



Headgate Rock Dam on Colorado River, built by the Indian Service to provide irrigation water for Indian farmers including Navajos and Hopi who will resettle there.

of this area can be added to the present working circle, it will influence the future mill operations. The area has never been surveyed to determine the allowable cut or the feasibility of logging operations. It is estimated that \$60,000 will be needed for these surveys and the preparation of a management plan.

The timber industry and tribal sawmill now give employment to 220 to 225 men. This level of operation can continue for about 25 years if timber from only the Defiance and Tsailec units is harvested. In order to increase employment it is proposed (1) to make a thorough appraisal of the timber resources; (2) to increase the mill output from the Defiance and Tsailec units; and (3) to process the lumber so as to market a more nearly finished product. It is believed that the appraisal of timber resource will reveal that the present cut of 13 million feet per year can be safely increased for the next 25-year period, and that sustained yield operations will thereafter be possible at a lesser rate of cutting.

Tribal funds are now available to meet costs of fire pre-suppression and suppression. An additional program should be worked out whereby a portion of tribal funds would be used to reforest areas of timber-growing land whereon the natural reproduction is not satisfactory, if field studies indicate that such a project is feasible. A prerequisite of such a

program is proper control of grazing on the timber-producing land.

An expansion of the timber industry on the reservation would also require certain improvements at the tribal sawmill. These are described in a subsequent section of this report dealing with community industries.

MINERALS

Although it is known that there are deposits of coal, oil, gas, and copper on the reservation, relatively little specific information is available on the quantity or quality of the mineral resources. Inasmuch as the development of these resources would provide a living for a substantial number of Navajos, and since there may well be other mineral deposits as yet not discovered, it is recommended that careful studies of the mineral resources be undertaken as soon as possible. The possibilities to be investigated include the following:

Coal.—An extensive coal deposit underlies the Black Mesa area, which includes all the Hopi Reservation as well as a considerable part of the Navajo. To date this resource has not been developed except for a few small mines for local and school-plant use. This coal appears to be somewhat superior to the Gallup coal. It evidently belongs on or about the dividing line between bituminous and subbituminous and

Table 2—Active existing irrigation project—Continued

Project	Number	Acres under ditch	Ultimate acres	Maximum irrigated period 1941-46	Estimated additional cost to complete ¹
Todelto Park	58-91	100	500	39	\$17,000
Tohalsissy	58-92	275	300	197	20,000
Tolani Lakes	58-95	220	220	107	12,000
Tolthlakan	58-97	160	340	112	20,000
Tuba City School	58-99	25	40	21	2,000
Well 14A-79	58-100	30	40	22	2,000
Well 14M-1	58-101	100	100	59	12,000
Wheatfields	58-103	1,000	1,050	711	175,000
Whiskey Creek	58-104	100	100	32	2,000
Zilbetod	58-105	250	300	147	20,000
Jeddito-Navajo	58-106	67	67	67	6,000
Aqua Sol		122	122	122	15,000
Shonto		102	102	102	15,000
Canyon De Chelly		250	600	(*)	20,000
Sonala Butte Reservoir					360,000
Miscellaneous:					
Project domestic water supply					267,400
Project building and plant					150,000
Surveys and investigations					200,000
Miscellaneous subsistence and dry farm tracts			2,900	(*)	1,400,000
Total		33,923	58,859	23,076	1,8,022,000

¹ Since these estimates were compiled, prices have risen, making the total estimated cost \$9,000,000.

² May become a part of Shiprock project.

³ 29,150 acres have been reported as "dry farm." It is estimated that 10 percent or 2,900 acres may be converted to irrigated units.

⁴ See No. 58-53.

⁵ No data.

TABLE 3.—Projects having assured water and incomplete

Project	Now irrigated	Acreage	
		Ultimate	Increase
Black Falls	0	1,600	1,600
Cudai	267	800	533
Fort Defiance	160	510	350
Fruitland	2,107	3,675	1,568
Ganado	1,249	2,825	1,576
Hogback	3,112	11,500	8,388
Many Farms	1,075	4,300	3,225
Natural Bridge	16	1,000	984
Red Lake	314	1,000	686
Total	8,300	27,210	18,910

Present maximum irrigated acreage..... 23,076
Increase on assured water supply units..... 18,910

Total acreage with assured water supply..... 41,986
Acreage with intermittent water supply..... 16,873

Total ultimate irrigable acreage..... 58,859

The potential irrigation development consists of (1) expanding to their ultimate areas the small miscellaneous units;

(2) the construction of the Shiprock project; (3) the inclusion in the proposed Bureau of Reclamation Animas-La Plata project of all irrigable Indian land in the Monument Rocks area; and (4) the inclusion in the proposed Bureau of Reclamation South San Juan project of all irrigable Indian land which can be served. The last three are discussed separately in a subsequent section of this report.

The 78 existing small irrigated tracts are scattered over the entire reservation, and because of such dispersal, fit in well with the livestock economy of the Indians. The expansion of these units to their ultimate irrigable area, estimated at 58,500 acres, should be given a high priority. The work involved consists principally of extending and improving the canal and lateral systems, the development of additional storage, and the preparation of the land for Indian use. Surveys and the preparation of detail plans are sufficiently advanced so that this work can be started immediately.

The reimbursable expenditures on these units to date amount to \$3,062,621 for the 23,000 acres presently supplied with irrigation facilities. The estimated cost of completing the 78 units to their ultimate irrigable area of 58,500 acres is \$9,000,000, at current prices of materials, equipment, and labor (which are about 180 percent of the 1940 costs), and assuming that funds are made available as needed, to permit economical construction.

On the basis of estimated productive capacity, the completion of these tracts will provide an additional 800 families with opportunities for attaining self-support by farming. In addition to the farm families, it is estimated that 300 nonfarm families would derive their support as a direct result of this development, making 1,100 families which, together with the present irrigated area, will provide opportunities for a total of 1,500 families on these miscellaneous irrigated tracts.

TIMBER

The forest resources of the reservation constitute a valuable tribal asset, which is now being successfully utilized on a relatively conservative scale, and which may be susceptible of further development to provide support for a substantial number of Navajo families on a permanent basis.

The present Navajo Tribal sawmill operation is obtaining saw logs from the Defiance and Tsailec timber units. These include an area of 160,000 acres supporting a stand of ponderosa pine estimated at about 600 million feet board measure, based upon a very extensive and inadequate cruise made about 10 years ago. The total allowable cut during the first 25-year cutting cycle is estimated to be 329 million feet, or about 13 million feet per year, which is about the rate of cutting being currently maintained by the sawmill.

In addition to the 160,000 acres in the present working circle there are probably 100,000 acres of commercial timberland in the Chuska Mountains. If any considerable portion

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