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Reconnaissance of the water resources of the Lonesome Valley area, Yavapai County, Arizona

By

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RECONNAISSANCE OF THE WATER RESOURCES OF THE LONESOME VALLEY AREA, YAVAPAI COUNTY, ARIZONA

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Introduction

In accordance with a request from its cooperating agency, the Arizona State Land Department, the U. S. Geological Survey has made a brief reconnaissance of the water resources of the Lonesome Valley area, Yavapai County, Ariz., to determine the probable hydrologic effects of a proposed dam on Lynx Creek. The construction of this dam has been proposed by the Arizona Game and Fish Department, for recreational and fish-cultural purposes.

Data on the geology of the area were furnished by Mrs. Medora M. Krieger, geologist, Geologic Division, U. S. Geological Survey, and the map was prepared by Floyd R. Twenter, geologist, Ground Water Branch.

Lynx Creek

The dam site is in sec. 8, T. 13 N., R. 1 W. (see attached map). Below this point, there are numerous places where Precambrian basement rocks are exposed in the creek bed. As these rocks are essentially impermeable, there is little chance that water enters them. The conclusion may be drawn that ground-water underflow along Lynx Creek in the bedrock area is small. The minor amount of surface water probably comes from the small storage in the sands and gravels of the creek bed upstream from bedrock barriers. Downstream from the point at which Lynx Creek leaves the bedrock area, there is no surface flow except during periods of heavy runoff.

Although data on streamflow are not available for Lynx Creek, the runoff is probably comparable to that of Granite Creek, which flows northeastward from Prescott. The runoff figures for Granite Creek, over a 14-year period, are given in U. S. Geological Survey Water-Supply Paper 1313, pages 683-684. The average annual runoff per square mile is slightly more than 100 acre-feet. The drainage area above the Lynx Creek dam site is about 21 square miles, and the average annual runoff, based on Granite Creek records, therefore should be about 2,000 acre-feet. As the storage capacity of the proposed reservoir is about 1,500 acre-feet, the runoff would be more than enough in an average year to form a lake behind the proposed dam, and to allow for evapotranspiration losses from the water surface of 55 acres and the adjacent banks. These evapotranspiration losses are the only water losses to be expected from construction of the reservoir. Any seepage would reappear downstream from the dam as surface flow, or would continue underground and eventually would reach the alluvial fill of the basin.

In addition, the runoff should be enough to satisfy the downstream surface-water requirements, which do not exceed 100 acre-feet per year. In years of heavy runoff a large part of the flow would pass over the spillway.

Lonesome Valley area

Although there is a drainage divide between Chino and Lonesome Valleys, geologically the two valleys are one basin that has been partially filled with alluvium from the surrounding mountains. At one time, Lonesome Valley had a much greater thickness of alluvium and the drainage of the valley was northward. Stream piracy by the Agua Fria River apparently has captured the drainage and reversed the direction of surface flow, as indicated by the course of Lynx Creek which drains northward in the mountains and then makes a sweeping turn eastward and southward to join the Agua Fria River.

The thickness of alluvium in Lonesome Valley is not known, but some wells at the Fain Ranch have been drilled to a depth of 800 feet without striking bedrock. The static water level in the alluvium between the Fain Ranch and Humboldt is less than 50 feet below the land surface. Thus a large amount of water probably is stored in the alluvium. Studies of the alluvium-filled basins in the southern part of the State indicate that the amount of recharge to the basins generally is small compared to the amount of ground water in storage. Although precipitation on the Lonesome Valley area is greater than that on the desert areas to the south, it is logical to assume that the amount of recharge to Lonesome Valley also is small in comparison to the amount of ground water in storage. This recharge comes not only from Lynx Creek but from numerous other washes.

There are about 10 wells along the Agua Fria River, used for irrigation and mining purposes. Their yields range from about 60 to 500 gallons per minute. Not more than 1,000 acres of land is under cultivation. If adequate water were available, conceivably several thousand acre-feet of water per year could be used for full-scale irrigation. The small number and rather small capacity of the existing wells, however, suggest that the pumpage is much smaller than the amount needed for such full-scale irrigation. The use of ground water for milling purposes at present amounts to not more than 600 acre-feet per year.

In view of the probably rather small total recharge to the basin, and of the fact that Lynx Creek is only one of several sources of recharge, it is believed that neither the present pumping nor future larger scale pumping, should it occur, would be affected greatly by any diminution in the flow of Lynx Creek that might occur as a result of evapotranspiration losses resulting from construction of the proposed reservoir. At the present small rate of pumping, only a small part of the pumpage is derived from recharge from Lynx Creek, and at heavier rates of pumping the effect of recharge from Lynx Creek would be proportionately even smaller because most of the water would come from storage.

Conclusion

It seems probable that the dam on Lynx Creek, as proposed by the Arizona Game and Fish Department, will have little effect on water levels in the wells along the Agua Fria River. Recharge from Lynx Creek will be temporarily reduced as the reservoir fills, and permanently reduced by the amount of evapotranspiration losses. However, as has been pointed out, the ground water withdrawn from the wells may be expected to come largely from storage, so that small changes in recharge will play a relatively small part in water-level declines that may occur in the future.