arouse interest in budgeting household expenditures.

Dr. B. Eleanor Johnson, College of Agriculture, University of Arizona reports the following:

"Little information regarding food consumption patterns for Arizona families is at present available. A comprehensive study would need to be carried on to determine the size of family income, how this income is apportioned to satisfy family needs, how much of the income is used for food, what foods and how much of each are produced, purchased and consumed by urban and rural families, white, negro, Mexican, Indian, of varying size and composition, and at different income levels. Data from this study should indicate the type of educational material most needed and the groups needing financial assistance. They should also be helpful in planning production and distribution programs.

"Wartime incomes are high in comparison with the pre-war level of 1939 for farmers, factory workers, and workers in war industries although white collar workers have received little or no increase in income. While food costs have increased 46.8% from August 1939 to November 1943 for the country as a whole, incomes of many groups have increased more than food prices. Studies show that expenditures for food increase with increase in income, so we may assume that many more families now have an adequate diet than ever before.

"What will be the situation after the war? What proportion of family incomes will be large enough to permit the purchase of diets nutritionally adequate? How much and how soon will incomes drop? Will there be many unemployed? Will price control continue and if so for how long or will prices rise? Will food rationing continue and for how long? Will family size be increased with the return of men from the armed forces with no corresponding increase in number of earners and consequently in money income and money available for food? What will be the lowest cost of an adequate diet in various parts of Arizona after the war?

"If incomes return to the level for 1935-36, we would expect to find approximately two-thirds of all families with incomes of less than \$1500. What part of this income would have to be spent for food for a family of a given size and composition in various sections of the state if family members are to be

adequately nourished? Price data collected in Tucson over a three year period indicate that in November, 1941, 33% of a \$1500 income had to be spent for foods furnishing an adequate low cost diet for a family of four, consisting of a man and woman, moderately active, a boy ten years old and a girl eight. To secure the same foods in November, 1942, almost 40% of a \$1500 income had to be spent, and in November, 1943, about 41%.

"Consumption studies indicate that food expenditure is the largest single cash item in family living in all but high income groups. It is essential, then, that consumers know how to spend the food dollar to secure maximum value from it. This would indicate the need for an educational program that would include the following:

1. An analysis of present food buying habits.
Which of these food buying habits are responsible for an increase in food prices? What is the cost of various store services such as credit, delivery, the return privilege, etc? What food buying habits should families attempt to set up?
2. A consideration of the advantages and disadvantages of home production of food from the standpoint of price.
3. An analysis of the type of information concerning foods that should be available at the place of purchase if foods are to be intelligently purchased.
4. Legislation that would result in greater satisfaction from the food dollar, such as: compulsory grade labeling; better enforcement of weights and measures legislation; state and municipal laws that would protect the consumer's health and purse by prohibiting adulteration and misbranding of foods manufactured or processed and sold within the state; enrichment of specific food products sold; stricter regulation of sanitary conditions for food processing; the setting of standard sizes for packaged foods so the price advantage of larger quantities could be more easily computed.
5. Savings that result from buying in quantity and from planned use.
6. Budgeting for food in the postwar period."

3. Nutrition Education in a Community

The needs for a nutrition education program

The needs for nutrition education will differ with the community and extent to which its social and economic agencies have been developed. Emphasis should be placed upon education of children and their families of simple nutrition facts and their relation to health. If the few basic facts of nutrition are taught effectively it will be demonstrated in the consumer's everyday selection of food. The educated community will thus become interested in its food laws and regulations and be in a position to enforce governmental action through popular demand more effectively than by any other method.

The needs for nutrition education will differ at the various levels in the school system but, at any level, whether it be elementary, secondary, adult and higher education, formal or informal in character, the majority of individuals need first to be taught those basic facts of nutrition and their relation to health. Any of the more technical aspects can be given later when the need arises.

The Committee on Nutrition Education, Arizona Nutrition Council, Mrs. Mildred W. Wood, Chairman, reports that up to the present time, progress has varied depending upon local leadership and funds available. Some communities in Arizona at the end of the war will have had a real awakening whereas others will still be peacefully unaware of their need for vital information which has been made available within recent years. At the end of the war nutrition education will have become a part of the health program in many communities but in others it will have been neglected.

With the support of such agencies as the Red Cross, which has offered many well attended short courses in nutrition throughout the state and of newspapers and radio which in turn offered popular articles and programs on nutrition, it is probable that a fair proportion of homemakers and their families realize at least that food is important for health and that they must do something about obtaining the right kinds of food. With this change in point of view, more people are now receptive to community activities of various kinds which are planned to improve nutritional status and at the end of the war it will be easier to develop a well organized nutrition program which shall be of real significance in the lives of the people and become an integral part of the general education program of the state.

Specific objectives of nutrition education program

Certain specific objectives of such a program have been outlined by this Committee. They are the outcome of a program which has been carried on as extensively as possible throughout the state with the teaching personnel and funds available:

(1) The public should be made to realize that nutrition is of importance to everyone. The idea has existed too long that nutrition education is for certain groups only, notably women homemakers, some girls in high schools and those responsible for group feeding.

(2) It should be recognized that nutrition information needs to be adapted to the particular group concerned. If the elementary school child, high school youth, adult and workers in industry are all to profit from such a program, then more time and effort must be put into ways of reaching these groups. Most important is the need to carry this program to low income groups and many have been the difficulties involved in this respect. One of these has been financial. Except in some rural communities where extension funds have been available, there has been no money for the payment of trained workers, nor are the teachers in the elementary schools

sufficiently informed in nutrition to be capable of reaching the low income groups through their work in the schoolroom. Even though money were made available there would still be the need for putting information into simple form. It takes near genius to be simple without effort and as much attention will have to be given this aspect of the program as to securing the facts in nutrition which are to be taught.

(3) A feeling should be created of individual responsibility on the part of those informed in this subject to influence in every way possible those with whom they come in contact. In that way a far larger group of people could be reached.

(4) The general public should be made aware of the importance of adequate school lunches for every child. One of the difficulties in the way of progress is the present state legislation which makes it impossible to spend school money for supervision of the lunch program.

Recommendations for nutrition education program

In view of the objectives outlined above, some specific recommendations are made by this committee:

(1) That a course in the fundamentals of nutrition be required for all education majors at the State Colleges and University, so that they shall have a basic understanding of the importance of nutrition. Nutrition lessons should be introduced as an important part of the health program beginning with the first grade.

(2) That supervisory staff be provided for public schools whose responsibility it shall be to help classroom teachers see how to include nutrition education at various levels.

(3) That the nutrition education program be correlated by planning goals to be reached at various levels and through class experiences in various subject matter areas as in biology, health education, and homemaking.

(4) That materials and teaching aids be developed to meet the needs at various age levels, particularly that of the lower level.

(5) That the efforts of various agencies working on nutrition education be correlated, particularly at the adult level.

(6) That the community program be extended through adult education so that families shall realize the importance of becoming self sufficient when practicable, learn how much food they can profitably raise so that none will be wasted or sent to other areas unless needed and how much should be conserved. By these means the need can be established for a community food conservation center. It is expected that with the release of necessary materials for freezing lockers, freezing shall become widely popular as has already occurred in many other states.

- (7) That an adequate staff be provided to supervise and direct local school lunch programs.
- (8) That the time of homemaking teachers be planned to give maximum service to the school and community. Many of the present homemaking teachers are trained in administration of the school lunch program, to teach out-of-school adult classes and to help elementary teachers adapt illustrative materials and other teaching aids to their programs. Instead they are asked to direct study halls and teach such subjects as Physical Education, English, Typing and General Science.

4. Community Services in Public Health as Related to Nutrition

There are available today comparatively quick and easy clinical methods of measuring physical fitness of children and some of the more specific deficiency diseases in their early states. This involves, first, a physical examination including some highly subjective tests as condition of skin, pallor, posture, musculature, skeletal firmness and evidence of presence or absence of fatigue. Body build measurements are used involving age, sex, height, chest and iliac width. Roentgenograms are used as a means of measuring skeletal maturity and skeletal mineralization in children. The incidence and extent of dental caries is determined by a doctor of dental surgery. Calculation of slump in standing and sitting and measurements of plantar contact are now being used in some laboratories. Other tests used are hemoglobin status, the use of the biophotometer based on association of retarded dark adaptation with vitamin A deficiency and for some limited purposes a test of capillary wall strength. Certain blood and urine vitamin tests are being used in studies of large numbers of children in some of the thickly populated industrial areas of the United States; also records of dietary intakes covering a sufficient length of time and their relationship to nutritional and socio-economic status of the family.

Except in a few laboratories not many of our community services are sufficiently well organized or financially able to make many of these recently developed tests on early deficiency states as a routine measure. The question of too much fluorine and too little iodine in some water supplies throughout the State with the probable consequence of endemic goiter and mottled enamel, respectively, deserve more serious attention.

Nutrition Consultant, Maternal and Child Health Division, State Department of Health

Much of the nutrition education being done by public health nurses in county health units is being directed by the Nutrition Consultant of the department of Maternal and Child Health Division, Arizona State Department of Health, whose office in this State was established in 1940.

The School Lunch Program

It is important for all in the community to realize that the school-lunch program as it is today is not just a feeding program. It is an educational experience for both the children and the staff of the school, and is an important part of school living. It is a part of a plan both national and international in scope to have "nurture assist nature" and to reach optimal development during the growing period.

In the past economic status of the children has been the determining factor as to which class of children should participate but investigation shows that, due to indifference and neglect, too large a proportion of the children from the higher income groups have been living close to the level of minimal adequacy and the lunch should be made available to them also.

The Committee on School Lunch, Arizona Nutrition Council, Hilda H. Kroeger, M.D., Chairman, reports that support of this program should be made a part of the elementary and high school curriculum, available to all. It is estimated that by the end of the war more children in this State shall be receiving school lunches than ever before; that the program shall have proved its effectiveness and justified the financial outlay both in terms of child health and in its final contribution to the community itself. The Committee also emphasizes that there should be no slump in this program after the war. At present because many mothers have left the home for defense jobs, provision for the care and feeding of their children has been a problem of state-wide concern. The committee recommends the following objectives and measures needed to solve these problems.

Desirable objectives

(1) The program be supported to the extent that the lunch can be made nutritionally adequate to carry its quota of the day's requirement at all times. There should be conservation of seasonal abundance of foods for use in the school lunch at community and commercial processing plants using the excess for intrastate exchange and increased production locally of foods which will add to its nutritive value.

(2) It be produced and served according to accepted standards of sanitation.

(3) The school lunch room experience be integrated with the health education curriculum at all grade levels in such courses as reading, hygiene, general science, biology and home economics.

(4) Inclusion of basis training in administration of the school lunch as part of the home economics curriculum at the higher levels.

Major problems in attaining above objectives

Difficulties which have been met in attaining these objectives in the opinion of this Committee are:

(1) Lack of understanding of the importance of these objectives by the parent, the public and the school authorities.

(2) Lack of funds to pay for personnel, equipment and food in the school lunch program.

(3) Unequal and inadequate distribution of food in certain areas of Arizona.

(4) Lack of trained and experienced personnel to properly staff school lunch programs.

Nutrition of Industrial Workers in Wartime

As evidence of the necessity for improvement in nutrition of industrial workers, a National Committee on Nutrition in Industry has recently been set up by industrialists and industrial physicians. To have more information and knowledge, some rigidly controlled studies were organized on the diet and nutritional status of defense workers in at least four regions in this country. The obvious remedy which was recommended was to bring the inadequate diet up to the proper level with natural foods. Supplementing the diet with synthetic vitamins were shown in these studies to be necessary only in certain instances.

Major causes of nutritional inadequacy were listed under four headings: poor food habits, poor "commissary" or provision of foods for the workers, economic factors such as those which interfere with proper selection of food and lastly metabolic stress involving illness, increased working hours, extremes of temperature, and speed-up of work. Three lines of attack were suggested: provision of food, education, and economy.

Under "provision" is listed the recommendation of the Food and Nutrition Board of the National Research Council for enrichment of all white flour and bread by addition of thiamine, niacin and iron, and possibly riboflavin. It recommended widespread use of iodized table salt and fortified oleomargarine. Under "education" were suggested: (1) make a dietitian available to employees and families for advice on diet, (2) use of posters and pamphlets at appropriate sites about the plant, (3) classes and demonstrations on nutrition for wives and families of employees, (4) maintenance of a cafeteria system where foods of high nutritional value are obtainable. Under "economy" were suggested: (1) that all cafeterias and other food units be under plant management on a nonprofit basis, (2) intelligent marketing be encouraged, (3) employment of a cafeteria dietitian to increase nutritional value of meals and decrease overhead.

In Arizona, some of these recommendations have been made with varying degrees of success and some momentum has been gained which should not be lost in postwar years. However, the work has progressed slowly because of (1) lack of paid leadership assigned to this field, (2) the push of other interests inherent in the war situation, and (3) failure to recognize inadequacy in the nutritional status of industrial workers. Nevertheless, interested groups have been trying to learn the needs of industry through visits to the plants and homes of the workers. For example, employees of the Home Service Department of Arizona light and power companies are making home visits and giving specific suggestions on planning meals for the home and to carry to the plant.

5. Plans for Postwar Nutritional Research

Dr. Margaret C. Smith, Department of Human Nutrition of the Arizona Agricultural Experiment Station, reports:

"Research problems in nutrition are of ultimate importance only in so far as they lead to improvement of human welfare in which nutrition plays a big role. Intelligent postwar planning will not radically change nutrition research programs. It should, however, augment search for information which will further improve nutritional status of the population in peace times.

There will be a tendency to swing from the popular or applied type of research conducted during the war to a more fundamental type of research. The wartime program which was to a certain extent restricted to problems of immediate concern, the findings of which lent themselves to immediate use, will be further extended after the war to include basic research.

The fields of research in nutrition are fertile ones. New vitamins and other essential dietary nutrients and their inter-relationship will be discovered, new methods of their assay be developed, more exact information concerning human requirements be sought, along with greater recognition of deficiency symptoms and development of simple methods of diagnosis, etc.

Many projects should be reorganized to fit into a scheme of cooperation in place of loosely organized research which does not efficiently take advantage of foods grown and studied by other departments. Some of these problems include expanded programs such as are already in force between the Department of Human Nutrition and the Department of Horticulture and Agricultural Chemistry and Soils of the Arizona Agricultural Experiment Station. Emphasis must be placed on the quality of foods produced rather than the mass production of foods of mediocre quality from the nutritional point of view, in other words, production of foods possessing the highest nutritional value. Plant breeders and horticulturists are continually developing new crops and varieties, each of which should also be studied from the nutritional point of view before they are accepted as commercial possibilities.

A few other research nutrition problems which demand attention may be mentioned as follows. The effect on the vitamin content of foods preserved in storage by dehydration, and more especially by quick freezing methods, should be further investigated. The inability to secure quick-freezing units at the present time has postponed this highly important work. The effect of cooking foods in large quantities under institutional conditions, in pressure saucepans, etc., on the nutritive value of a wide variety of foods should be determined. It appears probable also that electrical cooking by means of induction or high frequency waves will become very popular. This form of cooking, being new, will have an unknown effect on the nutritive value of foods.

All research projects should be flexible in nature to permit the shifting of the endeavor of the department to attack problems which may arise which are not foreseen at present."

CHAPTER XIII,— SURPLUS MILITARY SUPPLIES AND EQUIPMENT

This chapter was compiled by the following subcommittee: Raymond Price, Southwestern Forest and Range Experiment Station, Chairman; O. C. Williams, State Land Commissioner; A. F. Kinnison, Soil Conservation Service.

Owing to wartime restrictions it has not been possible to keep up adequate repair or replacement of agriculture equipment and supplies. Moreover, needed and worthwhile work, particularly in land-resources conservation and development, has been postponed because of manpower and equipment and material shortages. Consequently, at the end of the war the demand for these goods will be great. This will be manifest in two ways: (1) replacements for necessary going pursuits, and (2) equipment and supplies for needed and worthwhile additional work. The second category, including necessary work projects of a public-benefit character, is especially appropriate for suitable surplus military supplies and equipment.

In order to continue uninterruptedly necessary agriculture enterprises during the post-war period and facilitate the completion of worthwhile public-benefit work projects, therefore, appropriate amounts of surplus military supplies and equipment must be apportioned to agriculture. An indication of the possible extent and nature of these needs is outlined in the accompanying tabulations. The exact kinds and amounts of equipment cannot be fully itemized until more information is at hand as to the equipment and supplies available.

In disposing of surplus military supplies and equipment the following recommendations are made:

1. That all usable supplies and equipment be put to use and not destroyed.
2. That they be apportioned through responsible agencies at reasonable costs, care being exercised to avoid excessive profit to some and discrimination against and unfair distribution policies to others.

Earth Moving and Road Building
Equipment and Supplies

Buggies, concrete		15			15
Cable, steel, 1/2 in.	8,000 ft.				8,000 ft.
" " 3/4 in.	49,000 ft.				49,000 ft.
" " 7/8 in.	30,600 ft.				30,600 ft.
Carryalls, 6-8 yd.	8				8
" 4-6 yd.	8				8
Caps, elec., 6, 8, & 10 ft. wires	120,000				120,000
Cattle guards, steel, double grids, 15 ft.	250,400 lb.				250,400 lb.
Compressor, air			1		1
Culverts, various sizes	9 cars				9 cars
Detonator			2		2
Dragline, 3/8 or 1/2 cu. yd.		3			3
" 1-1/2 cu.yd, Crescent scraper	8				8
Graders, pull, 14,000 lb.	8				8
Jackhammers, 65 lb.	73	5	2		80
Loaders, gravel, portable bucket	1				1
Machine, earth boring (posts, piling, etc.)		3			3
Mixers, concrete, 1 bag.	17	5	1		23
" " 3-1/2 cu.ft., 1/2 bag		11			11
Motor patrol graders, 16,000- 18,000 lb.	2	5	1		8
Motor patrol graders, 14,000 lb.	11				11
Oilers, line	45				45
Pile driver, portable, 1,000 lb. hammer	1				1
Flow, snow	1				1
Powder	84 T				84 T
Rippers, large cable lift	16				16
" 5,000 lb.	24	14			38
Road oiling outfits, including 2 tank trucks for hauling oil. 1 black topper machine, and other misc. equipment	1				1
Rollers, road, 10 T	1				1
" sheepsfoot, double drum, 8,000 lb.	10	5			15
Rollers, sheepsfoot, single drum		9			9
Scrapers, 2-1/2 yd.	18				18

¹/Includes some farmer needs.

	F.S.	SCS	State	Farmer	Total
Shovels, 1/2 cu.yd., crawler type	3				3
Shovels, 1/2 cu.yd., truck type	3				3
Sprinkler, truck, 3 T	1	5			6
Tamper, air		5			5
Tank, water, 200-300 gal. on 2-wheel trailer	5	50			55
Tool, demolition		2			2
Tractor, bulldozer	2		1		3
" caterpillar	2		2		4
" with trail builder, RD-8 cat.	17				17
Tractor with trail builder, RD-7 cat	24				24
Tractor, trail, R-6	7				7
" 50 hp Diesel	8				8
" 50-80 hp with 6-8 cu.yd. carryall		21			21
Tractor, 50-80 hp with dozer or trail builder		16			16
Tractor, 50-80 hp with crane		2			2
Tractor, 50-80 hp solo		16			16
" 25-40 hp solo		8			8
" wheel type			675		675
" crawler type, 25 hp or smaller			100		100
Tractor, crawler type, 26-60 hp			90		90
Tractor, crawler type, over 60 hp			10		10
Trenching machine (Parsons)	2				2
Trucks, dump, 2- 2-1/2 T	114	51			165
Wire, road guard	12 mi.				12 mi.

Transport Equipment

Automobiles, pass. carryall		12			12
" " coupe	1		6		7
" " Jeeps		81			81
" " sedans	27	5	4		36
Jeeps			15		15
Showboats	2				2
Trailers and attachments			6	2,500	2,506
Trailers, 6-8 wheel, 10-12 T		7			7
" 2-wheel, box body		47			47
" 2-wheel, horse	2				2
" semi, 15-ton	8				8
" " 20-ton	1				1

	F.S.	SCS	State	Farmer	Total
Trucks, 1-1/2 T	6		2	1,200	1,208
" over 1-1/2 T				125	125
" 5 T			2		2
" cargo, 6x6		12			12
" 2-3 T with load luggor and 3 skips		10			10
Trucks, mobile repair shop		1			1
" pickups or jceps	289		8		297
" stake body, 2-3 T	210	50			260
" tank	24				24
" trail, R-6 type	14				14
" transport, 12 T		1			1
" " 10-12 T		1			1
" with service tractors, 1-1-1/2 T		5			5

Office Equipment

Adding machines	40		2		42
Cabinets, file			12		12
" " metal, letter size	100				100
Calculators	15	3			18
Chairs			12		12
Chairs, arm	12				12
" revolving	21				21
" typewriter	24				24
Desks	8		8		16
" typewriter	24				24
Ediphones	3		1		4
Extinguishors, fire	134				134
Safe			1		1
Tables, drafting	1		1		2
" office, 30x60 in.	20		6		26
Typewriters	40		4		44

Electrical Equipment and Supplies

Arc welder, 440 amp.	2				2
Battery analyzer	1				1
Battery charging equipment	6				6
Cable, tel., lead covered	2 mi.				2 mi.
Coil tester	1				1
Condenser tester	1				1
Generators, 1500 watt or equal	2				2
Headlight tester	6				6
Machine, motor analyzer and tester	1	1			2
Plants, elec. light, portable, 3-5 kw	1	5			6

	F.S.	SCS ^{1/}	State	Farmer	Total
Plants, elec. light, 10 kw	10				10
" " " 5 kw	16				16
Timing, light combustion tester	2				2
Transformers, 13,000 volt	3				3
Wire, insulated copper #16	72,000 ft.				72,000 ft.
" " " #14	5,000 ft.				5,000 ft.
" " " #12	5,000 ft.				5,000 ft.
" " " #10	5,000 ft.				5,000 ft.
" " " #8	5,000 ft.				5,000 ft.
Wire, power, #2 cond.	65 mi.				65 mi.
Wire, telephone, #10-12	34,000 lb.				34,000 lb.

Scientific Equipment

Alidades, telescopic with Beaman arc	10	5			15
Balances, analytical	2				2
Binoculars, 7 power	6		12		18
" 8 power	11				11
Centrifuges			6		6
Chemicals for 200-man health center			6 units		6 units
Colorimeter			6		6
Finders, fire, Osborn	20				20
Levels, dumpy, 18 in.	8				8
" Y	8	5			13
Microscopes			6		6
Planetable, 24x30 in., with tripod	13	5			18
Planetable, 18x24 in.	11				11
Plumb bobs, 6-8 oz.	42				42
Pole, range, 8 ft.	2	10			12
Radio sets	50				50
Rods, level, 12-1/2 ft.	36	5			41
Rods, line, 1 in.	22				22
Rods, stadia, folding	2	5			7
Rods, stadia, 14 ft.	36				36
Surveying pins	20 sets				20 sets
Tape, metallic	24	60			84
" steel, 300 ft.	32				32
" " 100 ft.	32	5			37
" " box, 50 ft.	30				30
Theodolites, 2 in.	1				1
" 10 in.	1				1
Transit, 5 to 5-1/2 plate, engineer's	8	5			13

	F.S.	SCS ^{1/}	State	Farmer	Total
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Hospital Equipment

Ambulance, air			6		6
" automobile,					
high speed	1		6		7
Ambulance, truck	1				1
Bandages and gauze for					
200-man health center			6		6
Beds, hospital			12		12
Blankets	500		100		600
Chairs, dental			6		6
Cots	100		12		112
Dental units, mobile with					
facilities & equipment			18		18
First-aid kits, small size	850				850
" " " large size	18				18
" " " 20-man units	2	50			52
" " supplies for 200-man					
health center			6		6
Instruments, dental, for					
200-man health center			6		6
Instruments, medical, for					
200-man health center			6		6
Linen (towels, sheets, etc.)	96 sets				96 sets
Linen (towels, sheets, etc.)					
for 200-man health center			6		6
Mattresses	100		36		136
Physiotherapy apparatus for					
200-man health center			6		6
Refrigerators			12		12
Snake-bite kits with belt pouch	50	250			300
Sterilizers, large			12		12
" small			12		12
Tables, examining			12		12

Buildings, Structures, and Supplies

Barracks, lumber, 20x50 ft.	40				40
" " 20x40 ft.	16				16
Building, house trailer,					
2 or 4 wheel		35			35
Building, frame, portable,					
20x100 ft.		20			20
Building, frame, portable,					
20x40 ft.	1	20			21
Building, frame, portable,					
20x20 ft.		20			20
Building, frame, shed,					
3000 sq.ft.		20			20

	F.S.	SCS ^{1/}	State	Farmer	Total
Cement	5,000	sacks			5,000 sacks
Coolers, air-conditioning	22				22
Lumber, native	145,000	ft.			145,000 ft.
		B.M.			b.m.
Plant, screening, sand, gravel, with power unit			1		1
Reinforcing steel	200,000	lb.			200,000 lb.
Rock crusher plants, com- plete with motor driven rock crusher, screens, bins, and other necessary equipment	2				2
Rock crushers, portable, 60 cu.yd. with power unit	8				8
Roofing, comp., llo#	1,300	sq.ft.			1,300 sq.ft.
Wire, screen	5,000	sq.ft.			5,000 sq.ft.
<u>Household Equipment</u>					
Gas system, Butane, 300-gal.	3				3
Phonograph with electric turntable	8				8
Polisher, floor, electric	5				5
Refrigerators, 8 ft.	21				21
<u>Camp Equipment</u>					
Beds, camp	500				500
Blankets	3,584				3,584
Camp, field, 20-man unit, mobile (Trailer mounted bunkhouses and kitchen with mess equipment, beds, and mattresses)			10		10
Canteens, 1 gal.	2,100				2,100
Cots, steel and mattresses	976				976
Lanterns, gasoline	1,048				1,048
Mess outfits, 6-man	100				100
" " 10-man	98				98
" " 25-man	35				35
" " 50-man	18				18
Ranges, field	53				53
Ranges, with pipe, large double oven with hot water back	32				32
Refrigerator unit, 600 ft.	218				218
Stoves, heating, including pipe, mats, poker, coal scuttle, etc.	125				125
Tents, 12x14, with poles	12		20		32

	F.S.	SCS-1/2	State	Farmer	Total
Tents, 14x16, with poles (If lumber barracks not available, add 192 tents for road building)	158				158
Tent flies, 12x14	30	50			80
" " 14x16	176				176
Tents, tepee, 7x7	6				6

Hand Tools

Axes, D.B., 3-1/2 lb., with handles	770				770
Axes, S.B., 4 lb., with handles	1,889	250			2,139
Axes, D.B., 4-1/2 lb., with handles	20	50			70
Bars, digging		200			200
" wrecking, gooseneck		50			50
Bits, wood, auger, set of 13	10	35			45
" " expansive, with 2 cutters	10	25			35
Brace, bit, ratchet, 10-inch	10	35			45
Calipers, inside, 3, 6, and 12 inch		4 sets			4 sets
Calipers, outside, 3, 6, and 12 inch		4 sets			4 sets
Carriers, timber	2	40			42
Chisels, wood, 1/4 to 2 in.	10 sets				10 sets
Crowbars, 6 lb	450				450
" 20 lb.		50			50
Drill, breast	40				40
Hacksaws, 12 in.	22	20			42
Hacksaw blades, 12 in.	22 doz.	24 doz.			46 doz.
Hammers, claw, with handles		100			100
" double-face, 12 lb., with handles		25			25
Hammers, double-face, 16 lb., with handles		25			25
Hammers, double jack, 8 lb.	360	50			410
Hammers, mason, 4 lb.	50				50
Hammers, single jack, 4 lb.	300	50			350
Hammers, Spalling, S.F., 3 lb., with handles		25			25
Hammers, Spalling, S.F., 6 lb., with handles		25			25
Hammers, rock, 12 lb.	50				50
Handles, pick, R.R.	200	800			1,000
Hatchets, broad, 2 lb., with handles		50			50
Hoes, mortar	10	100			110
Iron, soldering, elec.	6				6

	F.S.	SCS ¹ / ₂	State	Farmer	Total
Level, carpenter, 24 to 28 in.	10	50			60
Picks, R.R., #6	1,820	500			2,320
Picks, mattocks	820	200			1,020
Planes, carpenter, asstd.	5	sets			5 sets
" rabbet	1				1
Pliers, slip joint, 8 in.		50			50
" side cut	16	50			66
Rakes, asphalt	30	100			130
Saw, crosscut, 2-man	13	25			38
" " 1-man	10	25			35
Saw, hand crosscut, 6, 7, or 8 pt.	30	50			80
Saw, hand rip, 6 or 7 pt.	10	10			20
Screw drivers, 10 in.		50			50
Shovels, LHRP	1,820	400			2,220
" #2 DHSP		200			200
Squares, combination	2				2
" steel	10	50			60
Stones, ax, hand, carborundum		144			144
Tools, carpenter, complete set	29				29
Torch, blow, 1 qt.	6				6
Trowels, mason, brick	10	50			60
" " plaster	10	50			60
" " pointing	10	50			60
Wheelbarrows, rubber tired	225	100			325

Shop Equipment and Supplies

Aligner, for conn, rod & piston, asst'd size piston	1				1
Anvil, 200 lb.	10	10			20
Belting, leather or comp., 2 to 6 in.	300				300
Binders, load (Boomer)		100			100
Bins, nail	5				5
Bits, drill, 3/16- 1-1/4 in. x 1/64	20				20
Blacksmith outfits, incl. 200 lb. anvil and blacksmith tools, forge vises, acetylene welding outfits, taps, dies, pipe cutters, etc.	30				30
Blocks, snatch, 7/8 in., steel	24				24
" " 3/4 in. "	48	25			73
" " 1/2 in. "	48				48
" tackle, wood, 1 pulley, 3/4 in.		25			25
Blocks, tackle, wood, 2 pulleys, 3/4 in.		25			25

	F.S.	SCS ¹ / ₂	State	Farmer	Total
Body, repair kit	1				1
Boring machine, main car bearings	1				1
Boring machine, main tractor bearings	1				1
Calipers, frame micrometer, set 1-24 in.	6				6
Chains, tow, with hook, 20 ft. x 1/2 to 3/8 in.	5	100			105
Chisel, cold, 3/4 in.		50			50
Clamps, Shaler tire repair		25			25
Compressor, air, 66-100 cu.ft.		4			4
" " 105 cu.ft.	24				24
" " 210 cu.ft.	8				8
" and tank, 25 cu.ft., elec. driven	1				1
Compressor and tank, 15 cu.ft., elec. driven	29				29
Crane, auto, 2-1/2 T	1				1
Cutter, bolt, 14 in.	17				17
" " 18 in.	17				17
" " 24 in.	17	50			67
" " 36 in.	9	25			34
" pipe, set 3/8- 2-1/2 in.	2				2
Drill, bench, 1/2 in.	2				2
" " 1/4 in.	2				2
Drills, portable, elec., 1/2 in.	3	30			33
" " " 1/4 in.	3				3
Drill press, heavy duty, elec. driven	1				1
Drill press, medium duty, elec. driven	9				9
Drill steel sharpener and shanking machine, portable	1				1
Drill post, hand, 1 in. chuck		10			10
Drill, twist, set 1/8 - 1/2 in.		10			10
" " 1/2 in. shank		10			10
File, flat, bastard, 12 in., doz.	4	12			16
" mill " 12 in., doz.	4	24			28
" round " 8 in., doz.	4	6			10
" " " 12 in., doz.	4	6			10
File, 1/2 round, smooth, 12 in., doz.	2	6			8
File, extra slim taper, 5-1/2 in., doz.	6	24			30
Forge, B.S., portable		10			10
Goggles, safety	20	250			270
Grease rack, hydraulic	1				1
Grinder, brake drum	1				1
" bit, detachable	1				1
" tool, large, elec. driven	2				2

	F.S.	SCS	State	Farmer	Total
Grinder, tool, small, elec.driven	26				26
Grinder, tool, hand		10			10
Grinder, valve seat, light, elec. driven	9				9
Grindstones, foot power, mounted	12	10			22
Gun, grease, Alemite, asst'd. sizes, set	9				9
Gun, grease, 50 lb. size	25				25
Hacksaw frame, power	1				1
Hammer, ball Pein, 1-1/2 lb.		50			50
Hoist, chain, 2-1/2 T	2				2
" " 1 T	2				2
" " 3 T	5	5			10
" " 1-1/2 T		12			12
" " 2 T, elec. driven	1				1
Hoist, chain, 5 T, elec. driven	1				1
Hoist, chain, 10 T, elec. driven	1				1
Hoist, double drum, with power unit		1			1
Hoist, stationary, double drum, 15,000 lb. pull	8				8
Honing machine, elec.driven	1				1
Hose, air, 3/8 in.		200 ft.			200 ft.
Hose, jackhammer, 3/4 in.		16,200 ft.			16,200 ft.
Iron, soldering, set 6	9				9
Jack, Hydraulic, bumper	6				6
" " floor, 2 T	8				8
" " 3 T	14				14
" " 5 T	18				18
" " 10 T	10	20			30
" mech., floor 3 T	2				2
" " " 5 T	12				12
" transmission	1				1
Lathe, brake drum, elec. driven	1				1
Lathe, swing, elec. driven 24 in.	1				1
Lathe, swing, elec. driven 12 in.	1				1
Lathe, swing, elec. driven 9 in.	2				2
Machine, riveting	1				1
" stencil, cutting	1				1
Mitre box with saw	5				5
Motor testing equipment	1				1
Pipe. bender	1				1

	F.S.	SCS ¹	State	Farmer	Total
Pot, glue, elec.	1				1
Press, arbor, hydraulic, 30 T	1				1
" track " 100 T	1				1
Pullers, gear, asst'd. sizes	1				1
" wheel, large, set	1				1
" " small "	1				1
Pump, gasoline	30				30
Punches, drift, 1/4 in.	50				50
Rags, wiping	1,000 lb.				1,000 lb.
Rasp, wood, 1/2 round, 12 in.	1 doz.	24 doz.			25 doz.
Reamer and pilot, extension, set 7/16-11/16 in.	4				4
Reamer and pilot, extension, set 11/16- 1-1/8 in.	4				4
Reamer and pilot, extension, set 1-1/8 - 2 in.	4				4
Reboring machine, 2-1/2 - 5-1/2 in., elec. driven	1				1
Refacer, valve, elec. driven	9				9
Riveter, brake lining	1				1
Rope, manila, 3/4 in.		5,000 ft.			5,000 ft.
Saw, band	1				1
" hand, portable, elec.	1				1
" jig	1				1
" scroll	1				1
" table	1				1
Screwplates, SAE, 3/16-1 x 1/64, sets	7				7
Screwplates, Std., 1/4-1-1/4 x 1/16, sets	7				7
Screwplates, USS, 8-size set, sets		10			10
Shank threading machine	1				1
Shaper, horizontal, 16 or 24 in.	1	1			2
Steel, drill, 3/4 in., 2-10 ft. lengths	1,728				1,728
Stock and die, 1/2-1-1/4 in., sets	5	10			15
Stock and die, 3/8-2-1/2 in., sets	6				6
Stretcher, tire, hand	5				5
" " power	1				1
Tank, gasoline storage, 1,000 gal.	1				1
Tank, gasoline storage, 500 gal.	29				29
Tanks with pump, oil storage, 1 qt. self meas. sq., 67 gal.	34				34
Tester, valve spring for trucks and tractors	1				1

	F.S.	SCS ¹	State	Farmer	Total
Tire changer	1				1
Tool, sharpening, carborundum		24			24
Tool, brake drum and shackle, set	1				1
Torches, blow, gasoline, 1 qt.	15				15
Track, repinning & rebush- ing mach. for 50 Cat. R7-RD8	1				1
Vat, tempering	9				9
Vibrator, concrete, air operated		2			2
Vise, bench, 4-1/2 in. jaws	28				28
" " 6 in. jaws	38				38
Vise, blacksmith, 70-100 lb.	5	10			15
" pipe	10				10
Welding outfit, acetylene	25	10			35
Welding outfit, elec. arc mounted on 2-wheel trailer		10			10
Wheel aligning equipment	1				1
Wheel balancer, comb. static and dynamic	1				1
Wrenches, box, 3/8-1-1/4 in.		31			31
Wrenches, crescent, each 8, 10, 12, and 18 in.	52				52
Wrenches, ignition, sets	26				26
Wrenches, open end, 3/8- 2-1/2 in., sets		31			31
Wrenches, pipe, sets, 8, 10, 12, 18, 24, 36 in.	29	32			61
Wrenches, rim nut	4				4
Wrenches, socket, heavy duty, 1-2-1/2 x 1-1/16	12				12
Wrenches, socket, master set		31			31
Wrenches, socket, set 3/16- 1-3/4 in., snap on	34				34

Fencing Material
and Equipment

Cloth, hardware, 1/4 in. assortment	225 rolls				225 rolls
Cloth, hardware, 3/8 in. assortment	225 rolls				225 rolls
Cloth, hardware, 1/2 in. assortment	375 rolls				375 rolls
Cloth, hardware, 5/8 in. assortment	185 rolls				185 rolls
Cloth, hardware, 3/4 in. assortment	80 rolls				80 rolls

	F.S.	SCS ^{1/2}	State	Farmer	Total
Diggers, post, hole	305	100			405
Drivers, post	10				10
Pliers, fence, with staple puller		100			100
Posts, fence, steel	75,000				75,000
Staples, net	55 kegs				55 kegs
" fence	371 kegs				371 kegs
Stays	24,000				24,000
Stretchers, barbed wire	10	50			60
Wire, barbed, 160 rd. spools	30,600	156		3,230	33,986
" field, 55 in.	4,000 rods				4,000 rods
" hog or sheep	320 rolls				320 rolls
" mats, steel, roadway		10,000 sq.ft.			10,000 sq.ft.
" solid iron, #9-16	245,000 lb.	46,000 lb.			291,000 lb.
" stovepipe	5,000 lb.				5,000 lb.
" woven, heavy 48 to 60 in.	38,000 rd.	440 rd.		57,280 rd.	95,720 rd.
Wire, woven, heavy, varying widths		5,000 rd.			5,000 rd.

Plumbing, etc.

Pipe, G.I., and fittings, 1/2 in.	8,000 ft.				8,000 ft.
Pipe, G.I., and fittings, 3/4 in.	16,000 ft.				16,000 ft.
Pipe, G.I., and fittings, 1 in.	2,000 ft.				2,000 ft.
Pipe, G.I., and fittings, 1-1/4 in.	2,000 ft.				2,000 ft.
Pipe, G.I., and fittings, 2 in.	22,000 ft.				22,000 ft.
Pipe, sewer, vit., 6 in.	8,000 ft.				8,000 ft.
" " " 4 in.	7,300 ft.				7,300 ft.
Shower heads, misc. faucets	100				100
Tanks, hot water, 100 gal.	8				8
Toilets, flush	48				48

Water Supply

Pipe, galv., 3/4 in.	5,000 ft.				5,000 ft.
" " 1 in.	5,000 ft.				5,000 ft.
" " 1-1/4 in.	5,000 ft.				5,000 ft.
" " 1-1/2 in.	5,000 ft.				5,000 ft.
" " 2 in.	26,000 ft.				26,000 ft.
" " 3 in.	3,000 ft.				3,000 ft.
Pumps, back	26				26
Pumps, centrifugal, 2 or 3 in., with power unit		8			8
Pumps, centrifugal, 4 in., with power unit		5			5

	F.S.	SCS ^{1/2}	State	Farmer	Total
Pumps, centrifugal, 6 in., with power unit		2			2
Pumps, diaphragm, 4 in., with power unit		1			1
Pumps, double diaphragm, 4 in., with power unit		1			1
Pumps, Marlo or equal	16				16
Pumps, motor driven, 400- 500 gal. per hr.	8				8
Pumps, rotary	4				4
Pumps, windmill	12				12
Tanks, rim, cattle, asst'd.	24				24
Tanks, storage, G.I., 6x8 ft., 2,000 gal.	32				32
Tanks, water, 250-300 gal., metal slip on	50				50
Well drilling outfits complete	8				8

Farm Equipment

Balers, pick-up			250		250
Cutters, stalk, 12-blade	2				2
Machines, mowing (tractors)	3		650		653
Rakes, side delivery			700		700
Rope, manila, 3/8 in.	13,000 lb.				13,000 lb.
" " 1/2 in.	9,000 lb.				9,000 lb.
" " 5/8 in.	5,000 lb.				5,000 lb.
" " 3/4 in.	5,000 lb.				5,000 lb.
" " 7/16 in.	5,000 lb.				5,000 lb.
" " 1 in.	5,000 lb.				5,000 lb.
Scales, pit, 10 T	2				2

Photographic Equipment and Supplies

Boxes, slide, filing, 2x2 in.	30				30
Cameras, 18 mm, Kodachrome	5				5
Cameras, 35 mm, for pro- ducing 2x2 Kodachrome slides, with cases, grade and model to be determined by those available after the war	12				12
Cameras, 35 mm, equipped with color corrected nor- mal, medium telephoto and long telephoto lenses			1		1

Cameras, 4x5 in , each with case, satisfactory tripod, K-2, orange and red filters (3) and attachment sunshade. Model to be determined by those available post war	8				8
Cameras, motion picture, 16 mm, equipped with turret head and wide angle lenses, fully color corrected	1		1		2
Cameras, speed graphic, either 3-1/4 x 4-1/4 or 4x5, equipped with color corrected wide angle telephoto and normal lenses, cut film magazine back, synchronized flash gun	3		1		4
Enlarger	1				1
Exposure meters	12		2		14
Projector, sound, and screen			1		1
Projectors, slide, 2x2 in., 200-300 watt size, with cooling unit and case, Spencer Deleneoscope or equal, and screen	9		1		10
Projectors, motion picture, 16 mm, complete with loud speaker, Bell-Howell or equal	9				9
Rewinders, film, 16 mm	9				9
Screens, motion picture, 8x8 ft., complete with metal case and tripods	10				10
Screens, slide projection, 5x5 ft., glass beaded, portable, complete with tripod and case	10				10
Splicers, film, 16 mm	9				9

Guns and Ammunition

Ammunition, 22 rifle, 50 rounds each	150 boxes				150 boxes
Ammunition, 30-30 rifle, 20 rounds each	140 boxes				140 boxes
Ammunition, 12 ga. 25 rounds each	140 boxes				140 boxes
Rifles, 22	6				6
" 30-30	6				6
Shotguns, 12 ga.	6				6

CHAPTER XIV.--AGRICULTURAL INDUSTRIAL RELATIONS AND RURAL INDUSTRIES.

This chapter was compiled by the following subcommittees: Roland M. Gaver, Rural Electrification Administration, Chairman; C. E. Hellbusch, Farm Market Relations.

A review of this nation's economic development will show that community prosperity is closely related to the industrial development of the resources of the area. This use of resources may be farming, mining, lumbering or any one of this nation's many vocations which are in some measure the extracting of the earth's wealth. The various industries which are engaged in processing these products have had an enormous part in shaping the destiny of the different sections of these United States, and they will continue to have an even larger effect. The people of Arizona recognize these facts and stand ready to take advantage of the opportunities that are before them, for they want the resources of their state to be utilized in bringing greater prosperity and better living. To plan for these things now is to insure the best possible future for the men and women who will return from the many functions of the nation's war effort.

Where greater industrialization is the key to greater prosperity it may be expected that appropriate action will be taken. Most industries developed in rural communities will be small. The majority will be engaged in processing raw materials of the area. Rural industries easily applicable to Arizona and in fact to the entire southwest are cotton gins, soybean processing, small textile plants, sawmills, box factories, woodworking mills, alfalfa mills, citrus packing plants and numerous other plants that are only waiting for readily available, low-cost power to have their beginning. However, far-seeing persons will not close their eyes to sound developments which will provide the requirements of a greater prosperity.

It is recognized that the successful establishment or the existence of rural industries is dependent upon several major factors. The fact that industrial centers have become established is due in part to the location of power, capital, transportation, labor and raw materials. The question of raw materials does not need to arise here, as we are discussing the very areas in which the raw materials are produced. The financial considerations come into the picture very strongly, as the ability to pay must be present and sufficient desire for improved financial conditions is needed to develop enterprises to the fullest extent. With the increase in cooperative methods of business, one convenient way of financing small rural industries is available. This has the added advantage of community participation in a community enterprise. With greater insight into the various methods of financing, the question of capital is somewhat diminished.

When development depends upon or is improved by the use of modern methods of production, the presence of electricity will prove to be one of the factors which spurs expansion and leads to ultimate success of the undertaking. Whether the enterprise be new or already in existence, the use of low cost electricity gives the assurance of efficient, economical power. A survey of the unused electric power in a state, or of the possibilities of generating such power in adequate quantities at reasonable costs in usable locations, will reveal the ability to successfully develop the other resources by

electrical methods. Improved methods in the engineering field make it possible to utilize conditions that were not considered practical no more than ten years ago.

Labor problems become less because of the advancement in travel facilities. When the boys return from service many of them will seek new frontiers. One such new frontier may well be found in the development of rural industries. Here is one of agriculture's opportunities to contribute to the betterment of labor conditions. One great advantage of such development is the effect that it will have on the employment situation. Many industries can be of such a nature as to provide part time employment for farm help in the seasons when crops do not require attention. In fact, the existence or development of sound industrial enterprises will add to farm prosperity and in many cases by processing it, provide a market for the very produce of these farms. Thus each can help the other toward the common objective of increased prosperity in an area due to the greater development of the existing resources.

The transportation problems are dependent upon the type of industry to a large extent, but the coming of truck transportation has provided a convenient answer. Furthermore, transportation of the finished product is very likely to be less expensive than transportation of the raw material. Often a good portion of the consumption of the finished product will be local; therefore, unnecessary transportation is entirely eliminated.

The electric power resources of Arizona are great. She has access to 17.6 per cent of the total energy generated at Boulder Dam. Her several other hydro-electric developments add materially to this supply, and the problems of transmission and distribution of the power is lessened by their existence. The full utilization of this enormous amount of energy can only be realized if it is applied to the products of the state. Modern science has already found many ways of processing farm produce electrically or with electrically-operated machinery, and more will undoubtedly come. To profit by this, the rural communities of Arizona must have the power which is available from its great electrical plants. A network of transmission and distribution lines could start a new era of prosperity in many of the communities of the state.

By combined effort and purchasing ability, farms and industries can enjoy electricity in areas where it could not be economically obtained otherwise.

A survey of the state's resources of farm, forest, and minerals will give an indication of the present and potential location of industry to be developed from these resources. When this is summarized and studied jointly with a survey of un electrified areas, the possibilities of increased industrialization coupled with electrification will be evident.

A method of analyzing the industrial situation in the state is presented in the two attached exhibits. The first consists of a chart showing the framework of industry as a total process for converting natural resources into finished products. The second consists of a series of maps showing the location of industry in Arizona. These two exhibits dovetail with each other; one shows the "what" of industry and the other shows the "where".

On the chart is named each kind of productive process on which figures are readily available from the U. S. Census of 1940. The progress (or "flow") of products from one process to the next is shown in each case by a pointed line or arrow drawn from left to right. Thus extractive processes are shown leading to the manufacturing processes. The latter are divided into first stage, second stage, and third stage. Soil, plant and farm resources are converted into food and clothing. Forest and mineral resources are converted into housing and equipment.

Most lines of industry arising from the state's resources are being developed to greater or less extent. To what extent is indicated roughly in the chart. These developed industries are connected by black lines. But the red lines connect possible industries which, so far as available Census data show, are not being developed. The cheese industry, for example, seems not to be developed although butter, ice cream and other milk products are recorded. These red lines, therefore, are key lines to industrial opportunities.

The chart shows nothing about geography; it shows functional aspects only of the industrial mechanism. Geographic locations are shown in a series of nine maps. The first five of these concern plant and forest resources and the industries or processes issuing therefrom; the last four concern mineral resources and certain of the processes issuing therefrom.

Maps 1, 2 and 3 indicate the progress respectively from native grassland to farm cropland to the agricultural industries (food processing and leather working).

Maps 1, 4 and 5 indicate the progress respectively from native forest to farm woodland to the forest industries (lumbering and wood working).

As Map 1 shows plant and forest resources so Map 6 shows mineral resources. Emanating from these are a number of mineral industries. From them, three of the typical ones have been selected and are shown respectively on Maps 7, 8, and 9.

Map 7 shows the elements within the state of a possible iron industry. In addition to the mining of iron there are the resources for reducing and working it since coal, limestone and manganese are present. Also there are several iron working plants in various centers.

Map 8 shows possibilities in the non-ferrous metal industry. It shows a dozen or so centers wherein copper and zinc occur together (the ingredients of brass), and it also shows the centers of various non-ferrous metal working.

Map 9 depicts the stone industry and two resources thereof are shown (limestone and other building stone) as are also a number of stone working centers.

These exhibits (chart and map series) apply to the field of industry as a whole (the process of converting natural resources into finished products). Part of this field consists in rural industry, or enterprises conducted in rural areas (containing less than 1500 inhabitants). Types of such rural

industry applying in the state of Arizona are illustrated in some of the types now being served by REA-financed lines in the region (so-called "No. 10") covering Southern California, Arizona, New Mexico and Texas. Below is a list of them. Although all these types apply in Arizona only one enterprise therein (a cotton gin) has thus far been served by any REA-financed system. The list follows:

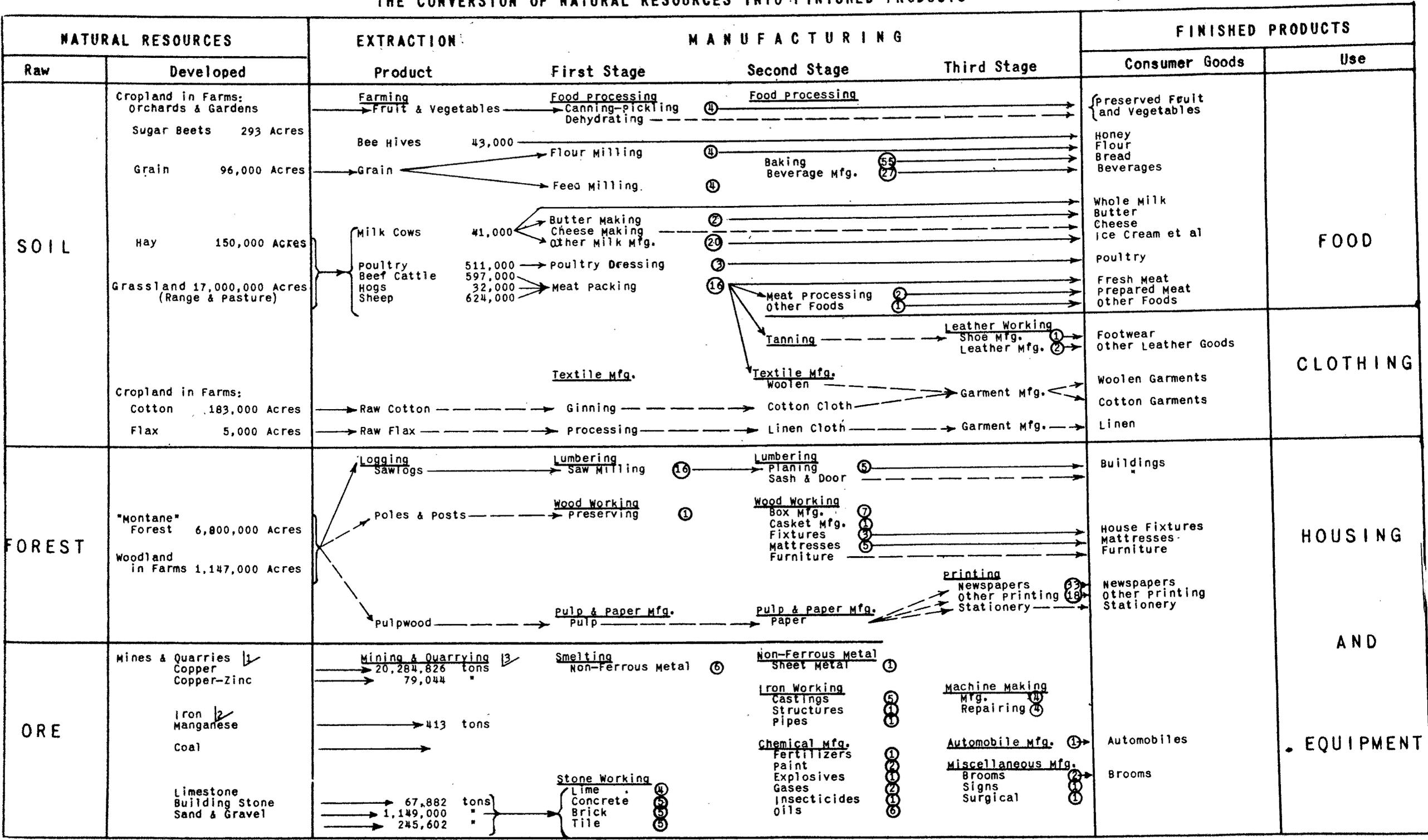
Flour and grist millings:	Alfalfa processing Peanut processing Grain elevators Cotton seed mills Feed mills
Dairy industries:	Dairy and ranch
Meat packing:	Abattoirs Rendering plants
Refrigeration and storage:	Sharp freezing plants
Textile industries:	Cotton ginning Cotton mills
Lumbering and wood working:	Lumber yards Furniture plants
Mining:	Iron mines Coal mines Graphite mines
Other industries:	Machine Shops

This statement is submitted not as the solution of a problem but as a "pattern of approach"; not as the plan of what to do but as a key for discovering such plan. It is based on a cursory study only; not on substantial research. The exhibits described are presented not as "blueprints" but as sketches. But they constitute the seeds of blueprints. The more in detail they can be developed, and on the basis of local ground surveys, the more accurate guides can they become in locating the practical industrial possibilities (or impossibilities) that lie within the state. Such guidance must depend not alone on the geographic aspects of industry, and not alone on its functional aspects, but on the two together. Thus approached, the facts themselves of the situation must reveal which paths to take.

FRAMEWORK OF INDUSTRY IN ARIZONA, 1940

THE CONVERSION OF NATURAL RESOURCES INTO FINISHED PRODUCTS

NOTE: Number in each circle shows the number of plants in process named.
 Broken lines indicate lines of industry which have not been separately reported by the 1940 U. S. Census.



1/ Samples only
2/ Deposits

3/ Tonnage stated is the
1940 Production of crude ores

LOCATION OF INDUSTRY IN ARIZONA

1940

RESOURCES AND PROCESSING THEREOF

- MAP 1. PLANT AND FOREST RESOURCES
- MAP 2. CROPLAND IN FARMS
- MAP 3. AGRICULTURAL INDUSTRIES
- MAP 4. WOODLAND IN FARMS
- MAP 5. FOREST INDUSTRIES
- MAP 6. MINERAL RESOURCES
- MAP 7. THE IRON INDUSTRY
- MAP 8. NON-FERROUS METAL INDUSTRY
- MAP 9. THE STONE INDUSTRY

B.MK
Jan/44

MAP 1. PLANT AND FOREST RESOURCES



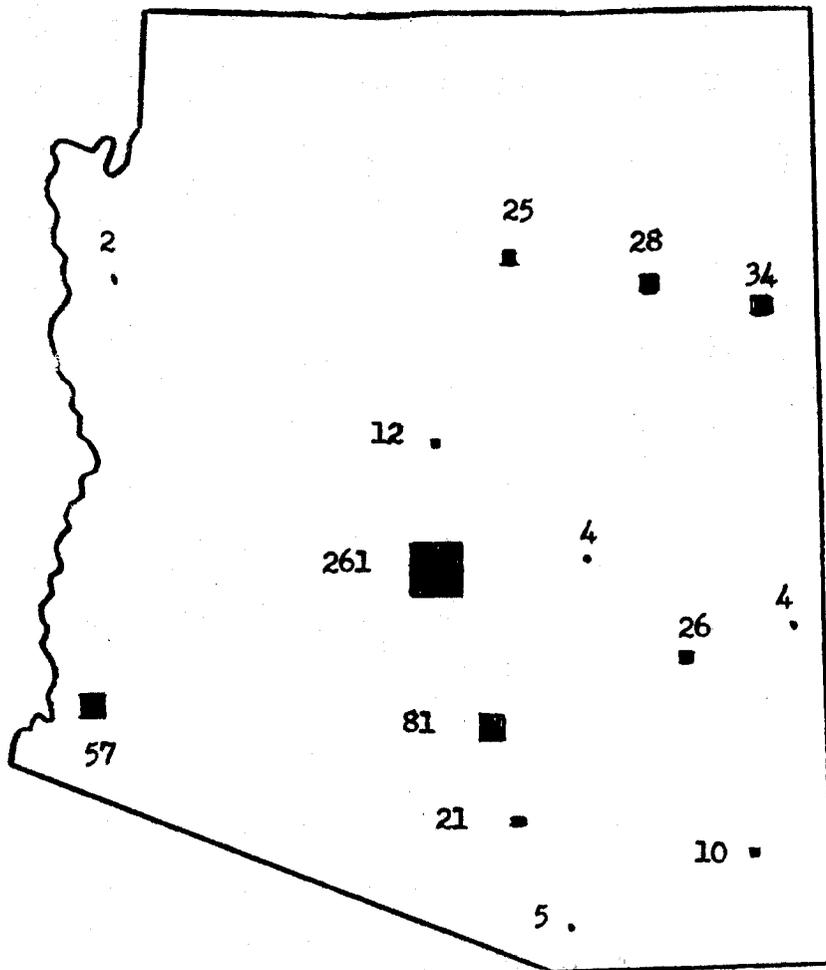
Short Grass
 Sagebrush
 Creosote Bush
 Desert Grass



Montane Forest (Yellow pine, Douglas fir)
 Arid Forest (Juniper, Piñon)



MAP 2. CROPLAND IN FARMS

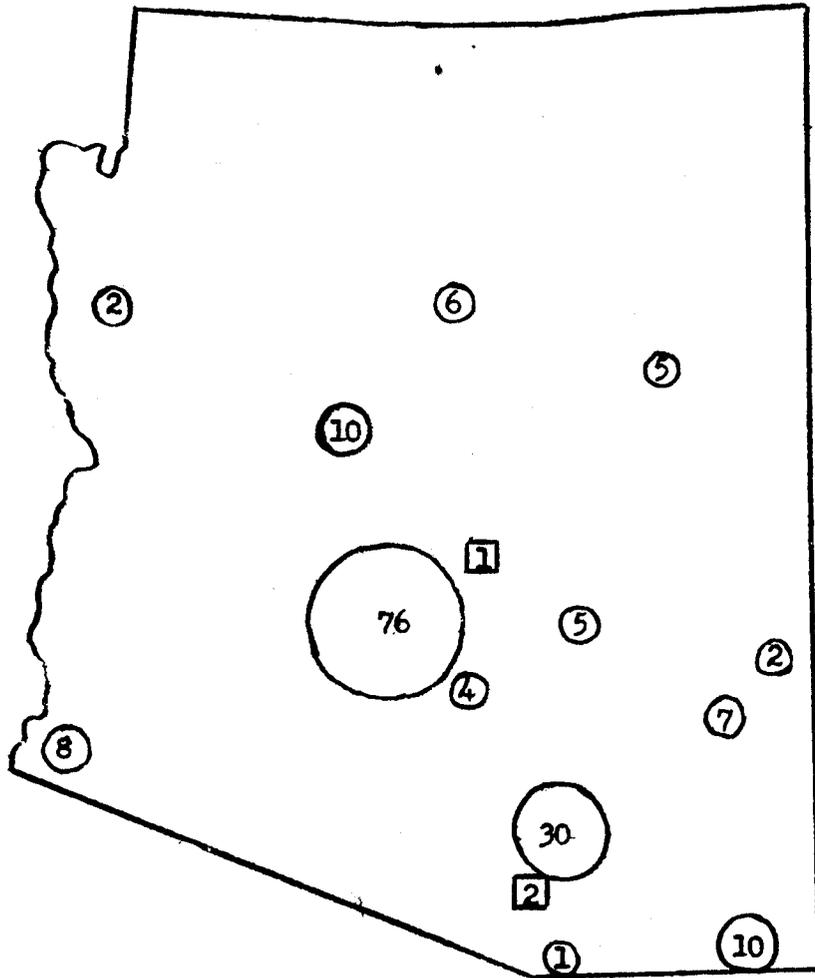


Approximate center of Farm Cropland in each County

shown by symbol with number of Thousand Acres therein

81 ■

MAP 3. AGRICULTURAL INDUSTRIES



Approximate center of Industry in given County
shown by symbol with number of Plants therein

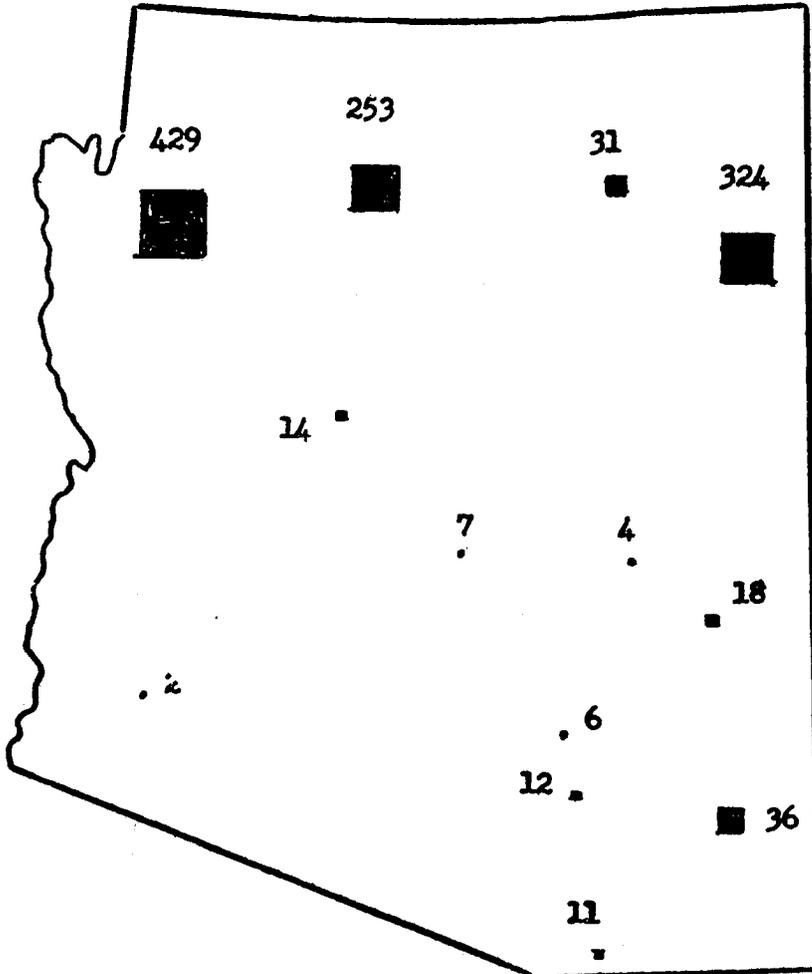
Food Processing

10

Leather Working

2

MAP 4. WOODLAND IN FARMS

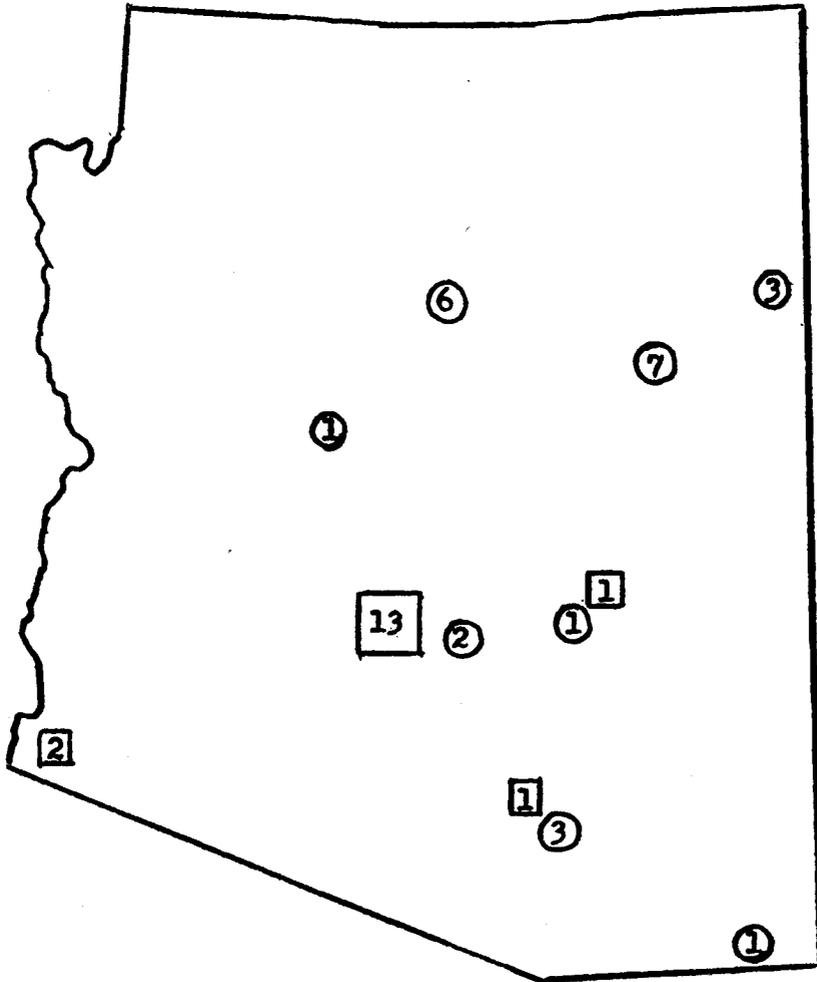


Approximate center of Farm Woodland in each County

shown by symbol with number of Thousand Acres therein

36 ■

MAP 5. FOREST INDUSTRIES



Approximate center of Industry in given County
shown by symbol with number of Plants therein

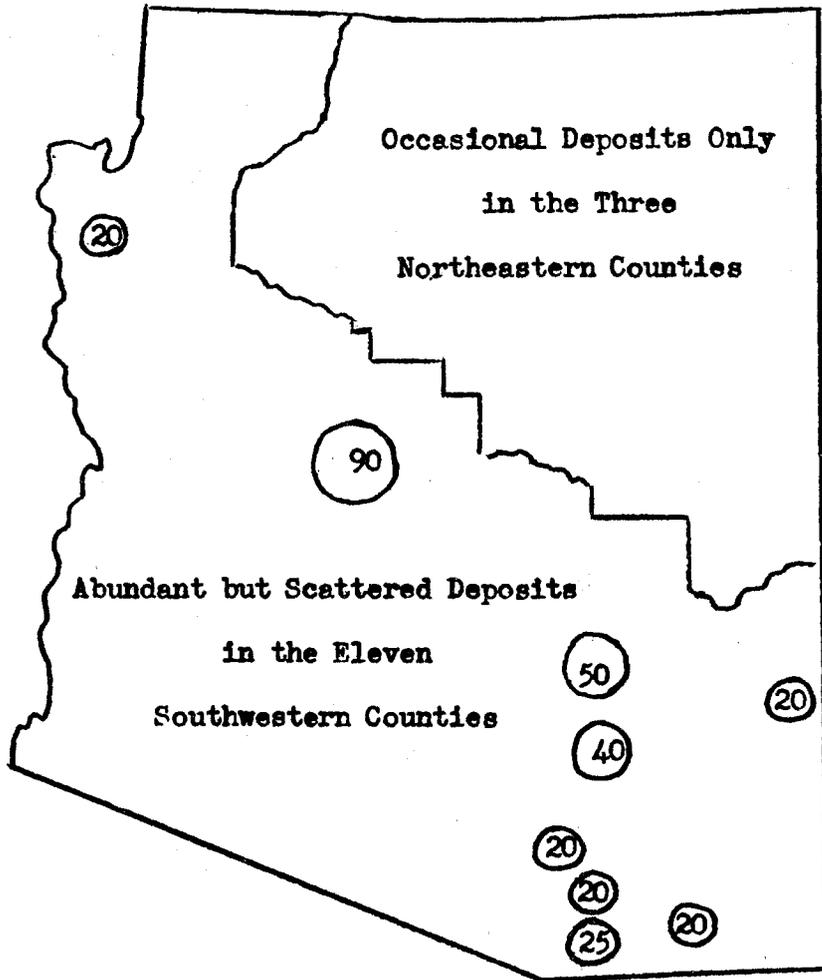
Lumbering



Wood Working



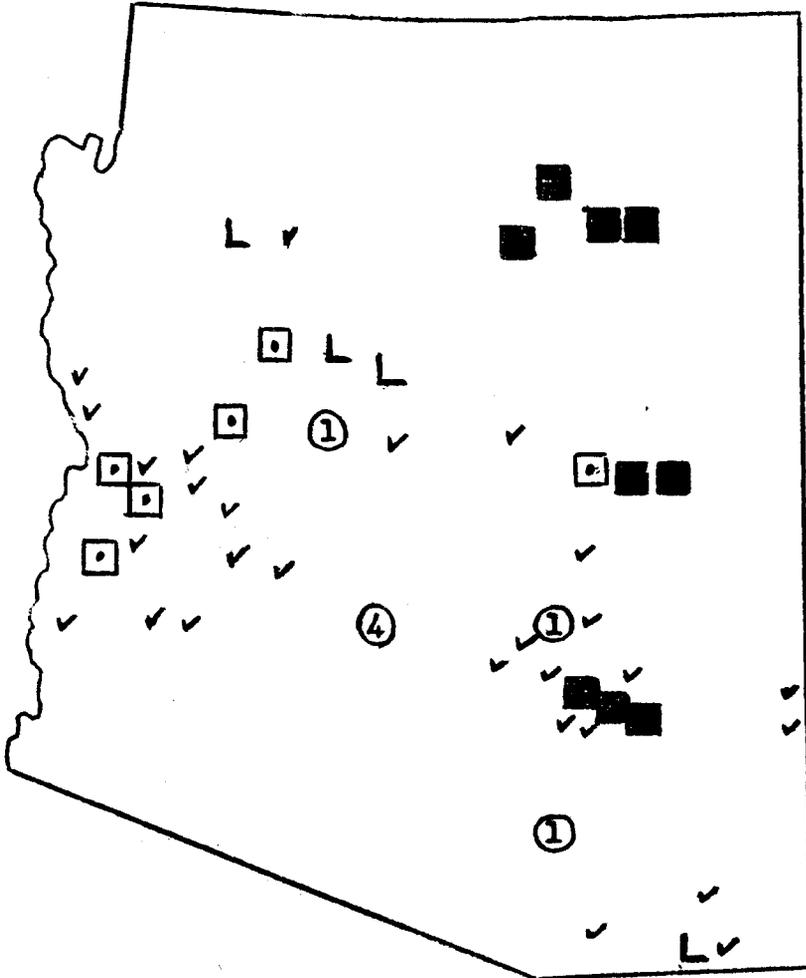
MAP 6. MINERAL RESOURCES



Approximate centers of Mineral Deposits
shown by symbols with number of Locations
indicated on the official "Mineral Map of Arizona"

20

MAP 7. THE IRON INDUSTRY



Resources:

Iron Deposits
 Coal
 Limestone
 Manganese

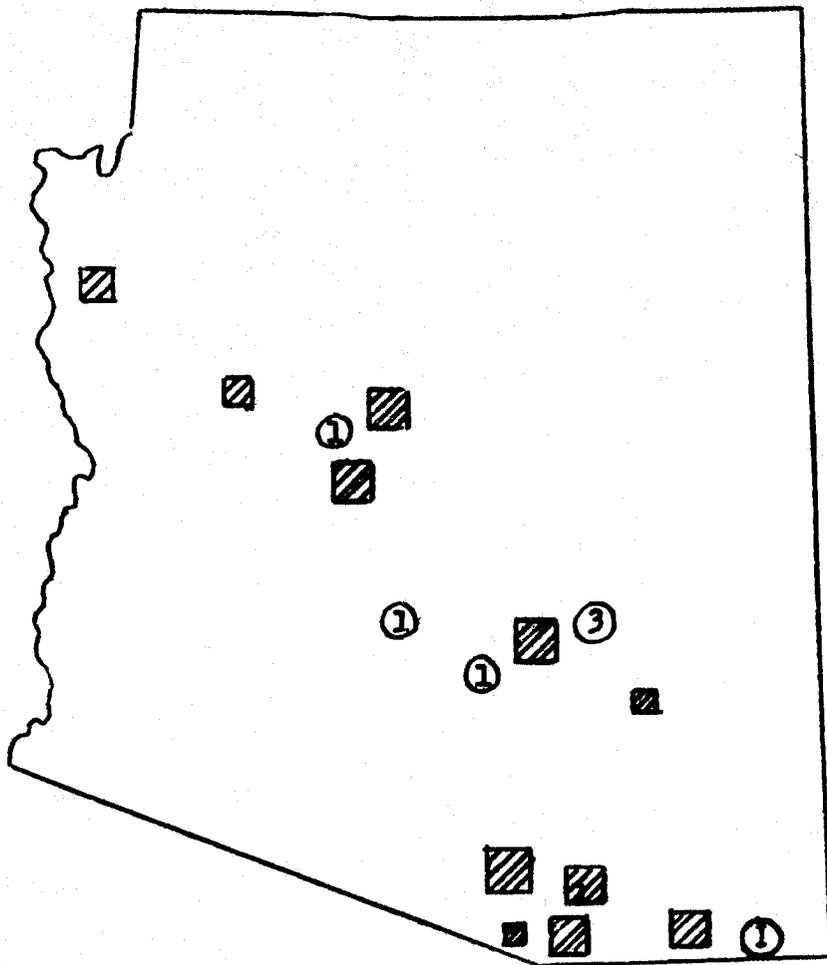


Iron Working:

Approximate center thereof in given County
 shown by circle with number of Plants



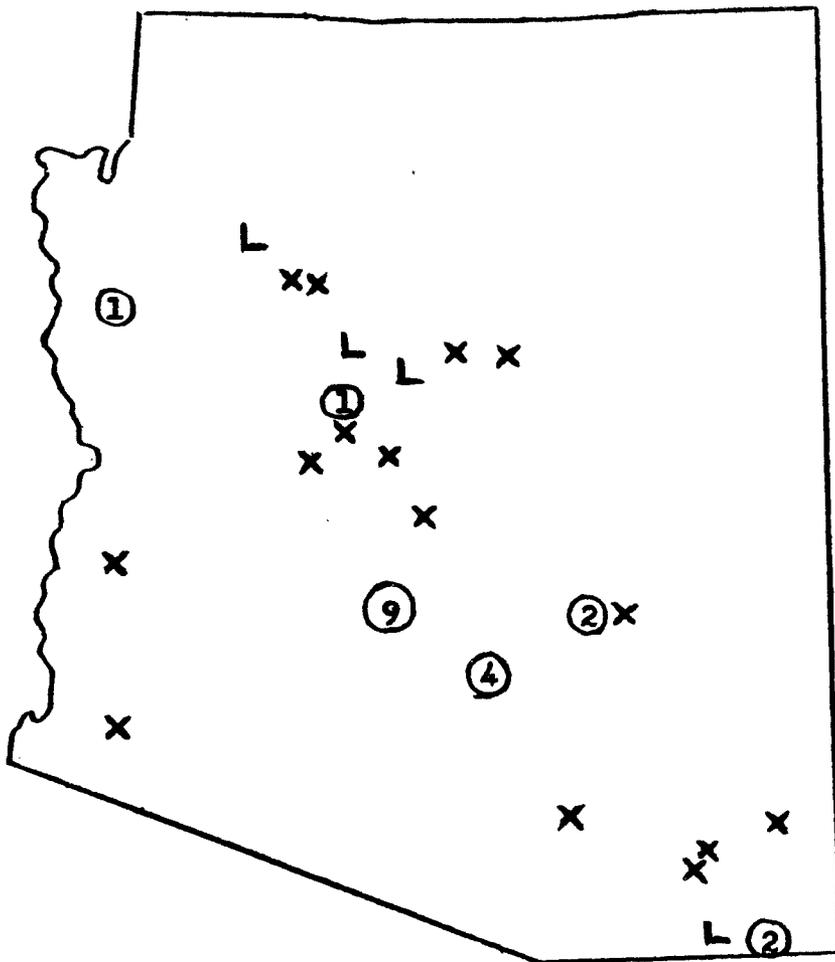
MAP 8. NON-FERROUS METAL INDUSTRY



Resources: Approximate centers of Copper and Zinc Deposits
shown in squares 

Non-Ferrous Metal Working: Approximate center thereof
in given County shown by circle with number
of Plants 

MAP 9. THE STONE INDUSTRY



Resources: Building Stone X
Limestone L

Stone Working: Approximate center thereof in given County shown by circle with number of Plants

9