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CONDENSED WAR EDITION
FISCAL YEAR ENDED JUNE 30, 1942

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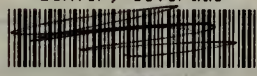
ANNUAL REPORT

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SECRETARY OF THE INTERIOR



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FISCAL YEAR ENDED JUNE 30, 1942

UNITED STATES
DEPARTMENT OF THE
INTERIOR

HAROLD L. ICKES

Secretary

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Successful Mobilization

of the Nation's natural resources for war, like their conservation in time of peace, depends upon the cooperation of a citizenry fully informed as to the tasks confronting it and the progress made toward their solution.

¶ To meet this requirement, the Department of the Interior presents a streamlined emergency War Edition of the Secretary's Annual Report for the Fiscal Year 1942, sharply restricted in volume and stripped of illustrations and detailed statistical material to meet the exigencies of war economy demands.



Letter of Transmittal

The Secretary of the Interior

HAROLD L. ICKES, Secretary

MY DEAR MR. PRESIDENT: During the last 12 months, the Department of the Interior has been dedicated to a vigorous war program. In some phases of the task of harnessing our natural resources for war, we have been highly successful. In others, we have failed to attain the goals we should have achieved. But in the final analysis, we have made real progress.

It is worthwhile, it seems to me, at a time of crisis, to review our effort of the last year and to appraise our performance under fire, so that we may evaluate our progress and reset our sights. We entered the fiscal year under the stress of a defense program and ended it under the greater pressure of war. The task of this Department was to convert its custodianship of the Nation's natural resources from a peacetime administration to that of war use.

This was an eye-opening proceeding. For years, this Nation had been deluded with the idea that it was practically self-sufficient, that its industrial processes were the world's best, and that its supplies were practically inexhaustible. A painful hangover resulted from that spree. We woke up to find out that we did not have enough steel to do the job; we did not have enough aluminum; we were short of power; we lacked magnesium; our sources of manganese were too far away to do us much good; our supply of timber and lumber did not hold out; our fisheries and other food resources could not be operated on the old basis nor supply enough to meet demand; our coal supply became endangered and the chaos of war tied our petroleum service up into knots.

In short, we discovered, that so far as our natural resources were concerned, we had been doing everything in the easy way. We had, up to the last year or two, been skimming the cream—and the cream ran out. While the enemies we despised had been making the most of their meager resources—and making them do the job—we had constructed our whole economy on our fat. The former "had-not" nations turned to their secondary ores and low-grade minerals, and by sweat and effort learned how to use them. We neglected our secondary sources of supply—the low-grade deposits of minerals,

for example—and went merrily on our way, using only the best, and therefore the most profitable. Then we discovered that we did not have enough of the best to meet our needs and that we must perforce proceed to the utilization of what we did have.

It was with this process of conversion that the Department of the Interior was chiefly concerned during the last year. The accumulated knowledge of our technical bureaus was put to work in as many directions as possible. New processes for ore treatment and metal extraction were devised and put into effect; new programs for the utilization of secondary deposits of minerals were effectuated, and some industries which had been accustomed to doing things the easy way were persuaded to try the hard way. It is in this connection that I cannot, with candor, assert that we have been successful. Our proposals for the complete utilization of certain domestic minerals, for example, did not meet with whole-hearted welcome. In some instances, temporary expedients seemed to be preferred by some groups to imaginative, full-scale adoption of novel, though proven, methods. We endeavored to work closely with the War Production Board in order that war industry might have the benefit of the work of our scientists and technical bureaus. The inertia of the old way, the weight of industrial tradition, the following of the established pattern, frequently induced heavy industries to postpone technical innovations. In my opinion, this was a postponement of the inevitable. Whether this postponement has been costly to the Nation in the long run remains to be seen.

For all of that, our efforts as a whole have been fruitful. With natural resources as our field, we early realized the need for drastic action in utilizing that which was within our reach, and the Department organized a definite war program with stated objectives for each bureau and agency. This drive was aimed at procuring the sinews for conflict—the metals, oil, power, fuel, helium, food, land, water, and timber available for war production and the equipment of the United Nations. Our activities increased and hastened production in the mines and in the mills; in the factories and yards where metals are processed and fabricated into planes, tanks, and ships; in the forests, on irrigation projects producing food and in the metallurgical laboratories. The program for discovery and exploration of new deposits of strategic and critical minerals was pushed vigorously with some encouraging results.

To stimulate the prosecution of war activities within the Department, we established a War Resources Council. This Council, composed of responsible officers of the Department, has coordinated our war work and has encouraged our bureaus to undertake programs which would contribute the most to the successful prosecution of the war and the production problems which are involved.

A few facts show the extent to which we have provided additional resources or led the way in wielding those at hand against the enemy with greater effect. Generating capacity on reclamation projects increased by 43 percent. From Columbia River projects alone, nearly 2,000,000,000 kilowatt-hours of power poured into war plants. By a process developed in our laboratories, it appears that enough manganese can be extracted from low-grade domestic ores to make 87,000,000 tons of steel annually*. More than a million tons of bauxite, the common source of aluminum, and other valuable ores have been found in our search for strategic metals. In the course of increasing these essentials of war, we have laid the groundwork for further production during ensuing years of more power, more metals, more food; of more and better-mobilized natural resources of all kinds.

The soundness of the conservation policies put into effect by your Administration when it came into office is now clearly apparent. Our activities during the last year in mobilizing for war could never have been as effective if previous policies had been less sound. Pearl Harbor and the events that followed have taught us that speed in war means ready access for the Nation as a whole to its resources. For some time this Department has worked to clear the Nation's title to many resources where conflicting claims have arisen. These actions, and our general progress in encouraging the wise use of our natural heritage, constituted a long advance toward mobilization of our resources in this time of great peril.

Throughout our activities we have streamlined for war. Many of our normal activities, desirable and essential in times of peace, have been laid aside or deemphasized. War work has been given the right-of-way and the curtailment of many normal functions has been severe. Economies have been put into effect, even to the degree that they have become painful. This belt-tightening has been extended into such details of administration as the reduction of printing and the discontinuance or curtailment of publications. This report has been reduced in size and content in accordance with that policy, and represents a genuine war edition. The length of the report has been halved, and other economies have been effected in format and printing. Because of this, I will not report to you in as great detail as customary in this letter, but I do wish to call your attention to a few pertinent facts that emphasize such progress in the war program as we have made.

The Bureau of Mines

The Bureau of Mines in December 1941 greatly expanded its war program. Skilled engineers, chemists, metallurgists, statisticians, economists, and others intensified their activities and directed them

toward putting idle mineral resources to work and speeding up the mine to metal cycle.

From the Bureau's laboratories and pilot plants emerged several new and better processes for treating strategic, critical, and essential ores; exploratory crews brought reports of new ore deposits which now are being developed; and the economists and statisticians assembled data to aid the Army, the Navy, the WPB, and other war agencies in their planning.

Meanwhile, the Bureau extended its program of promoting safety and efficiency in the mineral industries. This will conserve manpower and machinery and will help make secure from interruption the output of materials going into tanks, planes, ships, guns, and other equipment for the United Nations.

The Bureau's war plans utilized more than 30 years of experience and progress in the conservation and development of the Nation's mineral resources. To help offset the threatened curtailment of mineral imports from foreign countries, in cooperation with the Geological Survey, the Bureau in 1939 launched an investigation of domestic deposits of strategic minerals including antimony, chromium, manganese, mercury, nickel, tin, and tungsten. As the war spread throughout the world and the shipping situation became more acute, the Bureau's quest for domestic mineral deposits grew in importance and extent until it embraced virtually all of the important engineering metals. During the 1942 fiscal year alone, important reserves of chromite, manganese, mercury, tungsten, iron ore, bauxite, and alumina clay were charted.

Some of the indicated deposits were substantial. The estimated reserves of chromite were increased by 2,300,000 tons and production began in several areas. There were several discoveries of usable mercury and five findings of tungsten. Exploration for manganese ore of milling grade brought increases in reserves of more than 1,100,000 tons. In addition, more than 1,000,000 tons of workable bauxite were marked out and the exploration of five clay deposits pointed to 4,600,000 tons of ore containing 35 percent or more alumina.

In Alaska and in many of the ore-bearing districts of the Nation, the Bureau engineers faced adverse conditions and rough terrain to carry on their exploratory work of drilling, drifting, sinking, and trenching. By the end of the fiscal year, 740 deposits had been examined and rated.

Paralleling this work, metallurgists and chemists worked in laboratories and pilot plants devising methods of recovering metals from low-grade and complex ores. From these experiments it became known that substantial quantities of manganese, chromium, magnesium, and aluminum could be obtained from such domestic ores. Processes were developed for beneficiating ores containing antimony,

copper, iron, mercury, nickel, tungsten, zinc, and fluorspar, while methods were worked out for treating ores containing aluminum, cobalt, and magnesium.

Toward the end of the fiscal year, the Bureau reorganized its operating structure to place still greater emphasis on exploratory work, the development of additional metallurgical processes, and the utilization of these methods on a wider scale to bring idle ores into the production line. Examples of this program are the pilot plants for producing sponge iron and for reducing zinc ores with natural gas, together with an expansion of investigations in beneficiating low-grade bauxite ores, alumina-bearing clays, alunite and chromite, and in the production of electrolytic chromium and manganese.

Important gains also were registered in the field of nonmetallics during the year. On the basis of Bureau findings, the War Production Board made arrangements for the commercial production of flake graphite from domestic sources to overcome a shortage of the imported variety. The Bureau determined that some west coast sands could be treated and used in place of Belgian glass sand; it participated in the discovery of new sources of ceramic talc suitable for radio insulators; and conducted studies which revealed that certain volcanic rocks can provide workable substitutes for magnesite brick, a refractory material once imported from Austria and Greece.

Helium, the lightweight, noninflammable gas of which this Nation has a world monopoly, flowed in a greater volume from the Bureau's plant at Amarillo, Tex., in response to ever-increasing demands from the Army, Navy, and various Government and civilian agencies. To provide ample supplies of this gas for barrage balloons, blimps, and other uses, the production of the Amarillo plant established a new record and the Bureau began enlarging the facilities and constructing new plants.

Petroleum and natural gas engineers shouldered additional responsibilities as a direct result of the war. Laboratory research and field studies by petroleum engineers and surveys by Bureau statisticians gave war agencies detailed information regarding this Nation's ability to increase its output of aviation gasoline. The Bureau opened a new field office to stimulate crude oil production from the Appalachian fields. Other field offices marshaled their chemistry and refining experts to evolve solutions of technical problems in the field of petroleum and natural gas.

Looking to the time when our petroleum reserves may be depleted, the Bureau continued its research on the production of gasoline, fuel oil, and other byproducts from coal. New coals were tested and their suitability to liquefaction was determined. The Bureau made plans to study another process—the Fischer-Tropsch method—for pro-

ducing motor fuels from coal. Bureau chemists analyzed more than 15,000 coal samples to aid the Army, the Navy, and other agencies in their purchases of millions of tons of coal.

Expanding its program to assist workers and management in curbing the toll of death and injuries in the coal-mining industry, the Bureau began the systematic inspection of coal mines by Federal inspectors for the first time as authorized under the Coal Mine Inspection Act of 1941. Up to June 30, 400 mines had been inspected. While the act was not a wartime measure, the inspection program became doubly important after December 7, 1941, because of the absolute need for conserving manpower and avoiding interruptions in production schedules resulting from accidents and disasters.

The Bureau also was designated to administer the Federal Explosives Act, and as part of a Nation-wide move to protect production, supply, storage, and transportation facilities, the Bureau was made responsible for helping to protect coal mines, metal mines, quarries, mills, smelters, and allied mineral facilities from sabotage and subversive action. More than 100,000 persons received training in first aid, accident prevention, and mine rescue work, bringing the total instructed in first aid alone to more than 1,500,000.

Time and again the Bureau responded to requests from war agencies for assistance in particular problems. Demolition studies were conducted in cooperation with the Army; confidential research regarding the health factors in military equipment was undertaken for the Army and Navy; high-speed explosion diaphragms were developed for war industries and studies were made of the explosion and inflammability characteristics of chemicals used by the synthetic rubber and plastic industries; plant security examinations were conducted for the Ordnance Department of the Army; a new method of extinguishing magnesium fires in industrial plants was developed; and several experts of the Bureau acted in consultative capacities in various civilian defense activities.

The Bureau of Reclamation

An important role was played by the Bureau of Reclamation during the fiscal year in the war work of the West. The Bureau functioned as chief supplier of electric power, foodstuffs, and water—three basic essentials of national existence in war or in peace. Four decades of sound engineering work in the West made it possible for great multi-purpose reclamation projects to supply these three basic needs in larger and more important quantities for hundreds of cities, thousands of war factories, and millions of war workers.

Of 73 reclamation projects in operation, under construction or authorized, 45 were producing power and supplying water for irri-

gation, municipalities, and war industries. Twenty were under construction.

Brought to completion were 5 of the 15 storage dams under construction. Three of them—Grand Coulee, Friant, and Marshall Ford—rank among the five largest concrete dams in the world.

Outstanding was the Bureau's contribution of hydroelectric power—the potent energy that turns the machines that turn out the guns. In both the Pacific Northwest and the Southwest, Reclamation's giant power plants were the bulwark behind industries already working at top speed or mushrooming into existence for the production of war material. Energy poured out of these reclamation plants and others in 11 States for manufacturing and mining; for copper, steel, aluminum, magnesium; for bombs, planes, and ships.

Generative capacity was increased tremendously during the year, due chiefly to the installation of several huge hydro generators—bigger than any others in the world—in the Grand Coulee Dam power plant, Washington. In the Boulder Dam power plant, Arizona-Nevada, also, another big generator was installed and placed in operation—to make by far the most powerful array of dynamos ever assembled and synchronized into action. Being hurried to completion as the year closed were more generators at Boulder, Grand Coulee, and Parker (Arizona-California) Dams, due to start operating within 6 months.

Water, a primary essential in war, was provided during the year for municipal areas of 2,500,000 population. Extensive industrial and military concentrations were located in the areas. The Rio Grande project in New Mexico, Tex., the Contra Costa Canal on the Central Valley project in California, and the Provo River project in Utah were among these projects.

Aside from the generation of power, and the release of water itself for domestic and industrial uses, the regional production of food, forage, and fiber on the reclamation projects in the West supplied urgent needs. This production reduced the burden on transcontinental railroads and highways for the movement of men and equipment. It meant speedy delivery of supplies, and the saving of freight cars, of steel for rails and equipment, of fuel for engines, and of gas, oil, and rubber for trucks.

Stored water irrigated more than 3,000,000 acres of productive land. Irrigation district officials collaborated with the Bureau in an intense effort to get the most from high-production reclamation farms. The gross value of the 1941 crops on land served with reclamation water was \$159,885,998, a 35 percent increase over the \$117,788,677 of 1940. These values do not include the livestock fattened on reclamation projects, nor dairy products such as milk, butter and cheese, and poultry

and eggs—which would increase the totals perhaps more than 25 percent additional.

The storage capacity of the 81 reclamation reservoirs in the West at the end of the fiscal year was 61,610,283 acre-feet, a gain of 13,845,680 acre-feet—29 percent over the July 1, 1941, capacity. Active storage, available for power, irrigation and domestic and industrial uses, was 47½ million acre-feet compared with 41½ million last year, a huge increase graphically illustrating the foresightedness of the Bureau in undertaking construction long in advance of emergency need.

Set in motion also during the year was a program for lessening the shock of post-war dislocation. Under investigation were 209 river basins and potential irrigation or multiple-purpose projects in 17 Western States, which would produce an inventory of water resources and point the way to their economical and effective use in a region where water is the most precious natural resource and the surest basis for economic expansion.

From studies that have been completed or are well advanced, the Bureau is selecting for a reservoir of public works a minimum of 50 feasible post-war projects. Demobilized soldiers, sailors, and marines will require employment in useful occupations. Industrial workers released from war factories will want work close to their original homes. This shelf of projects and the remaining construction on more than 20 projects where work has been retarded by war conditions, including the Columbia Basin Reclamation project in the State of Washington, will provide some of that work. On completion the projects will offer settlement opportunities on irrigated farms where families can become self-sustaining.

The Bonneville Power Administration

In the Pacific Northwest, the Bonneville Power Administration delivered almost 2,000,000,000 kilowatt-hours of Columbia River energy to war industries in the area. Shipyards, naval stations, aluminum, magnesium, ferro-alloys, ferro-silicon, and war chemical plants and allied industries were energized by public power produced by the Bonneville-Grand Coulee system. Indeed, these vital war establishments came into being only because the Bonneville Power Administration made Columbia River energy available.

Thus one of your administration's great peacetime projects became one of the most productive facilities possessed by this country for war. It is no idle assertion to say that the great war output from the Northwest—planes, metals, chemicals, ships—would have been virtually impossible had it not been for this progressive power system. Bonneville and Grand Coulee dams, with their integrated network of transmission facilities controlled by the Bonneville Power Admin-

istration constitute one of the greatest power sources in this Nation. That source has been fully harnessed for war.

Not only is this Federal hydroelectric development on the Columbia River paying for itself as a war facility, it is, I am happy to report, beginning to pay back substantial amounts to the United States Treasury. Power revenues of the system during the 1942 fiscal year were three times the 1941 figures. On the basis of executed and assured contracts, the Administration's revenues in the 1943 fiscal period will more than double the 1942 income. This power system, you will recall, was once described as a "white elephant" by those who opposed its building on the ground that it would have no field for the disposition of the power to be generated.

Another record established by the Bonneville Power Administration is worthy of mention. Although the great war metals and production plants established in the Northwest were completely new, and thus required new construction of transmission facilities, power was waiting at the plant sites in every case by the time that the plants were ready to use it. In no case was there any delay in Northwest war production because of failure to have Columbia River power at the locations on time. The import of this accomplishment becomes clear when one considers the heavy amounts of power involved and the difficulties attendant upon heavy construction during a time of war, as well as the lack of necessary power in many important industrial areas in other parts of the country.

During World War I the resources of the Pacific Northwest were not developed as they are now. At that time, the hydroelectric projects on the Columbia existed only in the dreams of far-sighted men, and the Nation could not count on this area for the enormous war metals and weapon production that is now flowing from the Northwest. Now the call upon the Bonneville Power Administration for electric energy for war and for distribution by public agencies has proved both the wisdom of the construction of the Columbia River dams and of the basic planning of the Bonneville transmission system.

The Division of Power

Established April 18, 1941, to coordinate the Department's power-production activities, the Division of Power worked toward that end with emphasis on power for war throughout its first complete fiscal year.

Our principal objectives were the development of additional power for war; the maximum use of available power in war production; the construction of new power facilities which require a minimum of critical material and which can be completed in time for war use; the location of war plants on sites where low costs to war industries

and development of a balanced economy in the region of the plant would result, and where operations might continue after the war.

The Division has worked toward pooling the Department's power resources in ways that would result in the greatest efficiency and in the availability of maximum amounts of power in the various areas. It has insisted that power from Departmental projects be sold for war uses at the lowest possible rates in order to hold the cost of war essentials produced by the power at the lowest feasible level.

Arrangements to supply approximately 200,000 kilowatts to the big magnesium plant near Las Vegas, Nev. were worked out with the Bureau of Reclamation, the allottees of Boulder power and Defense Plant Corporation. This transaction constitutes one of the largest single sales of power ever made to a consumer.

Hetch-Hetchy power was turned to war use. In November 1941, a 17-year-old dispute regarding the disposition of this power in accordance with the terms of the Raker Act culminated in the rejection by the city and county of San Francisco of a charter amendment which precluded the civil use of the power which had been under consideration. Largely through the efforts of the Division, the Federal Government built an aluminum reduction plant near Modesto, and Hetch-Hetchy power was sold to the plant.

These are but highlights of the Division's activities. It also worked with the War Production Board for the installation of additional generators on Columbia River projects, assuring their maximum war-usefulness. It has kept war agencies informed about the quantity and location of available departmental power. It has acted generally as a liaison office between various agencies of the Department and the war agencies, and has operated within the Department as a clearing house for the increasing body of problems incident to departmental power activities.

During the fiscal year the installed capacity of power projects under the jurisdiction of the Department was increased by more than 500,000 kilowatts, bringing the total to almost 1,800,000 kilowatts. This represented an increase of 41 percent in power installations.

The Geological Survey

The work of the Geological Survey for the year was determined largely by a redistribution of essential metals among nations which was made necessary by the war. When Germany invaded Norway in April 1940 the Anglo-Saxon peoples controlled approximately 75 percent of the world's metal supply. Germany controlled a small percentage, and Japan a negligible portion.

Within a few months, Germany acquired the iron of Norway, the coal and iron of France and Belgium, the copper and aluminum-bear-

ing bauxite of Southeastern Europe, the metals of the Balkans and, by the force of international circumstances, could draw upon the product of Sweden's rich iron mines. On the other hand, the amount of metal available to us in other countries was reduced by Axis raids on our shipping, the disruption of war, the lack of transportation, and other concomitant factors.

The Geological Survey thus entered the fiscal year with our sources of metals for war greatly reduced, and those of our potential enemies correspondingly increased. Then Japan went into the war and swiftly captured the world supply of tin in the Dutch East Indies.

Inevitably a major activity of the Survey involved a diligent search for more minerals for war in the areas still accessible to us. Such a program, launched the previous year, was greatly enlarged and carried on throughout the United States and in Alaska as well as in Cuba, Mexico, and other American Republics, in cooperation, in many instances, with the Bureau of Mines.

This search, which is still being vigorously pursued, has a twofold purpose: The first, to make available more of the high-grade ores, customarily utilized in this country, by reevaluating old deposits and finding new ones; the second, to amass geological data which have to be available before we can recover low-grade ores, previously unused, but which must be used if we are to turn out enough munitions and implements of war to insure victory.

It is too early to measure the success of so comprehensive a program, but some encouraging results can be reported. Basic data essential to the planning of an iron and steel industry in the West have been provided. Large scale development of manganese deposits in Arkansas has been undertaken. Tungsten was discovered in an Idaho mine which, by the end of the fiscal year, was the Nation's largest single tungsten producer. Largely on the strength of previous findings, production of chromite began this year from the abundant deposits in the Stillwater District of Montana. A new mill there is turning out 150 to 175 tons of chemical grade chromite concentrates daily.

Elsewhere profitable work has been carried on with respect to these and other strategic metals—bauxite, high-grade aluminum clays and alunite (potential sources of aluminum), magnesite, quicksilver, beryllium, tantalum, lithium, and others in the United States and Alaska; manganese, nickel, chromite, tungsten, antimony, quicksilver, chrome, tin, and vanadium in Cuba, Mexico, and other American Republics.

Discovering and reevaluating deposits of high-grade minerals has led to an indispensable contribution to victory. These basic metals and alloys are forged into munitions and implements of war, or into machines for war manufacture. But the ultimate worth of complete

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data on deposits of low-grade ores is not so definite. Many of them have been evaluated qualitatively and quantitatively, but their effectiveness against the enemy depends upon how quickly and how extensively they can be put to use.

There are some encouraging signs. Plans now well underway for war manufacture from some of the low-grade iron deposits in the West appear certain to materialize. But general use had not been assured at the end of the fiscal year.

The Geological Survey also placed a war emphasis on its numerous fields of work which are unrelated to the search for minerals.

Data on water resources, regularly gathered and published by the Survey, are doubly valuable in time of war. Rapid expansion of the national war plant, requiring large water supplies for processing, and to accommodate concentration of troops and of war plant workers, requires knowledge of the quantity and quality of water available at these points of development. Reports and consulting services have been furnished on surface and ground-water supplies for war purposes at about 1,700 places in the United States and in certain islands of strategic importance, as requested by the War and Navy Departments, the War Production Board, and other war agencies.

These reports have related to the water supplies for Army cantonments, naval stations, munitions plants, largely increased local concentrations of population producing war supplies, and for other war activities. Surveys were made for the Navy Department of emergency supplies from wells in case of attack, and summaries of water conditions, on the surface and underground, throughout the United States were prepared each month for the use of the agencies in charge of water-supply and power activities related to the war.

The war program was furthered also by the Geological Survey's conservation work—its surveys and investigations of water and mineral sources of the public domain, and its supervision of certain phases of mineral- and power-production on these lands. Production of coal, petroleum, natural gas, natural gasoline, butane, potassium salts, and phosphate rock from public lands was substantially greater in 1942 than in 1941. Additional lands were coming into production, and an unusual amount of prospecting was underway. Production of lead, zinc, and coal also increased on Indian lands, and there, too, extensive prospecting was in progress.

Numerous mechanical devices constructed during the year have greatly accelerated the production of maps for the Air Corps. The most important are the Lewis rectoblique plotter, the Sketchmaster, and the Lucidagraph. A double photoalidade and a stereoblique plotter are now being developed. By means of such instruments, aerial photographs taken at an angle of approximately 30° below the

horizon may be converted into the kind of maps required for the navigation of air forces over previously unmapped or inadequately mapped areas.

The Office of Solid Fuels Coordinator for War

In a letter dated November 5, 1941, and addressed to me, you called attention to the need for "efficient and carefully coordinated development, production, distribution, utilization, transportation, and handling of solid fuels" to assure their availability when and where needed for military and civilian use, and requested me, as Secretary of the Interior, to serve as Solid Fuels Coordinator to help achieve these objectives.

The Office of Solid Fuels Coordinator was established and quickly began functioning, using, for the most part, the staffs, facilities, and data of the Bituminous Coal Division and the Bureau of Mines, thus effecting economy in time and funds, instead of building a large new organization.

Immediate steps were taken to organize the industries dealing with the coal supply on a war basis. Representatives of the coal mining industries, coal transporters, distributors, dealers, and mine labor met with me on December 18, 1941, and the groundwork for organizing the industries was laid. Cooperation continues through a council of 18 members, representing the industries concerned, mine labor, and the public.

Estimates made early in 1942 indicated that the Nation would require 550,000,000 to 570,000,000 tons of bituminous coal, approximately 60,000,000 tons of anthracite, and about 70,000,000 tons of coke during the calendar year of 1942—amounts far exceeding normal production. Later experience indicates that these estimates are in line with actual requirements.

The Coordinator, in cooperation with industry and other Government agencies, is taking various steps in an effort to forestall any emergency as to the coal supply because of wartime changes and deficiencies in manpower, equipment, and transportation.

Although there are many difficulties yet to be surmounted before the Nation can be assured of adequate wartime fuel protection, it appeared as of June 30, 1942, that it would be possible to provide adequate coal of some usable type to keep homes warm and industry operating throughout the winter, provided that dealers and consumers would order their coal sufficiently early to enable mines and carriers to make full and continuous use of their manpower and facilities throughout the warm season.

To bring about public cooperation, a "Buy Coal Now" campaign was launched in the spring of 1942 in cooperation with other Govern-

ment agencies and with industry. In general, public cooperation was excellent, although in many cases, consumers failed to make full use of their opportunities to obtain bituminous coal for storage. Restrictions in the production of anthracite, however, threaten to prevent the storage of the full amount of hard coal that consumers are ordering.

However, as of June 30, 1942, coal in general was being produced and transported at a rate much higher than was demanded by normal seasonal requirements, and a great deal of it was going into dealers' and consumers' storage as wartime fuel insurance.

The Bituminous Coal Division

It is anticipated that the war will necessitate the greatest production of bituminous coal in history. The stabilization of coal markets under the Bituminous Coal Act of 1937, as administered by the Bituminous Coal Division, is one of the principal factors which is enabling the coal mining industry to meet its responsibility for supplying the Nation with the principal source of the energy needed to forge the implements of war.

For 14 months prior to Pearl Harbor the industry enjoyed stable markets and fair trade practices by virtue of the minimum prices and marketing rules and regulations promulgated under the act. This gave it the incentive and the opportunity to improve its capital strength and better to prepare itself for the challenging task of meeting wartime fuel requirements.

It is essential that the stabilization of coal markets by minimum price regulations be continued vigorously as a measure of immediate importance to fighting the war. It will also aid the prevention of post-war chaos in this basic industry, such as followed World War I.

At the present time, the stabilizing effect of minimum price regulation makes it possible for the industry to plan the orderly production and distribution of coal in such a way as to obtain the maximum use and efficiency of the limited manpower and equipment available for producing and transporting coal in time of war. It prevents the recurrence of pressure buying, particularly by large industrial consumers; curbs cross-hauling and dumping, and constitutes a bulwark against other practices and conditions peculiar to the coal mining industry which would promote waste of the means of producing, transporting, and distributing this vital war fuel.

The demoralization of the coal mining industry which followed World War I, which involved destructive price cutting and undesirable trade practices on a Nation-wide scale, caused tremendous financial losses. It precipitated violent disturbances between mine owners and their employees, and seriously weakened the industry's capital structure. These conditions had an undesirable effect upon the general

economy of the Nation in addition to perpetuating the more acute situation in the coal mining regions. They persisted even in times of general Nation-wide prosperity, and continued until minimum prices and marketing rules and regulations were made effective on October 1, 1940. The continued stabilization of this industry under the Guffey Act will make a large contribution toward speeding general post-war stabilization.

The Bituminous Coal Division is making other great contributions to fighting the war. It is serving as a central source of coal statistics, and in many instances is providing technical advice, for other Government agencies dealing with wartime fuel problems, including the Coordinator of Solid Fuels, the OPA, the War Department and others.

The establishment by the OPA of anti-inflationary ceilings on coal prices was a task which obviously might have puzzled experts for many months. It was rendered relatively simple because the Division had classified all soft coals and was able immediately to furnish data on production costs and maximum price application and to give other technical assistance. The Division is continuing to give substantial aid to OPA in handling compliance matters and in making adjustments to the schedules.

The National Park Service

As trustee of much that is great in America, the National Park Service has endeavored to harmonize its activities with the war program while holding intact the things entrusted to it.

The stewardship of the Service extends over areas of outstanding beauty, scientific interest, historical significance, and, more important, the uniquely American concept under which the national parks are preserved inviolate for the present and future benefit of all of our people.

Lumbering, mining, grazing, and other exploitation of national park areas have been urged as a necessity of war. The Service has tried to measure the degree in which necessity justifies destruction of irreplaceable values and has acted accordingly. With due regard for its conservation responsibilities the Park Service has nevertheless rendered valuable service within the war program.

One hundred twenty-five permits have been issued to the War and Navy Departments and other war agencies to make use of National Park Service lands, buildings, and facilities. Salt for use in magnesium production has been made available from National Park property. Steps were taken to establish fire-lookout and air-raid warning towers immediately after war was declared, and much besides has been done in furtherance of immediate war aims.

Equally vital, if not so spectacular, the Service has helped to sustain national morale in the exercise of its usual functions. Special reduced rates for men in uniform were continued in effect in federal park areas, and an estimated 650,000 of them visited these inspiring monuments to America's present and past greatness during the year. Several thousand British sailors found rest and a change of scene while occupying group camping facilities in recreational demonstration areas and vacated CCC camps. Service technicians helped to plan and to direct the construction of 33 army rest camps in 23 States and the District of Columbia—places in which service men on leave might find rest and relief from training.

Instead of increasing as usual, travel to the National Parks decreased 30 percent this year because of limited motoring to conserve gasoline and rubber. The decline was greatest at Yellowstone, Glacier, and Crater Lake, and least at Sequoia, Yosemite, and Carlsbad Caverns which are closer to metropolitan centers.

While many activities of the Service were curtailed or deferred, historic areas were kept open and visiting time was lengthened.

The General Land Office

The General Land Office responded to the national war needs during the fiscal year by withdrawals of public lands for military and other war uses, by seeking new outlets for various resources on the public domain, by making public lands and their resources available for use in war industries, by facilitating the search for strategic metals, and by other activities, including many in close cooperation with other agencies.

More than 7,000,000 acres of public lands were withdrawn for military purposes, including areas for aerial bombing ranges, antiaircraft fields, combat training lands, artillery practice grounds, air navigation sites, flying schools, ammunition storage, and ordnance depots. This year's withdrawals bring the total area of public lands withdrawn for military use to 13,000,000 acres.

In the development of strategic minerals the General Land Office cooperated with the Defense Plant Corporation, Metal Reserves Co., the Reconstruction Finance Corporation, and other agencies. Opening reserved mineral deposits to exploitation has made available large quantities of tungsten, manganese, and other minerals. The potash reserves in New Mexico and California, operating under lease, now provide large supplies of potassium at less than one-sixth of the price paid for potassium during the first World War.

Studies are under way to determine possible new uses for resources on the public domain. New values are being found in minerals, natural vegetation, and other resources which heretofore were con-

sidered of little importance or which were not known to exist. Commercial quantities of strategic minerals may be developed from previously unused deposits, and such materials as fiber, rubber, turpentine, and resin, may be produced from desert shrubs.

Authorized by recent legislation to lease or sell lands in the public domain for use in connection with specified war manufacture, I have issued regulations under which the Commissioner of the General Land Office will negotiate transactions providing land to be used for its yield of timber, sand, gravel, and stone; and as factory sites, housing development sites for war workers, and as expansion areas for plants bordering the public domain.

It is possible that yucca, growing on public lands, may be used as a substitute for fibers that can no longer be obtained from the usual sources. Information also was gathered on the possibility of helping to relieve the rubber shortage by furnishing lands for the raising of guayule, and by making rabbit brush on public lands available.

Fire prevention and suppression activities have been greatly increased. Through the work of the Oregon Forest Defense Council, plans and policies were adopted which will greatly increase the effectiveness of fire suppression agencies in coping with forest fire conditions—even the abnormal conditions that exist in wartime. Work also continued in the suppression of outcrop coal fires which were threatening destruction of a very large amount of the Nation's coal resources in the vicinity of Little Thunder Basin, Wyo.

The Office of Land Utilization

The proper management of land, important in peacetime, becomes even more vital in war. This Department has jurisdiction over 625,000,000 acres of public land in the United States and Alaska. In order that this great domain might make its maximum contribution to the war, the Office of Land Utilization has directed close coordination during the year of all land management programs in the Department. An immediate result has been an increase in timber production from Departmental lands and an improvement in western range lands which has fitted them for greater sustained production of beef, leather, wool, and other livestock products. An increased output from the land of minerals, timber, food, and raw materials was made possible without compromising sound conservation practices.

Developmental programs were curtailed in accordance with the needs of war for money. At the time of Pearl Harbor, a \$2,178,000 soil- and moisture-conservation program was under way. This activity promptly was restricted to the projects offering the quickest return in increased production of necessary materials. The balance of the projects were postponed.

Burdens of protection also were assumed by the Office of Land Utilization. Working closely with the Office of Civilian Defense, the OLU took over the Facility Security Program which involved the establishment of a nonmilitary front against subversive action, forest and range fire hazards, and other forms of sabotage aimed against war production.

The Grazing Service

In addition to continuing its program of a wise use and development of Federal grazing lands during the fiscal year, the Grazing Service facilitated military use of the range.

Proving grounds were provided for thousands of bombers and tanks, and nearly 3,500,000 acres of Federal grazing districts were converted into training areas, bringing the area withdrawn for military use in 2 years to 8,500,000 acres. Despite these withdrawals, livestock production was kept at a high level.

Range improvement was confined, with few exceptions, to water development, construction of trails and feeder roads, revegetation, maintenance, and other activities requiring little or no critical materials.

Range reseeding experience furnished a valuable guide to future methods. A total of 199,670 acres was reseeded in 1942, compared with 66,000 acres in 1941. Nineteen million acres of range lands were surveyed and a recheck survey was accomplished on 10,000,000 acres during the year.

The Grazing Service became the first bureau of this Department to be decentralized from Washington. Headquarters were transferred in August 1941 from Washington, D. C., to Salt Lake City, Utah, the hub of the Federal range territory.

The Fish and Wildlife Service

The prudent use of our wildlife resources encouraged in the past by the Fish and Wildlife Service paid dividends this year as the Nation sought maximum returns from its investment in conservation. The Fish and Wildlife Service has done much to produce more abundantly for war from the resources that it administers, but it has enforced the principle of increased production to the extent consistent with conservation.

Nearly all of the war agencies have urged the delivery of more products derived from wildlife—more fish for the armed forces at home and abroad, for our outposts and for our allies; more vitamins from fish, more fish liver oils, more fur and fiber and food for war. We have given sympathetic assistance, but we have always looked

first to new sources to tap, to fuller use of resources at hand, and for means of spreading customary production further.

To increase the home supply of fish, we have advocated production in farm ponds that now flourish in the South. To augment the commercial catch, we have urged the industry to land species and sizes which previously were caught and discarded as unpopular, though suitable for table use. We have provided data on seafood production in the various theaters of war so that our expeditionary forces might find a local supply, thus diminishing their demand upon American resources and freeing shipping space for arms and munitions.

These are a few typical means by which we have tried to increase present fish production without impoverishing the future.

A program to use less material needed for war has paralleled our program for producing more food. With some success we have experimented with canning plates requiring reduced amounts of tin, and with noncanning methods of fish preservation. We have assisted in the release of fishing vessels for war use, and have facilitated the use of net-manufacturing machines in making camouflage nets.

We have been active in the field of predator control to conserve food and raw materials. In a single instance organized control reduced sheep losses from 7 percent to less than 2 percent. This is a considerable contribution when it is considered that the Army estimates a need for 100 pounds of scoured wool for each soldier during his first year of service, and taking into account also that 15,000,000 shearling pelts are needed to line aviators' coats.

In this report you will find accounts of the Fish and Wildlife Service rendering many war services other than those which its title indicates that it might perform. Among these are services related to the control of disease, often among concentrations of troops; the prevention of stream pollution, which was increasing because of hurriedly expanded mining and manufacturing operations, and to services related to food-storage in England.

All of these activities have been better correlated and their results have extended further because of the relationship between the Fish and Wildlife Service and the Office of Fishery Coordination. This Office, operating under my jurisdiction, is charged with mobilizing for war all of the industries concerned with harvesting, preserving, and distributing fish and fish products. The key personnel of the Service's Division of Fishery Industries and that of the Coordinator's office is identical.

The Office of Indian Affairs

The Office of Indian Affairs has dealt with numerous and important problems of war. After the attack on Pearl Harbor, all of the Aleutian Islanders west of Dutch Harbor were evacuated according to plan, and the removal of these people from their homes raised many problems for

this Office. It helped to relocate them, to provide relief and medical care, and to plan their future self-support.

It was also active from the beginning in the relocation of the West Coast Japanese, and is administering the largest of all evacuee centers. At the request of the War Relocation Authority, the Office of Indian Affairs assigned personnel and equipment to establish centers for large numbers of Japanese and their American-born families. Blocks of Indian land also have been requisitioned for military use, and the removal of Indian families, which resulted in some instances, constituted a direct war service for the Office.

Charged with grave responsibilities toward the Indians of the United States and the natives of Alaska, we have seen the war come very close to both—to the very doorsteps of some among the latter group in the Aleutian Islands. In both the United States and Alaska the response of these minorities to the challenge of war has been excellent.

The Alaskan natives have already defended their homes and given their lives on their own soil in this war for freedom. In the United States, Indian enlistment in the armed forces increased rapidly after war was declared, and on June 1, 1942, there were 7,500 of them in the service. Their most distinguished soldier, thus far, has been the late General Tinker, an Osage, lost in the battle of Midway on a daring air mission bravely self-undertaken.

At least 6,500 Indians who received vocational training under the CCC program are now in the service, and others are applying the skills that they learned in shipyards, airplane factories, and munitions plants.

The natives of Alaska are serving there in the United States forces. The skill of these men and their intimate knowledge of the country are of extraordinary value.

Evidence of the Indians' will to victory has come from even the remotest reservation. On several occasions groups of Indians have arrived at agency headquarters, each man with his gun, ready to proceed immediately to the scene of the fighting. The Crow Tribe in Montana offered the Government all of its resources and manpower. Indians in the United States and Alaskan natives alike have been generous buyers of war bonds.

During the fiscal year much has happened to strengthen our policy toward the Indians. War conditions are hastening the maturity of tribal self-government; the Indians are continuing the practice, begun several years ago, of investing tribal monies in the land; the courts have tended to sustain the tribes' rights in certain lands against conflicting claims and despite the fact of forcible removal, and to uphold their right to fish in accustomed places without payment of State license fees.

The Inter-American Indian Institute was formally created March 25, 1942, in Mexico City. This organization is the official agency for

the development of collaboration among the American nations on matters affecting the more than 30,000,000 Indians who live in the Western Hemisphere, and it has received support and encouragement from the Service.

The Division of Territories and Island Possessions

Although all of the American people have felt the effect of war, the people of our territories and island possessions have literally been living in the front lines. Two of the territories, Alaska and Hawaii, have been under enemy attack. Puerto Rico and the Virgin Islands have been under the heavy hand of maritime siege.

The response of the citizens in our territories to the trials and perils of war has been magnificent. In some instances they have been driven from their homes; they have had to accept sharp restraints; they have had to make profound readjustments in their lives and affairs. But the nearer the proximity of the enemy, the further in his blows the greater has been their determination to crush him once and for all, regardless of the cost to themselves.

The attack upon Pearl Harbor made Hawaii the center of an active combat zone. A well-organized civilian defense program took its place alongside of the military operations. Funds were provided for civil protection, health, sanitation, hospitalization and other civilian defense necessities, and a representative of my office proceeded to Honolulu to aid, temporarily, in the administration of the program. With the full-fledged cooperation of civil and military authorities a comprehensive program was undertaken to assure adequate protection for the population in the event of further attack.

The report of the Governor supplies the story in full detail. The willingness of all elements—citizens, plantation operators, factory owners, transportation employees, contractors, builders and utility workers—contributed to the prompt execution of a protection program that should serve as a model for Americans under fire.

Subsequent developments, as the life of the islands was abruptly switched from peace to combat, have had a disrupting effect. The change from normal, revenue-producing shipping to the movement of war supplies has adversely affected Territorial finances. Necessary combat zone restrictions on the daily life have caused complications. There is a shortage of housing, and the labor problem is far from being solved. No one has any doubts, however, as to the ultimate fortunate outcome of these matters.

Alaska also found itself in the front line. Close to the top of the world, where airline distances telescope amazingly, the Alaskans were keenly aware of their nearness to the enemy. They were awake, also, to the assiduity with which the Japanese had studied and

charted Alaskan waters, explored the coastline and penetrated the Aleutian Islands. It was no surprise to them, therefore, when bombs fell on Dutch Harbor. They had expected them earlier.

In the evacuation of native populations from the various islands, the Office of Indian Affairs played a large role. Several hundred natives and whites were forced to leave their homes and ancestral hunting areas and were moved to the mainland. Evacuation camps were established and the first American refugees were made completely comfortable in new locations. There is reason for great pride in the way in which this job was handled.

Severe problems were created for Alaska by the influx of large numbers of troops and the establishment of long-overdue military bases. In great numbers construction workers were suddenly dumped upon undeveloped areas, causing many difficulties in social adaptation and adjustment. Boom times transcending the days of the gold rush were created. Serious difficulties of supply had to be coped with.

Alaskans were prompt to volunteer for military service. Indians and Eskimos appeared with rifle in hand. The knowledge of the Alaskans of their own territory was put to excellent use. In countless other ways Alaskans lived up to their reputation as alert, enterprising Americans, able to cope with situations which might be dismaying to those of less tough moral fibre.

In Puerto Rico and the Virgin Islands, in the vital Panama Canal defense zone, the people and their governing officials realized the imminence of the war and the problems of our involvement more quickly than those facts were grasped on the continent.

In the Virgin Islands, our Easternmost outpost, the program for both civilian and military preparedness was especially intense. When war came, this was well advanced. James M. Landis, Director of the Office of Civilian Defense, later recognized this when he said, "We must put into practice in the Nation much of what these islands . . . have already done."

Such strength as we have shown in the off-shore areas has gained valuable time for us, especially in the instance of possible eventual enemy occupation. Much of our strength lay in the loyalty of the inhabitants, but much also was the result of your administration's farsightedness. Pre-war controls over shipping, trade in war-essential commodities and other activities strengthened our position.

The problem of supply for Puerto Rico continues to be acute. It is, without question, the most severe single problem that we face in any of the territories. Every effort is being made to obtain greater tonnage for the island, and in this all agencies of the Federal and Territorial Governments are cooperating to the fullest. The complete solution will come only when success in arms will release greater numbers of vessels for assignment to this service.

The Office of the Petroleum Coordinator for War

While the Office of the Petroleum Coordinator for War (now the Petroleum Administration for War) is not a part of the formal organization of the Department of the Interior, I wish nevertheless to mention this activity briefly in this letter. What the Nation would have done to handle its oil problem under actual war conditions had it not been for the earlier work of the Office of Petroleum Coordinator, I cannot guess. The story of the successive problems created by the disruption of normal petroleum transportation and supply pattern is too fresh in memory to bear repetition here. Although the warnings we issued in the summer of 1941 were largely ignored, and the restrictions which were imposed met with derision and a flood of misrepresentation, the correctness of our actions came to be generally recognized. Now, with war demands for specialized petroleum products increasing daily, it is clear that efforts to provide the aid necessary for war were started none too early.

In this connection, I want again to emphasize that the remarkable results that have been brought about would have been impossible without the wholehearted willingness of the oil industry to work in full partnership and understanding with the Federal Government. Too much credit cannot be given to the members of that industry. Traditional competitive practices have been laid aside, and many individual companies have willingly accepted severe financial loss to make an integrated handling of the oil problem possible. There is no such thing as "business as usual" today in the oil industry. Normal patterns have been junked for the duration, and the handling of petroleum from the well to the delivery of the finished product is replete with innovation. As one member of the industry puts it: "The difficult we do at once; the impossible takes a little longer."

Three principal tasks were faced by the OPC. They were to provide an adequate supply of petroleum and specialized products for our armed forces; for the United Nations, and for our own civilian front. It has been only by the use of considerable ingenuity that we have succeeded as well as we have. With the assistance of the industry, we will continue to dispose of the difficult and to perform the impossible.

Conclusion

Although this letter is optimistic in tone, the facts speak for themselves. The series of disasters inflicted upon the United Nations by their enemies depressed men's spirits everywhere, and a recounting of accomplishments such as this may seem somewhat trivial and academic when judged against the somber backdrop of the world today. And yet, as I analyze what this one Department of the Federal Government

has accomplished in the face of handicaps, there is ample cause for grim cheerfulness.

We can appraise our progress honestly and find that we have moved forward. Under the general tendency to magnify our defeats and belittle our accomplishments because they seem small against big events, we might not regard what we have done as significant. We have had failures, many of them. We have had lapses of imagination, and of concept, and failures of execution. But on the asset side, we have accomplished some truly worth-while things. So far as this Department is concerned, we intend to proceed with our work; to persist in what we think is the right course, and, with the greatest energy possible, proceed with the sensible development of conservation and supply programs that, in the end, will win the war.

Sincerely yours,

Harold L. Ickes

Secretary of the Interior.

(Note.—Specific details relating to individual projects and to power production normally contained in this report have been deleted at the request of the Office of War Information and the War Department)

Bureau of Reclamation

JOHN C. PAGE, Commissioner

BASED on the sound theory that soldiers and civilians fight best when properly fed, and victory is surer, swifter, Reclamation operations during the 1942 fiscal year were aimed at providing foodstuffs for men behind the guns and machines as well as hydroelectric power for the guns and machines themselves.

For a short conflict or a long pull—a war of attrition—this dual objective symbolizes the straight thinking of a democracy at bay.

The year's results from Reclamation activities in 16 Western States are impressive. Four decades of sound engineering work enabled the Bureau to assume a vital role in the Nation's war machine. Outstanding was its contribution of hydro power—potent energy that turns the machines that turn out the guns.

In the Pacific Northwest and Southwest giant Reclamation plants were the bulwark behind industries working at war tempo or mushrooming into production of war material. Power poured out of these plants and others for mining and manufacturing; for copper, steel, aluminum, magnesium; for bombs, planes, and ships.

Simultaneously, reservoirs on Reclamation projects furnished water to cities and their industry, to military establishments, their training centers, their airfields.

Stored water also irrigated 3,500,000 acres of productive land. Food, forage, and fiber were produced on the strategically located 45 irrigation projects in operation in the West. Farmers were urged to plant and to harvest, to raise cows, beef, and poultry. Irrigation district officials collaborated with the Bureau in an effort to get the most from high-production Reclamation farms.

Expanded production of food, forage, and fiber was recognized as necessary to supply the demands of the United Nations, to meet

domestic, civilian, and military requirements. Increasing civilian and military population and the urgency of conserving transportation emphasized the necessity of making the western half of the United States self-sufficient in food. This can be achieved only through an accelerated Reclamation program.

Geared to the over-all demands of the war, the construction of purely irrigation facilities made progress despite retardation by shortages of steel and other critical materials controlled by the War Production Board. Substitutions of noncritical material and concentration on excavation and other work enabled the Bureau to advance this work further than otherwise would have been possible.

Because of curtailed Work Projects Administration and Civilian Conservation Corps contributed labor, the water conservation and utilization program to stabilize the Great Plains and other semiarid areas was being redirected into a reserve against future contingency. Projects under construction are being advanced with all the speed possible; many others are being investigated and are being tagged for construction the moment war or postwar needs give the signal to go ahead.

Set in motion also was a still larger program for lessening the shock of postwar dislocation. Under investigation were 209 river basins and potential irrigation or multiple-purpose projects in 17 Western States. The investigations will produce an inventory of water resources and point the way to their economical and effective use in a region where water is the most precious natural resource and the basis for its economic expansion.

From studies that have been completed or are well advanced, the Bureau was selecting for a reservoir of public works, in accordance with the President's direction, a minimum of 50 feasible projects. This irrigation and multiple-purpose construction can be launched promptly at the conclusion of the war. Demobilized soldiers, sailors, and marines will require employment in useful occupations. Industrial workers released from war factories will want work close to their original homes. This shelf of projects, and the remaining construction on great undertakings like the Columbia Basin Reclamation project in the State of Washington, will provide that work.

In the Economic Front Line

As the fiscal year closed multiple-purpose irrigation projects engineered by the Bureau provided the hydroelectric power for war industry, assured a stable supply of water for essential agriculture and for cities and industry, and also represented a main source of manpower in the West—now in the economic front line. Once unpopulated and unproductive areas, former wasteland, after 40 years of sound Recla-

mation development were highly productive regions of farms and factories, towns and cities, all contributing their strength to the war.

The 81 reservoirs in operation on Reclamation projects had an active water storage of more than 47 million acre-feet—15,000 billion gallons—available for power generation, irrigation, and domestic and industrial needs. A 6-million-acre-foot increase in storage over last year illustrates the foresightedness of the Bureau in undertaking construction long in advance of an emergency.

Of 73 projects in operation, under construction, or authorized, 45 were producing power and supplying water for irrigation, municipalities and war industries. Twenty others were under construction. Nine were authorized but work was deferred because of the war. Of the 45 projects in operation several had important features still under construction.

More than 95 percent of the construction costs of these projects is reimbursable under the Reclamation law or other legislation. The remainder is allocated to flood control, aid to navigation, or to non-reimbursable labor costs.

Power Gain

The hydroelectric development on Reclamation projects as of June 30, 1942, was installed in 28 power plants on 17 projects in 11 States.

A tremendous power increase during the year was due chiefly to the installation of great generators in the Grand Coulee Dam power plant, Washington. In the Boulder Dam power plant, Arizona-Nevada, also, a big generator was installed and placed in operation, to make by far the most powerful array of dynamos ever assembled and synchronized into action. An addition at the Minidoka plant in Idaho and another at the Spanish Fork development on the Strawberry Valley project in Utah completed the year's installations.

But being hurried to completion as the year closed were more generators at Boulder, Grand Coulee, and Parker (Arizona-California) Dams due to start operating within 6 months.

Following the recommendation of the Bureau, the Congress appropriated funds for the completion of construction plans for a steam plant on the Central Valley project in California. The plant will firm Shasta and Keswick power and make the output more valuable. It will assure a larger net revenue to assist in repaying irrigation costs. The Congress also provided funds for the construction of a transmission system to carry power from the California project's Shasta and Keswick Dam power plants to market.

In the war program of the Department of the Interior for the development and utilization of western mineral resources, the Bureau recommended the construction of 17 new power projects in strategic-

ally located areas of 11 States. Included in the proposal were 8 steam plants. The remainder were hydro installations.

Aside from the generation of power, and the release of water itself for domestic and industrial uses, the regional production of food, forage, and fiber by Reclamation projects in the West supplied urgent needs. This production reduced the burden on transcontinental railroads and highways for the movement of men and equipment. It meant speedy delivery of supplies, and the saving of freight cars, of steel for rails and equipment, of fuel for engines, and of gas, oil, and rubber for trucks.

Water, prime essential in war, was provided during the year for municipal areas of 2,500,000 population. Extensive industrial and military concentrations were located in the areas.

The Boulder Dam system on the Colorado River in the Southwest provided water for Los Angeles and 12 other cities of the metropolitan area of southern California. It supplied both water and power to the huge new magnesium plant in Nevada near Boulder Dam.

The Rio Grande project in New Mexico and Texas supplied water to the city of El Paso to make possible more extensive military operations. The Contra Costa canal on the Central Valley project provided water for industries in Pittsburg, Calif.

Work was rushed on the Provo River project in Utah to provide water for a large steel plant and for Salt Lake City and Provo. Important military and industrial concentrations in this Utah area, with increased population, are draining the limited water supplies for domestic and agricultural purposes.

Other Reclamation projects also were under construction to provide municipal water supplies. The Altus project in Oklahoma and the Rapid Valley project in South Dakota will give Altus and Rapid City new reserves. The increase in Army personnel and population made the added water supply essential.

Irrigation Crop Returns 35 Percent Higher

The gross value of food, forage, and fiber produced in the calendar year 1941 on land served with Reclamation water was \$159,885,998, a 35 percent increase over the \$117,788,677 of 1940. These values do not include the livestock fattened on Reclamation projects, nor dairy products such as milk, butter, and cheese, and poultry and eggs—which would increase totals perhaps more than 25 percent. Nor do they include returns from areas irrigated by the All-American canal and 5 other supplemental water projects.

TABLE 1.—Reclamation area and average crop return, calendar year 1941¹

	Irrigable area ²	Irrigated area	Area in cultivation (paying area)	Crop values	
				Total	Per acre
	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>		
Regular projects, total.....	2,432,065	1,868,808	1,846,593	\$99,865,794	\$54.08
Storage projects, total.....	418,208	330,371	331,695	10,534,013	31.76
Storage projects, ³ total.....	667,105	(³)	(⁴)	(⁴)	(⁴)
Special and Warren Act lands, total.....	1,398,338	1,249,204	1,202,172	49,486,191	41.16
Grand total, 1941.....	4,915,716	³ 3,448,383	3,380,460	159,885,998	47.30
Grand total, 1940.....	4,835,693	3,500,070	3,316,030	117,788,677	35.52
Increase or decrease 1940-41.....	+80,023	-51,687	+64,430	+42,097,321	+11.78

¹ A detailed table of area and returns by individual projects is available on request from the Bureau of Reclamation, Washington, D. C.

² Area for which the Bureau is prepared to supply water.

³ Estimated irrigated area on projects with unreported crop returns is 250,000 acres, bringing the grand total of irrigated land in 1941 to approximately 3,698,000 acres.

⁴ Crop results not reported.

The cultivated area on regular and storage projects rose from 2,138,927 in 1940 to 2,178,288 in 1941, with crop values of \$80,098,196 and \$110,399,807 respectively (table 2). The cultivated Warren Act lands supplied with supplemental water increased from 1,177,103 to 1,202,172 acres with respective values of \$37,690,481 and \$49,486,191.

In acreage, hay and forage for livestock were the most important. Other products included vegetables and truck, fruits and nuts, small grains, seed, long-staple cotton, and sugar beets.

Reclamation projects in 12 States produced 1,450,321 tons of sugar beets, equivalent to a year's supply of sugar for an army of 5,000,000 soldiers.

The 1941 area of 101,219 acres in sugar beets was increased during the planting season of 1942, but labor difficulties and scarcity of factory facilities may restrict the year's production to a 25 percent increase. If labor is available and processing plants are established, production in 1943 could double the 1941 output.

The irrigable acreage for which the Bureau was prepared to supply water in 1942 was 4,915,716 acres. This figure includes more than 500,000 acres under the All-American canal.

The public land opened for homesteading was limited to 2,477 acres of the Payette division of the Boise project in Idaho. Owing to war conditions and the location of Japanese relocation centers on projects in California and Wyoming, other openings were deferred. Additional land was brought under irrigation on the Roza division of the Yakima project in Washington and on the Buffalo Rapids project in Montana.

TABLE 2.—Cumulative crop production, Reclamation projects, 1906-41

	Reclamation projects 1			Warren Act lands			Entire area		
	Irrigated acreage	Total crop value		Net area in cultivation	Total crop value		Net area in cultivation	Total crop value	
		For year	For year		Cumulative total	For year		Cumulative total	For year
1906	22,300	\$244,900	\$5,005,360					\$244,900	\$5,005,360
1907	187,628	4,760,460	28,500,360	2 169,100	2 169,100	2 169,100	2 169,100	4,760,460	28,500,360
1908	289,549	7,635,888	12,641,248	2 260,500	2 6,835,888	2 260,500	2 6,835,888	7,635,888	12,641,248
1909	410,628	11,926,663	24,561,911	2 369,500	2 11,926,663	2 369,500	2 11,926,663	11,926,663	24,561,911
1910	471,423	12,944,639	37,506,550	413,000	413,000	413,000	413,000	12,944,639	37,506,550
1911	562,311	13,086,441	50,592,991	470,100	13,086,441	470,100	13,086,441	13,086,441	50,592,991
1912	614,477	16,007,134	66,600,125	540,000	16,007,134	540,000	16,007,134	16,007,134	66,600,125
1913	684,142	15,676,409	82,276,534	637,227	15,676,409	637,227	15,676,409	15,676,409	82,276,534
1914	761,271	16,475,517	98,752,051	703,424	16,475,517	703,424	16,475,517	16,475,517	98,752,051
1915	810,649	18,164,452	116,916,503	760,085	18,164,452	760,085	18,164,452	18,164,452	116,916,503
1916	922,821	19,732,475	149,732,475	858,291	19,732,475	858,291	19,732,475	19,732,475	149,732,475
1917	1,026,663	206,194,788	206,194,788	966,784	206,194,788	966,784	206,194,788	206,194,788	206,194,788
1918	1,119,566	1,051,193	66,821,396	1,051,193	66,821,396	1,051,193	66,821,396	1,051,193	66,821,396
1919	1,187,255	1,113,469	88,974,137	1,113,469	88,974,137	1,113,469	88,974,137	1,113,469	88,974,137
1920	1,223,480	1,153,820	66,171,650	1,153,820	66,171,650	1,153,820	66,171,650	1,153,820	66,171,650
1921	1,227,500	1,157,900	49,620,300	1,157,900	49,620,300	1,157,900	49,620,300	1,157,900	49,620,300
1922	1,202,130	1,169,100	50,360,850	1,169,100	50,360,850	1,169,100	50,360,850	1,169,100	50,360,850
1923	1,213,700	1,179,870	593,189,421	1,179,870	593,189,421	1,179,870	593,189,421	1,179,870	593,189,421
1924	1,290,890	1,216,610	66,488,560	1,216,610	66,488,560	1,216,610	66,488,560	1,216,610	66,488,560
1925	1,320,300	1,242,750	77,608,880	1,242,750	77,608,880	1,242,750	77,608,880	1,242,750	77,608,880
1926	1,411,020	1,328,810	60,369,620	1,328,810	60,369,620	1,328,810	60,369,620	1,328,810	60,369,620
1927	1,378,990	1,326,810	70,985,450	1,326,810	70,985,450	1,326,810	70,985,450	1,326,810	70,985,450
1928	1,442,080	1,385,560	80,238,800	1,385,560	80,238,800	1,385,560	80,238,800	1,385,560	80,238,800
1929	1,504,810	1,420,070	87,559,670	1,420,070	87,559,670	1,420,070	87,559,670	1,420,070	87,559,670
1930	1,581,810	1,467,097	64,418,940	1,467,097	64,418,940	1,467,097	64,418,940	1,467,097	64,418,940
1931	1,522,718	1,462,565	40,121,089	1,462,565	40,121,089	1,462,565	40,121,089	1,462,565	40,121,089
1932	1,555,144	1,506,320	31,166,752	1,506,320	31,166,752	1,506,320	31,166,752	1,506,320	31,166,752
1933	1,589,770	1,529,903	48,138,576	1,529,903	48,138,576	1,529,903	48,138,576	1,529,903	48,138,576
1934	1,552,124	1,464,405	69,628,327	1,464,405	69,628,327	1,464,405	69,628,327	1,464,405	69,628,327
1935	1,640,936	1,604,166	63,601,663	1,604,166	63,601,663	1,604,166	63,601,663	1,604,166	63,601,663
1936	1,725,463	1,700,969	72,893,649	1,700,969	72,893,649	1,700,969	72,893,649	1,700,969	72,893,649
1937	1,777,584	1,764,363	67,859,804	1,764,363	67,859,804	1,764,363	67,859,804	1,764,363	67,859,804
1938	1,922,868	1,903,269	73,769,654	1,903,269	73,769,654	1,903,269	73,769,654	1,903,269	73,769,654
1939	2,152,808	2,138,927	80,098,196	2,138,927	80,098,196	2,138,927	80,098,196	2,138,927	80,098,196
1940	2,186,179	2,178,288	110,399,807	2,178,288	110,399,807	2,178,288	110,399,807	2,178,288	110,399,807
1941 3									

1 Includes projects constructed by the Bureau of Reclamation and those for which supplemental water is furnished from storage works built by the Bureau.

2 Estimated.

3 Does not include All-American Canal (Imperial Valley) project acreage and returns.

4 Increase over 1939 largely due to the inclusion of data for projects not previously reported.

Food and Forage for War

The West depends on irrigated land for more than 70 percent of its food supplies. Surveys indicate that more than 50 percent of the areas served by non-Federal irrigation systems requires supplemental water to insure production in normal times. An assured water supply is doubly essential now to safeguard both the growing civilian and military population of the area from disastrous food shortages in the event of drought—for new land to be brought under irrigation as well as for established irrigated areas.

At the request of members of the Congress, the Bureau outlined for congressional appropriations committees a program for accelerated development of projects under construction. It was shown that by 1945, with high priorities and adequate appropriations, the Bureau could serve 1,964,225 additional acres of land. Included in this area are 1,096,260 acres now inadequately irrigated by other systems, on which food production is limited by water shortages. Included also are about 867,965 acres of new land which can be brought in cultivation.

This accelerated program covers about a fourth of the 8,000,000 acres to be added to the present irrigable acreage in the Bureau's current over-all program of projects in operation, under construction or authorized. When all projects in the over-all program are completed, the Bureau will be prepared to serve 5,115,224 acres with a full (or primary) supply and 7,116,074 acres with supplemental water. This total of 12,231,298 is nearly three times the 4,915,716 acres (table 1 and footnote) the Bureau was prepared to serve with irrigation water in 1941.

In northern project areas are vast acreages that could be devoted to the production of sugar beets. In southern project areas nearly 1,000,000 acres of public land could be devoted to the production of guayule to insure a domestic supply of natural rubber.

Guayule as a domestic source of rubber has been recognized by the Congress. The Bureau, cooperating with the Guayule Emergency Rubber Project of the Forest Service, Department of Agriculture, has made test plots available on the Gila and All-American Canal projects. Growths on these plots are encouraging, and additional land will be provided for more extensive tests during the winter of 1942-43.

If guayule proves suited to southwest areas, under irrigation, it is estimated that approximately 1,000,000 acres can be planted ultimately on the Gila project in Arizona and under the All-American and Coachella branch canals in California. Under the Central Valley project studies begun this year the opportunities for growing guayule in the Central Valley of California are being explored. It is estimated that 300,000 acres may be suited for guayule production.

An experiment in cryptostegia rubber production is being carried on by the United States Rubber Co. on land leased from the Bureau on the Yuma project in Arizona. This work is still in an investigation stage.

At the close of the fiscal year Reclamation projects provided power and water to 4½ million persons in 15 Western States. On irrigation projects served by Reclamation systems were 1,088,504 persons, on 86,181 farms and in the 291 tributary cities and towns (table 3). The other 3½ million persons received power and domestic water.

In 40 years these projects have created taxable property values of a billion dollars and produced nearly 3 billion dollars (table 2) in crop values—nearly 4 times Reclamation construction expenditures through June 30, 1942 (table 5).

Vital Structures Guarded Against Sabotage

Guards, floodlights, steel fences, and other protective measures against sabotage were placed about vital Reclamation structures such as large dams and power plants during the year.

Begun with foresight early in the fiscal year, the program of protection on 48 projects in operation or under construction was expanded materially upon news of the Japanese attack on Pearl Harbor. On June 30 nearly 650 armed guards were patrolling their assigned beats.

On several projects troops aided in protection. The War Department has ruled that responsibility for protecting vital Reclamation structures rests upon the Bureau, however. Increase of the guard force to 800 was therefore proposed to the Bureau of the Budget for the fiscal year 1943.

Protective steps taken by the Bureau in addition to the guards were floating booms and steel nets in reservoirs to fend off boats and floating objects, prohibition of automobile parking on or near dams, and a close supervision of visitors, who are restricted to certain areas.

Three Japanese Relocation Centers Established

When the Army ordered the evacuation of persons of Japanese ancestry from critical areas on the Pacific coast, three Reclamation projects with undeveloped public land were selected by the War Relocation Authority as sites for relocation centers: The Tule Lake division of the Klamath project in California; the Gooding division of the Minidoka project in Idaho; and the Heart Mountain division of the Shoshone project in Wyoming.

Housing for 16,000 evacuees had been about completed on the Klamath project. Plans were formed to subjugate and bring into production a possible maximum of 21,000 acres. Housing construc-

TABLE 3.—Settlement and economic data, reclamation projects, July 1, 1941

State	Project	Irrigated farms		Towns on or tributary to the project		Number of schools	Number of churches	Banks		Special Warren Act contractors			
		Number	Population	Number	Population			Number	Deposits	Number of depositors	Irrigated farms ^a	Population	
Arizona	<i>Regular</i>	Salt River	13,158	42,000	12	140,351	96	156	7	78,196,154	34,000	1,110	5,142
		Yuma	4,830	3,525	5	11,000	13	27	1	2,072,841	2,203	---	---
		Orland	1,897	1,685	1	1,366	5	10	1	1,126,246	2,559	---	---
		Grand Valley	524	1,528	6	19,960	17	40	3	5,092,199	8,061	643	1,920
		Uncompahgre	1,755	5,914	3	8,812	28	35	4	4,200,329	()	---	---
		Moise	4,108	16,100	10	51,350	118	130	4	()	()	3,334	12,008
		Mindokta 1	4,538	16,738	10	24,997	57	104	10	()	()	3,015	32,220
		Bitterfoot	340	1,387	4	5,200	18	13	4	2,347,246	5,432	---	---
		Frenchley	442	1,387	1	1,000	1	1	1	()	()	---	---
		Himley	650	1,028	5	768	7	6	1	100,275	305	---	---
Montana	<i>Regular</i>	Milk River	631	2,532	10	11,381	34	39	7	5,465,611	7,197	---	---
		Sun River	1,004	2,576	7	1,019	11	15	1	300,701	614	---	---
		Lower Yellowstone	676	2,404	7	4,280	18	22	3	1,832,430	4,114	---	---
		North Platte	3,163	9,188	10	27,362	73	67	9	8,893,653	14,170	1,405	6,040
		Newlands	735	2,005	4	2,298	16	12	1	1,100,000	1,800	---	---
		Carlsbad	465	2,027	4	17,965	14	20	2	2,550,541	5,183	---	---
		Rio Grande	6,301	30,913	40	131,480	89	184	6	50,574,788	8,604	108	715
		Umatilla	511	1,474	4	1,528	7	12	1	3,496,765	1,250	---	---
		Yale	549	1,685	4	1,312	14	14	1	678,000	1,200	---	---
		Klamath	968	2,407	5	28,084	50	35	5	()	()	500	1,924
Oregon	<i>Regular</i>	Owyhee	1,480	5,403	8	14,900	28	27	5	3,037,000	4,210	220	---
		Bellevue	607	2,176	5	3,750	22	15	3	3,447,878	8,918	---	---
		Beilo Fourcile	2,000	8,550	13	16,264	28	31	4	1,478,046	2,600	---	---
		Strawberry Valley	424	936	4	5,112	9	8	2	7,911,169	13,814	4,642	22,525
		Yakima	5,465	17,332	24	46,210	83	80	8	10,361,576	12,000	---	---
		Kendrick	490	1,782	7	19,404	17	16	2	775,000	1,400	---	---
		Riverton	400	1,357	3	2,768	4	16	1	894,358	1,200	---	---
		Shoshone	1,037	2,357	5	2,219	3	12	1	---	---	---	---
		Subtotal	54,256	188,009	246	601,429	851	1,150	97	163,024,006	147,630	20,997	82,813

TABLE 3.—Settlement and economic data, reclamation projects, July 1, 1941—Continued

State	Project	Irrigated farms		Towns on or tributary project		Number of schools	Number of churches	Banks			Special Warren Act contractors		
		Number	Population	Number	Population			Number	Deposits	Number of depositors	Irrigated farms ⁶	Population	
	<i>Supplemental Storage Projects</i>												
California	All-American Canal ⁴	4,645	26,000	8	33,723	157	76	7	(¹)	(¹)			
	Humboldt	480	1,000	1	1,379	22	4	1	1,316,677	1,350			
Nevada	Truckee Storage	425	1,800	2	26,635	25	19	4	21,268,726	19,674			
	Deschutes ²	640	3,700	5	14,405	16	18	4	(¹)	(¹)			
Oregon	Stanfield	164	1,465	1	1,200	2	2	0	0	0			
	Hyrum	576	1,520	1	3,730	5	5	0	0	0			
Utah	Moop Lake	1,722	2,800	3	3,311	15	23	1	484,367	1,738			
	Ogden River	1,979	4,300	7	65,533	33	60	4	30,772,568	41,371			
	Sampele	237	1,086	2	2,933	7	6	1	504,000	850			
	Weber River	2,100	10,000	11	10,737	26	20	7	21,450,000	25,000			
	Subtotal	10,928	52,671	45	163,582	287	233	29	75,796,338	89,983			
	Grand total	65,184	240,680	291	765,011	1,138	1,383	126	268,820,344	237,613			

¹ Data not available.² Includes data for Fremont-Madison Irrigation District.³ Bank data for East division only.⁴ Imperial Valley Section, partially irrigated through All-American Canal.⁵ Central Oregon Irrigation District (Crane Prairie Storage).⁶ Total farms furnished partial or whole water supply by Bureau-constructed works.

tion for 10,000 evacuees on each of the other two centers was well under way. The Minidoka project was to provide 17,000 acres of land for irrigation and the Shoshone project 27,800 acres. Products from these lands are expected to provide subsistence for the evacuees.

The Army Engineers construct the housing and community facilities at the centers. The Bureau of Reclamation supervises the construction, by the evacuees, of the additional irrigation facilities on the projects. Funds for the construction will be provided by the War Relocation Authority, which will operate the centers. The evacuees acquire no rights in the land, a portion of which is expected to be opened for homestead settlement under the Reclamation law at the close of the war.

Consideration was being given to the employment of Japanese evacuees on construction work of Reclamation projects in place of Civilian Conservation Corps enrollees and Work Projects Administration workers.

Columbia Basin Investigations Field Work Virtually Completed

Field work in connection with the 28 joint investigation problems of settler location on the Columbia Basin project in Washington is virtually complete. Results of the field studies are being collated and integrated for application to the actual settlement phase of the project development. Funds have been appropriated by Congress for starting construction of the irrigation system. But construction cannot start until pending legislation authorizing the work is enacted, or repayment contracts are executed by the irrigation districts of the project. The Bureau will be prepared to launch the settlement phase of this project, to extend ultimately to 1,200,000 acres, as soon as water becomes available for irrigation.

Predevelopment Studies Started on Gila Project

Steps were taken to initiate a program of predevelopment on lands of the Yuma Mesa division of the Gila project, Arizona, in conformity with a directive from the Senate Committee on Appropriations. A committee was appointed to study the economic and agricultural aspects of the practical problems confronting settlers on the type of arid desert soil which characterizes mesa lands of this section of Arizona. Through the active cooperation of the college of agriculture, University of Arizona, experience gained by that institution on its experimental plot on the Yuma Mesa has been used in guiding the program. An area of 5,500 acres is expected to be leveled, put under ditch, and planted to alfalfa.

The program has the double purpose of conditioning the land for settler operation and of preparing an area for commercial plantings of guayule or other rubber-bearing plants, should they be required for war.

The experience gained in predevelopment of Yuma Mesa lands will be unique in its field. No other similar large area has been irrigated in the West. In order to assist future settlers in solving complex problems as to varieties of crops best adapted, the application and amount of irrigation water, settlement, and a host of similar subjects, the Bureau of Reclamation is advancing this work as rapidly as its authority will permit.

Central Valley Studies Undertaken

The rapidly converging problems of the agricultural and industrial economy of the Central Valley project area, associated with the construction of Shasta Dam, Friant Dam and other project works, are under intensive study by the Bureau and more than 50 cooperating agencies, Federal, State, and local.

The prime objective of the Central Valley studies is to direct its vast potentialities as rapidly as possible into war work. As these potentialities develop into realities of power for war industry, stabilized water supplies to lands now irrigated, more water for industrial plants, and new agricultural lands, the Bureau is working out the details of project administration.

As a second objective, the Central Valley studies will establish guideposts for the utilization of power, water, and land in a long-range program.

Construction Results

Five Dams Completed

The Bureau of Reclamation brought to completion 5 of the 15 storage dams under construction on irrigation projects. Three of the completed dams—Grand Coulee, Friant, and Marshall Ford—are the first, fourth, and fifth largest concrete dams in the world.

New electric generating equipment greatly increased the operating capacity of 28 plants on Reclamation projects. Also erected were 274 miles of high-voltage transmission lines.

The storage capacity of Reclamation reservoirs at the end of the fiscal year was 61,610,283 acre-feet, an increase of 13,845,680 acre-feet—29 percent—over the July 1, 1941, capacity. Active storage content, available for power, irrigation, domestic and industrial use, was 47¼ million acre-feet compared with 41½ million last year.

Statistically, the year showed the following additional construction: 260 miles of canals, 79 miles of drains, and 2,888 canal structures; 556 culverts, 48 flumes, 183 bridges; 259 miles of roads; 169 miles of telephone lines; 89 miles of pipe line; 13 tunnels of a total length of 38,655 feet; and 2 miles of railroad line. Placed in dams and other structures were 3,668,333 cubic yards of concrete, 2,247,653 cubic yards of earth, and 736,591 cubic yards of rock. Excavated in operations: 22,269,750 cubic yards of earth and rock. Used for concrete in structures: 4,156,572 barrels of cement.

The following dams were completed during the year: Grand Coulee Dam (Columbia Basin project, Washington), 9,926,005 cubic yards in volume, a straight-gravity concrete structure creating a reservoir with an estimated storage capacity of 9,700,000 acre-feet; Friant Dam (crest height was reached but the spillway gates and outlet works were not yet installed), (Central Valley project, California), 2,045,860 cubic yards in volume, a straight-gravity concrete structure creating a reservoir of 520,550 acre-feet capacity; Vallecito Dam (Pine River project, Colorado), an earth and rock-fill structure with a reservoir capacity of 129,675 acre-feet; Marshall Ford (Mansfield) Dam (Colorado River project, Texas), 1,864,000 cubic yards in volume, a straight-gravity concrete structure (with earth and rock-fill embankments of 1,715,000 cubic yards) with a reservoir capacity of 3,120,000 acre-feet; and Deer Creek Dam (Provo River project, Utah), an earth and rock-fill structure with a reservoir capacity of 150,000 acre-feet.

Two More Power Plants

Two of the newly completed dams—Grand Coulee and Marshall Ford—have power plants. When fully installed Grand Coulee's plant will have by far the largest installation in the world. Marshall Ford was in full operation at the end of the year.

Construction work was being pushed on more new plants at Parker, Green Mountain, Shasta, Keswick, and Anderson Ranch Dams.

The capacity of Boulder Dam, bulwark of war power in the Pacific Southwest, was being increased at a tremendous rate. As the fiscal year closed a large generator was being tested for operation and another was being rushed to completion for operation in December 1942. In addition, a third was ordered with high priority to supply a huge magnesium plant near the dam.

Water Conservation Program Progresses

Construction proceeded on 6 projects of the water conservation and utilization program to stabilize agriculture and employment in

the Great Plains and other semiarid areas to the westward most seriously affected by periodic droughts. The irrigated and producing area of a seventh project, under construction but already in operation, was increased. The 7 projects when completed will irrigate a total of 85,320 acres of land and benefit nearly a million acres of range.

Progress was retarded, however, by the imminent disbandment of the Civilian Conservation Corps, a large reduction in Work Projects Administration forces (both agencies contribute nonreimbursable labor to construction of water conservation and utilization projects) and restrictions on critical materials.

The need for this type of small project as a safeguard against drought and unemployment is unabated despite more rainfall in the Great Plains.

The Bureau carried on investigations of potential developments of this type for inclusion in its shelf of projects to provide employment and maintain established communities at the close of the war.

Forty Years of Construction

In the 40 years of its existence as a Federal agency the Bureau of Reclamation has placed in operation 45 irrigation projects. In the construction of these wealth-producing projects the Bureau has built 166 dams; 28 power plants; 5,678 miles of high-voltage transmission lines; 372 pumping plants; 16,277 miles of main canals and laterals; 5,010 miles of ditches and drains; and 208,931 canal structures. It has built 14,255 bridges, 23,060 culverts and 6,475 flumes, and bored 380 tunnels of a combined length of 105 miles. It has laid 2,264 miles of pipe and built 3,994 miles of road.

The Bureau has excavated 603,115,119 cubic yards of earth and rock and has used 35,195,538 barrels of cement in building irrigation structures containing 30,834,046 cubic yards of concrete—enough to pave a standard two-lane highway around the world at the equator.

Denver Laboratory a Crucible of Construction

The crucible of Reclamation engineering work is the expertly manned laboratory of the Bureau at Denver, Colo. Designs and materials for structures are submitted to intensive study and actual test by qualified engineers, some of international reputation. This applied science not only has insured sound, lasting, low-cost structural work but has saved the Government millions of dollars. Nearly \$6,000,000 was saved in the cost of Grand Coulee Dam alone by laboratory analysis of available cements and refinements in structural design as a result of exhaustive laboratory research.

Grand Coulee Dam Finished

The final bucket of the 9,926,005 cubic yards of mass concrete was placed in Grand Coulee Dam on the Columbia River in Washington. The pumping plant foundation and the left powerhouse were completed in December and work commenced on the right powerhouse.

Cooling of the mass concrete, in progress 5 years and requiring 2,000 miles of 1-inch pipe for circulating chilled river water, was completed in January.

The first big Grand Coulee generator went on the line October 1, the second on January 29, and the third on April 7. Two station-service generators started operating on March 22, 1941, because of the urgent need for power for Northwest defense industry. Contracts were also awarded during the fiscal year for additional big machines. In April, preparations began at Coulee for the installation of some generators originally purchased for the Shasta power plant on the Central Valley project. This shift was an incisive war measure recommended by the War Production Board. It makes additional power available to war industry practically a whole year sooner. The generators were to start operating before the end of 1942.

Completed during the year was the work of mapping and classifying 2,000,000 acres below the dam, and the appraisal of 1,200,000 selected fertile acres which ultimately will be irrigated, creating homes and livelihood for a third of a million persons.

The reservoir reached spill height on June 1. A tremendous cataract—larger in volume than Niagara Falls and twice as high—poured over the spillway down the face of the dam. The event was hailed as a wartime baptism of Grand Coulee's important role in supplying power to the Pacific Northwest.

Migratory fish conservation work was continued successfully to save salmon and fighting steelhead trout of the Columbia which were blocked by Grand Coulee's massive wall of concrete. Two hatcheries were in operation—at Leavenworth and at Entiat—under the direction of the Fish and Wildlife Service.

Central Valley Construction Advanced

Completing the relocation of the Southern Pacific Railroad around the Shasta Reservoir, placing the final cubic yard of concrete in Friant Dam, and commencing work on Keswick Dam and power plant were outstanding events on the Central Valley project, California.

Shasta Dam, a concrete gravity structure, 602 feet high (second in height only to Boulder) with a crest length of 3,500 feet, was 66 percent completed. More than half the estimated 6,230,000 cubic yards

had been placed. Concrete work on Shasta power plant was nearing completion.

Relocation of 36 miles of the main line of the Southern Pacific Railroad from the Shasta Reservoir site to a shorter new line outside the reservoir was completed in March. The new line is 30 miles long and includes 12 tunnels with a total length of $3\frac{1}{2}$ miles and 8 major bridges, including the highest double-decked bridge in the world, over the Pit River.

Migratory fish conservation, necessary for the protection of the salmon industry, was begun. Fish will be caught in traps at Keswick Dam and Balls Ferry, and transported by tank trucks to the Coleman station on Battle Creek, which is under construction.

Work was started on Keswick Dam and power plant, 9 miles downstream from Shasta. The structure will be operated to reregulate the variable releases from the Shasta power plant and generate power.

Friant Dam on the San Joaquin River reached crest height in June with the placing of 2,045,860 cubic yards of concrete. The spillway gates and outlet valves were not installed, however, owing to lack of priorities. The straight-gravity structure is 320 feet high with a crest length of 3,430 feet.

Work was continued during the year on the first section of the 37-mile Madera Canal, one of two main canals leading from Millerton Lake, the 520,550 acre-foot reservoir formed by Friant Dam.

Through a section of Contra Costa canal in the Sacramento-San Joaquin delta area domestic and industrial water was being supplied to the city of Pittsburg.

Boulder Dam Supplies War Power

Boulder Dam on the Boulder Canyon project of Arizona-Nevada-California supplied increased war power for Pacific Southwest industry. On October 9 another generator went on the line. The October 9 installation made the Boulder plant the largest in the world.

Colorado-Big Thompson Tunnel Driven 5 Miles

At the rate of more than 40 feet a day workmen drilled through the granite backbone of the Rocky Mountains, holing out the 13-mile Continental Divide Tunnel on the Colorado-Big Thompson project, Colorado. The tunnel will shunt Colorado River headwaters from the western to the eastern slope of the mountain. It was more than 8 miles complete on June 30; nearly 5 miles were excavated during the preceding 12 months. En route to sugar beet fields and other crops the irrigation water, after passing through the tunnel, will energize 6 power plants.

On the west slope work on Green Mountain storage dam and power plant proceeded with rapidity. The power plant is due to begin operating in February 1943.

In December 1941 the diversion and outlet tunnel was started for Granby Dam and by June 30 was 62 percent complete.

Deer Creek Dam Finished on Provo River Project

Deer Creek Dam on the Provo River about 14 miles northeast of Provo, Utah, was completed in October 1941. This storage dam is the second largest earth and rock-fill dam to be built by the Bureau. It is 235 feet high, 1,256 feet long, 2,809,800 cubic yards in volume, with a storage reservoir capacity of 150,000 acre-feet.

Also completed was a 9-mile section of the 40-mile Salt Lake Aqueduct on which work is being pushed with all possible speed. The aqueduct will provide domestic and industrial water for Salt Lake City. A contract was awarded to enlarge the Weber-Provo Canal.

All-American Canal Supplies Entire Imperial Valley

Operation of the All-American Canal—the country's largest irrigation canal, 242 feet in maximum width at water surface, 80 miles long extending from the Colorado River to the west end of the Imperial Valley, deep enough to float an ocean-going vessel—was extended throughout the Imperial Valley during the fiscal year.

On the 131-mile Coachella branch which stems from the All-American Canal, 81 miles are excavated; also structures along 47 miles are complete.

Rapid Progress on Anderson Ranch Dam

Excellent progress, with work 23 percent complete on June 30, was made during the fiscal year on Anderson Ranch dam and power plant, contract for which was awarded August 1941.

Located about 20 miles northeast of Mountain Home, Idaho, on the South Fork of Boise River, the structure will be the highest earth and rock-fill dam in the world—444 feet from the lowest point in the foundation cut-off to crest. A multiple-purpose development, the structure is also the largest dam of its type undertaken by the Bureau to date—9,600,000 cubic yards as designed.

The 500,000 acre-foot reservoir to be formed by the dam will provide a needed supplemental water supply for more than 300,000 acres of farm lands in the Boise Valley and control floods. The power plant will offset deficiencies in southern Idaho and northern Utah.

Marshall Ford Dam Finished

Marshall Ford (Mansfield) Dam on the Colorado River, about 18 miles northwest of Austin, Tex., was completed in May. It is a concrete structure of the straight-gravity type, 270 feet high, with an earth and rock-fill wing embankment at the left abutment 105 feet high and 4,910 feet long. With an over-all length of 7,333 feet, the dam contains 3,579,000 cubic yards of concrete, earth, and rock. The reservoir of 3,120,000 acre-foot capacity will provide flood control in addition to water for power generation.

Parker Power Plant Almost Ready for Operation

The powerhouse and installation of electrical machinery at Parker Dam, Arizona-California, neared completion. Construction of the Phoenix terminal substation was also in progress. On November 3 a contract was awarded for building a 123½-mile transmission line from Phoenix to Tucson, and a 50-mile line to connect the Gila substation at Blaisdell, Ariz., with drop No. 4 on the All-American canal in California.

Water Made Available for New Yakima Land

Approximately 50 miles of the 99-mile Yakima Ridge canal on the Roza division of the Yakima project in Washington were completed on June 30. Water for the irrigation of 6,630 acres was made available for the 1942 season.

On the Tucumcari project in New Mexico, earthwork and structures on a 25-mile section of the 75-mile Conchas main canal were completed, also three tunnels with a combined length of 3.8 miles.

On the Gila project in southwestern Arizona pumping plant No. 1 was completed in November. Installation of three pumps was started in December. Earthwork, structures and concrete lining for canals and laterals on unit No. 1 of the Yuma Mesa division were about half complete.

Canal and lateral construction was in progress on the Heart Mountain division of the Shoshone project, and the Riverton and Kendrick projects, all in Wyoming; the Owyhee project in Oregon-Idaho; and the Deschutes project in Oregon. Work was continued on the Wickiup Dam and canal system on the Deschutes project, using Government and CCC forces. The Cody-Thermopolis transmission line on the Shoshone project was completed in November. The Modoc unit of the Tule Lake division of the Klamath project, Oregon-California, was under construction.

Davis Dam Contract Awarded

A contract was awarded in June for construction of Davis Dam and power plant on the Colorado River about 67 miles downstream from Boulder. The dam will be an earth and rock-fill structure 200 feet high with a volume of 4,230,000 cubic yards, forming a reservoir of 1,940,000 acre-foot capacity.

Palisades Dam Authorized

Palisades Dam project on the Snake River in Idaho was authorized for supplemental storage and power generation under the 1939 Reclamation Project Act. Changed plans necessitated reauthorization of the Rapid Valley project on Castle Creek in South Dakota. Both projects include earth dams.

Field Investigations in Full Swing

Engineering investigations have two major objectives in connection with the war program: First, to determine the best method of providing additional electric power to avert a shortage in vital production areas of the West. Second, to prepare a reservoir of feasible irrigation and multiple-purpose projects on which construction can be quickly launched to provide employment and settlement opportunities at the close of the war.

Studies have been made of numerous hydroelectric power sites and steam plant installations. The major purpose of the steam developments would be to firm the power from and balance the output of existing or proposed hydroelectric plants.

The following 27 power projects have been investigated:

Albuquerque (steam) near Albuquerque, N. Mex.	Heart Mountain near Cody, Wyo.
Bismarck (steam) near Bismarck, N. Dak.	Klickitat near White Swan, Wash.
Brazos River near Waco, Tex.	Kortes power near Casper, Wyo.
Bridge Canyon near Kingman, Ariz.	Lower Big Horn near Hardin, Mont.
Cabinet Gorge near Sandpoint, Idaho.	Mystic power near Reno, Nev.
Canyon Ferry near Helena, Mont.	Newark (steam) near Newark, Calif.
Debenger Gap near Medford, Oreg.	Palisades Dam near Alpine, Idaho.
Denison power near Denison, Tex.	Pelton power near Redmond, Oreg.
Detroit power near Detroit, Oreg.	Pilot Knob near Yuma, Ariz.
Dewey Reservoir near Moab, Utah.	Provo (steam) near Provo, Utah.
El Paso (steam) near El Paso, Tex.	Sacramento (steam) near Sacramento, Calif.
Five Mile Rapids near The Dalles, Oreg.	Scriver Creek near Garden Valley, Idaho.
Folsom power near Folsom, Calif.	South Dakota (steam) near Mobridge, S. Dak.
Fort Collins (steam) near Fort Collins, Colo.	

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For a reserve of irrigation and multiple-purpose projects, more than 200 potential areas were under investigation. The work was divided among the States approximately as follows:

State	Project	Basin surveys	State	Project	Basin surveys
Arizona.....	10	2	Oklahoma.....	5	2
California.....	7	4	Oregon.....	20	4
Colorado.....	19	5	South Dakota.....	3	5
Idaho.....	13	4	Texas.....	7	7
Kansas.....	4	3	Utah.....	21	5
Montana.....	6	5	Washington.....	3	2
Nebraska.....	4	1	Wyoming.....	12	6
Nevada.....	1	3			
New Mexico.....	5	2	Total.....	145	64
North Dakota.....	5	4			

Tentative reports were prepared on 11 individual projects and 9 basin-wide reconnaissances as follows:

Project	River	State	River Basin	States
Balmorhea.....	Pecos.....	Texas.....	Missouri River below Fort Peck..	Montana, North Dakota, South Dakota.
Vaughn Division.....	Sun.....	Montana.....		
Robert Lee.....	Colorado.....	Texas.....	Upper Brazos.....	Texas.
Kern River.....	Kern.....	California.....	North Canadian..	New Mexico, Oklahoma, Texas.
Middle Rio Grande.....	Rio Grande.....	New Mexico.....	Smoky Hill.....	Colorado, Kansas.
Savage pumping.....	Yellowstone.....	Montana.....	South Umpqua.....	Oregon.
Mountain Home.....	Snake.....	Idaho.....	Neuces.....	Texas.
Bully Creek.....	Malheur.....	Oregon.....	Grand.....	North Dakota, South Dakota.
Cambridge.....	Republican.....	Nebraska.....	Knife.....	North Dakota.
Intake pumping.....	Yellowstone.....	Montana.....	Big Horn.....	Montana, Wyoming.
Canyon Ferry.....	Missouri.....	do.....		

The Bureau has been reviewing flood control reports of the War Department in numerous stream basins in California. Eight reviews have been completed and 20 others are in progress. This work has been carried out under the terms of the agreement of August 14, 1939, by which the Bureau of Reclamation, the War Department and the Department of Agriculture interchange information on multiple-purpose projects. The National Resources Planning Board is the liaison agency.

Operation of Projects

Multiple Goal Pursued

Production of food, forage and fiber was the multiple goal of the operation and maintenance activities on the Bureau's irrigation projects. Foresight pointed to the time when these agricultural commodities and especially foodstuffs might have as much effect on the outcome of the war as weapons.

The Division of Operation and Maintenance from headquarters in

Denver urged all projects to respond to the growing need for essential foodstuffs and livestock by bringing all irrigable land into production. On some projects idle tracts were leased and brought into cultivation. Larger areas of withdrawn classified land were leased for expanded stock raising. The acreage planted in the spring of 1942 was an increase over 1941.

The educational program to assist farmers in making the most economical use of available water supplies, preventing soil erosion, eradicating noxious weeds and developing pasture acreages, made good progress. Motion pictures, illustrated lectures, and instructive circulars were used.

Cooperative programs with agencies of the Department of Agriculture were continued. The Farm Security Administration has been active in helping settlers on newly developed areas on several Reclamation projects. Funds were transferred during the fiscal year 1942 for the employment of specialists of the Extension Service to assist farmers on certain Reclamation projects.

The Bureau took measures to aid in the Federal program for directing excess purchasing power of the water users into non-inflationary channels. It urged retirement of outstanding debts, advance payment of Government obligations and the creation of a reserve fund to take care of post-war emergencies. Projects were given information on the Government's policy with suggestions as to methods of cooperation.

Soil and Moisture Conservation Work Continued

Soil and moisture conservation operations were continued on lands under the Bureau's jurisdiction. Work included hydrographic measurements and studies for determination of seepage losses in canals and laterals; studies of materials and demonstrations of their application as sealing agents to reduce seepage; prevention of water erosion and depletion of soil fertility; and construction of controlling structures and planting of vegetation on noncultivated land at locations suffering from extreme wind erosion.

Six Contracts With Water User Organizations Executed

Amendatory contracts under the Reclamation Project Act of 1939 to adjust annual repayments to paying ability were executed with 6 water users' organizations. Contract drafts have been completed for 5 irrigation districts, and preliminary drafts for 9. Preparatory studies were begun on contracts for 11 districts.

Under the act of 1939, reclassification of irrigable acreages has been completed on 6 projects, and was in progress on 2 others.

Relief to Water Users Reduced

Relief by the extension of time for the payment of construction charges pursuant to Section 17b of the act of 1939, where water users are unable to pay such charges without great hardship, was greatly reduced. Time extensions were granted to 10 districts by the Secretary of the Interior for charges accrued for the calendar year 1941. The extensions amounted to \$322,929 or less than 11 percent of charges due from all projects, a reduction of about 50 percent of the amount granted for 1940. More prosperous conditions and improved water supplies increased the ability of the water users to pay their obligations.

CCC Suspended

Civilian Conservation Corps camp operations on Federal Reclamation projects were suspended late in the year in anticipation of the termination of CCC activities. Originally organized under the Emergency Conservation Work program, the CCC established its first camp on a Reclamation project at Guernsey Reservoir in Wyoming in 1934. On July 1, 1941 there were 43 camps.

During the past 7 years over 15,000 old wooden water control structures in canal systems were ripped out and replaced by permanent concrete structures; canals were straightened, strengthened, and rebuilt to grade and cross-section, and more than 100 miles were concrete-lined; 3,000 miles of operating roads were constructed along canal banks; dams of all types were examined, and rebuilt and repaired wherever necessary; 40,000 acres in reservoir areas were cleared of timber and debris; destructive rodents by tens of thousands were exterminated; and an aggressive campaign of weed control on Government lands was developed.

A major part of the construction on the Deschutes project, Oregon, was assigned to CCC forces. They also undertook reservoir clearing jobs on Utah projects, at Shasta Dam in California, and Vallecito Dam in Colorado. Facilities built by the CCC now provide recreation at Elephant Butte and Alamogordo Reservoirs in New Mexico, Guernsey, and Alcova in Wyoming, Minatare in Nebraska, Lahontan in Nevada, and Lake Walcott in Idaho.

CCC camps were assigned in 1942 to seven water conservation and utilization projects in the Dakotas, Nebraska, Montana, Wyoming, and Colorado, to build dams, canals and related structures.

The work of enrollees at camps on Reclamation projects trained thousands of truck drivers and tractor operators. Elementary training in concrete and masonry construction, erection of frame structures and the use and repair of hand tools were standard on job courses.

Although CCC work on Reclamation projects was far from complete when suspended, the excellent condition of the reservoirs and canal systems brought about by CCC forces is high-quality insurance against interruptions in the growing of crops on irrigated land.

Bureau Organization Being Remolded

The organization of the Bureau of Reclamation in Washington and in the field was being molded to the war pattern. Power plant construction, protection of structures against sabotage and preparation for irrigation expansion to meet war needs required an increase in personnel which more than offset military furloughs and transfers to other war agencies. The number rose from 7,636 to 8,016. The number of field offices remained at 57 but arrangements were being made to close several small ones.

Effective October 1941, the headquarters of the Operation and Maintenance division was transferred from Washington, D. C., to Denver, Colo. The accounting division, except for the chief accountant and a staff of five, also was transferred to Denver—to be designated as the central accounting office.

TABLE 4.—Accretions to Reclamation fund by States

States	Sale of public lands		Proceeds from oil leasing act		Total to June 30, 1942
	Fiscal year 1942	To June 30, 1942	Fiscal year 1942	To June 30, 1942	
Alabama			\$3, 313. 07	\$197, 572. 26	\$197, 572. 26
Arizona	\$21, 697. 82	\$2, 763, 735. 13	1, 370. 02	4, 852. 24	2, 768, 587. 37
California	36, 764. 10	8, 302, 096. 00	1, 112, 749. 20	20, 629, 356. 23	28, 931, 452. 23
Colorado	9, 937. 03	10, 322, 798. 29	99, 890. 74	997, 259. 52	11, 320, 057. 81
Idaho	10, 655. 49	7, 054, 747. 18	479. 35	22, 206. 29	7, 076, 953. 47
Kansas	81. 71	1, 033, 601. 40	3, 720. 28	6, 815. 54	1, 040, 416. 94
Louisiana			12, 698. 46	321, 484. 82	321, 484. 82
Michigan			19. 69	47. 26	47. 26
Mississippi			84. 00	110. 25	110. 25
Montana	4, 123. 41	15, 387, 227. 78	114, 951. 74	1, 536, 584. 47	16, 923, 812. 25
Nebraska	456. 53	2, 097, 288. 25	26. 25	252. 00	2, 097, 540. 25
Nevada	3, 237. 34	1, 040, 385. 90		5, 614. 22	1, 046, 000. 12
New Mexico	13, 773. 82	6, 742, 290. 99	870, 297. 49	3, 639, 373. 98	10, 381, 664. 97
North Dakota	68. 76	12, 219, 646. 27	29, 421. 78	240, 407. 90	12, 460, 054. 17
Oklahoma	468. 39	5, 931, 145. 58	3, 389. 15	6, 089. 77	5, 937, 235. 35
Oregon	424. 58	11, 994, 947. 97	665. 20	852. 02	11, 995, 799. 99
South Dakota	1, 206. 42	7, 733, 675. 48	5, 810. 28	12, 746. 26	7, 746, 421. 74
Utah	27, 333. 49	4, 397, 505. 92	145, 309. 90	984, 428. 13	5, 381, 974. 05
Washington	6, 674. 65	7, 472, 860. 19	5, 626. 55	42, 308. 26	7, 515, 168. 45
Wyoming	12, 143. 86	8, 720, 428. 32	1, 489, 478. 77	39, 493, 629. 58	48, 214, 057. 90
Total	149, 047. 40	113, 214, 380. 65	3, 899, 301. 92	68, 141, 991. 00	181, 356, 371. 65
Proceeds, Federal water-power licenses					1,893, 844. 45
Proceeds, potassium royalties and rentals					21, 145, 405. 42
Receipts from naval petroleum reserves, 1920 to 1938, act of May 9, 1938					29, 778, 300. 23
Grand total					213, 173, 921. 75

1. Proceeds for fiscal year, \$38,408.83.

2. Proceeds for fiscal year, \$297,639.17.

The accounting division transfer was not officially effective until July 1, however, and was not reflected in the personnel employed as of June 30, 1942, in Washington, D. C.—152, including the Commissioner and Assistant Commissioner and employees detailed to other offices and agencies but carried on the Washington office salary roll. Of the 7,864 Bureau employees in the field, 1,086 were in the field headquarters at Denver under supervision of the Chief Engineer and the General Supervisor of Operation and Maintenance and 6,778 were engaged in construction or operation and maintenance activities on the projects.

Fifty supervisory engineers report directly to the Chief Engineer in Denver; 22 project superintendents or other supervising officials report directly to the General Supervisor of Operation and Maintenance. Both the Chief Engineer and General Supervisor report to the Commissioner, who is appointed by the President and serves under direction of the Secretary.

During the year 517 Bureau employees were given military furloughs. The Bureau also released several hundred engineers for civilian transfers to the War Department, Navy Department, and other war agencies.

Reclamation Fund Accretions

Accretions to the Reclamation fund created by the Reclamation Act of 1902 (table 4) brought the total cash available from this source in 40 years to \$213,173,921.75. Collections—construction and operation and maintenance repayments, water rentals, power, etc.—were \$141,266,462.78. Disbursements totaled \$339,913,575.29, leaving a balance in the fund on June 30 of \$14,526,809.25.

Construction repayment collections during the year totaled \$2,327,886.42; operation and maintenance collections amounted to \$1,253,099.50; and water rental, power, and other receipts of \$2,983,596.66 were repaid to the Reclamation fund during the fiscal year 1942.

Federal Investment Increased

Construction expenditures for all projects during the year of \$84,349,841.29 increased to \$816,768,590.05 on June 30, 1942, the Federal investment, through the Bureau of Reclamation, in irrigation, power and multiple-purpose facilities in the West (table 5).

The emphasis in the fiscal year 1942 was on facilities which will bring in power for war industries. Expenditures, however, were directed toward completion of facilities which will benefit irrigation directly through additional storage or which, through power revenues, will assist in the repayment of the cost of irrigation systems.

For the fiscal year 1943, appropriations by the Congress for the Bureau of Reclamation totaled \$89,273,270, summarized as follows:

Reclamation fund:	
Operation and maintenance.....	\$1, 171, 220
Construction.....	1, 475, 840
Total.....	<u>\$2, 647, 060</u>
General fund:	
Colorado River front and levee system.....	\$47, 895
Colorado River development fund.....	399, 750
Colorado River dam fund:	
Boulder Canyon project.....	4, 999, 750
All-American canal.....	1, 000, 000
Protection of project works.....	700, 000
Construction (13 projects, investigations, etc.)....	78, 979, 340
Fort Peck power.....	499, 475
Total general fund.....	<u>86, 626, 210</u>
Grand total.....	<u>89, 273, 270</u>

John S. Moore, Field Supervisor in Charge of Soil and Moisture Conservation, was appointed General Supervisor of Operation and Maintenance effective September 16, 1941, succeeding George O. Sanford, retired. From Denver headquarters Mr. Moore supervises the activities of 15 projects which are operated in their entirety by the Bureau and 7 other projects which are Bureau-operated with respect to their dams, reservoirs and other reserve works. His administration also extends to 25 projects and operations conducted by water users' organizations under contracts with the United States. The Operation and Maintenance division deals with approximately 120 separate water users' organizations which are under contract with the United States.

TABLE 5.—Consolidated statement of construction cost of Reclamation projects ¹

	Construction cost		Operation and Maintenance before public notice (net)	Operation and Maintenance arrearages and penalties		Construction revenues, contributed funds, and nonreimbursable appropriation		Abandoned works and nonreimbursable cost and authorized charge-offs	Total repayable		
	Fiscal year 1942	To June 30, 1942		Fiscal year 1942	To June 30, 1942	Fiscal year 1942	To June 30, 1942		Fiscal year 1942	To June 30, 1942	
<i>Regular projects</i>											
Total.....	\$70, 537, 275. 23	\$604, 270, 362. 71	\$77, 660. 44	\$3, 294, 705. 07	\$127, 805. 37	\$9, 433, 920. 68	\$955, 788. 83	\$15, 771, 219. 35	\$17, 131, 650. 70	\$69, 787, 552. 21	\$584, 096, 121. 41
<i>Water conservation and utility projects</i>											
Total.....	\$1, 845, 524. 67	\$4, 684, 622. 93	\$21, 091. 43	\$39, 013. 70							
<i>Special projects</i> ²											
Colorado River Dam fund: ³											
All-American Canal.....	\$1, 069, 486. 45	\$31, 773, 647. 25									
Boulder Canyon project, Arizona:	3, 025, 473. 76	134, 898, 945. 52									
Parker Dam ⁴	5, 990. 82	6, 803, 083. 15									
Parker Dam power ³	6, 278, 106. 32	10, 771, 075. 17									
Texas:											
Colorado River, Tex. ⁵	1, 596, 965. 68	23, 566, 853. 32									
Total.....	11, 967, 041. 39	207, 813, 604. 41									
Grand total.....	\$4, 349, 841. 29	\$16, 768, 590. 05									

¹ Consolidated statement by individual projects available in mimeographed form at Bureau of Reclamation, Washington, D. C.

² Projects constructed under special legislation.

³ All costs repayable.

⁴ Funds advanced by Metropolitan Water District of Southern California.

⁵ Repayable costs not determined.

(Note.—Specific details relating to individual projects and to power production normally contained in this report have been deleted at the request of the Office of War Information and the War Department)

Bonneville Power Administration

PAUL J. RAVEN, Administrator

DURING the fifth year of its existence, the Bonneville Power Administration greatly increased its delivery of electric energy to war industries, public-owned distribution agencies, Government agencies and private utility enterprises. The energy of the two great dams on the Columbia river—Grand Coulee and Bonneville—was utilized almost continuously on a 24-hour a day basis, and served as one of the aggressive war weapons of the United States.

At the outbreak of the war in December 1941 the Administration was already far along in its war production program and through advanced planning prepared to take on even greater war loads.

With the passage of the defense appropriation bill (H. R. 1055) in June 1940 and the lend-lease bill (H. R. 1776) in March 1941, the Administration early recognized that a tremendous increase in the generating capacity of the Nation was necessary to carry out a war production program.

Early in 1941 the Administration recommended acceleration of installations of generating units at both Bonneville and Grand Coulee Dams and the speeding up of construction of necessary facilities to transmit the additional power to load centers.

As a result additional generating units were authorized at Bonneville Dam and at Grand Coulee Dam. In addition Shasta units were transferred from California for installation at Grand Coulee.

There was also appropriated to the Administration the sum of \$48,858,500 for the fiscal year 1942 for the construction of transmission and substation facilities.

The declaration of war and decisions to locate many war loads east of the Cascades made necessary certain major changes in the Administration's 1942-43 program. It nevertheless found the Administration in a position to meet the war strategy with changes only as to

location of additional lines and substation facilities, thus justifying the basic planning of the system.

The impact of the war program in the area served by the Administration was reflected by war contracts totaling \$1,259,449,000, covering the manufacture of aircraft, ships, ordnance, military and naval supplies and the construction of barracks, docks and munition depots, which had been awarded in Oregon and Washington, between June 15, 1940, and December 31, 1941. This figure does not include the purchase of raw materials such as aluminum, copper, zinc, lead and timber produced in the area.

The Columbia River projects, which had been assailed as "white elephants in the wilderness" during their building, had become an integral part of the war effort of the United States.

As the year ended the Administration operated a transmission system containing 1,748 miles of transmission lines and 37 substations.

The Administration acted to integrate all of the Northwest's power resources to provide greater security of service for the growing war load. In addition to its interconnections with the public systems of Seattle, Tacoma, Centralia and Grays Harbor, Wash., and Eugene and McMinnville, Oreg., the Administration interconnected its system with those of the Washington Water Power and Pacific Power & Light Companies. An interconnection with the Portland General Electric Co. was continued through the year.

Public-owned agencies, established for the purpose of distributing Columbia River power without profit and entitled to preference in purchasing Columbia River power under the Bonneville Act, voluntarily postponed their plans for construction of new power facilities until after the war.

Those public-owned agencies which were already in business and receiving Columbia River power continued to make steady reductions in rates in the face of rising costs attendant on the war.

During the year public ownership progress was steady. Eleven public agencies in Washington and Oregon were successful in purchasing either all or part of privately owned utility systems. Two other Oregon Peoples' Utility Districts approved revenue bond issues for the purchase of existing utility properties for \$885,000. During the year, 17 public agencies executed new contracts and 9 public agencies revised existing contracts with the Bonneville Administration for the purchase of power. The Administration's power deliveries to public agencies increased in the 1942 fiscal year.

The Year's Power Sales

Both from the standpoint of actual power deliveries and from the standpoint of "demand value" of contracts executed, the Administration's power sales showed heavy gains during the fiscal year 1942.

Of power actually delivered, war industries, comprising principally aluminum and shipbuilding, purchased 81.4 percent; private utility companies, 14.7 percent; public agencies, 3.8 percent; and Federal agencies, 0.1 percent.

Twenty-six new power contracts were executed during the year, bringing the cumulative total of signed contracts to 70.

TABLE 1.—New prime power contracts executed fiscal year 1942

Class	No.	Class	No.
Districts.....	6	Industries.....	4
Cooperatives.....	11		
Federal agencies.....	5	Total ¹	26

¹ In addition to these, four public utility district contracts, four REA cooperative contracts, two contracts with municipalities, one industrial contract and one contract with a private utility were revised as to contract demand.

The War Market

By June 30, 1942, industrial power contracts and commitments dominated the Administration's marketing program and construction plans. Industrial loads, all of them for war production, accounted directly for 92 percent of current contracts and commitments for 899,920 kilowatts.

The economics of the Pacific Northwest and of the electro-process industries of the country had long indicated that industrial power sales would play a major role in the development of the Northwest region.¹

At the close of the 1941 fiscal year, the Bonneville Power Administration had reported to the Department of the Interior some 20 types of industry which, by reason of their raw material, power and market needs, were especially feasible of establishment in the Pacific Northwest.² During 1942, the Bonneville Power Administration agreed to serve 5 of these 20 types of industry.

Shipyards Added to Load

In addition to industries of the "electro" type, the war brought a new market for power in the development of a huge shipyard industry. The Administration agreed to serve three shipyards in the Portland, Oreg.-Vancouver, Wash., district. The three new yards required a total supply of power which would not have been available in the lower Columbia district had it not been for the Bonneville project. New electric welding processes which require large blocks of electricity have reduced shipbuilding time from 250 days to as low as 10 days.

¹ See improvement of Columbia River at Bonneville, Oreg., War Department, Corps of Engineers, 1935-38; Annual Report of the Federal Power Commission, Fiscal Year Ended June 30, 1938; Annual Reports of the Administrator of the Bonneville Power Administration, 1938-41.

² See Annual Report of Bonneville Power Administration, 1941.

In detail, the Bonneville Administration's industrial power sales position on June 30, 1942, was as follows:

TABLE 2.—Industrial contracts in effect, June 30, 1942¹

Name	Date power contract signed
Aluminum Co. of America, unit 1.....	Dec. 20, 1939
Alcoa, unit 2.....	Apr. 16, 1940
Alcoa, units 3, 4, and 5.....	Oct. 21, 1940
Alcoa, overload units.....	Apr. 3, 1941
Do.....	Jan. 30, 1942
Pacific Carbide & Alloys Co.....	July 6, 1940
Pennsylvania Salt Manufacturing Co.....	Dec. 18, 1940
Reynolds Metals Co.....	Feb. 24, 1941
Do.....	Mar. 10, 1941
Oregon Shipbuilding Co.....	May 20, 1941
Electro Metallurgical Co.....	May 29, 1941
Do.....	do.....
Pennsylvania Salt Manufacturing Co.....	Oct. 17, 1941
Defense Plant Corporation.....	Feb. 18, 1942
Kaiser Co.....	May 8, 1942

¹ In addition, Defense Plant Corporation was being supplied with power in eastern Washington as the fiscal year ended, prior to formal signing of contract. Other commitments also had been made (see table 5).

Market Development Emphasized

In order to provide a solid foundation for the new electro industries of the region and to insure their continuous operation, technicians of the Administration assisted materially in the establishment of other industries, the products of which are critically needed in the manufacture of the materials and chemicals produced because of the availability of Columbia River electric power.

A proposal for a coke plant sponsored by a local industrial group was prepared, presented and carried through to approval by war agencies with the assistance of the Administration.

Similarly, ferro-alloys manufacturers and calcium carbide producers were assisted in obtaining suitable grades of raw materials in Oregon and Washington. Bonneville technicians also cooperated in the establishment and expansion of a plant in Utah, for the production of alumina from alunite ores and clays. This was a significant step since inexhaustible deposits of aluminum bearing clays are available on the Bonneville transmission system in the Castle Rock region of Washington. All these activities were undertaken with the firm conviction that suitable low-cost raw materials could be made available from the area's natural resources for the metallurgical and electro-chemical plants in the region to insure their continuity of operation.

These activities were carried on in conformance with the policy expressed by the Secretary of the Interior that the west is not only

building for the war, but for its future and that of the Nation. Every electro industry established during the past 4 years in the Pacific Northwest is part of a pattern of industrial development providing for the complete processing of Northwest resources from raw materials to consumer goods.

The Public Power Market

At the close of the year a total of 53 contracts between the Bonneville Administration and public utility districts, municipalities, cooperatives and Federal agencies had been executed.

Seventeen contracts with public agencies were executed during the 1942 fiscal year.

By the end of the year the cumulative total of Bonneville's public agency contracts included 17 with utility districts, 12 with municipalities, 19 with cooperatives, financed in all but one case by the Rural Electrification Administration, and 5 with Federal agencies.

Twenty-six of these fifty-three public agencies were distributing Columbia River power and nine cooperatives and two public utility districts were assured of Columbia River power almost immediately through interconnection agreements between the Bonneville Administration and privately owned utilities.

As of June 30, 1942, the Administration's contracts to public distribution agencies were as follows:

TABLE 3.—Contracts with public agencies ¹

PUBLIC UTILITY DISTRICTS

Name	Date executed ²	Date energized	Name	Date executed ²	Date energized
Skamania.....	Apr. 14, 1942 ³	Jan. 3, 1940	Clark.....	Apr. 17, 1941	
Pacific No. 2.....	Sept. 8, 1941 ³	Oct. 17, 1940	Cowlitz.....	Apr. 28, 1941	Aug. 11, 1941
Wahkiakum.....	Nov. 10, 1939	Nov. 12, 1940	Yakima.....	July 9, 1941	
Klickitat.....	June 18, 1942 ³	Nov. 6, 1940	Clatskanie.....	Mar. 17, 1942	
Tillamook.....	May 15, 1940		Central Lincoln.....	do.....	
Kittitas.....	Oct. 3, 1940	June 19, 1941	Union Co.....	do.....	
Lewis.....	Oct. 4, 1940	May 1, 1941	Whatcom.....	May 19, 1942	
North Wasco.....	Oct. 28, 1940		Grant Co.....	June 17, 1942	
Grays Harbor.....	Nov. 7, 1940	Nov. 9, 1940			

MUNICIPALITIES

Cascade Locks ⁴	Feb. 14, 1939	July 26, 1939	Tacoma.....	Mar. 5, 1940	Mar. 9, 1941
Forest Grove.....	Nov. 7, 1939	Nov. 27, 1939	Seattle.....	May 6, 1940	May 25, 1941
Canby.....	Dec. 22, 1939	Feb. 1, 1940	Ellensburg.....	Aug. 1, 1940	May 27, 1941
Monmouth.....	Jan. 5, 1940	Dec. 4, 1940	Eugene.....	Aug. 20, 1940	Dec. 6, 1940
McMinnville.....	Jan. 13, 1940	Oct. 18, 1940	Drain.....	Mar. 15, 1941	Apr. 1, 1941
Centralia.....	Feb. 13, 1940	Jan. 1, 1941	Grand Coulee.....	May 1, 1941	Jan. 6, 1942

¹ In addition to these, contracts have been signed with 6 war agencies. These include Army air bases, Coast Guard stations, navy yards and cantonments.

² Contracts are listed in order in which they were originally signed.

³ Revised.

⁴ Contract provides prime, secondary, and dump power.

TABLE 3.—Contracts with public agencies¹—Continued

COOPERATIVES

Name	Date executed ²	Date energized	Name	Date executed ²	Date energized
Benton-Lincoln	June 27, 1940	Oct. 12, 1940	Blachly-Lane Co-op.	Oct. 7, 1941	-----
Columbia R. E. A.	Oct. 1, 1940	July 17, 1941	Lane Co. Co-op.	May 1, 1942	-----
Wasco Elec. Co-op.	Oct. 2, 1940	May 24, 1941	Okanogan R. E. A.	June 15, 1942	-----
Inland Empire	June 5, 1942 ³	-----	Umatilla R. E. A.	do.	-----
Nehalem Valley	Oct. 7, 1940	Feb. 1, 1941	Big Bend Elec. Co-op.	-----	-----
Nespelem Valley	Feb. 19, 1941	Sept. 12, 1941	Kootenai R. E. A.	June 17, 1942	-----
Salem Elec. Co-op.	Mar. 17, 1941	Mar. 29, 1941	Stevens Co.	June 18, 1942	-----
Lincoln Elec. Co-op.	May 30, 1942 ³	Apr. 3, 1942	Idaho Co. L. & P. Co.	June 5, 1942	-----
North Douglas	Mar. 18, 1942 ³	July 15, 1941	-----	-----	-----
West Douglas	Aug. 29, 1941	Sept. 2, 1941	-----	-----	-----
Benton R. E. A.	June 15, 1942 ³	-----	-----	June 8, 1942	-----

Progress of Public Agencies

The public agency market for Columbia River power is largely dependent upon the ability of public-owned electric utilities to enter active business and become purchasers of power at wholesale.

For this reason the Administrator continued to accede to the wishes of the local utility districts, to serve as their official negotiator for the purchase of privately held utility systems.

One municipality, six cooperatives, and four public utility districts in Washington and Oregon reported success during the fiscal year in purchasing either all or part of privately owned utility systems.

The Skamania, Grant, Lewis, and Klickitat County Public Utility Districts, the city of Grand Coulee municipal system, the Orcas Light & Power Co. (REA), and the Stevens County Electric Cooperative each purchased all or part of privately owned utility systems in Washington. In Oregon the Central Electric, Coos Electric, Lane County Electric, and North Douglas Electric Cooperatives all completed purchases of all or part of utility systems.

The Clatskanie Peoples' Utility District and the West Coast Power Co. reached agreement to purchase the company's Clatskanie division for \$150,000 and the Central Lincoln District agreed to purchase the company's coast division for \$735,000. Revenue bonds were approved by voters in the two districts.

The Tillamook (Oreg.) Peoples' Utility District also reached an agreement to purchase practically all of the Mountain States Power Co. properties in Tillamook County for \$625,000.

The Public Agencies' Operating Record

On June 30, 1942, 26 public agencies had been distributing Columbia River power for periods up to 36 months. The success shown in their operations records was significant in its illustration of the possibilities which the public power market holds for the distribution of Columbia River power. Since the Federal statute under which the Bonneville

Administration operates makes public agencies and cooperatives the Administration's preferred market, the record of these first small public-owned utilities assumed double significance.

In 1939, 1940, and 1941, and the first half of 1942 the public electric systems in Oregon and Washington made rate reductions amounting to more than \$1,417,000. As a result of these reductions power consumption increased, thus permitting gross revenues to remain stable.

Substantial reductions in rates have been made by the public systems of Canby, Cascade Locks, Columbia County REA, Cowlitz County PUD, Drain, Forest Grove, Ellensburg, Eugene, Grays Harbor PUD, Kittitas County PUD, Lewis County PUD, McMinnville, Monmouth, Nehalem Valley REA, Pacific County PUD, Seattle, Skamania PUD, Tacoma, Wahkiakum PUD, Centralia, Douglas Electric Cooperative, Salem Electric Cooperative, Columbia County REA, and the City of Grand Coulee.

The Clark County Public Utility district signed contracts during the fiscal year to supply Columbia River power to a Federal Public Housing Authority project at Vancouver, Wash., and to one war industry. The housing project, which may be enlarged, included 1,000 permanent houses, 4,000 temporary houses, dormitories for 4,400 men, and 2,000 units of family apartments. These contracts gave the district a greater load than that supplied by the two private utility companies serving Vancouver.

One of the private utilities offered to supply the load for the 1,000 permanent houses for about \$84,600 a year. The district is supplying this load for approximately \$36,190. Housing Authority officials say it is the lowest power rate it has received in the United States.

During the year Monmouth, Oreg., made its second rate reduction. McMinnville, Oreg., also effected its second rate reduction since contracting for Bonneville-Grand Coulee power. The reduction brought McMinnville rates into line with the Bonneville standard resale rate and resulted in a further substantial saving to customers.

Typical of rural cooperative performance was the record of the Wasco Electric Cooperative in the mid-Columbia River valley. During the first 12 months of its operation with Columbia River power, the Wasco cooperative brought electricity to 365 Wasco County farmers who had never before had access to electricity. Nearly 340,000 kilowatt-hours were sold by the cooperative. Revenues totaled nearly \$10,000.

Cascade Locks (Oreg.) City Light, by June 1941, had reduced rates 31 percent, yet as a result of increased use of electricity by customers maintained its revenue from power sales.

Customers of this municipal system with their June 1942 bills received another reduction of 15 percent in commercial rates.

Future Industrial Sales

During the early months of the 1943 fiscal year the Administration expected to execute power sales contracts for the delivery of Bonneville and Grand Coulee energy to new war industrial plants, in addition to additional blocks of power to existing industrial customers. The Administrator had made definite commitments during 1942 to supply these plants and additions. It was expected that the full demand would be required by these plants before the middle of the 1943 fiscal year.

Contracts for these new plants were in advanced negotiation at the close of the fiscal year 1942. Several of the plants were actually under construction. The list follows:

TABLE 5.—Industrial contracts pending, fiscal year 1943

Company	Type of operation
Kaiser Shipbuilding Corporation-----	Shipbuilding.
Defense Plant Corporation-----	Reduction of aluminum oxide. ¹
Do-----	Reduction of aluminum oxide.
Do-----	Aluminum rolling mill.
Do-----	Magnesium.
Do-----	Ferro-silicon.
Oregon Electric Rolling Mill-----	Steel rolling mill.
Defense Plant Corporation-----	Reduction of aluminum oxide.
Oregon Shipbuilding Corporation-----	Shipbuilding.

¹ Energized May 1, 1942.

Prospective power sales to war and other industries in the Northwest for the fiscal years beyond 1944 were, of course, progressively more difficult to estimate. For this reason, in planning future generating and transmission capacities, the Administration endeavored to plan a power system of sufficient flexibility to supply not only normal load growth, but any fluctuations in load which might grow out of a war need extending over a number of years.³

Other Future Sales

The Bonneville Administration's estimates of power sales from its own system for the years 1943 through 1945 included four other classes of customers. These were non-Federal electric utilities, public power agencies, military establishments, and war housing projects which, among them, were estimated to require a combined peak delivery of 576,200 kilowatts by 1945.

³ For details see Six-Year Construction Program for Bonneville Power Administration, revised as of June 1942.

Service for Future Loads

In conformance with Executive Order No. 8455, the Bonneville Administration during the 1942 fiscal year revised its 6-year construction program in the light of new factors which developed during the year.

These new construction estimates of the Administration were conditioned by two fundamentals: First, the fact of the war need, and second, the fact that almost no other utility within the region has definite plans for expansion of its generating capacity.

These two factors meant that both normal growth in power consumption within the region and growth in power demand incident to a war of uncertain duration would have to be met in their entirety by the region's Federal power projects.

In planning future generation and transmission capacity, therefore, the Bonneville Administration planned to fill not only the needs of its own customers but the expanding needs of the region as well.

In the formulation of these plans three things became at once apparent: (1) that immediate material shortages would compel slight reductions in the over-all power consumption of the region in 1943 and 1944 below the Administration's estimates of June 1941, which were made contingent upon a recommended earlier installation of generators; (2) that beginning with 1945 the region's power needs would increase, in an annually expanding ratio, above the Administration's estimates of June 1941; and (3) even with the slight reduction of use in 1942 and 1943, additional generating capacity would be required in the Pacific Northwest over and above both existing and authorized capacity.

At the end of 1944, including units definitely approved for construction at the end of the 1942 fiscal year, the installed capacity of Bonneville and Grand Coulee Dams will be an insufficient total in view of the region's predictable needs.

New Generating Capacity Needed

Because of the potential power shortage in the region, the Bonneville Administrator jointly with the Bonneville Advisory Board, on February 10, 1942, urged that studies be completed on the 10 hydroelectric power projects in the Northwest which are known to be feasible of early construction. In addition the Administrator recommended immediate construction of another dam on the Columbia River accessible to the existing Bonneville-Grand Coulee transmission system and to the larger load centers of the region.

It was further recommended that new generator installations should be scheduled immediately because of the time required to complete

such installations. Only in this way could an adequate supply of power be assured for what might be the critical years of 1946 to 1949.

To carry this tremendous capacity from the power stations on the Columbia River to the power market centers of the region, extensive additions to transmission and terminal facilities of the Pacific Northwest will be required.⁴

The Year's Construction

The congressional appropriation of almost \$23,000,000 received by the Bonneville Administration at the start of the 1942 fiscal year instituted a construction program almost twice that of the previous fiscal year.

This enlarged program was again increased by an additional appropriation of \$30,000,000 in December 1941. Since the war program required the use of critical materials for the production of war goods, the Administration's program was limited after December 7 to only those extensions of its system which contribute directly to the prosecution of the war. As a result the Administration held in reserve a considerable portion of its construction funds at the end of the fiscal year pending determination of their detailed use.

New Facilities Energized

The Administration placed 586 miles of transmission line and 530,050 kva of substation capacity in service during the fiscal year. This represents an average of 2.3 miles of transmission line and 2,100 kva of substation capacity completed for each working day.

At the close of the fiscal year the Administration operated a transmission system containing 1,748 miles of transmission lines and 37 substations.

Design work was in progress on 13 substations and 19 major substation additions and on 8 transmission lines totaling 437.3 miles in length.

Construction was in progress on substations and additions and on transmission lines having a total length of 629.7 circuit miles.

The Year's Operations

As an operating utility the Bonneville Administration faced new operating problems affecting both the agency's management procedures and its electrical operations.

Until the last quarter of the fiscal year the organization was expanding to meet the immediate needs of building new transmission

⁴ For detailed discussion of estimates of generation and transmission see Bonneville Power Administration construction program revised as of June 1942.

facilities to serve war industries. During that period production increased markedly until it reached a processing peak of obligating over \$7,000,000 per month. New production records were attained and all commitments to war industries fulfilled on schedule.

When the national shortage of copper, steel, aluminum and other metals became critical, however, these production levels began to decline until, during the latter quarter of the year, previously approved construction plans had to be postponed with a resultant tapering off in personnel and production.

Some copper, aluminum, steel and other critical materials originally ordered under proper priorities of the War Production Board could not be used under the curtailed program of construction later initiated by the same agency. A complete inventory of these materials was made and submitted to the War Production Board, and arrangements made to make it available to other war agencies as needed.

Financial Statements

Studies were continued during the year for the purpose of further simplifying the Administration's accounting methods.

Financial or general ledger accounts were kept in accordance with requirements of the General Accounting Office and cost accounts were kept in conformance with the Federal Power Commission's system.

The Power Supply and the Future

Both the law and the power economics of the Pacific Northwest make it mandatory upon the Federal Government to provide sufficient generating and transmission facilities to supply the region's ever-increasing power demands, whether for war or for peace.

In terms of immediate need, competent studies ⁵ forecast a serious shortage of power for war production by 1944 unless new power sources are immediately developed throughout the Nation.

In terms of post-war requirements, the Bonneville Administration's own studies ⁶ indicate a need of nearly 5 million kilowatts for normal use in the Northwest in 1949.

The Administration does not anticipate any power surplus when the war ends. Generators now installed or being installed are worked to capacity. Even the end of the war and the possible slow-down of a number of industrial plants would permit only a normal and necessary reserve of power and withdrawal of generating units for necessary reconditioning and replacement of worn parts.

⁵ Will Electric Power Be a Bottleneck? by Louis Marlio, Brookings Institution, Washington, D. C., 1942.

⁶ See Bonneville Power Administration's 6-year construction program, revised as of June 1942.

In its consideration of the future, the Bonneville Administration has concluded:

More generating capacity must be developed.—Generator schedules for Bonneville and Grand Coulee in 1943 should be maintained and given the highest possible priority assistance. Grand Coulee units, which have been redesigned for installation in the second powerhouse at Grand Coulee because of the transfer of Shasta Dam generators to the present powerhouse, should be completed in 1944. This will require higher priorities for both the generators and the powerhouse than the A-2 priority now assigned them. In the last 6 months of the fiscal year 1942, short-term policies of the War Production Board had threatened the speed of all these generator installations. Finally, in order that the Pacific Northwest may contribute its share of new kilowatt capacity to be required for 1945, an immediate program should be adopted for development of an additional supply through the authorization of additional generators at Grand Coulee Dam and by construction of new hydro projects, such as those feasible of construction on the Columbia River.

In the allocation of new war industry to the Northwest, the Administration's seven-point industrial program might well serve as guide:

1. Columbia River power should be sold to such industries and on such terms as help the long run and best development of regional resources.

2. The establishment of basic electro-process industries should be followed by fabricating and supply industries so as to support the operations of the basic industries and to provide products for regional consumption at lower costs than obtained at present.

3. New feasible industries should be financed and managed as far as possible by business men of the region.

4. Research on new processes to use electric power and raw materials in the region must be stimulated by governmental agencies and the results of such research should be freely available for use by independent enterprise.

5. The opposition of established industry to new competition from Northwest industry and the attempts of any industrial groups to control large amounts of Columbia River power must be prevented.

6. Within the region, new industries should be encouraged to decentralize in accordance with the advantages of locational factors and of the "postage stamp" rate of the regional network.

7. Columbia River power should be sold on such terms as contribute to the conservation of other resources of the region and as prevent the destruction of scenic and recreational assets.

Division of Power

ARTHUR GOLDSCHMIDT, Acting Director

SUPERVISION exercised by the Division of Power over problems involved in the development of electrical energy by agencies under the jurisdiction of the Department of the Interior acquired even greater significance when the attack on Pearl Harbor transformed a condition of national emergency into a state of total war. Already established by the Secretary of the Interior in April 1941 to promote efficient coordination of the Department's power production activities, the Division was able to gear its organization to aid in the prosecution of the war program without loss of time.

Power for War

During the fiscal year the activities of the Division of Power were dedicated to the fulfillment of the purposes for which it was created, intensified by the war and the urgency that it has brought for the development of additional power for war uses and the achievement of the maximum utilization of existing plants for that purpose. During the year the installed capacity of power projects under the jurisdiction of the Department was increased by more than 500,000 kilowatts. Perhaps the most significant step in the power program during the year was the beginning of operations at Grand Coulee Dam on the Columbia River in Washington.

The Division has been constantly engaged in working for the construction of power projects which will require a minimum quantity of critical materials and can be completed with sufficient speed to warrant construction for the war program. In the fall of 1941 a comprehensive program was worked out in conjunction with the Bureau of Reclamation and the Bureau of Mines to develop 1,480,000 kilowatts of additional electric generating capacity throughout the Western States and to use it for the extraction and beneficiation of strategic minerals. This program included the more rapid completion and expansion of projects now under way and proposed immediate authorization and

construction of projects still in the planning stage. It also called for the integration of the Federal power resources by transmission networks. The Division has aided in the preparation of specific proposals for the development and greater industrialization of the Western States insofar as the use of power facilities is involved.

The Department's work on programs relating to the furnishing of power for war involves continuing contact and cooperation with other Government agencies, particularly the War Production Board, the Reconstruction Finance Corporation and its subsidiaries, and the Federal Power Commission. The Division serves as liaison between various agencies of the Department and the war agencies which are centralized in Washington. This work of the Division has made it possible to continue the Department's policy of decentralizing the administration of its power activities.

Arrangements for the supply of power to the magnesium plant near Las Vegas, Nev., were worked out in conjunction with the Bureau of Reclamation, the allottees of Boulder power, and Defense Plant Corporation. This transaction constitutes one of the largest single sales of power to a consumer ever consummated. Negotiations extended over a period of 6 months and at the end of the year the principal agreement and three subordinate agreements were ready for execution.

Extensive negotiations with the War Production Board were, and still are, carried on to assure the maximum war use of the Columbia River power developments through the installation of additional generators at Bonneville and Grand Coulee Dams. Authorization was secured for the installation of generators at Bonneville which will raise the capacity of the plant. Authorization of more generators for Grand Coulee was also obtained, but when it became apparent that other war demands would delay the completion of these, the Division participated in an arrangement whereby generating units designed for the Central Valley project in California, and ready ahead of time through the foresight of the Bureau of Reclamation, were transferred to the Grand Coulee powerhouse to bring power to the new metallurgical and shipbuilding industries in the Northwest sooner than could otherwise have been done.

In seeking the full utilization of the Department's power resources the Division has sought to have war plants located on a sound basis, looking to lowering costs to war industries and the development of a balanced economy in the regions involved. It has also endeavored, to the fullest extent commensurate with war production needs, to secure the location of plants which might continue to operate after the war and thereby contribute to the post-war readjustment and to safeguarding the Government's investment in the facilities.

Every effort has been made to effectuate the consolidation or pooling of the power resources of the Department in such a manner as to

secure the greatest efficiency and to make available maximum quantities of power in various areas. The appropriate war agencies have been kept fully and promptly advised of the quantity and location of power available from the Department's projects and have otherwise had the benefit of complete information as to the capabilities of these projects. Initial steps in the creation of a power pool in the State of Arizona had been taken at the end of the year. Similarly, a plan for consolidation of the power resources of the Department in Wyoming was under study. At the same time, the Division has insisted that power from the projects in the Department be sold to the war agencies and contractors at the lowest possible rates in order that the cost of war materials and supplies produced with the power might be held to the lowest feasible level.

Members of the Division's staff advised the Secretary of the Interior upon the power problems of the Island of Puerto Rico which became acute largely due to the stringency of the oil supply on the island. In order to conserve oil and to make the utmost use of the power facilities, it became necessary that all of the facilities be completely integrated. At the request of the Territorial Government and the Federal Works Agency, the Division assisted in formulating a program for the integration of the properties of the two utility companies which served a portion of the island with those owned by the Territorial Government for the wartime welfare of the island.

Hetch Hetchy

The city and county of San Francisco submitted to the voters in November 1941 the plan for acquisition of a distribution system which the Secretary of the Interior had found would comply with the terms of the Raker Act. After the rejection of the charter amendment to put the plan into effect, a bill was introduced in Congress to relieve San Francisco of the statutory requirement to distribute solely for the public benefit the power developed through the storage of water in Yosemite National Park. Hearings were held by the Public Lands Committee of the House of Representatives at which the Department opposed any change in the conditions under which the use of national park lands had been granted by Congress. At the conclusion of the hearings, the bill was not reported out of committee.

Thereafter, largely through the efforts of the Division and in accordance with the suggestion made by the Secretary of the Interior at the hearing upon the bill to amend the Raker Act, arrangements were worked out for an aluminum reduction plant to be constructed by the Defense Plant Corporation to utilize Hetch Hetchy power in accord with the Raker Act. The Department, through the staff of the Division, and the Department of Justice then joined with the

city in petitioning the Federal District Court for a further stay of the injunction against the city, to prevent loss of revenue to it pending completion of the plant. The court granted an additional stay of 1 year, within which time all Hetch Hetchy power will be disposed of through a direct sale to the Government-owned aluminum plant.

Central Valley Project

Even with two of its generating units temporarily transferred to Grand Coulee, the Central Valley Dams will supply one of the largest single blocks of power that will become available for war production. Every effort has been made to expedite the completion of the Shasta and Keswick Dams and to secure the priorities for materials necessary to the generation of electric energy which the War Production Board has agreed is vitally needed in California. An appropriation was obtained to begin the construction of transmission lines to bring the power to load centers and for engineering work on a steam standby station which is a necessary adjunct to the project if the full benefits of the power development are to be secured for the people of the area and if power is to contribute an appropriate share to the repayment of the cost of the entire project. Comprehensive studies were under way, including studies relating to the marketing of the power and the rates at which it will be sold. Emphasis is being placed particularly on the most effective use of the power for war purposes.

General

As the clearing house for the increasing body of complicated problems incident to the power activities of the Department, the Division of Power had handled matters relating to the Park Service, the Office of Indian Affairs, the Bureau of Reclamation and the Bonneville Power Administration. All problems relating to the power projects of agencies of the Department, which are of sufficient importance to require the attention of the Secretary, have been cleared through the Division. Further steps were taken to obtain a smooth-running procedural relationship between the Office of the Secretary and the agencies of the Department dealing with power, and to establish machinery which will permit coordination of the many matters which are of concern to more than one of the agencies of the Department.

The review of applications for the use of public lands by utility companies and other power agencies was continued. A large number of contracts for the sale of power from reclamation projects was also studied and reviewed. Suggestions were made from time to time looking toward the establishment of uniform policies and practices in power sales. Further steps were taken for the effectuation of the

policy of including in contracts with distributors of power at retail, provisions relating to the rates at which the power is to be resold, the aim being to prevent excessive profits from resale of Government power in the development of which public funds and public resources have been utilized. A study of the wholesale rates for power generated on a number of projects in the Department was begun, in collaboration with the Bureau of Reclamation, to determine whether adjustments could be made in accordance with the Reclamation Project Act of 1939.

Preparations were made for the Division to appear for the several interested agencies of the Department of the Interior at a hearing before the Federal Power Commission on the application of the State of Arizona for a license to dam the Colorado River at Bridge Canyon.

At the request of the members of Congress who are sponsoring the legislation, representatives of the Division attended and participated in the hearings on the bill to establish a Columbia Power Administration to market power from the Bonneville and Grand Coulee projects. The measure would permit the administration in charge of marketing Bonneville and Grand Coulee power to acquire private utility systems in the Northwest and resell to public agencies and cooperatives the distribution properties. The generating and transmission facilities would be retained by the Federal agency and would be coordinated with the Federally constructed system. This integration of facilities would enable the area to produce an increased quantity of power now so vitally needed for war uses. The Division also participated in the work of the Department pertaining to a number of other legislative matters affecting power interests, including the proposed amendment of the Raker Act.

The Division of Power has participated in a large measure in the work of the War Resources Council of the Department which has effectively made available for use in connection with power and other natural resource development problems the advice and data of the entire Department.

Geological Survey

W. C. MENDENHALL, Director

A SUMMARY of the work of the Geological Survey during the fiscal year 1942 indicates how completely the energies of this scientific and technical unit of Government have been directed toward the paths of war. An organization that for more than 60 years has been conspicuous among comparable organizations in the world in its contributions to scientific advancement in the fields of geology, paleontology, physiography, petrography, hydrology, hydrography and the techniques of mapping, the Survey now is applying its accumulated knowledge, its trained personnel, and its developed skills to war problems.

The processes of research are the same whether they are applied to the ends of war or to those of peace. The scientist's desire is to serve mankind. He strives to extend the fields of knowledge in order that life may be richer and better ordered. But the new natural laws and products that he reveals may be seized and used by destructive as well as by constructive forces. The gangster as well as the policeman can use a gun.

Now the scientist and the technician in field and laboratory everywhere in the world are carrying on a highly important although nonspectacular part in the struggle. The Geological Survey is enlisted in this effort. Through close cooperation with other agencies of Government engaged in other phases of the same endeavor, it is reevaluating and reporting upon all of the significant deposits of deficient and critical minerals, vigorously mapping strategic areas within and without the United States and its possessions, and supplying specific information, here and abroad, on terrain, water supplies, building materials and other elements affecting use of lands for war industries or military occupancy.

Geologic Branch

The major activity of the Geologic Branch this year was in the field of minerals vitally needed for war. Owing to the great increase in

requirements and the cutting off of many foreign supplies, this field now includes all the minerals previously recognized as strategic, ores of common metals, and many minor elements that until recently had been adequately supplied. As the problems involving these natural resources have increased, the experienced and specially trained staff of the Geologic Branch increasingly concentrated on them both in the United States and other American Republics, and peacetime activities were reduced to a minimum. A new development was work in military geology, involving the preparation of special reports and maps for the armed services. The geologic programs conducted in cooperation with different States were also focused, so far as practicable, on war minerals and war problems.

War Minerals

The investigations of strategic mineral deposits were financed by an appropriation of \$245,000, of which \$35,150 was allotted to the Alaskan Branch. In addition, about \$150,000 of the appropriation for "geologic surveys" was used for strategic mineral studies in field and laboratory.

Close contact was constantly maintained between the Geological Survey and the Bureau of Mines, the War Production Board, the Reconstruction Finance Corporation, and other agencies, and many field examinations of ore deposits were made at their request. Where field conditions seemed to warrant it, recommendations were made to the Bureau of Mines for drilling or otherwise exploring certain ore deposits, and geologists were assigned to these operations to study cores and excavations and make appropriate recommendations as the work progressed.

Although iron, copper, lead, and zinc had not heretofore been included in the list of strategic minerals, the rapidly growing need for increased supplies of those metals led to the field study of a number of iron deposits and to the formulation of plans for intensive studies of all these metals during the fiscal year 1943. For this purpose increases in the staff were made toward the close of the fiscal year 1942.

Most of the iron-ore districts examined this year were in the Western States. These districts include the deposits at Canyon Creek, Ariz., Eagle Mountains, Calif., Dayton, Nev., Jones Camp, N. Mex., Scappoose district, Oreg., and Bull Valley, Utah. The geologic examinations were made in advance of and during exploration work of the Bureau of Mines. They provided basic data essential to the planning of an iron and steel industry in the West. Iron-ore deposits in northeastern Alabama and in the Cartersville district, Ga., were also examined.

A program for exploring domestic sources of aluminum developed rapidly during the year. Late in 1941 the Survey collaborated with the Bureau of Mines in a field inventory of the known reserves of bauxite, the only ore from which aluminum is now obtained. The inventory revealed a potential shortage of domestic reserves, and consequently a joint program of exploration was started in November 1941, with funds especially appropriated by Congress. The program includes, in addition to explorations for bauxite, investigations of high-alumina clays and alunite, which are potential sources of aluminum. The geologic explorations for bauxite were conducted by nine field parties in Arkansas, Alabama, Georgia, Mississippi, Tennessee, and Virginia. Four deposits recommended by the Survey were drilled by the Bureau of Mines. Field examinations of high-alumina clays were made in California, Idaho, Mississippi, South Carolina, and Washington, and of alunite deposits in several Western States. The program is to continue through 1943.

The rising demand for magnesium is expressed in the Survey work during the year in widely different ways: In the State of Washington, for example, magnesite deposits were studied and reserves estimated; in Utah, members of the Survey staff worked in shifts at a test well of the Defense Plant Corporation, seeking to appraise the magnesium and potash in cores and brines; in the Las Vegas area, Nev., a search was begun for salt, a raw material needed in large quantities at the new plant of Basic Magnesium, Inc.

The outstanding results from work on deposits of manganese in 1942 were obtained in the Batesville district, Ark. Cooperative work with the Bureau of Mines on prospecting for wad-type ores continued from 1941 until February 1942, and geologic work is still in progress. The tonnage and grade of reserves indicated by prospecting and geologic work were such as to warrant recommendations to the Metals Reserve Co. and Defense Plant Corporation for systematic large-scale development. The recommendations were accepted, a metals reserve stock pile has been established, and systematic development has begun.

Domestic chromite production made a major advance this year when a chromite concentrating plant was completed at the Benbow mine, in the Stillwater district, Mont. This mill is now producing 150 to 175 tons of chemical-grade chromite concentrates daily. It is the largest chromite mill in the country and the first of three now planned for the Stillwater deposits. The Stillwater deposits are the largest single domestic reserve of chromite and are known to contain millions of tons of ore. The explorations initiated in 1939 by the Geological Survey and later carried on jointly by it and the Bureau of Mines were largely instrumental in bringing the district into production so quickly.

A similar advance was made in the domestic tungsten industry by the initiation of large-scale production from a mine near Yellow Pine, Idaho, in which tungsten had been discovered as a result of the cooperative work of the Geological Survey and the Bureau of Mines. At the close of the fiscal year, this property was the largest single producer of tungsten concentrates in the country. Work was also carried on in other tungsten districts in Washington, Idaho, Utah, Nevada, California, Colorado, and Arizona. One of the geologists engaged in tungsten investigations perfected, during the year, a simple apparatus that permits field estimation of the molybdenum content of scheelite (calcium tungstate) concentrates, a matter of some economic importance, in that an excessive molybdenum content subjects scheelite concentrates to a price penalty.

In the larger quicksilver districts of California, Nevada, and Oregon, the detailed mapping of the districts was followed by intensive geologic studies of individual mines. Detailed district and mine examinations were also started at Terlingua, Tex., and will be continued during the coming year. Many small and widely scattered properties in the Western States were inspected by joint parties composed of a Survey geologist and a Bureau of Mines engineer. These inspections, made mainly to select the more promising localities for detailed work, also added much specific information to the records of quicksilver deposits.

Among the minor metals particularly valuable because of peculiar properties, cobalt and vanadium deserve special mention. During scientific research on manganese minerals, in which X-ray and other refined methods of study were used, it was found that some manganese ores contain cobalt in such quantities as to be possible ores of cobalt. Tests of certain cobalt-bearing manganese deposits are to continue in the coming year. For vanadium, likewise, modern technique speeded scientific search. This was especially true in the examination of several hundred titaniferous magnetite specimens from many iron deposits, which were tested by spectrographic methods at the Department of Mineralogy and Petrography of Harvard University. The vanadium-bearing phosphate rock of southeastern Idaho and western Wyoming, about which much is known through years of field study, is also being tested in a cooperative project with the Bureau of Mines. Investigations of domestic beryllium, lithium, and tantalum sources were begun in the spring of 1942 and will be combined in part with the work on strategic sheet mica.

A wide variety of nonmetallic minerals, of immediate or potential value in the war, were examined in the field and laboratory. These minerals include fluorspar in western Kentucky; graphite in Alabama, New York, and Pennsylvania; phosphates in Idaho and Wyoming;

sheet mica in New England and North Carolina; talc in California and Nevada; and topaz in South Carolina.

The diversity of the wartime geologic work is illustrated also by some of the assignments of the fuel specialists, which included studies of occurrences of oil in certain areas in and adjoining Naval Petroleum Reserve No. 1 in California; geologic conditions near Mount Pleasant, Utah, in conjunction with the drilling of a test well by the Bureau of Mines in search of coking coal; and a survey in cooperation with the Bureau of Mines of sources of helium-bearing gas. In cooperation with the Geological Survey of Pennsylvania, geophysical investigations led to the drilling of a productive oil well.

American Republics

The projects of the Geological Survey in the American Republics, which are sponsored by the Department of State, are part of a broad, long-range program designed to further the cordial relationships between the countries and to provide basic mineral data of mutual value. During this year the work was entirely on the ores of war metals: manganese and nickel in Brazil; chromite, manganese, and tungsten in Cuba; manganese in Costa Rica; antimony, manganese, and quicksilver in Honduras; and antimony, chrome, quicksilver, tin, and vanadium in Mexico. The work was directed in part toward aiding increased production.

Examinations in Brazil were typical of the broader studies that anticipate future needs. In one study the reserves of manganese ore at an extremely large, undeveloped deposit were evaluated. At another the nickel silicate ores of a deposit that is possibly the largest of its type in the Western Hemisphere were studied in detail.

The chromite project in Cuba, continued from last year, was noteworthy for the close application of scientific geology to the production problems of operating companies. One feature of the cooperative work with the companies was the application of geophysical methods to chromite prospecting. These methods offer promise of considerable success within a certain limited field.

Military Geology

Since early February, 6 to 20 geologists have been engaged in the preparation of reports and maps on the military geology of many areas, in response to requests from the Intelligence Branch of the Army Engineer Corps, Air Forces, Naval Intelligence, Board of Economic Warfare, Engineer Board at Fort Belvoir, and the Army and Navy Munitions Board. The demands on this group for strictly military geology have increased steadily.

Alaskan Branch

What is the work of the Alaskan Branch and wherein and how during the past fiscal year has it served the national interests in these times of national need? Viewed broadly, the work is and long has been focused on determining the kinds, distribution, quantity, and characteristics of the various mineral commodities that Alaska contains which have contributed to or may contribute to the welfare of our citizens. It is no idle boast that our entire present-day civilization rests upon the availability of mineral materials from which our machines may be made, our structures built, and our system of life supported. Indeed, even the other basic industries, such as agriculture, depend in large measure on the mineral composition of the soils, the physical configuration of the terrain, and the supplies of that most indispensable of all minerals—water. Without the mineral products the cultivation, garnering, and marketing of the crops would come to an almost complete standstill. Realizing how requisite minerals are at all times in our normal activities, it is readily evident that now with the safety and even the perpetuation of our country at stake the needed supplies of minerals have become indispensable for protecting the Nation and waging war successfully.

Obviously, specific answers to questions as to the kind and quantity of mineral commodities that Alaska contains require intensive examinations in the field of the various areas by geologists. These scientists through long and detailed training and experience in developed areas where like minerals occur have become skilled so that they can recognize and interpret those elusive features that furnish the bases from which dependable judgments can be drawn as to the worth of deposits that have not yet been developed. Before reaching their conclusions, however, the geologists must avail themselves of such office and laboratory tests as will check and make definite their field observations. This may call for extensive microscopic examinations of the specimens collected, assays, and chemical analyses of the carefully taken samples, library research and consultations with specialists, and recalculation and review of the mass of field notes and measurements that have been made. Finally, the explanation of the findings must be set down in carefully prepared written reports, which will hand on to others the significant results of the investigations and thus stimulate development of the deposits that appear to merit it or discourage wasting time and money on those that seem to have little present merit.

Necessarily, these mineral investigations are not limited and should not be restricted to the determination of the mere mineral content of the deposits examined, because many other geologic and topographic factors play important roles in determining whether or not a certain

deposit may be of value. To supply part of the information needed in the consideration of these broader aspects, the examinations include the making of topographic maps to show the situation of the area discussed with respect to all its natural surroundings. From these maps may be read the distances to all points within the area, the height of all land and water features both with respect to sea level and to each other, and relations to routes and means of communication and transportation. Indeed the uses of these maps are so diverse that they are relied on in all lines of governmental and private enterprise, whether or not even remotely concerned with mining. In other words, they are the authoritative maps of the land areas of the Territory and are in demand by road makers, aviation companies, settlers, travelers, industrialists, and specialists of all kinds concerned with Alaskan problems.

During recent years, with the menace of war looming ever more threateningly ahead and finally with the actual outbreak of war, the activities of the Alaskan Branch have become increasingly directed toward supplying information of most current significance. Thus its studies of minerals have been centered more and more closely on search for those that are urgently needed in the war industries. Tin, nickel, chrome, tungsten, antimony, and mercury are among those of which domestic supplies are not available in sufficient quantities to make all the needed tanks, airplanes, bombs, guns, and the myriad of other tools of war, and consequently are the materials for which most diligent search is being made by the Survey's Alaskan geologists. In part that work has been financed through appropriations made by Congress direct to the Geological Survey. In addition, recognition of the need of expediting that search has led the War Production Board to transfer certain of its funds to the Geological Survey, so that additional projects could be undertaken.

The need for more adequate and special maps of Alaska for military purposes, especially those used in aerial navigation, has become increasingly urgent. As a result, the Army Air Forces during the past year arranged to utilize extensively the services of the personnel of the Alaskan Branch in compiling maps of Alaska and other areas. The long and specialized experience gained by Alaskan topographers in quickly and economically mapping large tracts of country by either ground surveys or aerial photographic methods made the Air Forces' selection of this group an especially fitting choice. By this selection a nucleus of skilled engineers was readily at hand to start immediate production, to devise methods and instruments to facilitate the work, and to acquire and train the personnel needed to prepare whatever maps the Air Forces may call on the Geological Survey to compile. At the end of the fiscal year 1942 more than 150 persons were employed on this special work for the Air Forces, and requests on file from

the War Department indicated that the Survey should recruit two or three times that number as rapidly as practicable.

Owing to the strong seasonal control exercised by the weather and other conditions on the field projects undertaken by the Geological Survey in Alaska, description of the various undertakings cannot well be limited to a single fiscal or calendar year. A start on most of the projects is made in March or April, when plans are set in motion. The field work generally begins in May and continues through September, or as late as the weather permits, and is then followed by office and laboratory work during the following winter and spring. This condition is so fully recognized that the regular appropriations for investigations of Alaska mineral resources usually are not limited to a single fiscal year but become immediately available on the passage of the annual appropriation act and continue to be available throughout the next fiscal year. It is therefore convenient to refer the various projects undertaken by the Alaskan Branch to the "season" in which the field work was done. Thus the season of 1941 may have started in May 1941 and continued well into 1942, though part of the work up to June 30, 1941, may have been paid for from funds for the fiscal year 1941 and part prior to that date, and all subsequent to that date may have been paid for from funds for the fiscal year 1942.

Season of 1941.—During the season of 1941 the Alaskan Branch engaged in 17 projects which involved field work and 2 projects which, though based on field records, involved only office and laboratory work by members of its staff. Of the field projects 12 were primarily for the study of mineral resources, 4 were for topographic mapping, and 1 was for general administrative purposes and the planning of future work. Of the geologic or mineral resources projects 3 examinations related to chrome deposits, 2 to nickel, 2 to tin, 1 to mercury, and 1 to antimony. Two of the projects, 1 in southeastern Alaska and 1 in the Alaska Range, though directed toward general regional examination, included incidental preliminary studies of certain other deposits of antimony, tungsten, nickel, molybdenum, and iron. A general geological reconnaissance was made of the Porcupine River Valley in east-central Alaska.

The four topographic mapping projects involving field work were reconnaissance surveys in the Yentna district, aerial photography in the Yukon-Kuskokwim region, and detailed surveys in the Hot Springs district and at two localities in the vicinity of Tanana.

Although not involving field work by members of the Alaskan Branch, the compilation of aeronautical piloting maps from photographs furnished by the Army Air Forces and largely paid for from funds it transferred to the Survey became the principal office activity of the branch during the season of 1941 and is being continued at an accelerated rate and with a largely increased force. Another office

task that is carried on uninterruptedly by the branch is the collection of statistics regarding the output of all mineral products from Alaskan deposits.

Season of 1942.—With the funds appropriated directly to the Geological Survey 14 field projects were gotten under way in the early part of the season of 1942. This number, however, was too small to permit undertaking all the examinations that were needed, and consequently in June the War Production Board made funds available to undertake 15 additional field projects. Although progress was made in recruiting personnel, getting equipment, and organizing these additional parties, none of them were actually in the field during the fiscal year 1942, and therefore these additional projects are not being described here further than to note that all of them related to the search for deposits of strategic and critical minerals. Of the original field projects 12 related directly to mineral resources and 2 primarily to topographic mapping. The 2 topographic projects that involved field work by the staff were reconnaissance surveys of parts of the Yukon and Kuskokwim Valleys that heretofore had not been adequately mapped. Both of these projects, besides contributing general information as to the parts of Alaska covered and being of special value in the compilation of military maps now in progress in the branch, were so planned as to fit into the Survey's regular program of mineral resources investigations that will be undertaken in the near future.

In addition to these projects involving field work in Alaska by members of its staff, the Alaskan Branch has continued in the office the compilation of maps needed by the Army Air Force for its series of aeronautical charts. This work is being carried on at a constantly accelerated rate, so that ultimately it will probably utilize the services of between 400 and 500 persons. It is therefore one of the largest activities of the branch at this time.

Reports and maps.—During the year 5 reports with maps and 1 report without maps, 3 new maps, reprints of 9 maps, and 8 press statements have been published; 10 reports containing maps and a reprint of 1 map are in course of publication; 9 reports and 1 new map are in course of preparation; and 2 reports prepared by the personnel of the Alaskan Branch were approved for outside publication.

Topographic Branch

The headquarters offices of the Topographic Branch and of its Atlantic Division are located at Washington; the headquarters office of the Pacific Division is at Sacramento, Calif.; and that of the Central Division at Rolla, Mo. Section offices were maintained at Denver, Colo., Chattanooga, Tenn., and Clarendon, Va.

General Office Work

Necessary office work incidental to the field work of the Topographic Branch consisted of the computation and adjustment of the results of control surveys, photoplanimetric compilation, and the inking, inspection, and editing of topographic maps prior to their submission for reproduction.

Section of Computing.—The volume of work connected with routine processes of computing, tabulating, and distributing the results of new control surveys was greatly increased during the year, because such surveys were accelerated in the field to meet the requirements of the large military mapping program. Activity was also intensified in reducing to current standard datum many older surveys, which could in this way be made useful to that program.

Manuscripts for three of the four parts of a bulletin that will contain the results of spirit leveling in Illinois were prepared and transmitted for publication. Bulletins 883-D and 883-E, Spirit leveling in Texas, the fourth and fifth of seven parts, were published during the year.

Section of Photomapping.—In addition to the Washington office this section maintains offices in Chattanooga, Tenn., and Clarendon, Va. Photomapping was also carried on in Rolla, Mo., and in Sacramento, Calif., under the immediate direction of the engineers in charge of the Central and Pacific Divisions.

Work in the Washington office consisted principally of the preparation of planimetric maps for use in the Central Division, the preparation of contracts for aerial photography, and the purchase of photographs from other agencies or companies. Thirty-two Geological Survey employees in the Chattanooga, Tenn., office were engaged in the preparation of planimetric and topographic maps of the Tennessee River Basin and of the State of New York, the latter being a project in which the War Department and the Tennessee Valley Authority are cooperating with the Geological Survey. Under this cooperation 834 square miles of topography were mapped in the State of New York.

The Clarendon, Va., office, which was established during this fiscal year, was engaged in the preparation of planimetric bases for topography and topographic maps of considerable areas in the Atlantic Division. Several special maps of areas in Western States were made for the Geologic Branch for use in studies of strategic and critical minerals. All work in the Clarendon and Chattanooga offices was done with either multiplex or aerocartograph photogrammetric instruments, but radial line methods only were employed in the Washington office.

Section of Cartography.—Work on the United States part of the map of the world on the scale of 1:1,000,000 was continued. Sheet N K-16,

Chicago, was lettered, edited, and transmitted for publication. The compilation and inking of sheets N K-17, Lake Erie, and N I-18, Hatteras, were in progress.

For the Public Roads Administration the preparation of the Transportation Map of the United States was continued. Compilation, inking, and lettering were in progress on 56 sheets. Proofreading and checking were completed on 24 sheets. Maps of 2 States, comprising 24 sheets, were published, and maps of 1 State, comprising 12 sheets, were in course of publication. Miscellaneous jobs were done for the War Department during the year.

Section of Inspection and Editing.—During the year 15 new topographic maps were prepared for photolithography as two-color advance sheets and 55 as planimetric maps; 186 new topographic maps were edited for publication, 104 of which were for multicolor lithography and 82 for engraving; 195 quadrangle maps, 4 State maps, and 3 State index maps were prepared and edited for reprint editions and corrections; and 29 maps were edited before furnishing prints for reproduction by outside contractors. Editing was also completed on 205 maps published as illustrations, making a total of 622 maps edited. Four hundred and ninety-three proofs of all types were read. On June 30, maps in the process of reproduction included 122 for engraving, 77 for multicolor lithography, and 26 planimetric maps. Maps being edited or awaiting editing included 80 maps for engraving and 129 for multicolor lithography. In Clarendon, Va., a drafting force was maintained for the drafting of Atlantic Division maps.

Map Information Office

The Map Information Office continued its work as an intradepartmental clearing agency for map and aerial photographic data pertaining to both Federal and commercial agencies. This office maintains extensive card index and map files and is equipped to furnish data to Federal and State institutions and to an interested public.

Field Surveys

Work was carried on in 38 States, in the District of Columbia, and in Puerto Rico. Cooperative projects were conducted in 17 of these States, in Puerto Rico, and with the Tennessee Valley Authority. Ninety-nine 15-minute and 133 7½-minute quadrangles were completed, and work was in progress on 72 15-minute and 84 7½-minute quadrangles. Of the completed quadrangles, 86 were mapped for the United States Army, and of those in progress 64 were for the same organization. Surveys of two special depots were completed for the Navy Department. Work on 7 special maps for the geologic

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Topographic mapping by the Geological Survey in the United States, Puerto Rico, and Hawaii, to June 30, 1942

State	Area mapped during fiscal year 1942 for publication on standard scales, contour intervals from 5 to 50 feet				Total area mapped to June 30, 1942	Total area of State mapped to June 30, 1942	Control, fiscal year 1942			
	Field scale		New survey	Resurvey			Spirit levels	Transit traverse	Triangulation stations established	
	1 to 24,000 or larger	1 to 48,000								
	Square miles	Square miles	Square miles	Square miles	Square miles	Percent	Miles	Miles		
Alabama	-----	1, 107	1, 107	-----	25, 209	48. 8	592	643	-----	
Arizona	-----	1, 202	1, 202	-----	32, 478	28. 5	119	-----	-----	
Arkansas	-----	132	-----	132	24, 367	45. 9	154	111	-----	
California	-----	67	3, 255	1, 097	2, 225	82. 2	1, 042	123	53	
Colorado	-----	106	468	468	106	58, 156	280	201	31	
Connecticut	-----	139	-----	-----	139	5, 009	305	165	-----	
Delaware	-----	-----	-----	-----	2, 057	100. 0	-----	-----	-----	
District of Columbia	-----	-----	-----	-----	69	100. 0	-----	-----	-----	
Florida	-----	529	529	-----	8, 457	14. 4	669	660	-----	
Georgia	-----	1 491	-----	491	25, 202	42. 8	-----	-----	-----	
Idaho	-----	(¹)	-----	-----	37, 272	44. 6	911	-----	11	
Illinois	-----	855	855	-----	43, 576	77. 3	33	-----	-----	
Indiana	-----	579	579	-----	7, 016	19. 3	575	641	-----	
Iowa	-----	79	79	-----	14, 233	25. 3	-----	-----	-----	
Kansas	-----	37	1 424	237	224	65, 852	487	897	18	
Kentucky	-----	-----	-----	-----	27, 559	68. 2	-----	-----	-----	
Louisiana	-----	(¹)	2, 921	2, 921	14, 567	30. 0	1, 449	162	-----	
Maine	-----	3, 688	1, 060	2, 628	25, 771	77. 6	-----	18	-----	
Maryland	-----	-----	-----	-----	10, 577	100. 0	-----	-----	-----	
Massachusetts	-----	741	-----	741	8, 257	100. 0	234	336	-----	
Michigan	-----	280	-----	18	262	15, 821	122	141	-----	
Minnesota	-----	-----	-----	-----	9, 542	11. 4	-----	-----	-----	
Mississippi	-----	314	314	-----	8, 997	18. 9	-----	39	-----	
Missouri	-----	47	1, 398	904	541	58, 915	75	73	-----	
Montana	-----	583	583	-----	38, 828	26. 4	88	-----	-----	
Nebraska	-----	-----	-----	-----	23, 225	36. 5	-----	-----	-----	
Nevada	-----	15	7	8	43, 543	39. 4	-----	-----	-----	
New Hampshire	-----	-----	-----	-----	9, 304	100. 0	-----	-----	-----	
New Jersey	-----	-----	-----	-----	7, 836	100. 0	-----	-----	-----	
New Mexico	-----	-----	-----	-----	35, 652	29. 3	198	-----	12	
New York	-----	121	138	259	49, 576	100. 0	430	1, 034	-----	
North Carolina	-----	1, 616	-----	1, 616	19, 574	37. 1	-----	-----	-----	
North Dakota	-----	52	198	244	6	16, 115	59	-----	36	
Ohio	-----	-----	-----	-----	41, 222	100. 0	-----	-----	-----	
Oklahoma	-----	-----	-----	-----	41, 342	59. 1	-----	80	-----	
Oregon	-----	246	212	34	34, 601	35. 7	167	-----	20	
Pennsylvania	-----	329	329	-----	42, 081	92. 8	308	161	-----	
Rhode Island	-----	332	-----	332	1, 214	100. 0	551	338	-----	
South Carolina	-----	152	-----	152	15, 772	50. 8	-----	-----	-----	
South Dakota	-----	-----	-----	-----	20, 750	26. 9	-----	-----	-----	
Tennessee	-----	1, 433	-----	1, 433	23, 998	56. 8	-----	-----	-----	
Texas	-----	572	572	-----	92, 018	34. 4	197	345	-----	
Utah	-----	4	135	135	4	20, 119	23. 7	49	-----	
Vermont	-----	26	26	-----	9, 176	95. 5	15	369	-----	
Virginia	-----	30	189	219	38, 097	93. 3	-----	333	-----	
Washington	-----	1, 123	326	802	43, 507	63. 8	888	84	67	
West Virginia	-----	-----	-----	-----	24, 181	100. 0	-----	-----	-----	
Wisconsin	-----	(¹)	-----	-----	20, 273	36. 1	-----	633	20	
Wyoming	-----	-----	-----	-----	35, 322	36. 1	-----	-----	-----	
Total	-----	6, 374	19, 784	13, 804	12, 354	1, 411, 724	46. 7	9, 997	7, 587	268
Hawaii	-----	-----	-----	-----	6, 435	100. 0	-----	-----	-----	
Puerto Rico	-----	2 4	4	-----	1, 013	29. 5	57	-----	49	

¹ Planimetric maps, not included in total surveys, were compiled from aerial photographs with field examination—Georgia, 140; Idaho, 62; Kansas, 341; Louisiana, 563; and Wisconsin, 2,106.

² Contour interval in meters.

investigation of strategic minerals was completed and work on 2 continued. The survey of the Dinosaur National Monument, Colorado-Utah, was completed. Twenty-seven 7½-minute and twenty-two 15-minute planimetric maps were also completed. Revision of the map of Washington and vicinity was 99 percent completed.

Of the total area of the United States, 46.7 percent has been covered by topographic maps prepared by the Geological Survey.

Water Resources Branch

The Geological Survey collects and publishes data on the quantity, chemical quality, and availability of the water resources of the United States. These data are prerequisite to the location and operation of military establishments and war industries and to the orderly and efficient development of domestic, municipal, and industrial water supplies. They are also essential for assuring the success of irrigation, power, navigation, flood-protection, and pollution-control works.

Funds aggregating nearly \$3,000,000 were available for water-resources investigations during the fiscal year 1942. Of that amount, about 40 percent was appropriated by Congress, about 35 percent was contributed by States and municipalities, and about 25 percent was transferred or reimbursed by other Federal agencies.

Cooperation With States and Municipalities

The appropriation by Congress for water work during the fiscal year 1942 was \$1,285,500. Of that appropriation, \$1,000,000 was restricted for use in cooperation with States and municipalities, and these cooperative agencies contributed essentially the same amount, as summarized below.

<i>State</i>	<i>Contri- bution</i>	<i>State</i>	<i>Contri- bution</i>	<i>State</i>	<i>Contri- bution</i>
Alabama.....	\$10,000	Maryland.....	\$7,925	Oklahoma.....	\$18,812
Arizona.....	24,900	Massachusetts.....	14,104	Oregon.....	25,475
Arkansas.....	10,500	Michigan.....	14,250	Pennsylvania.....	30,725
California.....	81,050	Minnesota.....	12,023	Rhode Island.....	1,750
Colorado.....	34,000	Mississippi.....	15,000	South Carolina.....	5,500
Connecticut.....	9,350	Missouri.....	11,960	South Dakota.....	400
Florida.....	42,150	Montana.....	20,335	Tennessee.....	10,150
Georgia.....	15,000	Nebraska.....	26,000	Texas.....	73,704
Idaho.....	24,300	Nevada.....	1,500	Utah.....	23,000
Illinois.....	15,268	New Hampshire.....	11,250	Vermont.....	4,760
Indiana.....	11,024	New Jersey.....	25,100	Virginia.....	22,458
Iowa.....	22,347	New Mexico.....	42,200	Washington.....	33,680
Kansas.....	40,000	New York.....	70,847	West Virginia.....	7,500
Kentucky.....	10,500	North Carolina.....	18,570	Wisconsin.....	8,175
Louisiana.....	15,415	North Dakota.....	5,750	Wyoming.....	15,775
Maine.....	7,500	Ohio.....	18,550	Hawaii.....	37,352

Activities Carried on for Other Federal Agencies

Other Federal agencies have provided about \$670,000 for water-resources investigations that could not be financed by appropriated funds of the Survey or included in cooperative projects. These agencies are: Office of the Chief of Engineers, Office of the Quartermaster General, and the Mississippi River Commission, War Department; Bureau of Yards and Docks and Coast Guard, Navy Department; Bureau of Prisons, Department of Justice; Tennessee Valley Authority; Flood Control Coordinating Committee, Department of Agriculture; Weather Bureau, Department of Commerce; Bureau of Reclamation, Fish and Wildlife Service, Grazing Service, National Park Service, Office of Indian Affairs, and Office of Land Utilization, Department of the Interior; Department of State; Federal Power Commission; and National Resources Planning Board.

Review of the Year's Accomplishments

The Geological Survey's operations related to water are grouped under five administrative divisions of the Water Resources Branch: Surface water, ground water, quality of water, utilization of water, and power resources.

Records of the stages, quantity, or availability of surface waters are collected at about 5,000 gaging stations, of which nearly 3,800 are equipped with water-stage recorders, distributed through every State and the Territory of Hawaii—sparsely in some States and increasing in number as the cooperative funds increase. The field records are analyzed, studied, and published. They become the basis for development projects and for the control and distribution of water for municipal, industrial, and irrigation uses and for the protection of health, the operation of inland waterways, and similar activities.

Surface-water investigations were conducted in cooperation with 140 State and municipal agencies. The field personnel for this work operates from 45 principal field offices. The program of construction, operation, and maintenance of gaging stations in connection with the flood-control investigations and maintenance and improvement of river and harbor works of the Corps of Engineers, War Department, was continued. Cooperative stream-flow investigations in connection with irrigation systems, land-use studies, water-power developments, and other activities were continued with other Federal agencies.

The studies of ground water relate to the waters that lie within the zone of saturation, from which wells and springs are supplied; the source, occurrence, quantity, and head of these waters; their conservation and natural and artificial replenishment; their availability and adequacy for domestic, industrial, irrigation, and public supplies

and as sources of water for livestock and desert travelers; and methods of constructing wells and recovering water from them and of improving springs. The increasing use of water from wells is causing a great demand for intensive studies of the quantities of ground water that are perennially available.

Ground-water work, conducted through 25 field offices, was done in nearly every State. In 32 States and in Hawaii it was accomplished in cooperation with the State Geological Surveys or other State and municipal agencies. Periodic measurements of water levels or artesian pressures were made in about 7,100 observation wells, 312 of which were equipped with recording gages.

Chemical analyses of 2,201 samples of water were made in Washington, and analyses of 7,114 samples were made in field laboratories. Studies were continued on the chemical character of surface waters in cooperation with four States, and analyses of water were made in connection with cooperative studies of ground water in other States.

In addition to work for war agencies, interpretations of analyses or advice about water problems were furnished for 17 bureaus in 6 Federal departments and for 7 independent Government agencies.

A variety of hydrologic and hydraulic studies and compilations are made on the utilization and control of streams, and a monthly summary is issued of stream-flow conditions throughout the country as indicated by reports received from the field engineers. These summaries are used by major war agencies in administering production in which water excesses, as in floods, or shortages, as in droughts, are vital. The administration of certain responsibilities relating to permits and licenses of the Federal Power Commission has been continued. Because of the importance of power in the war program this function is increasingly essential. Investigations of water problems along the international boundary between the United States and Canada have been continued for the State Department and the International Joint Commission. Among the important problems studied have been the international aspects of storage above the Grand Coulee Dam and in Kootenai Lake, both of which have great importance in the production of power for war.

With the aid of various Federal agencies a report, by countries, of the amount of developed and potential water power of the world has been compiled and published. This report showed that the total potential water power, based on ordinary minimum flow, was 672,000,000 horsepower and that the total capacity of water-power plants of the world was 71,600,000 horsepower on January 1, 1942. Of the developed power, about 27 percent is in the United States, 12 percent in Canada, 9 percent each in Italy and Japan, and lesser amounts in other countries.

War Service

Reports and consulting services have been furnished on the quantity and quality of both surface- and ground-water supplies for war purposes at about 1,700 places in the United States and in certain islands of strategic importance, as requested by the War and Navy Departments, the War Production Board, and other war agencies. These reports and services were made available in part on the basis of information collected in previous years and in part on the results of special investigations made in regions where such information was meager or the possible deficiencies in quantity or the doubtful quality of water appeared to be most threatening. Trained personnel stationed at 75 field offices throughout the country were utilized for such special field investigations, which related to the water supplies for Army cantonments, naval stations, munitions plants, largely increased local concentrations of population producing war supplies, and for other war activities. Because of the danger of local depletions of ground water by heavy pumping for war purposes, regional surveys were undertaken to determine total pumpage, water-level fluctuations, and possible salt-water encroachment in critical areas. Surveys were also made for the Navy Department of emergency supplies from wells in case of attack.

Day-by-day records of water are essential not only to the social and economic development of the Nation but also to the development and operation of the war program. Private and public power developments, such as the Bonneville, Boulder, and Tennessee Valley Authority systems, are furnished with basic data on available water supplies required currently for operation of the plants and for planning the expansions that may be made necessary by the rapidly increasing demand for electric power.

Summaries of water conditions, both on the surface and underground, throughout the United States were prepared each month for the use of the agencies in charge of water-supply and power activities related to the war. Collaboration with the Dominion Water and Power Bureau of Canada enables both the United States and Canada to benefit from a knowledge of conditions brought up to date each month. The Water Resources Branch has furnished information on water supplies in many foreign countries to the War and Navy Departments. It also has furnished information on present and potential power resources requested by those Federal and allied agencies directly concerned with power production.

The Water Resources Branch through the facilities of its Nationwide distribution of personnel served the War Production Board by making a survey of the use of pig iron at about 2,400 foundries.

Thus, the reservoir of information contained in the published and

unpublished records related to the water resources of the Nation, the facilities and information made available by cooperation with many States and municipalities, and the asset represented by hundreds of engineers, geologists, and chemists experienced in work on water have been made of maximum value in the war.

Conservation Branch

The normal work of the Conservation Branch consists of the making of surveys and investigations of the water and mineral resources of the public domain; the supervision of operations incident to the development of power and the production of minerals from public lands, Indian lands, and naval petroleum reserves; and the furnishing of technical decisions and information to Government agencies engaged in administering the public-land laws. In time of war these continuing functions of government undergo little change in basic character but are materially intensified and accelerated by the necessity of meeting the imperative need of the Nation for increased supplies of power and raw materials. At such time the whereabouts, worth, and accessibility of the mineral and water-power resources under Federal control—questions answered by adequate land classification—become overnight matters of grave national concern; and the competent prospecting and efficient development of Government-controlled sources of mineral fuels, metals, fertilizers, and industrial chemicals—the result of adequate mineral-lease supervision—become vital elements of national survival.

Since December 7, 1941, both of these primary phases of Conservation Branch work—land classification and mineral-lease supervision—have been intensified and, wherever possible, so redirected as to lend increased support to the national objectives of winning the war and of perpetuating the best in the American way of life.

Classification of Lands

Mineral classification.—As consultant in geology to Federal agencies, primarily bureaus and offices of the Interior Department charged with the administration of laws governing Federal and Indian lands, the Mineral Classification Division continued in 1942 its indispensable work of supplying the geologic findings and decisions that are prerequisite to the grant or transfer of prospecting and development rights in such lands under the mineral-leasing laws, to the approval of unitization agreements for oil and gas holdings and of participating areas thereunder, to the occupancy of such lands for right-of-way purposes, and to the outright disposal of such lands under the nonmineral land laws. In all, 7,355 cases involving from 1 to 50 geologic decisions

each were acted on during the year. Additional office work included the preparation and promulgation of definitions or redefinitions of the known geologic structure of 17 producing oil and gas fields, the net area so defined in nine public-land States being increased to 1,686,950 acres at the end of the fiscal year.

In aid of mineral classification geologic surveys were made of coal, petroleum, and potash occurrences in Wyoming, Kansas, and New Mexico and of geologic conditions at one dam site in Washington.

Water and power classification.—The work of obtaining basic information concerning the water-power resources and storage possibilities of Federal lands and of making such information available for use in the administration of the public-land laws was continued throughout 1942. Office activity resulted in the addition of 19,618 acres to power-site reserves and the elimination of 22,720 acres therefrom, with net reduction of the outstanding reserves in 22 States and Alaska to 6,615,746 acres; in the publication in mimeographed form of 6 preliminary reports on stream utilization; and in final action involving hydraulic determinations on 228 cases received for report from departmental sources and the Federal Power Commission. Reservoir-site reserves in 9 States remained unchanged, at 137,172 acres.

In the field, topographic surveys were made of 68 linear miles of stream valley, of 9 dam sites, and of 1 mineral leasehold, and, in cooperation with the Water Resources Branch, supervision of construction and operation was given to 160 power projects under license from the Federal Power Commission and to 136 such projects under permit or grant from the Department of the Interior. For want of funds the division office at Sacramento, Calif., was discontinued during the year.

Mineral Lease Supervision

Mine supervision.—Through the Mining Division inspectional, regulatory, and accountancy supervision is exercised over operations for the discovery and production of coal, potassium, sodium, phosphate, oil shale, and sulfur in public lands; of gold, silver, and mercury in certain land grants; and of all metalliferous and nonmetalliferous minerals except oil and gas in tribal and restricted-allotted Indian lands. The work is done from seven field offices in the West and Southwest, and on June 30, 1942, it involved 696 public-land properties under lease, license, and prospecting permit in 15 States and Alaska and 313 Indian properties under lease and permit in 14 States.

In the field of mine supervision the effects of war on industrial activity throughout the country, on transportation, and on the fuel-consuming habits of the American people were beginning to be ap-

parent before the end of the fiscal year 1942. The production of coal, potassium salts, and phosphate rock from public lands in 1942 was substantially greater than in 1941, and the accrued revenues were correspondingly increased. Additional properties were coming into production at the end of the fiscal year, and an unusual amount of prospecting was under way on public lands, particularly for coking coal suitable for metallurgical uses, for magnesium-rich brines, and for vanadium-rich phosphate rock.

On Indian lands, mining activity was responsive to the same economic forces and resulted during the year in a large increase in the production of lead and zinc, in a substantial increase in the production of coal, and in extensive prospecting of such lands with a view to the early development of deposits of vanadium, tungsten, magnesium, copper, and chromium known to occur therein.

Information and assistance on war-engendered problems involving the occurrence of coal and of numerous other minerals, both metalliferous and nonmetalliferous, in various parts of the United States and its possessions were provided by the engineers of the division both in Washington and in the field to numerous individuals contemplating development and to representatives of many State and Federal agencies.

Oil and gas supervision.—Through the Oil- and Gas-leasing Division supervision analogous to that of the Mining Division is exercised over operations for the discovery and production of petroleum, natural gas, natural gasoline, and butane occurring in public lands of the United States, in naval petroleum reserves, and in all Indian lands subject to departmental jurisdiction, both tribal and allotted, except those of the Osage Nation, Oklahoma. During the fiscal year 1942 the inspectional, regulatory, and accountancy duties of supervision were discharged through 16 field offices and suboffices in California, New Mexico, Oklahoma, Colorado, Wyoming, Montana, and Utah.

Because of the vital importance of petroleum, its fluid associates, and its derivatives to industry, transportation, and all phases of warfare, the transition of the Nation from a defense basis to an all-out war basis during the year increased vastly the duties and responsibilities of oil and gas leasehold supervision. Necessary and far-reaching controls imposed by the Government on oil and gas production and particularly on the multifarious uses of steel throughout the petroleum industry entailed extensive revisions and modifications of drilling programs affecting leaseholds under the jurisdiction of the division, increased vigilance in safeguarding the conservational and pecuniary interests of the lessors involved, and caused unprecedented use of the informational and consultive facilities of the division by lessees, operators, State agencies, and Federal officials.

On public lands the number of properties under supervision at the

end of the fiscal year aggregated 4,465 and involved 3,513,125 acres in 20 States and Alaska. Drilling on such lands during the year included the spudding of 414 wells and the completion of 460 wells, 346 of which were productive of oil or gas and 114 of which were barren. In all, 10,154 public land wells, including 5,327 capable of oil and gas production, were under supervision on June 30, 1942. The production of petroleum, natural gas, natural gasoline, and butane from public lands in 1942 was substantially greater than in 1941.

During the year 5 new plans of unit operation involving public lands were approved and 5 were canceled, leaving 117 approved plans, involving 1,862,860 acres, outstanding on June 30, 1942. Production under approved unit agreements constituted about 45 percent of the petroleum, 55 percent of the natural gas, and 65 percent of the gasoline and butane obtained from public lands in the fiscal year.

On Indian lands the work of oil and gas lease supervision involved 4,281 leaseholds in 8 States containing, at the end of the year, a total of 7,875 wells, 4,176 of which were productive of oil or gas, and 213 of which had been completed during the year. Production from such leaseholds was substantially greater than in the preceding year, notably from Kiowa lands in Oklahoma, Blackfeet lands in Montana, and Shoshone lands in Wyoming, and revenues accrued therefrom as royalty, rental, and bonus are estimated to be in excess of \$2,600,000.

On behalf of the Navy Department supervision was continued in 1942 over operations for the production of oil, gas, gasoline, and butane from 22 properties under lease in Naval Petroleum Reserves Nos. 1 and 2 in California and for the conservation of shut-in production in Reserve No. 3 in Wyoming. Production from 294 active wells on Reserves Nos. 1 and 2 aggregated 2,753,877 barrels of petroleum, 1,931,786,000 cubic feet of natural gas, and 8,918,047 gallons of natural gasoline and butane, having an aggregate royalty value of \$633,603.64.

Public Works projects.—During the fiscal year 1942 expenditures of \$5,014.39 were made from funds allotted by the Public Works Administration in the plugging or conditioning, under the supervision of personnel of the Oil- and Gas-leasing Division, of wells for which no bonded liability for proper abandonment exists.

Work on Publications

Texts.—The book publications of the year numbered 69 in the regular series and 20 pamphlets and circulars for administrative use. The total number of pages was 7,295. Besides these printed publications 53 brief papers were issued in mimeographed form as memoranda for the press.

Illustrations.—The illustrations prepared consisted of 684 drawings and photographs. One thousand and fourteen illustrations to accompany 64 reports were transmitted to the printer, and 687 proofs and 57 edition prints were examined.

Geologic map editing and drafting.—Most of the 107 maps and illustrations prepared by the section were related directly to investigations of mineral deposits essential to the war effort. Some of these were intended for publication in reports of the Geological Survey; others were sent direct to the War Production Board or other war agencies. Work was continued on the reconnaissance map of southeastern New Mexico. Maps and illustrations for 64 reports were edited, and proofs of 60 geologic maps and sections for 29 reports were read.

Distribution.—A total of 742 publications, comprising 68 new books and pamphlets, 102 new or revised topographic and other maps, 1 geologic folio, 39 Tennessee Valley Authority maps with contours, 326 reprinted topographic and other maps, 184 new advance sheets, and 22 reprinted advance sheets were received during the year. The total units of all publications received numbered 125,670 books and pamphlets, 1,410,317 topographic and other maps, and 4,570 geologic folios, a grand total of 1,540,557. The division distributed 102,124 books and pamphlets, 1,972 geologic folios, and 1,490,140 maps, a grand total of 1,594,236, of which 1,570 folios and 1,352,823 maps were sold. The net proceeds (gross collections less copying fees and amounts refunded) from the sales of publications were \$37,200.64, including \$36,842.92 for topographic and geologic maps and \$357.72 for geologic folios. In addition to this, \$52,686.52 was repaid by other agencies of the Federal Government at whose request maps or folios were furnished. The total net receipts, therefore, were \$89,887.16.

Engraving and printing.—During the year 13 special maps and 89 newly engraved topographic maps, 6 of which were revised maps, were printed, making a total of 102 new maps printed and delivered. Reprint editions of 309 engraved topographic maps and 17 photolithographed State and other maps were printed and delivered. Of new and reprinted maps, 428 different editions, amounting to 1,149,957 copies, were delivered. One geologic folio amounting to 4,570 copies was delivered. Printed small sale editions of 57 planimetric, 17 advance photolithographed, and 126 multicolor photolithographed topographic maps, totaling 247,155 copies, were printed from plates previously made for official purposes. A large amount of work was done for 80 other units of the Government, including branches of the Geological Survey, and the charges for it amounted to about \$220,000, for which the appropriation for engraving and printing geologic and topographic maps was reimbursed. Transfer impressions and velox

prints, numbering 276, were made during the year, and the amount turned over to miscellaneous receipts was \$547.86. Topographic maps and contract and miscellaneous work of all kinds, totaling 2,623,379 copies, were printed and delivered. The photographic laboratory made 10,517 negatives, 27,435 prints, and 3,075 photolith press plates, 285 intaglio etchings, and 8 celluloid transfers, and mounted 218 prints.

Library

In the work being done for the armed forces the library is rendering essential service, not only to its own bureau but also to the War and Navy Departments and to the various planning and production agencies, both by loans of material and by service to research workers. Because of war conditions the new material received has decreased, the number of books and pamphlets received during the year being only 12,735. The number of readers jumped to 11,291, an increase of nearly 4,000 over the previous year. Nearly 56,000 pieces of material were circulated, an increase of more than 50 percent within the Survey and 80 percent in interlibrary loans.

Field Equipment

The Division of Field Equipment designs, constructs, and repairs instruments used by the several branches of the Geological Survey in their war activities, in addition to its work as custodian of the various surveying, geologic, meteorologic, and hydrologic instruments used in the field by those branches. The Division's greatest contribution toward winning the war lay in the assistance given to the Alaskan Branch in the design and construction of numerous mechanical devices that have greatly accelerated the production of maps in connection with the mapping program for the Air Corps. The most important of those devices are the Lewis rectoblique plotter, the Sketchmaster, and the Lucidagraph. Development work is in progress on several new devices, such as a double photoalidade and a stereoblique plotter. By means of instruments of this type, aerial photographs taken at an angle of approximately 30° below the horizon may be converted to maps such as are required for the navigation of air forces over previously unmapped or inadequately mapped areas. The reconditioning of between 50 and 100 outmoded plane-table alidades for field use by the Topographic Branch in mapping strategic areas is another outstanding contribution of the division. These alidades, although practically discarded during previous years because of newer improvements, proved to be a valuable resource when the manufacturers of such instruments became so busy on War and Navy contracts that deliveries on new equipment became long-delayed or impossible to obtain.

Funds

During the fiscal year 1942 there was available for expenditure under the direction of the Geological Survey a total of \$9,362,809. Of this amount, \$4,997,880 was appropriated directly to the Geological Survey, and \$4,364,929 was made available by other Federal agencies and by States and their political subdivisions. In addition, \$9,800 was allotted from the appropriation for contingent expenses of the Department of the Interior for miscellaneous supplies.

Funds available to the Geological Survey in 1942 from all sources

General administrative salaries, Interior Department		
Appropriation Act.....		\$187, 000
Topographic surveys:		
Interior Department Appropriation Act.....	\$1, 962, 500	
States, counties, and municipalities.....	340, 605	
War Department.....	1, 046, 070	
Tennessee Valley Authority.....	53, 000	
Public Roads Administration.....	33, 815	
Public Works Administration.....	37	
Miscellaneous repay.....	51, 606	
		3, 487, 633
Geologic Surveys:		
Interior Department Appropriation Act.....	500, 000	
Third Supplemental National Defense Appropriation Act.....	1, 440	
States, counties, and municipalities.....	45, 117	
Bureau of Mines.....	80, 000	
National Defense allotment (Office of the President).....	30, 000	
Miscellaneous repay.....	6, 410	
		662, 967
Strategic and critical minerals:		
Interior Department Appropriation Act.....	195, 000	
Second Supplemental National Defense Appropriation Act.....	50, 000	
State Department (for work in other American Republics).....	50, 000	
		295, 000
Mineral Resources of Alaska:		
Interior Department Appropriation Act.....	75, 000	
Third Supplemental National Defense Appropriation Act.....	540	
War Department.....	124, 842	
Office for Emergency Management.....	164, 642	
		365, 024
Gaging Streams:		
Interior Department Appropriation Act.....	1, 274, 500	
Third Supplemental National Defense Appropriation Act.....	11, 000	
States, counties, and municipalities.....	1, 038, 320	

Funds available to the Geological Survey in 1942 from all sources—Continued

Gaging Streams—Continued.

Permittees and licensees of Federal Power Commission.....	\$19, 556	
Department of the Interior:		
Bureau of Reclamation.....	3, 485	
Fish and Wildlife Service.....	3, 838	
Office of Indian Affairs.....	23, 468	
National Park Service.....	350	
Bonneville Power Administration.....	224	
Department of Agriculture.....	45, 477	
Commerce Department.....	448	
Federal Power Commission.....	264	
Federal Works Agency.....	1, 064	
Department of Justice.....	792	
National Youth Administration.....	60	
Navy Department.....	2, 508	
State Department.....	58, 600	
Treasury Department.....	928	
Tennessee Valley Authority.....	55, 000	
War Department:		
Office of Chief of Engineers.....	658, 659	
Mississippi River Commission.....	4, 670	
Quartermaster Construction Division.....	680	
War Production Board.....	47, 440	
National Resources Planning Board.....	939	
		\$3, 252, 270
Classification of lands:		
Interior Department Appropriation Act.....	105, 000	
Miscellaneous repay.....	400	
		105, 400
Printing and binding, Interior Department Appropriation Act.....		125, 000
Preparation of illustrations, Interior Department Appropriation Act.....		25, 000
Engraving and printing geologic and topographic maps:		
Interior Department Appropriation Act.....	159, 900	
Third Supplemental National Defense Appropriation Act.....	3, 000	
Miscellaneous repay.....	220, 000	
		382, 900
Mineral leasing:		
Interior Department Appropriation Act.....	317, 000	
Third Supplemental National Defense Appropriation Act.....	6, 000	
Navy Department.....	45, 000	
Office of Indian Affairs.....	100, 000	
Public Works Administration.....	5, 297	
Miscellaneous repay.....	56	
		473, 353
Payment from proceeds of sale of water, special account.....		1, 262
Total.....		9, 362, 809

Bureau of Mines

R. R. SAYERS, Director

Foreword

GUIDED by more than three decades of experience in the conservation and development of mineral resources, the Bureau of Mines quickly and efficiently completed the conversion of its activities to the national-defense program by the beginning of the 1942 fiscal year, and when hostilities began in December 1941, the Bureau adjusted all its widespread operations to a full war basis.

Many valuable contributions to the war program were recorded by the Bureau of Mines during the fiscal year. Engineers and technologists explored domestic mineral deposits throughout the United States and in Alaska, and revealed several hitherto unknown reserves of strategic, critical, and essential ores; metallurgists presented the country with new and improved methods for beneficiating low-grade domestic ores and thus developed additional means for obtaining some of the metals vitally needed for guns, ships, planes, and tanks; petroleum and gas engineers increased by many times the output of helium at the Government-owned plant; solid-fuels chemists developed further the knowledge of domestic coking coals; health and safety experts concentrated on conserving skilled manpower for war industries; and mineral economists and statisticians collected and interpreted data on the production, consumption, and uses of minerals and helped guide the Federal war agencies and private war industries in essential planning for prosecution of the war.

Former dependence upon imports for many critical and strategic minerals and the necessity for a quicker change to utilization of the domestic low-grade ores, which was created partly by American shipping losses, brought the exploratory and metallurgical work of the Bureau into sharp focus during the 1942 fiscal year. The Bureau's mining engineers made known important additional reserves of chromite, manganese, mercury, tungsten, iron ore, bauxite, and alumina clay. As a result of this work, the estimated reserves of chromite alone were increased about 2,300,000 tons, and production was begun in three areas; there were two important discoveries of high-

grade mercury and five significant findings of tungsten; the reserves of manganese ore of milling grade were increased at least 1,100,000 tons; more than 1,000,000 tons of usable bauxite were found; and drilling at five clay projects indicated 4,600,000 tons that contained 35 percent alumina. Altogether, 740 deposits of strategic ores were examined and rated as to relative importance.

To utilize to the fullest extent both the newly found ores and other known low-grade domestic deposits, the Bureau's metallurgists and chemists labored in the 1942 fiscal year to develop and perfect new treatment processes and to improve old ones. Laboratory investigations and pilot-plant tests showed that substantial amounts of manganese, chromium, magnesium, and aluminum could be made available. Methods also were developed for treating ores containing aluminum, cobalt, and magnesium, and laboratory work was continued on the beneficiation of ores containing antimony, copper, iron, mercury, nickel, tungsten, zinc, and fluorspar. A number of specific proposals for increasing domestic production were submitted to the war-production agencies. Because of the importance of manganese in steel-making, considerable attention was given to developing the vast low-grade reserves of this metal. Through its network of laboratories and pilot plants, the Bureau expanded and intensified its work in ore dressing, ore concentration, hydrometallurgy, electrometallurgy, and pyrometallurgy.

Proportionate attention was directed toward the development and use of many of the important nonmetals, such as graphite, kyanite, talc, glass sand, and forsterite. A shortage of flake graphite for crucible and steel-ladle stoppers was foreseen during the fall of 1940, and in consequence of the Bureau's experiments on graphite from domestic deposits, the War Production Board made arrangements for five mills. Substitutes were found for Indian kyanite. Samples of talc were tested to find ceramic talc suitable for radio insulators; some West coast sands were found to be usable, with treatment, as substitutes for imported glass sands; and deposits of volcanic rock of a certain type were found to be good substitutes for magnesite brick.

The Bureau's technologic work on solid fuels included the analyzing and testing of coal samples from all parts of the United States; advising the Government in the purchase of coal; exploring for western coal deposits and testing these coals to find those suitable for coking to be used in the steel industry of that region; making gasoline from coal; devising a new method of extinguishing magnesium incendiary fires in industrial plants; and treating and conditioning boiler waters. More than 15,000 coal analyses were made. New blast furnaces in the West and a lack of coking coal led the Bureau to analyze numerous western coals; as a result, it was found that certain coals will meet needs for coking coal in the West.

In response to the increasing demand for high-octane gasoline to run the engines of the United Nations' fighting planes throughout the world, the Bureau examined the aviation-gasoline stock of 200 crude oils and the products of 25 condensate plants. It also made a series of tests on the blending of high-octane gasoline and studies of the available reserves. The Bureau opened a new petroleum field office at Franklin, Pa.

An outstanding accomplishment last year was the promptness with which the Bureau increased helium production at its plant in Texas to supply greatly increased demands for this lightweight, noninflammable gas to fill submarine-patrol dirigibles, Army blimps and balloons, meteorological balloons, and barrage balloons, and for other military and essential civilian uses. Helium production in 1942 was higher than at any time in the 13-year history of the Government plant, as output actually exceeded the rated plant capacity.

Explosives research and testing by the Bureau in the 1942 fiscal year resulted in an increased volume of work to meet the growing demands of the mining industry, which normally uses more than two-thirds of all the industrial explosives manufactured in the United States. The Bureau made numerous chemical analyses, gallery tests, and control tests of a physical nature in the program of retaining safe characteristics of permissible mining explosives and also cooperated with the Ordnance Department of the Army and the Army Board of Engineers in explosives and demolition studies.

Effective December 26, 1941, the Bureau of Mines was designated by Congress to administer the Explosives Act of 1917, which was amended and invoked shortly after the United States went to war. Thereupon the Bureau set up a system of control by licensing manufacturers, dealers, and users and by establishing a field force of investigators. Licensing agents were appointed for nearly every county in the United States, regulations were promulgated under the law, and other effective steps were taken to prevent explosives or the ingredients of explosives from reaching and being used by persons hostile to the United States or persons careless or inexperienced in the use of explosives.

The far-flung health and safety activities of the Bureau assumed added importance because of the necessity for conserving skilled manpower and maintaining uninterrupted production in the mineral industries. A new responsibility in this field during the fiscal year was the setting up of the coal-mine inspection program as authorized by Congress in May 1941. Despite a delayed start, approximately 400 coal mines, producing almost 25 percent of the total coal tonnage annually produced in the Nation, were inspected up to June 30, 1942. Nearly 100 coal-mine inspectors were hired and trained and sent into the field, beginning December 1, 1941.

The Bureau continued instructing workers in the mining, petroleum, and allied industries in accident prevention, mine rescue methods, and first aid to the injured, bringing the total persons trained since 1910 to more than 1,500,000; investigating and reporting on mine explosions, fires, and miscellaneous accidents; and making field studies of various mining problems. A new unit composed of doctors, engineers, and chemists was established to investigate occupational disease in the mineral industries and to perform other important duties in the Bureau's program of improving health in this field of employment.

Other war agencies throughout the year called repeatedly upon the Bureau for economic and statistical information, and the requests were answered with full and complete data at all times. The Bureau's services in this respect included the collection, analysis, and publication of current and periodical data on all mineral commodities; studies of special economic phases of the mineral industries brought on by the war; and compilation of the Minerals Yearbook, the internationally recognized economic and statistical authority in this field. Many special statistical studies and investigations on strategic and critical metals and nonmetals, as well as fuels, were undertaken by the Bureau in cooperation with the several Government war agencies.

The Bureau published over 400 reports, including numerous bulletins, technical papers, handbooks, and Minerals Yearbook chapters. It replied to more than 100,000 letters of request for information and distributed about 550,000 copies of Bureau publications. Educational motion pictures acquired during the year totaled 546 sets; the outstanding borrowers of films from the Bureau of Mines were the Army and Navy air services, the Coast Guard, the CCC, and schools offering defense training classes.

The Bureau of Mines coordinated its work with that of other agencies of the Department of the Interior through the War Resources Council for the Department, which was established by Secretary Ickes for the purpose of mobilizing the strategic natural resources of the Nation on the scale made necessary by global warfare.

Future Work

To devote to the Nation most effectively the full benefit of its knowledge and experience for the winning of the war, the Bureau of Mines during the fiscal year 1942 made definite plans not only to utilize immediately the vast store of technical information acquired over a long period, but also to undertake new phases of work and new endeavors that would help to maintain the security of domestic mineral production and help to speed victory through the expanded output of usable strategic and critical minerals.

In anticipation of authorization and appropriation of funds by the Congress, the Bureau of Mines planned still greater enlargement of its

helium-producing facilities; an increase in its program for the exploration and development of domestic deposits of strategic, critical, and essential mineral ores; an intensification of its search and development of domestic substitutes for minerals formerly imported or for which the United States is still largely dependent upon foreign sources; and an expansion of its field investigations and laboratory and pilot-plant studies that would tend to increase production from known sources and develop usable substitutes for domestic materials in which critical shortages apparently were developing.

To expedite its future work as planned, the Bureau reorganized its operating structure during the last days of the fiscal year. Among the changes was the expansion of the Office of the Director to include an Assistant Director. As a result of new work undertaken during the year, the Health and Safety Service was expanded to include three additional divisions—a Coal Mine Inspection Division, the Explosives Control Division, and the Mineral Production Security Division.

The phases of work the Bureau scheduled for the fiscal year 1943 include the following:

The erection of pilot plants for investigating the best methods of producing sponge iron on a commercial scale will be undertaken. Direct reduction of iron ore by solid fuels and by natural gas are two of the processes to be employed to obtain a material that can be utilized during the war as a suitable substitute for scrap iron to mix with pig iron in the manufacture of steel.

To satisfy the anticipated needs of the military forces for helium, the Bureau will increase substantially its output of the noninflammable, light-weight gas by many additional millions of cubic feet. To achieve this unprecedented production goal, the Bureau planned to complete within the shortest possible time the new addition to its Amarillo (Tex.) plant, to undertake immediately the construction of a new plant, and to intensify the studies of other gas fields and to investigate possible additional plant sites.

Because of the limited known reserves of high-grade bauxite in the United States for the production of aluminum metal and for chemicals and abrasives essential to war industries, the Bureau will expand its investigations of methods of beneficiating low-grade bauxite ores, alumina-containing clays, alunite, and other potential raw materials.

Other strategic, critical, and essential minerals also will be investigated. The mineral exploration program will be expanded to include new areas and additional minerals. Hand in hand with this field work, laboratory studies of selected ores will be carried out and economic studies will be undertaken. From the data obtained, recommendations, where warranted by the facts, will be made to private industry and to Federal war agencies with a view to bringing all vital metals and nonmetals into production.

Further research will be done on magnesium in the laboratory and in pilot plants, additional studies will be undertaken on the beneficiation of chromite and on the production of electrolytic chromium, a pilot plant will be constructed and operated to obtain engineering data on the reduction of zinc concentrates with methane gas, and the resources of the West will be investigated and examined with a view to the feasibility of establishing a larger steel industry in that area.

Plans also were made for more effective enforcement of the Federal Explosives Act by the placement of explosives investigators throughout the Nation. Under the sponsorship of the Office of Civilian Defense, and in cooperation with other Federal, State, and local agencies, the Bureau will help protect the Nation's mines, quarries, smelters, and allied mineral facilities from sabotage and subversive action.

Review of the Year's Work

As the changes in the organization of the Bureau of Mines were not effected until 2 weeks before the close of the fiscal year, the activities of the Bureau described in the following paragraphs reflect the activities of the organization when it comprised four branches—Technologic, Health and Safety, Economics and Statistics, and Administrative. These branches administered and planned in Washington the activities that were carried on largely in the principal mining districts of the country through experiment stations, field offices, and district representatives.

Technological Work

Exploration of Ore Deposits

The Bureau of Mines centered its program of examination and exploration of ore deposits mainly on ores designated as "strategic" by the Army and Navy Munitions Board, namely, ores of antimony, chromium, manganese, mercury, nickel, tin and tungsten. Investigations also were started of raw material resources for western steel production (iron ore and coking coal) and of deposits of bauxite, alunite, and aluminum-bearing clay for the production of alumina. Near the end of the year, the Bureau began drilling for deep-lying magnesium chloride salts in Utah.

Highlighting the accomplishments of the year's work were the following:

About 2,345,000 tons of chromium ore—in Montana, California, Oregon, and Alaska—was added to the known reserves of the Nation. Three of the properties explored during the year already are in production.

An important new find of mercury ore of good, commercial grade was made in central Idaho, where 436,000 tons of low-grade (2.7 pounds mercury per ton) had been indicated earlier in the year in a partially developed section of the same property. The high-grade ore is in a body about 30 feet thick and at the end of the year had been traced by four diamond-drill holes over a strike length of 200 feet. It probably will be found to contain much more than 50,000 tons, assaying 8 pounds of mercury per ton. A second discovery of commercial-grade mercury ore was made by diamond drilling in an old mine in Oregon, recently closed because of depleted ore reserves.

The exploration of one deposit in Idaho indicated probable tungsten ore reserves of 150,000 tons, with reasonable expectation of developing 300,000 to 500,000 tons more. (In the 1941 fiscal year the largest and most important discovery of tungsten ore was made by the Bureau of Mines and Geological Survey. This deposit of ore is now making a substantial contribution to the war effort.) At three other tungsten mines in Nevada where ore reserves had been depleted, productive operations were resumed on new ore made known by the Bureau of Mines. Exploration at these mines was continuing at the end of the year.

Sampling in southeastern California and western Arizona revealed enough manganese ore to warrant construction and operation of one, and possibly two, 100-ton beneficiation plants, and completion of exploration in Arkansas established sufficient reserves of wad ore to warrant a 300- to 500-ton mill. More than 20,000,000 tons of iron ore were indicated by exploration of about 1 mile of an iron-bearing formation 6½ miles long in California, and over 8,000,000 tons in two other areas in Arizona and Oregon, respectively. Drilling in Georgia and Oklahoma revealed deposits of bauxite estimated to contain 1,165,000 tons of usable ore.

Seven hundred and forty deposits containing strategic minerals were given preliminary examination and were indexed and rated as to their relative importance. Sixty-five exploration projects were active during all or part of the year as follows: 1, antimony; 10, chromite; 21, manganese; 4, mercury; 2, nickel; 8, tungsten; 1, coking coal; 6, iron; 5, bauxite; 2, alunite; and 5, alumina clay. Some of these projects comprised work on 2 to 10 separate deposits.

Persons throughout the United States interested in the search for strategic minerals sent in samples of ore to the Bureau. More than 7,000 of these were examined during the year.

Metallurgical Investigations

Because many of the domestic ore deposits already known or explored by the Bureau are low-grade or complex, or both, the program

of developing and testing methods of beneficiation was given considerable attention. The laboratory investigations and pilot-plant tests demonstrated that substantial amounts of vital minerals for the war can be made available from domestic ores.

Methods have been developed for the concentration of many manganese ores to ferrograde manganese; for the recovery of chromium and ferrograde chromite from low-grade chromium ores; for the preparation of alumina from clays and alunite; for the production of magnesia and magnesium; for the recovery of cobalt metal or oxide; for increased production of lead; and for the beneficiation of ores containing antimony, copper, iron, mercury, nickel, tungsten, zinc, and fluorspar.

Ore Dressing.—Ore dressing provides a quick and inexpensive means to beneficiate the mined product. Studies were made of the concentration of ores containing the following strategic and critical metals and minerals: Antimony, chromium, cobalt, copper, iron, manganese, mercury, nickel, tungsten, zinc, magnesium, fluorite, and andalusite. The results of laboratory investigation of about 140 ores containing one or more of these metals have been encouraging in almost every instance.

The concentration of more than 125 manganese ores from the Western States was investigated. Although only half of the ores tested may be classified as amenable to concentration to ferrograde manganese, the production from these ores could make up much of the indicated deficiency. Most of the ores that could not be beneficiated to ferrograde were readily concentrated to an intermediate grade, which would be desirable feed to either leaching or pyrometallurgical processes to produce high-grade manganese products.

Ore-dressing methods also were used in the laboratory and pilot plants for beneficiating manganese ores from the Eastern States. A pilot magnetic roasting and magnetic separation plant treated various manganese ore samples from the Cuyuna range of Minnesota and the Batesville district of Arkansas. Construction of float-and-sink and leaching plants was undertaken to provide additional facilities for ore testing. Manganese concentration mills were designed for the Batesville and the Cuyuna range districts, and for the Deming district of New Mexico. Flow sheets for these mills were based upon laboratory and pilot-plant tests.

The ore-dressing pilot mill at Boulder City, Nev., was completed in September 1941 and immediately put in operation for treating the manganese ore from the nearby Las Vegas Wash area. The operations proved the feasibility of beneficiating higher-grade ores to ferrograde and the lower-grade ores to an intermediate grade. Early in April 1942, the pilot mill was converted to testing the low-grade and refractory Artillery Peak (Ariz.) ore.

The Chamberlain (S. Dak.) pilot manganese-concentration plant was treating the nodule-bearing shale of the area to recover nodules. The process includes hand sorting, kiln drying, and screening the nodules from the shale. For experimental purposes, an explosive shattering unit was added to the plant.

Hydrometallurgy.—Numerous laboratory leaching tests on manganese ores that were not amenable to concentration by ore-dressing methods were completed. New procedures for dissolving manganese from the ore were devised and older processes improved. The nitrogen dioxide process reached the pilot-plant stage. The sulfur dioxide-sulfuric acid leach was modified to produce a high-grade product from ores containing up to several percent phosphorus. Large-scale laboratory leaching tests using smelter flue gas containing sulfur dioxide were conducted. A new process was developed that may be used on manganese ores containing appreciable quantities of objectionable impurities, such as zinc.

The hydrometallurgical pilot plant treated ores too low grade for direct use in standard industrial ferro-alloy production. The manganese from low-grade ores was leached with sulfur dioxide, nitrogen dioxide gas, or dilute sulfuric acid. Manganese sulfate or manganese nitrate was obtained by evaporation of excess water. Further treatment by this leaching method yielded material highly suitable for electrolytic deposition of high-purity manganese metal in the pilot plant.

Domestic chromium ores usually may be concentrated to a product of low chromium:iron ratio. Reduction roasting of subgrade concentrates followed by acid leaching of the iron produces a residue that is smelted to standard ferrochrome. Construction of a 25-ton-per-day reduction roasting and leaching pilot plant was undertaken.

A process was developed for recovering cobalt from domestic low-grade oxidized cobalt ore. This process yielded a high-grade cobalt oxide or cobalt compound suitable for the production of electrolytic cobalt metal.

Studies of various proposed methods for preparing alumina from alunite, clays, and other aluminum-bearing materials resulted in the selection of a procedure for investigation in a small pilot plant. Samples from most Western States were run through the plant. The operation included dehydration of the clay followed by an acid leach. The electrolytic precipitation of hydrous alumina and the dehydration of alum produced in various ways were studied. Production of metallic aluminum from these products will be investigated.

Electrometallurgy.—The operations of the electrolytic manganese pilot plant determined optimum electrolyte concentrations, economic current densities, and the most satisfactory cell-room equipment for

commercial installations. Current efficiency was increased to 60 percent.

A process for producing magnesium metal by direct electrolysis of magnesia in a fused salt bath was developed. It showed excellent possibilities for utilizing domestic magnesites and dolomitic ores. An 8,000-ampere pilot electrolysis cell was placed in operation. Electrothermic reduction of magnesia by carbon is potentially a superior process for producing magnesium metal. Improved methods of overcoming technical difficulties were developed in a small pilot plant at Pullman, Wash. Methods also were developed for the production of high-purity electrolytic chromium.

Conditions were established for the electrodeposition of metallic cobalt from solutions obtained by the treatment of low-grade oxidized cobalt ore.

Pyrometallurgy.—Refractory low-grade manganese ores were successfully smelted with pyrite in an electric arc furnace to produce a manganese sulfide matte. This matte can be used as such in the steel industry or can be sintered to a 60-percent manganese product that will meet ferrograde manganese specifications. Fine, high-grade manganese oxide and carbonate ores, manganese carbonate flotation concentrates, calcines from deleading manganese oxide flotation concentrates, and calcines from the treatment of manganese sulfate were successfully sintered to meet ferrograde specifications.

The recovery of vanadium from titanomagnetites by smelting a sintered concentrate in the 6-ton University of Minnesota experimental blast furnace was investigated. Results showed trends that may be investigated in more detail in industrial furnaces and should lead to the recovery of a substantial quantity of vanadium from domestic deposits heretofore not utilized.

Methods were developed for taking advantage of the more rapid smelting rates for lead on the Scotch hearth furnace, using pelletized, richer and more finely divided flotation concentrates. A mechanical charging device was designed and installed. It was found that a good portion of the zinc wasted to lead blast-furnace slags may be separated and saved.

Testing Methods.—Many ores containing war minerals were subjected to microscopic examination, chemical analyses, and physical testing. In all, 3,500 prospectors' samples were tested for the occurrence of strategic minerals. The properties of various alloy systems were studied. New equipment was designed and built to extend the facilities of the laboratory. Considerable X-ray work was done on determining the structure of various alloys and in distinguishing between closely related minerals.

The investigation of the thermoelectric method of checking the composition of metals was continued to materials of higher alloy

content. Its usefulness in making acceptance tests on purchased materials and in sorting scrap metal was demonstrated. A simple, quick method, based upon the emergence of substances of fixed melting points, was developed for determining the temperature of molten metals, and work was begun to produce a complete series of test substances.

Metallurgical Fundamentals.—Because the control and improvement of energetics of processes for critical metals require precise data on the various forms of energy content involved in transformations of these substances, the Bureau determined the quantities of the various energy forms for the most important critical substances, with special emphasis on manganese, chromium, and magnesium. The magnetic properties of certain manganese alloys also were studied.

Nonmetals Research

The Bureau of Mines met heavy demands for cooperative assistance in the field of nonmetals, as well as metals, by the Federal war agencies.

The removal of impurities from low-grade bauxite by gravity-washing and froth-flotation methods was undertaken just before the beginning of the fiscal year, and by October 1941 improved methods of washing were determined.

A special appropriation for the investigation of calcium aluminate processes for extracting alumina from siliceous bauxite was used to test the Seailles process. The conclusion was that while the process can be operated technically, it is not attractive from the economic and practical standpoints. The lime-soda sintering process was one of the methods thought to be more practical. A sequence of operations was worked out that gives high extractions and recoveries of alumina of satisfactory grade. The process was scheduled for testing in a subcommercial test plant in the fall of 1942.

Foreseeing that the metallurgical demands for bauxite would make it necessary to substitute clay for bauxite in making aluminum sulfate (used in water treatment, paper manufacture, etc.), the Bureau undertook studies on preparing clays to make them suitable for this purpose. As a result substitution of properly calcined kaolins for bauxite can be recommended; and the War Production Board was reported to be working out the means for the production and use of such clay.

Substitutes were found for Indian kyanite, a mineral used for special refractories, formerly imported from near Calcutta. The most attractive one is topaz, which can be mined commercially in South Carolina. The War Production Board reported it is making arrangements for commercial production.

The shortage of flake graphite, normally imported from Madagascar,

for crucible and steel-ladle stoppers was foreseen during the fall of 1940, and work was initiated on the Alabama graphites that had been exploited during the First World War. A far larger size of flake now is needed than in 1917. Suitable means of milling the graphite rock were developed. The War Production Board, guided by these results, made arrangements for building five mills in three States.

Radio ceramic talc suitable for radio insulators was found to be insufficient for expanded needs during the winter of 1941. The Geological Survey sought suitable grades of talc available in quantity and the Bureau of Mines did the technical work of testing the talcs. Many were found to need flotation to remove impurities. Increased production along the lines recommended by the Bureau of Mines is expected.

The war in Europe cut off Belgian glass sand, which had supplied Pacific coast glass plants. A study was made of methods for scrubbing off iron stains and removing feldspar and heavy minerals from West coast sands. One of the larger glass companies undertook construction of a plant at Monterey, Calif., which will incorporate the Bureau's findings and produce high-grade sand in large quantities.

Deposits of the volcanic rock, dunite, made up mostly of olivine, exist in the Eastern States, as well as in the Far Western States, and electric-furnace fusion of the rock with sufficient reducing agent produces ferrosilicon and fused magnesium silicate, or forsterite. Tests of brick made with the forsterite showed it to be a desirable supplement to magnesite brick and usable as a substitute for refractory material formerly imported from Austria and Greece.

Coal and Coal Products

The Bureau of Mines expanded the consulting service that it maintains for all the Government agencies for: (1) The purchase and operation of steam generating and heating equipment, (2) the purchase and analysis of coal, and (3) the conditioning of water used in boilers. Consultation, acceptance tests, and inspections were provided on numerous equipment installations, particularly for the War Department. Attention was directed to the conversion of Federal plants on the East coast from oil- to coal-burning equipment.

More than 15,000 coal analyses were made and about half of these were in connection with the purchase of 3,130,000 tons of coal for the War and Navy Departments and 518,000 tons for other Government agencies. To obtain analyses for awarding Government coal contracts, Bureau of Mines coal-sampling trucks visited 468 mines in 12 States and collected 1,740 samples, primarily in areas adjacent to new war activities.

Coking Coal.—The construction of seven new blast furnaces in the West has created a demand for western coals that have satisfactory

coking properties. The Bureau's field exploratory crews and the coal-carbonization laboratory in Pittsburgh showed that certain coals of Oklahoma, Arkansas, Utah, New Mexico, Colorado, and Wyoming will meet the needs. The survey of the coking properties of coals of the United States, which the Bureau of Mines began in 1927, has been especially valuable in the selection and blending of coals for blast-furnace coke. Bureau of Mines laboratory research also provided information for coke-plant operators on the storing properties of coals of various compositions.

Gasoline From Coal.—The Germans, who have been working on processes for the conversion of coal to gasoline and oil since 1913, were so successful that it is estimated now that their plants will produce about 5,000,000 tons of gasoline annually. The Bureau has experimented with a hydrogenation process for several years and has determined the amenability of many American coals to liquefaction, which will be most useful in the future; moreover, the Bureau has developed a relatively low pressure hydrogenation treatment for producing a heavy fuel oil suitable for use as Bunker C oil. Valuable byproducts, such as phenols, cresols, and xylenols, also can be obtained from coal-hydrogenation products. The Fischer-Tropsch water-gas method is to be investigated during the coming year. Hydrogenation byproduct lignin from paper-pulp manufacture has been found to yield isopropylcyclohexanol, a material valuable in the plastics industry and of possible importance as an antiknock addition agent to gasolines.

Boiler Water.—Proper conditioning and treatment of boiler waters assumed added importance because of the war demand for uninterrupted steam production. Analyses of boiler water samples by the Bureau increased by 250 percent over 1941. Material improvement in efficiency and economy for boilers operated by the War Department resulted from this water-conditioning service.

Coal Storage.—To protect industrial and domestic consumers against coal shortages, storage of ample quantities of coal became essential. Because bituminous and subbituminous coals are subject to spontaneous heating and ignition, the Bureau instituted a survey of the action of coal under storage conditions in industry to determine the best practical methods of storing individual coals.

Coal Mining.—The Bureau initiated studies relating to consumption of power in the mines and indicated ways and means of effecting economies with no losses in efficiency.

Petroleum and Natural Gas

Although the war did not change the character of the research and investigative work of the Bureau of Mines on petroleum and natural

gas, it changed the emphasis on particular problems, created demands for volumes of factual data, and allowed less time in which to assemble and collate essential information. The Bureau was able to respond to the immediate needs of the War and Navy Departments, the Office of the Petroleum Coordinator for War, and other Government agencies for technical advice and information on several phases of the national program of supplying petroleum products for war uses.

Petroleum engineers of the Bureau made a survey of more than 200 crude oils and of the products from 25 condensate plants to determine their content of high-octane aviation-gasoline stock. They also undertook a series of tests to determine the most effective blending of various components of 100-octane aviation gasoline, and initiated a study to determine the components of the reservoir fluids and the available reserves in fields of the condensate type which yield hydrocarbons needed in aviation gasoline. Other typical assignments included a study of all possible petroleum sources of toluene for use in the manufacture of explosives, and a study of the possibility of augmenting supplies of paraffin wax.

In April 1942 the Bureau opened a petroleum field office at Franklin, Pa., to help 15,000 oil producers in the Appalachian region who lack technical staffs of their own to determine the best practical means of repairing wells and repressuring the sands with air and gas to stimulate the production of oil needed for special lubricants.

The Bureau turned the whole chemistry and refining program of the Petroleum Experiment Stations at Bartlesville, Okla., and Laramie, Wyo., to the search for technical answers to current practical questions regarding the essential nature of crude oils, natural gas, condensates, and their components. High-efficiency fractionating towers were designed and built; work progressed on desulfurization of marginal aviation-gasoline base stocks to improve their response to tetraethyl lead; and reports gave valuable information on volume and types of asphalts needed for military airport runways and roads.

Reports on the Bureau's methods of collecting and examining subsurface samples of petroleum, the results of its field studies, and a new basis for analyzing reservoir behavior, using pressure-production data, have advanced the technology of determining oil and gas reserves and pointed toward advisable methods of withdrawal under war conditions. Special attention was given to the effects of high gas:oil ratios, excessive pressure declines, and abnormally low rates of water encroachment. Subsurface samples were taken in various fields and analyzed for quantity of gas in solution, shrinkage resulting from gas liberation, and composition of the oil-gas mixtures in reservoirs. Core samples were subjected to connate water determinations, and studies were made of the permeability of porous rocks and productivity indexes of wells and fields. Contributions were made to the subject of well

spacing. The Bureau made reports on the proper blending of oil-well drilling mud-fluids and on methods of combatting heaving shales.

Information on the chemical nature and gas-water ratios of gas hydrates was obtained in cooperation with the American Gas Association. As a result, gas transmission lines can operate at higher capacities. Determinations were made of the distribution of residual gases returned to the producing formations by cycling operations in condensate fields to obtain maximum yields of liquefiable components.

The Bureau gathered a fund of information on stimulating production in "stripper" fields containing large oil reserves that may be recovered by well-planned, secondary-recovery methods. They also reported on the treatment of oil-field brines and their use as a repressuring medium in water-flood projects.

The Bureau conducted tests on tanks which gave valuable information on changes that may be expected in aviation gasoline and evaporation losses of blend components stored for the war use.

The far-sighted policy of research, development, and conservation followed since the Bureau's helium program was initiated during the last World War makes it possible to supply this gas in quantity to the United States armed forces in the present conflict. The Amarillo (Tex.), helium plant produced more helium in 1942 than in any previous fiscal year. The Amarillo helium plant is being enlarged, and a new plant is being built. The Cliffside field now has a total of nine wells producing helium-bearing gas.

Explosives

Experimental research on explosives developed new findings, many of which are directly applicable to military explosives and have been used by the war agencies. The research program included studies of sheathed explosives, the production of toxic gases by explosives, the ignition hazards of explosives when used in the presence of combustible gases and dust, the strategic properties of liquid-oxygen explosives, and an underlying inquiry into factors affecting the temperatures and pressures developed by explosives.

For protection of equipment and personnel in special war industries against very rapid gas explosions, certain high-speed explosion diaphragms were developed; and to assist the synthetic rubber and plastics industries, studies were made of explosion and inflammability characteristics of butadiene, styrene, acrylonitrile, chlorobenzene, and trichlorethylene. Other studies included one of methods of preventing explosions due to hydrogen liberation in the charging of storage batteries. Further work was done on the use of helium in preventing explosions of anesthetic mixtures; and a study of the chemical factors controlling anthracite mine fires was completed.

For safeguarding war industries using Diesel engines in explosive or combustible atmospheres, a testing gallery was completed and put in operation.

The Bureau explosives-testing program, carried on for many years with a view to maintaining safe characteristics in explosives and blasting devices used by the mineral industries, moved forward rapidly. The Bureau made 111 chemical analyses, 958 gallery tests, and 678 control tests of a physical nature in the 1942 fiscal year.

As part of the scientific research carried out in connection with administration of the Federal Explosives Act the Bureau, at the request of the Ordnance Department of the Army, made plant-security studies of some ordnance facilities and developed valuable information relating to manufacture of explosives. The Bureau also made some demolition studies in cooperation with the Army.

Several disasters were investigated, including those that occurred at a black powder plant, a primer plant, two pyrotechnic plants, a railroad torpedo plant, and a quarry.

Since the increasing use of inflammable metal powders in the war industries has created new and additional dangers from dust explosions, the Bureau extended its studies of metallic dust hazards. One result was the discovery that hard pitch (in granulated form) is an excellent agent for extinguishing magnesium fires in industrial plants where the use of sand and similar agents might harm machinery and equipment.

The Bureau assigned an engineer to cooperate with the Chemical Warfare Service of the War Department, in connection with the latter's civilian protection activities, to conduct training work and to assist in the research work on the extinguishment of incendiary bombs and on kindred war problems.

Upon completion of its studies of the effects of seismic vibrations from quarry blasts, the Bureau began a study of air waves from blasts, and the technique developed was applied to military problems.

Safety, Plant Protection, and Health Activities

Conservation of manpower and mining equipment and the protection of mineral facilities from serious damage or destruction by carelessness, neglect, sabotage, or subversive action were made paramount by the war. Safety education and accident-prevention work, supported by investigative and testing activities, carried on in the same manner and with equal effectiveness as in past years, constituted the keystone of the vastly expanded safety and security program. The power of entry to coal mines, conferred on the Bureau by the Federal Coal Mine Inspection Act enacted in the previous fiscal year (May 1941), and the regulatory powers granted by the Federal Explosives

Act approved December 26, 1941, as well as the broad authority implied in Executive Order 9165, of May 19, 1942, dealing with the national facility security program, proved to be of considerable assistance.

The need for safety education and training and retraining of mineral industry workers in first-aid, accident prevention, and mine rescue operations, became progressively greater as increasing numbers of employees were drafted for military service, migrated to better-paying war industries, or absented themselves, leaving their ranks to be filled by men inexperienced and untrained in the newer mechanized operations.

Safety Work

Engineers and safety instructors of the Bureau trained 90,206 employees of the mining and affiliated industries in first aid and mine rescue during the fiscal year, bringing the total number of persons who have completed such courses since the establishment of the Bureau in 1910 to 1,538,758. Moreover, with the training of 1,459 persons as first-aid instructors, more than 16,000 persons throughout the country became qualified to teach the Bureau of Mines first-aid course in the civilian defense program of the Office of Civilian Defense. During 1942, 117 additional mines and plants were awarded certificates showing that all employees had been trained in first aid. Since the Bureau has been convinced that persons trained in first aid are less likely to injure themselves or be involved in accidents, it has further promoted such training by endorsing and aiding first-aid competitions. During the year, it awarded certificates to 1,072 persons who qualified as judges for first-aid contests and assisted in conducting 61 first-aid contests in 11 States.

The Bureau's personnel instructed 2,008 mine workers in mine rescue work, and gave its advanced mine rescue training course to 138 persons during the year. These men, familiar with the use of gas masks, oxygen breathing apparatus, and procedures connected with fires and explosions in confined places such as mines and tunnels, constitute an efficient reserve for use in civilian defense and rescue work.

At virtually all major mine disasters, Bureau personnel assisted in the rescue and recovery operations, sometimes at the risk of life or limb. The Bureau's engineers investigated 24 mine explosions in 11 States, 25 mine fires in 15 States, and 52 miscellaneous accidents in 24 States during the year. Rigid inspections were made of 43 privately owned mine rescue stations at the request of the owners.

The Bureau's plan of giving accident prevention courses was continued. During the year 112 persons were trained in the course for coal-mine officials. A total of 8,521 mine officials and others have

taken the complete course, and 5,122 have received partial training since 1930 when the course was inaugurated. The accident-prevention course, especially designed for coal miners, has been given in complete form to 1,841 miners and in partial form to 795 others since the course was organized in 1940. An accident-prevention course for metal miners was introduced and given to 160 metal-mining officials. During the fiscal year, 170 persons completed a course of instruction in petroleum safety, and 120 others received part of the training.

In its safety education program for the mineral industries, the Bureau utilized motion pictures, slides, exhibits, testing galleries and similar educational tools extensively. During the year, sound motion pictures on safety subjects were exhibited 170 times at safety meetings. Thirteen safety exhibits were shown in 10 States at fairs and expositions in mining districts and at mining conventions. The Bureau's representatives attended, and at times addressed, 612 safety meetings held in 33 States.

Testing work on electrical machinery and equipment, to determine their safety for use in gassy and dusty atmospheres in mines, was continued. The Bureau approved 50 additional machines and types of apparatus during the year, and made 282 explosion tests for the Navy on certain explosion-proof enclosures intended for use on ships.

The Bureau has three all-steel railroad coaches equipped for safety training and for recovery work following mine disasters; two are in active service, and one is held in reserve for emergency use.

The yearly Nation-wide statistical survey of mines, quarries, mills, smelters and coke ovens, which reveals the number of men employed, man-hours worked, and the number and causes of occupational accidents, was made again, bringing up to date this information that is essential to accident-prevention work. A preliminary survey also was begun to obtain accident data on the petroleum industry.

Coal-Mine Inspection

Although the Federal Coal Mine Inspection Act of May 7, 1941 (Public Law 49, 77th Cong.), was passed before the United States entered the war, its importance in the war effort has increased correspondingly with the growing dependence on coal to keep the Nation's vital industries operating at full speed. Despite a delayed start in inspecting mines, because of the time required for examining, qualifying, certifying, and appointing applicants through the Civil Service Commission and for training the new inspectors in the Bureau's policies and procedure, 400 coal mines in all were examined between December 1, 1941, and June 30, 1942.

Most of the mines inspected were the larger ones; their combined production was 24.7 percent of the total annual output for the United

States in 1941, and their combined employment was 117,346 persons, or 21.9 percent of the total coal-mine employment in that year.

The mine inspections consisted of a thorough examination of the local conditions, including careful observation and study of the practices, conditions, and equipment in and about the mines, the collection and analysis of dust and air samples, and a compilation and interpretation of the mine accident records. A preliminary report, calling attention to the hazards that require immediate attention, was posted at the mine at the completion of each inspection; and a detailed report, available for public inspection, was transmitted later to the management, the miners' labor organizations, and the State mine inspection agency.

The reception of the inspection program by the industry was favorable generally, once the inspection work got under way. Although there were some criticisms, mine management, mine workers, and State inspection services demonstrated their cooperativeness. In many instances, hazardous conditions and practices pointed out by the inspectors were corrected immediately.

In addition to the inspections, inspectors and other engineers of the Bureau made special investigations relating to explosives and electrical equipment in mines and other individual phases of coal mining.

Federal inspection of mines has not been in operation long enough to determine what effect it will have on the disaster and accident records of the country. The inspection procedure is, however, exerting a definite influence toward the reduction of accidents, in spite of handicaps resulting from the war. According to available records, all major industries have shown far greater increases in accident rates than the coal-mining industry since war production entered its peak phases.

Explosives Control

The Bureau of Mines is charged with administering the Federal Explosives Act of 1917, which was amended and invoked on December 26, 1941 (Public Law 381, 77th Cong.). Aimed at the prevention of sabotage and the misuse of explosives, it provides for control of the manufacture, purchase, sale, use, and possession of nonmilitary explosives and explosives ingredients by means of a licensing system, accompanied by investigations of the manufacture and storage, thefts or losses of explosives, and fires and explosions in which explosives are believed or known to be a contributing factor. Regulations promulgated by the Bureau have the force of law, and violations thereof are penal offenses.

The Bureau appointed 4,400 licensing agents throughout the United States and Territories and possessions. These licensing agents, who serve without pay except for a 25-cent fee which they are entitled to

collect from each person to whom a license is given, issued about 145,000 licenses to vendors, purchasers, and foremen by the close of the fiscal year. The Bureau itself examined and acted upon 2,000 additional applications for licenses from manufacturers, schools, colleges, and laboratories.

Forty-eight explosives investigators were appointed and stationed in the various States and in Alaska to supervise and guide the licensing agents and to investigate the manufacture, handling, and use of explosives. Inasmuch as the mineral industries are the principal nonmilitary users of explosives, the investigators' work was directly connected with the safety and mineral security program of the Bureau. The investigators, who made reports on more than 750 stores of explosives of which 450 were in critical areas, were assisted by other engineers and technicians of the Bureau in investigating fires and explosions in mines, quarries, munitions plants, and fireworks factories.

To facilitate its explosives control work and to coordinate it with the entire Federal program, the Bureau established liaison with the Army and Navy Intelligence services, the Office of Civilian Defense, and the office of the Chief of Ordnance and the Provost Marshal General.

Information was collected by the Bureau, as in past years, on the quantity of industrial explosives manufactured and used in the United States, and the estimated quantity of nitroglycerin and other ingredients used in the manufacture of explosives.

Antisabotage

As its part in the Nation-wide emergency program of the Federal Government to protect vital production, supply, storage, and transportation facilities, the Bureau undertook to make secure the continued production of vital war material from the metal mines, coal mines, quarries, mills, smelters, and allied mineral facilities. The Bureau received an allotment of funds from the appropriation made by Congress for this program toward the close of the fiscal year. The administrative organization to handle this work was set up, and the Bureau prepared to employ and train an initial field force of 75 to 100 engineer-investigators who could carry out the work in close coordination with the mine inspectors, explosives investigators, safety engineers, and other field personnel of the Bureau, as well as in cooperation with the field personnel of other Federal agencies concerned in the facility security program.

Health in the Mineral Industries

Activities of the Bureau in the field of health were expanded during the year. A new unit comprised of doctors, chemists, and

engineers was established to make investigations and studies of occupational diseases in the coal-mining industry, in conjunction with the inspection work; and the Bureau's gas and dust laboratory was enlarged to handle the greatly increased volume of analytical work created by the large quantities of mine gas and dust samples received from the mine-inspection field force. The laboratory analyzed 5,300 gas samples as compared with approximately 1,500 during the previous fiscal year.

The Bureau tested scores of respiratory devices for protection against noxious gases, fumes, and dusts, which were submitted by manufacturers, and gave its approval to several such devices. Manufacturers were advised on the development of more efficient respiratory equipment, and information was provided the public on the use and limitations of existing respiratory equipment. The Bureau issued more than a dozen publications on air contamination or contaminants.

At the request of, and in cooperation with, the Army and the Navy, confidential studies were made with respect to health factors in some military equipment.

Through laboratory studies and through investigations in underground tunnels in New York, Tennessee, and Colorado, the Bureau obtained information that may be of value in increasing the use, under well-controlled conditions, of Diesel equipment on underground main haulage without hazard to health.

At the request of the New York City Tunnel Authority, the Bureau also investigated the probable effects of air contamination at a portal of a newly projected vehicular tunnel. Tests also were made in a wind tunnel, the results of which may lead to the safe ventilation of vehicular tunnels without contamination of the atmosphere at the mouths of such tunnels.

Economics and Statistical Services

The accelerated demands resulting from the war for current comprehensive data on production, trade, distribution, supply, and consumption of minerals and mineral commodities on the part of the operating divisions of the Bureau, as well as the increasing needs on the part of the other Federal war agencies and the war industries, resulted in a marked expansion of the Bureau's economics and statistical services. In addition to the collection, analysis, and publication of current and periodical data on all mineral commodities, the Bureau studied and reported on special economic phases of the mineral industries, with particular emphasis on the strategic and critical metals and nonmetals and the fuels required by the war industries.

By means of the available data and through representation on committees and conferences, the Bureau was able to advise the war

agencies on threatened bottlenecks in supply, on advisability of expanding plant facilities, on production and plant capacities, and on possible substitution of some minerals for others.

The Minerals Yearbook (Review of 1940) was published at a much earlier date than in the previous year, and the preprints of all chapters were available by August 1941. Many chapters of Minerals Yearbook (Review of 1941) were prepared and some were available for distribution by the close of the 1942 fiscal year.

Metals

Although domestic metal-production facilities were sustained at maximum capacity throughout the year, the demand for metals in many cases exceeded the supply, and as a result the Government imposed a priority allocation system and placed severe restrictions on the consumption of critical metals by other than the war industries. To keep pace with the rapidly shifting situation, the Bureau's war-time augmented staff of commodity experts was frequently consulted and the Bureau provided the war agencies with detailed statistical studies of 30 commodities on a monthly basis to cover both producer and consumer phases. In the case of many of the metals, similar data were furnished to show the picture of raw materials used. Of a total of 120 separate surveys conducted during the past fiscal year, 75 were designed specifically for the use of war agencies. This not only represents an increase in the number of surveys undertaken but also a marked expansion in the number of persons replying to Bureau questionnaires.

As the problem of obtaining additional supplies of new metal became more acute, the question of available secondary metals was raised to major importance. The Bureau, now operating under policies outlined in the general preference orders of the War Production Board, converted the quarterly iron and steel scrap survey to a monthly statistical review showing stocks, receipts, production, consumption, and other data as reported by about 19,000 respondents, including producers, dealers, brokers, and consumers of scrap. Results of the surveys were made available to various war agencies and served as the basis of much of the scrap allocation program. Surveys of 3,000 consumers and 4,000 dealers of nonferrous scrap were broadened to include the reports of metal produced from scrap as well as scrap consumed. Magnesium was included for the first time in the growing roster of scrap metals.

The monthly canvasses of copper, lead, and zinc production inaugurated the previous year also were expanded. The usual preliminary reviews of nonferrous metal mining, including gold and silver, in 13 Western States in 1941 were released by the middle of January

1942; and final detailed statistics on copper, lead, and zinc for each of the 13 Western States and for Alaska, for incorporation in the individual chapters of *Minerals Yearbook, 1941*, were completed before the end of June 1942.

Nonmetals

In addition to the regular, periodic compilation of data on non-metallic minerals, including two monthly cement reports, a quarterly gypsum report, and a semiannual phosphate rock report, the Bureau made monthly canvasses of mica, graphite, asbestos, barium oxide, and natural sodium compounds; a semimonthly canvass of cement; and special canvasses of quartz crystal, mineral pigments, and industrial diamonds.

Special studies also were conducted by staff members on the sources of high-grade dolomite needed for making magnesium metal; sources of magnesia; processes for recovering magnesia from dolomite; magnesia refractories; resources and uses of monazite; uses and supplies of strontium; sources of high-grade clays for aluminum salts; and nonmetallic mineral industries in the South.

The Bureau compiled a review of all important trends and accomplishments in the nonmetallic mineral field in 1941; and, to assist present or prospective operators in securing markets for their products, developed special facilities and prepared a series of reports covering the marketing problems of various minerals and including lists of prospective buyers.

Petroleum and Natural Gas

The Bureau continued its comprehensive collection of statistics and economic data covering the operations of the petroleum and natural gas industries. Although the Bureau has no jurisdiction with regard to transportation shortages, control of production, rationing, readjustments in refinery operations and similar problems brought on by the war, it was able to assist those Government agencies responsible for solutions with essential current data.

The monthly statistics of aviation gasoline, initiated in October 1939 and supplemented by capacity surveys, proved of special value to the program of expanding output to meet war requirements. The Bureau adapted and altered its work on forecasts to meet Government requests for longer-term estimates of national demands, as well as to forecast requirements on critical areas such as the East coast. The forecast of demand for crude petroleum by States of origin found use as basic data for Federal allocations.

Coal and Coke

Because of the altered conditions in the coal and coke industry brought about by such factors as the increased needs for metallurgical coke, the off-season demand for solid fuels, and the greater storage of coal by consumers in anticipation of transportation difficulties, the Bureau found the Federal war agencies dealing with this industry in need of more comprehensive and more up-to-date statistical information. Accordingly current studies were expanded, new studies were inaugurated, and the dates for the return of questionnaires by the industry were in many cases moved ahead.

The Bureau completed according to schedule its regular annual reviews on developments in the Pennsylvania anthracite industry and the lignite, byproduct and beehive coke, fuel briquet, packaged fuel, and peat industries; and continued its monthly and weekly reports on the various phases of the anthracite, coke, and byproducts industries. At the same time, it furnished the war agencies with special reports.

A field survey on the dredging of anthracite and an historical study of the production of coal, petroleum, natural gas, and electricity in the United States, 1929-40, were completed.

Data on Foreign Minerals

The lack of statistical and economic data formerly obtained from official sources in Axis and enemy-occupied countries, and suspension of the publication of similar data usually obtained from allied and neutral countries prompted the Bureau to establish a service whereby essential statistical information relating to current production, stocks, and exports of strategic and critical minerals is obtained on a confidential basis from official sources in nonenemy countries.

As a result of the Bureau's policy of withholding publication of all data that might give aid to the enemy, publication of foreign statistical and other economic information was stopped but was provided on a confidential basis to all war agencies.

The five foreign mineral specialists assigned the previous year as technical advisors to certain of the American embassies in Latin America continued in the same status during the current fiscal year. A mining engineer was assigned to Mexico for checking Mexican resources of mica, manganese, tungsten, tin, mercury, and other strategic minerals.

Public Information

In response to direct requests from individuals and agencies concerned in mineral production, the Bureau distributed about 196,000

copies of the Bureau's printed publications and approximately 350,000 processed reports and monthly lists of publications. About 100,000 copies of the printed reports of the Bureau were sold by the Superintendent of Documents.

The Bureau decided that some of the material published previously might be of aid and comfort to the enemy, and for that reason, as well as the desire to economize wherever possible, discontinued a few of its publications such as the *Foreign Minerals Quarterly*, and changed its other reports dealing with foreign conditions to a confidential basis. Other current reports dealing with demand, supply, and consumption of strategic and critical minerals also were placed on a confidential basis and their distribution was restricted to a limited list of Federal officials. All other publications were carefully reviewed to avoid the disclosure of vital information; the size of the editions of processed material was cut, and the style altered with the resultant saving of about 400,000 sheets of paper.

Exactly 440 reports (comprised of 22,500 manuscript pages and 1,800 illustrations) were prepared for publication as bulletins, technical papers, handbooks, *Minerals Yearbook* chapters, and contributions to technical journals. The Bureau added 3,314 books to its Washington library; received 295 periodicals; and loaned 23,788 publications for outside use. In addition to the thousands of letters dealing with technical material, the Bureau replied to more than 70,000 letters from the public requesting publications or general information on minerals. Ten exhibits illustrating the Bureau's work were prepared and shown.

Educational motion pictures from the large film library of the Bureau were circulated more extensively than ever. The Army Air Forces, the Naval Air Stations, the Coast Guard, the N. Y. A. and schools, colleges, and other centers for defense training were outstanding borrowers. The total number of showings during the year was reported as 99,699, with an estimated attendance of 10,366,166 persons. The Bureau acquired 546 sets of new films, all made, in accordance with past procedure, in cooperation with industrial concerns that pay all of the costs of production and provide the Bureau with copies for free loans.

Administration

The Bureau's activities during 1942, as in past years, were administered from Washington, D. C., but were carried on mainly in the field. The Bureau opened a new petroleum field office at Franklin, Pa., and a new district office for health and safety work at Mount Hope, W. Va.

Personnel

On June 30, 1942, there were 2,104 full-time employees on duty in the Bureau, as shown in the following table:

Classification and number of appointees

	Profes- sional	Subpro- fessional ¹	C. A. F.	Cus- todial ²	Total
Washington.....	³ 66	4	301	6	377
Pittsburgh.....	⁴ 146	83	141	82	457
Field.....	⁵ 613	157	291	209	1, 270
Total.....	825	249	733	297	2, 104

¹ Includes instrument makers, etc.

² Includes laborers, mechanics, etc.

³ Engineers, 14; chemists, 4; metallurgists and metallurgical engineers, 3; miscellaneous, 45; total, 66.

⁴ Engineers, 48; chemists, 53; metallurgists and metallurgical engineers, 3; miscellaneous, 42; total, 146.

⁵ Engineers, 221; chemists, 71; metallurgists and metallurgical engineers, 98; miscellaneous, 223; total 613.

In addition to the foregoing full-time employees, there were 798 employees holding appointments on a when-actually-employed basis as follows: 42 consultants; 125 excepted; 13 classified; 3 unclassified; and 615 field agreements.

Property

The records as of June 30, 1942, show that the property of the Bureau had a total valuation of \$7,320,530, of which \$3,209,606 was for land, buildings, and improvements; \$1,127,928 for machinery and power-plant equipment; \$713,415 for laboratory equipment; and the remainder for certain helium properties, office furniture, automobiles, and other goods.

Finances

The total funds available to the Bureau of Mines for the fiscal year ended June 30, 1942, including direct appropriations, departmental allotments, reappropriated balances, and sums transferred from other departments for service work, were \$10,894,518. Of this amount, \$9,133,940 was spent, leaving an unexpended balance of \$1,760,578. On the regular work of the Bureau, \$7,210,643 was expended. These figures are subject to revision because of unpaid obligations.

Table 1 presents classified and complete information regarding the financial history of the Bureau since its establishment in 1910.

Table 2 gives a statement of the distribution of congressional appropriations to the branches and divisions and the expenditure of these funds in 1942 by Bureau divisions.

TABLE 1.—Bureau of Mines appropriations and expenditures, fiscal years ended June 30, 1911–42

Fiscal year	Appropriated to Bureau of Mines	Department allotments ¹	Funds transferred from other departments ²	Total funds available for expenditure	Unexpended balances	Total expenditures	Expenditures, exclusive of service items ³
1911	\$502,200.00	\$34,200.00	-----	\$536,400.00	\$22,818.27	\$513,581.73	\$513,581.73
1912	475,500.00	45,640.00	-----	521,140.00	6,239.77	514,900.23	514,900.23
1913	583,100.00	47,850.00	-----	630,950.00	4,087.20	626,862.80	626,862.80
1914	664,000.00	57,307.79	-----	721,307.79	4,678.29	716,629.50	716,629.50
1915	730,500.00	55,424.60	-----	785,924.60	4,178.11	781,746.49	781,746.49
1916	757,300.00	48,710.87	-----	806,010.87	9,058.63	796,952.24	796,952.24
1917	981,060.00	52,400.00	-----	1,033,460.00	48,588.10	984,871.90	984,871.90
1918	1,467,070.00	51,901.98	-----	4,580,971.98	395,745.10	4,185,226.88	1,172,939.64
1919	³ 3,245,285.00	49,542.86	-----	11,894,827.86	2,452,236.78	9,442,591.08	1,137,471.37
1920	1,216,897.00	52,800.00	-----	1,269,697.00	9,592.18	1,260,104.82	1,245,891.36
1921	1,362,642.00	62,618.72	666,720.00	2,091,980.72	13,985.89	2,077,994.83	1,412,923.15
1922	1,474,300.00	59,800.00	182,200.00	1,716,300.00	52,120.45	1,664,179.55	1,483,038.47
1923	1,580,900.00	70,814.30	97,100.00	1,748,814.30	10,959.08	1,737,855.22	1,640,840.57
1924	1,784,959.00	50,710.00	347,820.00	2,183,489.00	38,085.43	2,145,403.57	1,804,500.41
1925	2,028,268.00	57,500.00	236,465.86	2,322,233.86	107,743.20	2,214,490.66	1,998,669.20
1926	1,875,010.00	81,220.00	510,501.15	2,466,731.15	28,891.78	2,437,839.37	1,841,150.80
1927	1,914,400.00	94,443.39	325,000.00	2,333,843.39	44,871.29	2,288,972.10	1,926,910.12
1928	3,025,150.00	113,266.45	328,000.00	3,466,416.45	⁷ 736,235.62	2,730,180.83	1,997,270.66
1929	2,725,118.00	103,000.00	205,500.00	⁷ 3,753,094.67	⁸ 152,701.34	3,600,393.33	2,280,960.68
1930	2,274,070.00	123,300.00	166,200.00	⁸ 2,684,386.38	⁹ 135,714.93	2,548,671.45	2,216,995.72
1931	2,745,060.00	120,680.91	166,500.00	⁹ 3,134,595.10	¹⁰ 195,534.37	2,939,060.73	2,304,121.45
1932	2,278,765.00	137,866.48	194,500.00	¹⁰ 2,770,712.18	¹¹ 344,689.43	2,426,022.75	2,186,799.92
1933	1,860,325.00	75,100.00	184,000.00	¹¹ 2,361,138.96	¹² 475,895.41	1,885,243.55	1,710,949.42
1934	1,574,300.00	50,230.00	17,000.00	¹² 1,872,586.04	¹³ 397,131.28	1,475,454.76	1,254,949.11
1935	1,293,200.00	69,000.00	126,513.10	¹³ 1,520,472.17	¹⁴ 34,154.47	1,486,317.70	1,349,490.72
1936	1,970,311.00	69,500.00	47,570.00	¹⁴ 2,114,966.51	¹⁵ 14,074.34	2,100,892.17	2,052,751.87
1937	2,093,200.00	69,000.00	73,000.00	¹⁵ 2,237,812.45	¹⁶ 8,700.66	2,229,111.70	2,161,472.73
1938	2,272,720.24	83,000.00	62,300.00	¹⁶ 2,421,985.69	¹⁷ 59,920.71	2,362,064.98	2,286,858.08
1939	2,892,880.01	88,790.00	96,650.00	¹⁷ 3,086,719.30	¹⁸ 77,198.05	3,009,521.25	2,480,485.08
1940	2,980,498.88	93,290.00	100,000.00	¹⁸ 3,187,330.29	¹⁹ 106,925.87	3,080,404.42	2,946,170.44
1941	3,952,400.95	91,290.00	2,219,400.00	¹⁹ 6,269,590.95	²⁰ 1,069,240.11	5,200,350.84	5,111,010.54
1942	8,961,686.00	97,490.00	1,835,342.00	²⁰ 10,894,518.00	²¹ 1,760,578.00	9,133,940.00	7,210,643.00
1943	12,525,365.00	106,450.00	4,910,700.00	²¹ 18,653,246.00	-----	-----	²² 14,300,227.00

¹ Includes printing and binding, stationery, and contingent funds.² Includes proceeds from sales of residue gas.³ Service items include Government fuel yards, helium, and other investigations and services for other departments.⁴ Includes gas investigations for War Department.⁵ Includes \$1,586,388 for Government fuel yards.⁶ Includes War Minerals Relief Commission, \$8,500,000.⁷ Includes \$719,476.67 unexpended balance reappropriated.⁸ Includes \$120,216.38 unexpended balance reappropriated.⁹ Includes \$102,354.19 unexpended balance reappropriated.¹⁰ Includes \$159,580.70 unexpended balance reappropriated.¹¹ Includes \$241,713.96 unexpended balance reappropriated.¹² Includes \$231,056.04 unexpended balance reappropriated.¹³ Includes \$50,000 unexpended balance reappropriated.¹⁴ Includes \$27,585.51 unexpended balance reappropriated.¹⁵ Includes \$2,612.45 unexpended balance reappropriated.¹⁶ Includes \$3,965.45 unexpended balance reappropriated.¹⁷ Includes \$8,399.29 unexpended balance reappropriated, and balance of \$35,544.39 receipts from sale of helium and other products.¹⁸ Includes \$13,541.41 unexpended balance reappropriated, and balance of \$58,822.55 receipts from sale of helium and other products.¹⁹ Includes \$6,000 unexpended balance reappropriated, and balance of \$85,452.95 receipts from sale of helium and other products.²⁰ Includes \$934,013.68 balance reappropriated, and balance of \$87,431.51 receipts from sale of helium and other products.²¹ Includes \$1,229,937 balance reappropriated and balance of \$128,019 receipts from sale of helium and other products.²² Estimated.

Mineral Production and Economics Division																		15,036	
Nonmetals Economics Division																			
Petroleum Economics Division				88,163															
Total				442,418															15,036
Health and Safety Branch:																			
Coal-Mine Inspection Division																			
Safety Division																			
Health Division			342,625																421,271
Mineral Production and Security Division			47,758																41,369
Explosives Control Division																			
Total			390,383																462,630
Total appropriations	67,900	290,500	704,650	553,500	466,880	109,480	85,000	525,000	950,000	1,508,000	1,250,000	1,210,000	1,508,000	1,508,000	1,40,000				729,000
Total expenditures	66,090	284,474	671,642	539,926	461,428	109,247	84,685	445,000	935,093	1,457,663	1,210,000	1,457,663	1,457,663	1,457,663	1,40,000				948,835
Balances	1,810	33,008	33,008	13,574	5,452	233	315	180,000	14,907	50,337	140,000	140,000	50,337	140,000					180,165

1 Available for expenditure in fiscal year 1943.

TABLE 2.—Bureau of Mines expenditures, fiscal year 1942—Continued

	Investigations and research on processes for production of potassium carbonate and sodium borate from trona and Wyoming rock	Electric furnace laboratory building, Norris, Tenn.	Investigations of raw material resources for western steel production	Helium production	Maintenance, Bureau of Ships	Expediting production of equipment and supplies	Protection of mineral resources and facilities	Salaries and expenses, Office for Emergency Management (transfer)	Emergency fund for the President (transfer)	Development and operation of helium properties (special fund)	Working funds	Printing and binding	Contingent expenses	Totals
Branch or division														
Office of the Director														\$12,730
Office of the Assistant to the Director	\$2,812,427		\$8,856,123	\$2,605,480					\$13,185,948	\$1,450		\$8,689,390	\$7,133	5,003
Office of Current Information				4,480							\$122			14,153
Total	3,239		9,979	8,085					22,633	1,450	122	12,649	7,133	51,886
Administrative Branch:														
Office Administration Division														
Information Division														
Total														
Technologic Branch:														
Coal Division														
Explosives Division			1,344						19,502,27,171			14,417,370		543,884,466,967
Metallurgical Division											341,206,3,656	5,459		2,352,918
Mining Division			300,582			\$303,102,105,093		\$1,770				4,266		1,530,290
Nonmetals Division					\$5,710							1,085		432,398
Petroleum and Natural Gas Division		\$9,924												
Principal Mineral Technologist				202,915						55,847		1,116		2,208,930
Total	28,198	9,924	301,926	202,915	5,710	408,195		1,770	46,673	55,847	344,862	26,663		7,551,223

Economics Branch:										
Coal Economics Division							3,483		660	49,841
Foreign Mineral Division								9,565	91	81,572
Metal Economics Division								68,849	8,280	182,488
Mineral Production and Economics Division									16,951	93,477
Nonmetals Economics Division									1,788	60,615
Petroleum Economics Division									651	98,814
Total							3,483	68,414	28,421	557,772
Health and Safety Branch:										
Coal-Mine Inspection Division										
Safety Division										
Health Division									20,185	421,271
Mineral Production and Security Division						\$64,111				362,810
Explosives Control Division										83,117
Total							164,995			64,111
							164,995		20,185	164,995
Total appropriations	77,400									1,102,304
Total expenditures	31,437	10,000	340,000	241,000	6,000	550,000	278,000	185,316	90,290	7,200
		9,924	311,905	211,000	5,710	64,111	1,770	413,672	413,398	7,133
Balances	145,963	76	28,095	130,000	290	1,485,889	1,348,230	1,128,019	274	9,547,388
									2,372	67
										1,760,852

† Available for expenditure in fiscal year 1943.

Bituminous Coal Division

DAN H. WHEELER, Director

THE attack on Pearl Harbor found the bituminous coal producing industry, with its markets stabilized under the Bituminous Coal Act of 1937, in the soundest condition in many years to meet its wartime responsibility as the Nation's principal source of fuel.

It found in the Bituminous Coal Division, the administrator of this law, a central source of statistics and other information and technical assistance readily available to the Government in taking steps to protect the soft-coal supply.

In addition to regulating the coal markets to help the producing industry keep itself in a sound condition, the Division since the war has become one of the primary aids of the Office of Solid Fuels Coordinator for War. Also, it is assisting the Office of Price Administration in maintaining an anti-inflationary ceiling over soft-coal prices, and is serving as the principal source of statistics and, in many instances, providing technical advice for the various other governmental agencies concerned with problems relating to the fuel supply.

Industry Strengthened

A little more than a year prior to the attack upon the United States, the bituminous coal producing industry, with the establishment of minimum prices and marketing rules and regulations on October 1, 1940, had emerged from nearly two decades of savage, competitive warfare that had financially drained and seriously weakened it. The year and three months of market stability which the industry had enjoyed under Coal Act regulation had given it an opportunity to repair much of the damage of the years of chaos before it plunged into the job of meeting wartime fuel demands.

Decisive battles are fought on the industrial front, and fuel is vital ammunition in this modern age of highly developed industrial organization and mechanical warfare. Bituminous coal is the Nation's principal fuel. The head start which the soft coal industry had in

rehabilitating itself, and the continuation of the stabilization of its markets under the Coal Act, are major contributions toward assuring an adequate supply of this fuel for war needs.

Prior to the war, soft coal provided approximately 75 percent of the power for manufacturing, 80 percent of that for railway locomotives, and about 70 percent of that for steam-generated electricity. Also, it was the most common fuel for homes, and the source of raw materials for many essential military and civilian materials, such as explosives, artificial silk and rubber, medicines, plastics, paints, and chemicals. Now that the war is reducing the availability of other fuels in certain areas of the United States and Canada, coal must carry a still greater share of the fuel burden.

Aids Planning Coal Supply

Planning and protection of an adequate coal supply in time of war is one of the most important governmental functions correlated with its actual military operations. The industries that mine and transport this fuel require much labor and large quantities of strategical materials. They are constantly exposed to the disruptive forces set loose by world conflict, and careful thought and constant vigilance are necessary to keep coal moving in required quantities from the mines to consumers.

In requesting the Secretary of the Interior to act as solid fuels coordinator to protect the fuel supply, President Roosevelt, in his letter of November 5, 1941, stated:

As the defense effort progresses it will become increasingly urgent to assure that the supply of solid fuels will be adequate and that they will be readily available at consuming points when required for military, industrial, and civilian purposes. Difficult problems are already arising with respect to their supply and availability for such uses. These problems require the efficient and careful coordinated development, production, distribution, utilization, transportation, and handling of solid fuels.

You have in your Department extensive information and facilities with respect to solid fuels. I refer particularly to the Bituminous Coal Division, the Bureau of Mines, and the Geological Survey. In addition, in your capacity as Petroleum Coordinator for National Defense you have important functions with respect to oil and gas. It is essential that the handling of solid fuel and of oil and gas problems should be closely coordinated in the present emergency.

Immediate Action Made Possible

Rather than to organize a large staff to carry on the work of coordinating the soft-coal supply, the facilities of the Bituminous Coal Division were made available for that purpose. Additions were made to the Division where necessary to accommodate the additional duties entailed by the Solid Fuels work. A great deal of information per-

taining to the production, transportation, distribution, storage, and consumption of soft coal, compiled primarily for use in the regulation of coal markets, was made immediately available to the Solid Fuels Office. In addition to this, a well-trained staff of technical employees was placed at the disposal of that Office. This saved a great deal of valuable time and a substantial amount of money, and it materially speeded the work of protecting the Nation's coal supply.

With this assistance, the Office of Solid Fuels Coordinator for War was enabled to launch immediately a program to aid the coal and transportation industries and fuel consumers to take wartime precautions. This program included steps to stimulate consumers to increase their stocks of coal while the fuel was readily available as protection against possible emergencies; to keep coal moving in heavy volume during the off-season to avoid loss of the use of limited labor and equipment; to aid producers in obtaining priorities to obtain rationed equipment and materials; to help the coal industry establish emergency movements to counteract the loss of regular coal transportation facilities due to wartime disruptions, and other actions in connection with planning and maintaining an adequate coal supply.

Additional Data Necessary

Although the information readily available in the Division made it possible for the Solid Fuels Office to begin effective work at once, sound planning required the compilation of much additional data to meet problems peculiar to the wartime coal supply. Much of the information had been compiled in shape designed particularly for market regulatory purposes, and had to be revised and brought up to date to be adequate for use by the Solid Fuels Office.

For instance, information available from mine invoices showed each mine's shipments of particular kinds, qualities, and sizes of coal during recent years, thus giving some indication of the mine's past ability to produce. Other information was available which shed still more light on mine capacity. But the available data left too much to guesswork in estimating the Nation's capacity for producing and shipping the various kinds, qualities, and sizes of coal with the degree of accuracy necessary in wartime.

With the aid of the Bituminous Coal Producers' Boards, the Division, at the request of the Solid Fuels Office, began a more adequate survey of actual and potential mine capacity; the first to be made in recent times. The Producer's Boards are comprised of the elected representatives of the producers in each district, and represent the industry in participation in the administration of the Coal Act. They have intimate contact with the mines in their respective districts. At the close of the fiscal year, this survey was well under way and

already was providing useful information, although it was not complete, due to the large number of mines to be covered.

Early in the war it became manifest that the draft, enlistments, and the loss of men to other industries were having a substantial effect in reducing the labor supply available to the coal industry. Some producers reported that their production was being severely hampered, particularly by the loss of keymen. The Division was requested by the Solid Fuels Advisory War Council, a wartime industry-public advisory body on coal and coke problems, to make a study of the effect of the war on mine labor. This study showed that the mining industry had lost 48,439¹ men as of March 31, 1942, because of war reasons.² Appeals were made by industry and the Solid Fuels Office to Selective Service authorities to help protect the supply of mine labor.

It became apparent that the rubber shortage would have a substantial effect upon the coal supply that would require planning to counteract. The Division studied the over-all effects of the rubber situation, to provide information as required. It was found that approximately 50 million tons of soft coal per year move from the mines to consumers in motor trucks.

Coal Stacking Program Aided

Statistics compiled by the Division showed that all during the spring of 1942, coal was flowing into consumers' storage piles in great amounts, in response to the program operated by the Solid Fuels Office in conjunction with other agencies of the Government and the coal and transportation industries. But, the available figures indicated that a great many individual consumers, including many important war industries, were failing to take adequate precautionary measures. To probe this situation accurately, the War Production Board and the Solid Fuels Office undertook, with the Division's help, a plant-by-plant survey of the precautions being taken by prime war industries and the railroads.

The investigation bore out what previous information had indicated. Many industries were not taking adequate precautions. These were searched out, and the Division was engaged in preparing notices warning the individual plants of their situation, which were to be sent out by the Solid Fuels Office.

At the request of the Solid Fuels Office, the Division investigates and makes recommendations upon applications by coal producers for priority ratings to obtain materials and supplies for expanding or

¹ This figure was computed on 80 percent of the tonnage. Projected to cover 100 percent of the industry, it would indicate a loss of 60,549 men. Due to recruitment, the net shortage of men was computed at 33,765 as of Mar. 31, 1942.

² Entering military service, shifting to other industries, and because of inadequate transportation.

rehabilitating mine production facilities. Such applications are referred to the Solid Fuels Office by the War Production Board for advice before acting upon them.

Also, the Division investigates and makes recommendations to the Solid Fuels Office regarding applications for necessity certificates in connection with income-tax deductions sought under section 124 of the Internal Revenue Code which provides for amortization within 5 years of the cost of expanding plant facilities for the production of goods essential to the war program.

The Division has furnished technical personnel which is engaged currently in assisting preparation of details of an emergency coal distribution program for the Office of Solid Fuels Coordinator for War. All the information in the Division's records, needed in preparing the program, has been made available to the Solid Fuels Office. The program will be put into effect only if the coal supply system breaks down under the stress of war pressure and shortages threaten to impede operations of essential war plants or to cause civilian suffering.

Maximum Coal Price Regulation

Approval of the Emergency Price Control Act of 1942 on January 30 opened a new field for the Division's participation in prosecution of the Nation's coordinated war effort. Through an exchange of letters between Secretary Ickes and Price Administrator Leon Henderson, the groundwork was laid for cooperation between the Division and the Office of Price Administrator in taking steps necessary to prevent war-time inflationary prices for bituminous coal.

Accordingly, a plan was developed whereby the Division recommends to the Price Administrator suitable action under powers vested in his office by the Emergency Price Control Act with reference to control of maximum bituminous coal prices charged by producers, distributors, and sales agents. The plan was devised under section 201 (a) of the Price Control Act, which provides that the Price Administrator may utilize the services of other Federal agencies in administering the act. In order to discharge its recommendatory function, the Division was empowered to conduct hearings, conferences, and handle necessary correspondence.

The first fruits of this cooperative arrangement was establishment of Maximum Price Regulation No. 120, setting up maximum prices for producers, sales agents, and distributors on deliveries from mines and preparation plants. Participation of the Division in its establishment is described in the regulation itself, as follows:

At the request of the Price Administrator the Bituminous Coal Division, United States Department of the Interior, has cooperated with the Price Administrator in the formulation of the maximum prices established by this regulation in accord-

ance with the arrangement effectuated by the letters dated March 9 and 13, exchanged between the Price Administrator and the Secretary of Interior.

As in the case of its cooperation with the Office of Solid Fuels Coordinator, the Coal Division was exceptionally well prepared to aid the Price Administrator in setting up maximum bituminous coal prices.

This was due, in a measure, to the fact that the Coal Division, at the time the Emergency Price Control Act was approved, had before it Docket No. A-983. This was a proceeding instituted on application of the Bituminous Coal Consumers' Counsel seeking establishment of maximum prices under provisions of the Bituminous Coal Act. The Acting Director ruled continuation of these proceedings was unnecessary, but instructed the Division staff to proceed with a careful study of all materials presented and filed.

OPA Aided By Division

These and other voluminous data in the Division files concerning costs of production and invoice prices were made available for use in formulating the maximum prices established under Regulation No. 120. The regulation itself leans heavily upon the size groupings and classifications set up in the minimum price schedules established by the Coal Division, and the minimum price schedules lent a systematic pattern for formulation of a readily comprehensible set of maximum prices for coal delivered from the mine. In addition, Regulation No. 120 contains many provisions designed to assure that the maximum price regulation will be consistent with the minimum prices and marketing rules and regulations.

In addition, the Division was consulted in respect to Maximum Price Regulation No. 122, which governs bituminous coal delivered from docks, yards, and terminal facilities. In connection with this regulation, Division technicians made two studies: One concerned the interrelationship between Regulation 120 and 122. The other dealt with the interrelationship between Regulation 122 and Bituminous Coal Division regulation over minimum prices and marketing rules and regulations applicable to distributors, including dock operators. Various suggestions offered by the Division were utilized in the final form of the regulation.

It was upon advice of the Division that OPA granted a request from the War Department that Alaska be deleted from the maximum price schedule.

Division Investigates Violations

However, the responsibility of the Bituminous Coal Division in prevention of wartime inflationary bituminous coal prices is not dis-

charged merely by furnishing the Price Administrator with economic data and technical advice on the bituminous coal industry. In the agreement between the Secretary of the Interior and the Price Administrator the task of detecting and investigating violations of Maximum Price Regulation No. 120 was assigned to the Division.

This arrangement, including recommendations to OPA as to the application of appropriate measures, was consummated because the Division had a compliance staff with the specialized training needed for the task. The arrangement likewise obviated the possibility of overlapping activities by the two Federal agencies. As the fiscal year concluded, this additional and important work had been assumed by a compliance staff fully aware of the extensiveness of the undertaking. As of June 30, 1942, there were 186 cases involving violations of Maximum Price Regulation No. 120 under investigation by the Division.

Division Recommends Amendments of Maximums to OPA

Still another important task devolves upon the Division in connection with establishment, enforcement, and maintenance of wartime maximum bituminous coal prices for mine shipments. It is called upon to consider and make recommendations concerning the many requests for relief by way of adjustment, exception, or amendment from the maximum prices or accompanying regulations.

These requests for relief from persons affected by the regulation, are made in petitions or protests filed in accordance with Procedural Regulation No. 1 of the Office of Price Administration. When filed with OPA, the protests or petitions are docketed and referred to the Division where they are processed and analyzed in the light of data available to the Division and the coal needs of the Nation.

On the basis of such study the Division recommends to the Office of Price Administration the disposition it believes should be made of the petition or protest.

Cooperation With Other Agencies

With the advent of war, the Division, in addition to duties imposed by statute or arrangement, has developed a highly important function as a service unit for other war agencies and departments of the Government. This is especially true of the relationship between the Division and the Departments of War and Navy, the War Production Board and its various subdivisions.

The Under Secretary of War, the Quartermaster General, and other high officials of the War Department and of the Navy Department as well, have frequently sought from the Division, especially the Mar-

keting Branch, its technical advice and assistance. Many of their problems concerned availability of coal of various types for Army and Navy concentrations, its qualitative value, price at the mines, freight rates, and other questions of supply.

Because of the threatened shortage of other fuels, the War and Navy Departments have urged use of coal for power upon many plants being constructed for war goods production. The Departments have called upon the Marketing Branch to recommend sites for these plants with reference to readily available supplies of suitable coal.

The problems upon which technical advice has been sought and received from the Division went farther afield than coal availability. For example, they include such diversified matters as discussions with War Production Board officials on proper coals for steel making and with the Chemical Warfare Service on properties of fly ash. Explosive plants, arsenals, the Treasury Department, the Post Office Department, Rural Electrification and the Interstate Commerce Commission are among other Government agencies which the Division has supplied with technical information.

The Division has granted a request advocated by the Consumers Counsel that the War Department temporarily be exempted from a marketing rule that requires purchasers to pay interest on past-due transportation charges prepaid on coal shipments by code member producers and registered distributors. At the request of the War Department the Division likewise facilitated establishment of new transportation facilities for war materials from the Huntsville Arsenal. This was done by establishing minimum prices to permit shipment of coal in barges via the Tennessee river from "truck mines" in the Tennessee-Georgia field. This action was sought by the War Department chiefly to render feasible development of interrelated barge shipments of coal and other raw products to, and the processed goods from, the Huntsville Arsenal and a nearby Army fabricating plant.

Administration of Regulatory Functions

The Bituminous Coal Act of 1937 was designed to free one of the Nation's most vital industries from a savage competitive warfare which was rapidly dissipating its \$2,500,000,000 investment, plunging many of its 500,000 miners into dire poverty, impoverishing entire sections of the country, and causing serious dislocations in the whole economy of the country.

These grievous conditions did not arise overnight. They stemmed largely from World War I which saw a vast expansion in the productive capacity of the bituminous mines. This was due partly to increased fuel requirements for war goods manufacture. In part it was due to attempts to make up deficiencies of supplies at various points of consumption caused by transportation shortages.

After the war, however, demand and potential supply were thrown far out of adjustment. Although manufacturing remained at a high peak, demand for bituminous coal lessened year by year. This situation was caused by increased efficiency in the use of coal coupled with growing competition from other fuels.

The excess capacity created by lessened demand led to lowered prices which were often below the cost of production. Producers sold their coal for what they could get in the wholly human hope of "weathering through" until markets improved.

In consequence, the era of prosperity enjoyed by other industries from 1923 to 1929 found a sad contrast in the bituminous coal industry. They were years of mounting losses to coal producers, which were heightened in the depression years which followed. In 1929 the industry produced 525,000,000 tons of coal but suffered a net loss of \$11,822,033. In 1932 the net loss was \$51,167,000.

Need of Regulation Obvious

It became obvious that in the absence of some regulation the Nation soon would lose its chief source of energy or find it controlled by the few financially able to survive the destructive competitive price war.

To obviate what threatened to be a major blow to American industry, the Congress enacted a statute under which are established minimum prices designed to return to producers a realization which approximates the weighted average costs in their respective areas.

The law established the framework of a public policy within which the industry could function efficiently in the interests of the producers, miners, and the consuming public. This was the objective of the coal act, rather than any attempt at coercive interference with coal producers. The Supreme Court, in an opinion holding the act constitutional said, "The history of the bituminous coal industry is written in blood as well as in ink . . . If the strategic character of this industry in our economy and the chaotic conditions which have prevailed in it do not justify legislation, it is difficult to imagine what would."

Provisionally these "chaotic conditions" were removed by the operation of the act long enough in advance of America's full swing into the war to permit producers to strengthen themselves sufficiently financially to undertake the all-out production demanded. They likewise were able to throw their resources into production with the comforting assurance that the minimum price structure would provide them realization on sales at least approximately equal to weighted production costs and protect them against price cutting.

In addition to the benefit of stabilization through operation of minimum price schedules, the industry has enjoyed in many markets increased consumer requirements for coal and consequent price in-

creases for certain grades and sizes because of the huge war goods manufacturing program.

Regulatory Structure Still Required

Wartime price improvement is not regarded by Division economists and marketing experts as any valid reason for relaxation of the market regulatory structure which brought about and is maintaining stabilization.

Statistical studies made during the fiscal year showed that some coal still was competing in various markets at prices close to the minima established under the act. The obvious inference was that this competition would have resulted in prices for this coal which were below the cost of production, in the absence of any regulatory structure. In addition, there are certain competitive factors peculiar to, and variables inherent in the coal industry which often act as disturbing forces on parts of the market when there is a rising demand in another. The only effective control over these factors ever devised is minimum price schedules.

For instance, requirements are never uniform through the range of sizes and qualities of coal. The mine owner, in producing the size for which there is need often must, of necessity, produce sizes for which there is little or no requirement. Since it is generally economically unfeasible to maintain storage at mines, the slower moving sizes are loaded into whatever cars are available where they clog up tracks and hamper movement of sizes for which there is a ready sale. Until establishment of minimum price schedules it had been the historic custom of the coal industry to dump this coal at any price obtainable, regardless of production costs. However, what was a "dumped" size for one producer may have been a major size for another so that in the maze of sales the price level was influenced strongly by the quotations on the distressed residuals. With transportation facilities dwindling day by day and requirements centering more and more on industrial sizes, it is obvious that this dumping practice would be resumed upon any relaxation of the act's regulatory features.

Fluctuations in Production

One of the variables with which the coal industry must contend is low production in the summer season. This may be illustrated by observing the 3 years of 1936, 1938, and 1940. During each of these 3 years production was not seriously interrupted by stoppages due to strikes. Considering the average monthly production in these 3 years as 100 percent, the average January production in the United States was 113 percent, while the average April production was 83 percent,

with averages for May and June at about the same level as April. The average December production was 121 percent. Low summer production was most marked in District 14 (Arkansas-Oklahoma) where the average January production was 183 percent, with the averages for April and May being 23 and 24 percent, respectively.

Another variable is week by week production in any season. For example, the production of the week ended July 5, 1941, was only 61.2 percent that of the previous week and only 70.9 percent that of the following. Production for the week ended September 20, 1941, was 90 percent that of the previous week and 90.7 percent that of the following. With both winter and the war effort in full swing, production for the week ended January 3, 1942, was only 88.7 percent that of the following week.

It is obvious that such extreme fluctuations in production result in periodic surpluses. It is a fair assumption that, in the absence of minimum price schedules, these surpluses would be disposed of by the price cutting technique which brought about the chaotic conditions from which the industry suffered for more than two decades.

The history of the bituminous coal industry, "written in blood as well as in ink," records its plunge into chaos when its economy was disrupted by the cataclysm of World War I. The bituminous coal industry, however, has in the Bituminous Coal Act of 1937 a tested bulwark to protect it now and in the approaching period of reconstruction against such a buffeting as it suffered as a result of the last war.

Adjustment of Minimum Prices

The period covered by this report saw the conclusion of the first phase of a proceeding, designated as General Docket 21,³ instituted by the Division to determine whether or not production costs had changed sufficiently to make appropriate a general revision of minimum price schedules. Adjustment of effective minimum prices is required by the statute whenever it is determined that the weighted average costs of the producing industry have changed in excess of 2 cents per ton in any minimum price area.

The first phase of the proceeding dealt solely with determination of cost changes in various price areas throughout the Nation. The Acting Director issued determinations that costs had increased in virtually all minimum price areas and that the weighted average increase for the Nation was 10.63 cents a ton. The findings were reviewed and affirmed by Secretary of the Interior Ickes, whereupon

³ Since the conclusion of the fiscal year, Trial Examiner Floyd McGown, who heard the proceeding, made his report and recommendations to Acting Director Dan H. Wheeler of the Bituminous Coal Division. Acting Director Wheeler received briefs, heard oral arguments, and on Aug. 28, 1942, issued an order, effective Oct. 1, 1942, establishing minimum prices which represented increases in minimums of 5 to 30 cents for various designated areas.

the second phase of the proceeding was initiated. The second phase looked toward revision of minimum price schedules as required by the statute in view of the change in costs, and was still in process at the close of the fiscal year.

Aside from changes in the costs used in formulating minimum prices, there are constant changes in other factors affecting the marketing of coal that require constant adjustments to minimum price schedules and marketing rules and regulations. To make possible the maintenance of the regulatory structure on a sound basis, the Congress expressly provided for ready adjustment in section 4 II (d) of the Bituminous Coal Act. It authorizes the filing with the Division of petitions seeking modification of the effective minimum price schedules and the Marketing Rules and Regulations. Code members, district boards, the Bituminous Coal Consumers' Counsel, and governmental subdivisions have availed themselves freely of this privilege of petition.

Price Adjustment Petitions Lessen

In the 9 months elapsing between establishment of minimum price schedules and Marketing Rules and Regulations on October 1, 1940, and June 30, 1941, 944 petitions were filed under this section. They sought either supplementation or revision of effective minimum price schedules and Marketing Rules and Regulations. During the entire fiscal year ended June 30, 1942, only 572 petitions were filed. The majority of these were requests for the establishment of minimum prices for new mines, additional minimum prices for new sizes produced by old mines, additional minimum prices for rail shipments from mines which had formerly shipped only by truck, and new or additional loading points for mines already shipping by rail. Thus it may be seen that the majority of petitions stemmed from developments in business rather than objection to minimum prices already established.

Of the 1,516 petitions filed from October 1, 1940, to June 30, 1942, all but 10 had been acted upon in an appropriate manner by the latter date and 909 had been disposed of finally by order or memorandum.

When numerous petitions were filed for adjustment of the complex price structure immediately after establishment of minimum prices and Marketing Rules and Regulations in October 1940, the Coal Division deemed it necessary to give full opportunity to all parties to present evidence concerning their complaints. Hearings were held in virtually all 4 II (d) proceedings except when the parties interested waived them. As a result of those hearings, the Coal Division has devised appropriate methods for expediting adjustment of established price structure to reflect the continual changes in the coal industry. It is now possible to curtail greatly the number of hearings.

Requests for the establishment of new prices for new mines, for revisions in established prices, for establishment of new prices for newly prepared sizes at old mines, for establishment of new loading points, have been ruled on when possible without formality of oral hearings. On the basis of affidavits from petitioners and others interested in such cases, the Coal Division has endeavored to dispose of requests for adjustment by orders granting temporary relief. These orders provide conditionally for final relief to become effective 60 days from the date of the order. Wide opportunity is given anyone interested to object and be heard. Thus in 568 out of the 1,516 proceedings conducted under section 4 II (d) such temporary and conditionally final orders were issued.

River Transportation Problem

Several proceedings have arisen which involve controversial problems arising out of the river transportation of coal in relation to coal transported by railroad or other means. Among them is one affecting the Cincinnati, Ohio, market area, which still was pending at the end of the fiscal year. The Cincinnati area consumes annually approximately one and a half million tons of coal shipped via the Ohio River and one and a half million tons of coal shipped by rail, largely from the high volatile producing field in District No. 8. In view of the many complaints particularly from retailer dealers and retail dealer associations in Cincinnati, the Coal Division, in January 1942, initiated a proceeding, known as Docket No. A-1239, in order to determine the exact nature of the problems affecting the Cincinnati area insofar as the shipment of bituminous coal and resale of such coal in that area were concerned, and looking toward a solution. The hearing in that proceeding lasted for approximately 8 weeks, when, because of the difficulty in procuring cost figures from producers shipping by river and from retail dealers allegedly adversely affected by the minimum prices established by the Division, the hearing was temporarily adjourned. The failure of several persons to produce materials required under a subpoena issued by the Acting Director made necessary the institution of a court proceeding, which is still pending. As a result of initiation of the court action, however, negotiations have been conducted with the persons affected with a view toward procuring the necessary cost material without recourse to a court order.

Compliance Under Coal Act

To an extent as great as possible with the limitations of the staff available, the Division has checked carefully the market activities of

companies subject to the Bituminous Coal Act to prevent violations of minimum prices, the Marketing Rules and Regulations and other orders. A review of the numerous checks leads to the conclusion that the pledges of compliance have been kept faithfully by the preponderance of the industry and that the disastrous marketing conditions and practices which the Congress desired to prevent have been eliminated.

However, the magnitude of the task of checking compliance can be appreciated only on the basis of full knowledge of the variable channels and methods used in marketing bituminous coal, the unstandardized nature of the product, and of the multiplicity of unfair trade practices formerly prevalent in the industry. The scope of the undertaking may be indicated, however, by noting that bituminous coal is sold by more than 17,000 companies or individuals, who as producers, sales agents, or distributors have agreed to observe the regulations.

It is reasonable to assume that under less favorable market conditions than those prevalent during this fiscal year there may have existed a greater incentive to sell coal at less than the minimum prices and engage in unfair methods of competition.

The general conclusion, that for the most part, compliance pledges were kept faithfully is not meant to indicate a condition approaching total absence of violations. Despite the upward trend of prices generally, great quantities of bituminous coal have competed on the market at prices approximating the minimum. As might be expected, this has been particularly true of low grade coals. Such competition also results from the inability of the mine operator to produce particular sizes of coal in a volume proportionate to the market demand for those sizes without also producing residual sizes for which at times there is no corresponding demand. The compliance staff, with the cooperation of the District Boards, has uncovered many instances of violation as a result of these conditions and the sanctions provided in the act and the regulations have been imposed on the violators.

Penalties provided for producers include the revocation of membership in the code with a condition of restoration being the payment of a tax of 39 percent of the sale or minimum price to the United States Treasurer, or else orders directing the producer to cease and desist from further violations. Applications may be made by the Division to the Circuit Court of Appeals of the United States to enforce such orders. The penalty provided for distributors, acting as such or when purporting to act as sales agencies, is suspension or revocation of their registration thereby depriving them of the privilege of receiving a discount from the minimum price when purchasing coal from the producer.

Procedure in Violation Cases

When checks of records of companies disclose what seems to be wilful violations, steps are taken to set such matters for hearing. If evidence and testimony at the hearings lead to the conclusion that wilful violations have been committed, appropriate orders are issued imposing the sanctions.

During the fiscal year 829 such investigations have been completed, 283 hearings have been held and 232 orders imposing the penalties under the act and rules and regulations have been issued. Of these orders 103 directed producers to cease and desist from further violations; 95 revoked the code membership of producers, the restoration of which was conditional upon the payment of taxes ranging from moderate sums up to \$12,000.14 and totaling \$89,072.41; 29 suspended the registration of distributors from 30 days to 9 months and 4 revoked the registration of distributors.

Of the 232 compliance orders, 35 were entered without formal hearing pursuant to the Division's procedure under which compliance proceedings may be disposed of without formal hearing on the basis of an application filed by the alleged violator. At the close of the fiscal year 497 investigations were in process and 122 hearings had been held as a result of which final orders had been entered.

A great many investigations disclosed violations which did not seem to be wilful or circumstances which made it inadvisable to institute formal compliance proceedings. In such cases the Division usually disposed of the matters informally. Often it required sales agents and distributors to render corrected invoices for the full minimum price or required sales agents and distributors to refund unlawful allowances received by them from producers.

Litigation

Only two important court decisions were rendered during the year directly affecting the Coal Division. One of these, a decision by the United States Supreme Court, is regarded as a milestone in the field of judicial review of administrative adjudications.

Seaboard Air Line Case

On December 15, 1941, the Supreme Court, with three justices dissenting, rendered its opinion in *H. A. Gray et al. v. Legh R. Powell, Jr., et al.* No. 18, October Term, 1941, reversing the Circuit Court of Appeals for the Fourth Circuit and upholding the Division's order denying the Seaboard Air Line's petition for exemption from mini-

imum price regulation.⁴ The railroad had contended that under section 4 II (1) of the coal act exempting coal consumed by the producer thereof, it was entitled to an exemption in the situation where it had leased coal lands and entered into agreements with three independent contractors to mine coal for petitioners. In upholding the Division's order the Supreme Court stated the determination of who is the "producer" is a matter for the expert and informed judgment of the body entrusted with the administration of the act.

The Midland Cooperative Case

The Director's interpretation of the unfair trade practice provision of the act was upheld in all respects by the Circuit Court of Appeals for the Eighth Circuit in *Midland Cooperative Wholesale v. Harold L. Ickes and H. A. Gray*, No. 12,085, November Term, 1941.

The case was instituted by a petition filed by Midland Cooperative Wholesale to review an order of the Director which held that the Midland Co. could qualify to receive discounts from the minimum prices only with respect to that coal which it purchased for resale to bona fide and legitimate farmers' cooperatives. Petitioner, however, contended that (1) the permission granted to "farmers' cooperatives" in the last paragraph of section 4 II (i) of the act was intended by the Congress to be extended to all types of cooperative organizations and (2) that the distribution by it of patronage dividends did not disenable it from qualifying as a distributor.

In an opinion in which the Division's brief is quoted at length, the court ruled that the Director was correct in ruling that Congress had not intended to extend to consumer cooperatives the same privileges it had extended to farmers' cooperatives. It also ruled that the Director had correctly found that petitioner could not qualify as a distributor since in its capacity as a "purchasing agent" for those of its member associations which were not farmers' cooperatives, it was an "instrumentality of retailers" within the meaning of paragraph 12 of section 4 II (i) of the act and was therefore prohibited from receiving discounts from the established minimum prices.

Petitioner's request for certiorari was denied by the Supreme Court on April 27, 1942.

Miscellaneous

On November 28, 1941, Wheeling Valley Coal Corporation, et al., code members in District No. 6, filed a petition with the Circuit Court of Appeals for the Fourth Circuit to review an order of the Director

⁴ The decision was rendered as a result of a reargument of the case before the court, the court having previously (Mar. 31, 1941) by an evenly-divided vote upheld the decision of the Circuit Court of Appeals for the Fourth Circuit.

which denied the request to establish special "ex-river" prices on shipments of coal to certain northern Ohio market areas. Subsequently petitioners filed a motion for leave to apply to the Division to reopen the matter before it. The court granted such leave and petitioners on July 24, 1942, after filing a petition to reopen the cause with the Division pursuant to leave of the Division, filed a motion to dismiss its petition with the court.

On January 26, 1942, the Circuit Court of Appeals for the Seventh Circuit granted the Division permission to intervene in the case of *Bell & Zoller Coal Co. v. Wilson & Co., Inc.*, a proceeding instituted by the Bell & Zoller Coal Co., a code member, to recover the difference between the minimum price and the contract price for certain coal shipped after October 1, 1940, pursuant to a contract entered into prior thereto which provided for a sale price below that established as the minimum price. In resisting payment, the defendant contended that the price provisions of the act could not lawfully be made applicable to coal moving wholly within the State of Illinois and attacked the validity of an order entered earlier by the National Bituminous Coal Commission ruling that all commerce in bituminous coal within Illinois directly affects interstate commerce.⁵

On March 4, 1942, a suit was filed in the Circuit Court of Appeals for the Sixth Circuit by Edwin R. Eberhart, a code member, to review an order entered by the Acting Director revoking and canceling Eberhart's code membership and for a stay of the effective date of that order. The court first granted the stay and thereafter, upon motion of the Division, modified the stay order by adding a condition that pending final disposition of the petition for review, Eberhart was not to sell coal in violation of the price requirements of the act. On May 6, 1942, the court, acting on stipulation of counsel, dismissed the proceeding and vacated the stay order.⁶

On May 19, 1942, the city of Indianapolis filed with the Circuit Court of Appeals for the Seventh Circuit a petition to review an order of the Acting Director denying the city an exemption from the act with respect to the mining operations of its wholly-owned subsidiary, Milburn By-Products Co. Petitioner's request for a stay of the Acting Director's order was denied by the court but the case has not yet been considered on the merits.

On May 23, 1942, the Ozark Coal Co. filed a petition with the Circuit Court of Appeals for the Sixth Circuit seeking a review and reversal of an order establishing prices for the coals produced by the company at its Arkansas mine. The cause has not yet been scheduled for argument.

⁵ On Aug. 10, 1942, on stipulation of counsel an order was entered in favor of the plaintiff for the full amount of the difference between the established minimum price and the contract price.

⁶ Eberhart's code membership was reinstated upon payment of a tax in the amount of \$4,648.41 as provided in section 5 (c) of the act.

Office of Solid Fuels Coordinator for War

HOWARD A. GRAY, Deputy Coordinator

THE adequacy of the coal supply is a matter of much concern to the Nation in time of war. Coal is the basic source of heat and power for industrial and household uses, and, certain kinds are necessary for the manufacture of steel, rubber substitutes, explosives, and other military and civilian goods.

The war has exposed the coal supply to many difficulties and disruptions. The production of war goods, military activities, and their repercussions are substantially reducing the availability of manpower and necessary materials used in coal mining. Coal production requires much highly trained labor, men of military age and physical fitness, and huge quantities of such critical materials as steel, copper, rubber, and heavy machinery.

One of the most important elements bearing upon the coal supply that is being affected by the war is transportation. The movement of coal is the biggest job entailed in transporting any single commodity. The railroads normally carry approximately 85 percent of the supply some part or all of the way from the mines, over distances often long and through regions of congested rail traffic. Heavy tonnages are moved also by ocean shipping, inland waterways, and motor trucks, each offering its own peculiar wartime problems.

The war has increased the burden upon the transportation system enormously, but limitations of manpower, time, and materials have prevented a corresponding increase in transportation facilities.

In a letter dated November 5, 1941, requesting the Secretary of the Interior to serve as Solid Fuels Coordinator, President Roosevelt wrote as follows:

As the defense effort progresses it becomes increasingly urgent to assume that the supply of solid fuels will be adequate and that they will be readily available at consuming points when required for military, industrial, and civilian purposes. Difficult problems are already arising with respect to their supply and availability for such uses. These problems require the efficient and carefully coordi-

nated development, production, distribution, utilization, transportation, and handling of solid fuels.

A short time after the Secretary of the Interior took over these new responsibilities, the Office of Solid Fuels Coordination was established. On May 25, 1942, the name was changed, by direction of the President, to the Office of Solid Fuels Coordinator for War.

Rather than build a large, new organization, whose work would duplicate part of that normally carried on by the Bituminous Coal Division and the Bureau of Mines, the staffs of these agencies and much valuable information in their possession were made available to the new office. The staff of the Solid Fuels Office was held to a minimum. This saved much money, and enabled the Coordinator to begin functioning effectively almost at once.

Immediate steps were taken to organize the several industries dealing with the coal supply on a war basis, and to establish channels of communication between them and the Government to facilitate expeditious and effective action. The industries cooperated heartily in this undertaking. In response to the Coordinator's invitation, representatives of the bituminous and anthracite mining industries, coal transporters, distributors, dealers, and mine labor met with him on December 18, 1941, at Washington, D. C., where the ground work for organizing the industries was laid. As a result, there was established an Industry Committee on Solid Fuels, whose 18 members represent the various industries concerned, and mine labor and the public. This group, which later was named the Solid Fuels Advisory War Council, meets regularly each month (or upon call), and discusses in detail the various problems affecting or threatening the supply of coal, coke, and other solid fuels.

Estimates, made early in 1942 with the aid of the Bituminous Coal Division and the Bureau of Mines, indicated that the Nation would require between 550,000,000 tons and 570,000,000 tons of bituminous coal, approximately 60,000,000 tons of anthracite, and about 70,000,000 tons of coke during the calendar year of 1942. This would be the largest bituminous production since 1926, the largest anthracite in over a decade, and the greatest output of coke in history. Later experience indicates that these early estimates are in line with actual requirements.

In view of disruptions and difficulties caused by the war, and the large increase in fuel needs, it will require careful planning and organization of production, transportation, and distribution to assure that the supply of coal and coke will be adequate where and when needed in 1942. After establishment of the Solid Fuels Office, no time was lost in beginning this task.

By the close of the fiscal year, it appeared that unless unforeseen difficulties occur, the steps taken to protect the solid fuel supply will

make it possible to provide sufficient coal of some kind, quality, or size to keep homes warm and factories running throughout the winter of 1942-43. However, in order to enable mines and carriers to supply the coal it will be necessary for dealers and consumers to order their fuel early enough to enable the mines and carriers to have full use of their limited manpower and equipment during the summer. This is necessary to reduce the fall peak in coal shipments to a size that will not overburden facilities, and to provide sufficient storage of coal in consumers' bins to protect them against any local emergencies or delays in shipments that otherwise might catch them without adequate fuel.

To bring about public cooperation in this task, the Solid Fuels Office, in cooperation with other Government agencies and industry, launched a "Buy Coal Now" campaign in the Spring of 1942. At the close of the fiscal year, consumers were cooperating heartily.

Both bituminous and anthracite coals were being produced and transported at a rate much higher than normal seasonal requirements, and, generally speaking, production and transportation were functioning relatively smoothly in light of war difficulties. The bituminous output was averaging well above 11,000,000 tons per week and anthracite was flowing in excess of 1,000,000 tons per week. Although the bituminous mines could supply much more, the anthracite mines were working at near capacity, due to the handicap of the results of a flood during the Spring. Ample transportation was available.

A great deal of this fuel was going into dealers' and consumers' storage. The amount of bituminous held in storage totaled 73,268,000 tons as of June 30, 1942, and was expected to exceed all past records in history before the end of the year. No records were available as to the amount of anthracite in storage, but factors indicated that it was high.

The production of bituminous coal during the first half of 1942 was estimated at 284,808,000 tons, or more than half of the year's anticipated requirements. Anthracite production for that period was estimated at 29,507,000 tons, or close to half of the year's expected requirements.

In addition to the summer coal storage drive, the Coordinator's office was engaged in numerous other activities designed to assure an adequate supply of coal, coke, and other solid fuels. Among them were:

1. A survey of the Nation's coal requirements, and of actual and potential mine production capacity. Although helpful preliminary information is now available from both studies, the latter one is not completed.
2. Studies of the adequacy of coal stocks held by consumers. Most of these investigations were carried out with the aid of the Bituminous

Coal Division and the War Department, and a survey of stocks held by war industries and the railroads was made in conjunction with the War Production Board. Wherever large war industry consumers or railroads were found to have insufficient coal on hand, they were advised to build up stocks. Essential consumers and war industries were advised to store sufficient coal to last from 90 to 120 days. Other industries were advised to store an average of 60 to 90 days' supply.

3. The planning and recommendation of emergency coal movements in various areas to supplement disrupted or deficient transportation via normal routes, or the inability of normal sources to supply wartime needs in various areas. It was necessary to arrange for emergency routing of coal, particularly to New England, to make up for the loss of colliers. Also, it was necessary to transfer heavy tonnages to all-rail routes to certain areas along the lower Great Lakes as a result of the diversion of lake colliers from coal to other war service. In other instances, the necessity for arranging supplemental movements into certain Midwestern areas and into the States of Washington and Oregon to make up for a deficiency in production capacity in the mines normally serving those areas is under study.

4. Survey of the availability of mine labor and consultation with the Selective Service System and the War Manpower Commission in effort to protect the mine labor supply. Preliminary studies indicate that the mines have suffered a net loss of upward of 40,000 workmen in the first half of 1942, because of the effects of the war.

5. Investigation of the need for priorities to enable producers to obtain necessary critical materials used in mining.

6. Studies of coke requirements, and the recommendation of necessary steps to assure sufficient coke to meet steel manufacturing needs. It appears that all coke requirements can be met, barring unforeseen difficulties, although a situation wherein the supply of low-volatile coking coals is tightening is being carefully watched.

7. Formulation of a proposed emergency distribution system for recommendation to the appropriate Governmental authority for establishment if and when necessary. The work of formulation is well under way.

War Resources Council

STEPHEN RAUSHENBUSH, Acting Director

ON December 7, 1941, the Secretary of the Interior put all employees and all bureaus of the Department on a war emergency basis. He established a War Resources Council, with Michael W. Straus as Director, to expedite this policy, and approved a war program to serve in mobilizing strategic natural resources of the Nation on the scale made necessary by global warfare. It has as its aim the supplying of essential raw materials, ores, minerals, metals, fuels, and power to the industrial processors and fabricators in order to attain the national war production goals set by the President. The Department and all of its agencies are devoting the full knowledge and experience gained through years of development, conservation, and study of these natural resources to the winning of the war. The council has been called upon to help in developing many parts of the program, and in coordinating the work of several bureaus.

Metals for War

Machines have made this war unique and have raised metals to first rank among essential war materials. Years of exploration and experiment have prepared the Bureau of Mines and the Geological Survey to move the country forward toward production on a victory scale by turning known but unused, low-grade materials into metals. The Department has begun to secure the immediate use of new processes tested in its own laboratories which can supply enough manganese to make 87 million tons of steel annually from low-grade domestic manganese ores. Its program is: To give all aid possible toward the establishment of plants using the Department's improved acid process for producing aluminum; to make available its magnesium processes utilizing domestic ores; to complete and secure the prompt use of a process for producing half a million tons of chromium concentrates annually from low-grade chromium ores; to develop a sponge iron program to meet the Nation's deficiency in scrap metal; to carry

explorations for copper, lead, zinc, iron, chromite, aluminous clays, vanadium, tungsten, and mercury to the point of action; to furnish the War Production Board as needed with a ranking of the best possible new developments of all critical ores; to formulate for it a domestic ore-buying program, and to stand ready to supervise it if requested.

Oil for War

Without petroleum products, the war machine of the United States and the United Nations could not function. Preparations to meet the challenge were made through the Office of the Petroleum Coordinator for War. This organization, although not a part of the Department of the Interior, was placed under the leadership of Secretary of the Interior Harold L. Ickes as Petroleum Coordinator. Its functions are among the most important of war activities, as the organization was charged with assuring an adequate supply of petroleum for both military and civilian use. While not an agency of the Department, the importance of its functions merit recognition in any discussion of the war responsibilities of the Secretary of the Interior.

The Office of the Petroleum Coordinator for War organized, through the industry, petroleum production based upon sound engineering techniques, stimulated exploration for new reserves. Its program is: To multiply the industry's capacity to manufacture high-octane gasoline; to establish new and more effective transportation methods required in moving blending stocks for aviation gasoline; to reshape the complex transportation system of the oil industry by substituting tank cars, trucks, barges, and pipe lines for tankers diverted to war service; to aid in marketing, and in the manufacture of rubber ingredients, and of toluene; to aid in a drilling campaign, and to aid in the production, handling, and transportation of petroleum products.

Power for War

The war budget of 56 billion dollars will require 154 billion kilowatt-hours of electric energy annually for the manufacture of airplanes, tanks, guns, warships, and fighting material. The Department is the major producer of power in areas where the principal undeveloped resources are located. Units recently completed at Boulder, Bonneville, and Grand Coulee Dams now make the Department ready to produce at the rate of more than 7 billion kilowatt-hours annually. The Department has begun to triple the 1941 output of producing agencies in the Department by the program now under way, and to add by 1945, about 1,480,000 kilowatts, with an output of 9 to 10 billion kilowatt-hours, to the power capacity now scheduled, by constructing new hydroelectric and steam plants.

Fuel for War

Coal provides half the Nation's energy, and coke fires the blast furnaces in the steel mills, and supplies many basic chemicals.

The Office of the Coordinator for Solid Fuels estimated that more than 600,000,000 tons of anthracite, bituminous, and lignitic coals were required in 1942, and 70,000,000 tons of coke. The facilities of the Department have been mobilized to see to it that an adequate supply of coals and coke is available where and when it is needed, to organize the production of coal so that sufficient quantities of necessary types and grades are available for war industries.

Its program is: To promote orderly production and distribution; to urge the maintenance of large reserves in consumers' storage; to encourage the conservation of high-grade coals for metallurgical uses; to aid users of special kinds or grades of coal; to determine minimum and maximum prices as required in the public interest; to administer the market regulatory features of the Coal Act in order to keep the bituminous coal mining industry in a sound operating condition, and to conduct a rigid mine safety inspection program for elimination of hazards.

Helium for War

Helium is a light, noninflammable war gas of which the United States Government has a world monopoly. To supply the increased demand for helium that has arisen from the war, the Department has begun to double in 1942 the record production of the 1941 fiscal year. It is making a comprehensive survey of gas fields suitable for helium production in order to select sites for additional helium plants. It is continuing research to reduce costs of production of helium.

Food for War

Adequate food is essential to success at arms. In many ways the Department contributes to the food supplies of the United Nations. It will increase these contributions. For example, the 1,921 million pounds of fishery products utilized in 1939 can be increased in a few years, without injury to the resources, to 3,582 million pounds through proper management and development.

The Department has begun to increase as required within the next few years by 1½ billion pounds, our fishing products. Its program is: To store and deliver water for the irrigation of 10,000,000 acres of land in the arid west for the production of food crops, long-staple cotton and other fibers, and rubber-bearing plants; to assure more adequate forage on Federal ranges for the 12,000,000 head of livestock grazing there, in order to increase up to 10 percent the products now

produced; to increase the production of cane and beets; to explore new sources of aquatic products for use as foods, vitamin oils, and animal feeds; to augment predatory animal and rodent control work, including plague-bearing rodent control efforts, and to conduct a food-drying program to relieve demands on tin and containers.

Land, Water, Timber for War

The increased production of those war necessities which are products of the forest, of the land, and of the water is receiving careful attention from the Department which supervises and manages the Federal land estate of 283 million acres. The Department has begun to increase to a billion board feet in 1942 and to a billion and a quarter in 1943, if required, timber production from the Oregon and California re-vested lands and from Indian reservations. Its program is: To establish fire lookout and air-raid warning towers; to provide trained crews to combat forest fires; to assure water supplies for municipalities and military concentration; to aid road building in Alaska; to map areas of military significance; to provide hospital and other emergency facilities, together with medical staffs, along the West Coast and in Alaska; to increase the fur and wool supplies for clothing for the armed forces; to withdraw public lands and to clear them of mineral and other claims so as to permit the establishment of military ranges, cantonments, and aviation fields, and to provide special facilities for rehabilitation and recreation of members of the armed forces.

The council is now composed of Stephen Raushenbush (Acting Director); Under Secretary Abe Fortas; John C. Page, Commissioner of the Bureau of Reclamation; R. R. Sayers, Director of the Bureau of Mines; Joel David Wolfsohn, Assistant Commissioner of the General Land Office; and Walton Onslow, Acting Director of Information. R. H. Rutledge is Acting Director of the Western War Resources Council, with headquarters in Salt Lake City.

Petroleum Conservation Division

J. W. STEELE, Acting Director

ON April 1, 1942, the Petroleum Conservation Division began its seventh year of administration and enforcement of the Connally Act. The act, approved February 22, 1935, for a period of 2 years, extended by Congress in 1937, again in 1939, and in June 1942 made permanent, prohibits the transportation in interstate commerce of petroleum or its products produced in excess of amounts permitted by State laws.

During the fiscal year 1942, in addition to its regular functions, the Division has cooperated with other Government departments, particularly with the Office of Petroleum Coordinator, in furthering the defense effort. Monthly reports of operations received by Federal Tender Board No. 1 have proved invaluable sources of information in respect to petroleum resources.

Federal Tender Board No. 1, Kilgore, Tex., established March 1, 1935, to issue certificates of clearance on petroleum and its products moving in interstate commerce from the East Texas field, and to conduct investigations of violations of the act within and without that area, was, by an order of the Secretary of the Interior, approved by the President May 26, 1941, given supervisory authority over an additional area of 102 Texas counties, two counties of New Mexico, and the entire State of Louisiana. In this area, which comprises the major oil producing sections of the south and southwest, monthly reports of operations of producers, refiners, and transporters of petroleum are required to be filed with the Board, and subordinate offices of the Board are located at strategic points therein to investigate alleged violations of the act and to enforce the rules and regulations contained in the order of May 26, 1941.

Operations of Federal Tender Board No. 1

The order of May 26, 1941, became effective in the extended area August 1, 1941. Prior to that date, Federal Tender Board No. 1 had maintained active supervision in an area comprising two oil

fields containing 25,700 producing wells, with an average daily production of 330,000 barrels; 5 refineries, with an average daily production of 10,500 barrels; 16 casinghead gasoline plants, with an average daily production of 20,000 barrels of petroleum products. Since the Board assumed administrative jurisdiction over the extended area, active enforcement has been in effect in an area comprising 703 fields containing 71,500 wells with an average daily production of 1,650,000 barrels of oil; 70 refineries, with an average daily production of 1,480,000 barrels of oil, and 120 gasoline extraction plants with an average daily output of 96,600 barrels of petroleum products. All of the above operations are reported to Federal Tender Board No. 1 on sworn monthly reports, but certificates of clearance were required only in the designated five-county area of East Texas.

Subordinate offices of Federal Tender Board No. 1 were maintained during the fiscal year at Houston, Corpus Christi, and Midland, Tex., and New Orleans, La., within the above area, and at Wichita, Kans., outside the area.

Effective at the close of the fiscal year 1942, the requirement of certificates of clearance in the East Texas area was rescinded by order of the Secretary of the Interior, and that area will, after July 1, 1942, be included within the enforcement area designated by the order of May 26, 1941.

Criminal Investigations and Prosecutions

During the fiscal year 1942, the volume of routine investigations by the Board of producing, refining, and transporting facilities increased as a result of extension of the supervised area. In addition to these matters, eight cases of Connally Act violations under investigation on June 30, 1941, were completed, and several major investigations were initiated. Cases and investigations carried over from the fiscal year 1941 and those instituted during the fiscal year 1942 were disposed of as follows:

Of six cases pending in United States district courts on June 30, 1941, three were terminated by successful prosecution, one was dismissed upon recommendation of the United States attorney, and two were pending June 30, 1942.

Of two cases pending with the Department of Justice on June 30, 1941, one was closed by the United States attorney and one remains unchanged.

Of eight cases under investigation on June 30, 1941, three were closed by the Board for lack of sufficient evidence, five were completed and submitted to the Department of Justice, of which one was

successfully prosecuted and four were pending further action on June 30, 1942.

Of 19 investigations begun during the year, 6 were incomplete on June 30, 1942, 5 were closed by the Board for lack of sufficient evidence and 8 were submitted to the Department of Justice for prosecution. Of the latter 8 cases, 1 was successfully prosecuted, 2 were presented to grand juries and indictments returned, and 5 were pending action of the Department of Justice on June 30, 1942.

The five cases successfully prosecuted during the year resulted in assessment of fines totaling \$121,800, and imposition of several suspended sentences ranging from 6 months to 2 years.

General Land Office

FRED W. JOHNSON, Commissioner

THE need for new supplies of strategic minerals, power, and grazing facilities, and the military and naval requirements for large areas of public lands placed increased responsibilities upon the General Land Office during the fiscal year ended June 30, 1942. The regular activities of the General Land Office are now geared to meet war needs, and they are effectively coordinated with the activities of other agencies for the purpose of facilitating the prosecution of the war program.

The withdrawal of public lands has been expedited by Executive Order No. 9146, authorizing the Secretary of the Interior to sign public land orders effecting the withdrawals. These withdrawals include lands for aerial bombing ranges, antiaircraft fields, combat training areas, artillery practice grounds, air navigation sites, flying schools, ammunition storage, and ordnance depots. Designated employees are devoting themselves exclusively to this work and a priority of routing has been established on all matters relating to the war. More than 7,000,000 acres were withdrawn during the year, making an aggregate of more than 13,000,000 acres withdrawn for military purposes.

In addition to the millions of acres of public lands made available by the General Land Office, the Government is acquiring for military and allied purposes extensive acreages of other land, which raises a serious post-war land use question. The General Land Office is studying this problem along with the other studies being made relative to uses of public lands which are to be returned to its administration at the close of the war under the reversion clauses in the withdrawal orders.

The war has prevented the importation of many minerals from their usual sources and these products must now be obtained as far as possible from domestic deposits. The General Land Office has cooperated with the Defense Plant Corporation, the Metals Reserve Co., the Reconstruction Finance Corporation, and other agencies in developing strategic and critical minerals.

In order to help make our Nation more self-sufficient, the General Land Office is conducting studies to determine new uses that may be made of resources on the public domain. New values are being found in the minerals, natural vegetation, sites for health and recreation, and other resources which heretofore were considered of little importance or not known to exist. Commercial quantities of strategic minerals may be developed from hitherto-unused deposits, and such materials as fiber, rubber, turpentine, and resin may be produced from desert shrubs. A number of health and recreational sites have already been developed in desert areas. Barren desert areas so sparsely vegetated as to have little or no value for grazing or agriculture have been found to have terrain and climate especially adapted to the training of our armed forces. Other areas heretofore remote, inaccessible, and thinly populated have, because of these limitations, become very valuable for such purposes as heavy artillery or bombing practice areas.

Recent legislation has authorized the Secretary of the Interior to lease or sell lands in the public domain "for use in connection with the manufacture of arms, ammunition, and implements of war, or the production of equipment, supplies, and materials, or machinery usable in such manufacture." Under the Secretary's regulations, the Commissioner of the General Land Office will negotiate transactions providing land to be used for its yield of timber, sand, gravel, and stone; and as factory sites, housing development sites for war workers, and as expansion area for plants bordering the public domain.

Notwithstanding the increased burdens incident to the war which were handled without increased appropriation, the General Land Office maintained its position as one of the few agencies of the Federal Government whose operations resulted in revenues exceeding expenditures. Total cash receipts from all sources during the year amounted to \$9,014,172.87, which represents an increase of \$1,281,830.94 over the preceding year. The receipts were almost four and one-half times the amount of the expenditures (\$2,047,504.64), and this was the sixth consecutive year in which the receipts were in excess of \$7,000,000.

With the development of war plans, the Oregon and California Revested Lands Administration of the General Land Office immediately gave particular attention to special war needs, in addition to providing for the needs of the industry in manufacturing the usual types of lumber.

The volume of timber cut during the year was 456,131,000 board feet which represents an increase of 19 percent over the cutting of the preceding year.

During the fiscal year, the General Land Office increased its efforts to provide grazing land in areas in the Western States outside of

grazing districts, and it now has outstanding 8,821 leases, covering 9,871,843.19 acres.

Because of the special hazards due to the war, the General Land Office greatly increased its fire prevention and suppression activities in the "O and C" forests in Oregon, the forest area in Alaska, and on the public domain generally.

During the past fiscal year, many township plats and State maps were furnished to the War Department. For many parts of the United States, the best map data available for military purposes are the General Land Office township plats showing the boundaries of lands and the general topographic descriptions compiled in connection with the public land surveys.

The efficiency of the General Land Office was enhanced through the creation of a Branch of Field Examination by Secretary's order of January 17, 1942. It is the function of this branch to make such inspections, surveys, or other field examinations as are essential to the operation of the General Land Office and of such other agencies of the Department as may best be served by it. The staffs for this unit, including regional field staffs at San Francisco, Calif.; Billings, Mont., Salt Lake City, Utah; and Albuquerque, N. Mex., were supplied by the Division of Investigations of the Department which heretofore had handled such field examination work.

The total number of permanent employees of the General Land Office as of June 30, 1942, was 776. Of this number, 447 employees had headquarters in 36 cities in 13 Western States and Alaska.

Recommendations

As a result of the experiences and problems of the General Land Office, the following recommendations are made:

1. A leasing system applying, under certain conditions, to all minerals not now subject to leasing is urged. With respect to metaliferous minerals, there are no leasing or similar laws under which the Federal Government can share in any gains that might result from its exploration or development work. As a result of the operation of the present mineral laws, metallic mineral deposits, upon discovery, may pass immediately into private ownership, and therefore, there are no known reserves of the metallic minerals on the unappropriated, unreserved public lands of the United States. New interest in the possibilities of producing strategic and other minerals from public domain lands has arisen because of the requirements of the war. Some procedure should be made possible, therefore, under which the Government could carry on additional exploratory work for metalliferous minerals on public domain lands and retrieve any gains from discovery for the benefit of the Government and the

public. Such a procedure would make it economically feasible to carry on much exploratory work not otherwise possible. An important part of such a procedure would be the requirement that certain lands be segregated so that they would not be subject to mining claims but rather to mineral leasing laws.

2. In order that the Government may have a better knowledge and insight into the situation with regard to minerals, especially strategic and critical minerals, placer claim holders should be required to record their claims in the district land offices.

3. Provision should be made to prepare a comprehensive report upon a plan for the post-war development of the Territory of Alaska. The report should include not only the necessary basic information upon resources, conditions, and markets, but also recommendations for legislation, financing, and procedure. Such a report is necessary as a basis for planning an integrated economic development for increasing the permanent welfare of the present and future population of the Territory.

4. In administering the 5-Acre Tract Act, a number of difficulties have arisen because of the short-term lease system. It is believed that the tracts could be made much more satisfactory to those who wish to place substantial improvements on them, and that at the same time the public interest would be better protected, if, for certain classified lands, long-term leases could be granted. Study is being made as to the desirability of permitting sales in special areas.

5. In the interest of conserving our natural resources, additional attention should be given to war and post-war fire protection and control on public domain lands. In Alaska, particularly, much additional effort should be given to protecting public domain forests, grass lands, tundra, and coal deposits from destruction by fire. Not only are there millions of dollars worth of direct damage done annually to these resources, but inestimable damage is done in land erosion and destruction of all forms of wildlife.

6. Federal public lands are now administered under some 5,000 public land laws. It is recommended that at the first opportunity provision be made for the careful study and restatement of the public land laws.

Military Reservations and Withdrawals

From July 1, 1941, to June 30, 1942, withdrawals from the public domain in the United States and Alaska aggregating more than 7,000,000 acres were made to permit construction and operation of facilities required by the Army, the Navy, and the Civil Aeronautics Administration.

The registers of the district land offices determined the status of thousands of acres and contributed their special knowledge of the districts in assisting in the selection of lands suitable for war purposes. Upon request of the Navy Department, the field examiners of the General Land Office assisted in the appraisal of privately owned lands. The General Land Office investigated thousands of unpatented mining claims in withdrawals for War Department use.

Strategic, Critical, and Other Minerals

The leasing and other activities of the General Land Office were greatly increased insofar as they may help to accelerate the production of minerals essential to the prosecution of the war. Every effort has been made to provide mineral lands and to facilitate their operation to the fullest extent.

In opening reserved mineral deposits to exploitation, the General Land Office has made available large quantities of such minerals as tungsten, manganese, and other minerals equally essential to the war effort. The production of oil and gas from 690,919 acres of leased public land is of vital importance. The potash reserves in New Mexico and California, operating under leases, now provide large supplies of potassium at less than one-sixth of the price paid for potassium during the First World War. Rents and royalties paid to the Government on mineral leases and permits amounted to \$7,393,046.37 for the fiscal year 1942, as compared with slightly over \$6,000,000 for the preceding year.

Food, Fiber, Leather, and Rubber

The production of beef, mutton, lamb, wool, mohair, and leather on the western ranges constitutes a very important contribution toward winning the war. During the period covered by this report, the General Land Office intensified its efforts to provide necessary grazing land and it now has outstanding 8,821 leases, covering 9,871,843.19 acres. Work is now under way on converting these leases from a short-term to a 10-year basis.

From July 1, 1941, to June 30, 1942, the General Land Office expended \$255,417.70 of Range Development Service and Soil and Moisture Conservation funds in the rehabilitation of public domain lands situated in the 10 Western States. The primary purpose of the range development work is to increase the carrying capacity of these lands from 500,000 animal units per year to 750,000 animal units. This objective can be accomplished by the exercise of proper range improvement and by an extended program of water development, reseeding, destruction of noxious weeds, rodent control, and

similar measures. Although it will take a considerable period of time in which to bring about the desired result, effective headway was made in this direction during the period under consideration.

In the interest of the livestock industry, stock driveway withdrawals in Arizona, Colorado, Nevada, Idaho, Montana, Washington, and Wyoming, covering 10,928 acres, were made during the year. Other adjustments were made for the purpose of improving the location and increasing the usefulness of the driveways. These withdrawals and adjustments are of particular significance to the prosecution of the war as they have facilitated the movement of stock made difficult by the curtailment of other means of transportation. Stock driveway revocations, releasing for grazing purposes lands no longer needed for driveways also have been prepared.

Investigations have been made of the possibility of using yucca growing on the public domain as a substitute for fibers that can no longer be obtained from the usual sources. Information has also been gathered on the possibilities of helping to relieve the rubber shortage, particularly through furnishing land for raising guayule, and making rabbit brush available from the public domain.

Lumber and Timber

The volume of timber cut during the year from lands under the jurisdiction of the Oregon and California Revested Lands Administration of the General Land Office was 456,131,000 board feet, which represents an increase of 19 percent over the cutting of the preceding year. Sales of timber on these lands amounted to 482,271,000 board feet. The quantity sold showed a decrease of 2 percent, as compared with the preceding year, but on a value basis sales showed an increase of 24 percent. The chief factor affecting the rate of timber cutting at the present time is the limited ability of the industry to produce. Owing to the great need for lumber for war construction and as substitutes for steel, demand is far greater than present ability to produce.

The "O and C" Administration has employed additional personnel, partly for the purpose of making and supervising timber sales which call for the cutting of special grades of timber required in the war program. The cutting of these special grades causes much unnecessary waste, unless carried out on a selective basis and properly supervised.

The "O and C" Administration participated in special surveys to determine how much Sitka spruce, suitable for aircraft manufacture, is available, and to determine the volume and location of the remaining supply of Port Orford cedar on "O and C" and other lands.

As a contribution to the defense of the Northwest, the Civilian Conservation Corps, under the supervision of the "O and C" Administra-

tion, built various war structures including revetment structures needed by the armed forces for the protection of aircraft. In other ways, the three Civilian Conservation Corps camps assigned to the General Land Office for work in the "O and C" area were utilized more than ever because of the importance of forest and forest products in time of war. In this connection, 10.8 miles of new high standard truck trails were constructed and 60 additional miles were maintained and improved. The importance of this work was recently highlighted by the designation by military authorities of one of the CCC constructed trails as an important link in the military transportation system of the coastal area. Other activities included the construction of telephone lines and horse trails, fire hazard reduction, forest nursery development, reforestation, white pine blister rust control, preparation and transportation of materials, and forest fire suppression, all of which contribute to the conservation of a nation's forest resources and to the security of a country at war. The closing of these camps on June 30, 1942, brought to an end the fine work they were doing in the protection and development of the "O and C" forests.

Fire Protection

The General Land Office increased its fire prevention and suppression activities, especially in the "O and C" forests in Oregon and the forest areas in Alaska, because of the additional hazards incident to the war.

In order to coordinate the forest fire-control activities of all agencies within the State of Oregon, the Oregon Forest Defense Council was created. Through the work of this Council, plans and policies were adopted which will greatly increase the effectiveness of fire-suppression agencies not only in meeting and handling the normal but also the abnormal forest-fire condition. Pursuing the cooperative policy which is guiding the forest-fire activities within Oregon, the "O and C" Administration has established several emergency fire-control camps to augment regular forces in such a way as to deal effectively with any emergency which may arise as a result of the war. Arrangements have been made with other protection agencies whereby the fullest cooperation will be maintained at all times in order that all forest, brush, or grass fires will be controlled as quickly and efficiently as possible with a minimum disturbance of war work.

The Alaskan Fire Control Service, under the jurisdiction of the General Land Office, is charged with the prevention and suppression of fires on the public domain lands of Alaska. Of the approximately 323,000,000 acres of vacant and unreserved public domain, an estimated 250,000,000 acres of timber and grazing lands need fire protection to assure continuance of Alaska's rich natural resources of timber,

furs, and wildlife. An additional amount of \$115,000 has been made available for prevention and suppression of forest fire to supplement the regular appropriation of \$27,000. A vigorous educational program in fire prevention has been continued during the past year. Because of war limitations on paper and radio releases, greater emphasis has been placed on personal contact in group gatherings, such as 4-H Clubs, Boy Scouts, Girl Scouts, Chambers of Commerce, and Service Clubs. The objective has been to bring fire consciousness to every class of people.

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Changing economic conditions have likewise resulted in a great variety of demands for use of the public lands. The construction of new roads into previously isolated areas, the erection of war plants, the

development of air fields, the extraction of minerals and the increased demand for recreational facilities are but a few of the causes which make it impossible to classify permanently lands for one use or another.

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Leases and Permits

The extent of the leasing activities of the General Land Office is shown by the following tables:

Mineral leases, permits, and licenses outstanding,¹ as of June 30, 1942

Mineral	Leases		Permits		Licenses		Total	
	Number	Acres	Number	Acres	Number	Acres	Number	Acres
Coal.....	372	71,284	124	89,607	99	3,193	595	164,084
Oil and gas.....	² 3,325	2,562,222	³ 14	27,477	-----	-----	3,339	2,589,699
Phosphate.....	7	4,935	-----	-----	-----	-----	7	4,938
Potash.....	20	47,092	1	2,539	-----	-----	21	49,631
Sodium.....	4	1,873	101	156,641	-----	-----	105	158,514
Total.....	3,728	2,687,409	240	276,264	99	3,193	4,067	2,966,866

¹ Act of Feb. 25, 1920 (41 Stat. 437), and other acts.

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Type of lease	Number	Acres	Annual rental
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5-acre tracts.....	298	1,490.00	1,490.00
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Water well.....	10	400.00	360.50
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Total.....	9,219	11,184,735.22	202,321.26

Mineral land withdrawals and classifications outstanding, as of June 30, 1942

[In acres]

Class of mineral land	Area with- drawn	Area classi- fied	Total
Coal.....	24,017,364	134,923,945	58,941,309
Oil.....	² 4,359,154	71,884	4,931,038
Oil shale.....	5,989,949	4,081,208	10,071,157
Phosphate.....	1,889,601	302,219	2,191,820
Potash.....	9,411,906	-----	9,411,906
Metallic minerals.....	8,507	-----	8,507
Total.....	46,176,481	39,379,256	85,555,737

¹ Includes 5,229 acres of coal land reserved for the use of the United States (Coal Reserves Nos. 1 and 2).² Includes 13,578 acres withdrawn as a helium reserve.Acreage of lands patented with minerals reserved to the United States,
as of June 30, 1942

Type of mineral reservation	Patented dur- ing fiscal year 1942	Total patent- ed through June 1942
Reservation of all minerals:		
Under stockraising act.....	193,861	33,433,330
Under other acts.....	665,415	1,897,514
Total.....	859,276	35,330,844
Reservation of specific minerals:		
Coal.....	10,224	10,846,077
Others ¹	14,371	1,859,722
Total.....	24,595	12,705,799
Grand total.....	883,871	48,036,643

¹ Includes coal reserved in combination with other minerals.Homesteads, Sales,^r and Other Entries

Transfers of lands under laws providing for homesteading and mining claims and for sale of isolated tracts, timber, stone and town sites, are shown in the tables which follow:

Original entries and selections ¹ fiscal year 1942

Type of entry or selection	Public lands		Ceded Indian lands		Total	
	Number	Acres	Number	Acres	Number	Acres
Homestead entries:						
Stockraising.....	14	8,451			14	8,451
Enlarged.....	7	1,503	(2)	38	7	1,541
Reclamation.....	59	6,805	2	229	61	7,034
Forest.....	5	296			5	296
Sec. 2289 R. S., et al.....	198	20,073	(2)	40	198	20,113
Total.....	283	37,128	2	307	285	37,435
Other entries and selections:						
Desert land entries.....	18	1,738			18	1,738
State selections.....	50	85,311			50	85,311
Timber and stone application.....	1	39			1	39
Mineral applications and adverse claims.....	121	10,165			121	10,165
Townlots ³	97	(4)			97	
Lieu selections.....	2	115			2	115
Scrip selection.....	1	40			1	40
Total.....	290	97,408			290	97,408
Grand total.....	573	134,536	2	307	575	134,843

¹ An original entry or selection is one made in pursuance of an act of the Congress which prescribes the terms and conditions under which patent may be issued or other evidence of title granted. An original entry becomes a final entry upon compliance by the entryman with further requirements of the law, such as residence or additional payment, and upon the issuance of a final certificate. A State selection becomes final upon certification by the Commissioner of the General Land Office.

² One entry amended.

³ Townlots upon which only part payment was made.

⁴ Area not tabulated.

Final entries ¹ fiscal year 1942

Type of entry	Public lands		Ceded Indian lands		Total	
	Number	Acres	Number	Acres	Number	Acres
Homestead entries:						
Stockraising.....	286	138,989	17	6,460	303	145,449
Enlarged.....	29	7,541	4	547	33	8,088
Reclamation.....	214	21,455	45	5,668	259	27,123
Forest.....	6	844			6	844
Commuted.....	5	500	13	824	18	1,324
Sec. 2289 R. S., et al.....	187	18,678	15	1,161	202	19,839
Total.....	727	188,007	94	14,660	821	202,667
Other entries:						
Desert land entries.....	52	7,192			52	7,192
Public auction sales ²	230	20,256	3	284	233	20,540
Timber and stone entry.....	1	39			1	39
Mineral entries.....	107	10,860			107	10,860
Miscellaneous entries.....	157	5,989	³ 14	4,404	171	10,393
Total.....	547	44,336	17	4,688	564	49,024
Grand total.....	1,274	232,343	111	19,348	1,385	251,691

¹ A final entry is one upon which final certificate has issued showing that the law has been complied with and that in the absence of irregularity, the entryman or claimant is entitled to a patent. If the requirements of the law have been met, the equitable title to the land passes to the claimant upon the issuance of the final certificate.

² Isolated tracts.

³ One entry (4,080 acres) on Indian tribal lands.

Patents and certifications,¹ fiscal year 1942

Type of patent	Public lands		Ceded Indian lands		Total	
	Number	Acres	Number	Acres	Number	Acres
Homestead patents:						
Stockraising.....	380	191,439	11	1,227	391	192,666
Enlarged.....	41	10,141	41	5,559	82	15,700
Reclamation.....	306	30,064	1	160	307	30,224
Forest.....	18	1,203			18	1,203
Commuted.....	5	414	1	120	6	534
Sec. 2289 R. S., et al.....	210	22,111	17	1,336	227	23,447
Total.....	960	255,372	71	8,402	1,031	263,774
Desert land patents.....	57	9,417			57	9,417
Public auction patents ²	279	29,641			279	29,641
Timber and stone patents.....	4	279			4	279
Mineral patents.....	89	4,392			89	4,392
Indian patents.....	108	8,985	185	³ 3,231	293	12,216
Miscellaneous cash sale patents.....	164	6,450	3	640	167	7,090
Exchange patents.....	234	704,003	1	³ 2,914	235	706,917
Curative and supplemental patents.....	⁴ 312				312	
Miscellaneous patents.....	102	7,150	2	³ 4,093	104	11,243
Total.....	2,309	1,025,689	262	19,280	2,571	1,044,969
Certified to states.....		10,447				10,447
Grand total.....	⁵ 2,309	1,036,136	262	19,280	2,571	1,055,416

¹ Where upon final examination it is found that an entry or selection is in proper form and that the law has been complied with, a patent conveying the legal title to the claimant is issued. In the case of indemnity state selections, the legal title is conveyed upon approval thereof by the Secretary of the Interior and certification by the Commissioner of the General Land Office.

² Isolated Tracts.

³ Indian tribal lands.

⁴ Acreage not counted because previously reported.

⁵ Includes a small number of patents on Indian lands.

Land Grants

Despite the concentration of its efforts on war activities, the General Land Office has maintained its peacetime functions of assisting the States in providing for schools and internal improvement. Indemnity school land selections, amounting to 6,777.75 acres, were approved and certified to the States, with minerals reserved to the United States upon 1,760 acres. Selections under quantity grants to States for specific purposes, embracing 1,455.02 acres, were approved and patented with all minerals reserved to the United States, and 1,142.24 acres of swamp lands were patented. Patents for granted school sections were issued for 600,311.26 acres.

The rights of the land-grant railroads to institute higher rates for certain Government transportation services in return for releasing claims to additional lands expired on September 18, 1941, under the provisions of the Transportation Act of 1940. Before the expiration date, 65 of the 72 unforfeited railroad grants had been formally closed and the remaining 7 had been filed for closing. This brought to an end a phase of land activity which in pioneer years was of outstanding interest to the developers of the West.

Applications for 381 rights-of-way for railroads, highways, reservoirs, irrigation, and telephone, telegraph and pipe lines were approved.

Of the number approved, 155 were for permits or easements, with an annual rental of \$4,250.

Land Exchanges

Exchanges with private owners of land resulted in the addition to grazing districts of 19,830.42 acres, in exchange for 30,394.38 acres of Government lands; to a bird refuge 4,491.83 acres in exchange for 1,960.25 acres of Government land; to Indian reservations 17,889.70 acres in exchange for 167,135.18 acres of Government land; and to the national forests 484,804.17 acres in exchange for 10,524.7 acres, and in addition sufficient timber to equalize the values as is permitted in exchanges of this character.

Exchanges of lands with the States under the Taylor Grazing Act amounted to 492,269.02 acres, with all minerals reserved to the United States. These exchanges were made upon an equal area basis. Other exchanges of lands with the States amounted to 5,388.74 acres, patented or certified.

Receipts and Expenditures

The total cash receipts from all sources were \$9,014,172.87. The total expenditures from appropriations made for the conduct of the bureau were \$2,047,504.64.

The following table shows the distribution of the receipts:

Disposition of receipts of the General Land Office,¹ fiscal year 1942

Source of receipts	Covered in the Treasury earmarked for—				Total
	General fund	Reclamation fund	States and counties	Indian trust funds	
Sales of public lands.....	\$38,700.12	\$90,018.26	\$4,688.44	-----	\$133,406.82
Fees and commissions.....	10,602.78	33,272.14	-----	-----	43,874.92
Mineral leases and permits:					
Mineral Leasing Act.....	² 691,925.29	3,630,606.23	2,593,290.16	-----	6,915,821.68
Red River oil and gas lands.....	-----	-----	2,569.14	\$4,231.89	6,851.03
Potash.....	39,623.38	³ 254,435.04	148,587.69	-----	442,646.11
Other ⁴	27,727.55	-----	-----	-----	27,727.55
Total mineral.....	759,276.22	3,885,041.27	2,744,446.99	4,281.89	7,393,046.37
Oregon and California grant lands.....	239,503.21	-----	718,509.62	-----	958,012.83
Coos Bay grant lands.....	184,498.35	-----	⁵ 25,700.00	-----	210,198.35
Taylor Act grazing leases.....	97,425.24	-----	97,425.23	-----	194,850.47
Rights-of-way leases.....	32,991.44	-----	-----	-----	32,991.44
Sales of Reclamation town lots.....	-----	⁶ 6,510.99	-----	-----	6,510.99
Sales and lease of Indian lands.....	-----	-----	-----	5,612.49	5,612.49
Copying fees.....	15,463.65	-----	-----	-----	15,463.65
Miscellaneous.....	20,204.64	-----	-----	-----	20,204.64
Grand total.....	1,398,665.55	4,014,842.66	3,590,770.28	9,894.38	9,014,172.87

¹ Before final settlement of all accounts by the General Accounting Office.

² Includes \$381.25 collected in Alaska.

³ Includes \$46,412.27 collected in California under act of Oct. 2, 1917 (40 Stat. 297).

⁴ Includes \$16,844.35 collected in Wyoming under act of June 26, 1926 (44 Stat. 1621) and \$10,883.20 collected in Alaska.

⁵ Estimated.

⁶ Includes \$58.74 collected from sales of Reclamation lands under act of May 20, 1920 (41 Stat. 605).

Grazing Service

R. H. RUTLEDGE, Director

EVENTS of the 1942 fiscal year broadened the scope of Grazing Service activities and tested its ability to meet new situations caused by the stress of sudden and total war.

Immediately after Pearl Harbor the Secretary of the Interior placed the Department on a wartime footing, declaring that: "Actions upon matters resulting from declarations of war will have precedence over all other duties." Spurred by that declaration, the Grazing Service reexamined its problems and stepped up its operations to a war tempo, gaining momentum as the year progressed. Advisory boards, other ranchers, and citizens cooperated to protect forage and timber resources, produce more meat and fiber, and to promote full partnership in the fight for survival.

New uses of public lands.—To meet the increased demands made upon the range by war, the public domain took on new and added importance. Furnishing proving grounds for the thousands of American planes, bombers, and tanks, nearly 3,500,000 acres in Federal grazing districts were converted during the year into training areas, bringing the area withdrawn for military purposes in 2 years to 8,500,000 acres. Although requiring sudden adjustment in some cases, stockmen gave whole-hearted support to the program. At the same time livestock production was kept on a high level. Certain hardships were experienced by growers in some areas but to them the training program was of paramount importance.

Decentralization.—During the first week of August 1941, the transfer of the headquarters of the Grazing Service from Washington to Salt Lake City was completed.

Salt Lake City is at the hub of the Federal range territory. Spokes radiate from this hub to the 10 regional offices, none of which is more than 500 miles from the Director's desk in the Walker Bank Building.

In bringing the Grazing Service to the center of its job, the transfer helped to advance cooperation among all agencies engaged on western resource problems. Technicians of the Department were brought to-

gether to discuss how the several agencies could contribute, promptly and effectively, to the solution of the war problems.

Western War Resources Council.—At the suggestion of the Director of Grazing, 20 men from the several Interior Department bureaus operating in Western States met in March 1942 and organized a Western War Resources Council to coordinate ideas and to integrate facilities for war purposes. The Director was made chairman and his office was designated as a clearing house for information and prompt contact with war agencies, producers, and the Secretary's War Resources Council. In this way technical and skilled assistance was rendered promptly to individuals, corporations, agencies, and groups working on discovery, development, merchandising, transporting, stockpiling, and processing of materials for war.

National Advisory Board Council.—Livestock people cooperated in every way possible to protect resources and to help win the war. Reflecting full accord of the industry, the National Advisory Board Council recommended a program to maintain the ranges in full productive capacity, organize range users to protect ranges and forests against fire and other destructive elements, combat subversive activities and sabotage, and produce more pounds of wool, meat, and hides by better husbandry of range and stock.

This council, composed of 20 leading stockmen in the 10 range States, continues to cooperate on all matters of vital interest to the industry itself and the 21,000 licensees and permittees in grazing districts.

The Federal Range Code.—A revised draft of the Federal Range Code, which had been considered jointly by the advisory boards and the Grazing Service during the previous year, was studied by the National Advisory Board Council in Salt Lake City in January 1942. Upon conclusion of its 2-day session, and agreement on certain further changes, this council voted that the revised code be submitted to the Secretary for approval.

Protection of nonuse.—Under the full impact of war, policies of conservation with use undergo the supreme test, and the experiences of the past year have broadened public support for these fundamental principles.

An important part of the Nation's Food-for-Victory program is to produce more tonnage of meat and yet maintain the range in good vigor. In recent years stockmen themselves have proven that this can be done with greater net returns realized. In many areas it has been achieved by voluntary reduction of numbers, improved breeding, culling of herds, and better range management coupled with water development and other improvements. The livestock operator and the Grazing Service have never before been so closely in agreement on the dual objectives of conservation with economic use, and the

percentages of operators who are applying these principles are increasing steadily.

The Secretary, recognizing the need for the protection of operators brought about by the unusual conditions existing because of the war, established a departmental policy of granting nonuse permits for an indefinite period when:

1. The range is overstocked and the operator voluntarily states that he is willing to run the reduced numbers until such a time as the range shows improvement.

2. The range is not overstocked but the operator is unable to obtain replacement numbers after selling or culling for the purpose of meeting increased marketing goals that are established as a part of the Food-for-Victory program.

Going one step further, he extended the same privilege under other conditions which may arise, but which are entirely beyond the control of the individual operator.

Licenses and Permits.—Stockmen took advantage of good prices to reduce numbers and shape herds, resulting in a decrease of 111,101 head on the range as compared with the previous year. A total of 6,110, or about 29 percent of the users, were on a term permit basis at the end of the fiscal year. Matters that deterred the desired progress on permits have been cleared up in most regions, and a high percentage of all users will be on a permit basis at an early date. Wilful trespass was kept to a minimum due to the cooperation of range users and to further subdivision of the range into individual and group allotments. A summary of range use in 1942 is shown in Table 1.

TABLE 1.—Livestock use of grazing districts, fiscal year 1942

Region	Number of licenses and permits	Number of cattle	Number of horses	Number of sheep	Number of goats	Total livestock
Arizona	648	100,364	3,391	118,155	29,981	251,891
Colorado	2,111	179,640	5,351	798,438	98	983,527
Idaho	3,280	200,679	20,366	1,613,324	118	1,834,487
Montana	2,955	151,840	24,425	974,281	46	1,150,592
Nevada-California	1,932	347,818	19,721	944,621	4,837	1,316,997
New Mexico	2,136	282,863	14,443	619,702	81,687	998,695
New Mexico No. 7	1,378	4,755	8,525	150,686	19,056	183,022
Oregon	1,417	186,869	14,352	470,028	-----	671,249
Utah	3,946	195,572	10,129	1,705,652	13,840	1,925,193
Wyoming	1,446	159,846	13,154	1,479,123	360	1,652,483
Total	21,249	1,810,246	133,857	8,874,010	150,023	10,968,136

Reseeding.—Range reseeding experience furnished a valuable guide to better future methods and to the selection of species which are most likely to succeed on the arid and semiarid ranges. A total of 199,670 acres was reseeded in 1942 compared with 66,000 acres the previous year. It has been definitely shown that for successful reseeding there

1810246
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Oil.....	² 4,859,154	71,884	4,931,038
Oil shale.....	5,989,949	4,081,208	10,071,157
Phosphate.....	1,889,601	302,219	2,191,820
Potash.....	9,411,906	-----	9,411,906
Metallic minerals.....	8,507	-----	8,507
Total.....	46,176,481	39,379,256	85,555,737

¹ Includes 5,229 acres of coal land reserved for the use of the United States (Coal Reserves Nos. 1 and 2).² Includes 13,578 acres withdrawn as a helium reserve.Acreage of lands patented with minerals reserved to the United States,
as of June 30, 1942

Type of mineral reservation	Patented dur- ing fiscal year 1942	Total patent- ed through June 1942
Reservation of all minerals:		
Under stockraising act.....	193,861	33,433,330
Under other acts.....	665,415	1,897,514
Total.....	859,276	35,330,844
Reservation of specific minerals:		
Coal.....	10,224	10,846,077
Others ¹	14,371	1,859,722
Total.....	24,595	12,705,799
Grand total.....	883,871	48,036,643

¹ Includes coal reserved in combination with other minerals.

Homesteads, Sales, and Other Entries

Transfers of lands under laws providing for homesteading and mining claims and for sale of isolated tracts, timber, stone and town sites, are shown in the tables which follow:

Original entries and selections ¹ fiscal year 1942

Type of entry or selection	Public lands		Ceded Indian lands		Total	
	Number	Acres	Number	Acres	Number	Acres
Homestead entries:						
Stockraising.....	14	8,451			14	8,451
Enlarged.....	7	1,503	(²)	38	7	1,541
Reclamation.....	59	6,805	2	229	61	7,034
Forest.....	5	296			5	296
Sec. 2289 R. S., et al.....	198	20,073	(²)	40	198	20,113
Total.....	283	37,128	2	307	285	37,435
Other entries and selections:						
Desert land entries.....	18	1,738			18	1,738
State selections.....	50	85,311			50	85,311
Timber and stone application.....	1	39			1	39
Mineral applications and adverse claims.....	121	10,165			121	10,165
Townlots ³	97	(⁴)			97	
Lieu selections.....	2	115			2	115
Scrip selection.....	1	40			1	40
Total.....	290	97,408			290	97,408
Grand total.....	573	134,536	2	307	575	134,843

¹ An original entry or selection is one made in pursuance of an act of the Congress which prescribes the terms and conditions under which patent may be issued or other evidence of title granted. An original entry becomes a final entry upon compliance by the entryman with further requirements of the law, such as residence or additional payment, and upon the issuance of a final certificate. A State selection becomes final upon certification by the Commissioner of the General Land Office.

² One entry amended.

³ Townlots upon which only part payment was made.

⁴ Area not tabulated.

Final entries ¹ fiscal year 1942

Type of entry	Public lands		Ceded Indian lands		Total	
	Number	Acres	Number	Acres	Number	Acres
Homestead entries:						
Stockraising.....	286	138,989	17	6,460	303	145,449
Enlarged.....	29	7,541	4	547	33	8,088
Reclamation.....	214	21,455	45	5,668	259	27,123
Forest.....	6	844			6	844
Commuted.....	5	500	13	824	18	1,324
Sec. 2289 R. S., et al.....	187	18,678	15	1,161	202	19,839
Total.....	727	188,007	94	14,660	821	202,667
Other entries:						
Desert land entries.....	52	7,192			52	7,192
Public auction sales ²	230	20,256	3	284	233	20,540
Timber and stone entry.....	1	39			1	39
Mineral entries.....	107	10,860			107	10,860
Miscellaneous entries.....	157	5,989	³ 14	4,404	171	10,393
Total.....	547	44,336	17	4,688	564	49,024
Grand total.....	1,274	232,343	111	19,348	1,385	251,691

¹ A final entry is one upon which final certificate has issued showing that the law has been complied with and that in the absence of irregularity, the entryman or claimant is entitled to a patent. If the requirements of the law have been met, the equitable title to the land passes to the claimant upon the issuance of the final certificate.

² Isolated tracts.

³ One entry (4,080 acres) on Indian tribal lands.

Patents and certifications,¹ fiscal year 1942

Type of patent	Public lands		Ceded Indian lands		Total	
	Number	Acres	Number	Acres	Number	Acres
Homestead patents:						
Stockraising.....	380	191,439	11	1,227	391	192,666
Enlarged.....	41	10,141	41	5,559	82	15,700
Reclamation.....	306	30,064	1	160	307	30,224
Forest.....	18	1,203	-----	-----	18	1,203
Commuted.....	5	414	1	120	6	534
Sec. 2289 R. S., et al.....	210	22,111	17	1,336	227	23,447
Total.....	960	255,372	71	8,402	1,031	263,774
Desert land patents.....	57	9,417	-----	-----	57	9,417
Public auction patents ²	279	29,641	-----	-----	279	29,641
Timber and stone patents.....	4	279	-----	-----	4	279
Mineral patents.....	89	4,392	-----	-----	89	4,392
Indian patents.....	108	8,985	185	3,231	293	12,216
Miscellaneous cash sale patents.....	164	6,450	3	640	167	7,090
Exchange patents.....	234	704,003	1	2,914	235	706,917
Curative and supplemental patents.....	4 312	-----	-----	-----	312	-----
Miscellaneous patents.....	102	7,150	2	4,093	104	11,243
Total.....	2,309	1,025,689	262	19,280	2,571	1,044,969
Certified to states.....	-----	10,447	-----	-----	-----	10,447
Grand total.....	2,309	1,036,136	262	19,280	2,571	1,055,416

¹ Where upon final examination it is found that an entry or selection is in proper form and that the law has been complied with, a patent conveying the legal title to the claimant is issued. In the case of indemnity state selections, the legal title is conveyed upon approval thereof by the Secretary of the Interior and certification by the Commissioner of the General Land Office.

² Isolated Tracts.

³ Indian tribal lands.

⁴ Acreage not counted because previously reported.

⁵ Includes a small number of patents on Indian lands.

Land Grants

Despite the concentration of its efforts on war activities, the General Land Office has maintained its peacetime functions of assisting the States in providing for schools and internal improvement. Indemnity school land selections, amounting to 6,777.75 acres, were approved and certified to the States, with minerals reserved to the United States upon 1,760 acres. Selections under quantity grants to States for specific purposes, embracing 1,455.02 acres, were approved and patented with all minerals reserved to the United States, and 1,142.24 acres of swamp lands were patented. Patents for granted school sections were issued for 600,311.26 acres.

The rights of the land-grant railroads to institute higher rates for certain Government transportation services in return for releasing claims to additional lands expired on September 18, 1941, under the provisions of the Transportation Act of 1940. Before the expiration date, 65 of the 72 unforfeited railroad grants had been formally closed and the remaining 7 had been filed for closing. This brought to an end a phase of land activity which in pioneer years was of outstanding interest to the developers of the West.

Applications for 381 rights-of-way for railroads, highways, reservoirs, irrigation, and telephone, telegraph and pipe lines were approved.

Of the number approved, 155 were for permits or easements, with an annual rental of \$4,250.

Land Exchanges

Exchanges with private owners of land resulted in the addition to grazing districts of 19,830.42 acres, in exchange for 30,394.38 acres of Government lands; to a bird refuge 4,491.83 acres in exchange for 1,960.25 acres of Government land; to Indian reservations 17,889.70 acres in exchange for 167,135.18 acres of Government land; and to the national forests 484,804.17 acres in exchange for 10,524.7 acres, and in addition sufficient timber to equalize the values as is permitted in exchanges of this character.

Exchanges of lands with the States under the Taylor Grazing Act amounted to 492,269.02 acres, with all minerals reserved to the United States. These exchanges were made upon an equal area basis. Other exchanges of lands with the States amounted to 5,388.74 acres, patented or certified.

Receipts and Expenditures

The total cash receipts from all sources were \$9,014,172.87. The total expenditures from appropriations made for the conduct of the bureau were \$2,047,504.64.

The following table shows the distribution of the receipts:

Disposition of receipts of the General Land Office,¹ fiscal year 1942

Source of receipts	Covered in the Treasury earmarked for—				Total
	General fund	Reclamation fund	States and counties	Indian trust funds	
Sales of public lands	\$38,700.12	\$90,018.26	\$4,688.44	-----	\$133,406.82
Fees and commissions	10,602.78	33,272.14	-----	-----	43,874.92
Mineral leases and permits:					
Mineral Leasing Act	² 691,925.29	3,630,606.23	2,593,290.16	-----	6,915,821.68
Red River oil and gas lands ..	-----	-----	2,569.14	\$4,281.89	6,851.03
Potash	39,623.38	³ 254,435.04	148,587.69	-----	442,646.11
Other ⁴	27,727.55	-----	-----	-----	27,727.55
Total mineral	759,276.22	3,885,041.27	2,744,446.99	4,281.89	7,393,046.37
Oregon and California grant lands	239,503.21	-----	718,509.62	-----	958,012.83
Coos Bay grant lands	184,498.35	-----	⁵ 25,700.00	-----	210,198.35
Taylor Act grazing leases	97,425.24	-----	97,425.23	-----	194,850.47
Rights-of-way leases	32,991.44	-----	-----	-----	32,991.44
Sales of Reclamation town lots ..	-----	⁶ 6,510.99	-----	-----	6,510.99
Sales and lease of Indian lands ..	-----	-----	-----	5,612.49	5,612.49
Copying fees	15,463.65	-----	-----	-----	15,463.65
Miscellaneous	20,204.64	-----	-----	-----	20,204.64
Grand total	1,398,665.55	4,014,842.66	3,590,770.28	9,894.38	9,014,172.87

¹ Before final settlement of all accounts by the General Accounting Office.

² Includes \$381.25 collected in Alaska.

³ Includes \$46,412.27 collected in California under act of Oct. 2, 1917 (40 Stat. 297).

⁴ Includes \$16,844.35 collected in Wyoming under act of June 26, 1926 (44 Stat. 1621) and \$10,883.20 collected in Alaska.

⁵ Estimated.

⁶ Includes \$58.74 collected from sales of Reclamation lands under act of May 20, 1920 (41 Stat. 605).

Grazing Service

R. H. RUTLEDGE, Director

EVENTS of the 1942 fiscal year broadened the scope of Grazing Service activities and tested its ability to meet new situations caused by the stress of sudden and total war.

Immediately after Pearl Harbor the Secretary of the Interior placed the Department on a wartime footing, declaring that: "Actions upon matters resulting from declarations of war will have precedence over all other duties." Spurred by that declaration, the Grazing Service reexamined its problems and stepped up its operations to a war tempo, gaining momentum as the year progressed. Advisory boards, other ranchers, and citizens cooperated to protect forage and timber resources, produce more meat and fiber, and to promote full partnership in the fight for survival.

New uses of public lands.—To meet the increased demands made upon the range by war, the public domain took on new and added importance. Furnishing proving grounds for the thousands of American planes, bombers, and tanks, nearly 3,500,000 acres in Federal grazing districts were converted during the year into training areas, bringing the area withdrawn for military purposes in 2 years to 8,500,000 acres. Although requiring sudden adjustment in some cases, stockmen gave whole-hearted support to the program. At the same time livestock production was kept on a high level. Certain hardships were experienced by growers in some areas but to them the training program was of paramount importance.

Decentralization.—During the first week of August 1941, the transfer of the headquarters of the Grazing Service from Washington to Salt Lake City was completed.

Salt Lake City is at the hub of the Federal range territory. Spokes radiate from this hub to the 10 regional offices, none of which is more than 500 miles from the Director's desk in the Walker Bank Building.

In bringing the Grazing Service to the center of its job, the transfer helped to advance cooperation among all agencies engaged on western resource problems. Technicians of the Department were brought to-

gether to discuss how the several agencies could contribute, promptly and effectively, to the solution of the war problems.

Western War Resources Council.—At the suggestion of the Director of Grazing, 20 men from the several Interior Department bureaus operating in Western States met in March 1942 and organized a Western War Resources Council to coordinate ideas and to integrate facilities for war purposes. The Director was made chairman and his office was designated as a clearing house for information and prompt contact with war agencies, producers, and the Secretary's War Resources Council. In this way technical and skilled assistance was rendered promptly to individuals, corporations, agencies, and groups working on discovery, development, merchandising, transporting, stockpiling, and processing of materials for war.

National Advisory Board Council.—Livestock people cooperated in every way possible to protect resources and to help win the war. Reflecting full accord of the industry, the National Advisory Board Council recommended a program to maintain the ranges in full productive capacity, organize range users to protect ranges and forests against fire and other destructive elements, combat subversive activities and sabotage, and produce more pounds of wool, meat, and hides by better husbandry of range and stock.

This council, composed of 20 leading stockmen in the 10 range States, continues to cooperate on all matters of vital interest to the industry itself and the 21,000 licensees and permittees in grazing districts.

The Federal Range Code.—A revised draft of the Federal Range Code, which had been considered jointly by the advisory boards and the Grazing Service during the previous year, was studied by the National Advisory Board Council in Salt Lake City in January 1942. Upon conclusion of its 2-day session, and agreement on certain further changes, this council voted that the revised code be submitted to the Secretary for approval.

Protection of nonuse.—Under the full impact of war, policies of conservation with use undergo the supreme test, and the experiences of the past year have broadened public support for these fundamental principles.

An important part of the Nation's Food-for-Victory program is to produce more tonnage of meat and yet maintain the range in good vigor. In recent years stockmen themselves have proven that this can be done with greater net returns realized. In many areas it has been achieved by voluntary reduction of numbers, improved breeding, culling of herds, and better range management coupled with water development and other improvements. The livestock operator and the Grazing Service have never before been so closely in agreement on the dual objectives of conservation with economic use, and the

percentages of operators who are applying these principles are increasing steadily.

The Secretary, recognizing the need for the protection of operators brought about by the unusual conditions existing because of the war, established a departmental policy of granting nonuse permits for an indefinite period when:

1. The range is overstocked and the operator voluntarily states that he is willing to run the reduced numbers until such a time as the range shows improvement.

2. The range is not overstocked but the operator is unable to obtain replacement numbers after selling or culling for the purpose of meeting increased marketing goals that are established as a part of the Food-for-Victory program.

Going one step further, he extended the same privilege under other conditions which may arise, but which are entirely beyond the control of the individual operator.

Licenses and Permits.—Stockmen took advantage of good prices to reduce numbers and shape herds, resulting in a decrease of 111,101 head on the range as compared with the previous year. A total of 6,110, or about 29 percent of the users, were on a term permit basis at the end of the fiscal year. Matters that deterred the desired progress on permits have been cleared up in most regions, and a high percentage of all users will be on a permit basis at an early date. Wilful trespass was kept to a minimum due to the cooperation of range users and to further subdivision of the range into individual and group allotments. A summary of range use in 1942 is shown in Table 1.

TABLE 1.—Livestock use of grazing districts, fiscal year 1942

Region	Number of licensees and permittees	Number of cattle	Number of horses	Number of sheep	Number of goats	Total livestock
Arizona	648	100,364	3,391	118,155	29,981	251,891
Colorado	2,111	179,640	5,351	798,438	98	983,527
Idaho	3,280	200,679	20,366	1,613,324	118	1,834,487
Montana	2,955	151,840	24,425	974,281	46	1,150,592
Nevada-California	1,932	347,818	19,721	944,621	4,837	1,316,997
New Mexico	2,136	282,863	14,443	619,702	81,687	998,695
New Mexico No. 7	1,378	4,755	8,525	150,686	19,056	183,022
Oregon	1,417	186,869	14,352	470,028	-----	671,249
Utah	3,946	195,572	10,129	1,705,652	13,840	1,925,193
Wyoming	1,446	159,846	13,154	1,479,123	360	1,652,483
Total	21,249	1,810,246	133,857	8,874,010	150,023	10,968,136

Reseeding.—Range reseeding experience furnished a valuable guide to better future methods and to the selection of species which are most likely to succeed on the arid and semiarid ranges. A total of 199,670 acres was reseeded in 1942 compared with 66,000 acres the previous year. It has been definitely shown that for successful reseeding there

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must be a coordinated program of rodent control and other control features.

Range Surveys.—Nineteen million acres of range lands were surveyed and a recheck survey accomplished on 10 million acres during the year. Most of this field work was compiled and kept current for administrative use.

Advisory boards continued to give their support financially and otherwise to the range survey program, and this technical work reached a new high in its contributions to the objectives of the Service.

Soil and Moisture Conservation.—The second year of activities under the President's Fourth Reorganization Plan dealing with soil- and moisture-conservation work in grazing districts advanced the over-all range development program. Original range project areas were reduced in size, conforming to grazing administrative units, and the soil and moisture work became an integral part of the entire job, being coordinated into a closely knit Departmental program.

Range Studies.—Work at the Squaw Butte Range and Livestock Station was correlated with the Harney Branch Agricultural Station at Burns, Oreg., under a superintendent employed by the Grazing Service. Conducted as before in cooperation with the Oregon State Agricultural College, the new arrangement afforded a year-long livestock study applicable to a ranch and range empire aggregating about 30 million acres in four States.

The collection of actual range use records through utilization checks continued to furnish guides for helping the stockmen and the Grazing Service determine rate of stocking, seasons of use, and other information where range surveys are as yet incomplete. The range appraisal study was continued by collecting additional range-operation data. No recommendation has been made as to the establishment of grazing fees varying from those now in force, such being held in abeyance until after the war. Cooperative range studies were expanded to many areas in several States. Field work on the Elko County, Nev., project was completed and the results analyzed, compiled, and shaped for joint publication.

Wildlife.—Wildlife conservation, predatory animal control, rodent control, and State Pittman-Robertson Act projects advanced under continued cooperation with the Fish and Wildlife Service, with other Federal agencies, and with States and groups interested in such problems in grazing districts. In certain congested areas plans were developed to increase the big-game kill under systematic hunting supervised by appropriate authorities. Surveys indicate a big-game population of about 419,000 such animals in Federal grazing districts, with some only seasonally.

Range Improvements and Maintenance.—Range improvement work was confined largely to water development, construction of trails and

feeder roads, revegetation, maintenance, and other activities requiring little or no critical material. With dwindling enrollee strength and shortage of materials, the accomplishments fell below those of the previous year when 89 camps were maintained in full operation. A summary of major accomplishments for the fiscal year and for the period April 1935 to June 1942, is shown on Table 2.

TABLE 2.—Major range improvements, end fiscal year 1942

Type of project	Unit	Fiscal year 1942	Total, April 1935 through June 1942
Springs.....	Number.....	182	826
Reservoirs, for watering stock.....	Number.....	420	1,795
Wells.....	Number.....	60	299
Pipe and tile conduits.....	Linear feet.....	31,845	276,138
Fences.....	Miles.....	1,018	5,413.3
Cattleguards.....	Number.....	88	648
Corrals.....	Number.....	28	371
Bridges.....	Number.....	19	322
Truck trails (minor roads).....	Miles.....	620	9,266.5
Stock trails.....	Miles.....	104	1,260.3
Permanent check dams.....	Number.....	676	8,141
Temporary check dams.....	Number.....	1,938	49,873
Water control structures other than dams.....	Number.....	993	1,527
Rodent control.....	Acres.....	1,370,756	11,469,993
Insect pest control.....	Acres.....	307,376	469,512
Range revegetation (reseeding).....	Acres.....	199,670	348,046
Tree planting, gully.....	Square yards.....	2,000	11,580
Diversion ditches.....	Linear feet.....	10,500	272,876
Channel construction.....	Linear feet.....	15,432	27,973
Water spreaders.....	Linear feet.....	26,410	179,915
Clearing and cleaning channels.....	Square yards.....	72,720	183,540
Riprap and paving.....	Square yards.....	4,960	153,128
Fire fighting.....	Man days.....	9,538	121,970

Range Fires.—Due to increased forage growth, curtailment of CCC, and possible increase in subversive activities on the range territory, the fire hazard is of growing concern. CCC enrollee contributions cannot be measured in dollars and cents. In 6 years prior to January 1, 1942, these boys devoted 180,000 man days (500 man years) to range fire control. During the 1941 calendar year alone there were 433 fires in the grazing districts and a total burn of 1,614,000 acres. This destroyed forage that would feed 16,000 cattle or 80,000 sheep one year, representing a loss of 4,000 tons of meat. Grass fires move fast and, without manpower and tools ready for quick counterattack, the results are devastating.

To help meet this situation in the face of reduced manpower, the Service reorganized its fire fighting setup. A fire supervisor, with a small contingent of trained men and with authority to recruit per diem guards and fire fighters subject to call when needed, was appointed in each of the 10 grazing regions and coordinated with the Office of Civilian Defense in accordance with Executive Order No. 9165 of May 15. Cooperation with ranchers, highway patrols, CAA training posts, and other groups for prompt reporting of fires, provided an effi-

cient, widely spread fire detection plan. The sum of \$25,000 appropriated by Congress to control range fire was thinly spread in the regions of highest fire hazard. For the present season the Office of Land Utilization has allotted \$100,000 to the Grazing Service for emergency fire protection.

Civilian Conservation Corps.—Wherever possible CCC work in grazing districts was devoted to war-aid projects. As the number of camps and the size of enrollee strength tapered downward, facilities and equipment were put in shape for military requests. Eight camps finished the year on a full-time war basis, constructing roads to mineral deposits, posting bombing ranges, guarding water supplies, and developing airfields in four States. One side camp, connected with 10 camps in the intermountain area by short wave radio, operated as a central detection service in cooperation with the Office of Civilian Defense. At these stations enrollees kept a 24-hour alert, and some instances of private unauthorized night flying were detected and reported.

Hearings and Appeals.—Of the 326 appeals involving grazing privileges filed during the year, more than half were disposed of by local agreements or by examiners' decisions. Twenty-three grazing cases involving 48 persons were appealed to the Secretary of the Interior during the year. The Secretary rendered 30 decisions on grazing cases during the year.

Consolidation.—During the year a chief counsel was attached to the Office of the Director to coordinate and to integrate legal matters with the Office of the Solicitor. Full cooperation was had with other agencies of the Department on a multitude of interlocking problems which required legal interpretation. The work of the Engineering, Inspection, and Safety units and the Range Surveys unit, formerly operating as field units at Salt Lake City, also was consolidated in the Office of the Director.

Funds and Personnel.—Administrative funds provided by Congress, including per diem and travel for district advisers, totaled \$800,000 for the fiscal year. Other funds allotted and contributed for soil and moisture conservation work; for construction and maintenance of range improvements; for protection against range and forest fires; for leasing of Pierce Act grazing lands, and for CCC camp operation, totaled \$2,778,329.94.

Salaried employees totaled 658 on June 30, a net decrease of 482 during the year, due primarily to abolishment of CCC camps, military furloughs, and transfers. Ninety-six employees entered military service, 46 transferred to war agencies, and others resigned to work in war production plants.

Grazing Fees.—Earned grazing fees in the 10 States totaled \$899,962.12 during the year, bringing the total so earned since 1936 to

\$4,567,456.71. Except an item of \$1,382.21 deposited to the credit of Indians in certain grazing districts, one-half of the 1942 earned fees (\$449,289.94) is shared by the 10 States in proportion to the amount users paid in those States as follows: Arizona \$25,909.48, California \$9,818.38, Colorado \$29,636.80, Idaho \$55,291.21, Montana \$33,494.08, Nevada \$80,307.22, New Mexico \$52,646.44, Oregon \$26,392.00, Utah \$69,908.40, and Wyoming \$65,885.93. To date, the States mentioned have shared in earned grazing fees to the extent of \$2,262,711.69. In turn they have contributed \$421,191.04, to be used under State laws for range development work specified by the stockmen's advisory boards. In the 1942 fiscal year \$68,621.22 was contributed for such purposes. This is commonly referred to as the 50 percent fund.

Equipment.—Much heavy CCC equipment was transferred to the Army Quartermaster and some was delivered to central repair shops. Certain units were later loaned back to the Grazing Service for fire protection and access road construction, thus placing the Grazing Service in a fairly good position with equipment to conduct pressing emergency work.

Whenever possible, travel was made by common carrier. When absolutely necessary to travel by automobile, pool trips were arranged within the Service itself and a plan worked out with other Interior Department agencies in the West for interbureau pooling of automobile travel when feasible. Strict accountability was placed on drivers and mechanics to maintain rigid inspection and upkeep standards, to reduce accidents, conserve fuel, rubber, and rolling stock.

Job Load Analysis, Audit, Inspection, and Training.—Job load analyses, based on 31 primary grazing district activities, revealed a much greater work load than the present force can possibly accomplish.

A system of proprietary accounting was installed at the beginning of the year and all business transactions of the Grazing Service were reviewed, resulting in improved fiscal and property records in the districts. Reduction of the auditor force, leaving only one such employee in the Service, slowed down this important phase of the work.

Training at CCC camps consisting of on-the-job instruction involving machinery, tools, drafting, and specialized classroom work equipped thousands of enrollees for effective front line and supply line duty. A 3-week field conference of 37 key district men featured training-in-service.

Status of Grazing Districts.—One additional district was established during the year, bringing the total to 58, with an approximate gross area of 264,600,000 acres. Vacant public land in grazing districts totalled 133,419,100 acres. Sixty-two modification orders resulted in additions to grazing districts of 1,995,000 acres and the elimination of 2,252,000 acres from districts. About 93,000 acres were added to districts by orders revoking stockdriveway withdrawals created by

other public land laws. A breakdown of grazing district areas by States is shown on table 3.

TABLE 3.—Acreages in grazing districts, June 30, 1942

State	Number of districts	Gross area	Vacant unappropriated public land	Other public land	Total administered by Grazing Service	Other land
Arizona.....	4	18,171,400	10,067,100	719,900	10,787,000	7,384,400
California.....	2	8,050,300	2,869,700	812,400	3,682,100	4,368,200
Colorado.....	8	15,903,700	7,190,200	643,600	7,833,800	8,069,900
Idaho.....	5	21,867,600	11,000,000	762,200	11,762,200	10,105,400
Montana.....	6	31,968,700	4,555,100	923,800	5,478,900	26,489,800
Nevada.....	5	48,560,200	34,466,800	549,700	35,016,500	13,543,700
New Mexico.....	7	39,747,400	14,506,200	684,400	15,190,600	24,556,800
Oregon.....	7	20,346,500	12,245,100	148,300	12,393,400	7,953,100
Utah.....	9	37,487,800	23,582,700	2,142,900	25,725,600	11,762,200
Wyoming.....	5	22,506,100	12,936,200	1,092,900	14,029,100	8,477,000
Total.....	58	264,609,700	133,419,100	8,480,100	141,899,200	122,710,500

Office of Land Utilization

LEE MUCK, Assistant to the Secretary

THE Department of the Interior is charged with the administration of a vast national estate and although about 12,000,000 acres were withdrawn for military purposes during the fiscal years 1941 and 1942, there are still under the jurisdiction of the Department approximately 275,000,000 acres in the continental United States and 350,000,000 acres in the Territory of Alaska. The condition of these lands, including the resources thereon, is highly variable, ranging all the way from open grazing areas to primeval forest and from bare desert to scenic masterpieces.

The state of extreme diversification which exists has resulted in a correspondingly wide range of aims and purposes and has created a situation which requires a high degree of coordination if a unified conservation policy is to govern the administrative management of the estate. In recognition of the necessities in this connection the Office of Land Utilization was established as a unit of the Office of the Secretary under date of April 15, 1940.

The Office of Land Utilization is charged with the responsibility of securing the cooperation of the action agencies and the correlation of their functions, programs, and activities in the field of resource management. It supervises the expenditure of departmental conservation appropriations and exercises the fiscal control incident to such supervision, including the preparation of estimates, the presentation thereof to the Bureau of the Budget and to the Congress and the allotment of funds to the bureaus and agencies concerned with soil conservation and emergency protection programs.

Activities Reoriented

Before the fiscal year 1942 had reached its median point, the Nation was shocked by the attack upon Pearl Harbor by the Japanese Imperial Government and the consequent declaration of war by the American Congress. This necessitated a reorientation of the activities of

the agencies in the Department of the Interior having control or supervision over natural resources. Fortunately the steps toward reorganization, cooperation, and correlation that had already been taken were such as to facilitate a prompt and effective meeting of the new problems encountered. Without endangering gains already made, or in any way compromising the conservation aims of the Department, the Office of Land Utilization has, during the last half of the fiscal year 1942, given first attention to directing coordinated land-management programs so as to increase timber production and to augment the quantity and quality of products from the western range lands under the administration of the Department of the Interior. Increased amounts of timber, food, minerals, and other raw materials are now flowing directly into war channels from forest, range, and other types of land under the supervision of the Department of the Interior.

In recognition of the requirements of the war emergency, action has been taken toward the restriction of developmental activities to those that are urgently essential to a maintenance of existing values and to the highest possible contribution to the effective prosecution of the war. Emphasis is being placed upon projects that will contribute directly and substantially to the accomplishment of military objectives. The funds available for forest and range purposes are being devoted primarily to the protection of existing resources, and the development of those that will serve the imperative current needs of the Nation. Many improvements that are recognized as desirable on public lands, national parks, reserves for wildlife, and Indian reservations will be deferred until after the war has been won.

Soil and Moisture Conservation Operations

The President's Reorganization Plan No. 4 transferred the functions of the Soil Conservation Service of the Department of Agriculture with respect to operations conducted on lands under the jurisdiction of the Department of the Interior to the Department of the Interior effective July 1, 1940. The transfer imposed new and enlarged obligations upon the latter Department. However, it was a logical development in the plan of the President to establish definitive fields of responsibility in Federal administration. The coordination of the soil and moisture conservation activities of the Department was assigned to the Office of Land Utilization, and field operations were placed under the direct supervision of the action agencies.

The soil and moisture conservation program of the Department of the Interior had been fully organized and was well under way by the end of the fiscal year 1941. Governing policies and procedures had

been fully laid down; practical project plans formulated and approved; and a competent technical staff placed in charge of field operations.

An appropriation of \$2,178,700 was authorized for the fiscal year 1942 and since this was only slightly less than the amount made available for the preceding year, operations were continued for the first 6 months in accordance with the plans formulated during 1941.

Promptly after Pearl Harbor, however, the soil and moisture conservation program was modified; the acreages included in project areas were reduced; and operations were restricted to those which would produce prompt results. The primary purpose of this streamlining process was to limit work to those projects which would give immediate results (1) by actually increasing livestock production, and (2) by reducing siltation, flood damage, or other adverse conditions affecting irrigation projects or strategic facilities which might adversely affect production.

Special emphasis was placed upon projects which would increase production. Range reseeding, small water developments, water spreading, vegetative gully control, and similar projects that are low in cost, and require the use of local materials, were the principal types of work engaged in during the year. Soil and moisture conservation operations such as these helped to increase the forage resources of the range without taking from industrial projects the critical materials so urgently needed in the production of equipment and facilities of primary importance in the war program.

Past conservation programs on range lands under the jurisdiction of the Department of the Interior, coupled with the simplified but highly productive program carried out in the fiscal year 1942, not only insured better and higher production of range products for war but guaranteed continued protection of the publicly owned range lands from overuse and misuse during the period of hostilities.

Close cooperation was maintained by field offices throughout the year 1942 with local soil conservation districts. A cooperative agreement for use by the land-management bureaus of the Department and local soil conservation districts was formulated. These cooperative agreements, when entered into between the bureaus of the Department and local soil conservation districts, provide for conducting correlated programs of soil and moisture conservation on public and private lands within such conservation districts. Cooperative relationships were greatly strengthened through the declaration of a joint policy by the Department of the Interior and the Department of Agriculture. This policy statement set forth the broad principles for initiating and carrying out simplified soil and moisture conservation operations on an integrated basis on both public and private lands.

Forest Conservation and Development

The forest resources under the jurisdiction of the Department of the Interior are so strategically situated and so well developed as to make substantial contributions to the prosecution of the war. These resources are in a position to furnish large volumes of essential forest products during the existing emergency, and the administrative agencies in charge of development have been so organized as to meet the substantial increase in demand which has developed. Under forest management plans devised and put into practical application by the Oregon and California Revested Lands Administration, a division of the General Land Office, and the Forestry and Grazing Division of the Office of Indian Affairs, timber cuts have been substantially increased to help fill the Nation's war demands for forest products.

Immediately following the entrance of the United States into the present conflict, the Department of the Interior set up a production goal of over 1 billion feet b. m. of timber from the Oregon and California revested lands and from Indian forests for the year 1942. Timber cutting rates were increased immediately and the sale of additional timber was authorized from both Indian lands and O. and C. lands.

During the fiscal year 1942 a total volume of 456,131,000 feet b. m., having a value of \$1,079,000, was cut from the O. and C. forests. Thus, for the first time the sustained-yield capacity of 500,000,000 feet b. m. per annum prescribed by the act of August 28, 1937 (51 Stat. 874) was approached. The volume cut during 1941 was 383,000,000 feet b. m., thereby reflecting a production increase for the year 1942 of approximately 75,000,000 feet b. m.

One hundred ninety-five new timber sale contracts on the O. and C. lands were completed during the fiscal year 1942 involving a volume of 482,271,000 feet b. m. for which the purchasers agreed to pay a total of \$1,356,820. In the previous year 172 timber sale contracts were completed, involving 493,000,000 feet b. m. and a value of \$1,095,584, reflecting an increase of approximately 25 percent in the value of the timber sold. The cost of administration and protection on the O. and C. lands for the year 1942 was \$228,000, which amount when considered with the cash receipts for that period of \$1,189,000, reflects a ratio of cost to income of about 19 percent.

The sale of timber from Indian forests was also increased substantially during the fiscal year 1942 and the income received therefrom also greatly increased. Stumpage prices were advanced on practically all timber contracts in effect and several new large contracts in the States of Oregon and Washington were executed and approved.

The total income from Indian forest and range lands during the

fiscal year ending June 30, 1942 was \$3,378,000 and the cost of administration and protection \$610,000, reflecting an operating coefficient of approximately 18 percent.

Although the production of timber from both Indian forests and O. and C. forests was increased during the year 1942, the development of these resources was conducted in full accordance with the Department's conservation policies and the legal requirements with respect to the application of the principles of sustained-yield forest management. The conservation aspects of good forest management were in no way subordinated to the development program. Thus the forests under Department of the Interior administration are meeting the demands for increased production for war without jeopardizing the forest resources under management.

Programs Related to War

In addition to conducting its regular land-management functions and activities during the fiscal year 1942, the Office of Land Utilization, in cooperation with other bureaus and agencies of the Department of the Interior, was charged with additional authority and responsibility in connection with the supervision of programs related directly to the war.

Under date of August 17, 1941, the Director of the Office of Civilian Defense, acting under a directive from the President, initiated the organization of a Facility Security program in cooperation with the departments and agencies of the Federal Government. The Facility Security program has as its objective the mobilization of existing authorities and nonmilitary forces of the Nation into a well-organized front against subversive action. It also seeks a reduction of danger from fire and other hazards of accidental origin which may possibly disrupt the war program.

The execution of the protection program for strategic resources and facilities was delegated to appropriate agencies of the Federal Government operating in the various resource and facility fields. In this connection 10 facility protection subcommittees were organized, namely: communications, air commerce, highways, railroads, public buildings, timber and related facilities, minerals and related facilities, foodstuffs and storage, power and irrigation water, and domestic water.

The forestry agencies of the Department of the Interior, in cooperation with the Forest Service, Department of Agriculture, have been charged with the prosecution of the timber security program; responsibility for the protection of minerals, including petroleum, has been delegated to the Bureau of Mines and the Office of the Petroleum Coordinator for War; and the Bureau of Reclamation, in cooperation with the Federal Power Commission, has assumed the

responsibility of protecting the power resources and irrigation facilities of the Nation. The Assistant to the Secretary of the Interior in Charge of Land Utilization was designated as the chairman of the Timber and Related Facilities Subcommittee of the Office of Civilian Defense, and acting in that capacity, and under the coordinating authority vested in him by the Department, organized the fire protection program covering the lands under the jurisdiction of the Department of the Interior.

On May 19, 1942, the President issued Executive Order No. 9165 which directed the Office of Civilian Defense to assume responsibility for the development and execution of a program of protective measures against subversive enemies. This order gave authority and impetus to the plans and programs which had already been worked out by the various facility security subcommittees of the Office of Civilian Defense. In fact, surveys had been conducted in the various facility and resource fields and action programs formulated in detail. As a result of the state of completion of the plans covering the timber and mineral fields, protection programs were ready for immediate action upon the enactment of the Sixth Supplemental National Defense Appropriation bill for 1942-43. The bill, which was signed by the President on April 28, 1942, included \$812,000 for the protection of forest, brush, and grasslands under the jurisdiction of the Department of the Interior and \$800,000 for the protection of mineral resources and facilities of the Nation including petroleum. Subsequently an additional appropriation of \$95,900 for the protection of forests was authorized in the Appropriation Act of the Department of the Interior for the fiscal year 1943.

Within a comparatively short period of time after the appropriation had been made available for the protection of forest, brush and grasslands under the jurisdiction of the Department of the Interior, funds were allotted to the action agencies by the Office of Land Utilization and detailed programs of protection formulated and approved. By the end of the fiscal year 1942 the emergency fire protection program had been fully organized, and for the first time in the history of the Department a comparatively adequate plan of protection for the resources under its jurisdiction was placed in effect.

The emergency protection funds authorized by the Congress made it possible for the Department of the Interior to greatly strengthen its protection organizations on Indian lands, the Oregon and California revested grant lands, the national parks, and the wildlife refuges. Protective measures were also provided for the unreserved and unappropriated public lands under the jurisdiction of the General Land Office. Operations in the continental United States were confined largely to lands situated within 300 miles of the eastern and western coasts and gulfs of California and Mexico by reason of the strategic

importance of these zones from the standpoint of possible attacks from the air. However, attention was also directed to areas of high hazard where accidental or incendiary fires might totally disrupt or temporarily obstruct the progress of the protection programs essential to the prosecution of the war.

Owing to the strategic importance of Alaska, special consideration was given to the large areas of forest and brush land in the interior of the Territory. Adequate funds have never been available for the protection of these vast resources. However, the Sixth Supplemental National Defense Appropriation made it possible to set aside \$200,000 for the protection of these lands and to initiate measures which would provide at least a fair degree of security.

As a part of the emergency fire protection program, plans were completed during the latter part of the fiscal year 1942 providing for the cooperation of the Civil Air Patrol in the protection from fire of forest, brush, and grasslands in the continental United States. The establishment of this service greatly strengthened the programs of the protection agencies and made the Civil Air Patrol available to these agencies for fire detection and the transportation of men and supplies to fires in inaccessible areas. The details of the plan were worked out by the Civil Air Patrol in cooperation with the United States Forest Service, Department of Agriculture, and the Office of Land Utilization and the protection agencies of the Department of the Interior.

The emergency fire protection program of the Nation was further strengthened by the establishment of the Forest Fire Fighters Service by the Office of Civilian Defense in cooperation with the forestry agencies of the Department of the Interior and the Department of Agriculture. The purpose of the organization is to safeguard forest lands and other related facilities and resources and to aid in the prevention and suppression of fires which might endanger such facilities or resources. The Forest Fire Fighters Service cooperates with the Department of the Interior, the Department of Agriculture, State forestry officials and private forest protection organizations in mobilizing the manpower necessary to safeguard forest resources. The organization is being trained by specialists of the various agencies under which they will operate wherever increased manpower is essential for adequate protection. It will assist materially in providing the protection agencies of the Nation with trained manpower.

Another program of outstanding importance to the prosecution of the war, with which the Office of Land Utilization was directly concerned during the fiscal year 1942, was the relocation of Japanese evacuees from the West Coast areas upon lands under the jurisdiction of the Department of the Interior. The Office of Indian Affairs, the Bureau of Reclamation and the Office of Land Utilization cooperated effectively with the War Relocation Authority from the inception of

this undertaking and large numbers of evacuees were relocated upon Department of the Interior lands in Arizona and Oregon. Several other projects for the relocation of evacuees were under consideration at the close of the year and the working out of cooperative agreements and land-use permits by the War Relocation Authority and the Department of the Interior were in process. It is expected that the responsibilities assumed by the Department of the Interior agencies in this connection will be continued for the duration of the war.

National Park Service

NEWTON B. DRURY, Director

THE fact that the Nation is at war and that all resources, material and spiritual, must be mobilized for victory has altered the immediate program of the National Park Service but has given added meaning to its ultimate objectives.

Visitation has declined, many activities have been curtailed or deferred, and the Service has faced the necessity of adapting itself to rapidly changing conditions. It has been possible to give direct aid to the war program through properties and personnel. Uses of park areas not contemplated in peacetime are being undertaken, even to the point of sacrifice of park values where clearly necessary and with no alternative, as part of the cost of victory.

At the same time the stress of war has compelled the Service to take stock of its primary functions and responsibilities. As trustee for many of the great things of America—areas of outstanding natural beauty, scientific interest, and historical significance—the National Park Service has realized its obligation to harmonize its activities with those relating to the war, aiding wherever possible, and striving to hold intact those things entrusted to it—the properties themselves, the basic organization trained to perform its tasks, and, most important of all, the uniquely American concept under which the national parks are preserved inviolate for the present and future benefit of all of our people.

In war, no less than in peace, the national parks and allied areas have served as havens of refuge for those fortunate enough to be able to visit them. Providing an environment that tends to give relief from the tension of a warring world, the parks are being looked upon as a factor in a program of rehabilitation, physical and mental, that will be increasingly necessary as the war progresses. In the past 12 months, July 1, 1941, to June 30, 1942, approximately 650,000 members of the armed forces have visited the parks. Even though the demands of war may sharply curtail use by the civilian population for a time, Americans will still take pride and courage in the fact that this part of their cultural heritage is being preserved for future enjoyment.

The wisdom of the Nation in preserving these areas is clearly evident on the American continent today as increased demands upon our natural resources are invading and forever changing the native landscape. The national parks and monuments may soon be among the few places in the world where forests continue to evolve normally, where animal life remains in harmonious relationship to its environment, and where the ways of Nature and its works may still be studied in the original design.

War Activities of the National Park Service

On December 16, 1941, the Secretary of the Interior called upon all bureaus of the Department for "full mobilization of the Nation's natural resources for war . . . upon a basis best suited to serve our military and naval forces without waste, and with a view to saving all that we can of such resources for future generations."

The National Park Service has responded to that call, doing those things that came within its functions, endeavoring meanwhile to perform its established tasks, and not looking upon the war program as an opportunity to expand.

In all, 125 permits have been issued by the Department of the Interior to the War and Navy Departments and war agencies to make use of National Park Service lands, buildings, and facilities. These permits have ranged from the installation of direction finders along the coastal areas to the complete assignment during the war period of two national monuments—Fort Pulaski in Georgia and Cabrillo in California. The extent and nature of most of these permits of necessity is confidential.

The Paradise section of Mount Rainier National Park was used last winter for training troops in mountain warfare.

At Boulder Dam National Recreational Area, lands for an airport, rifle range, recreational development, and rights-of-way for water lines to serve the Defense Plant Corporation with water from Lake Mead for the operation of a vital magnesium project were turned over to the Army, Navy, and war production agencies. Temporary emergency permission was given to the Defense Plant Corporation for the removal of salt, necessary in the production of magnesium, from Death Valley National Monument.

The Chickamauga and Chattanooga National Military Park now accommodates a large Army recreation camp; it also is a training center for the Provost Marshal of the United States Army.

To assist the War Production Board, approximately 40 Service employees were assigned to a pig-iron survey in about 900 foundries located in New York, Pennsylvania, Ohio, Michigan, Illinois, and Wisconsin.

Immediate steps were taken after the declaration of war to establish fire-lookout and air-raid-warning towers in forested areas and to provide trained crews to combat forest fires and man lookout and patrol stations. Arrangements have been made whereby the observers cooperate with the designated authorities in spotting and reporting airplanes. The Service has taken part in the formation of emergency fire organizations in the Pacific Coast States and Montana. Fire schools were conducted throughout the park system for training instructors in forest and building fire suppression, control of incendiary bombs, defense against sabotage and other war hazards, law enforcement, protection of visitors, and conduct of operations under war conditions. Emergency organization plans have been developed in each park area.

First-aid courses and ambulance service training have been given in practically all areas of the National Park Service. Hospital supplies from Yosemite and Sequoia National Parks were made available to hospitals in the San Joaquin Valley to accommodate patients that were moved from the San Francisco hospitals required for the sick and wounded from Pearl Harbor.

There have been numerous instances throughout the National Park System where the Service personnel were the only sources of authentic information and Government-owned lands, buildings, and equipment were the only readily available facilities. In many small towns and isolated areas Service buildings were used as headquarters by the Selective Service System, Office of Civilian Defense, Aircraft Warning Service, rationing boards, and other public organizations. Direct assistance has been given and is being given to the Army, Navy, Marine Corps, and Coast Guard personnel in providing quarters, bivouacking for troops on maneuvers, and furnishing equipment and supplies that are often required. The knowledge that Service personnel have of the areas under their administration is constantly sought by military authorities. The Army has requested Service landscape architects, engineers, and field men to assist in locating gun emplacements and effectively camouflaging them, and in reporting weather data, condition of roads and trails, and accessibility of mountain and densely forested areas.

Army Rest Camps

Early in the spring of 1941 the Army recognized the desirability of providing inexpensive facilities in areas which would be available for use by soldiers on leave or which could be used for a week or two at a time to give men relief from the training grind. Field technicians of the National Park Service were called upon to assist in planning and directing our CCC forces in the construction of Army rest camps.

As the first six camps approached completion, a steadily increasing number of locations were considered and designated by the Army, most of them in or near centers of population and one on the Lake of the Ozarks Recreational Demonstration Area in Missouri. Thirty-three camps with a capacity of approximately 20,000 men were constructed in 23 States and the District of Columbia.

Rest and Relaxation for British Sailors

When the American shipyards were thrown open to the British Navy, the British Advisory Repair Mission was faced with the problem of making provision for the crews of these vessels that would permit the sailors to get away from the sea for as complete a change of scene as possible. The group-camping facilities in the recreational demonstration areas and five vacant CCC camps were offered to the British Navy through the United States Navy. These areas have been used by approximately 10,000 British sailors who have been accommodated in them for periods ranging from 3 days to 10 weeks.

Recently the National Park Service has been called upon to supply or arrange for additional temporary housing for British crews. In addition to the use being made of the recreational demonstration areas, the Service has been able to transfer strategically located CCC camps to the United States Navy for this purpose.

War Use of Park Areas in the Nation's Capital

Adaptation to wartime conditions has been a matter of principal concern to the District of Columbia and the National Capital Parks during the fiscal year. Not only has military occupancy of some park areas been arranged, but it has been necessary to construct temporary war buildings in the Mall, West Potomac Park, the President's Park, the Washington Monument Grounds, and the George Washington Memorial Parkway.

The result of this military need was the withdrawal from public use of approximately 30 percent of the major recreational facilities of the National Capital Parks. The replacement of these facilities at other locations is gradually being accomplished to meet the needs of the increasing population of the Nation's Capital.

Fort Washington, Md., and Fort Hunt, Va., were taken over by the War Department, and the protection of the Washington water supply necessitated closing to public use certain sections of the Chesapeake & Ohio Canal.

Travel to the National Park Areas

Although the National Park Service is accustomed to reporting large annual increases in travel, this year's figures show a decrease of 30 percent from last year, and travel for the month of June 1942, as compared to June 1941, showed a 50 percent decrease. However, an impressive total of approximately 16,030,000 visitors, including an estimated 650,000 members of the armed forces, visited the Federal park areas between July 1, 1941, and June 30, 1942, approximately 4,000,000 of whom were visitors after December 1941. The rubber and gasoline shortages, the need of conserving transportation equipment for use by the military and war agencies, and the limited vacations of workers in war industries made advisable the curtailment of promotion of park attendance not only by the National Park Service but also to a large extent by the park operators. Two meetings of representatives of the park operators were held with the Director after the declaration of war. Insofar as was consistent with the changing war program and the position taken by higher authority, it was agreed that the parks would remain open and public-service facilities would be made available to provide accommodations for the people who are able to visit the parks. Special reduced rates were continued in effect for members of the armed forces. The park superintendents were delegated authority to adjust rates and services to meet the rapidly changing war conditions.

Analysis of the travel figures since the outbreak of war shows that while the number of visitors decreased the per capita day use of park areas increased. Most of the people who were able to visit the parks and monuments remained for a longer period than in previous years.

In accordance with orders from the Office of Defense Transportation, all sightseeing and charter bus service was brought to a close in the national parks and monuments. Transportation from rail and bus terminals to established destinations such as the hotels and lodges within the parks has been maintained.

Visitation to Hawaii National Park, Hawaii, and Mount McKinley National Park, Alaska, was stopped by the outbreak of the war. The superintendents of those areas and their staffs, however, continued to protect them, to assist with local civilian defense programs, and to make park features available to the members of the armed forces and civilians in the vicinity.

National Park Concessions, Inc., the nonprofit distributing corporation authorized by the Secretary of the Interior in 1941 to operate public facilities at Mammoth Cave National Park, Ky., completed a year of successful operations. One concession unit was established on the Blue Ridge Parkway and plans are being made for the post-war

operation of facilities by this corporation along the entire length of the parkway.

Travel Bureau Operates on War Basis

The program of the Travel Bureau—established by Congress in 1940 and placed under the supervision of the National Park Service—was revised to eliminate promotion of travel. The field offices in New York and San Francisco were closed. A small force is continuing in Washington to serve as a liaison agency in supplying essential information to the travel industry, to war agencies, and to the public. The travel interests of the country, in collaboration with the Bureau, set up the North American Travel Conference, the keynote for which was the utilization of available recreational travel facilities to keep war workers and the public fit for their patriotic duties. This conference first promoted the idea of staggered vacations which later was established as an official policy. Through the Interdepartmental Committee in Cooperation with the American Republics in forwarding the Good Neighbor Policy, and under an allotment of \$25,000 from that committee, the Travel Bureau, assisted by the Photographic Section of the Division of Information, scored 12 reels of film in Spanish and Portuguese for distribution by the State Department to the American Republics.

Problems of Protection Growing Out of the War

In connection with the war program there have arisen proposals to open national park areas to lumbering, mining, grazing, and other commercial exploitation. These present a problem of major importance. The National Park Service is aware that the cost of victory in this war is going to be high and that our natural resources are going to be called upon more and more to meet the shortages in available strategic materials. It is the responsibility of this Service to measure the degree to which the justified needs of the Nation require destruction of irreplaceable national park values and to recommend accordingly. Inconvenience to park administration and to park visitors or remediable damage to park property have not been considered sufficient reasons for questioning the use of park resources for war purposes. Only where uses proposed would do irreparable damage and entail destruction or impairment of distinctive features and qualities in the parks have we felt justified in raising the question as to whether all reasonable alternatives have been exhausted before invading the national park areas. Critical necessity rather than convenience should, we believe, be the governing reason.

This test applies, for instance, to such proposals as that for the logging of airplane spruce in Olympic National Park. The shortage of Sitka spruce for airplane manufacture is recognized as a direct threat to perpetuation of these forests in Olympic National Park. This area has served its highest public use by preserving for the enjoyment of future generations a representative remnant of the vast virgin forests that once were the glory of the Pacific Northwest. Once gone, an outstanding natural spectacle is lost to America forever. The consensus of conservation leaders is that none of the virgin forest in this park should be cut unless the trees are absolutely essential to the prosecution of the war, with no alternative, and only as a last resort. Other spruce should first be used. Supplies from Alaska and from Washington and Oregon are being made available for this purpose, and the Service is cooperating in the provision of some airplane spruce by modifying the taking lines of the Coastal Strip and the Queets Corridor Parkway adjoining Olympic National Park. The Service is following the situation closely, and at each turn of the war program we shall take a position dictated by paramount national need.

Similarly with proposals to mine strategic minerals in the national parks and monuments, the position has been taken that invasion of a national park by mining can be justified only to furnish strategic or critical minerals indispensable to the war and not obtainable elsewhere. In general, studies indicate that strategic minerals are not present in national park areas in sufficient quantities to be of economic importance, but the Service, in collaboration with the Geological Survey, stands ready to aid in determination of the Nation's highest interest in the matter of sacrifices necessary to provide war materials.

The long-range departmental policy of eventually eliminating grazing from all national parks and monuments has been reaffirmed. Land-management studies prove that a small acreage of cultivated pasture is equal to many thousand acres of mountain grazing. The ruinous erosion caused by overgrazing and the spoiling of mountain meadows and streams and serious conflicts with recreational use—all are ample justification for not permitting grazing within the national parks and monuments. Destruction to roads, trails, and improvements by trampling, and the expense of developing water, fences, and other facilities would render such proposed grazing uneconomical; therefore, it has been held that any extension of grazing in aid of the demands caused by the war should be made only after all other possibilities have been exhausted.

In these and other cases where destructive uses of national park lands are proposed for war purposes the Service does not take a hide-

bound position, but rather one of full attempt to cooperate with the military authorities in determining whether the need is critical for the Nation or merely convenient for some individual operation, and whether the need can be met expeditiously somewhere else without destruction of the qualities of the national parks.

Protection of Cultural Resources

Through representation on the President's Committee on the Conservation of Cultural Resources; by surveying and recording materials of cultural, scientific, and historic importance in its possession; by storing irreplaceable items at places which are considered safer than their original repositories; and in the preparation of the handbook issued by the committee, chapter 4 of which on the protection of historic buildings is almost entirely the work of members of our staff, the National Park Service has aided this important phase of civilian defense.

Members of our staff are alert and prepared to protect historical, scientific, and other irreplaceable exhibits that have been entrusted to our care. The Service has cooperated with Federal, State, and local agencies and has worked with the Committee on the Conservation of Cultural Resources, the Office of Civilian Defense, and the Public Buildings Administration in developing plans for the protection of historic buildings and cultural materials.

Public Use of Historic Sites

In recognition of the fact that a nation without physical reminders of its past heroism and military exploits would have little enduring national pride, the Service not only kept its historical areas open as in normal times, but also lengthened the hours of visitation and extended and improved its interpretive programs. Close proximity of these areas to Army and Navy centers provided many soldiers, sailors, and marines with opportunities for recreation and patriotic stimulation, and special programs were arranged for them by National Park Service personnel.

Much was done to perfect and intensify the basic contribution of the historical and military parks to the strengthening of morale. Special theme studies were undertaken to redefine and fortify the National Park Service interpretation of the great movements and crises of American history. Interpretive statements were reexamined and in many cases revised to show how each historical area is an integral part of the theme of the building of America.

On Guard in the Nation's Forests

The agencies in charge of the Nation's forests face perhaps the most critical fire season in history. The National Park Service is cooperating closely with the U. S. Forest Service and with State and conservation agencies. Acute threats of sabotage and incendiarism increase the normal protection problem—always a serious one—and it is further intensified by reduction in available manpower for prevention and suppression activities.

The loss of the Civilian Conservation Corps on June 30 and the withdrawal from the forested areas of large numbers of trained fire fighters seriously complicated the fire-protection program. Immediate steps were taken to locate sources of local labor and to train every available Service employee in the essential elements of combating forest fires.

Civilian public service camps, composed of conscientious objectors, were able to do effective work in combating a large forest fire in the vicinity of the Blue Ridge Parkway. Plans of the Selective Service System for locating additional camps of this type in forested areas are under way.

During the 1941 season, lightning caused more fires than in any single year of record—over one-third of the 540 forest fires reported in the parks. A total of 3,788 acres of forest and brush lands were burned throughout the entire system. In addition, 25,000 acres of grassland in the Lava Beds National Monument were burned over by lightning-caused fires.

Although fires started by careless smokers continue to be the most prevalent of the human causes of forest fires in the national parks, the intensified fire-prevention program has given encouraging results in that the total number of preventable man-caused fires has not increased in proportion to park use.

Measured by acres, the park forests represent a relatively small part of the forested area of the United States and its Territories. Nevertheless, aside from the aesthetic value, strategic location makes them of great significance to the Nation. Situated primarily on mountain slopes and in high country, their preservation is essential to the protection of watersheds vital to water supply, agriculture, and power.

Protection Against Forest Insects and Diseases

The forest insect situation in the National Park System is favorable because of thoroughness of previous intensive control programs. A few limited outbreaks still require control work. Continual vigilance, moreover, must be exercised to assure recognition of epidemics at an early stage. Regular surveys and prompt control of infestations are of

greater importance now than in normal times because of limited manpower available.

The white pine blister rust continues to spread among the five-needle pines. Over a third of a million acres of pine forests in the national park areas warrant intensive control work. The program was accelerated during the past year through appropriation of special funds. Complete control work has been carried out on 66,793 acres.

Loss of Civilian Conservation Corps Camps

Reduction of the Civilian Conservation Corps during 1942 and its abolishment in the 1943 fiscal year as a wartime economy measure caused the National Park Service a serious loss of manpower. Since 1933 the Service has depended to a large extent upon the CCC for men to fight forest fires, maintain trails, install recreational facilities, and carry on general measures of conservation and protection. Rapid reorganization of regular Service personnel has been necessary to establish the basis on which many of these protective functions will be conducted in the future.

The number of CCC camps under the technical supervision of this Service was reduced from 262 in July 1941 to 91 by June 30, 1942. Throughout the year as camps were required they were assigned to Army and Navy areas. In the Hawaiian Islands, the corps as a whole was allocated to war projects. The St. Thomas camp in the Virgin Islands was discontinued early in the year as defense work provided employment for all available youth.

By the end of July 1942, all of the CCC camps will be terminated, bringing to a close a 9-year cooperative program that has been of inestimable value in park development and protection. Although this will be reported upon in the 1943 report, we now salute the CCC and acknowledge the aid the National Park Service has received from CCC activities throughout the Nation.

Construction Work Deferred

Along with other civilian agencies of the Federal Government the National Park Service has virtually halted all construction and development for the duration of the war. New work was deferred and reductions were being made even before mandatory restrictions were issued by the War Production Board. Many members of the staff engaged in planning and construction joined the armed forces or war agencies. The Service has made its shift to a war basis for the duration with little difficulty.

The suspension of construction activities affords an excellent opportunity for careful and thorough formulation of plans for future work.

A nucleus of the planning branches is being retained in each of the regional headquarters and the Director's office. The first call on the services of these employees will be to meet emergency conditions that arise. The remainder of their time will be devoted to a "plans-on-the-shelf" program, which the Service has been instructed to prepare. This should prove to be an important element in any accelerated building program that may be decided upon to take up the slack in employment that may well be anticipated at the end of the war. It will also assure mature and sound plans for any future program of development. The benefit of a "breathing spell" in the matter of construction and development is recognized by the Service.

Parkways

The National Park Service and Public Roads Administration are drafting a long-range plan for resuming development of the Blue Ridge and the Natchez Trace Parkways after the war. The Blue Ridge Parkway ultimately will connect the Shenandoah National Park in Virginia and the Great Smoky Mountains National Park in North Carolina and Tennessee, a distance of 484 miles. Appropriations and allotments to date for the Blue Ridge Parkway have totaled \$24,518,047.33, and more than two-thirds of the total mileage has been completed, with one continuous stretch of bituminous surfaced road between Adney Gap, near Roanoke, Va., and Deep Gap, near Blowing Rock, N. C., a distance of 150 miles.

On the Natchez Trace Parkway, which follows the general location of the Old Indian Trail between Nashville, Tenn., and Natchez, Miss., known as the "Natchez Trace," some work is being completed under contracts issued prior to the war, and as the present construction draws to a close 37 miles have been graded and surfaced out of a total of 454 miles, and 83 additional miles have been graded.

Master Plans

As a basis for the planning program of the national park and monument areas, a Master Plan Manual was issued for the guidance of administrative and professional employees of the Service. The Master Plan is the controlling document which governs the orderly development of all areas administered by the National Park Service. Its purpose is to assure the soundness of that development and coordinate the thought and effort of all persons engaged in establishing the policies which govern an area's preservation, interpretation, administration, and operation. During the 1942 fiscal year, the Service brought to completion and approval master plans for all 166 units of the National Park System. Based on these, development

programs were submitted to the National Resources Planning Board as a basis of the 6-year advance plan and program of Public Works construction submitted annually.

Interpretation

An "inventory of values" describing the outstanding features of each area and defining the significance of those features in relation to human experience has been prepared for many of the natural and historical areas of the Service. These inventories are the result of the collaboration and research of various technicians, and serve as the interpretive statements for each area. They are of particular importance in the master-planning program.

Soldiers, sailors, war workers, and civilian visitors to the national parks and monuments were given an opportunity to gain a deeper understanding of the inspirational, historical, and educational significance of these areas through the guided trips and illustrated talks given by the naturalists and historians, and the field museums operated by the Service.

Interpretive activities were cut to a war pattern. Guided trips calling for the use of private cars (frequently referred to as "caravan" trips) were practically eliminated, and scheduled hiking trips substituted. The Yosemite School of Field Natural History, which for many years served as a training ground for naturalists, and the Yosemite Junior Nature School were discontinued for the period of the war.

Many technical, semitechnical, and popular publications and periodicals were postponed or suspended indefinitely to avoid use of paper and printing facilities needed for emergency work and to make possible personnel reductions. The preparation of a series of radio programs was abandoned, as were the monthly "clip sheets" dealing with phases of conservation in popular vein.

Museums

Museum exhibits have been directed toward the primary value of each area in strengthening patriotic thought. One typical exhibit, "What We Fight For," was installed at the historical museum at Morristown National Historical Park. It presented in graphic form the ideals of freedom of worship and freedom of speech as exemplified by George Washington.

The Western Museum Laboratories in California closed upon termination of Work Projects Administration programs, and the preparation of museum exhibits has been curtailed throughout the Service.

Among the acquisitions of scientific and historical materials were

the Wirt Robinson Indian Collection which was installed in the museum on Jamestown Island section of Colonial National Historical Park, and the John Nelson Collection of objects relating to the prehistoric Indians who lived in the vicinity and visited the Mammoth Cave, which were gathered over a long period of years by John Nelson, a former cave guide, and were purchased by the Mammoth Cave National Park Association and donated to the park. They will form the basis for an interpretive museum exhibit and study material.

The Advisory Board

The Advisory Board on National Parks, Historic Sites, Buildings, and Monuments met twice during the year to consider policies involved in the preservation and use of national park and monument areas during the war. The interest of this Board and their helpful recommendations to the Secretary are of great value to the Service. The members are: Edmund H. Abrahams, chairman; Dr. Clark Wissler, vice chairman; Dr. Frank M. Setzler, Secretary; and Dr. Thomas Barbour, Dr. Herbert E. Bolton, Mrs. Reau Folk, George deBenneville Keim, Dr. Fiske Kimball, Dr. Waldo G. Leland, Richard Lieber, and Charles G. Sauers.

Archeology

The National Park Service in collaboration with the Bureau of Reclamation, Office of Indian Affairs, Tennessee Valley Authority, and Work Projects Administration reviewed, investigated, and conducted many important archeological studies. Typical of these was the archeological reconnaissance and obtaining of scientific data relating to the little-known period of cave habitation belonging to the early Basket Maker development from the Yampa and Green River drainage basins in Dinosaur National Monument, soon to be inundated by project dams and reservoirs, and, also, the salvaging of important archeological data and collections at Mancos Canyon, near Mesa Verde National Park. By the end of the fiscal year, archeological programs under the Work Projects Administration on which this Service and the Smithsonian Institution have given technical review were greatly reduced, and all excavations on national park areas were brought to a close.

Wildlife Conservation

The National Park Service continued its cooperative relationships with the Fish and Wildlife Service on important wildlife problems. Recognizing that the sight of animals, large and small, in their natural

habitat is an integral part of the American scene as exemplified in the national parks, efforts were directed toward wildlife management in its broad phases.

During the past year wildlife experts recommended reductions in the number of so-called "big game" and the fur-bearing animals, in order to relieve overpopulation of the range and guard against deterioration of these animals through starvation and disease that accompany continuously overstocked ranges.

The greatest problems occurred in Yellowstone National Park, which contains the largest mammal population of any unit in the system. Although the winter range which is shared by elk, deer, antelopes, and bighorn showed some improvement, this was due primarily to weather conditions, particularly mild winters that made it possible for the big animals to graze in the high country, thus relieving the regular winter range of its usual grazing burden. To prevent further jeopardy of the range, and guard against wildlife disaster in an unexpectedly severe winter, it is necessary to reduce the large existing elk surplus and maintain the herd at less than carrying capacity until the range has fully recovered.

A too-large bison population is another Yellowstone problem. During the year a program was inaugurated for reduction of the Lamar bison herd leading to its eventual establishment on a self-sustaining basis. In all, 183 bison were disposed of to Indians, relief agencies, and the San Rafael Grazing District, Utah.

Elk, deer, and beaver in other areas were reduced, some being used for stocking purposes on non-Federal areas.

A comprehensive analysis of grazing by saddle stock in Kings Canyon National Park was prepared as a basis for a protective program for meadows and open areas and to insure proper watershed and wildlife forage.

To assist in rendering the Hawaiian Islands as nearly self-sustaining as possible, grazing was authorized on Hawaii National Park lands found adaptable therefor.

Fish Conservation

Heavy plantings of fish were continued, with the release of 22 million fish (eggs, fry, fingerlings, etc.) in waters of 20 park areas. Most of the planting stock was supplied by Fish and Wildlife Service hatcheries. Rearing pools were operated by the National Park Service in Great Smoky Mountains, Rocky Mountain, and Sequoia National Parks.

A uniform series of cooperative agreements was entered into between the Service and the California Division of Fish and Game governing fish-stocking procedure for each of the national parks in California.

In addition to these annual agreements, a general policy agreement was reached between the National Park Service, Fish and Wildlife Service, and California Division of Fish and Game.

Soil and Moisture Conservation

In accordance with the program of the Department's Office of Land Utilization, much important work was accomplished in soil and moisture conservation, particularly in the Southwest.

The engineering laboratory of the Service made soils and building material analyses. Architectural concrete researches were made to determine effect and weathering qualities of integral colored pigments and surface stains of importance in camouflage. Continued assistance was given the Bureau of Yards and Docks of the Navy Department, both in performance of tests and in the use of laboratory facilities by naval personnel. In collaboration with the National Bureau of Standards, further investigations were made of cement-stabilized soils.

Sanitation and Safety Precautions

Close cooperation was continued with the Public Health Service in maintaining proper sanitation conditions throughout the National Park System. Sanitary engineers of the Public Health Service inspected water supplies, sewerage and sewage disposal, garbage disposal, camp and picnic grounds, swimming pools, and food-handling places throughout the system. No critical problems of sanitation arose.

In-Service training courses in fire-protection engineering were given groups of selected engineers and architects, to familiarize the personnel with the principles and safe practices of fire protection as they apply to the design, construction, and operation of building and auxiliary equipment.

The trend of employee accidents continued downward, with a reduction of more than 70 percent in the compensation costs for employee injuries since the establishment of a safety unit in the National Park Service in 1937. This record is especially noteworthy since for the 5 years preceding 1937 there was a rising trend of employee injury costs.

Cooperation in State Park and Related Development

Early in 1942 the Service published its report on A Study of the Park and Recreation Problem of the United States which was based to a considerable extent upon information obtained through the various

State park, parkway, and recreational area studies. Its greatest value will be in planning future programs, especially during the post-war period.

The total of State reports was increased to 36 with the completion of those for Vermont and West Virginia.

Regional park and recreation studies of New England and the Central Southeast, launched in the preceding year, were suspended for the duration. A long-range study of the recreational resources of the Denison Dam, Texas and Oklahoma, was initiated under a special congressional appropriation. The 1940 quinquennial survey of county and municipal parks, conducted in cooperation with the National Recreation Association and the American Institute of Park Executives, was completed.

The reduction in the number of Civilian Conservation Corps camps throughout the year, and the redirection of CCC work to activities contributing directly to the protection of vital resources and to the military effort, resulted in virtual elimination of State, county, and metropolitan park projects.

All States that had benefited from this cooperative enterprise were advised, in anticipation of some form of Federal assistance when the war is ended, to work along three main lines: (1) perfection of their administrative and technical organizations; (2) building up their land ownership, particularly to round out existing parks; and, (3) continued preparation of adequate plans for future development.

Drainage Basin Activities

An important part of the Service's cooperative planning work during the year was the study of the recreational resources of the various drainage basins throughout the country. This is a part of the continuing program of drainage basin studies carried on by Federal, State, and local authorities under general auspices of the National Resources Planning Board.

Contributions of planning advice through regular attendance at drainage basin meetings were made in connection with the current studies in a number of other basins throughout the country. Despite loss of personnel Service representation continued on all drainage basin committees.

A plan for the utilization of the recreational resources created by development of the Grand Coulee Reservoir in the State of Washington was completed and turned over to the Bureau of Reclamation. The work was done at the request of that bureau as a part of the complete analysis of the project's resources and possibilities. A start was made on similar planning for the Central Valley project in California.

In cooperation with the Bureau of Reclamation, as a part of the studies to formulate a comprehensive plan for the utilization of the resources of the Colorado River Basin, a recreational survey was in progress throughout the year. Special emphasis was placed upon the most vital water conservation possibilities, suggested by the Bureau of Reclamation at points along the Colorado and Green Rivers.

International Cooperation in Conservation

Of significance in the preservation of the natural attributes of the Americas is the Convention on Nature and Wildlife Protection in the Western Hemisphere.

The necessary number of Governments ratified the convention during the past year, and it came into force on April 30, 1942. The treaty establishes conservation principles that will be of great value in preserving the natural conditions, birds, and animals of the Western Hemisphere.

The National Park Service has exchanged information with the Cultural Relations Division of the State Department and the Hispanic Foundation of the Library of Congress concerning legislation, classification, protection, and treatment of historic sites. Representatives of Brazil, Peru, Colombia, and Guatemala visited Washington and a number of the national parks to study park operation, stabilization methods, legislation and administrative methods used, and archeological conservation.

Great Britain now is making plans for nature preservation in its post-war construction, through its municipal corporations and scientific societies.

At meetings in Mexico City, representatives of the United States and Mexico made recommendations to carry out the act of August 18, 1941, authorizing the establishment of the Coronado International Memorial on the international boundary between the States of Arizona and Sonora.

Additions to the National Park System

One new national monument was established during the past year, bringing the total number of units of the National Park System to 166. This new unit and additions to existing units increased the total area of the system to 21,686,029 acres.

The Andrew Johnson National Monument, with a total area of 17 acres, was established by Presidential proclamation of April 27, 1942, pursuant to the act of August 25, 1935. The State of Tennessee donated the Andrew Johnson Tailor Shop property at Greeneville, where the former President engaged in his trade from 1826 to 1843;

the War Department transferred the Andrew Johnson National Cemetery; and the Andrew Johnson Homestead was purchased, bringing together the essential properties for establishment of the monument.

Additions were made to 25 existing units through the purchase of 2,503 acres; the acquisition by donation of 4,285 acres; and the transfer of 28,608 acres already in Government ownership.

Progress of National Park Projects

Consummation of several major national park projects appeared possible at the close of the year, and good progress on several others can be reported.

The Big Bend National Park project, launched in Texas over 10 years ago and authorized by the act of June 20, 1935, approached successful conclusion as the State of Texas acquired title to more than 600,000 acres of land within the proposed park boundaries. Additional purchases are expected to bring the total to approximately 710,000 acres by September 1, after which no further expenditures can be made against the \$1,500,000 appropriated by the State legislature for that purpose. Land acquisition was handled by the Texas State Park Board. The Republic of Mexico plans to establish eventually a similar national park on the opposite side of the Rio Grande. The two will form an international park on our southern boundary similar to the Waterton-Glacier International Peace Park on the Canada-United States boundary.

The Everglades National Park project was authorized by act of May 30, 1934. Negotiations with the State of Florida were continued, and considerable progress was made during the past year to formulate plans to exchange miscellaneous State lands for privately owned lands within the project boundaries, and the eventual transfer of the lands to the Federal Government. The Governor of Florida has evinced wholehearted interest in this projected park.

Coronado International Memorial, Arizona.—By act of August 18, 1941, the Congress authorized the establishment of a memorial in Arizona to commemorate the explorations of Francisco Vasquez de Coronado. An area of 2,880 acres of land adjoining the international boundary and located about 10 miles west of the town of Naco has been selected for this purpose. The act provides that a Presidential proclamation establishing the memorial shall be issued when the Government of Mexico has established, or provided for the establishment of, an adjoining area of similar type and size in the State of Sonora.

At a conference held in Mexico City in June attended by representatives of the United States Government and Arizona and of the Government of Mexico arrangements were made to survey the area proposed for the memorial in the State of Sonora so that a decree

can be issued by the President of Mexico establishing it as the Coronado International Memorial Park. The uses, functions, development, and administration of the Coronado International Memorial, comprising areas on each side of the international boundary, also were outlined at the conference. This international memorial, when established, will symbolize the unity existing between Mexico and the United States.

Cumberland Gap National Historical Park project, Kentucky, Tennessee, and Virginia, was authorized by act of June 11, 1940. A recent appropriation for land acquisition by the Kentucky Legislature of \$150,000 brought this project nearer realization. The State of Tennessee had previously appropriated \$75,000 with which to acquire its portion of the tri-State area. Virginia has completed its surveys and options with funds allocated for the purpose and has indicated that \$75,000 will be forthcoming with which to exercise the options.

Cape Hatteras National Seashore Recreational Area project, North Carolina, was authorized by act of August 17, 1937, and redesignated by the act of June 29, 1940. During the past year the Cape Hatteras Seashore Commission has been successful in securing more than 7,000 acres, mostly in lands belonging to the State and to Dare County, for conveyance to the Federal Government. At least 10,000 acres must be acquired before the area, which will include the existing Kill Devil Hill Memorial National Monument, Fort Raleigh National Historic Site, and Cape Hatteras Lighthouse, can be established.

Saratoga National Historical Park project, New York, was authorized by act of June 1, 1938. Title to most of the area was conveyed to the United States by the State of New York in 1941. Options have been obtained on more than one-half of the remaining lands which must be acquired before the park can be formally established.

Encouraging as are the foregoing gains, the Service realizes that effective means have not yet been found to save some unique areas that are worthy of preservation, the status of which is critical. The Tensas River forest in Madison Parish, La., and the Porcupine Mountains forest in northern Michigan are typical examples. In both areas there are priceless remnants of virgin forest in imminent danger of destruction, and there are rare wildlife species which must have adequate sanctuary if they are to survive. The Service is aware, also, of the continuing deterioration of the values in some of its authorized projects, where no systematic program of national park land acquisition has been authorized. Likewise, little progress has been made in the vital matter of acquiring private inholdings in the established national parks and monuments. In the Joshua Tree National Monument, for instance, the private-land situation is such that it prevents the proper development of the monument for public use or the adequate protection of the plant species for which the area is named.

Reappraisal of Objectives and Classification of Areas

World War II brought to a close a 9-year period of park development that was one of the outstanding phases of the peacetime conservation and employment programs. This finds the National Park Service with enlarged responsibilities and functions. The national park areas now number 166, contain almost 22,000,000 acres, and were visited during the past 5 years by an average of approximately 17 million people annually. To the 26 areas designated by the Congress as "national parks" there have been added other types—national monuments, historical parks, military parks, historic sites, parkways, and recreational areas. Under the CCC, the Historic Sites Survey, and the Park, Parkway, and Recreational Area Study, there has been a widespread program of cooperation with the States. This has of necessity called for more complicated organization, greater personnel, and new policies to meet varying situations and needs. The Service during the past year, therefore, has thought it appropriate to analyze its position, and to redefine and clarify its objectives in the light of changed conditions.

Many members of the Washington Office staff and representatives from the field have collaborated in preparing a statement of objectives. This takes into account the increased complexity of the Service's activities as a result of the emergency program, the added functions that by congressional and executive action it has been asked to assume, and the new types of areas that it has been called upon to administer.

Today, as in the early years, much of the Service's prestige and distinction lie in the fact that it is the Nation's trustee for certain outstanding historic shrines and superlative examples of Nature's handiwork in the United States. It was such areas that the Congress had in mind when the basic policy of administering national park lands was thus stated in the act of August 25, 1916: "To conserve the scenery and the natural and historic objects and the wildlife therein, and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

This, the foundation idea upon which the Service is built, is basic today. It provides the unifying element that welds all national park units into a system. Development and use of the areas must follow a pattern that will afford to visitors, without material impairment of the natural and historical characteristics, the deeply satisfying experience that each area is capable of giving.

The Service has also given considerable study to the question of terminology, with the hope that the present unwieldy classification of areas might be reduced and simplified to meet the requirements of common usage.

Officials Receive Pugsley Awards

The three Cornelius Amory Pugsley medals, awarded by the American Scenic and Historic Preservation Society each year for outstanding park achievements, were all given in the national field for 1941 rather than for National, State, and municipal work, as in the past.

The gold medal was awarded to Secretary of the Interior Harold L. Ickes for "Distinguished park service in the national field." Arthur E. Demaray, Associate Director of the National Park Service, was awarded the silver medal for his long and able service in the interest of the national parks; and Miss Harlean James, executive secretary of the American Planning and Civic Association, received the bronze medal for her years of devoted service in the interest of America's parks. Presentation of the medals was made in the office of the Secretary of the Interior on June 4, 1942.

Former Director Cammerer Honored

At the request of the National Park Service, approved by the Secretary of the Interior, the United States Board on Geographical Names authorized the naming of two natural features in Great Smoky Mountains National Park, Mount Cammerer and Cammerer Ridge, in recognition of the distinguished services of Arno B. Cammerer, Director of the National Park Service from 1933 to 1940, and an official of that agency from July 1919 until his death in April 1941 deprived the Service of one of its most valuable members. Mr. Cammerer had a large part in the establishment of Great Smoky Mountains National Park and other eastern national parks; he had guided the efforts of many thousands of employees and had borne the brunt of organizing many new and expanded activities of the Service between 1933 and 1940. Always, he zealously guarded the national parks against over-development in order to retain their significant natural and historic character.

Removal of Service's Washington Office to Chicago

On December 19, 1941, the Director of the Bureau^{of} the Budget issued a directive providing for the removal of the Washington offices of the National Park Service, the Fish and Wildlife Service, and the

Office of Indian Affairs, Department of the Interior, to Chicago, Ill., as a part of a program to make additional office and housing space available for the rapidly expanding war agencies. At the close of the fiscal year, the Office of Decentralization Service, Public Buildings Administration, had completed negotiations for the rental of space for the central offices of those agencies in Chicago's Merchandise Mart Building. A small liaison office will remain in Washington to handle matters affecting the National Capital Parks, the District of Columbia Zoning Commission, and the National Capital Park and Planning Commission, and to carry out special assignments for the Director.

Personnel Changes

The war has brought far-reaching changes in the personnel of the National Park Service. The reductions in the CCC throughout the year and its elimination on June 30, 1942, reduced the working organization substantially. Curtailment of appropriations brought further reductions. The move to Chicago made it necessary for many employees to transfer to other agencies.

Over 300 Service employees, regular and CCC, have joined the armed forces, and more than 150 have transferred to agencies primarily engaged in war work.

The Service is proud of those who are making such a worthy contribution to our Nation by joining the ranks of her defenders and of the many who have sought arduous and technical assignments in war production work. We are also proud of the way in which added burdens have been assumed by the existing staff because of the many transfers and reductions in personnel.

Throughout the National Park Service our wartime pledge is to protect for this and future generations the outstanding examples of the American scene entrusted to us, and to administer each area so as to maintain integrity of the purpose for which it was established. We are strengthened in this resolution by your statement that "A Nation like ours at war is inspired to greater efforts by the thought that institutions in which it takes pride, and which symbolize its greatness, are being defended and will exist after the war has been won."

Statistical Tables

This year, with the annual report reduced in length to economize on paper and to relieve the burden on printing facilities, only one table listing the areas administered by the National Park Service, the acreage in each and the visitation is included. Other statistics on the operations of the National Park Service have been compiled for administrative purposes and copies may be obtained from the Director, National Park Service, Chicago, Ill.

National park system, acreage, and visitation

Areas (classification)	Location (State)	Approximate acreage	Approximate visitors, fiscal year July 1, 1941-June 30, 1942	Approximate visitors, 5-year average, 1938-42
National parks:				
Acadia	Maine	24, 629	381, 750	395, 500
Bryce Canyon	Utah	35, 980	101, 000	106, 300
Carlsbad Caverns	New Mexico	49, 568	219, 250	231, 600
Crater Lake	Oregon	160, 334	335, 200	255, 400
Glacier	Montana	984, 310	156, 400	167, 300
Grand Canyon	Arizona	645, 120	343, 900	375, 000
Grand Teton	Wyoming	96, 000	113, 150	116, 500
Great Smoky Mountains	North Carolina-Tennessee	457, 462	1, 188, 100	950, 500
Hawaii	Territory of Hawaii	173, 399	140, 950	235, 250
Hot Springs	Arkansas	1, 011	192, 550	175, 800
Isle Royale	Michigan	133, 839	7, 350	1, 350
Kings Canyon	California	454, 600	152, 900	1, 105, 350
Lassen Volcanic	do.	104, 527	95, 750	96, 600
Mammoth Cave	Kentucky	49, 696	148, 100	112, 750
Mesa Verde	Colorado	51, 334	36, 550	35, 500
Mount McKinley	Alaska	1, 939, 493	700	1, 500
Mount Rainier	Washington	241, 782	399, 700	409, 325
Olympic	do.	835, 411	187, 700	98, 000
Platt	Oklahoma	912	250, 950	304, 300
Rocky Mountain	Colorado	269, 416	422, 000	600, 800
Sequoia	California	386, 560	262, 000	270, 000
Shenandoah	Virginia	193, 441	878, 100	950, 000
Wind Cave	South Dakota	12, 640	19, 200	18, 700
Yellowstone	Wyoming	2, 221, 773	499, 600	512, 200
Yosemite	California	761, 111	490, 500	550, 250
Zion	Utah	86, 343	158, 100	164, 000
National monuments:				
Ackia Battleground	Mississippi	49	(²)	(²)
Andrew Johnson	Tennessee	17, 08	2, 600	1, 2, 600
Appomattox	Virginia	970	15, 500	13, 100
Arches	Utah	33, 680	2, 700	2, 500
Aztec Ruins	New Mexico	26	11, 150	15, 000
Badlands	South Dakota	150, 103	210, 300	1, 170, 000
Bandelier	New Mexico	26, 026	9, 700	12, 100
Big Hole Battlefield	Montana	200	3, 450	7, 500
Black Canyon of the Gunnison	Colorado	13, 969	16, 700	17, 100
Cabrillo	California	50	(³)	1, 150, 000
Canyon de Chelly	Arizona	83, 840	2, 100	2, 000
Capitol Reef	Utah	37, 060	1, 050	1, 500
Capulin Mountain	New Mexico	680	33, 200	33, 750
Casa Grande	Arizona	473	13, 400	20, 600
Castillo de San Marcos	Florida	19	231, 950	1, 232, 000
Castle Pinckney	South Carolina	4	(²)	(²)
Cedar Breaks	Utah	6, 067	13, 200	16, 800
Chaco Canyon	New Mexico	21, 509	1, 150	3, 400
Channel Islands	California	1, 120	(²)	(²)
Chiricahua	Arizona	10, 695	8, 300	9, 500
Colorado	Colorado	18, 311	22, 850	39, 000
Craters of the Moon	Idaho	48, 280	14, 400	19, 000
Death Valley	California-Nevada	1, 907, 720	70, 900	73, 500
Devil Postpile	California	800	5, 125	7, 300
Devils Tower	Wyoming	1, 153	37, 350	36, 350
Dinosaur	Utah	203, 965	6, 300	9, 000
El Morro	New Mexico	240	1, 150	2, 000
Father Millet Cross	New York	.01	(²)	(²)
Fort Jefferson	Florida	87	720	1, 000

See footnotes at end of table.

National park system, acreage, and visitation—Continued

Areas (classification)	Location (State)	Approximate acreage	Approximate visitors, fiscal year July 1, 1941-June 30, 1942	Approximate visitors, 5-year average, 1938-42
National monuments—Continued.				
Fort Laramie	Wyoming	214	5,450	2,500
Fort Matanzas	Florida	18	9,600	17,600
Fort McHenry	Maryland	48	589,350	461,500
Fort Pulaski	Georgia	5,427	28,800	41,300
Fossil Cycad	South Dakota	320	(2)	(2)
George Washington Birthplace	Virginia	394	35,700	49,000
Gila Cliff Dwellings	New Mexico	160	300	180
Glacier Bay	Alaska	2,299,520	(2)	(2)
Gran Quivira	New Mexico	611	2,550	2,750
Grand Canyon	Arizona	201,291	160	1,100
Great Sand Dunes	Colorado	46,034	11,100	10,600
Holy Cross	do	1,392	435	50
Homestead	Nebraska	161	1,000	1,500
Hovenweep	Utah-Colorado	286	50	200
Jewel Cave	South Dakota	1,275	2,400	3,800
Joshua Tree	California	837,480	28,500	11,200
Katmai	Alaska	2,697,590	(2)	(2)
Lava Beds	California	45,967	27,500	33,000
Lehman Caves	Nevada	640	3,600	4,200
Meriwether Lewis	Tennessee	300	19,050	16,400
Montezuma Castle	Arizona	521	8,450	9,000
Mound City Group	Ohio	57	(2)	(2)
Muir Woods	California	425	117,600	128,500
Natural Bridges	Utah	2,740	450	750
Navajo	Arizona	360	400	500
Ocmulgee	Georgia	683	47,600	44,600
Old Kasaan	Alaska	38	(2)	(2)
Oregon Caves	Oregon	480	25,350	48,000
Organ Pipe Cactus	Arizona	330,687	24,450	11,500
Perry's Victory and International Peace Memorial	Ohio	14	20,975	28,400
Petrified Forest	Arizona	93,199	189,750	205,500
Pinnacles	California	14,498	7,500	21,500
Pipe Spring	Arizona	40	800	1,850
Pipestone	Minnesota	115	2,250	1,000
Rainbow Bridge	Utah	160	185	250
Saguaro	Arizona	63,284	11,250	16,350
Santa Rosa Island	Florida	9,500	175,200	118,100
Scotts Bluff	Nebraska	3,476	65,250	86,500
Shoshone Cavern	Wyoming	212	(2)	(2)
Sitka	Alaska	57	8,600	1,650
Statue of Liberty	New York	10	389,700	381,750
Sunset Crater	Arizona	3,040	11,050	10,100
Timpanogos Cave	Utah	250	6,850	10,900
Tonto	Arizona	1,120	6,700	6,150
Tumacacori	do	10	7,100	11,400
Tuzigoot	do	43	8,000	4,700
Verendrye	North Dakota	253	4,250	5,850
Walnut Canyon	Arizona	1,879	12,000	12,300
Wheeler	Colorado	300	4,255	1,600
White Sands	New Mexico	144,946	69,800	74,650
Whitman	Washington	46	4,100	12,450
Wupatki	Arizona	35,813	3,250	3,300
Yucca House	Colorado	10	50	10
Zion	Utah	49,150	4,250	150
National military parks:				
Chickamauga and Chattanooga	Tennessee	8,551	302,850	364,850
Fort Donelson	do	103	51,150	40,000
Fredericksburg and Spotsylvania County Battlefields Memorial	Virginia	2,424	110,400	112,250
Gettysburg	Pennsylvania	2,425	490,650	787,500
Gullford Courthouse	North Carolina	149	11,300	38,600
Kennesaw Mountain National Battlefield Park project	Georgia	2,813		
Kings Mountain	South Carolina	4,012	17,000	23,100
Moore's Creek	North Carolina	30	2,950	4,500
Petersburg	Virginia	2,047	207,950	199,400
Richmond National Battlefield Park project	do		44,100	
Shiloh	Tennessee	3,717	196,200	261,450
Stones River	do	324	4,400	4,300
Vicksburg	Mississippi	1,338	158,450	234,300

See footnotes at end of table.

National park system, acreage, and visitation—Continued

Areas (classification)	Location (State)	Approximate acreage	Approximate visitors, fiscal year July 1, 1941–June 30, 1942	Approximate visitors, 5-year average, 1938–42
National historical parks:				
Abraham Lincoln	Kentucky	111	92,600	115,800
Chalmette	Louisiana	30	17,100	24,000
Colonial	Virginia	6,793	649,400	563,800
Morristown	New Jersey	1,051	139,000	169,680
Saratoga project	New York	1,428	59,100	126,350
National cemeteries:				
Antietam	Maryland	11	(⁵)	(⁵)
Battleground	District of Columbia	1	1,500	3,500
Chattanooga	Tennessee	136	(⁵)	(⁵)
Custer Battlefield	Montana	765	29,600	23,000
Fort Donelson	Tennessee	15	(⁵)	(⁵)
Fredericksburg	Virginia	12	(⁵)	(⁵)
Gettysburg	Pennsylvania	16	(⁵)	(⁵)
Poplar Grove	Virginia	9	(⁵)	(⁵)
Shiloh	Tennessee	10	(⁵)	(⁵)
Stones River	do	20	(⁵)	(⁵)
Vicksburg	Mississippi	120	(⁵)	(⁵)
Yorktown	Virginia	3	(⁵)	(⁵)
National parkways:				
Blue Ridge	Virginia-North Carolina	34,296	1,300,000	1,234,700
George Washington Memorial	District of Columbia, Virginia, Maryland	2,367	(²)	(²)
Natchez Trace	Mississippi	12,834	(²)	(²)
National battlefield sites:				
Antietam	Maryland	54	7,900	26,800
Brices Cross Roads	Mississippi	1	1,500	3,000
Cowpens	South Carolina	1	6,000	5,000
Fort Necessity	Pennsylvania	2	43,000	75,000
Kennesaw Mountain	Georgia	60	19,900	10,000
Tupelo	Mississippi	1	3,600	6,000
White Plains	New York		(²)	(²)
National memorials:				
Camp Blount Tablets	Tennessee			
Kill Devil Hill	North Carolina	314	72,950	72,575
Lee Mansion	Virginia	50	259,500	393,750
Mount Rushmore	South Dakota	1,710	31,500	186,300
New Echota Marker	Georgia	1	3,000	5,450
Boulder Dam National Recreational Area	Arizona-Nevada	1,737,893	647,200	663,600
National historic sites:				
Atlanta Campaign Markers	Georgia	21		
Federal Hall Memorial ⁶	New York	49	(²)	(²)
Fort Raleigh ⁶	North Carolina	16	79,350	131,075
Gettysburg Cyclorama National Historic Object ⁸	Pennsylvania			
Gloria Dei (Old Swedes' Church) ⁷	do		(²)	(²)
Hopewell Village ⁸	do	6,198	66,900	130,950
Jamestown Island ⁹	Virginia			
Jefferson National Expansion Memorial ⁸	Missouri	77	(²)	(²)
Manassas --National Battlefield Park ⁸	Virginia	1,605	5,050	3,625
McLoughlin House ⁷	Oregon		(²)	(²)
Old Philadelphia Custom House ⁶	Pennsylvania	1	(²)	(²)
Salem Maritime ⁸	Massachusetts	9	7,450	13,850
San Jose Mission ⁷	Texas			
Vanderbilt Mansion	New York	212	16,150	16,750
National Capital Parks				
House Where Lincoln Died	District of Columbia	1025,570		
Lincoln Memorial	do		31,150	43,000
Lincoln Museum	do		1,071,150	1,340,350
Washington Monument	do		51,550	67,700
	do		813,550	894,500
Grand totals		21,686,029	16,034,285	16,996,910

¹ Less than 5 years.² Travel record not maintained.³ Closed to visitors for duration of war.⁴ Estimated. Complete travel figures are not available.⁵ Included in figures for battlefield site, military park, or historical park.⁶ Federally owned; operated by cooperating private agency.⁷ Privately owned and operated.⁸ Federally owned and operated.⁹ Federally and privately owned and operated.¹⁰ Includes Chopawamsic Area in Virginia.

Recreational demonstration areas ¹

Areas (classification)	Location (State)	Approximate acreage	Visitors (1942 fiscal year)
Alex. H. Stephens	Georgia	938	12, 533
Beach Pond	Rhode Island	2, 472	34, 177
Bear Brook	New Hampshire	6, 155	² 28, 699
Blue Knob	Pennsylvania	5, 136	12, 214
Camden Hills	Maine	4, 962	24, 290
Catoctin	Maryland	9, 745	21, 451
Cheraw	South Carolina	6, 832	(³)
Chopawamsic	Virginia	14, 080	(⁴)
Crabtree Creek	North Carolina	4, 983	79, 286
Cuivre River	Missouri	5, 802	11, 836
Custer	South Dakota	20, 167	-----
Fall Creek Falls	Tennessee	15, 776	8, 457
Hard Labor Creek	Georgia	5, 602	34, 666
Hickory Run	Pennsylvania	12, 908	14, 596
Kings Mountain	South Carolina	6, 175	(³)
Lake Guernsey	Wyoming	1, 753	-----
Lake Murray	Oklahoma	2, 228	10, 873
Lake of the Ozarks	Missouri	16, 037	⁵ 33, 474
Laurel Hill	Pennsylvania	4, 025	² 22, 250
Mendocino	California	5, 419	3, 061
Montgomery Bell	Tennessee	3, 744	15, 762
Montserrat	Missouri	3, 439	23, 565
Oak Mountain	Alabama	7, 805	⁶ 4, 840
Otter Creek	Kentucky	2, 435	22, 330
Pere Marquette	Illinois	2, 522	27, 840
Pine Mountain	Georgia	3, 018	4, 530
Raccoon Creek	Pennsylvania	5, 034	14, 445
Roosevelt	North Dakota	63, 365	17, 236
St. Croix	Minnesota	18, 499	13, 870
Shelby Forest	Tennessee	12, 305	87, 451
Silver Creek	Oregon	4, 088	2, 961
Swift Creek	Virginia	7, 610	132, 157
Versailles	Indiana	5, 371	10, 278
Waterloo	Michigan	12, 018	35, 881
Waysides	South Carolina	239	-----
Waysides	Virginia	206	-----
Winamac	Indiana	6, 233	39, 713
Yankee Springs	Michigan	4, 197	196, 091

¹ Act of June 6, 1942, authorizes Secretary of the Interior to convey or lease to States recreational demonstration projects, or any parts of such projects, transferred to him by Executive Order No. 7496, dated Nov. 14, 1936, the States to administer, operate, and maintain such areas for public park, recreational, and conservation purposes.

² Attendance for June 1942, estimated.

³ Leased to State of South Carolina.

⁴ Transferred to National Capital Parks, August 1940.

⁵ Figures are for July to December 1940; January to June 1942.

⁶ Figures for December 1941 to June 1942, estimated.

Fish and Wildlife Service

IRA N. GABRIELSON, Director

Custody of Wildlife and Fishery Resources in Wartime

THE second year of the Fish and Wildlife Service¹ was one of the most difficult in a history that through parent agencies extends well back into the nineteenth century. Still engaged at the year's opening in the task of organizing and coordinating the work of a new governmental unit, the Service had at the same time to face the adjustments required by the national defense program, adjustments that became all the more difficult in the middle of the year when war itself came to the Nation. Soon thereafter the Service was confronted with the task of preparing for the transfer of its headquarters to Chicago, Ill., and finally to the perplexities of these problems were added those of retrenchment in accordance with reduced appropriations for the next year.

Nevertheless, it is possible to report considerable success in wildlife and fishery conservation programs, and it is encouraging to realize that a series of progressive years had placed the resources in good condition to face the hazards that come to peacetime pursuits in time of war. Though thus encouraged, the Service and conservationists throughout the country were engaged in the grim task of conversion to war. Camps of the Civilian Conservation Corps, for example, which had provided labor for developing national wildlife refuges, were reduced from 36 to 12. Of the remaining camps, 4 were working on military areas, and arrangements were being completed for thus using the other 8, when, at the close of the year, action of Congress abolished the CCC. Other aspects of the Service's work, on the other hand, received increased emphasis.

Fishery Management

The fisheries of the Nation assumed immediately an outstanding importance as a source of vital food. The facilities of the Service

¹ This Service was formed on June 30, 1940, by consolidating the Bureau of Biological Survey and the Bureau of Fisheries in accordance with the President's Reorganization Plan No. III.

for making the fishery contributions most effective were mobilized and made available to the armed forces, the lend-lease agencies, and the industry. By the end of the year plans were well formulated for the program that began later with the appointment of the Secretary of the Interior as Fishery Coordinator and the Director of this Service as Deputy Coordinator.

The fishery contributions of food and essential byproducts, it was realized, are so great that without them the ability of the Nation to wage war would be lessened materially. Increasing demands for canned food led to an adjustment of regulations in Alaska whereby the fisheries may produce the maximum yield consistent with maintaining a future supply. Adoption of scientifically developed management measures by the States are allowing more fishes to grow to marketable size and to spawn, thus resulting in greater yields. Farming methods were advocated for restoring depleted oyster beds, and procedures of scientific oyster culture are improving the quality of the edible product. Although the "popular" fishes, including haddock, cod, shad, and salmon, are being harvested to capacity, the fishermen are being urged to concentrate on the landing of minor and less familiar species, with the result that many tons of food and byproducts are being derived from hitherto underutilized species. There are possibilities of further increases from this source, not only in the sea but even in the Great Lakes and the larger rivers. Additional sources of vitamin-potent fish oils are being sought to supplement present supplies, and possibilities for developing new products have been disclosed. The development of farm ponds in the Southern States is spreading rapidly under scientific guidance, and the adoption of improved methods of pondfish culture and pond fertilization and management is producing fishery resources of great aggregate magnitude in areas where fresh fish hitherto has been a luxury food. Not only are scientific investigation and development of methods for controlling industrial pollution saving tons of valuable fishes in inland and coastal waters, but control methods are resulting in the recovery of quantities of strategic material from the wastes.

Statistical compilations, too, were made as an essential labor of the Service. As vital in conservation of fisheries as other natural resources, these summaries stand as guides for Service activities and as aids in informing other Federal agencies and the public. Data collected for 1940 (the latest year for which complete figures are available) show, for example, that nearly 125,000 fishermen, employed that year in the catch of 4,059,524,000 pounds of fishery products, in waters of the United States and Alaska, profited to the extent of almost \$100,000,000—a 2-percent gain in value over the preceding year despite a 9-percent recession in volume. A total of about \$238,000,000 was estimated as the value of this harvest to domestic

primary fish handlers and processors (in whose plants worked an additional 90,000 men) as prepared for market in 1940.

Collecting, compiling, analyzing, and issuing current data on the production, distribution, and marketing of all fishery products provided information of paramount importance in any Federal program incorporating food control, information of great value to the Office of Price Administration, and also to the fishing industry. Investigations in canning and curing fishery products made available information on up-to-date methods in food preservation and indicated what fishes are most suitable for canning or curing when increased supplies are demanded as a food-conservation measure. Other activities included examining samples of canned fish for quality; assisting military procurement officials to draw up purchasing specifications for fish and advising with them in their purchase of these products; working out methods of canning or curing species of fishes not now utilized; and advising on the practicability of proposed new canning ventures to increase the national food supply for emergency use.

At the request of a committee that included representatives of the United Nations, the Service's laboratories expanded their vitamin-A programs to include a survey of potential sources. In allied interest, liver and viscera samples were collected from many species of fishes and studied for A and other vitamin-oil content, concentrates, and most efficient methods of recovery. Other studies involved a factual survey on vitamin-D oils, the development of more rapid methods for drying fish for domestic use or shipment to our expeditionary forces and to the peoples of the United Nations, and finding a substitute for the agar-agar used in bacteriological media in many industrial and drug-manufacturing plants and by hospital and public-health services.

The purchasing of large quantities of canned fishery products for use by expeditionary forces and for export under the lend-lease program were seen as definite limiting factors on the quantity of canned fish available for domestic consumption. To counteract this effect, extended study was made relative to preservation of fishery products, a study that may enable the fishery resources of Alaska to supplement the domestic supply with minimum requirements for shipping space. Attention was also given to the rapidly growing importance of cold-storage locker plants, some 3,500 of which are available in this country and can be used in substituting frozen for canned fish. Fish producers, distributors, and locker-plant operators were acquainted with the manner in which channels of distribution can be established for utilizing this equipment. Close to half a million tons of fresh and frozen fishery products have been annually packaged in tin, including salmon, shad, sardines, tuna, mackerel, crab meat, shrimps, clams, and oysters. With the tin supply as it is, the Service has engaged in experimental

and research work on substitute metals, on determining the species of fish that can be best marketed in forms other than canned, and on the standardization of the can sizes used for sea foods.

Specialists of the Service collaborated with the Navy Department and the Maritime Commission to maintain a proper balance between the number of vessels in each fishery taken for military use and those retained for food production, and with the Agricultural Marketing Administration to enable that agency most efficiently to purchase fishery commodities for lend-lease use. One expert visited Iceland on a detail relative to fishery matters for the Office of Lend-Lease Administration, pausing en route in England to make a rapid survey of distributoin of lend-lease fishery products there.

In cooperation with the Coordinator of Inter-American Affairs and the Department of State, a survey of the fisheries of the countries surrounding the Caribbean Sea was undertaken. Not only has this work promise of leading to the discovery of new fisheries and consequently new supplies of food, vitamin oils, and industrial raw materials to be developed locally and perhaps tapped by our own fishermen, but it has also, it is hoped, advanced our good neighbor policy.

For the Office of Price Administration, War Production Board, Public Health Service, War, Navy, and State Departments, Inter-American Development Commission, and other Federal agencies, additional studies are being made, or the services rendered by fishery specialists levied upon, to appraise species of fishes that can be canned in quantities for lend-lease or military use; to determine the seasons of capture of various species in order that net-manufacturing machines may be more efficiently utilized for making camouflage nets; to prepare price data for determining ceilings on fishery products; to learn the needs of the fishery industry for war-risk insurance; to advise on the position fishery products should take in the stock of reserve foods to be stored in Puerto Rico and Alaska in the event of curtailed transportation; and to compile statistics on the production of sea foods in waters of various countries in the theatres of combat. This last, at the request of the Board of Economic Warfare, may enable the military to find local fish supplies abroad for our expeditionary forces and so allow more space for arms in ships. So, also, more may be left at home for domestic consumption.

The Service continued its protection of the fisheries of Alaska, which yield products having an average annual value of more than \$45,000,000, about nine-tenths of which is in canned salmon. Increased intensity of fishing is considered inevitable under wartime conditions, and greater vigilance has thus been deemed necessary on the part of the law-enforcement officers and biological investigators to prevent impairment of future fishery harvests through inadequate spawning.

The production of fish and eggs at the Federal fish hatcheries was maintained at approximately the same level as in the preceding year. The necessity for more economical operations compelled a revision of the program with the object of closing some of the hatcheries as well as deferring all new hatchery developments or expansion of existing units. Likewise distribution and planting practices were modified to meet new conditions. Attention was given to stocking farm ponds for the production of food, and to planting game fishes in more accessible waters so that urban populations may enjoy angling recreation with a minimum of travel.

Wartime Wildlife Management

Control of predators and rodents that are limiting factors on food production also took on increasing importance when war began. Livestock, poultry, and agricultural industries were protected by the elimination of 123,667 predatory animals, by controlling injurious rodents on 20,966,606 acres of infested farm and range lands, and by destroying rats in town and country, thereby saving large quantities of the Nation's wool, fats, lanolin, food and feed resources for military and civilian needs and preventing the spread of animal-borne diseases transmissible to man and domestic livestock.

Furs became a concern of the armed forces facing the task of waging war in cold climates, and the Service rendered assistance illustrated by the appointment of its outstanding fur expert as a specialized consultant of the Cold Climate Clothing Section of the Quartermaster Corps.

The Navy Department called upon the Service through its Division of Land Acquisition to appraise lands for war purposes in the State of Washington, and later requests for land appraisals and cadastral surveys in many parts of the United States so increased that at the close of the year the entire field staff of this division was engaged in appraising and surveying lands for the Navy Department. Its Washington staff was also engaged for the most part in preparing reports and maps submitted from the field on the areas appraised and surveyed.

In other ways also the Service applied its activities to the fighting needs of the Nation.

Projects not directly related to the war were drastically curtailed, but without discontinuing conservation programs that must not be abandoned. The extensive habitat-improvement and other development work accomplished during recent years on national wildlife-refuge lands, for example, together with the excellent water conditions prevailing on most of the refuges last spring, demonstrated the value of these refuges in this period of national emergency in greatly increased wildlife production. All forms of wildlife occurred on the

refuges in greater numbers than ever before. Fur animals increased to a point where they made a substantial contribution to the war in providing furs for outfitting troops for military duty in northern climates. Wherever feasible without adverse effect on the wildlife, grazing by domestic livestock, hay harvesting, agricultural crop production, and other economic uses of refuge lands were permitted, thus making many thousand acres available for the production of food. Almost 1,000,000 acres of national wildlife-refuge lands were turned over to the War and Navy Departments for military purposes.

In wartime as well as in peace the Nation's natural resources must be safeguarded, and the Fish and Wildlife Service is one of those agencies upon which the responsibility rests to see that no avoidable damage is suffered on the home front. Its efforts have thus been exerted to make every possible contribution to the war but at the same time to provide security for the fish and wildlife resources during the struggle and for the peace to come—through every means and every effort that cannot be exerted directly in fighting.

Throughout the year the Service has been conscious of the importance of outdoor recreation to the citizens of a nation under the stress of war, and it has done everything possible to continue its efforts on behalf of those resources that are important to sportsmen and others who seek relaxation in the outdoors. Despite time devoted to war activities, increased numbers of persons sought food and relaxation by hunting waterfowl. This was indicated by the sale of nearly 1,400,000 migratory-bird hunting stamps, compared with 1,260,810 sold last year. Enforcement of the Federal laws and regulations protecting wildlife continued effective, and excellent cooperation in this work was given by an appreciative public and the State game departments.

Importance of Fish and Wildlife Research

All the year's activities again emphasized the importance of the Service's fact-finding projects—fish and wildlife research, including field and laboratory investigations and experiments and the collection and compilation of statistical data. Wartime shortages of materials used in rodent control required intensification of studies of substitutes available from domestic sources. Plans for the best utilization of food resources were dependent on reliable data, and the development of new areas from which fishes can be taken required explorations. Such regulatory work as that of setting seasons for the hunting of migratory birds, as in the past, seemed feasible only with the knowledge based on year-round investigations—studies that during this past year indicated the desirability of relaxing restrictions and thus, of course, demonstrated the success of the restoration program.

The research and conservation policies of the Department in management of the national migratory game-bird resources have, in fact, been fully justified by consistent increases under a sound utilization program during recent years. A survey inventory of big-game animals showed improvement in the status of this important food and recreational resource. Development of new methods for the control of destructive predatory animals, rodents, and birds assumed greatly increased importance in the war requirements for meat, cereals, fruits, and other food products because of the cutting off of supplies required for the preparation of standard materials heretofore used. Intensive work was concentrated on this requirement with promising results. Work on fur and fur fibers was directed vigorously to meet warm-clothing requirements of military and civilian agencies through new and improved manufacturing methods in utilizing pelts, fur, hairs, and waste materials. Increased fur-animal production was aided by presenting improved feeding and breeding practices and methods for the prevention and control of diseases. Thus despite demands for discontinuing many research projects during the war, it was the duty of the Service to emphasize the basic importance of continuing its scientific investigations.

Keeping the Public Informed

Though necessarily reduced, activities were continued to keep the public and particularly conservationists informed regarding the needs in safeguarding the fish and wildlife resources. With a curtailment of programs not directly related to the war, it was realized that prevention of raids on the resources under false pretexts become more important than before and require a vigilance on the part of conservationists that can be maintained only through adequate information programs. One of the most promising developments in the field of wildlife conservation in recent years has been the organization and growth of the Outdoor Writers Association of America and the increase of outdoor columns in the daily press, supplementing the contributions of outdoor periodicals and other agencies to conservation education. Thus, for the sake of maintaining conservation vigilance and also of meeting the needs of those who serve the information requirements of the public, it seemed essential to maintain the Service's basic responsibility for disseminating information though the output was drastically curtailed.

In one sense such publicity on the outdoors has seemed to be a distinct contribution to the Nation at war, for men and women whose time in the outdoors is limited, whose access to the tonic benefits of recreation in the open is cut off, may get some of their needed relaxation in reading, or in hearing radio broadcasts that bring the outdoors

indoors. Such news items and broadcasts may also in some measure encourage outdoor interests among the general public, and it seems apparent that, like the British people, the Americans will find themselves in need of such relief from the stresses and strains of carrying on a difficult war.

In another sense, conservation publicity serves a national need in preventing the spread of ideas whose folly can be revealed to the public merely by a word of caution. Considerable display was given by the American press, for example, to a London report that "sparrows, starlings, crows, larks, curlews, and even swans are helping to feed Britain at war." Fortunately this publicity was followed promptly by this Service's widely read comment that, although wildlife has emergency food values, Americans will make a grave mistake if they try at present to include song and game birds in their wartime larder. It has been demonstrated that the song birds will make a much better contribution to the food-for-freedom cause by making war on the insect pests of crops. Even game, which becomes a part of the Nation's food supply and is estimated to replace annually enough meat to feed an army of 5,000,000 for 77 days, affords recreation that Americans consider even more important than the meat obtained from its pursuit. Yet the general public cannot be constantly aware of these relationships; it must be kept informed.

Americans have been waging an uphill, though successful, fight to restore their wildlife populations after disastrous exploitation. Game laws have been as liberal as the game could stand. Better management can increase the surpluses, and even at present there is in some areas a surplus of deer, elk and other animals that might be more wisely used to the Nation's wartime advantage. Yet selfish interests may—without discrimination—be ready to use war conditions as a pretext for making disastrous inroads on this resource. If it ever becomes necessary, Americans can fall back on their wildlife meat supply, although it would not last long. Anyone advocating this at present, however, except for species that are locally overabundant, is either misguided or else is thinking more about his own privileges than about the needs of the Nation. A most effective way to combat the wartime spread of such proposals is through making the facts and actual relationships known.

No Time to Forget Conservation Principles

This is no time to forget conservation principles, and, though energies must now be applied fully to the task of winning the war, this should be done without losing sight of the peace conditions for which the fight is waged. Those who by force of circumstances are not on the actual fighting front have an increased responsibility—

they should be doubly alert to see that the needs of conservation are not forgotten when the materials and revenues of the Nation are so urgently needed for war that conservation programs must be curtailed. We should realize that information media are now feasible and most useful instruments for conservation. As shown by the experience of the past year, they are also instruments that can be used with comparatively little expenditure of time and effort. Drastic reductions were in fact made in the small personnel specializing in information work, and other employees carried on such work incidental to their specialized duties.

During National Wildlife Week, for example, Service members throughout the country made 56 broadcasts of a radio program called *Wildlife and the American Way of Living* and placed news items on the week's significance in 180 newspapers in 40 States. Officials of the Service, in connection with their attendance at conventions and meetings, presented addresses and, in response to requests, described the wildlife situation in articles for periodicals. Among the latter was an extensive discussion in an article for *Audubon Magazine* by the Director with the title *No Time To Forget Conservation*. As a result of these incidental, though deliberate, efforts it is believed that the American public and particularly the organized conservationists were kept informed and alert and that the hazards to conservation of a neglectful public were minimized.

So far as expenditure of time, effort, and money was involved, it should be emphasized again that the Service's distinctive concerns of the year were primarily those related to its part in the Nation's war program.

Fishery Biological Investigations

Fish for war is the present aim of the fishery biological investigations of the Service. Procuring a maximum yield of food from the fisheries, a food particularly adapted to wartime needs, depends upon management of the fish supply and the rate and method of harvesting. Without management, overfishing of the most important and valuable food fishes will continue. Thus production in subsequent years will be curtailed when ample food supplies will be even more essential. On the other hand if management is applied this year and the fishing rate is adjusted to the annual rate of replacement of the fish stocks, greater yields will be obtained during each succeeding year with fewer vessels and at smaller cost, the fisheries will be brought to maximum production, and conservation of the future supply will be assured.

Principles of management, however, cannot be determined deductively or applied arbitrarily. Research is required to disclose, year by year and for each important species of aquatic food animal, varia-

tions in the rate of reproduction, in the total fish populations or standing crops, and in the rate of fishing or withdrawal. The measurement of these variables involves also a relatively complete knowledge of the life histories, migrations, and ecological relations of the food fishes and of both the organisms on which they depend for food and those that prey upon them. Important, too, but in more limited spheres, especially in relation to oysters, clams, trouts, salmons, and certain pondfishes, are the perfecting of methods for artificial culture, farming, nutrition, and control of diseases, predators, and parasites—all vital activities in conserving existing stocks, restoring depleted populations, and creating new supplies. By the conservation of fishery resources on these principles, man is permitted to harvest and use the products of the waters to the fullest extent consistent with their perpetuation.

Commercial Fishery Management and Conservation

The annual fulfillment of the congressional mandate of February 9, 1871, to determine "whether any and what diminution in the number of the food fishes of the coasts and lakes of the United States has taken place" and "whether any and what protective, prohibitory, or precautionary measures should be adopted" demands more than simple statistical recapitulation. To meet the need, fishery biology, an exact science, has been developed by synthesizing the disciplines of biology, physics, chemistry, mathematics, economics, and logic. A brief résumé will illustrate the progress made in commercial fishery studies; recount new findings about the fisheries and the animals that support them; and tell of their use in developing conservation principles and management practices, of the recommendations adopted to insure the production of more fish of better quality, and of the restoration of depleted fisheries.

The possibilities for better coordination of fishery activities and for eventual attainment of the objective of uniform management are inherent in the ratification by the Congress on May 4, 1942, of the Atlantic Coast Marine Fisheries Compact, signed by nine States, under which the Service has been designated as the chief investigative and advisory agency.

The Service's only opportunity for direct application of findings in fishery biological research is in the management of the Alaskan fisheries, where the advantages of the flexible modern method as opposed to the traditional system of regulation by specific rigid legislation has been demonstrated.

The Fishery Mission to Mexico was continued and has made considerable progress in studies of the commercial fishery resources and

in the development of sound management measures. Surveys and restocking of interior waters were also undertaken in cooperation with the Mexican Government.

North Atlantic Area

Following the warning issued by the Service a year ago that the continued capture and sale of baby haddock would result in great financial loss and ruin the fishery, the industry voluntarily curtailed landings of baby haddock to only about 13 percent of the quantity landed during the previous year. Recommendations for increasing the minimum size limit for haddock from 1½ to 2 pounds and enlarging mesh in trawls to release small fish, though not yet adopted, will materially increase the supply of large haddock.

Flounder catches showed marked improvement, owing to increased landings of yellowtails. This species dominated the catches, whereas a few years ago it was of only minor importance. The greater yield bears out the Service's forecast that more fish could be produced by greater concentration on species not widely known or advertised. The blackback flounder had declined in yield and abundance, and current studies indicate the probable ineffectiveness of artificial propagation in maintaining the supply.

Rosefish were landed in greater quantities than ever before, the catches having risen from an insignificant figure in 1933 to 145,000,000 pounds. This unprecedented catch, an increase of 70 percent over 1940, has caused concern over the future of the fishery. Preliminary findings indicate the possible existence of more than one stock supporting the fishery and emphasize the need for control.

The reduced abundance of lobsters during recent years, about one-fifth of former high levels, indicates a need for better management. In Maine 96 percent of those marketed had never spawned. A greater minimum size limit, 3½ inches carapace measurement, instead of 3¼ inches was recommended and already has been adopted by Maine, Massachusetts, and New York. Canada also followed the recommendation in parts of Nova Scotia and New Brunswick. Since tagging experiments indicate that lobsters move only short distances, repopulation of depleted areas can be accomplished only by increased spawning and not by migration from other areas.

Atlantic salmon restoration was begun in Maine through the conclusion of a cooperative agreement between the Service and State conservation agencies, and the generous aid of the Canadian Government, which provided eggs for restocking.

Measurement of changes in mackerel abundance is an important problem, for the supply varies from year to year by as much as 20 to 450 percent, with corresponding variations in the total yield.

There seems to be no present danger of depleting the supply, but observations are being continued to trace trends of abundance as an aid to stabilizing the fishery at a more productive and profitable level.

Middle Atlantic Area

The 1940-41 blue crab fishery production of Chesapeake Bay was about 50 percent less than in 1939, due chiefly to lack of an adequate spawning reserve, although unusually cold weather in January 1940 was presumed to have killed large numbers of crabs, especially females. Recommendations made for restoration included establishment, now accomplished, of sanctuaries closed to crabbing from May 15 to September 1; enforcement of all size limits specified by Virginia and Maryland laws; discontinuing the holding of green crabs in shedding floats; and adequate collection of catch statistics.

The Atlantic coast shad, except in the Hudson River, has been seriously overfished for years, the total food yield has been reduced, and shad fishermen are suffering economic distress. Based on studies in Chesapeake Bay and in North Carolina and South Carolina the Service recommended a reduced rate of fishing as this would initiate a recovery of shad populations comparable with that in the Hudson, where the fishing rate has permitted survival of sufficient spawning fish to bring the yield to the highest level in history. Maryland has adopted regulations that embody this recommendation of the Service.

South Atlantic and Gulf Areas

The spawning population of the common shrimp from Georgia to North Carolina, badly reduced by adverse weather in 1940, is being restored slowly, and normal fishing can be expected within a year or two. During this period of scarcity, the grooved shrimp occurred in unusual abundance, especially off North Carolina and Georgia. Research has been directed toward perfection of methods to determine the abundance of shrimp off the Texas coast, and toward correlation of abundance with climatological changes and assessing the effects of current fishing practices.

During recent years the crab fishery of Louisiana and the redfish fishery of Texas have been so intensified that indications of depletion have become evident.

Pacific Area

Investigations of the Alaska salmon and herring fisheries provided data on the populations and runs of the various regions, which were used as a basis for regulations issued by the Secretary. Recommendations for management of the fisheries were prepared with full

regard for the need of additional canned products and for insuring continuance of substantial future supplies.

Studies were undertaken at the recently established laboratory at Little Port Walter, Alaska, the results of which will place regulation of the great pink salmon fishery of southeastern Alaska on a firmer basis. By means of a two-way counting weir, the number of fry returning to the ocean from each year's spawning is determined. In this way the size of the next commercial run can be estimated with considerable accuracy and the fishing regulations adjusted to permit the maximum safe catch.

The greatly increased demands for canned fishery products, as well as for meal and oil, have stressed the importance of the pilchard fishery. A serious feature is that the catch continued to be composed predominantly of small fish, even in waters north of California, where hitherto they had been much less numerous. Fishing intensity since 1938 increased fourfold over that from 1925 to 1933. Total mortality increased concurrently from 40 to 80 percent per annum, a near maximum rate of exploitation.

The shark fisheries, stimulated by wartime demands for vitamin A and by its high concentration in certain shark-liver oils, especially those of the soupfin shark, developed so rapidly as to suggest that the catch may be too high in relation to the available supply and depletion may be imminent. In the interest of economy, it has been urged that carcasses be landed to provide for the utilization of additional materials that are lost when only the livers are removed at sea and the carcasses discarded.

Great Lakes Area

The Lake Huron whitefish will soon be added to the list of species that no longer support fisheries, a fact emphasizing the need for immediate action to control adverse conditions if these fisheries are to be preserved. In 1931 the catch of these whitefish was 4,140,000 pounds, but it has declined continuously ever since; in 1939 it was 225,000 pounds; in 1940, 188,000 pounds; and in 1941, 114,000 pounds, or only 2.8 percent of the 1931 catch. Destruction of the fishery is imminent, owing to the introduction of the deep trap net in 1928 and its multiplied use during later years. Prompt control of this highly destructive gear at the outset would have saved the fishery, but warnings of the Service were not heeded until the damage was done.

The International Board of Inquiry for the Great Lakes Fisheries, established by Canada and the United States on February 29, 1940, has completed its work, and it may be forecast with certainty that the final report will recommend some form of unified control and scientific management of the fisheries to replace the present divided jurisdiction of nine regulatory bodies.

Shellfishery Investigations

In investigations directed toward the solution of practical problems concerned with the cultivation of oysters and other mollusks, utilization and management of oyster bottoms, improvement in the food quality of the product, protection against enemies and pollution, and measures for restoring stocks, special surveys were conducted in Louisiana, Texas, and Washington to determine causes of low productivity. Private oyster farming was recommended as one method of creating additional wartime food. To enable oyster growers to learn scientific methods, demonstration oyster farms were set up with State cooperation in North Carolina and South Carolina. Farming of mussels as a means of providing more food was undertaken experimentally, and only a few months' work has shown its feasibility.

Oyster cultivation has been assisted by the development of a new method of spreading quicklime on oyster beds to destroy predatory starfish and by the use of a strong solution of copper sulphate to kill young oyster drills. In the control of the boring clam, which has been found more difficult, the best method yet devised is to destroy old oystershells that harbor the pests and plant clean seeds.

Sponge Investigations

There was a recurrence of the sponge blight that caused widespread damage off Florida and the West Indies 2 years ago, but it was less intense and appeared in only a few localities. The causative organism was identified definitely as *Spongiophagus*, a water-borne fungus. The Florida grounds are showing good recovery, and if no further epizootic occurs a return to normal sponge-fishing operations will be possible within 2 years.

Management of Angling Resources

The war has given added importance to fresh-water angling resources, not only because of their recreational aspects but also because they make a significant annual contribution to the food supply. Intensification of hitherto limited activities in local fisheries for rough fishes, and the creation of new fisheries for warm-water species in areas where fishing possibilities are few, are but two of the direct means of compensating the tremendous demands now made on the commercial fisheries at all the great coastal producing centers.

The fish-management investigations that have been carried on for several years are beginning to yield positive results, particularly in the southern Apalachians, where they demonstrated that trout fishing can be improved greatly by consistent stocking, even in streams rela-

tively poor in food. They have also shown that the number of trout resulting from natural spawning is approximately the same from year to year and that increases in the numbers available to anglers must be supplied by artificial stocking. Experiments on conditioning hatchery fishes have proved that gradual acclimatization of trouts to stream conditions prior to planting results in much greater survival.

The farm-pond program, a relatively new development, offers possibilities for increasing fish production and fully utilizing undeveloped water areas. The belief of many that a fishpond once stocked will continue to produce year after year, with no attention, is erroneous. To afford optimum conditions for good fish growth, ponds must receive care similar to that of farm lands—fertilization, control of noxious weeds, and careful cropping. Experiments are gradually developing methods that the layman can apply in good pond management.

Fertilization is not only instrumental in increasing and maintaining fish production in farm ponds but is also increasingly important in the production of warm-water fishes at hatcheries. Among various fertilizers being tested are soybean meal, cottonseed meal, mixtures of sheep manure and superphosphate, and inorganic compounds. Heavy fertilization of standing waters is proving to be the most effective method of controlling undesirable aquatic vegetation, in that it does not subject fish to the hazards inherent in copper sulphate, sodium arsenite, and other chemical weed killers.

Testing artificial diets for hatchery fish was continued in various sections to devise feeding procedures that provide good growth at low cost—an important factor in raising large quantities of fishes to fingerling or even to legal size before planting in streams.

Fish Parasites and Diseases

Diseases and parasites are the greater deterrents to hatchery efficiency. New contributions to the pathology of fishes included the isolation of the causative organism of ulcer disease, a strain of *Bacteria salmonicida*, another strain of which causes furunculosis. Inoculations of healthy brook trout with a pure culture of the new strain produced the typical lesions of ulcer disease. Progress was made in the study of peduncle disease, which, it was determined, is caused by infection by bacteria not yet isolated in pure culture. Four new species of external protozoan parasites, occurring on gill filaments, were discovered as infestations of crappies. A new suctorian parasite of smallmouth black bass was described, and highly effective techniques for controlling the parasites *Costia* and *Trichodina* by means of formalin were developed, as was the fact that bacterial gill disease can be controlled by prolonged treatment with nontoxic concentrations of potassium permanganate.

Pollution Studies

Defense production, followed by actual war conditions, has magnified existing water-pollution problems and added new or little-known types of pollution. Wastes from paper, fiber, and pulp industries, including rayon and viscose plants, increased in volume; the need for petroleum and its derivatives opened new oil fields with attendant pollution hazards; and increased and unrestricted mining activities added volumes of silt and rock wastes to formerly unpolluted waters. War also brought great changes in the chemical industry that resulted in new wastes, some harmless and others dangerous, but concerning which little is known. The mobilization of large concentrations of troops created in some areas difficult problems of sewage disposal and sanitation.

Given full cooperation of the War Department, field investigators of the Service studied pollution problems at 30 ordnance plants and visited 12 others where no pollution occurred. With standard testing equipment installed on its laboratory trucks and in permanent pollution laboratories at Columbia, Mo., Fort Worth, Tex., and Spearfish, S. Dak., complete analyses of wastes were undertaken and bioassays determined the effects of their components on fishes. As rapidly as results warranted, recommendations for pollution control were made to the proper authorities, who are giving excellent cooperation in aquatic-resource preservation.

In addition to the special investigations at Army plants, regular programs for studying industrial pollution were maintained. A report on arsenical wastes was completed, and detailed researches are being made on mine wastes and return waters from irrigation projects. A manual for the study of water pollution is being prepared.

Fish Protection and Engineering Developments

Only in recent years has attention been paid to the preservation of fish in streams affected by the construction of dams for power generation and for irrigation, flood control, and other purposes. Consequently, some fisheries have been permanently lost. Detailed biological surveys as well as the solution of problems in engineering design, construction, and hatchery development are necessary for the protection of fishery resources in waters affected.

Stream surveys were conducted throughout the Columbia River Basin to appraise the effectiveness of fishery protective measures already in operation and to learn where additional protection and facilities are needed. Programs of rehabilitation were planned for use in the vicinity of Shasta Dam, Calif., where the former spawning grounds in the upper Sacramento River have been made inaccessible.

The procedure followed is essentially similar to that in operation at Rock Island Dam on the Columbia River, where the great height of Grand Coulee Dam prevents the use of ladders or other devices that enable fishes to pass over lower dams. The upstream migrants are trapped below the dam and hauled to new streams suitable for spawning or to holding ponds where they remain until the sex products ripen, can be stripped, and are incubated artificially in hatcheries. Surveys in the Willamette Valley were continued in cooperation with the War Department to determine the need for fish protection in connection with four high dams scheduled for future construction.

Fish screens have been used with some success for many years to prevent the loss of fishes in irrigation diversions, but their designs have not yet been standardized. Screens constructed and operated by the Service serve both to conserve fishes and to test new designs and methods of operation. Accumulations of silt and debris on the screens are troublesome, and efforts are being made to overcome the difficulty by use of baffles. Fungous growth also clogs the screens, and customary automatic cleaning methods have been ineffective, but various devices tested experimentally have proved satisfactory.

Research on Birds and Mammals

Waterfowl and Other Migratory Birds

To supply current information as a basis for sound regulation, investigational activities were concentrated on the migratory game birds, a resource of great recreational and esthetic value as well as of economic worth. The food value alone of the estimated annual bag of 15,000,000 ducks and geese is not less than \$5,250,000 and when used as food the game releases its equivalent weight in domestic poultry and other meats.

The Waterfowl Situation

The Service's minimum objective for a continental waterfowl population has been achieved, the inventory of January indicating that the stock of ducks and geese has grown to about 100,000,000 birds, more than $3\frac{1}{2}$ times the estimate for 1935.

Canada.—Sampling of conditions on important Canadian breeding grounds was continued in Nova Scotia, New Brunswick, Prince Edward Island, Quebec, Manitoba, Saskatchewan, and Alberta. A report on British Columbia prepared by the chief migratory bird officer of that Province was received through the cooperation of the National Parks Bureau at Ottawa. A trip was made to Newfoundland, followed by a survey in the Maritime Provinces during the hunting

season. In eastern Canada there was a gratifying increase in numbers in most species of nesting ducks and geese. Only those of the important black duck appeared to have decreased slightly. During the fall migration, however, this species appeared in normal numbers. In the Prairie Provinces there was little change in the general water situation. Many sloughs and pot holes visited in 1940 were dry, whereas other areas that formerly grew wheat were supporting broods of ducks. Insufficient water to last through the season frequently resulted in waterfowl losses. A few moderately severe outbreaks of botulism occurred, and comparative analysis indicated that the number of birds produced probably varied little from that of 1940. Water levels were below normal in the Athabaska Delta, and although food was abundant most lakes lacked good rearing cover. As a result ducks were less common than the year before, and it seemed probable that many had continued northward to the McKenzie Basin. The great interior valleys of British Columbia supported a somewhat larger population of breeding waterfowl than in 1940, which was particularly gratifying in the case of the diving species.

Alaska.—The biologist of the Mississippi Flyway established summer headquarters at Chevak, in the lower Yukon Valley and from that point made an extensive survey of the vast breeding grounds of the region, which indicated a satisfactory increase in both ducks and geese.

Mexico.—The biologist of the Pacific Flyway continued studies in the Valley of Mexico and in western areas. The number of ducks reaching these winter quarters was far below normal, attractive climatic and water conditions keeping them in the United States. Geese and cranes were present in numbers that compared favorably with those of other recent seasons.

United States.—Studies in the United States were concentrated chiefly about units of the national wildlife refuge system. Abundance of water throughout the breeding grounds resulted in the highest waterfowl production in many years, a fact that was confirmed by reports from volunteer migration observers. In the North Central States and generally on the Pacific coast, sportsmen had good shooting, apparently close to normal. Elsewhere, however, due to continued mild weather, the kill was light.

Other Migratory Birds

Studies of the woodcock on its breeding grounds in Pennsylvania, Maine, and the Maritime Provinces indicate slow recovery from the losses suffered 2 years ago. Regulatory action affording complete protection to the Wilson's snipe was fully justified, as reports indicate a continued decrease in its numbers. The causes are not definitely

known, and this species should be made the subject of continental investigation. Studies of the status of the mourning dove were made during fall, winter, and spring, particularly in the Southeastern States. Recovery of this species, especially the eastern form, has not been satisfactory, indicating need for additional restrictions on shooting. A definite management plan for the white-winged dove will result from investigations being concluded during the calendar year 1942, including those of the biologist of the Central Flyway who worked south through eastern Mexico to Guatemala and El Salvador, and of a special party assigned to northwestern Mexico.

Distribution and Migration Records

For reasons of economy and to limit the use of aluminum needed for war purposes, bird banding was drastically curtailed. Though practically no new permits were issued, and work with colonial species was largely suspended, cooperators reported the banding of 280,842 birds, of which 46,758 were ducks and geese. Returns and recoveries totaling 25,846 brought the grand total to more than 292,000. Distribution and migration data received from 225 observers added 44,340 records to the files. In addition 900 locality and 817 bibliographic references were compiled.

Wildlife Surveys and Management

Wildlife Relationships to Forest and Range

In the Lake States the goldfinch, junco, chipping sparrow, and Brewer's blackbird, and the white-footed mouse, chipmunk, and red squirrel, seriously reduce both the natural and artificial regeneration of jack pine. The practical remedy after fires or logging operations is to plant seed at ebbs in these animal populations and to treat the seed with certain recently developed repellents. Experiments show that bird damage to longleaf pine reproduction in Mississippi and Florida, is partially offset by direct seeding following planned burning.

Studies on the San Joaquin Experimental Range, Calif., reveal that the ground squirrel, kangaroo rat, and cottontail rabbit compete directly with livestock for forage. Damage by the pocket gopher to vegetation in foothill areas is adequately compensated through benefits resulting from the presence of this rodent. Pneumonia and malnutrition contribute to constant fluctuations in the numbers of all species of rodents and rabbits and of some species of birds. Investigations at the Squaw Butte Experimental Range, Oreg., show that rodents prevent the reseedling of crested wheatgrass in midsummer. The remedy appears to be artificial seeding in periods of rodent scar-

city. A plague of meadow mice destroyed 50 percent of grasses and 25 percent of bitterbrush and other browse plants in some eastern Oregon areas. Experiments were begun in Montana and Idaho to determine the effects of fire on rodent populations and the measures necessary to protect forest plantations from rodents. Pocket gophers are of importance on Rocky Mountain and Intermountain range areas in relation to livestock grazing. Overutilization of range by both livestock and deer constitutes a serious problem in Nevada and Idaho forests, and recommendations were made for liberal reductions in deer and livestock herds in critical areas. Damage to ponderosa pine in Arizona by Abert squirrels was controlled by live trapping for stocking other areas and by supervised hunting.

In Arizona and New Mexico jack rabbits were most abundant on overgrazed livestock areas. Smaller numbers were noted on weedy ranges, and an increase on good grass lands. Active cooperators in the work on forests and ranges included the Forest Service, Grazing Service, Soil Conservation Service, and State conservation departments.

Cooperative Wildlife-Management Research

Active cooperation with the land-grant colleges, State conservation departments, and the American Wildlife Institute was continued in wildlife management research in 10 States representative of their regions (table 1). As in preceding years the major objectives were: (1) Research on important problems in wildlife management, (2) aid in training young men for management and investigative work, and (3) cooperation with all agencies in translating research findings into active programs and practices. A brief tabulation of activities follows:

TABLE 1.—Activities in cooperative wildlife-management research, 1942¹

Units	Projects		Graduate students trained	Active cooperators	Units	Projects		Graduate students trained	Active cooperators
	Carried	Completed				Carried	Completed		
Alabama.....	6	0	7	15	Pennsylvania...	11	2	6	20
Iowa.....	10	2	8	17	Texas.....	7	0	7	18
Maine.....	8	3	6	18	Utah.....	9	4	6	20
Missouri.....	17	7	13	22	Virginia.....	11	5	9	16
Ohio.....	12	5	8	15					
Oregon.....	7	4	8	16	Total.....	98	32	78	177

¹ Wildlife under investigation: Wild turkey, quail (bobwhite and mountain), ring-necked pheasant, grouse (ruffed and sage), mourning dove, woodcock, Hungarian partridge, deer (whitetail, mule, and blacktail), antelope, snowshoe hare, cottontail rabbit, squirrel (gray and fox), muskrat, beaver, skunk, opossum, weasel, red fox, predators, and waterfowl.

Biological Investigations on Wildlife Refuges

On the Wichita Mountains Wildlife Refuge, Okla., rainfall above normal produced a heavy growth of annual forage plants and an increase in long grasses, possibly crowding out some of the valuable short grasses. The small herd of introduced pronghorn antelope is slowly increasing. On the Sheldon National Antelope Refuge, Nev., and the Hart Mountain National Antelope Refuge, Oreg., competition between wild game and domestic stock and the range requirements of the antelope were studied. A cover-type map of the Sheldon Refuge was completed in cooperation with the Grazing Service and a management plan projected.

State Biological Surveys and Faunal Studies

Investigations were continued on a biological survey of the State of Washington, a report on the biological survey of the Aleutian Islands is nearing completion, a manuscript was completed for publication as a North American Fauna on the habits, classification, and distribution of North American wolves, work progressed on revisions of the classification of American pumas and the white-tailed deer, and a study was completed of the marten of the northern Rocky Mountains, with plans for its management. From surveys an estimate was made of 5,964,391 big-game animals in the United States at the close of 1940.

The mammal collection was increased by 800 specimens, 496 specimens were identified for other institutions, and 706 were loaned. To the bird collection were added 935 specimens, 819 specimens were identified for other institutions, and 716 were loaned. A leaflet describing the Biological Surveys mammal collection was issued. Service biologists described 12 new mammals belonging to the genera *Canis*, *Lemmiscus*, *Lutra*, *Nasua*, *Onychomys*, *Peromyscus*, *Pitymys*, *Tamiasciurus*, and *Thomomys* and one new bird of the genus *Colinus*. The Biological Surveys laboratories were used by more than 150 cooperative research workers.

Economic Investigations on Wildlife

Wildlife relationships.—Studies were continued in cooperation with the Bureau of Entomology and Plant Quarantine, Department of Agriculture, of the relationship of birds to rice production, particularly to the control of insect pests of rice. Investigations were made of waterfowl depredations on crops in Colorado, Utah, Idaho, and Washington and of the effectiveness of control methods. In surveys of damage by starlings to horticultural crops, methods for prevention

were tested. Economic relationship studies involved bald and golden eagles, band-tailed pigeons, gallinules, owls, foxes, raccoons, and bobcats. Cooperation in wildlife food studies was extended to various Federal and State agencies, and eight State conservation agencies utilized the Service's laboratory facilities for work on wildlife problems. Completion of field research on the economic status of the Canadian porcupine included the development of measures that largely eliminate losses due to local concentrations in timber and forest reproduction and maple-sugar production areas and in orchard and truck crops. A color motion picture on the subject was filmed and will soon be available for public use.

Control Methods

Coyote control.—Research on coyote control methods included tests to determine the efficacy of a new device, the "coyote-getter," a toxin-discharging cartridge. Results obtained from 82,000 trap-set days and 107,000 set days with the new device disclosed that the latter is less destructive than steel traps to domestic sheep, big game, certain furbearers, and large birds of prey and that the trap is superior for use in cattle pastures and in sections containing bears and domestic dogs, but more subject to interference by rodents. The coyote-getter was generally more effective in severe weather; the trap in mild. The new device is being used to a limited extent in coyote control in several Western States to supplement trapping operations.

New or substitute control poisons.—As the war has cut off importation of thallium, squill, and strychnine, programs of predator and rodent control must depend upon poisons that can be effectively used as substitutes. Tests thus far made indicate that zinc phosphide, though not so consistently satisfactory, may serve in place of strychnine and thallium in rodent control.

Propagation of red squill.—Toxic red squill, a most important rat poison formerly imported from Mediterranean countries can be grown in the United States, although the supply of bulbs and seed for this purpose is limited. Experimental propagation of the plant is being developed through cooperation with the Bureau of Plant Industry, of the Department of Agriculture. Red squill requires 4 to 5 years, however, to mature. It is hoped that through careful selection and tests marked increase can be made in the toxicity of bulbs grown. Numerous cooperators from Florida to southern California are joining in this effort. The process for the fortification or strengthening of low-grade squill powder developed by the Service last year is being put to practical use in rat-control work. In addition to the Government-operated fortification unit at Denver, a plant was set up in Louisiana under technical direction of Service scientists.

Control of rabbits on southwestern ranges.—Ranches in the Southwest have been periodically confronted with ravages by jack rabbits and other rodents on the open range, particularly under the combined pressure of livestock and drought. Removal of livestock alone will not correct the situation—the rabbits also must be removed for a time. An investigator is working on a low-cost method for range lands of relatively low forage production.

Black rat control.—An experienced investigator was sent to Florida to develop control methods for black and Alexandrian rats in the southern coastal areas and at ports where the entrance of rats infested with plague or typhus-bearing parasites might occur.

Eagle studies.—Federal legislation giving protection to the bald eagle in all parts of continental United States except Alaska has focused attention on its economic relationships, but investigations of the status of this and the golden eagle have been largely stopped by war conditions. The bald eagle is relatively uncommon over much of the United States though still abundant in the coastal region of southeastern Alaska, despite being long subject to bounty payments there.

Upland Game Birds

Nutrition and physiology of upland game birds.—As a basis for management, comparative studies were made of the feeding of immature ring-necked pheasants and ruffed grouse. In studies of nutritional requirements of breeding bobwhite quail the effects of various grinds of feed on the health of these birds were extensively tested, certain ones showing important results in the lowered death rate of young birds. The symptoms of vitamin A deficiency in quail were determined.

Upland game management.—The results of stocking a pure strain of wild turkey on Bull Island, S. C., in 1940 were encouragingly successful, as there was a marked population increase after two breeding seasons. Cooperating with the Forest Service, Department of Agriculture, a management unit known as the Wambaw Wild Turkey Management area was established on the Francis Marion National Forest, S. C.

Waterfowl Habitat Studies

Marsh management.—Surveys were completed of the 200,000 acres of wildlife refuge land in Louisiana, and recommendations made to State authorities for needed biological improvements for fur, fish, and other wildlife resources. Investigations of waterfowl habitats demonstrated the relation of shallow water areas and cyclic organisms to the occurrence of duck sickness and pointed to remedial management measures. Grazing was shown to be an aid to maintenance of desir-

able goose and shorebird habitat. Habitat and economic relations of the sandhill crane were investigated on breeding grounds in Oregon and on wintering areas in New Mexico and Texas.

Mosquito control in wildlife habitat.—Completion of a 4-year study on means of coordinating necessary mosquito control with wildlife conservation demonstrated that by developing appropriate water-control structures in coastal or tidal marshes so as to maintain fishes at all times, mosquito breeding usually is practically eliminated and that improving such marshes for waterfowl may afford local control of mosquito production. In cooperation with the Tennessee Valley Authority, an analysis was completed of the results of malaria-control practices at power and flood-control reservoirs.

Propagation of waterfowl food plants.—In studying optimum storage conditions for the germination of seeds of five valuable species of bulrush, in cooperation with the Bureau of Plant Industry, it was found that material stored wet gives uniformly better results than that kept dry. The effects of changing salinities and of silting on the production of marsh and aquatic plants were recorded for the tidal section of the Potomac River. Successful experimental plantings of waterfowl foods were made in storm-created ponds at the Delta National Wildlife Refuge, La.

Control of pest plants.—Changing undesirable to desirable plant associations and maintaining the latter is imperative in developing and managing areas for producing game and fur. Intensive investigations were made on refuges in Louisiana, Tennessee, New Mexico, Oregon, Utah, and Maryland. Experiments in plant growth control by alteration of water levels, by planting desirable competing species, by use of chemical agents and mechanical devices, and by grazing and burning, showed that each method is effective under appropriate conditions.

Fur Animal Conservation and Restoration

Wartime Use of Furs

To render maximum service toward insuring that our armed forces in cold climates shall be properly equipped with warm clothing, the fur resources program was reorganized, cooperative arrangements were entered into with the Quartermaster Corps and the War Production Board, and the Secretary of War appointed an official of the Service as fur consultant. The Service supplied samples of numerous furs for use in determining their frost-resistant qualities and testing their suitability for sleeping bags and certain types of clothing. At the request of war agencies, comparative tests of furs and fabrics were initiated in cooperation with the Bureaus of Home Economics

and Animal Industry of the Department of Agriculture. The receipts from furs sold by the Service amounted to \$2,466,308. These comprised furs taken on national wildlife refuges, \$73,891.77; predatory animal pelts, \$22,389.47; experimental and miscellaneous skins, \$9,328.76; and fur seals and blue foxes, \$2,360,698.

Cooperative Research

Fur-fiber investigations.—Continuing the study of factors contributing to desirable quality in pelts of fur animals, a preliminary analysis was made of inherited fur fiber characteristics associated with woolliness in domestic rabbits. Studies of luster in Karakul sheep pelts were furthered by construction of new apparatus, and information on growth characteristics of Persian lamb curls was assembled from available foreign literature, contributing to investigations conducted in cooperation with the Bureau of Animal Industry. Toward the end of the year the entire program was so revised as to handle new projects having direct bearing on the war. These include studies of the suitability of furs and fur fibers for war use, and the utilization of waste fur and fur scraps.

Reproduction studies.—In studies on the reproductive cycles of fur animals, continued in cooperation with Swarthmore College, work on the silver fox was concentrated on the relation of onset of heat to ovulation, maturation of the ovum, sperm transport and respiration, spermatogenesis, and on chromosomes. A survey of breeding practices in mink ranching was begun. Relationship between delayed implantation and long gestation period in the marten was established. Fur seal reproductive and embryological material was also studied.

Nutritional research.—Nutritional studies on fur animals conducted in cooperation with Cornell University have shown that silver foxes require vitamins A, B₁, D, nicotinic acid, and the antigrey hair factor. The minimum requirements of foxes and minks for vitamin A were determined. The effects of thiamin deficiency and Chastek paralysis in foxes were found to be identical. A series of digestion trials showed that both minks and foxes digest cooked starch to the extent of 90 percent or more but that they do not digest raw starch so well. An estimate was made of the maintenance-energy requirement of adult foxes and minks. Studies were continued on the digestibility of high protein feeds by foxes and on the relation of nutrition to urinary calculi and Chastek paralysis in minks.

Fur-Animal Experiment Stations

New York.—Wartime conditions have demonstrated the wisdom of developing substitutes for raw meat in feeding fur animals. Experiments at the station near Saratoga Springs showed that beef meal, fish

meal, and tripe can be used to replace half the raw meat in summer mink rations. Preliminary studies indicated that mating minks on two consecutive days after March 9 or 10 is as satisfactory as the usual practice of mating them several times at weekly intervals. Observations were made of the effect on the quality of fox pelts of shaded fur sheds as compared with open, raised wire pens. Data obtained during the fox breeding season indicated a definite correlation between vulvar size, cell structure, and ovulation. Experiments are in progress to determine the minimum calcium requirements of growing fox pups.

California.—In a 27-month test at the Rabbit Experiment Station at Fontana, in which 56 does and 2,758 young were self-fed during the lactation period, it was found that a ration containing a limited number of cereal grains is satisfactory when the rabbits are given free choice of one or more grains in conjunction with a plant protein supplement and legume hay. The normal body temperature for rabbits was determined to be 103.6° F. Encouragement was given to the use of domestic rabbit meat in the Food for Freedom campaign.

Maryland.—Muskrat investigations at the fur animal field station on the Blackwater National Wildlife Refuge included correlation of house count with pelt production per acre and field studies of trapping management methods, effects of sex and season on market classification of pelts, and feeding and breeding habits. The value of fur research on the refuge was enhanced by the establishment there of a Weather Bureau observation unit. Studies of the muskrat and nutria in pens were expanded. Musk glands of muskrats and beavers and testes of muskrats were collected for the Bureau of Animal Industry for analyses with a view to the isolation of new compounds to point the way to an interpretation of steroid hormone metabolism. Embryological material also was assembled to complete the representation for the year. Upon request, a study was made of the possibilities for raising muskrats in the Mobile Bay Delta, Ala.

Wildlife-Disease Investigations

Fur animals.—Through laboratory and field tests an increased margin of safety in distemper vaccine for use with farm-raised minks has been achieved by prolonged exposure of the virus to formalin. A valuable contribution to knowledge of the hosts of canine distemper was made by the detection of this disease in a zoological park in red, gray, and kit foxes, raccoon dogs, coyote-dog hybrids, and dingoes. A source of loss in domestic rabbit has been eliminated by the recognition and removal from forage of the woollypod milkweed (*Asclepias eriocarpa*).

Big game.—The practice of vaccinating the buffaloes on game refuges against brucellosis is being continued, and a considerable num-

ber of young immunized animals are now safe for introduction into new localities.

Bird diseases.—Measures for the control of infectious rhinitis in quail have been improved by the use of bacterins in combating the secondary invading organism. An important relationship of the bacterium *Pseudomonas aeruginosa* to *Clostridium botulinum* in outbreaks of western duck sickness has been discovered, and steps are being taken to apply this finding in more effective control measures.

National Park Wildlife

The study of the relations of predators to Dall sheep and caribou, begun in 1939 in Mount McKinley National Park, was completed. In the presence of a rather stable wolf population the sheep numbers seem not to have varied greatly in recent years, as it is generally the weaker animals that are captured. Wolf predation on lambs during their first winter seems the most important factor in stabilizing the sheep population. The caribou, which is the main wolf food, is a buffer species in respect to sheep and appears to be maintaining its numbers. No evidence was found of eagles preying on Dall sheep lambs.

A thorough range survey of Glacier National Park led to the coordination of the horse-grazing program with improved wildlife, vegetation, and soil-management practices. In Kings Canyon National Park, studies of grazing pressure by pack and saddle stock led to recommendations for the protection of scenic and recreational areas. Studies were made of livestock grazing in Arches and Zion National Monuments and Carlsbad Caverns National Park, and of winter range in Yellowstone National Park and of the possibilities for disease and probable consequent losses in big game. Survey of the critically overbrowsed condition of Zion Canyon in Zion National Park showed that tree and shrub reproduction is impossible with present deer numbers. As previous live-trapping of deer proved ineffective, more drastic reduction is imperative. Damage to forests by porcupines was investigated in Bryce Canyon National Park and Montezuma Castle National Monument.

Inventories were made of wildlife populations in Kings Canyon, Sequoia, and Kings Mountain National Parks, Joshua Tree National Monument, and Cape Netarts State Park. A survey of Custer Recreational Demonstration Area was made to determine the possibility of reintroducing big-game mammals. Inventories were made of the flora of Organ Pipe, Arches, and White Sands National Monuments and of the proposed Big Bend National Park. Cooperation was extended to military authorities at Fort Knox in reintroducing game and fur animals and at Fort Story in plans for mosquito control.

Investigation of aquatic resources were made in Kings Canyon National Park and Boulder Dam National Recreational Area. Waters of five recreational demonstration areas in Pennsylvania were inspected by Service and State biologists in a movement to formulate a fish-stocking policy for all areas in that State. A study of waters in Shenandoah National Park was made as a basis for determining streams to be stocked and for preparing fishing regulations.

Wildlife on Indian Lands

Wildlife research and conservation activities of this Service were this year extended to cover all Indian lands in the United States—about 55,000,000 acres. Under an agreement with the Indian Service, approved August 7, 1941, a project for investigations of wildlife on Indian lands was organized in the Fish and Wildlife Service to work on the conservation of wildlife resources of reservations and the increase of food and fur therefrom. Practical problems studied included food production from salmon, bison, deer, and other species; fur production from beavers, muskrats, and other fur animals; rodent and predator control; conservation and management education; drafting wildlife laws; and coordination of Indian and State conservation activities. The facts disclosed and the recommendations made had the following results: Six tribes enacted laws to maintain high yields of prime beaver pelts; management of the Crow buffalo herd, largest in the United States, was directed toward meat and hide production; salmon fishing was regulated on the Columbia River and on the Quillayute Reservation, Wash.; Indian claims to fish trap sites in Alaska were suspended to prevent hindrances to salmon production during the war; and wartime development of wildlife resources on the Colorado Reservation was begun by using Japanese evacuees.

National Wildlife Refuge Program

Land Acquisition

The program of land acquisition for national wildlife refuges was greatly curtailed by economic conditions brought on by the war. Early in the year it was decided not to institute arbitrary condemnation cases but to proceed only with those already filed.

The Migratory Bird Conservation Commission, at its only meeting of the year, on January 27, approved the Service's recommendation for the lease of 1 tract of 4,756 acres and the acquisition of 203 parcels totaling 23,511 acres in 22 refuge units, as follows: Bear River, Utah (an easement); Blackbeard, Ga. (headquarters site); Brigantine, N. J., 4.6 acres; Chassabowitzka, Fla., 4,837 acres; Chincoteague, Md.-Va., 10,000 acres; Horicon, Wis., 695 acres; Kentucky Woodlands, Ky., 248 acres; Lake Ilo, N. Dak., 144 acres; Lake Isom, Tenn., 11 acres;

Little Pend Oreille, Wash., 681 acres; Long Lake, N. Dak., 320 acres; Lower Klamath, Oreg., 1,275 acres; Necedah, Wis., 87 acres; Okefenokee, Ga., 980 acres; Parker River, Mass., 417 acres; Reelfoot, Tenn. (headquarters site); Santa Ana, Tex., 2,014 acres; Skagit, Wash., 81 acres; Tamarac, Minn., 212 acres; Union Slough, Iowa, 905 acres; White River, Ark., 532 acres; and Willapa, Wash., 65 acres.

On 29 refuges 121 acquisitions were closed, adding 58,394 to the acreage already under the jurisdiction of the Service. Appraisals were made of 331,000 acres for the program under the Federal Aid to Wildlife Restoration Act, and by Executive order there were reserved 3,114 acres of public lands in Arkansas and Washington under the jurisdiction of the Department of the Interior for use by the State game commissions in connection with State wildlife refuges established under that act.

Executive orders added 4 national wildlife refuges—the Kenai National Moose Range and the Kodiak, both in Alaska; the Safford, Ariz., and the Susquehanna, Md., involving 4,657,000 acres of public domain, 245 acres transferred from other agencies, and 2,895 acres leased—and one wildlife-management area of 81,049 acres, the Beltrami, Minn., for administration under Service custody by the Minnesota Department of Conservation, through the transfer of jurisdiction from the Department of Agriculture to the Department of the Interior; and enlarged the St. Marks Refuge, Fla., by 40 acres of public lands. Three easement refuges—the Creedman Coulee, Halfbreed, and Lamesteer, Mont.—involving 80 acres of public domain and 6,826 acres of land under gratuitous easement were added.

Surveys were made of 654 miles of boundary and interior lines; and 87 miles of boundary were staked for fence construction. Survey descriptions for title examination and preparation of deeds of conveyance for 411 tracts were completed on approximately 86,731 acres.

In March the Bureau of Yards and Docks of the Navy Department made the first of many requests for appraisals of lands for war purposes, and at the close of the year practically the entire land-acquisition personnel was engaged in evaluating and surveying lands and preparing reports and maps for that Department.

Development of Refuges

Despite great curtailment in the use of CCC, WPA, and NYA labor on wildlife refuges, development progressed considerably. The WPA furnished 5,747 man-months of employment, of which 1,173 were used on road improvements essential in the national emergency. The projects were operated principally in localities where relief labor was not required in connection with the war program.

In the past the CCC provided the labor necessary for extensive development operations on Federal refuges, but this year, in order to

furnish the greatest possible aid to the war program there was a transition of CCC activities from refuge development work to important war work and the number of camps assigned to the Service was reduced from 36 to 12. Of these, 4 were engaged in the development and improvement of military areas, and arrangements were completed for utilizing 8 camps on military areas or on projects necessary for the protection and conservation of national resources that are important to the war program. The work accomplished by the 4 military camps is typical of the contribution made to the war program by the CCC. It consisted of constructing and improving truck trails, fences, communications systems, bomb-storage shelters, pipe lines, rifle ranges, and recreational areas and in improving areas by mosquito control. Camps not detailed to military areas were assigned the important task of protecting natural resources, which involved the construction and maintenance of fire breaks and fire lines, extensive reduction of fire hazards, fire fighting, completion of water-control structures, dikes, dams, and other water-utilization projects, and biological development.

Administration and Management

The number of national wildlife refuges now administered by the Service is 272 (17,643,915 acres) (table 2), of which 254 (9,592,713 acres) are in the United States and 18 (8,051,202 acres) in Alaska, Hawaii, and Puerto Rico, 2 having been dropped from the list—Siskiwit, Mich., and Expedition Island, Alaska. Executive orders established 7 new refuges, and 8 refuges (1,272,407 acres) were placed under active administration with permanent personnel assigned. Exclusive of easement refuges, 101 units (11,960,268 acres) are now operated by a staff of 261 permanent and 36 part-time personnel, about the same as last year, although the acreage increased 12 percent, assistance from CCC and WPA was practically eliminated, and many employees were on military furlough with the armed forces. War restrictions on the purchase of tires, equipment, and repair parts reduced the operation of automotive and other equipment drastically, the permitted mileage for cars and trucks from a third to a half that of the previous year.

TABLE 2.—Classification and acreage of national wildlife refuges administered by the Fish and Wildlife Service

Classification	Number	Acres
For migratory waterfowl	184	2,962,025
For other migratory birds and general wildlife	25	3,973,754
For colonial nongame birds	46	104,149
For big game	16	10,601,364
Patuxent Research Refuge, Md.	1	2,623
Total	272	17,643,915

Funds received from the Sixth Supplemental Defense Act of 1942 for the emergency protection of forests, forest industries, and important facilities were expended for that purpose on a number of refuges. Fires on refuges totaled 169 and involved 32,195 acres. Moneys made available under a special appropriation for soil and moisture conservation activities were allotted to 10 refuges.

For use for bombing and artillery ranges, troop maneuvers, military bases, emergency landing fields, and other war purposes, the Service turned over to the War and Navy Departments for the duration 972,987 acres of refuge lands—primarily submarginal areas in the South and Midwest and parts of large areas in the West used jointly for wildlife and livestock. No highly developed wildlife areas were released and little or no harm to wildlife has resulted from military activities.

Bird Refuges

The following bird refuges were established by Executive orders: Ash Creek (Safford), an upland game-bird area of 240 acres in Graham County, Ariz., transferred from the Soil Conservation Service (E. O. April 20, 1942); Susquehanna, an area of 2,900 acres in Cecil and Harford Counties, Md., primarily a resting and feeding refuge for ducks during migration (E. O. June 23, 1942); Creedman Coulee, an easement area of 2,684 acres in Hill County, Mont., as a waterfowl nesting and resting refuge (E. O. October 29, 1941); Halfbreed Lake, an easement area of 3,097 acres in Stillwater County, Mont., for waterfowl nesting and resting (E. O. May 19, 1942); and the Lamesteer, an easement area of 800 acres in Wibaux County, Mont., also for waterfowl nesting and resting (E. O. May 19, 1942).

Most of the waterfowl nesting refuges had more water and were in better condition than ever before, and several had an abundance of water for the first time since their establishment. The spring run-off gave the water-control structures the most severe test since their installation. Most of them proved adequate, although some suffered damage necessitating minor repairs.

Big-Game Refuges

Two new big-game refuges were established, both in Alaska: The Kenai National Moose Range (2,000,000 acres), for the protection of the giant Kenai moose and other wildlife (E. O. December 16, 1941); and the Kodiak National Wildlife Refuge (1,957,000 acres), for the protection of the brown bear and other wildlife (E. O. August 19, 1941).

The numbers of big-game animals on the fenced big-game areas are given in table 3.

TABLE 3.—Number of animals on fenced big-game areas maintained by the Fish and Wildlife Service

ANIMALS AS OF MAY 31, 1942

Refuge	Buffalo	Elk	Antelope	Big-horn sheep	Deer		Texas long-horn	Total
					White-tailed	Mule		
National Bison Range, Mont.....	497	143	-----	12	42	170	-----	864
Fort Niobrara National Wildlife Refuge, Nebr.....	123	31	-----	-----	8	5	37	204
Sullys Hill National Game Preserve, N. Dak.....	16	12	-----	-----	10	-----	-----	38
Wichita Mountains Wildlife Refuge, Okla.....	549	181	49	-----	626	-----	241	1,646
Total.....	1,185	367	49	12	686	175	278	2,752

YOUNG BORN IN CALENDAR YEAR 1941

National Bison Range, Mont.....	113	24	-----	3	1	21	-----	162
Fort Niobrara National Wildlife Refuge, Nebr.....	29	6	-----	-----	2	-----	7	44
Sullys Hill National Game Preserve, N. Dak.....	6	2	-----	-----	4	-----	-----	12
Wichita Mountains Wildlife Refuge, Okla.....	70	30	14	-----	50	-----	41	205
Total.....	218	62	14	3	57	21	48	423

Harvesting Refuge Crops

Extensive habitat improvement and other development work on refuges is resulting in greatly increased wildlife production. The restoration of drained marsh areas has served to increase substantially not only the numbers of waterfowl but also of fur animals, the pelts of which are of great value in outfitting troops in northern climates. In all, 153,000 muskrats and other fur animals were taken from refuge lands. Reconditioned water areas are producing enough fishes to permit the removal not only for sport but also for commercial purposes, thus supplementing the take of salt-water fishes that has been reduced because of naval and military coastal activities.

To keep the herds of big game at a level consistent with the available range, 136 buffaloes, 71 elk, 60 white-tailed deer, and 17 Texas longhorns were transferred from the 4 fenced big-game refuges to State conservation commissions for restocking or were sold or donated for exhibition, propagation, or food. The harvesting of wildlife from the refuges for restocking other public lands and through controlled public hunting increased greatly. Permits issued to State conservation departments authorized removal of 41,200 ring-necked pheasants, 1,215 deer, and 1,620 fur animals for restocking State areas, and more than 50,000 ducks and upland game birds were taken on lands open to public hunting. Grazing by domestic livestock, hay harvesting, agricultural crop production, timber cutting, and other economic uses of refuge lands were permitted wherever they would have no adverse effect upon wildlife. The total revenue from the lease of refuge lands and the sale of surplus refuge products was \$100,396.26.

Federal Aid in Wildlife Restoration

The benefits of 4 years' operation of the Federal aid in wildlife restoration program under the Pittman-Robertson Act are becoming increasingly apparent. Projects approved are being utilized by State game departments to gather information on scientific and administrative problems for which State funds had not been available; areas for wildlife restoration and perpetuation are being acquired; and developments are being made on private and public lands for game and fur production. The Federal Aid to Wildlife Restoration Act was amended to extend its benefits to Alaska, Hawaii, Puerto Rico, and the Virgin Islands. Restoration projects were inaugurated in all these areas except Hawaii, where action was postponed because of the war.

Acquisitions made by 18 States this year for wildlife breeding, feeding, and resting grounds totaled 150,081 acres, representing largely additions to existing State programs. Examples are the placing of many scattered refuges and game management units in Pennsylvania, Michigan, Iowa, Utah, and Washington; acquisition by Kansas of 6,800 acres in the Cheyenne Bottoms for developing a combination waterfowl refuge and public shooting ground; purchase by Wisconsin of land to restore the southern part of the famed Horicon Marsh; and purchase by Florida of 19,130 acres in the Charlotte County game management unit for deer, wild turkeys, and bobwhites.

A comparatively recent development in wildlife management has been the restoration by Federal aid of desirable species through soil-conservation practices. Game departments of Virginia, Florida, Alabama, Mississippi, Louisiana, Arkansas, Texas, Nebraska, Idaho, and Washington are supplying farmers in soil-conservation districts with seeds of soil-holding plants for use on field borders, gullies, and odd corners that cannot be successfully cultivated but will provide essential cover and food for game birds and mammals. Missouri conservation officials have cooperated with farmers in building ponds in areas deficient in surface water, to serve as refuges and breeding places for fur animals, waterfowl, and upland game birds and to provide water for domestic animals.

Many States are stocking depleted ranges with native wild-caught birds and mammals. Texas had unusual success with wild turkeys and reports increases up to 400 percent from transplantings. Virginia, West Virginia, Florida, and Texas transplanted white-tailed deer from areas where plentiful to those where scarce. New Mexico, Colorado, Wyoming, and Texas did the same with antelopes; and Alabama, Mississippi, Idaho, Oregon, Montana, and Wyoming, with beavers.

The 46 cooperating States, Alaska, the Virgin Islands, and Puerto Rico submitted and had approved 301 projects involving Federal funds of \$2,075,476.76. Of these projects, 111 (\$857,497.49) were for the purchase of lands, 99 (\$620,001.39) for developments of lands and

waters, 70 (\$490,901.64) for surveys and investigations into problems of wildlife management, and 21 (\$107,076.24) for direction and coordination of the wildlife restoration programs undertaken by the States.

TABLE 4.—Status of Federal aid to wildlife restoration funds for the fiscal year 1942

State, Territory, or possession	Federal apportionment fiscal year 1942	Unobligated balance June 30, 1941 ¹	1942 funds obligated June 30, 1941	Federal funds unobligated July 1, 1941 ²	Obligations during fiscal year 1942	Balance June 30, 1942
Alabama	\$40,725.36		\$2,773.89	\$37,951.47	\$27,977.02	\$9,974.45
Arizona	53,149.13	\$9,616.07		62,765.20	55,336.75	7,428.45
Arkansas	31,388.09	14,099.28		45,487.37	22,219.81	23,267.56
California	111,800.92	82,032.68		193,833.60	150,572.91	43,260.69
Colorado	70,421.06		7,133.53	63,287.53	50,202.55	13,084.98
Connecticut	7,146.33		1,422.10	5,724.23	5,554.51	169.72
Delaware	3,420.30		3,028.64	391.66	³ 81.18	472.84
Florida	34,099.30	28,406.10		62,505.40	58,874.69	3,630.71
Georgia ⁴	37,902.31	32,644.80		70,547.11		70,547.11
Idaho	52,386.41		16,665.72	35,720.69	35,720.69	
Illinois	78,081.94	2,039.52		80,121.46	22,417.74	57,703.72
Indiana	75,403.24	8,745.41		84,148.65	65,535.90	18,612.75
Iowa	54,319.36	41,463.70		95,783.06	64,143.54	31,639.52
Kansas	48,668.07	34,497.62		83,165.69	52,287.41	30,878.28
Kentucky	33,031.15	29,363.32		62,394.47	19,276.18	43,118.29
Louisiana	36,502.37	7,213.98		43,716.35	38,243.82	5,472.53
Maine	30,370.71	1.33		30,372.04	24,810.26	5,561.78
Maryland	17,372.27	12,234.61		29,606.88	16,932.99	12,673.89
Massachusetts	16,501.20	779.70		17,280.90	7,467.78	9,813.12
Michigan	143,946.94	93,153.20		237,100.14	149,147.54	87,952.60
Minnesota	76,662.12	33,275.94		109,938.06	71,815.40	38,122.66
Mississippi	39,711.19		19,501.30	20,209.89	12,695.01	7,514.88
Missouri	61,904.65		22,436.95	39,467.70	533.95	38,933.75
Montana	77,247.05	14,070.33		91,317.38	39,942.03	51,375.35
Nebraska	54,155.19	12,324.47		66,479.66	48,157.53	18,322.13
Nevada ⁴	48,023.76	43,456.27		91,480.03		91,480.03
New Hampshire	12,974.66		2,279.24	10,695.42	6,307.79	4,387.63
New Jersey	24,993.46		1,516.77	23,476.69	9,026.46	14,450.23
New Mexico	55,671.21	47,251.85		102,923.06	58,847.90	44,075.16
New York	120,204.86		2,911.55	117,293.31	53,993.63	63,299.68
North Carolina	47,863.69	304.67		48,168.36	44,381.95	3,786.41
North Dakota	36,483.89	2,460.16		38,944.05	28,586.12	10,357.93
Ohio	104,909.05	87,387.36		192,296.41	133,114.23	59,182.18
Oklahoma	47,090.65		32,715.71	14,374.94	³ 1,178.81	15,553.75
Oregon	56,415.32	23,443.04		79,858.36	42,599.20	37,259.16
Pennsylvania	130,083.67		13,360.69	116,722.98	115,194.57	1,528.41
Rhode Island	1,953.42		1,342.29	616.13	³ 396.04	1,012.17
South Carolina	28,916.39		6,266.27	22,650.12	14,695.18	7,954.94
South Dakota	44,979.44		31,909.25	13,070.19	11,967.71	1,102.48
Tennessee	31,904.50		3,901.69	28,002.81	14,633.11	13,369.70
Texas	132,716.54		55,987.19	76,729.35	44,947.48	31,781.87
Utah	48,094.60		28,689.49	19,405.11	16,126.68	3,278.43
Vermont	11,593.55	7,758.52		19,352.07	12,952.34	11,759.73
Virginia	41,315.43		19,259.20	22,056.23	21,992.03	64.20
Washington	63,896.62		1,477.72	62,418.90	53,075.20	9,343.70
West Virginia	35,658.01		12,895.21	22,762.80	13,391.46	9,371.34
Wisconsin	72,939.26	18,295.97		91,235.23	89,663.92	1,571.31
Wyoming	44,996.36		7,436.16	37,560.20	23,933.40	13,626.80
Alaska	25,000.00			25,000.00	20,600.00	4,400.00
Puerto Rico	10,000.00			10,000.00	10,000.00	
Virgin Islands	10,000.00			10,000.00	10,000.00	
Total	2,575,000.00	686,319.90	294,910.56	2,966,409.34	¹ 1,882,880.34	1,083,529.00

Does not include funds unexpended and unobligated during availability and transferred for carrying out the provisions of the Migratory Bird Conservation Act.

² Apportionment of Federal funds to Alaska, Puerto Rico, and the Virgin Islands was made on November 19, 1941.

³ Credit adjustments (italic figures) during the fiscal year 1942.

⁴ Not eligible to participate.

⁵ Unexpended funds on completed projects have been deducted from this column and credited for future use.

Propagation and Distribution of Food and Game Fishes

Hatchery Production

The record of fish-hatchery production deviates from previous records in that it covers the calendar instead of the fiscal year, a change adopted because both the practical aspects of hatchery operations and the reproductive cycles of fishes impose a definite break, or seasonal interruption, in midwinter. Moreover, planting young fishes from the hatcheries corresponds in season to the annual increment from natural reproduction, and an accurate impression of yearly accomplishment cannot be gained if the tabulations are summarized in the middle of the propagating and distributing period. In presenting totals, therefore, there is an overlapping of 6 months and certain lots of fishes will appear in both reports. The duplication is more seeming than real, however, as the current report does not include figures for 2 consecutive reproductive periods for any species.

The gross production of fishes and eggs for the calendar year 1941, the output of 119 fish-cultural stations, some of which were under construction, was 5,862,960,200, a decrease of more than 15,000,000 from that of the fiscal year 1941. Among the groups showing increased production were six species of game trouts, both the largemouth and smallmouth black basses, and four species of Pacific salmons. The take of eggs of the buffalofish, an important freshwater commercial species, was doubled. The eggs were fertilized and planted on the spawning grounds, as also is done with eggs of groundfishes along the New England coast.

The policy of not releasing game fishes until they reach a larger size was reflected in an increase of about 10,000,000 fingerlings. There were decreases in several of the marine commercial species and in some of the lesser pan and game fishes.

The Carbon Hill, Ala., Hebron, Ohio, and Moorefield, W. Va., pond-fish stations operated on a productive basis for the first time. Two cooperative seasonal units were not used—the Senecaville, Ohio, station was not opened in the spring because of an inadequate water supply; and the Barneveld, N. Y., station was permanently closed.

Salvage operations along the Upper Mississippi River were insignificant in comparison with those of earlier years. Slightly more than half a million stranded fishes were seined from overflow areas.

Construction

All new hatchery developments and work on the partially completed unit at Farlington, Kans., were suspended at the outbreak of the war, but projects well advanced were continued, including hatch-

eries at Williams Creek, Ariz., Salem, Maine, Austin, Tex., and Corning, Ark. The substations for salmon propagation at Winthrop and Entiat, Wash., built by the Bureau of Reclamation, are part of the field establishment supervised by the Service and the latter was placed in partial operation. The Bureau of Reclamation continued the construction of the large Sacramento River salmon hatchery at Coleman, Calif.

Cooperation With Other Conservation Agencies

A decline in the number of applications for fishes submitted by private individuals does not indicate a lessening of demand but rather reflects the Service's policy of handling fish distribution through State conservation departments and other official bodies responsible for the management of lands and waters. The advantages of thus coordinating fish distribution have become increasingly evident, and though much remains to be done in extending this policy, it has proved to be a type of informal Federal aid that results in greater returns from funds expended.

Cooperative Predator and Rodent Control

The control of predatory animals and injurious rodents directly contributes to fulfilling the Service's obligations during the war period by increasing the food and feed supply through reducing depredations of ground squirrels, jack rabbits, prairie dogs, and other rodents on growing and stored crops and range forage and reducing rat damage in city, town, and country; by increasing the food supply and raw materials for clothing through protecting sheep, goats, and calves from slaughter by coyotes, wolves, and other large predators; and by safeguarding public health through the destruction of rodent and predator carriers of bubonic plague, typhus, rabies, and other infectious diseases.

In cooperative predator and rodent control, expenditures were made of \$873,597 from departmental funds; \$536,933 from cooperating States; \$1,055,576 from cooperating counties, livestock and agricultural associations, and others; and approximately \$254,146 from emergency funds.

Predator control resulted in the taking of 111,076 coyotes, 791 wolves, 10,957 bobcats and lynxes, 204 mountain lions, and 639 predatory bears, a total of 123,667. In rodent control operations, 7,263,448 acres of infested lands were treated under direct supervision, and 13,703,158 under general instructions. In cooperative rat control, assistance was given local communities in organizing rat control proj-

ects, including permanent control measures. The Service's Supply Depot and Laboratory at Pocatello, Idaho, prepared and distributed 821,224 pounds of rodent bait materials to cooperators throughout the country and manufactured and distributed other equipment and supplies used in predator and rodent control operations.

Destruction of Food and Property

Because of inability to apply control measures in all areas, heavy losses often occur in localities where destructive rodents and predators are numerous, as illustrated by the following instances.

In Arizona a goat raiser near Aquila, and his neighbor, lost 200 to 250 goats annually to predators, and a sheep raiser reported that mountain lions killed 26 sheep in one night in March. In the Perraine area of Florida, cotton rats destroyed \$10,000 worth of tomatoes and eggplants on 250 acres. At Belfield, N. Dak., a rancher lost so many sheep to coyotes that he had to dispose of a flock of 200 sheep that he had owned for a year and a half; and in Slope County, N. Dak., other small flock owners report annual losses to coyotes of 15 percent of their flocks. A poultryman in Pennsylvania lost 1,500 week-old chicks to rats in one night. In a Rhode Island orchard 300 apple trees were girdled by meadow mice with a loss of \$4,500. On a sugarbeet-seed plantation in Weber County, Utah, field mice destroyed 10 acres of young plants having a value of \$3,000. On a farm near Georgetown, La., wolves killed 192 pigs valued at \$768 and 46 calves worth \$368.

Conserving Food and Feed Supplies

If, as has been stated, food will win the war, every effort must be made to produce and to conserve it as a vital factor. To this end the Service has cooperated with State agencies, local livestock, poultry, and agricultural interests, individuals, and military establishments in preventing the destruction and damage of food and feed by predators and rodents. The chairman of the United States Department of Agriculture War Board of Cass County, Tex., expressed thanks to the Service for helping acquaint the farmers with the agricultural outlook in the Food for Freedom program, stating that the plan for controlling pocket gophers in and around peanut fields will greatly assist farmers in meeting their peanut quotas and that the plan of directly coordinating work toward the war effort will materially assist them in meeting their goals.

Cooperative rodent control has been carried on about cultivated and grazing areas to protect growing farm crops and forage, and stored food and feed has been protected from rat and mouse damage by meeting increased demands from many areas for cooperative

assistance. Rat and mouse destruction of grain in elevators and mills has been severe. Toxic baits have been used extensively in combating it, but sanitary and rat-proofing methods of control have been stressed to insure more lasting results. Cooperation has been extended to counties and cities in organizing intensive permanent rat-control projects and to State, county, and local livestock organizations and individuals in organizing and supervising intensive control programs to protect sheep, goats, cattle, pigs, and poultry from the larger predators, thereby safeguarding the Nation's meat resources. In 4 counties in South Dakota and 6 in North Dakota cooperative control operations reduced the average annual sheep loss to coyotes from 10 to 2 percent. Application of the Service's rat-control methods stopped the following losses: \$10 weekly to foodstuffs in a grocery market in Florida, \$300 annually to a turkey grower in Maine, and \$2 a ton on 2,000 tons of stored feed at a cottonseed oil warehouse in Texas. Rats were controlled also in a military warehouse and an airport hangar in Texas, where they were cutting cords from parachutes and chewing fabric and stitching off the wings of training planes. In September, a Service hunter reduced destruction by taking 6 coyotes in 6 days from an area in Nevada, where, during a 14-day period, 3 purebred Hereford calves valued at \$50 each were lost. In Catron County, N. Mex., cooperative pocket gopher control effected a 25-percent increased yield of potatoes from a 20-acre field. The carrying capacity of a 40-acre pasture in Beaver County, Okla., increased five times after removal of prairie dogs at a total cost of \$3. Capture of one bear that killed 20 adult sheep last fall in Summit County, Utah, ended depredations.

Conserving Raw Materials for Clothing

In the Western States the more than 37,000,000 adult sheep and lambs that graze on open ranges that are infested with coyotes and other large predators have been protected by the Service's cooperative control operations conducted over the greater part of the range areas, and thus losses of essential raw materials have been reduced.

☐ The need for wool for clothing to meet the Army estimate of 100 pounds of scoured wool for each man during his first year in service makes it a matter of grave concern to maintain and if possible increase the output of domestic wool, the only supply deliverable in quantity to our mills without undergoing the hazards of marine transportation. The requirement of 15,000,000 shearling pelts for lining aviators' coats exceeds the present supply. Lanolin, a byproduct of wool, is needed in quantity to insure the smooth operation of war machines.

In western Wyoming a livestock outfit lost 80 valuable range sheep to coyotes during January and February, but losses stopped after a

Service hunter took 42 coyotes. In Montana, a producer in Meagher County running 5,000 head of sheep reduced annual losses from 7 to less than 2 percent by organized predator control, and in Yellowstone County a Service hunter stopped losses by taking a female coyote that had killed 15 of 25 lambs in a short period. During February in Gilliam County, Oreg., the capture of a single crippled coyote, called Two-Toes, which was known to have killed 250 lambs and 40 ewes over a 3-year period, prevented further losses. The taking of 1 wolf charged with killing 125 sheep and goats during a short period in Cisco County, Tex., ended the trouble, and losses were stopped in Newton County, Tex., by taking an old female wolf reported to have killed 50 lambs and 14 sheep.

Safeguarding Public Health

During the national emergency, greater attention must be given to the part played by rodents and predators in the dissemination of animal-borne diseases. Outbreaks of bubonic plague, rabies, typhus, infectious jaundice, and Rocky Mountain spotted fever, all of which are transmissible from wild animals to man or to livestock, have occurred, some of them near military areas; and the Service has worked closely with war agencies, the United States Public Health Service, State and local health units, and other cooperators to reduce the number of disease-carrying rodents and predators. Rat control was inaugurated at Fort Lupton, Colo., to overcome infectious jaundice and in Miami and in Dade County, Fla., and New Orleans, La., in cooperation with city and county health departments, to suppress typhus fever; and in San Antonio, Tex., cooperative rat-control operations reduced the positive laboratory-tested cases of typhus from 80 to 1. During the spring, 30 people in southern New Mexico were required to take the Pasteur treatment for rabies, when an epizootic occurred among coyotes. Valuable livestock also were infected, but increased predator-control operations are being carried on with the hope of soon suppressing the disease. In Bryan County, Okla., Rocky Mountain spotted fever caused the death of an attending physician and one member of a family of six. Pocket gophers were found to be infected with the ticks that transmit the disease, and control measures were promptly applied. Experts from the Service have been commissioned in the Sanitary Corps of the Army to supervise rodent control on military areas. Systematic repressive work is being conducted in cooperation with the Gulf Coast Health Unit, which is responsible for work on epidemics in coastal parts of Texas. Control of ground squirrels in and around the army air base near Boise, Idaho, where bubonic plague was found by the Public Health Service, was continued.

Fishery Industries

Technological fishery investigations and broad statistical surveys are functions delegated to the Service by a Congress desirous of fostering, promoting, and developing an industry that although vast in its ramifications and great in significance to the economy of the country, is composed of units too diverse to carry out these essential functions for themselves. Thus, the fact-gathering facilities of the Service have been placed at the disposal of the commercial fishing interests, both to their benefit and to that of the public. By developing more orderly marketing procedures and more efficient methods of using raw materials, conservation of fishery resources is promoted, the Nation's nutritional level is improved, and great quantities of sea foodstuffs are made available to meet wartime emergency conditions.

Fishery Exploratory Investigations

During the spring, the United States Government in cooperation with other American Republics and with the Government of the British West Indies, undertook through this Service, an inquiry into the fisheries of the Caribbean Sea. Information thus far collected indicates that the fisheries in some localities can be materially expanded. Undoubtedly new industries can be developed in the fishery resources of South America and the West Indies and areas not now visited by commercial fishermen can be made highly productive, developments that are particularly important in wartime. Such cooperative studies off the coast of neighboring Americas result not only in augmenting the total food supplies of the Americas, but also in improving general relationships among the American Republics.

Investigations to Improve Fishery Technology

In technological fishery work the Service is concerned chiefly with problems in the production, preservation, and utilization of fishery products and byproducts. Investigational work conducted in the laboratories at College Park, Md., Seattle, Wash., Ketchikan, Alaska, and Mayaguez, P. R., made use of applied chemistry, bacteriology, and engineering in the improvement of current practices and in the development of new methods and products.

War has created a multitude of new fishery problems and brought increasing dependence upon scientific research for their solution. Previous technological work is now proving of direct value in adjusting and extending fishery activities the better to meet present and future needs. When early in the war it became apparent that increasing disruptions in world trade were likely to develop shortages in

a number of items necessary to public well-being that are derived principally from the fisheries, technological programs were revised to include investigations of possible new sources of these items or suitable substitutes. A partial substitute for imported agar was developed; empty bottles were shown to be desirable as substitutes for imported glass floats formerly used on subsurface gill nets; and it was found that a high quality poultry feed can be prepared from dogfish and shark carcasses—now discarded by the shark-liver fishery—thus supplementing the vital domestic supply of protein concentrates. For more efficient utilization of raw material in manufacturing fish meal and fish oil, additional information was obtained regarding the solubility of fish proteins during the reduction process. Conversion of starfishes and other oyster pests into substitutes for some of the materials that may not long be available is being studied.

Increasing demand for vitamin A for domestic consumption and for distribution under the lend-lease program directed greater attention toward possible new sources of raw materials, and caused data to be obtained regarding more efficient vitamin A recovery from existing supplies and studies to be undertaken to establish standards of quality.

Increased Government buying of canned salmon, pilchards, sardines, and mackerel so reduced the supply for domestic needs that it was sought to develop new canned products from species not previously used in canning or considered of only limited utility. With the increased demand for dehydrated foods for transport abroad, attempts are being made to devise more efficient methods of dehydrating fish.

Investigations to Improve the Economics of Fisheries

Continued studies in fishery economics resulted in two published reports, one dealing with the retailing of fish in 56 cities in the Eastern States and the other with similar information on a regional basis for cities of the upper Ohio River Valley. In addition, brief studies were made with the object of providing necessary information to the Office of Price Administration, the War Production Board, and other emergency agencies and to the trade interests appearing before governmental bodies.

As war activities intensified, the drainage of manpower and vessels from the industry became more serious. Lowered production in combination with vast military and lend-lease purchases reduced civilian supplies of certain fishery commodities. The market development work of the Service was gradually reoriented to meet the situation. Of chief concern now are the encouragement of those fisheries most susceptible of stimulation under war conditions and a readjustment of fish consumption to meet new conditions of supply. The marketing of varieties not usually produced in large volume is

being encouraged and the public is shown how to make the best use of them. Consumer information was aided by the establishment of defense councils under the auspices of the Office of Civilian Defense and of information centers encouraged by the Office of Price Administration.

The territories of field agents were enlarged, and agents were given roving assignments to cover specific problem areas. More effective use of the heavy runs of Great Lakes smelt and herring was stimulated through work with producers, dealers, and consumers. Locker-plant operators were shown how they could make fish more readily available in the Midwest by establishing contacts with producers and dealers and using their refrigeration facilities. Army purchasers were helped to get a variety of fishery products beyond that furnished by the more common species and to get the species favored by personnel from specific regions. Problems of obtaining adequate quantities and the desired methods of preparation also were solved. Industrial plants and schools were helped to add variety to their cafeteria menus by greater use of fish. Efforts were made to facilitate the conversion of canneries producing interdicted commodities into those canning fishery products.

Fishery Market News Service

From field offices of the Fishery Market News Service in New York, Boston, Chicago, Seattle, Jacksonville, and New Orleans the latest available information on production and shipment of fishery products and marketing data on supply, demand, and prices is sent out in daily mimeographed reports, telegraphic bulletins, and radio broadcasts to fishermen, shippers, wholesalers, buyers, and consumers. This market news service has been conducted since 1938, long enough to build up a valuable backlog of fishery data and an experienced personnel capable of meeting increased wartime demands.

In order that the fishery resources may be utilized to the utmost extent consistent with conservation, detailed periodic summaries for the most important markets are prepared. These and the daily releases on production and current prices furnish the war agencies charged with regulating our food supplies with price and supply data. Thus, quickly recognized, surpluses may be removed and shortages remedied, and military purchase of fishing vessels may be followed in the daily reports and the effects gaged almost as fast as the vessels are withdrawn from the fishing fleet. Since Pearl Harbor, purchasing officers and mess sergeants have been placed on the daily report mailing lists in order that with a knowledge of market conditions they may request bids for sea foods, and suppliers are kept informed concerning

the Army's requirements and Federal specifications. Former Federal specifications for fresh fish were revised to meet military needs and to conform more closely to current commercial practices.

One step in the direction of establishing standard Federal specifications for sea foods and in enabling purchasing officers to buy fish and shellfish more economically was the issuance of a Fresh and Frozen Fishery Products Reference Manual, a supplementary number of the Service's monthly periodical, Fishery Market News. The text is replete with tables and diagrams embracing information of paramount importance to the fishing industry as well as to the military service. Prepared primarily for use in procuring supplies of fishery products for the armed forces, it includes data on seasons of abundance, standards, market forms, food and fuel values, edible portions, fat content, shipping containers, methods of cooking, basic recipes, and related information.

Collection and Dissemination of Fishery Statistics

The collection of essential statistics relating to the yield of fishery products, the employment of men, craft, and gear, and the production of manufactured fishery commodities was continued, and new surveys were undertaken to provide specific current information required by Federal war-training agencies. With expanding civilian and military markets for fishery products for food and industrial uses and with increased demands placed upon these by lend-lease commitments, the commercial fisheries have been subjected to unusual strain. To help the industry fulfill its obligations, many statistical services have been rendered in getting priorities, matériel, and Federal aid. A survey is in progress to learn the exact requirements of the fishery industry so that allocations and priorities can be most efficiently determined and necessary production maintained. Data are being gathered upon gear, fuel-oil requirements, and vessels operated and needed. This study will guide, especially the War Production Board, the Navy Department, and the Office of Petroleum Coordinator for War in work in their respective fields. For use in the price-ceiling schedules of the Office of Price Administration surveys were conducted to determine the production of vitamin A fish-liver oils for human consumption, the normal stocks on hand, and the sales, prices, and anticipated future production. A similar survey on vitamin D oils for presentation to various war-planning agencies was made. Finally, the War Shipping Board was supplied with statistical information on the effects of Navy purchases of fishing vessels upon landings of fishery products.

Game Law Enforcement

Administration of Conservation Laws

The principal Federal wildlife-conservation statutes administered by the Service are (1) the Lacey Act; (2) the Migratory Bird Treaty Act; (3) the Migratory Bird Conservation Act; (4) the Migratory Bird Hunting Stamp Act; (5) the black bass law; (6) a law protecting wildlife and property on Federal refuges (sec. 84, Criminal Code); and (7) through the Alaska Game Commission, the Alaska Game Law of 1925, as amended.

Amendments to the Migratory Bird Treaty Act regulations removed canvasback and ruddy ducks from the list of species that were limited to 3 in the daily bag, legalized in 15 States the possession of 1 wood duck, prohibited the use of cattle, horses, or mules as blinds, reduced the weekly limit on geese in certain counties of North Carolina, California, and Illinois, closed the season on Wilson's snipe, and limited the mourning dove season to 42 days.

Work of Game-Management Agents

The 74 regular Federal game-law enforcement officers, singly or in cooperation with State agents and United States deputy game wardens obtained evidence in 2,892 cases of game-law violations. Prosecuted in State and Federal courts, these resulted in 2,711 convictions (table 5). By undercover operations under rules approved by the Secretary, and with an expenditure of \$599.89, game-management agents obtained evidence in 54 cases, 11 of which are pending; and in the 43 already tried, fines of \$2,385 and jail sentences of 15 months were imposed.

Cases of violation of the Migratory Bird Treaty Act disposed of during the year and cases still pending on June 30, 1942

<i>Disposition</i>	<i>Number</i>	<i>Pending</i>	<i>Number</i>
Conviction.....	552	From preceding year.....	140
Dismissal.....	73	New cases.....	714
Nol-pros.....	36		
Found not guilty, jury trial...-	3	Total.....	854
Closed without prosecution....-	15	Disposed of.....	685
No bill rendered.....	5		
Closed by death.....	1	Pending at end of year.....	169
Total.....	685		

TABLE 5.—Summary of penalties imposed during the year for violations of wildlife-conservation laws

Act	Convictions	Fines and costs	Jail sentences
	<i>Number</i>	<i>Dollars</i>	<i>Days</i>
Migratory Bird Treaty Act.....	552	17,826.71	1,426
Migratory Bird Conservation Act.....	43	1,215.00	130
Migratory Bird Hunting Stamp Act.....	57	879.00	-----
Wildlife Refuge Trespass Act.....	2	-----	40
Upper Mississippi River Wildlife and Fish Refuge Act.....	13	235.00	-----
Lacey Act.....	3	271.40	-----
State prosecutions resulting from Lacey Act Investigations.....	111	5,895.40	513
State laws, cooperative prosecutions.....	1,927	60,282.45	1,394
Black Bass Act.....	2	225.00	-----
Bald Eagle Act.....	1	89.90	-----
Total.....	2,711	86,919.86	3,503

Importations and Permits

The war conditions caused a decrease in importations of birds and animals from 1,640 to 1,371, including 4 at Honolulu; and the number of shipments inspected from 250 to 154. Denied entry were 1 mongoose from India, 2 crested mynas from China, and 2 bullfinches from Egypt, which were destroyed or returned to the shippers. Birds imported, including 6,389 canaries, 100 parrots, and 37,490 Mexican quail, totaled 56,211, compared with 89,028 last year. Among the animals imported were 6,024 Rhesus monkeys compared with 8,655 last year, 68 black bear cubs from Canada, 2 giant pandas from China, 8 gorillas from the Belgian Congo, 1 Chilean fox, and 19 vampire bats from the British West Indies.

Scientific collecting permits issued aggregated 320, bringing the total to 1,779. Scientific possession permits numbered 604, and permits were issued to 132 individuals to possess specimens found dead. Birdbanding permits numbering 2,363 are in effect.

Propagation permits issued to possess migratory waterfowl numbered 258, and to take migratory waterfowl, 13; 632 propagating permits were canceled, and 3,716 are outstanding. Permittees reported the raising in captivity of 3,101 wild geese and 76,072 wild ducks, of which 71,325 were mallards. Sale of propagated migratory waterfowl included 31,921 ducks and 329 geese for food, and 11,545 ducks and 1,550 geese for propagation. Propagated birds liberated included 12,611 ducks, 234 geese, and 33 mourning doves.

Depredation permits were issued in 758 instances to protect crops, fish, and property, but only after investigation by game-management agents disclosed frightening devices to be ineffective. Other permits included 29 for taking birds and mammals in Alaska and 8 for taking small fishes for bait from the waters in the District of Columbia.

One shore station and two whale catchers were licensed to capture whales along the California coast and to process them for which the Treasury received a fee of \$1,000.

Alaska Fish and Wildlife

Fishery Laws and Regulations

Under the broad principles laid down in the act of June 6, 1924, whereby the Department is vested with full authority and responsibility for regulating the time, place, and method of commercial fishing in Alaska, the Service continued its established program for the protection and conservation of the fisheries to assure a stabilized yield. The Director and other officials spent several weeks in the Territory giving attention to problems pertaining to management of aquatic resources. After the close of the fishing season, public hearings at which the Director presided were held at seven places in Alaska and at Seattle, Wash., to obtain recommendations with regard to fishery regulations. Revised regulations were based upon testimony presented at these hearings and upon investigations conducted by fishery biologists and law-enforcement officers on duty in Alaska. Vigilant control over the fishery resources is necessary to prevent unwise exploitation in the period of national emergency, when current market demands stimulate increased operations. The Department's regulations are meant to provide a sustained yield so that any prolonged emergency will not find the Nation lacking in essential fishery products.

In protecting the fishing grounds, 12 patrol vessels, 13 speedboats, and a number of other small powerboats, effectively supplemented by Government-owned and chartered airplanes, were used. The personnel engaged in fishery protective work numbered 190, including fishery-management agents, stream guards, weir operators, vessel crews, and biologists. In addition, 11 wildlife agents of the Alaska Game Commission were deputized to assist.

Throughout the season, careful observations were made of the extent and condition of the salmon runs and escapements, for guidance in modification of the regulations. Weirs for counting the escapement of spawning salmon were operated in 10 representative streams. Biological investigations concerning the salmon and herring were continued.

Products of the Fisheries

The total output of Alaska fishery products in 1941 was 426,369,438 pounds, valued at \$63,439,593, compared with 323,507,000 pounds, valued at \$36,441,000 in 1940. The estimated value of the 1941 catch to the fishermen was about \$15,512,000, or about \$5,000,000 more than in 1940. The number of persons employed in the various branches of these fisheries increased from 25,199 in 1940 to 26,178 in 1941.

Salmon products represented about 83 percent of the weight and 92 percent of the value of Alaska fishery products in 1941. Canned salmon made up 93 percent of the output, the pack amounting to 6,932,040 cases, or 332,737,920 pounds, valued at \$56,217,601, an increase of about 37 percent in quantity and 79 percent in value over the 1940 pack. Red salmon comprised 17 percent and pink 67 percent of the total pack, as against 19 and 58 percent, respectively, in 1940. There were 109 canneries in operation, 9 more than in 1940, and the number of persons employed increased from 19,666 to 21,994.

In the herring industry, the number of operated plants dropped from 24 in 1940 to 13 in 1941. This decrease was due principally to the number of small plants closed in central and western Alaska and had little effect on the total production.

Halibut landings of the Alaska fleet decreased 5 percent in quantity but increased about 8 percent in value over 1940. Several of the minor fisheries made gains over the previous year, but there was a marked decline in the production of clams, shrimps, and crabs, owing chiefly to labor disputes and to the scarcity of labor.

Pribilof Fur Seals and Blue Foxes

Sealing on the Pribilof Islands and the incidental foxing operations were carried on by the natives under supervision of white employees. In all, 95,013 fur seal skins and 834 fox skins were obtained.

At the fur seal byproducts plant on St. Paul Island there were produced 35,000 gallons of No. 1 blubber oil; 19,610 gallons of No. 2 press, or carcass, oil; and 747,546 pounds of seal meal. All the meal and 39,610 gallons of oil were shipped to Seattle and sold through competitive bidding.

The annual supplies for the Pribilofs were shipped from Seattle on the U. S. S. *Spica*, through the cooperation of the Navy Department. The Coast Guard also cooperated in patrolling waters of the North Pacific Ocean and Bering Sea for the protection of fur seals and sea otters. The Service vessel *Penguin* made five round trips between Seattle and the Pribilofs, transporting supplies and personnel.

The Fur-Seal Treaty of 1911 expired on October 23, 1941, 1 year after formal notice of abrogation had been given by the Japanese Government. As the expiration was not until after the 1941 sealing season, both Canada and Japan normally would be entitled to the usual 15 percent of the season's take. Canada will receive her share, but in view of the existing state of war, the eventual disposition of the Japanese share has not been determined.

The estimated number of animals in the Pribilof Islands fur seal herd as of August 10, 1941, was 2,338,000 or 153,000 more than in 1940, an increase for the herd of about 7 percent.

Two public auctions of fur seal skins were held at St. Louis, Mo. In September 29,668 sold for \$1,363,310.50, including 8,246 dyed black, 8,701 safari brown, 12,075 matara brown, and 646 raw and partly processed; and in April 30,695 sold for \$985,839.75, including 6,101 dyed black, 10,387 safari brown, 13,848 matara brown, and 359 raw and partly processed. In addition, 2 sealskins were sold for \$105.11 at a special sale authorized by the Secretary. In all, 60,365 seal-skins were sold for the account of the Government for a total of \$2,349,254.96.

The care of blue foxes on the Pribilof Islands is incidental to sealing activities. Of the 834 fox skins taken, 182 were from St. Paul Island and 652 from St. George Island. There were sold at public auction 640 blue and 11 white fox skins taken on the islands in the 1940-41 season. The blue pelts brought \$11,634, and the white \$236.50, a total of \$11,870.50.

Japanese Activities in Bering Sea

A Japanese fishing fleet, comprising the floating plant *Kosei Maru* of Tokyo and 8 trawlers, also the *Tenyo Maru* and the *Sugura Maru*, and numerous small tenders, engaged in fishing operations in the Bering Sea in 1941. The fleet arrived off the northern coast of the Aleutian Islands in May, worked northward past the Pribilof Islands, and spent the greater part of the season fishing in the waters between the Pribilofs and Nunivak Island and elsewhere. The fleet withdrew from the Alaska coast sometime in July. Apparently the catch consisted chiefly of halibut and cod.

Enforcement of Alaska Game Law

The regulations approved for the 1942-43 season under the Alaska game law prohibit the taking of mountain sheep anywhere in Alaska, reduce the bag limits on deer and caribou, and generally shorten the open season on all game animals. On brown bear the bag limit was reduced to one in the Kodiak-Afognak Islands, and a closed season provided on the Alaska Peninsula west of Herendeen Bay. An open season on marten is allowed throughout the Territory, except on Prince of Wales, Baranof, and Chichagof Islands.

With the purchase of 2 more airplanes, the Commission now operates three 4-place and two 2-place planes based at Ketchikan, Anchorage, Dillingham, and Fairbanks, in addition to three salt-water patrol vessels, 4 river boats, 13 automobiles, and numerous outboard-motor craft.

Office of Indian Affairs

JOHN COLLIER, Commissioner

IT IS probably difficult for the average layman to understand why an agency such as the Indian Service becomes immediately and directly involved in the war. The Office of Indian Affairs has a wide range of responsibilities, covering almost every aspect of human living for a group of some 350,000 Indians in the United States and 33,000 natives of Alaska. In an all-out war these people are vitally affected. Indians who have heretofore lived in isolated areas on reservations suddenly find themselves part and parcel of the national war program. Their young men volunteer or are drafted. Both men and women enter war industries in large numbers. Blocks of their lands are requisitioned for cantonments and bombing ranges, and in the case of natives of the Aleutian Islands the war comes to their very door steps. Consequently, the Indian Service finds itself devoting much of its time and effort to problems arising directly from the war.

Indian Service Administers War Relocation Center

One of the major war connected tasks of the Service had to do with the evacuation and relocation of Japanese from the West coast. Even before the creation of the War Relocation Authority, the assistance of the Indian Service was sought in the handling of this problem. Within a few days after the creation of the WRA arrangements had been made to utilize a portion of the Colorado River Indian Reservation in western Arizona, upon which to locate some 20,000 evacuees. This project, the largest of all the centers established to handle evacuees, is being administered entirely by the Indian Service under an agreement with the War Relocation Authority.

There are approximately 1,200 Mojave and Chemehuevi Indians living at the northern end of the reservation. They have irrigated and cultivated some 8,000 acres of land by pumping water from the Colorado River. Several years ago the Indian Service planned the

subjugation of approximately 100,000 acres of land within the boundaries of this reservation lying along the eastern bank of the Colorado. Inasmuch as the resident Indians could use not more than 15,000 or 20,000 acres, it was planned over a period of approximately 15 years to colonize on the newly developed land Indians from other reservations, such as the Navajo, Hopi, and Papago, where land resources are utterly inadequate to meet the needs of the existing population. In 1942, the Indian Service completed the construction of a diversion dam across the river. In May, the main canal from the dam was connected with the irrigation system used by the Indians, substituting gravity water for the water previously pumped.

Several miles to the south of the land occupied by the Indians the War Department has built three communities for evacuees. The first accommodates 10,000 colonists and each of the other two accommodates 5,000. A ditch from the Indian irrigation system to the relocation center delivers water to the communities in order to provide for the planting of grass and shrubs around their homes. The colonists are clearing and leveling land in the vicinity of the communities and crops soon will be planted to aid in their own subsistence. Eventually it is expected that they will clear, level, and irrigate 25,000 acres, planting this with subsistence crops. After the war the evacuees will be removed from the reservation and these newly developed lands will be used by members of the Colorado River tribe, and of other tribes to be colonized there.

The War Department, under contract, built the communities, but upon completion, moved out and turned them over to the Indian Service to administer. The Service found it necessary to transfer many of its best personnel to the project in order to get it under way promptly. The superintendent of the Papago Reservation was detailed to become the director of the project and the superintendent of the Truxton Canyon Reservation was detailed as his associate. Many other employees of the Service were detailed to various types of work within the project.

One of the major problems was to provide necessary school facilities for the 6,000 children of the colonists. These schools had to be designed, built, equipped, and staffed between the first of July and the opening of the school term. The colonists themselves aided in the construction.

These buildings were constructed of adobe, thus making the maximum use of the labor of the colonists, both skilled and unskilled. Buildings of this type are more useful in the hot climate.

The difficulty of securing adequate medical personnel and the delay in the completion of the hospital units placed increased burdens upon the project staff. Furthermore, the lack of adequate medical facilities caused considerable anxiety and insecurity among the colonists.

Obviously, the problems of 20,000 people living under most adverse conditions are very acute. These were further complicated by the uncertainty of the future and the tremendous shock incident to their being uprooted, and moved from their homes into a new and utterly different life. In spite of these conditions, the rate of sickness actually declined.

The experience of the Indian Service with a minority group over many years is proving invaluable in the administration of the Center.

With both the Indians and the evacuees the major objective is to develop functioning local democracies. The colonists have elected a representative government. Local courts and all aspects of municipal government have either been formed or are in process of formation. A month's intensive training in the principles and procedures of cooperatives was arranged in response to the request of the colonists that stores, amusements, and personal services of all types, be conducted on a cooperative basis. In cooperation with the Friends Service Committee and St. Johns' College a program of adult education has been initiated. Other types of adult education are also planned. Full liberty of speech and assembly is granted the colonists.

Relocation Center on Gila River Reservation

On the Gila River Reservation, in southern Arizona, an additional 15,000 evacuees are being placed. Here the War Relocation Authority is leasing 7,000 acres of land which the Indians have held in a large communal tract and which they have operated for cash income in order to take care of their irrigation costs. On these lands the colonists will plant crops for subsistence. They will clear and level an adjacent 8,000-acre tract and construct laterals and bring this land under cultivation. Upon the termination of the war this improved land will also revert to Indian use. Many of the Indians are employed upon the community construction at these two centers.

Japanese Invade Aleutian Homes

Prior to the attack on Dutch Harbor, plans were being developed in cooperation with the Naval authorities for the possible evacuation of the Aleutians. Immediately after the attack these plans were put into effect and all of the natives of the islands west of Dutch Harbor were evacuated to the mainland. It became necessary for the Indian Service, in cooperation with other agencies, to make arrangements for the location of these evacuees, to house them, to provide necessary relief and medical care, and to plan for their future self-support.

Many of the Indian Service teachers in Alaska are licensed radio operators under the Federal Communications Commission, and their

responsibilities for maintaining communication with the military authorities as well as for looking after the welfare of the Indians and Eskimos are of prime importance during wartime.

Indian Service Hospital at Unalaska Bombed

Across the narrow bay from Dutch Harbor lies the little village of Unalaska. In the bombing of Dutch Harbor, one bomber detached itself from the squadron and devoted its efforts to the destruction of buildings at Unalaska and the machine gunning of citizens in the streets. The Indian Service hospital was struck and partially destroyed. The civilian defense organization had functioned perfectly, and every patient, nurse, and physician had been removed to more sheltered quarters.

Enemy Attack Expected

Since the outbreak of war, Alaska's Indians and Eskimos, constituting 50 percent of the peacetime population, have expected an enemy attack, and are prepared to meet it. The United States armed forces in Alaska contain a number of natives, whose special training is of inestimable value. Alaskan natives are accustomed to travel all day on snowshoes, are skilled in the use of rifles and knives, have first-hand knowledge of the geographic and climatic conditions of the Arctic region, and are accustomed to its peculiar temperatures. These are factors of prime importance in territorial defense.

The full support of Alaskan natives to the United States Government is manifested by their eagerness to enlist in the armed forces and by their generous purchases of war bonds. The largest single purchase of war bonds in the Territory for the month of January came from Indians and Eskimos, who presented Gov. Ernest Gruening with a check for \$110,645.72.

A few days after the outbreak of war, Alaska organized an efficient civilian defense program.

There is much yet to be told of the courageous work of the Indian Service men and women and the inspiring role of the Alaska natives in defending their homes and giving their lives in the war for freedom.

Indian Lands Used for Army Purposes

Many requests for use of Indian lands and other facilities for a variety of purposes were made during the year by both the Army and the Navy.

For example, the enlargement of a camp and the establishment adjacent to it of a large bombing range necessitated the almost over-

night removal of some 50 Indian families located in the area. It was necessary to purchase additional land for them, to provide housing and to rehabilitate these families in new locations.

Almost at the same time the demand of the War Department for lands for an aerial gunnery range necessitated the removal of more than a hundred families to another part of an Indian reservation. There is little tribal land on this reservation; most of it is individually owned or held by allottees and their heirs under restricted or trust patent. Therefore, it was necessary to purchase land for these families and to provide them with the necessary livestock to make themselves self-supporting in their new location.

The Metlakhatlans in Alaska made part of an island available to the armed forces.

The Attitude of Indians Toward the War

One would expect the Indians of the United States to be confused and perplexed by the war situation. Essentially they are a rural people. Many of them live in remote areas, speak only their native languages, and have little access to newspapers, radio, or other forms of communication. How could they be expected to understand the clash of ideologies which has precipitated the world crisis?

Moreover the treatment which the Indians received at the hands of the Federal Government during the past century and a half might easily have alienated their sympathy and loyalty and left them disinterested in the Nation's welfare and unwilling to defend it against its enemies.

From the very beginning, official attitude toward the Indians was largely one of intolerance and repression. They lost much of their land through forced treaties and were pushed back onto reservations which the Government promised to preserve. Treaties were broken, solemn pledges ignored, and more and more of their land taken from them.

Finally through the forced allotment of many of the reservations much of their remaining land was lost to them and their social organization destroyed and their tribal culture driven under cover.

This "liquidation of the Indian" was accomplished by the destruction of his ways of earning a livelihood, by the wiping out of the buffalo, by the Indian wars in which the slogan was that the only good Indian is a dead Indian, and by a vigorous campaign of education and regulation to stifle Indian languages, arts, and ceremonials.

Although Federal policies for the past 12 years have been completely reversed, Indians are still experiencing discrimination on every hand. In at least three States Indians are still refused the right to vote. They are often discriminated against in industrial

employment; are the last to be taken on the job and the first to be let off. In many areas even where they are permitted to vote, they have been in a large measure debarred from participation in the civic life of white communities. How, one might ask, could they be expected enthusiastically to take up arms in the defense of the country which has treated them in this fashion?

Strange as it may seem the Indians have responded earnestly and even enthusiastically to the challenge of the war. From the remotest parts of isolated reservations has come evidence of Indian concern over the war. More than once an Indian, or a group of Indians, has shown up at agency headquarters, each man with his gun, ready to register for selective service and to proceed immediately to the scene of fighting. Prior to the Japanese assault at Pearl Harbor, Indians in the Army alone numbered 4,481, of whom approximately 60 per cent had enlisted either in the Regular Army or the National Guard. The rate of enlistment increased very substantially since the declaration of war, until on June 1, 1942, more than 7,500 Indians were in the armed forces. While this seems relatively a small number, it represents a larger proportion than any other element of our population.

Of record in Washington are purchases of \$1,270,000 in Treasury bonds from April 1, 1941, to March 1, 1942. Additional applications aggregated approximately \$750,000.

The Crow Tribe of Montana offered the Government all of its resources and all of its manpower. Even the girls and women attempted to enter active military service.

The California Indians, especially, have been at odds with the Federal Government since 1850, and yet the Mission Indian Federation, with 3,000 members from 30 reservations telegraphed President Roosevelt and Governor Olson "a message of loyalty and readiness to serve our great Nation."

Indians are serving in almost every corner of the world where American forces are in action. Large numbers were at Bataan. Occasionally individuals are singled out for honors. The outstanding Indian soldier thus far has been the late Maj. Gen. Clarence Tinker, an enrolled member of the Osage tribe, who was lost in the battle of Midway. Major General Tinker was placed in command of the Hawaiian Air Force shortly after Pearl Harbor. In the battle of Midway he selected himself to lead a bomber attack on the Japanese navy. Flyers in the same formation with General Tinker reported that his plane was last seen descending rapidly into the ocean. Although a careful search was made of the area, no trace was found of the bomber or its occupants.

Lt. Gen. Delos C. Emmons, Military Governor of Hawaii and Commander of the Hawaiian Department, praised General Tinker's gal-

lantry and skill in a statement which he issued shortly after the Air Force Commander was reported missing. General Emmons said:

“The entire Hawaiian Department mourns the loss of Major General Tinker and his gallant crew.

“Because General Tinker would not ask his subordinates to undertake risks he himself would not take, he selected himself as flight leader of an important combat mission requiring great courage, skill, and experience.

“He died knowing that he had had an important part in winning a great victory. His leadership was an inspiration to his command and his loss is a deep personal one.”

It may not be too great a stretch of the imagination to suggest that the Indians have identified the struggle of democracies the world over with their own struggle of the last century. It may be that they see in a victory of the democracies a guarantee that they too shall be permitted to live their own lives. Perhaps their experiences of the last 10 years in which there has been a rebirth of spirit, a reviving of the smoldering fires of local democracy, and a step toward economic rehabilitation have helped them to see the possibilities in a world of the “Four Freedoms.”

A few instances lifted from the official record will serve to show something of the spirit with which they approach the world crisis:

Immediately after Pearl Harbor, the Indians of the little village of Santa Ana in New Mexico left their homes and went secretly to their ancient shrine. There in their former home, long since abandoned, the entire Pueblo remained for one unbroken month in secret prayer. Their prayers were for the people of all the world. News of the pilgrimage became known only when the Indians sent word to the authorities that they intended to build a great fire at the conclusion of their ceremony. They wanted the Army to know that this was a sacramental fire and not the result of sabotage or overt enemy action.

The Pueblo of Zia, also a little village in New Mexico, engaged in prayer before the second selective service registration. In the Pueblo of Zuni in New Mexico the Red Cross drive was announced from the housetops and the canvassing started in a blinding snowstorm. Each household contributed wheat, corn, or hay, or whatever there might be available. One family donated \$6 and two rings.

The great Navajo Tribe, numbering some 50,000, was so stirred by this country's declaration of war that its tribal council laid aside its pressing business and spent almost an entire day in patriotic demonstrations, plying the superintendent with questions about the flag and its meaning, questions as to how the Navajo Tribe could best contribute to the prosecution of the war. Even the old people were insistent that they be allowed to enlist and the action of the Selective Service officials in turning down many young Navajos because of their

inability to read and write or speak the English language has been felt very keenly by the entire tribe.

There is some evidence among the Indians of confusion over their legal obligations and responsibilities under the Selective Service Act. During the last war most of the Indians in the United States were not citizens, and were, therefore, declared not to be subject to conscription. Only those few who were citizens were required to register. A very large number volunteered, however, and made an enviable record.

In 1924, Congress passed an act which conferred citizenship upon all Indians born in the United States who had not already acquired such citizenship. The courts have now held that by virtue of this conferring of citizenship the Selective Service Act is applicable to all Indians. That they should be exempted in one war and drafted in the second has created some confusion. It has been necessary for agency officials patiently to explain and to interpret.

The unique legal status of Indian tribes as separate political communities has further confused some of the Indians with regard to their status under the Selective Service Act. Indian tribes have many inherent powers—far more than the average municipality. They possess all of the powers of a sovereign nation except those specifically infringed by acts of Congress or by treaties. Several tribes, conscious of these powers of self-government, have made declarations of war upon the Axis Powers. Notable in this regard was the action of the Six Nations of the Iroquois confederacy. Delegates of this historic government, representing the 6,000 Indians who reside on eight reservations in New York State, came to Washington early in June to present to the President and to the Congress their formal declaration of war against the Axis Powers.

Indians in Wartime Industry and Agriculture

The Indians are playing an important role in the agricultural and industrial production program of the war. Skilled Indian workers are to be found scattered throughout important war industries in almost every section of the country. They are doing highly technical jobs in aircraft industries on the West coast, in Kansas, and in New York State. They are to be found among the crews constructing bases in far-flung parts of the world. They are handling skilled jobs of every description—welding steel, operating jack hammers, and handling some of the most difficult machine operations. Under the program of the Indian Service during the past 10 years thousands of Indians were employed in the building of truck trails, look-out towers, highways, and soil conservation structures. They demonstrated

marked ability to learn to operate heavy machinery of all kinds. Hundreds of other young Indians were trained in Indian schools in sheet metal, welding, auto mechanics, radio maintenance, and other industrial trades and are now employing their skills in airplane plants, tank factories, and shipyards.

Indians Grow Food for Freedom

Reports coming to the Indian Office indicate that there has been a 15-percent increase in the number of gardens planted by Indians this year and a 35-percent increase in acreage. Field crops are reported 18 percent greater and the spring pig crop 25 percent greater than last year. Indian livestock increased by 35 percent during the first 6 months of this year and sheep by 50 percent.

Every acre of grazing land not essential to Indian operation is being made available for permittees.

The unsettled conditions in Alaska make uncertain at the moment the output of the canneries operated by Indians. They have been urged to make every effort to increase their packs, but the availability of transportation and cans will partially determine the success of these efforts.

The Indians of the Red Lake Reservation expect to market a million pounds of fresh fish during the present season.

Timber Production

In connection with timber production, the Office recently approved a sale of spruce on the Quinault Reservation for airplane production. A contract has been let on the Warm Springs Reservation for one-half billion feet of lumber. There is under consideration a contract for one-half billion feet each on the Yakima and Colville Reservations. Lumber amounting to 400 million feet on the Fort Apache Reservation and 150 million feet on the Klamath Reservation is available if scalers can be found to help get timber out of the forests. In each instance the maximum cut allowable under sustained-yield operation is being permitted.

Last year approximately 600 million feet of timber were cut from Indian reservations. It is expected that this will be materially increased this year.

In addition to the regular funds, \$140,000 have been placed in Arizona, California, and Washington for the employment of lookouts and guards to protect Indian forests. One hundred and thirty towers are now manned.

Indian Service Assists Other Countries

The work of the Indian Service during the past year literally extended to the four corners of the world. For example, the Government of Saudi Arabia learned of some of the small-scale irrigation developments among the Indians of the Southwest and the King personally requested assistance in developing similar facilities among the people of that country. The Palestine Economic Corporation asked the Office of Indian Affairs for recommendations and help in the development of similar work in Palestine.

At the request of the Rosenwald Foundation, studies were made of Indian education in Peru, Ecuador, and Bolivia, and assistance given educational officials in those countries in the development of a program of Indian education.

Active assistance was rendered the Ecuadorian Economic Survey Mission, formed by the Office of Foreign Agricultural Relations of the Department of Agriculture, upon request of the Coordinator of the Office of Inter-American Affairs, to study the possibilities of improving and increasing the production of sheep and wool in Ecuador. Service officials assisted the Haitian Government in developing its rural school program. This service was requested by the Haitian Government and the Department of State.

Other activities included a study of Indian administration in the various Latin American republics, assistance in developing collaboration among the several governments which have large Indian populations, and surveys in South America in behalf of the Coordinator of Inter-American Affairs, in the interests of the popular arts.

Indian CCC Leaves Outstanding Record

The fiscal year 1942 marked the ninth year of conservation work by Indian enrollees of CCC and concluded a unique chapter in the annals of Indian Service. The original objectives of CCC-Indian division were to provide employment and vocational training for Indians who were in need of work. Actual accomplishments far surpassed those initial aims.

Conservation structures to check the destructive erosion of lands now protect the forests, range, and forage cover on Indian reservation lands and adjacent areas. Thousands of miles of truck trails reach into Indian forests and range lands. Telephone lines, fences, and firebreaks aid in the efficient protection and use of forests and ranges. Fences alone, built by Indian enrollees, measure 12,537 miles—more than half the circumference of the earth.

More than 75,000 different Indians had a part in the CCC program. Vocational training was provided in 55 different occupations. Eight

thousand Indians earned the rating of skilled workmen. Forty thousand were classed as semi-skilled in job performance.

Approximately 6,500 former Indian enrollees are now in the armed forces. The skills and safety habits acquired through their CCC jobs in truck driving, tractor operation, radio and telephone mechanics, automotive repairs, jack-hammer operation, handling of explosives, fire fighting, and the like, will prove of inestimable value to the Nation.

Others are employed in airplane factories, in shipyards, in munition manufacturing plants, on highway construction. Among them are welders, riveters, engineers, tractor operators, metal workers, carpenters, and masons.

Indian Schools Adapt Curricula to War Training

The schools of the Indian Service naturally have been affected by the preparations for war and by the program of war training. Many of the older boys have entered the armed forces of the country and many of the men teachers have accompanied them. In the Indian high schools located near war industries, the remaining students have been rapidly absorbed into such employment as soon as they have reached an employable age and have had a minimum of skilled training. On the West Coast, employment opportunities in aircraft factories and shipyards have been opened to young women and classes in machine-shop practice and welding for girls have been provided by the Indian Service. This trend toward female employment is being carefully watched and similar classes will be opened in other Indian Service schools as the demand arises. Most of these high schools have operated on a 6-day week, 12-month basis, to speed up the training of students and provide for the training of an increased number. Older men have been welcomed in these schools for retraining or brush-up work preparatory to entering the war industries.

The Wingate Vocational High School on the Navajo Reservation has undertaken special preenlistment training for young Navajo men to perfect their use of English, give them necessary preliminary health instruction, and the elements of preliminary military training which should ease their induction into the armed forces and compensate for their lack of earlier education. The war is resulting in additional emphasis on the program of native language work for it is through the use of written Navajo particularly that the older non-English-speaking Indians are receiving instruction in war aims and objectives, and with regard to civilian activities which contribute to the war effort.

The reservation Indian schools have taken the leadership in repair and maintenance of automotive equipment, farm machinery, and

other similar activities making their shops available for use by adult Indians in cooperation with the Extension Division and CCC project leaders. School gardens have been greatly increased and school personnel has cooperated closely with the Extension Division in encouraging the increase of Indian community gardens.

The rubber shortage has reduced the use of school buses, and in a number of instances riding horses or horse-drawn vehicles have been substituted. The Education Division's program of breeding Morgan horses initiated several years ago at Pine Ridge, Rosebud, Tongue River, Carson, and Chilocco has laid the foundation for the replacement by horses of much automotive equipment. The success of the program has led to the introduction of horse breeding on other reservations. This activity may contribute directly to the war program in other areas by supplying well-bred horses for military and civilian use outside the Indian Service.

Cooperation with the Department of Agriculture in the development of community size dehydrating plants has resulted in the production of a very useful unit built largely of second-hand material, which has made possible the quick drying of many types of fruits, vegetables, and meats. These experiments have been conducted at Phoenix Indian School and hundreds of tons of this summer's crop of surplus food products have been dried and are available for use in Indian schools in the United States and Alaska. Additional units are being built for use in other areas of the Service. This is only a portent of the potentialities of dehydration not only for the Indian Service, but for commercial production.

Tribal Government in the War Crisis

These war years perforce will hasten the maturing of tribal self-government. With appropriations reduced, with personnel drawn off into military service and war industries, and with the Federal Government concentrating its resources on the prosecution of the war, the Indian tribes will find it expedient and perhaps necessary to make ingenious use of their powers of self-government. Some few tribes may fail for lack of leadership or because of peculiar handicaps, but for the great number it will be a time of challenge and of growing into maturity. Under normal conditions this growth might have been reached through years of hesitant groping. Now, faced by crisis, there is no choice.

The ground is well prepared for this testing. The tribal governments which have been fostered since June 18, 1934, the date of the passage of the Indian Reorganization Act, are survivals of tribal governments which existed even before the founding of the American Republic. Were they the recent creations of a federal government

suddenly granting local home rule to Indian groups there could be little expectation of survival for them during the months ahead. But the rooting is deep. The powers of self-government possessed by Indian tribes are not derived from the Indian Reorganization Act. This act is largely a recognition of the inherent powers of self-government which the tribes have always possessed and is the means of helping such tribal government effectively to function.

From the earliest years of the Republic, the Indian tribes have been recognized as distinct and separate political communities, qualified to exercise powers of self-government, not by virtue of any delegation of powers from the Federal Government but rather by reason of their original tribal sovereignty. The public usually thinks of Indians as wards of the Federal Government, which exercises over them individually the kind of power and protection usually exercised by a guardian over a minor. Many people, otherwise familiar with Indian affairs, do not realize that Indian tribes are legal entities, subject to Federal law to the exclusion of State law, and entitled to exercise their inherent rights of self-government so far as is consistent with Federal law. An Indian tribe possesses all powers of a sovereign State except those which have been specifically taken away from it either by treaty or by act of Congress. Tribes are subject to the legislative authority of the United States, that is to the Congress. They are not subject to State laws except where Congressional action has so decreed.

While the Congress and administrative officials have in numerous instances frustrated the exercise of tribal powers, the courts have repeatedly upheld them. And while these powers have been restricted somewhat by treaties and acts of Congress there still remains to the Indian tribes a large area in which the inherent powers of self-government may function. A tribe may determine its own membership, regulate domestic relations, control the distribution of the property of its members in the absence of contrary legislation, administer justice in connection with every offense not specifically made a Federal offense, and exercise many other rights and powers.

It is well to call attention at this time to the relationship of Indian tribes to State and Federal government in view of the considerable attention now being given in this country to problems of colonial administration likely to be encountered after the war. The Indians represent conquered nations but nations whose rights are being protected by the highest courts in the land. However much the Federal Indian Service may suffer for lack of appropriated money or of qualified personnel, Indian tribal government should suffer no loss of effectiveness. On the contrary this should be a time of structural growth against the future.

Tribes Invest Their Money in Land

One certain indication of the growing earnestness with which Indian Tribes are facing the task of providing for the future is to be seen in their willingness to invest their own tribal monies in land. This trend started several years ago and continues at a quickening pace. Among the tribes using their funds for land purchases are the Navajo tribe of New Mexico and Arizona; the Confederated Bands of Utes, Utah; the Round Valley Reservation, California; and Colville Reservation, Washington; the Flathead Indians, Montana; the Omaha Reservation, Nebraska; the Spokane Indians, Washington; the Chippewa of the Consolidated Chippewa jurisdiction in Minnesota; the Warm Springs Reservation in Oregon, and the Cheyenne River Reservation in South Dakota. The Flathead tribe, which receives a sizeable annual revenue from a power site lease, is in the midst of developing a long-term program which contemplates land purchase, the resettlement of landless members, and investment in livestock and farming equipment. A similar opportunity confronts the Black-foot Tribe in the same State. Here royalties derived from oil deposits in tribal land are being converted into the resources and tools required for an extensive program of tribal and individual rehabilitation.

Lands in Heirship

Absence of an adequate land base is not the only handicap which some tribes face. In the Sioux area of North and South Dakota there is abundant land, but unfortunately a great part of it, in the case of one or two reservations the greater part of it, remains in Indian possession and yet is lost to effective Indian use through inheritance possession; ownership has become divided among so many and so widely scattered heirs that control is lost and the Indian Service is burdened with a costly and unproductive real estate agency. This situation has existed for a number of years. The Indian Service has made little headway in improving the situation though it has been a subject of constant discussion during the past decade. The most encouraging development of these last 10 years is the interest which the Sioux Indians themselves are now taking in the problem. During the fall of 1941 meetings were held with Indians on several of the Sioux reservations, followed by a general conference for the purpose of summarizing observations and recommendations. Indians eagerly participated in these conferences and contributed some of the most searching and constructive thinking. The Cheyenne River Tribe has already taken the lead in formulating a code of land management aimed at establishing procedures for consolidating scattered individual and tribal holdings. It has long been realized that this baffling

problem will not be remedied until the Indians concern themselves with it. From the beginnings now being made in the Sioux country it is possible that the first real advance toward the solution of this old dilemma will be made.

Tribes Maintain Their Own Courts and Police

In still another important area of social action Indian tribes are developing the type of autonomous action which is latent in the powers residing in them. This is in the field of law and order, domestic relations, and the conduct of members. Maintaining law and order among upwards of 350,000 Indians living on 174 reservations has never been a simple task. Offenses committed by Indians against Indians on Indian reservations are not usually subject to the jurisdiction of the State courts. Only 10 major offenses are subject to the jurisdiction of the Federal courts. Other offenses must be handled by the Indians themselves through their own courts. To add to the difficulty there has been a serious reduction in law enforcement personnel. The Indian tribes have met the situation seriously and effectively. Out of all the Indian tribal courts and Indian enforcement machinery now operating, there have been remarkably few complaints of injudicious action or of failure of the tribal machinery. A comparative study of the effectiveness of this tribal adjudication with courts operating in non-Indian communities would probably illuminate interestingly the essential law abidingness of the Indian people and the high level of judicious practice. In the allotted areas where Indians and non-Indians live side by side the enforcement of law and order through tribal courts is often more difficult.

The Planning and Development Branch has especially emphasized the necessity of having tribal councils and Indian communities plan for a more effective utilization of their social and economic assets. Numerous conferences have been held in the field with Indian Service personnel and members of Indian councils relative to the formulation of plans for the establishment of planning committees and the development of social and economic programs for communities and reservations. Functioning planning organizations have been established on the Warm Springs, Flathead, Fort Belknap, Rosebud and other reservations.

Victory for the Walapai Tribe

On December 8, 1941, the Indians won an important victory in the Supreme Court of the United States. A unanimous decision affirms the possessory right of the Walapai Indians to lands which they have occupied from time immemorial although these lands had

been granted by the Congress of the United States to the Santa Fe Railroad prior to the establishment of the reservation.

In 1923, the Santa Fe Railroad, claiming about half of the lands of the Walapai Reservation under a railway grant act, asked that the reservation be divided into two equal parts, one of which would henceforth be the absolute property of the railroad.

Case Lost in Two Courts

Six years ago, the Department of Justice commenced a suit to establish the continuing Indian right of occupancy to the whole reservation and, its right to such other areas as still might rest under an unextinguished right of occupancy. The case was lost in the United States District Court of Arizona, and again in the United States Circuit Court of Appeals. The Solicitor of the Interior Department, upon invitation of the Department of Justice undertook to make a final effort to have the Supreme Court review and reverse the decision of the lower courts.

The Supreme Court granted the petition for a review of the case by certiorari. The case was argued on November 13 and 14.

The Circuit Court of Appeals had held that Indians in this area are in an inferior legal status to Indians in other areas, because of supposed discriminations under Spanish and Mexican law. This position was vigorously rejected by the Supreme Court, which declared that the rules laid down in earlier opinions guaranteeing respect for aboriginal occupancy of tribes under former Spanish dominion had "been so often and so long repeated as respects land under the prior sovereignty of the various European nations, including Spain, that like other rules governing titles to property they should now be considered no longer open."

Supreme Court Reaffirms Marshall Doctrine

It was argued also that since the land claims of the Walapai Tribe had never been recognized by the Federal Government either in a treaty or in any other formal action, the tribe could not show any rights superior to those of the railroad. In rejecting this contention the Supreme Court reaffirmed the doctrine of Chief Justice Marshall that the Indian tribes are "distinct political communities, having territorial boundaries, within which their authority is exclusive, and having a right to all the lands within those boundaries, which is not only acknowledged, but guaranteed by the United States." Accordingly, the Court said, the fact that a right of occupancy finds no formal recognition is not conclusive.

A third question of general interest considered in the Supreme

Court's opinion, written by Mr. Justice Douglas, was whether forcible removal of Indians from their ancestral homeland terminates their possessory rights in lands which they have occupied from time immemorial. The Supreme Court held that where such removal is not based upon Indian consent, there is no forfeiture of rights. Referring to the military removal of the Walapai Tribe, the Court said:

Their forcible removal in 1874 was not pursuant to any mandate of Congress. It was a high-handed endeavor to wrest from these Indians lands which Congress had never declared forfeited. No forfeiture can be predicated on an unauthorized attempt to effect a forcible settlement on the reservation, unless we are to be insensitive to the high standards for fair dealing in light of which laws dealing with Indian rights have long been read.

The case was remanded to the courts below to secure an accounting to the Walapai with respect to income heretofore derived by the railroad from lands legally subject to Indian occupancy.

Supreme Court Upholds Indians' Fishing Rights

In another significant decision the Supreme Court on March 30, 1942, held that the State of Washington is without power to charge the Yakimas a fee for fishing in their usual and accustomed places.

Sampson Tulee, a member of the Yakima Tribe, was convicted in the Superior Court for Klickitat County, Wash., on a charge of catching salmon without first having obtained a State license. This conviction was upheld by the Supreme Court of the State of Washington.

In 1855, the Yakimas were occupying lands which the United States wished to open up for settlers. Representatives of the Government met with representatives of the Indians and negotiated a treaty under which the Indians ceded a large amount of land.

Article III of this treaty secured to the Indians the exclusive right of taking fish in streams running through or bordering the reservation and also the right to take fish at all usual and accustomed places in common with the citizens of the territory.

Relying upon its powers to conserve game and fish within its borders the State asserted that its right to regulate fishing might be exercised at places not within the boundaries of the reservation. The appellant, on the other hand, claimed that the treaty gave him the right to fish in the "usual and accustomed places" free from State regulations of any kind.

The Supreme Court decision upholds the right of the Yakimas to fish in such areas without having to pay the State license. The decision, however, makes it clear that the State does have a right to regulate the taking of game and fish but holds that the imposition of license fees is not indispensable to the effectiveness of a State conservation program.

Menominees Win Court Award in Swamplands

When the United States, in 1854, under treaty with the Menominee Indians, set aside the present reservation, the Menominees were given lands which 4 years before had been granted to the State of Wisconsin as "swamplands."

The Court of Claims during the past year decided that the Indians were entitled to these lands and handed down an opinion opening the way to the recovery of the lands from the State of Wisconsin. If this opinion is not upset by the Supreme Court, it will dispose finally of a problem which has vexed the Indians and Indian administration for many years. These swamplands are scattered over the reservation—small islands of land, within the reservation, to which title was in dispute. With the purchase of these the entire reservation and its timber will belong to the Menominee Tribe.

This reservation has one of the finest stands of hemlock and hardwoods in the entire Lake States. It has not been cut over as has most of the area. The Menominees operate a lumber mill and cut the timber of the reservation on a sustained yield basis.

A Vital Opinion on the Fishing Rights of Alaskan Natives

The fishing industry is the largest and most important source of income and of employment for the natives of Alaska.

Originally the natives of the Territory had access to many fishing areas. Under Indian custom certain families or tribes were accepted as owners of these areas. From time immemorial, they possessed hereditary exclusive rights to these sites. The white corporations came to Alaska and established fishing traps and salmon canneries and began to encroach upon and to establish fishing sites where Indians had formerly been fishing.

After the Supreme Court handed down the Walapai decision, the Solicitor of the Interior was asked to give an opinion as to whether the Indians of Alaska did not have aboriginal fishing rights which, according to the principles set forth by the Court in the Walapai case, were being violated. The Solicitor's opinion of February 13, 1942, was in the affirmative.

After citing numerous court decisions upholding the possessory rights of Indians in lands and water where such rights have not been extinguished by any treaty, statute, or administrative action, the Solicitor concluded that "Available evidence indicates that the possessory rights traditionally asserted by Alaskan natives are ex-

clusive rights, under which the right to exclude others from a given area is an integral part of the right in itself. In this situation the Interior Department would have no authority to open up to public fishing any areas subject to such possessory rights, any more than it could open to the public a private cannery, whether on land or afloat."

It becomes necessary, under the opinion of the Solicitor, for the natives to establish the fact of continued occupancy.

National Indian Institute Formally Created

The report of the Department for 1941 announced the ratification by the United States Senate on May 26, 1941, of the international convention creating the Inter-American Indian Institute. This institute was formally created on March 25, 1942. On that date the representatives of the adhering nations met in Mexico City, organized the Governing Board, and selected Mexico City as the permanent site of the Institute. Commissioner Collier was selected president of the board. This organization is the official agency for the development of collaboration among the American nations on matters affecting the more than 30,000,000 Indians who live in the Western Hemisphere.

Article X of the Convention stipulates that each ratifying nation shall establish a National Indian Institute to serve as an affiliate of the Inter-American organization. Pursuant to the provisions of this article, President Roosevelt, by Executive order, on November 1, 1941, established an Institute to serve the United States.

The National Indian Institute will perform within the United States functions comparable to those which the Inter-American Indian Institute performs among the American nations.

The National Indian Institute utilizes the administrative facilities of the Office of Indian Affairs and receives guidance from a Policy Board composed of the Commissioner of Indian Affairs, two or more members appointed by the Secretary of the Interior, one of whom must be an Indian, and one representative each to be designated by the Secretary of State, the Secretary of Agriculture, the Smithsonian Institution, the Librarian of Congress, the National Research Council, the Social Science Research Council and the American Council of Learned Societies.

The Department of Interior representatives on the Board are Assistant Secretary Oscar L. Chapman, who will serve as chairman, Mr. Rene d'Harnoncourt, General Manager of the Indian Arts and Crafts Board, Mr. D'Arcy McNickle, who is the Indian member of the Board, and Mr. John Collier, United States Commissioner of Indian Affairs, who serves as the director of the Institute.

Activities of the Institute During the Last Year

The National Indian Institute last year sent two field representatives to Latin America to investigate the Indian policies of the various countries, to describe the work of the several divisions of the governments dealing with the Indian problems, and to evaluate the effectiveness of that work. Reports on the Indian policies of Venezuela, Ecuador, Peru, Brazil, and Guatemala were prepared and the data were collected for an evaluation of these policies. These reports have had wide distribution among United States officials interested in Latin American collaboration.

The war has served to focus the attention of the American people upon the necessity of improving our relations with the peoples of other American republics. In this process we are discovering that in many of these countries the Indians constitute the bulk of the population. We are finding out, too, that if we are to get rubber from Brazil, tin from Bolivia, and other strategic minerals from the Central and South American countries we shall be dependent almost entirely upon Indians for labor and transportation. Thirty million Indians in the Western Hemisphere are a significant percentage of the total population, indicating that only in our provincial North American thinking has the Indian and his culture ceased to live and function. With the increased emphasis upon Pan-Americanism we shall hear much more of the Indian in the post-war era.

For many years the record of the United States in its handling of its Indian minority served only to create fear among the countries south of the Rio Grande with large Indian groups. Fortunately, however, the new Indian program of the United States, increasingly effective over the last dozen years, has exhibited nearly all that the Indians of the southern countries could hope for. This new program has emphasized the changed attitude on the part of the United States toward a minority of a different culture and blood, and constitutes a reassurance to our neighbors. It has provided one of the needed foundations for Hemisphere cooperation.

Indian Arts and Crafts

The impact of the war economy on the production and merchandising of Indian arts and crafts has created many new problems that threaten the gains made in this field under the guidance of the Indian Arts and Crafts Board. General regulations governing production and commerce in the emergency must be formulated mainly to fit

industrialized production and therefore often create excessive hardship among Indian craftsmen. The WPB regulation prohibiting the use of wool in the manufacture of drapes and floor coverings, for example, would have barred thousands of Navajo weavers from earning a cash income. Since these Indian weavers are not in a position to change their technique or to use other raw materials, and since the total wool consumption by Indian weavers is relatively small, their case was presented by the Board to the appropriate authorities, and an exemption was secured for textiles that are both hand-woven and hand-spun. A similar problem was presented by the restriction on the use of silver for purposes nonessential to the conduct of the war.

The intervention of the Board has been and is still needed in the establishment of price ceilings and the posting of price lists based on price levels as of certain dates in the past. Since many Indian products are not made in accordance with accepted standards, but vary from piece to piece, arrangements must be made to allow for the evaluation of those products for which no precedent has been established.

One of the tasks of the Board in wartime is to keep up crafts production among those groups who are unable actually to participate in work that is directly connected with the war. This is particularly important, since many of the jobs now available to Indian labor, such as construction work on factories located near reservations, are only of a temporary nature.

The present decrease in tourist trade, that is due to the current transportation difficulties, has been felt in many regional outlets for Indian arts and crafts. To overcome these difficulties, the Board is organizing new temporary retail outlets in areas not affected by travel limitations. The Board has also continued its long-range activities of initiating and enlarging Indian production and merchandising organizations.

The Northern Plains Indian Arts and Crafts Association, located on the Blackfeet Reservation at Browning, Mont., has for the first time, during the past summer, offered products from several other nearby reservations, such as Fort Belknap, Rocky Boy, and Flathead. On each of these reservations, production groups have been or are now being organized to supply the Northern Plains Arts and Crafts Association with merchandise.

Surveys to be used for the organization of production and merchandising units have been made among the Hopi, the Maricopa, and the Yavapai.

Research Projects

Several research projects have recently been organized which should prove of far-reaching value to Indian administration.

The first of these is a study of Indian diet, a study intended to determine the effects on food habits, of custom, tribal prejudice, economic factors, and education. The study is to be comparative among tribes of different environment and tradition. Pilot studies have been completed on the Papago, Hopi, and Navajo reservations and for comparative purposes in two Spanish-American communities in New Mexico. The Indian Service and the University of Chicago are jointly undertaking this study, field direction under the general oversight of Dr. Robert Redfield, being provided by Dr. Fred Eggan, assistant professor of anthropology at the university. The inter-American Indian Institute has signified its wish to extend this food study to Latin America.

Of still deeper significance is a study of personality development of Indian children begun tentatively on the Papago Reservation in February and now broadened into a well-organized project on six reservations: Papago, Navajo, Hopi, Zuni, Zia, and Pine Ridge. This research seeks to describe how Indian children grow up, how they are molded by the world of family, of tribal customs, of white teachers and government personnel, and how they take their places as adults. The data gathered by this inquiry will be coordinated by a professional staff under the chairmanship of Dr. W. Lloyd Warner, professor of sociology and anthropology at the University of Chicago, and will be available at the same time for administrative interpretation by the Indian Service. This project also has been adopted as an international one by the inter-American Indian Institute.

The study of the relationships of Navajo medicine and religion to modern medicine, mentioned in last year's report, has been continued during the year and will extend throughout the fiscal year 1943. This study was first begun by Dr. Alexander Leighton and Dr. Dorothea Leighton of Johns-Hopkins. Dr. Dorothea Leighton has now been retained by the Indian Service and will continue the study which already is giving Indian Service physicians an insight into ways and means of utilizing the therapeutic values inherent in the songs, prayers, ceremonials, and healing herbs, sweat baths, and other parts of the native medicine and religion.

Dr. Alexander Leighton was called to active duty by the Navy but fortunately the Office was able to obtain his detail to the War Relocation Center on the Colorado River Reservation to direct needed research in connection with the administration of this project, where many social problems confront the administrative staff of the Center.

While this particular research does not deal directly with Indians, the findings should be of inestimable value in future dealings with Indian groups where many of the same problems are to be found. It is even probable that this study will prove helpful in coping with some of the problems of colonial administration which will be encountered in the post-war reconstruction the world over.

Medical Research

The Indian Service continued during the year its tuberculosis case findings, although the loss of personnel handicapped these efforts somewhat. A general survey revealed 419 fewer new cases than the survey of 1937, indicating at least a slow but definite progress in the elimination of this scourge among the Indians.

Treatment of trachoma by sulfanilamide has continued to produce spectacular results. Although close laboratory check has been discontinued, most patients receiving treatment are hospitalized in order to assure supervision. Sixty to eighty percent of all cases treated are reported arrested with remarkable improvement in vision. Many schools are now entirely free of the disease.

Publication of Handbook of Federal Indian Law

One of the outstanding contributions to Indian administration was made during the past year with the publication of the Handbook of Federal Indian Law by Felix S. Cohen, Assistant Solicitor of the Department of the Interior.

Based on a compilation of some 4,000 statutes and treaties and 5,000 judicial decisions and administrative rulings, the handbook traces the development of Federal Indian law, Indian administration, and Indian rights from their origin to present time. The legal basis of the Federal Government's treaty relations with Indians is fully discussed and there is a detailed analysis of the extended relationships of tribal self-government, Federal powers and reserve State powers over Indians. Mr. Cohen's work represents the most comprehensive survey ever made of laws relating to Indians in the United States.

Indian Service Personnel Hard Hit by War

Indian Service personnel administration has experienced the worst year, perhaps of all times. Scores of employees have left to join the armed forces. Many others have transferred to agencies more directly connected with the war.

The medical service has been especially hard hit. Twenty regular physicians and six part-time physicians have been called to active duty with the armed forces. Replacements are difficult to obtain. An additional 15 physicians hold reserve commissions and expect to be called at any time. Some have also left the Service to enter private practice. There is now a 70-percent coverage of the Indian Service by full-time physicians. This situation is alarming and it is impossible to provide Indians with even the most essential medical care.

Nurses likewise have been called to the armed forces. There are 200 vacant positions among the Indian Service hospital and field nurses. The situation is particularly acute in Alaska with transportation of newly appointed nurses often delayed for months. To help meet this critical situation the Indian Health Service is increasing and intensifying its training program for Indians. Classes for nurse-aides at the Kiowa hospital in Oklahoma now enroll 40 students instead of 20. Graduation occurs after 6 months of training instead of the usual 9. Sixty men are being trained as hospital orderlies and interpreters at various centers, following a regular schedule of class work. Hundreds of Indians and employees are being given Red Cross courses in first aid and in home nursing.

Restrictions in local transportation due to rubber shortage further limits the effectiveness of those employees who remain. Many ingenious methods of increasing the scope and effectiveness of employees are appearing on every hand. Extension agents and foresters are riding horses. Regional supervision has been materially reduced.

There has been a continual recasting of the functions of the Service. Essential war activities must go on, such as food production, mining of strategic minerals, protection and utilization of forests, power production and protection, and cooperation with the War Department in securing gunnery and bombing ranges and airports. Other services not immediately war connected will be maintained to the extent possible with limited personnel. Every effort will be made to continue to provide medical care and to maintain school facilities for children, and to operate other functions essential to the welfare of the Indians.

Civilian Conservation Corps

CONRAD L. WIRTH, Representative, Department of the Interior,
Advisory Council, Civilian Conservation Corps

DURING the fiscal year ending June 30, 1942, six bureaus and offices of the Department of the Interior supervised the conservation and development of the Nation's natural resources through the operation of an average of 309 Civilian Conservation Corps camps and 71 CCC-Indian units in the continental United States and an average of 8 camps in Hawaii, Alaska, and the Virgin Islands.

Projects undertaken by the CCC included the protection and improvement of Federal Grazing lands and Indian reservations; protection and propagation of wildlife; development of recreational facilities in National, State, and local parks; cooperation in the development of irrigation and hydroelectric power programs; broad conservation of the public domain; and rehabilitation of the human and natural resources of the islands and territorial possessions.

General Land Office Camps

The General Land Office operated three Civilian Conservation Corps camps in Oregon, and one in Wyoming, and carried on a program in the Territory of Alaska. The camps in Oregon were assigned to the conservation, protection, and development of the 2,500,000 acres of Oregon and California revested lands, an important reservoir of commercial timber being put on a sustained-yield basis to provide a productive forest in perpetuity. The declaration of war, however, caused concentration on activities directly connected with the waging of the war, with the resultant curtailment of forest conservation work. Despite this diversion of strength from conservation projects and the reduction of personnel, however, the camps continued their forest protection and utilization work. Since the Oregon and California area is an important source of timber for military purposes, every effort must be made to protect it and make it available for present use.

The Wyoming camp, until it was closed in May, continued its work of suppressing the outcrop coal fires which were threatening with

destruction an inestimable amount of the Nation's coal resources lying in the vicinity of Little Thunder Basin, Wyo. These deposits represent a fuel reserve of untold value.

During the year 11 coal fires were attacked, 4 of which were definitely suppressed. Although all of the fire suppression projects have not been completed, all except one are in good enough condition to withstand weathering and further combustion for some time despite lack of attention.

Civilian Conservation Corps activities on the 325,000,000 acres of public domain in Alaska were transferred to the General Land Office on April 1, 1940. Since the impact of the war prevented the enrollment of the planned number of whites, the enrollment was chiefly native Alaskan Indians and Eskimos. The program was therefore directed mainly for the benefit of the native peoples. Working in cooperation with the Office of Indian Affairs, the General Land Office coordinated its enrollment, work projects, and camp locations with the development program of the Indian Office. Wherever possible, native CCC camps were established in villages in dire need of relief assistance and where projects would benefit the entire community. About 50 villages were benefited during the year.

One of the greatest problems in Alaska is transportation. CCC personnel maintained and staked winter sled trails and maintained winter landing fields to make mail, freight, and passenger operations possible with a minimum disruption in service.

Office of Indian Affairs

Both the work projects and training activities of CCC in the Office of Indian Affairs were modified during the past fiscal year so that the whole program would be made to contribute directly to the prosecution of the war.

At the invitation of the War Department, three projects were undertaken on military reservations to relieve troops for training duty who would otherwise have been required to do this work. Typical service rendered was one project where Indian enrollees, using CCC-Indian division equipment, cleared and leveled the drill fields, removed brush and filled in gulleys, cleared away debris left by the construction contractors, built camouflage structures, constructed a rifle range and a small arms practice range.

During the year, approximately 2,000 Indian enrollees prepared themselves through national defense training courses for direct employment in war industries. Over 8,000 Indians have been trained in forest fire fighting and a similar number have completed the American Red Cross standard or advanced first-aid training. There are 250 Indian first-aid instructors in the CCC-Indian division. Camps

operated by the Indian CCC are located at strategic places in forest or range areas, thus providing trained crews ready for instant call in emergency service. Other CCC-Indian division activities have centered around the Indian communities, thereby permitting close coordination between CCC and the local programs for civilian defense.

Results of the work of Indian CCC which are helping to win the war are becoming increasingly evident. The enlarged carrying capacity of ranges, the saving and storage of water for livestock and for irrigation, the conservation of ranges and forests, are enabling the Indian reservations to yield increased quantities of needed food and wood products.

Bureau of Reclamation

During the fiscal year 1942 there was a reduction in the number of CCC camps assigned to the Bureau of Reclamation from 43 camps in operation on July 1, 1941, to 7 camps in operation on June 30, 1942. The termination of the camps assigned to the Bureau was effected in company with a general reduction of all camps within the Civilian Conservation Corps.

In general, the year's activities were a continuation of previously initiated programs, accentuated to reflect the country's war program. The development of irrigation facilities and the rehabilitation of existing irrigation facilities were stressed for early completion.

National Park Service

The fiscal year 1942 saw a marked change in the Civilian Conservation Corps program conducted by the National Park Service. The development of park and recreational areas gave way to the urgent business of developing military reservations with the many facilities needed for proper training of the armed forces that had to be made available quickly. In July 1941, 262 continental CCC camps were operating under the technical supervision of the National Park Service, 20 assigned to areas under the jurisdiction of the Army and Navy, 83 to national parks and monuments, 21 to recreational demonstration areas, 113 to State parks and 25 to county and metropolitan areas. Because of reduced enrollments numerous reductions in over-all CCC operations were made until at the close of the year only 89 camps were being operated, with 50 assigned to military and naval areas, 20 to national parks and monuments, 10 to recreational demonstration areas and 9 to State parks.

With the declaration of war, the National Park Service terminated CCC projects which were not directly related to the war effort. By the end of the year all work was progressing in the interest of the full

war program. The on-the-job training that the enrollees had received in the development of public lands for park and recreational purposes equipped them well for the work required at the many large military reservations. This enabled the armed services to devote more of their attention to the important job of providing military training.

The realigned CCC programs for the protection of Federal and State areas were planned for defense against direct enemy attack, sabotage, and other war hazards to forests, waters, strategic structures and other physical improvements. Major emphasis was placed upon perfecting methods and organization for protection of important natural resources and strategic facilities against incendiary fires and high explosives, and of personnel against war gases. But consideration was also given to the protection of forest and grass lands which represented the extensive watersheds essential to agriculture, power, and domestic water supply.

Civilian Conservation Corps activities in the Territory of Hawaii continued with an authorized strength of 675 enrollees. Until December 8, general conservation projects were prosecuted. Thereafter the CCC engaged in emergency work directed by the Army. This war-time work has been reported to be of great importance to the military authorities.

The CCC in the Virgin Islands completed an important well-drilling program started in the previous year. Also much general conservation and development work was continued. After the declaration of war, CCC labor and resources were used on defense projects requested by the military authorities.

Grazing Service

The facilities of the Civilian Conservation Corps were utilized by the Grazing Service in the construction and maintenance of range improvement projects on the public domain during the past fiscal year. The work was equitably distributed among the 58 Federal grazing districts located in the 10 Western States of Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, and Wyoming. These districts embrace a total of 142,000,000 acres of range land which provides forage for the seasonal grazing of 11,000,000 head of livestock.

At the beginning of the fiscal year 63 camps were assigned to the Grazing Service. The number was gradually diminished, however, until only 10 were in operation at the end of the fiscal year.

In the last half of the year much of the regular range improvement work was deferred in order to concentrate on projects which contribute more directly to the war objectives. Minor roads were built to mines and mills engaged in the development and production of strategic minerals. Roads were also built to aid in the construction

and operation of bombing areas, gunnery ranges and emergency landing fields. And, in one instance, many miles of road were constructed parallel to an international boundary as an aid to border patrol. The Grazing Service reproduction plants, manned largely by CCC enrollees, produced many maps and photographs for the Army and various defense agencies.

On December 9, 1941, less than 48 hours after Pearl Harbor, the Grazing Service, working in conjunction with the Office of Civilian Defense of the State of Utah and the Army, established a detection service for reporting the approach of aeroplanes. Ten Civilian Conservation Corps camps are equipped with radios and 24-hour service has been maintained. Any unusual movement of planes is immediately reported by radio to our station and the information relayed to the Office of Civilian Defense and the Army.

The CCC camps of the Grazing Service supplied the main source of manpower for our program of range and forest fire protection during the year. Extensive training in fire suppression was given to selected enrollees in order that well-trained and efficient crews would be ready for any emergency.

Fish and Wildlife Service

The amount of wildlife conservation and developmental work accomplished this year by the CCC on refuge areas was greatly diminished due to the gradual decrease of the number of camps under the jurisdiction of this Service from 36 to 12. Existing camps have been or are being converted as rapidly as possible from work on the refuge areas to more important essential war work in order to furnish the greatest possible aid to our war effort. During the year this Service had 4 camps directly engaged in the development and improvement of military areas, and arrangements are being completed to utilize the remaining 8 camps which are scheduled to this Service either on military areas or on projects necessary for the conservation of our national resources most important to the war program.

Division of Territories and Island Possessions

GUY J. SWOPE, Director

THE impact of war on the offshore areas coming under the supervision of this Division has overshadowed all other events. The war has brought about changes in the lives of the people in the continental United States, but it can truthfully be said that every aspect of life has been affected to a much greater extent in all our offshore areas.

In a report such as this it has been customary to present considerable statistical information as to progress made during the preceding year but it does not seem advisable to attempt to do so in any detail in this report primarily for military reasons, and also due to the fact that statistics in a war economy, particularly such as in effect in our offshore areas, are distorted to such an extent that they are almost meaningless.

The general pattern during the year up to December 7, in all these areas, was almost the same. Feverish defense preparations and the expenditure of large amounts of Federal funds had brought about increased employment. On the other hand, the cost of living was rising rapidly and the shipping problem was causing widespread readjustments in the internal economy of the offshore areas. The controls which the United States Government placed over exports and the supply of strategic material and equipment presented additional problems. Other factors which caused intricate and difficult questions, notably in the Philippines, were the orders establishing control over assets belonging to aliens.

These conditions were bringing home to the people the imminence of war and, to a much greater extent than prevailed generally on the continent, the people and local officials visualized the problems which war would bring to the civil governments and the civilian populations. Preparations for civilian defense were under way in all areas for it was realized where the brunt of opening attacks would be likely to fall. Attacks on Hawaii and the Philippines were almost simultaneous and these were soon followed by hostilities in Alaska. With these

attacks the people of the offshore areas settled down in earnest to the grim business of war.

The people of these areas reacted in a manner which has been a source of pride and satisfaction to the government. Whatever our sins of omission and commission may have been in respect to the inhabitants of areas over which the American flag was first raised less than 50 years ago, the fairness and justice of basic policies, in a time of real emergency, bore abundant fruit. All joined hands in the common defense of a system of government, the advantages of which were more appreciated by residents of insular areas than they were, in many cases, by residents of the continental areas who for generations had never known any other system of government and had come to take their rights and privileges as a matter of course.

A brief résumé of conditions in each area follows:

The Territory of Alaska

Actual hostilities came to Alaska in June 1942, when the United States Naval Base at Dutch Harbor was bombed and this was followed shortly by the occupation of the three western-most islands, Attu, Aggatu, and Kiska. Even before this attack, the Territory had been declared a combat zone. These attacks brought about a continuation and expansion of a program which has been under way for 2 years, a program which has affected every aspect of life in Alaska, and seemed certain to bring about even more far-reaching changes.

Just what part Alaska is playing in the war cannot be publicly reported at this time, but eventually the record will form an interesting chapter in the history of the Territory.

The routine affairs of the Territory and the activities of the various Federal agencies which function in the Territory were continued as well as could be expected under abnormal conditions. The finances of the territorial government are in excellent shape. The various Federal agencies which operate in the Territory do so largely on their own funds which relieves the Territory from what would otherwise be a heavy burden. Cooperation between representatives of the Federal Government and the territorial officials has been splendid. One Federal activity, the Civilian Conservation Corps, closed its functions on the last day of the fiscal year. The work done by this organization in its 9 years of operation in constructing emergency landing fields in remote areas and the building of docks, roads, bridges, etc., is proving of immense value in the defense program. Extensive work was done during the year in the development and protection of wildlife resources which is one of the major assets of the Territory. Both the Territory and Federal agencies concerned give special atten-

tion to the problems of the native population and the means of adjusting them to a rapidly changing social and economic order. An extensive program of education and public health designed to fit the peculiar interests of the natives is followed.

The general public in the United States has little conception of the present importance of Alaska industries to the economy of the United States and the latent possibilities of their development of these resources. Products of the mines, and of the fish, fur, and lumber industries are of tremendous value in a wartime economy. Alaskan spruce is of importance in the manufacture of airplanes and there are extensive forests suitable for the manufacture of newsprint. It may reasonably be expected that one result of the war will be the development of aviation both for passenger and freight traffic beyond anything formerly even dreamed of. More than any other area under the American flag, such a development would be of importance to Alaska and the possibilities of aviation and other means of communication which are being improved as a result of the military program as a means of developing the latent resources of the Territory are almost unlimited.

The Alaska Railroad

The Alaska Railroad operated 500.8 miles of line the year around, furnishing passenger and freight service between Seward and Fairbanks, and on branch lines serving the Matanuska and Nenana coal fields.

The passenger train schedule in effect during the summer of 1941 provided for three round trips weekly between Seward and Fairbanks, one weekly between Fairbanks and McKinley Park, and one every 2 weeks between Fairbanks and Nenana. No regular schedule was maintained from September until January, when a weekly trip between Anchorage and Fairbanks was made. Beginning April 24, three round trips weekly were made between Seward and Anchorage.

Both passenger traffic and freight tonnage showed substantial increases over last year. A new freight house was built at Anchorage, and a new concrete depot and general office building is under construction there. A dormitory and mess house was completed at Eska Coal Mine.

River boat service was maintained during the season of river navigation from Nenana to Tanana, Ruby, Holy Cross, and Marshall.

Territory of Hawaii

Immediately following the attack on Pearl Harbor on December 7, 1941, the Territory was transformed instantaneously into the center

of an active combat zone. The Governor of the Territory proclaimed a state of martial law and suspended the writ of habeas corpus.

Under an act passed a few months before known as the "Hawaii Defense Act," steps had been taken prior to the attack by the civil authorities to prepare for war. The Office of Civilian Defense was sufficiently well organized to swing into immediate action with its 17 divisions and 12 subdivisions, employing a total of 2,529 persons, augmented by some 14,000 volunteers. From funds provided by the Department of the Interior for civilian defense in Hawaii, financial assistance was rendered and is being continued to four additional agencies not directly under OCD—the office of the military governor, public health service, public and private hospitals, and county police and fire departments.

The more important divisions under the OCD, all of which are functioning continually, include the bomb disposal division; communications; gas defense; mortuary and burial division; plans and training; women's division; demolition, rescue and repairs; transportation; air-raid wardens, with nearly 5,500 volunteer members; evacuation division, emergency medical division, including supervision of the blood plasma banks, first-aid stations and emergency ambulance service, the civilian emergency hospital and nursing activities; registration division; and bureau of classification.

Despite the dislocation in all phases of life and economy in Hawaii engendered by the state of war, the financial condition of the Territory continues to be excellent, it was indicated by the general fund revenue receipts for the fiscal year which totaled \$22,065,468.54 against the estimates as prorated for the fiscal year of \$19,707,155.21, or an increase of \$2,358,313.33. From a review of a further revision of estimates for the next fiscal year it is felt that an unappropriated surplus of the general fund at the close of the present biennium on June 30, 1943, will approximate \$4,000,000 in the light of present emergency conditions.

Cash on hand and in banks of all funds deemed to be in the Treasury of Hawaii amounted on June 30 to \$24,529,428.50, an increase of \$4,923,150.51 over the \$19,606,277.99 on hand and in banks as of June 30, 1941.

Collections of the Territorial Harbor Board in the fiscal year ended June 30 were \$891,336.51, a decrease of \$66,591.53 from those of the previous year, due to the current war conditions since December 7, 1941.

This decrease was brought about by reason of the fact that all shipping between the Territory and overseas as well as interisland shipping was operated after December 7, 1941, by agencies of the Federal Government which paid no charges. Negotiations are under way by which it is hoped that the territorial government which is

required to maintain such harbor facilities may be reimbursed by the Federal Government.

The Governor of the Territory points with pride to the fact that Federal internal revenue collections for the fiscal year amounted to \$32,067,927, an increase of more than 100 percent. As compared to the situation in other offshore areas, the Territory may well be proud of this record.

Production and shipment of canned pineapple and pineapple juice continued throughout the year in nearly normal quantities, shipments in the 12 months ended May 21, 1941, having been 11,056,491 cases of pineapple and 11,284,938 cases of pineapple juice. The Federal Government purchased substantial quantities of these and announced that its requirements for the coming year would be 34 percent of the canned pineapple pack and 21 percent of the juice pack for Army, Navy and lease-lend shipments.

Shipments of raw sugar, Hawaii's other principal agricultural product, are expected to total 850,000 tons for the calendar year 1942.

In brief, under martial law and under the broad provisions of the Hawaii Defense Act, the work of virtually every Territorial department has been turned in some degree to furthering the war effort of the United States. War and the Nation's program has affected in some way the life of every citizen and every person resident in the Territory of Hawaii.

Territory of Puerto Rico

Employment rose during the year to levels hitherto unknown in the labor history of Puerto Rico. Work on the various military establishments now under construction on the island thinned out appreciably the legions of the unemployed, once a salient feature of the local economic scene.

Wages likewise rose. Increased employment, the operation of the Fair Labor Standards Act, and heightened union activity, all combined to ordain sorely needed adjustments. An additional factor, the Insular Minimum Wage Law, is expected to make a similar and important contribution during the coming year; it became operative at too recent a date to make itself felt at this writing.

Prospects for the immediate future, however, are distinctly less promising, for as the year drew to a close the employment situation took a sudden turn for the worse. The cumulative effects of the shipping problem became increasingly evident as shortages of raw materials, consumption commodities and gasoline dictated curtailed operations in private business. Widespread dismissals of employees ensued, and to aggravate matters, they came at a time when defense projects were nearing completion.

Organized labor registered a general advance during the year. New unions sprang up and became affiliated with existing organizations as discrimination against unionized employees tailed off under the National Labor Relations Act. A companion measure "To Protect Workmen and Employees Against Prejudicial Discrimination of Their Employers, etc.," was passed by the Insular Legislature and approved toward the close of the fiscal year.

However, the upward trend of wages can hardly be considered to have been adequate in the face of the proportionally greater increase in the cost of living that was registered during the year. Taking the year 1938-39 as a basis, it appears that indexes of wage rates were 130 for industrial workers, 136 for commercial employees, and 128 for office workers, whereas price indexes of the main constituents of the Puerto Rican labor diet were 191 for rice, 310 for codfish, 181 for beans, and 157 for fats; the index for all foods was 172.

As is to be expected in a period characterized by rapidly expanding commercial activity, increasing employment, and a rising cost of living, there were frequent industrial disputes during the year. The Department of Labor aided in the conciliation of 71 strikes and controversies involving 26,740 workers. In this task the Department enjoyed the cooperation of the United States Conciliation Service in the person of Commissioner Charles Goldsmith, whose extremely valuable assistance in preventing and adjusting strikes served to promote industrial peace, especially in those operations affecting the program of national defense.

A wealth of social and labor legislation was passed and approved during the year with a view to promoting the welfare of insular society in general and of labor in particular.

The financial progress achieved during the fiscal year amounted to \$10,650,411.82, as against \$2,960,415.82 for 1940-41. The general fund showed a balance of \$20,526,788.18, compared to \$6,447,843.39 for the previous year.

Total tax collections from the alcoholic beverage industry and from narcotics reached a new high at the close of the fiscal year under report. Total collections reverting to the general fund amounted to \$18,044,306.23, an increase of \$10,639,184.10, or 143.67 percent above the previous year's collections, which amounted to \$7,405,122.13.

The tax collections on Puerto Rican rum shipped to the United States constitute the largest amount ever collected on the island from a single source of government income. The unprecedented increase for the present year is accounted for by the rapid growth of the local rum industry, and the favorable market conditions prevailing in the United States.

Income-tax collections also reached a new high during the period under review. Total collections amounted to \$7,635,382.93 as com-

pared to \$2,843,433.42 for the previous year, the increase amounting to \$4,791,949.51.

During the year the Treasurer of Puerto Rico revised the revenue estimates for the general fund increasing them from \$20,450,000 to \$35,200,000, but the revenue collections actually totaled \$37,578,862.49.

Outstanding bond obligations of The People of Puerto Rico on July 1, 1942, amounted to \$23,700,000, as against \$26,975,000 on July 1, 1941. During the year bonds were redeemed in the sum of \$3,275,000.

The Virgin Islands

By reason of their strategic location not only as the most eastern outpost of the United States but also as the keystone of the arch protecting the Caribbean Sea approaches to the vital Panama Canal, it is most natural that the major concern of the Virgin Islands during the past year has been that of defense, both military and civilian.

Such has been the scope of the defense plans and their fulfillment that perhaps in no other place under the American flag has the normal economic and social structure of community life been so radically affected. Months before our entry into the war, the administration recognized the gravity of the geographical position of the Virgin Islands. Steps were initiated immediately toward a concentrated program of civilian defense. There was a prompt organizing of Councils of Defense by both island municipalities which were quick to move into active intensive programs. When war did come, the Virgin Islands defense program was well under way.

In this connection it is gratifying to note the comments of James M. Landis, Director of the United States Office of Civilian Defense, on examination of a report of civilian defense activities in the islands:

From these small dots of American soil in one of the world's most critical defense zones, we get a splendid example of civilian alertness to common danger and timely cooperation to meet it with adequate measures. We must put into practice in the Nation much of what these islands, which have an area of only 133 square miles, have already done.

On the islands of St. Thomas and St. Croix there have been extensive military preparations. What has been done in this connection and what the effects have been may not properly be recorded at this time. It can be said, however, that the entire population of the islands has responded in an excellent manner and that the islanders have demonstrated their patriotism and loyalty to the United States.

The war has emphasized the difference in economy between the islands of St. Thomas and St. Croix. The resources of St. Thomas are commercial and the increases in trade stimulated by defense activities raised the estimated municipal revenues of \$249,000 to

nearly \$600,000, thus making it possible for the municipality of St. Thomas and St. John, for the first time since the purchase of the islands by the United States in 1917, to be financed without Federal deficit appropriation.

The economy of the municipality of St. Croix is agricultural and it has been adversely affected during the last 5 years by repeated droughts. During the year, the Municipal Council of St. Croix with the approval of the present administration repealed the iniquitous export tax of \$6 a ton on sugar, which tax was among the burdens that destroyed the private sugar industries of St. Croix and added to the losses of the Virgin Islands Co. which was established by the government solely to provide employment and a market for small farmers. Existing nowhere else under the United States flag, the repeal of this tax had been urged for many years. About the time of the tax repeal, the present administration succeeded in having Congress apply to the Virgin Islands the Sugar Act of 1937. Heretofore St. Croix had been the only sugar-producing area of the United States that did not share in the benefit payments provided by that act, in spite of the fact that St. Croix's sugar was required to pay the processing tax from which such benefit payments were made to all other areas.

Employment, which is the first known measure of economic health, was at its peak on the island of St. Thomas where extensive military preparations gave remunerative employment to every employable male. In St. Croix, after months of much unemployment, the Work Projects Administration and the National Youth Administration gave employment to nearly every eligible male. By the end of June, however, the WPA employment quota was severely reduced and the National Youth Administration and the Civilian Conservation Corps were abandoned. The serious effects of this, as well as the gradual reduction of employment in the municipality of St. Thomas, by reason of the tapering off of military construction, will be increasingly felt in the new fiscal year. Although the employment situation was most satisfactory, it cannot be said that the economic health of the Virgin Islands is sound, despite its fair superficial appearance, because real economic health depends upon real wage and stability of employment.

In the municipality of St. Croix the new abattoir built by the Federal Government was operated as a WPA demonstration and training project. Many cattle, sheep, and hogs were slaughtered for export to St. Thomas and Puerto Rico. In St. Thomas the modern cold storage market built by the Federal Government was substantially completed. Facilities have been provided for the marketing and cold storage of all locally produced foodstuffs, fish, poultry, meats, vegetables, eggs, and dairy products. The processing, selling, and cold storing of meats have been given particular consideration in

order to serve as a companion project to the abattoir in St. Croix. It is expected that the operation of this market together with the operation of the abattoir in St. Croix will be within the framework of the Virgin Islands Co. These two units when organized for operation will be an important factor in meeting the demand for foodstuffs created by defense activities and the serious shipping situation.

The finances of the municipal government in St. Thomas were in excellent condition. For the first time since 1917, the municipality of St. Thomas and St. John was financed without a Federal deficit appropriation. The Federal deficit appropriation of \$15,000, which was made by Congress, was not used. In St. Croix the fiscal affairs of the municipality, after being at a very low ebb for many years, took a slightly more favorable turn. For the first time in 4 years it was not necessary to borrow money to meet an operating deficit over and above the Federal deficit appropriation. However, an enthusiastic reception of this golden era must be tempered by the poor potentialities of the forthcoming fiscal year.

The Philippine Islands

The Philippines are the only outlying possession of the United States under the jurisdiction of this Department that has fallen into the hands of the enemy.

In view of the growing tension in the Far East, President Roosevelt, on July 26, 1941, issued an order calling all of the organized military forces of the Government of the Commonwealth of the Philippines into the service of the armed forces of the United States for the period of the emergency.

During the preceding months, with the aid and cooperation of the American authorities, the President of the Philippines had used the emergency powers granted him by the National Assembly to prepare and carry forward the work for national and civilian defense. This foresight proved invaluable when the Philippines were attacked.

National elections were held in November 1941, for President, Vice President, Senators and Representatives to form the new bicameral Philippine Congress that was to replace the National Assembly on December 30. President Quezon and Vice President Osmena were reelected.

The outbreak of war with Japan came 3 weeks after the sixth anniversary of the establishment of the Commonwealth Government and completely changed the Philippine picture. At the celebration of that anniversary (November 15, 1941) President Quezon renewed the pledge of loyalty of the government and of the people of the Philippines to the United States and urged cooperation "in her gigantic

effort to save democracy and banish totalitarianism from the face of the earth." On December 3, 1941, President Quezon declared—

There is no territory under the American flag, including continental United States, where the people are more united behind President Roosevelt than we are here in the Philippines. . . . The flag of the United States will be defended by American and Filipino soldiers until the last round of ammunition has been fired. The whole Filipino people welcome the opportunity of testing their loyalty to America through blood and fire.

On December 8 (Manila time) the Japanese attacked the Philippines. A week later the National Assembly met and adopted a resolution declaring a state of total war emergency. President Quezon was authorized to enforce emergency regulations and he immediately commandeered food, fuel, building materials, and other prime necessities. He simplified government machinery by merging the nine cabinet positions into four key posts. When it became evident late in December that Manila could not be held against the advancing Japanese forces, it was declared an open city (December 26), and the United States High Commissioner with certain members of his staff and the President of the Philippines and cabinet members transferred their offices to Corregidor. There the second inauguration of President Quezon and Vice President Osmena took place on December 30. In his inaugural address the President reaffirmed his loyalty to the United States and pledged the Filipinos to "stand by America and fight with her until victory is won." Throughout the 4-month Luzon campaign—on Bataan which fell into the hands of the enemy on April 9 and on Corregidor which fell on May 6—Filipino soldiers heroically fought alongside Americans in defense of their country until disease and exhaustion forced them to surrender. As expressed by the President of the United States, their gallant struggle against the Japanese aggressors "elicited the profound admiration of every American."

United States High Commissioner Francis B. Sayre and certain members of his staff were transferred to Australia later in February and from there returned to Washington. Upon his arrival on March 23, Mr. Sayre submitted his resignation to the President, and it was later accepted effective as of June 30.

The President of the Philippines and members of his cabinet were evacuated to the southern part of the Philippine Archipelago late in February and subsequently transferred to Australia. Later, accepting the invitation of President Roosevelt, they arrived in Washington on May 13, and on May 14 formally established a government in exile. On many occasions since then, the President of the Philippines has reaffirmed the gratitude and loyalty of the Filipinos, stating "We stood and still stand with the United States in life and in death." He stated that his government's immediate job was to take care of

the thousands of Filipinos stranded here and abroad and to prepare for the day when his government is reestablished in Manila.

War conditions in the Philippines necessitated prompt action by our Congress. In December several measures were enacted for the purpose of dealing with the changed situation. The First War Powers Act, 1941 (Public 354, 77th Cong., approved December 18) conferred on the President of the United States broad powers to control foreign funds and enemy property. The powers of the High Commissioner were greatly extended by the delegation to him on December 19 of such powers relating to alien-owned property in the Philippines. These included authority to take over for safekeeping securities, gold bullion, silver currency and other reserves and to take steps necessary to prevent their falling into the hands of the enemy. The work of collecting tons of metal and paper in Manila and transporting them to Corregidor, where they were counted and inventoried, was performed with the aid of the Army, Navy and other government officials under most trying conditions. The paper currency and treasury certificates were destroyed; the bullion worth about \$1,500,000 and valuable securities were loaded on a submarine at Corregidor and transferred in mid-ocean to another naval vessel, which delivered them to the United States Treasury Department. Thus every ounce of gold and every security accepted by the office of the High Commissioner for safekeeping reached the United States safely.

The Sugar Act of 1937 was amended by extending for 3 years (or until June 30, 1945), payments to the Commonwealth government of taxes collected thereunder, and an additional sum of \$10,000,000 was appropriated by the Congress for public relief and civilian defense in the islands for the fiscal year 1942.

Granting in part a petition of the Philippine National Assembly, the Congress suspended until December 31, 1942, the collection of the export taxes on Philippine products and the progressive reduction of quotas prescribed in the Tydings-McDuffie Act as amended. The assembly had requested such suspension from January 1, 1941, until July 3, 1946, or during the present emergency.

The total overseas trade of the Philippines during the first 9 months of 1941 (the last period for which figures are available) amounted to \$245,532,635. Included in this figure is the value of gold and silver exports (\$38,542,914), nearly all of which came to the United States. Trade with the United States and Territories amounted to \$203,526,409, or approximately 83 percent of the islands' total trade. The Philippines purchased from the United States merchandise valued at \$90,113,868, thus occupying seventh place as a customer of the United States, as compared with ninth place in 1940. In this respect the islands were outranked by the United Kingdom, Canada, Union of South Africa, Egypt, Mexico, and Brazil, in the order named. Philip-

pine shipments to the United States, including gold and silver, amounted to \$113,412,541, or nearly 85 percent of the total exports.

The above figures reveal that, despite prevailing war conditions, had trade continued uninterrupted and at the same ratio for the full 12 months, the total external trade of the Philippines for the year 1941 would have exceeded that of the record year of 1929 by \$12,469,335, or nearly 4 percent. It should be noted, however, that there would have been only a slight gain of \$1,647,973 in imports. The increase of \$10,821,362 in exports would have been due entirely to the increased production of gold and silver, which rose from \$3,300,393 in 1929 to an estimated figure of \$51,390,552 in 1941.

Lack of shipping, excessive freight and insurance rates, tightening of export control and the dislocation of trade due to war conditions in Europe continued during the first 5 months of the period under review to hamper the normal interchange of merchandise. During the 3 months, July–September 1941, Philippine exports to Asia and Oceania, which in part had compensated for loss of trade with Europe, showed a decline of almost 22 percent compared with the corresponding period of 1940. The explanation for this is found in the fact that, due to the freezing of her assets, Japan's purchases for the same period had fallen from \$2,312,985 for the same quarter in 1940 to \$878,388 in 1941. On the other hand, the increased demand for war materials in the United States more than offset this loss, so that in September 1941, the American market absorbed more than 93 percent of all the products exported by the Philippines. Had it been possible to ship a substantial tonnage of the sugar held in Philippine ports because of lack of shipping space, the United States would have had a virtual monopoly of the Philippine export trade during the last part of 1941.

At the same time, however, the outlook for Philippine economy was not promising, especially as represented by the sugar industry, upon which the government depends for more than 40 percent of its revenue. The iron ore industry also had lost its best, and practically only, customer—Japan. Late in October it was reported that, beginning November 1, the United States Federal Loan Agency would begin the purchase of specified quantities of certain strategic war materials such as chrome and manganese ores and form stock-piles in case they could not be shipped at once. The course of events, however, made inoperative all measures taken to ward off an apparently impending economic crisis in the Philippines.

During the year ended June 30, 1942, payments in total amount of \$8,710,030.35 were made by this Division from funds of the Philippine government. Of this amount \$2,086,292.16 was for supplies purchased in the United States and shipped to the Philippines, \$4,109,000 was for the redemption of Philippine bonds, \$1,998,097.50 was for interest on the Philippine public debt, and the remaining \$516,640.69 was for

salaries and expenses of Philippine personnel in the United States, pensions to retired Philippine employees, and other miscellaneous items. The interest payment on outstanding bonds of the Philippine government will continue to be met from funds of the Commonwealth of the Philippines on deposit in this country. No payment of principal is due until 1946.

As of June 30, 1942, the Philippine Commonwealth had funds in a total amount of \$212,036,221.67 on deposit in the United States, \$210,047,729.54 being with the Treasurer of the United States and \$1,988,492.13 with two national banks. These funds consisted of \$134,169,734 currency reserves, \$67,900,933.78 general funds, \$9,950,000 trust funds and \$15,553.89 unexpended balance of funds set aside for the purchase of bonds.

Included in the amount of general funds mentioned is an item of approximately \$29,000,000 being the proceeds of collections of the excise tax on coconut oil, which is earmarked for the specific purposes stated in the Philippine Economic Readjustment Act of August 7, 1939. It is estimated that additional collections to be reported will raise this amount to approximately \$35,000,000.

The United States Treasury Department is also holding for the Commonwealth silver pesos with a face value equivalent to \$315,000, and gold bullion valued at \$1,500,000.

Equatorial Islands

The administration of Howland, Baker, Jarvis, Canton, and Enderbury Islands, situated in the mid-Pacific Ocean, approximately on the Equator, continued through the year without any untoward incident until the outbreak of hostilities on December 7, 1941. A detailed report on these activities is omitted on account of the war situation.

Puerto Rico Reconstruction Administration

GUY J. SWOPE, Administrator¹

DURING the past year, the impact of war in the Caribbean brought swift readjustment of several Puerto Rico Reconstruction Administration operations to meet emergency conditions. Local production of increased food supplies to take the place of imports from the States reduced by shipping difficulties became a major objective. Facilities made available by the long-range program for social betterment in Puerto Rico were placed at the disposal of the armed forces. For example, numerous prints of required portions of PRRA's aerial survey map of the island were supplied to the Army and Navy, and the Puerto Rico Cement Corporation plant which was constructed with PRRA funds has been allocating two-thirds of its daily production of high quality cement to Army and Navy projects and a substantial portion of the rest of its production is consumed by other defense projects. In addition, a butyl alcohol and acetone plant is delivering its complete production to industries having either direct or indirect war contracts.

Resettlers on PRRA lands have been moved to other locations in order that farms and homes they had occupied might be transferred to meet Army and Navy requirements. First aid emergency rooms have been provided adequately in the various urban housing projects and the fullest possible cooperation has been extended to the civilian defense authorities.

Under the expanded food production program, 175 acres of the land in the Eleanor Roosevelt Development not occupied by houses and streets has been planted in rice, beans, corn, and peas; short-term crops are intensively cultivated under PRRA supervision at the Cas-

¹ By Executive Order No. 8888 dated September 3, 1941, Guy J. Swope, Director of the Division of Territories and Island Possessions, was appointed Administrator to serve without additional compensation, vice Admiral William D. Leahy, who resigned as Administrator in December 1940 when appointed Ambassador to France. Miles H. Fairbank, Assistant Administrator, who had been interim Acting Administrator, resigned and was succeeded December 1, 1941, as Assistant Administrator in active charge of work in the field by Guillermo Esteves.

taner and American Suppliers projects, and in the Lafayette District. Further, it is anticipated that at least 2,000 additional acres will be devoted to food production during the next fiscal year as the result of construction of about 600 small rural houses authorized by the President on previously undeveloped PRRA lands.

Funds Available

Contrasted with an aggregate of \$69,904,000 in relief funds made available to the PRRA during the previous 6 years of its existence, the Puerto Rico Reconstruction Administration has had only \$1,428,891 available for expenditure during the 1942 fiscal year. Of this, \$175,338 represented unobligated balances as of June 30, 1941, from previous appropriations, was reappropriated by the Second Deficiency Act of 1941 to complete the purposes and objects stipulated in section 3 of the Emergency Relief Appropriation Act, fiscal year 1941; and \$1,253,553 was approved by the President for expenditure during the fiscal year from the Puerto Rico Revolving Fund (49 Stat. 1135) for the following projects:

Housing management, replacement and repairs.....	\$186,000
Lafayette project.....	95,903
Castaner Farm, operation and maintenance.....	50,000
Loans to cooperatives.....	350,000
Eleanor Roosevelt Development.....	450,000
Administration.....	121,650
	<hr/>
Total.....	1,253,553

A summary of the year's principal accomplishments follows:

Housing Management

The PRRA manages, operates, and maintains 5 low-cost urban housing projects containing 1,051 family dwelling units, 2,589 homesteads in its 7 rural resettlement areas, and 3,129 homesteads scattered throughout the island. Most of these houses are of concrete, and are termite and hurricane-proof. In addition there are 5,272 small parcels of land which are leased for cultivation to laborers at nominal rentals. The Eleanor Roosevelt urban development near San Juan, containing about 500 dwelling units constructed under previous programs, was qualified as a defense housing project; construction of 161 additional units, financed by \$450,000 allocated out of the revolving fund was authorized, and 51 of these have been practically completed; the remaining 110 will be finished in the next few months. Occupancy as of June 30, 1942, for the urban projects was 100 percent; for the 7 rural resettlement areas 98.25 percent, and for the scattered rural

units, 95.17 percent. Total rental collections amounted to \$255,290, with obligations for management, repairs, and maintenance of \$142,900, leaving a gross return of approximately \$112,390. With an estimated reserve of \$40,000 for future replacement and repair work, there is a net return of about \$72,390 as compared with \$60,000 for the preceding year.

Rural Electrification

To complete the program of previous years during which the PRRA expended approximately 9½ million dollars for hydroelectric projects, transmission and distribution lines, \$43,318 of the unobligated balances authorized for use during the fiscal year was invested in supplies and machinery for the Dos Bocas hydroelectric project. The Insular Government has provided the necessary funds for the small amount of work required to bring this important project to full completion and use.

Forestry

Having no further funds for continued development and protection of approximately 22,000 acres of land acquired under previous reforestation programs, the PRRA has practically completed negotiations for transfer of about 5,000 acres to the Forest Service of the United States Department of Agriculture, and the remaining 17,000 acres to the people of Puerto Rico for reforestation purposes.

Soil Conservation

To continue progress in soil conservation practices with emphasis on increased production of foodstuffs, the PRRA had available during the fiscal year only \$12,000 reappropriated from previously unobligated balances. However, research, field, and demonstration work on insular, Federal, and private lands was continued.

Cattle Tick Eradication

The PRRA's systematic cattle-dipping program of previous years laid the foundation for providing the island with wholesome milk and meat. To insure insular continuance of the program, the legislature of Puerto Rico appropriated \$150,000, and the PRRA transferred to the Insular Department of Agriculture and Commerce all of the equipment formerly used in the work.

Loans to Cooperatives

With \$350,000 authorized for expenditure from the revolving fund, the PRRA continued the supervision, organization, and financing of

cooperatives. Particular attention was devoted to the vegetable cooperatives organized primarily with a view to exporting fresh vegetables to the New York winter market. To save tomatoes, etc., which could not be shipped or sold to Army and Navy bases or in the local markets, small loans were made for the purchase of cans, and the addition of the canned product to the island's needed food supply.

Shortage of cargo space for their sugar has added to the problems of the cooperative Los Canos and Lafayette sugar mills, and because of priority restrictions, they have also had difficulties in obtaining equipment needed for increased operating efficiency. However, they have done as well as could be expected, and the increased supply of butyl alcohol and acetone by the Lafayette enterprise to industries engaged in the war program is a source of real gratification.

An insular act regulating the sugar industry of Puerto Rico was approved May 12, 1942, effective 90 days thereafter. This new law makes the manufacture, processing, and refining of sugar in Puerto Rico a public service enterprise, subject to the control of the Insular Public Service Commission as to rates, profits, zone of operations, etc. It is too early to speculate as to the possible effect of this legislation on the two sugar mill cooperatives financed by the PRRA.

The Puerto Rico Rug Cooperative, which obtained an additional loan of \$10,000 in the fall of 1941, and which from October last to the first of June this year had shipped and sold nearly 114,000 rag and string rugs for about \$55,500, will now have to reduce operations and confine itself to the local market until shipping conditions are improved.

An additional loan of \$75,000 was made to the Puerto Rico Cotton Growers' Marketing Cooperative in July 1941 to finance its rapidly expanding operations. For the first 5 months of the season members in the southern district of the island had already delivered to the gin more than twice the amount of the previous year's production, and it is expected that the northern district also will surpass all previous records in cotton weight and quality. The cooperative has a contract with the Commodity Credit Corporation for special cotton required in the war program.

The Sociedad Agricola de Puerto Rico, organized in 1939 principally to purchase farm supplies (particularly fertilizer), for members who now number about 1,700, obtained an additional PRRA loan of \$190,000 in February 1942, partly to finance acquisition of a chemical fertilizer mixing plant, partly for necessary operating capital.

Rural Rehabilitation

No Federal funds were made available for the broad program of rural rehabilitation which formerly had been one of the most impor-

tant PRRA activities. However, through \$81,200 appropriated to the PRRA by the insular legislature, operation of PRRA'S Central Service Farms was resumed and substantial rehabilitation work in the rural resettlement projects was continued. With emphasis on increased production of food crops on approximately 12,000 acres already in cultivation by PRRA resettlers, 500 additional acres of seedbeds were planted in bananas, plantains, yams, corn, rice, beans and various other vegetables. In a coordinated program with the Work Projects Administration, the PRRA furnished technical direction, land, work animals, agricultural implements, warehouse and other facilities, and the Work Projects Administration furnished labor, fertilizers, insecticides, etc., for planting 300 acres of seedbeds in grains and tubers to be turned over to the WPA for its planting and school-lunch programs. Like activities, including repairs and upkeep of roads, waterworks and buildings in PRRA resettlement areas, as well as operation of Central Service Farms and the furnishing of technical advice and help to resettlers in their production of food crops so badly needed in the island, will be financed during the fiscal year 1943 by \$50,000 appropriated by the insular legislature and \$82,900 approved for expenditure from the revolving fund

Conclusion

The tremendous amount of unemployment which principally motivated the establishment of the PRRA does not appear in as bold outline as it did 7 years ago, but the problem of a dense and ever-increasing population forced to wrest a livelihood, mainly by agriculture, from exceedingly limited resources, still remains. Recent financing of the PRRA and the \$1,150,380 authorized for expenditure out of the revolving fund for the fiscal year 1943 is barely sufficient temporarily to protect investments of the Government valued at approximately \$20,000,000 produced by previous PRRA programs, and to conserve some of the social and economic progress which would be completely lost if the program were entirely terminated. Unless the present Revolving Fund Act is amended by legislation (S. 1358) which has long been pending in the Senate so that receipts from projects financed out of the revolving fund (as present PRRA projects are financed), shall go back into the revolving fund, that fund will soon be exhausted. Then either the PRRA will have to be liquidated, or continuation of its most necessary activities either by the PRRA or by some other agency qualified to do the work, will have to be financed by direct Federal appropriations. It is also to be borne in mind that when the war is over, or sooner if Army and Navy projects now under way are completed, the unemployment problem somewhat alleviated by those activities, will again become

acute. Inevitably then by reason of the insufficiency of the island's peculiar economy, consideration again will have to be given as to whether mere palliative relief should be afforded, or whether in the light of the PRRA's experience, relief or other Federal expenditures should not be devoted to projects with long range reconstruction possibilities. The contributions which the PRRA has made to the development of the natural and human resources of the island, and particularly the development of more progressive leadership among those who have received its help and training, should not be allowed to go to waste.

Division of Investigations

DALE B. WHITESIDE, Director

THE Division during the fiscal year 1942 rendered substantial services in meeting requirements of our Nation at war.

Before and since Pearl Harbor, large areas of public lands in the United States and Alaska were withdrawn by Executive order, subject to valid existing rights, from all forms of appropriation under the public land laws and reserved for the use of the War or Navy Departments as bombing or gunnery ranges, or for other military or naval purposes. Such use required the clearing of title to the withdrawn areas which necessitated the checking of thousands of mining claim records and the examination of several million acres of land. In order to serve notice of the proceedings, a search was made for approximately 10,000 claimants. Numerous hearings were held in contested cases and thousands of invalid mining claims were canceled as a result of the investigations.

Services performed for the Bureau of Reclamation included the appraisal of mineral lands and the examination of mining claims within the Shasta, Keswick, and Friant Reservoirs of the Central Valley project in California, the Davis Dam project on the Colorado River, and the Colorado Big Thompson reclamation project in Colorado. Similar services were rendered in completing the remaining mineral cases affecting the Grand Coulee project in the State of Washington.

A recheck appraisal of a considerable area of privately owned lands to be purchased in connection with the Cascade Reservoir site, Idaho, was also made at the request of the Bureau of Reclamation.

The Division cooperated with the National Park Service in appraising lands to be added to parks and in investigating mining claims on park and monument lands. The work involved in clearing title to lands within the Joshua Tree National Monument in California proved to be extensive as approximately 8,750 mining claims were found of record. Adverse proceedings have been directed against 3,900 of these claims and 105 applications for hearing are pending.

A number of investigations were made for the Office of Indian Affairs, including a survey to determine the grazing privilege rights of white stockmen on certain lands within the so-called Ute Extension Area within Utah Grazing District No. 8. The lands in question had been purchased by the Office of Indian Affairs in furtherance of a program to make additional areas available to Indians for grazing purposes.

A substantial part of the work of the Division continued to be the investigation of grazing lease applications and renewals, in furtherance of the program to protect and conserve the public domain. During the fiscal year 2,899 reports were submitted relating to investigations of grazing lease applications.

The following violations were investigated on which reports were submitted during the fiscal year ended June 30, 1942, for criminal prosecution:

Embezzlement.....	4
Submitting false claims against the Government.....	3
Perjury.....	4
Making false acknowledgments in certificates.....	1
Timber trespass.....	3
Grazing trespass.....	2
Forgery.....	1
Cutting witness trees at section corners.....	2
Theft of Government property.....	2
Oil and gas frauds.....	2

Nine of these violators were indicted during the fiscal year and 10 defendants, some of whom were indicted prior to July 1, 1941, were convicted.

Reorganization

By departmental order dated January 17, 1942, the Division of Investigations was reorganized. A Branch of Field Examination was established in the General Land Office to make inspections, surveys, or other field examinations. The order also established a staff of field representatives attached directly to the Office of the Secretary for the purpose of making such over-all studies and performing such field examining work for the Office of the Secretary and its various bureaus as the Secretary shall direct.

Summary

The combined units, on June 30, 1942, consisted of 115 employees, of whom 23 were on duty at Washington, D. C., and 92 in the four regional offices located at San Francisco, Calif.; Billings, Mont.; Salt Lake City, Utah; and Albuquerque, N. Mex.

The following is a résumé of the work accomplished during the fiscal year:

Type of case	Pending July 1, 1941	Received	Closed	Pending June 30, 1942
Appraisals (including mining claims).....	580	20,057	5,580	15,057
Application to purchase timber.....	1	1	2	0
Color of title.....	0	1	1	0
Contest.....	0	1	0	1
Court cases, miscellaneous civil.....	4	8	8	4
Court cases, criminal.....	15	19	24	10
Desert entries.....	854	57	859	52
Five-acre tracts.....	0	8	1	7
Grazing applications.....	28	0	28	0
Grazing leases.....	1,252	2,492	2,999	845
Homesteads.....	468	479	671	276
Indian allotments.....	0	3	0	3
Irrigation projects.....	2	1	3	0
Isolated tracts.....	128	443	352	219
Land classification.....	2	2	3	1
Land exchanges.....	123	572	296	399
Leases, Alaska.....	39	9	43	5
Mineral entries.....	129	132	198	63
Miscellaneous.....	54	399	363	90
Official conduct.....	4	0	1	3
Oil and gas leases.....	0	11	0	11
Oil shale.....	363	0	0	363
Oil placer claims.....	120	91	211	0
Permits.....	11	2	4	9
Personnel.....	19	60	72	7
Qualification of abstractor.....	1	1	2	0
Rights-of-way.....	3	3	2	4
Selections.....	38	32	56	14
Stock driveways.....	13	31	27	17
Swamp lands.....	1	4	4	1
Timber cases.....	352	255	289	318
Timber and stone.....	0	15	6	9
Town sites.....	0	1	0	1
Trespass, coal.....	120	166	166	120
Trespass, fire.....	0	1	1	0
Trespass, gravel.....	2	4	6	0
Trespass, grazing.....	95	9	101	3
Trespass, signboard.....	73	51	124	0
Trespass, timber.....	360	198	305	253
Unlawful enclosures.....	12	9	9	12
Unlawful occupancy.....	5	1	5	1
Total.....	5,271	25,629	12,722	18,178

Division of Personnel Supervision and Management

MRS. J. ATWOOD MAULDING, Director

THE Division of Personnel Supervision and Management has stepped into the pace set by the emergency to meet the heavy demands for the recruitment of employees created by new war activities, heavy losses by personnel transfers, decentralization of bureaus, and the replacement of men leaving for military service. Nearly 5,500 separations in the Department have been directly attributable to the war, including approximately 1,500 military furloughs.

Many positions have been filled by promotion from within the service, in accordance with the established policy, and those vacated by employees going to the armed services are, of course, filled provisionally for the period of absence. During the year the bureaus in Washington requested eligibles for 2,460 positions, and single requests for as many as 50 or more coal mine inspectors, explosives investigators, geologists, engineers, and nurses were not uncommon. Over 200 engineering aides were appointed in response to an open order from the Geological Survey. These figures do not include the great number of positions filled in the field through the offices of the district civil-service managers.

On January 1, last, the Civil Service Commission inaugurated a direct recruiting system for certain types of qualifications, and the Department has cooperated in this recruitment program. The situation with regard to stenographers and machine operators has been particularly acute, and a large number of these were secured through the direct recruitment process. There has been daily liaison with the Civil Service Commission and recently the Commission has assigned a special representative to handle our requests. There has also been close cooperation with representatives of the Commission in the negotiation of war service transfers, both to and from the Department.

Nearly 17,000 applications for employment have been rated in the Employment Section, and more than 1,000 applicants interviewed,

not including those interviewed in regard to the forthcoming decentralization of the Fish and Wildlife, National Park, and Indian Services. Of employees unable to transfer with these bureaus, 274 have been placed in other positions, and 115 persons have been recruited for the transfer.

In October 1941, the Civil Service Commission delegated to the Department the authority to approve all promotions and changes in status for our own employees. In order to regulate these changes, the Division set up and distributed to the bureaus a comprehensive set of qualifications standards for various types of positions.

In accordance with the terms of the Ramspeck Act, there was established a Departmental Board of Review on Efficiency Ratings, including one member elected by the employees. Only three appeals were received by the Board. The Department feels rather proud of this record since it indicates considerate attention on the part of the rating and reviewing officers and a well functioning grievance machinery. Effective March 31, last, the Civil Service Commission prescribed a revised efficiency rating system. This was inaugurated in the Department with a course in procedures and techniques conducted for 300 officers who are responsible for rating and reviewing the work of employees. The interest shown was commendable.

An effort has been made to stimulate training of various kinds within the Department, especially as a method of meeting the increasing shortage of available experienced personnel. The Stenographic Training Center has continued with increased attendance, but because of the mounting shortage of stenographers, the program of the center has been curtailed. Its principal objective now is to make newly appointed stenographers acquainted as expeditiously as possible with the Interior Department and its style and form of correspondence make-up and procedure. The short program does not provide much opportunity for increasing skills in short hand and typing, but an effort is made, by means of diagnostic tests, to isolate performance faults and to prescribe remedial drills.

The volume of paper work in connection with enlarged war activities and increased personnel turn-over, as well as the loss of a number of the Division's own trained persons, have made unusual demands upon the Division. The volume has also been increased by the operation of the automatic promotion law, involving the processing of a large number each quarter. To meet the situation there was installed in the Appointments Section a "processing line" type of organization for the speedy transit of personnel actions for signature. Conformity with the departmental policy, classification, accuracy, and completeness of action are now checked in one continuous procedure without involved routing and resulting delay. During the past year, 39,675 personnel actions have been handled.

The amendment to the Retirement law on January 24, 1942, extended the benefits to practically every regular Government employee. This very desirable legislation has greatly increased the number of records maintained in the Central Office of the Department, and a large number of inquiries have been handled in recent months. During the year there have been 188 retirements—65 for age, 65 for disability, and 58 voluntary retirements before reaching the retirement age.

A comprehensive Personnel Manual bringing together all existing orders and instructions relating to personnel management in the Department was issued in December 1941. The War Service Regulations and new streamlined procedures adopted by the Civil Service Commission have made material modifications necessary, but we consider the manual a valuable aid, especially to the field officers operating at long distance. The Personnel Bulletin formerly issued semi-monthly is now issued quarterly in line with the desire to conserve labor and paper.

An Employee Handbook explaining the objectives of the Department and the regulations, rights, and privileges of employees has been issued, primarily for the benefit of new recruits, and other steps have been taken to assist new employees in making a satisfactory personal adjustment.

Office of the Solicitor

NATHAN R. MARGOLD, Solicitor ¹

WITH the mobilization of the Nation's vast resources on a war-time basis there devolved upon the Office of the Solicitor, the bureau counsel, and field attorneys, a correspondingly heavy burden of complex, controversial, and unique legal questions. The necessity for developing and making immediately available all of the Nation's resources, without delay to the war program, within the framework of the law, with due regard for individual rights and with a minimum of interference with long-established conservation policies and programs, created many complex legal problems and presented many legal obstacles requiring resourceful, expeditious counsel.

Shortly after the start of hostilities with Japan, it became important to determine what measures would be necessary not only to protect American and Philippine currency and securities in the hands of United States citizens and nationals but also to prevent the use of such currency and securities which might be in or which might fall into the hands of the enemy or enemy agents here and abroad. After intensive study of the United States and Philippine laws involved, especially with respect to Philippine credits in the United States, and following conferences with the representatives of the Treasury Department and of the Commonwealth of the Philippines, measures were devised to accomplish the desired objectives and these measures were successfully carried into effect by the appropriate civil and military authorities. Similarly, the same subject has been studied with respect to currency and securities in other areas, as a result of which instructions have been issued by the Treasury Department providing adequate safeguards and machinery for the registration, custody and, if necessary, the destruction of securities and currency in the event of invasion of such areas.

One of the important laws enacted by the Congress during the year directly affecting the Department was the Federal Explosives Act of

¹ Mr. Margold terminated his service as Solicitor on July 9, 1942, to become an Associate Judge of the Municipal Court for the District of Columbia. Felix S. Cohen served as Acting Solicitor until August 26, when Warner W. Gardner was inducted into office as Solicitor.

December 26, 1941. This is a revision of the 1917 wartime explosives act and was drafted by the Solicitor's Office during the preceding fiscal year. It provides the necessary authority and machinery for the exercise of Federal licensing and control of the manufacture, distribution, storage, use and possession of explosives in time of war or national emergency and is designed to prevent the misuse of explosives by limiting their use and possession to reliable, experienced and loyal persons or concerns. Regulations and licensing procedures implementing the provisions of the act were devised and prepared by attorneys of the Solicitor's Office, and promulgated with their assistance.

The decision of the commanding general of the Pacific coast area to evacuate all persons of Japanese descent from within certain limits and to relocate them on Government land removed from possible combat zones resulted in a series of agreements between the War Relocation Authority and the Department of the Interior. Thousands of acres of the public domain were required for this purpose and both Bureau of Reclamation and Indian lands have been made available to the War Relocation Authority for the construction of housing facilities, the establishment of self-governing communities under Federal supervision and for farming and industrial purposes. Agreements also have been negotiated and methods devised whereby the Bureau of Reclamation will supply these wholly unique projects with water and electric power for domestic and commercial purposes; it also will construct irrigation works and provide the necessary facilities and water. Cooperative agreements between the agencies affected, and with the Indians, provide for the utilization of Indian lands without extinguishment of the Indian title to such land or the transfer of title to any other grantee. Not only will the Indian owners receive money rental, but also any improvements made upon the land will inure to their benefit. At least 30,000 evacuees will be relocated on the Klamath, Minidoka, and Shoshone sites, on lands of the Bureau of Reclamation; at least 20,000 on the Colorado River Indian Reservation and an additional 10,000 on the Gila River Indian Reservation.

With the rapid development of the war program and the tremendous expansion of the armed forces it became necessary to make available to the Army, Navy, and Marine Corps millions of acres of public land for immediate use as bombing and gunnery ranges, antiaircraft ranges, training and recreation areas, and combat bases, and for other military purposes. Lands already withdrawn and dedicated to a particular use were also made available for military purposes by the Indian Office, Bureau of Reclamation, National Park Service and Fish and Wildlife Service. The orderly, legal, and expeditious disposition of the lands so required presented a variety of novel legal problems. Many apparent obstacles had to be overcome and prac-

tical methods devised—consistent with existing law and the emergency presented.

An important decision concerning the validity of 174 mining claims situated in the area set aside for the use of the War Department as the Muroc Bombing and Gunnery Range, California, was rendered, thereby expediting the availability of the area for military use.

Greatly increased demands upon the Bureau of Mines by the Navy Department for helium gas necessitated the consideration of many intricate legal problems in passing upon the validity of title to easements, rights-of-way and plant sites, and in the preparation of contracts for the acquisition of such lands. A recent appropriation of 4 million dollars, to enable the Bureau of Mines to expand its program to meet the war requirements for helium will, necessarily, result in a marked increase in the legal work in connection therewith.

Rights asserted by private individuals under applications filed pursuant to the sodium provisions of the mineral leasing act to salt deposits in the Death Valley National Monument, California, needed for Federal use in connection with the production of magnesium, and private rights sought to be created by locating mining claims under the United States mining laws for Government-owned sand and gravel in Nevada, needed in the construction of Federal defense plants and housing, were held to be without force and effect.

Yucca, a plant found on the public domain and needed in the prosecution of the war as a substitute for certain strategic or critical materials formerly imported from abroad, was made available for appropriate disposition under authority vested in the Secretary of the Interior by Executive Order No. 9180, of June 5, 1942, issued pursuant to the President's war powers.

Hundreds of legislative matters were presented, vitally affecting the prosecution of the war. Legislation pertaining to the sudden development of the Nation's mineral resources, the rapid expansion of industrial operations and the resultant demand for increased power facilities in the Pacific Northwest; problems in connection with the use of public lands by the Army, Navy, and Marine Corps, especially by the air arms of the services; questions affecting an important source of food supply, the commercial salmon fisheries of Alaska and the Pacific Northwest, and many others, required extensive legal consideration.

A substantial portion of the legal work performed during the fiscal year affecting the Division of Territories and Island Possessions concerned matters directly or indirectly connected with the prosecution of the war. Examples of such matters are: Proposed legislation to provide protection for persons and property in the Territories and possessions against bombing attacks; authorizing the planting of guayule for the production of a domestic rubber supply; authorizing expenditures for evacuating dependents of civilian employees in the

Territories and possessions; to permit censorship of communications with and between the Territories and possessions; to provide benefits for injury, disability, death, or detention of civilians; questions concerning the filing of income-tax returns and the payment of the tax by persons in the Territories and possessions affected by the war; delegation to officers in the Territories of emergency powers with regard to the making and modification of contracts; contracts, leases, and other questions regarding relief and civilian defense in the Territories and possessions; questions regarding shipping rates and war-risk insurance on shipments to the Territories and possessions; proposed legislation establishing a military code for Alaska; question regarding construction of a military highway to Alaska; orders for the suspension of toll charges on shipments over the Richardson Highway for war projects; proposed legislation for the employment of nationals on war projects in Hawaii; questions concerning the appointment of nonresident police officers in Hawaii to provide protection for vital facilities; questions concerning the payment of expenses of the Hawaiian home guard; questions as to civil jurisdiction within the naval base at San Juan; questions regarding the sugar shortage and the suspension of quotas under the sugar act; Executive order certifying Puerto Rico as a distressed emergency area; questions regarding applicability of Selective Service Act in the Virgin Islands; Executive order transferring property in the Virgin Islands to the Navy Department; contract between the War Department and The Virgin Islands Co. for constructing distribution facilities and supplying power in connection with Benedict Field, St. Croix, Virgin Islands.

A most important patent case arose during the fiscal year covering a new and useful means of extinguishing magnesium incendiary bombs by the application of feldspar. Manufacture and sale of the extinguisher is permitted under regulations which were drafted in a manner to insure availability of the product at low cost, honestly represented, and which prevent, insofar as possible, monopolistic practices.

During the fiscal year the office was required to pass upon many involved legal problems and to devise methods for the expeditious utilization of Indian lands, resources and facilities necessary or desirable in the furtherance of the war program, including the production of strategic minerals, the marketing of commercial timber, increased grain and other food production, including forage for livestock on Indian lands, tribal or allotted, and acquisition by the military forces—Army, Navy and Air—of needed areas of Indian lands.

A number of legal matters affecting the prosecution of the war were presented in connection with the activities of the Grazing Service, of which the following are examples: analyzing the means of providing recreational areas for civilian and armed war forces;

analyzing legal aspects of access-road problems, and facilitating withdrawals for bombing, aerial gunnery or chemical warfare areas; facilitating transfer of Grazing Service equipment needed by the armed forces or for other direct war work.

The number of items presented to the Counsel at Large for the Territory of Alaska was 781, many of which directly related to the prosecution of the war.

Legal questions arising in the Bureau of Reclamation during the fiscal year 1942 were largely concentrated on activities related to the prosecution of the war. Contracts were drafted and negotiated for supplying power from the Boulder Canyon project and other reclamation projects to vital war industries. Legal arrangements were made for furnishing water for war industries, for military camps and training centers. Land acquisitions required in the construction of power producing projects were expedited. Authority under the War Powers Act was utilized to expedite construction of power producing projects such as Central Valley and Colorado-Big Thompson. Requirements of the War Department and other war agencies for lands, machinery and equipment necessitated the preparation and negotiation of numerous leases and sale contracts. The irrigation program, of vital importance in furnishing food, forage and fiber essential to the successful prosecution of the war, continued to present the usual large volume of difficult legal problems.

During the course of the year the Solicitor, or members of his staff, appeared before the courts in behalf of the Secretary of the Interior and other officers in many matters affecting the Department. Counsel assigned to the immediate office, as well as bureau counsel and attorneys in the field, actively participated in the preparation of numerous cases referred to the Department of Justice and, in many instances, cooperated with attorneys of that Department in the actual handling and trial of cases. The two most important cases decided during the year were those argued by the Solicitor before the United States Supreme Court, in each of which the position taken by the Department was upheld. The decisions in these two cases, *United States v. Santa Fe Pacific Railroad Co.* (Walapai case), and *State v. Sampson Tulee*, climaxed a record commenced in March 1933 in which the Department has been successful in every case before the high court wherein the validity of departmental action by this Administration has been challenged. The unanimous decision of the Supreme Court in the Walapai case affirms the possessory rights of the Indians in lands which they have occupied from time immemorial, even where the title to such lands has been granted to a railroad. The Sampson Tulee case affirms the sanctity of Indian treaties and denies the contention that such rights must yield to State laws; it is expected to have far-reaching influence in the interpretation of Indian treaties insofar as they deal with fishing rights in the Northwest. These two cases con-

stitute a sweeping and significant victory for a minority people against the claims of a dominant majority, and are evidence of the sacredness with which the United States upholds its obligations toward the original owners of the continent.

Other litigation of particular interest included the cases of *Dow v. Ickes* and *Gilbert v. Ickes*, which were finally determined in favor of the Secretary of the Interior by the Court of Appeals for the District of Columbia, the United States Supreme Court denying certiorari. These two cases were attempts to compel the Secretary to modify certain provisions of the Alaska Fisheries regulations. Certiorari was also denied by the Supreme Court in the case of *United States v. Forness*, 125 F. (2d) 928, where the Circuit Court of Appeals for the Second Circuit upheld the position of the Department with reference to a regulation by the Seneca Tribal Council canceling some 800 leases in the town of Salamanca on the Allegany Indian Reservation. In the case of *United States v. General Petroleum Corporation of California*, which is presently in the course of trial, the United States is seeking an accounting of over 3 million dollars in oil royalties alleged to be due on account of oil and gas produced and sold from Federal lands. It also seeks to establish the authority of the Secretary of the Interior to fix, pursuant to the Mineral Leasing Act of February 25, 1920, reasonable minimum valuations for the purpose of computing royalty due the United States. Other cases either handled or participated in by the Department's attorneys include: *Nebraska v. Wyoming and Colorado, United States, Intervener*, pending in the Supreme Court of the United States; *United States v. Orr Water District*, and *United States v. Alpine Land & Reservoir Co.*, pending in the United States District Court for the District of Nevada, in which the United States is seeking, among other things, to establish the ownership of unappropriated water of nonnavigable streams. Important questions of law concerning the valuation of reservoir and power sites are involved in the case of *United States v. Washington Power Co.*, pending on appeal from a decision in favor of the United States in the United States Circuit Court of Appeals for the Ninth Circuit, and *United States v. Big Bend Transit Co.*, pending in the United States District Court for the District of Washington.

The preparation of opinions, decisions and legal memoranda constituted a very important part of the work of the Solicitor's Office, and during the year more than 600 opinions and over 3,000 memoranda and matters requiring legal interpretation were prepared and disposed of. The problems presented involved matters of vital concern to the efficient and lawful administration of the affairs of the Department and, as has been indicated, included many unique problems growing out of the war program.

The regulation of the fishing industry in Alaska and certain bills pending before the Congress seeking to revise the laws regulating the

commercial fisheries of Alaska and the Pacific salmon fisheries provoked numerous legal and administrative problems. The suggested legislation necessitated extensive analysis with respect to the significance and implications of the proposed changes in the provisions of the law and several important memoranda were prepared with respect thereto. One important opinion held that the Secretary of the Interior has authority to limit the number of salmon trap sites which may be occupied in the territorial waters of Alaska by any individual, concern or combination. The annual revision of the Alaska Fisheries regulations also required the preparation of legal opinions by the Solicitor to the Secretary with respect to the aboriginal occupancy rights of Alaska Indians in the light of the decision in the Walapai case and, among other things, it was decided that with respect to areas which may be shown to have been subject to aboriginal occupancy, fish trap site locations in Alaskan waters may not be closed to Indians in contravention of established Indian rights.

The revision and preparation of the new Federal Range Code by the Conservation Division of the Solicitor's Office, in cooperation with the Acting Chief Counsel of the Grazing Service, was another matter of paramount importance. The new code reflects the experience of the Department in the regulation of the range since the passage of the Taylor Grazing Act; it clarifies and develops the provisions of the existing code in accordance with the experiences of the users of the range; its provisions represent a practical, commonsense attempt to assure the orderly, efficient utilization, development and preservation of the vast grazing resources of the Nation.

Approximately 170 laws directly affecting the Department of the Interior were enacted during the fiscal year. The nature and range of the subjects covered is indicated by the following list of some of the more important statutes enacted during the year:

Public, No. 539 (H. R. 6020).—Granting the consent and approval of Congress to an interstate compact relating to the better utilization of the fisheries (marine, shell and anadromous) of the Atlantic seaboard and creating the Atlantic States Marine Fisheries Commission.

Public, No. 151 (S. 178).—Authorizing the Secretary of the Interior to issue oil and gas leases on certain lands.

Public, No. 586 (H. R. 5394).—To authorize the lease or sale of public lands for use in connection with the manufacture of arms, ammunition, and implements of war, and so forth.

Public, No. 381 (H. R. 3019).—To amend the act entitled "An act to prohibit the manufacture, distribution, storage, use, and possession in time of war of explosives, providing regulations for the safe manufacture, distribution, storage, use, and possession of the same, and for other purposes," approved October 6, 1917 (40 Stat. 385).

Public, No. 624 (S. 2066).—To make permanently effective the act regulating interstate and foreign commerce in petroleum and its products.

Public, No. 197 (H. R. 4816).—To facilitate the construction, extension, or completion of interstate petroleum pipe lines related to national defense, and to promote interstate commerce.

Public, No. 356 (H. R. 4854).—To facilitate and simplify the administration of the Federal Reclamation laws and the act of August 11, 1939, as amended.

Public, No. 214 (S. 173).—To amend section 61 of the National Defense Act of June 3, 1916, as amended, for the purpose of extending to Hawaii, Alaska, Puerto Rico, and the Canal Zone the permission to organize military units not a part of the National Guard which was granted to the States by the amendment made to such section by the act of October 21, 1940.

Public, No. 392 (H. R. 5822).—To establish a military code for the Territory of Alaska.

Public, No. 586 (H. R. 5394).—To authorize the lease or sale of public lands for use in connection with the manufacture of arms, ammunition, and implements of war, and so forth.

The reorganization of the legal work of the Department, which has been in the process of development during the past two fiscal years, has resulted in a substantial drop in the numerical volume of routine matters passing through the immediate office, in the elimination of considerable duplication of effort, and in the saving of much time formerly expended in routine review. Final disposition by bureau counsel of numerous classes of matters susceptible of determination at the bureau level, and the institution of the divisional system in the immediate Office of the Solicitor, whereby responsibility for final disposition of certain matters has been vested in the division chiefs, have made it possible for the Solicitor to devote his personal attention more fully to matters presenting legal questions of first impression or of sweeping significance.

The volume of legal work moving through the immediate Office of the Solicitor is indicated by the following table which shows the number of recorded items passed upon during the fiscal year 1942:

Requests for Solicitor's opinions.....	604
Legal memoranda and correspondence.....	3,008
Legislative matters.....	1,705
General Land Office matters.....	5,834
Geological Survey.....	178
Bureau of Mines.....	1,604
Petroleum Conservation Division.....	34
War Minerals Relief Commission.....	12
Grazing Service.....	178
Office of Indian Affairs.....	9,801
Bureau of Reclamation.....	175
National Park Service.....	721
Division of Territories and Island Possessions.....	104
Division of Investigations.....	88
Fish and Wildlife Service.....	167
Bituminous Coal Division.....	31
Matters handled by Counsel at Large, Alaska.....	775
Construction and supply contracts.....	134
Miscellaneous matters.....	113
Total.....	25,266

In addition to the matters directly passed upon in the immediate Office of the Solicitor, a much larger number of matters were disposed

of by the attorneys who, while acting under the supervision of the Solicitor, are directly attached to the various bureaus of the Department.

The office of the Chief Counsel, National Park Service, handled approximately 20,000 matters during the fiscal year and it is estimated that at least 3,000 matters were handled in the field. It was necessary to draft many agreements and to revise various regulations to facilitate the means whereby the Army has been able to use areas under the jurisdiction of the Park Service for camp sites and other military purposes.

The Office of the Chief Counsel of the Fish and Wildlife Service handled approximately 2,400 cases or items which required legal review or the preparation of appropriate opinions, documents, or other papers. The matters referred to this office cover a wide field of legal problems arising in connection with the administration of the Migratory Bird Treaty Act, the Migratory Bird Conservation Act, and the several acts relating to the Alaska commercial fisheries, the Alaska Game Law, and a number of laws specifically applicable to certain areas or certain species of wildlife. Functions and duties of the Fish and Wildlife Service with respect to the administration of the Alaska commercial fisheries and with respect to investigations and recommendations concerning the commercial fisheries have a direct relation to the war program.

The volume of public-land litigation and trespass work in the Law Division of the General Land Office increased substantially during the fiscal year 1942. Sixty-five cases were referred to the Department of Justice for appropriate action resulting in the collection of \$65,205.13, as compared with 31 cases and \$47,347.52 collected during the preceding year. The sum of \$35,979.17 was collected in settlement of trespass on the public lands by administrative proceedings conducted under the supervision of the Law Division as compared with \$27,477.50 collected during the preceding year. In the aggregate, the Law Division of the General Land Office during the fiscal year 1942 received, considered, and disposed of a total of 42,055 items.

During the fiscal year 1942 the legal staff of the Geological Survey disposed of approximately 2,880 diversified matters. The work related primarily to mineral leasing operations, chiefly to oil and gas. Unit plans submitted pursuant to existing statutes necessitated considerable legal attention. At the present time unitized operations govern the recovery of 46 percent of all crude oil and 56 percent of all gas produced from public lands. Legislative reports were prepared in connection with several mineral bills designed to promote the utilization of the natural resources of the Nation.

The entire legal set-up of the Solicitor's Office was seriously handicapped by a substantial turn-over of the legal staff, caused by military furloughs and transfers of experienced personnel to important positions in other agencies engaged in war activities.

Division of Information

MICHAEL W. STRAUS, Director

HAVING adjusted its activities to meet national emergency conditions well in advance of the formal declaration of war, the Division of Information was able to render effective aid during the past fiscal year by promoting popular understanding of the problems and aims of the Department in carrying forward the mobilization of the Nation's natural resources for victory.

The swift transition from the peacetime field of conservation operations to that of war endeavor was accompanied by drastic steps in the curtailment of expenditures. Sharp economies in the use of postal facilities and paper supplies essential to the war were put into effect. As early as October 1941, mailing lists hitherto maintained in accordance with written requests from the public for information on conservation progress were scrapped for the duration of the war. Publication of the monthly clipsheet *Current Conservation* was suspended. Other publications of the Department and its agencies were either discontinued or their distribution sharply restricted. Dissemination of information through press releases was generally limited to essential subjects connected with the war program.

Discontinuance of these nonwar activities, however, brought no diminution in the volume of tasks and responsibilities placed upon the division with its establishment by Congress in 1938; it merely shifted its objectives from peacetime to war problems. After Pearl Harbor, the Director served as Director of the Department of the Interior War Resources Council, and the Division was called upon to assist in the preparation and distribution of information material setting forth the Department's war program for the mobilization of metals, oil, power, fuel, helium, food, land, water, and timber for war purposes.

During the course of the year, enactment by Congress of the Mine Safety Act, containing specific directions for publication of findings brought additional responsibilities to the Division. Facilities of the Division were opened to the Office of Petroleum Coordinator for War, and a heavy volume of material was handled for that organization. Likewise, new activities were created for the Division by placing of the Office of Solid Fuels Coordinator for War under the leadership of

Secretary Ickes. The Division's duties subsequently were increased by the establishment of the Office of Fishery Coordinator by Executive order.

In meeting these responsibilities, the Division issued a total of 1,478 press releases during the year. The increase of 342 over the 1941 fiscal period represented in large measure the volume of informational material made mandatory under the Mine Safety Act.

Maintaining the organization authorized by Congress, the Division of Information consists of an editorial branch, a radio section, a photographic section, and a publications section.

Radio Section

The facilities of the Radio Section were shared by the Department of the Interior throughout the year with other agencies of the United States and of foreign governments in the dissemination of information concerning the United Nations' war activities. Operating one of the best equipped broadcasting and recording studios in the country, the Radio Section rendered full cooperation in the preparation of programs which, since the Studio maintains no transmitting equipment of its own, were broadcast through the cooperation of commercial radio stations of the United States.

Among the governmental agencies utilizing the services of the section during the year were the Army and Navy, the Office of Emergency Management, Office of War Information, War Production Board, Office of Facts and Figures, Office of the Coordinator of Information, Office of the Coordinator of Inter-American Affairs, United States Maritime Commission, War Manpower Commission, Department of Agriculture, and the United States Public Health Service.

Several hundred programs were prepared for the United States Army and Navy for use in special training work.

In addition to its work in preparing programs for these agencies, the section also produced programs in various languages and presented important speakers for shortwave broadcasts, at the request of the Office of Coordinator of Information and the Office of War Information.

In the past year, more than 250 programs concerned with the activities of the Department of the Interior were prepared by the Radio Section. Time for these programs was made available at no cost by major networks and by local radio stations throughout the country. All in all, a total of over 2,500 stations used these programs from the Department of the Interior, representing a total number of air presentations of over 3,300.

Photographic Section

During the 1942 fiscal year, the photographic laboratories and facilities of this section enabled the Department to carry out its program of

providing service for all its bureaus and agencies, as well as furnish photographic illustrations pertaining to its varied activities to the press and other publications. This work included the furnishing of illustrative material for textbooks, guidebooks, pamphlets and travel literature requested by many types of educational, technical and scientific magazines.

Outstanding photographic projects of the year included field work in a number of western national parks and national monuments, and a photographic study of the work of the Office of Land Utilization in Southwestern States. During a visit of members of the Argentine Congress to the United States in April, a departmental staff photographer was assigned to accompany this group on its tour, under the direction of the Office of the Coordinator of Inter-American Affairs.

In addition to its work for the various bureaus and agencies of the Department, the laboratories and equipment of the Photographic Section were made available to outside governmental agencies for the production of material involved in their war programs.

Motion-picture activities were drastically curtailed during the year with relinquishment of the motion-picture laboratory space to the War Department for its use in connection with the preparation of special training films for use in the armed forces and other branches of the Department. Nevertheless, the section collaborated in the production of a series of 12 motion-picture films with Spanish and Portuguese versions for circulation in South American countries, at the request of the Division of Cultural Relations of the Department of State.

Publications Section

Streamlined procedure to promote speed and efficiency in the production of printed information essential to the war was put into effect during the past year by the Publications Section, which serves as the liaison agency between the Department of the Interior and the Government Printing Office. A production control system was installed to insure early delivery of technical bulletins, pamphlets, statistical data, maps, charts, etc., required by the war agencies of this and other departments.

At the same time, drastic curtailment was brought about in the issuance and distribution of informational material not essentially concerned with the war, through a revision of the publication programs of the various bureaus and a sharp revision of mailing lists maintained by the Department.

Substantial progress toward further economy in departmental printing costs was accomplished by the preparation of standard forms for handling routine administrative matters, and the adoption of steps for the conservation of paper supplies.

Board on Geographical Names

GEORGE C. MARTIN, *Executive Secretary*

THIS Board is official authority on use of geographic names by the Federal Government. It decides unsettled questions on form, spelling, or application of names for use on maps and charts and in publications by the Government, and considers new names proposed by Government officers. The Board also serves as informal authority in non-Government use of place names and gives information on names, and on location and identity of little known places, on request from Government and other sources as far as facilities permit.

The Board consists of an advisory committee in which the Government and some geographic societies are represented, which acts chiefly by its executive committee, and of an administrative and investigative unit, the Division of Geographic Names, in the office of the Secretary of the Interior. The advisory committee, June 30, 1942, included:

W. L. G. Joerg, National Archives (chairman); Lt. Comdr. K. T. Adams, Coast and Geodetic Survey; Roscoe E. Baber, Government Printing Office; Clarence Batschelet, Bureau of the Census; James M. Darley, National Geographic Society; E. E. Carter, Forest Service, Department of Agriculture; William J. Dixon, Post Office Department; Capt. Walter F. Jacobs, Hydrographic Office, U. S. Navy; Col. Lawrence Martin, Library of Congress; W. C. Mendenhall, Geological Survey, Department of the Interior; Raye R. Platt, American Geographical Society of New York; Mrs. Sophia A. Saucerman, Department of State; John R. Swanton, Bureau of American Ethnology; and Frank E. Williams, Geographical Society of Philadelphia.

The Advisory Committee held one meeting during the year. The Executive Committee held 16 meetings at which 444 names were approved. Decisions on those names will be included in a pamphlet entitled "Decisions of the U. S. Board on Geographical Names Rendered Between July 1, 1941, and June 30, 1942," which can be obtained from the Board without charge when published.

The location by geographic units of the approved names and the

number in each were: Minnesota 106, Alaska 56, California 40, Oregon 38, Washington 25, Texas 24, Louisiana 22, North Carolina 22, Florida 19, Arizona 16, Massachusetts 14, New York 8, Montana 7, Vermont 7, Colorado 5, Mississippi 5, Alabama 4, Connecticut 4, Maryland 4, Idaho 3, Virginia 3, Bahama Islands 2, North Carolina-Tennessee 2, Utah 2, Delaware 1, Georgia (Russia) 1, Hawaii 1, Maine 1, South Carolina 1, Tennessee 1.

The sources of requests for decisions and the number from each source were: Coast and Geodetic Survey 188, Forest Service 153, Geological Survey 59, War Department 18, Office of Indian Affairs 15, National Park Service 5, State organizations 4, Bureau of Reclamation 1, Library of Congress 1.

Interior Department Museum

H. L. RAUL, Museum Curator

SINCE Pearl Harbor the attendance in the museum has largely increased due to the influx to the National Capital of servicemen and new Government workers recruited throughout the Nation. These visitors find in the Interior Department Museum a graphic visualization, carefully designed and presented by methods easily understood, of the history, aims, and the current activities of the Department.

During the past year, approximately 55,000 persons visited the museum and visitors from all of the States in the Union were recorded in the Visitors' Register. Registrations were received also from Alaska, the Canal Zone, Puerto Rico, Hawaii, and the Philippine Islands; also from Argentina, Australia, Bolivia, Brazil, Canada, China, Costa Rica, Dominican Republic, England, France, Mexico, Soviet Union, and Uruguay.

Recent additions and improvements have greatly enhanced the popularity of the museum. Pursuant to the order of the Secretary placing the Department on a war basis, the museum has been augmented with new exhibit features reflecting the intensified and enlarged activities of the Bureaus in fields vital to winning the war. Eight panels based on the war program are shown in appropriate Bureau galleries under the following title labels: The War Program of the Department of the Interior; Metals for War; Oil for War; Power for War; Fuel for War; Helium for War; Food for War; Land, Water, Timber for War. An illuminated pedestal case, with changing transparencies, and label text emphasizing the war importance of every Bureau, has been installed at the museum entrance.

A first-aid animated diorama demonstrating the Schafer prone pressure method of artificial respiration, as taught by the Bureau of Mines, has been installed for public information as well as to assist the first-aid classes which for months have been meeting in the museum. A new exhibit, How to Deal With an Incendiary Bomb, has been installed. This exhibit shows a full-size incendiary bomb model and cross section with instructions for rendering the effect of

the bomb harmless. A new exhibit pertains to the Coal-Mine Inspections Act under which the Bureau of Mines makes inspections and investigations in coal mines; another exhibit explains the amended explosives act governing the licensing, by the Bureau of Mines, of the manufacture, possession, sale, purchase, and use of explosives.

In the interest of safety, many rare and original historical documents displayed in the museum are now provided with replacement photostat facsimiles.

During the past year the museum educational facilities were augmented by the installation of three picture projection devices. A silent motion picture projector shows first-aid and other departmental films. A motion picture cabinet with sound is in operation showing important departmental films. The cabinet has been allocated to the museum through the cooperation of the Bureau of Reclamation, Fish and Wildlife Service, National Park Service, and the Bonneville Power Administration. An automatic slide projector with changing series, 70 slides to each program, also features departmental activities. By order of the Secretary, a similar projector is maintained by the museum as an extension service for servicemen at the National Capital Service Men's Club in Washington.

Upon request the museum furnished Princeton University with exhibits for use in the university defense course on military planning and construction and the emergency war course on photogrammetry. Assistance in scale-model and camouflage techniques was rendered by the museum to the Army. In addition, the museum during the year complied with various requests from the Navy Department, the Department of Agriculture, the Pan American Union, and other agencies.

Special attention has been given to revisions and additions to the standing exhibits of the several Bureaus transferred to other cities. It is realized that with the decentralization of Bureaus to locations distant from Washington, the Interior Department Museum has an increased responsibility in making available to the public a visual representation of the Bureau's activities during their absence from the National Capital.

During the year many display cases were redesigned or amplified, and the Fish and Wildlife Service Exhibit Gallery, comprising 10 display cases and 7 wall niches, was installed. To meet a need of visiting students of Government procedures, this new gallery was especially designed to explain in full detail how the actual organization of a Bureau is accomplished and how its work is performed in all its functional and regional activities.

The museum cooperated with the Bureau of Reclamation and the Television Program Department of the Columbia Broadcasting System in supplying museum exhibit materials for program use.

This marked the first time that exhibit materials of the museum have been shown by telecast and suggest interesting future possibilities.

Among the accessions acquired during the year are included an additional 512 specimens of the Gibson Collection of Indian Materials, purchased by order of the Secretary, 1936, transferred by the National Park Service to the custody of the museum. These specimens complete the Gibson collection, being supplemental to the Gibson materials exhibited in 25 display cases located in the main corridor alcoves. Another important acquisition is the Fish and Wildlife Service Fuertes Collection, consisting of 50 original paintings in water color of Birds Common to the United States by Louis Agassiz Fuertes. Five additional old and rare books on fishes and fisheries have been added to the rare book collection placed in the custody of the museum. Two large silhouettes entitled "The Opening of the West" and "Modern Surveying," were designed and installed in the General Land Office Gallery. A colorful and outstanding new exhibit is an Indian war drum used in the ceremonies of the Iroquois Indian Confederacy in declaring war upon the Axis nations. Also included are 12 large dioramas, display cases and other exhibit materials.

During the past year 5 special exhibits were prepared and displayed by the museum in collaboration with the Bureaus, featuring the following subjects: Specimens Illustrating Some of the Species shown in U. S. Geological Survey P. P. 146, Part 2, Micro-fossils from Texas; Scene Near East Base and Antarctic Nocturne, paintings in oil by Leland Curtis, Antarctic Expedition, 1939-40, Division of Territories and Island Possessions; Indian Sculptures by Marina Nunez del Prado, Bolivia, by invitation of the Secretary; Economic Map of Costa Rica by Carmen Madrigal Nieto; Selected Indian Materials from the Museum Collections.

Using the facilities of the museum, approximately 400 selected students from high schools located in States east of the Mississippi River participated in two student institutes of Government conducted by the National Capital School Visitors Council. A Teachers Institute of Government from the University of Maryland also made a study of the museum displays. Public and private school groups were given conducted tours of the museum galleries throughout the year.

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