
GRAVEL RESOURCES
APPLEGATE RIVER VALLEY - JACKSON COUNTY, OREGON

GRAVEL RESOURCES OF THE APPLEGATE RIVER AREA IN JACKSON COUNTY, OREGON

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GRAVEL RESOURCES OF THE APPLEGATE RIVER AREA IN JACKSON COUNTY, OREGON

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ABSTRACT

It is estimated that about 30 million tons of good-quality gravel is present in the floodplain area adjacent to the Applegate River channel in Jackson County between Ruch and the Josephine County line. Based on the normal population growth and per-capita needs for the area in the next 30 years (year 2000), only about 1 million tons of gravel will be required locally. Therefore, several million tons of excess gravel could be exported. Possible markets are the Medford-Jacksonville area and Grants Pass, both within economic hauling distances.

INTRODUCTION

Purpose of the report

The Applegate River gravel study is part of an over-all investigation of gravel resources in Jackson County. A previous report published in 1970 presented information on gravel resources in the Rogue River and Bear Creek Valleys. This report completes the studies of the sand and gravel resources in the county.

Location and extent of area

The area studied consisted of the Applegate River Valley and its terraces from the proposed damsite on the Upper Applegate in Jackson County downstream about 30 miles to the Josephine County line. The coverage was approximately 25 square miles (figure 1).

Method of study

This study involved mapping the gravel deposits along the Applegate River and also the adjacent bedrock units that were part of the original source for the gravels. In order to plot this information at a convenient scale, the maps contained in the Jackson County Interim Flood Report by the U.S. Army Corps of Engineers were used as a base for field mapping; these maps are also incorporated into the present report (sheets 1-5). As an aid in interpreting the bedrock units, the authors made use of two published geologic maps prepared by previous workers. These are: 1) Preliminary geologic map of the Grants Pass quadrangle, Oregon, by F. G. Wells and others, published in 1940 by the State of Oregon Department of Geology and Mineral Industries at a scale of 1:125,000; and 2) Geologic

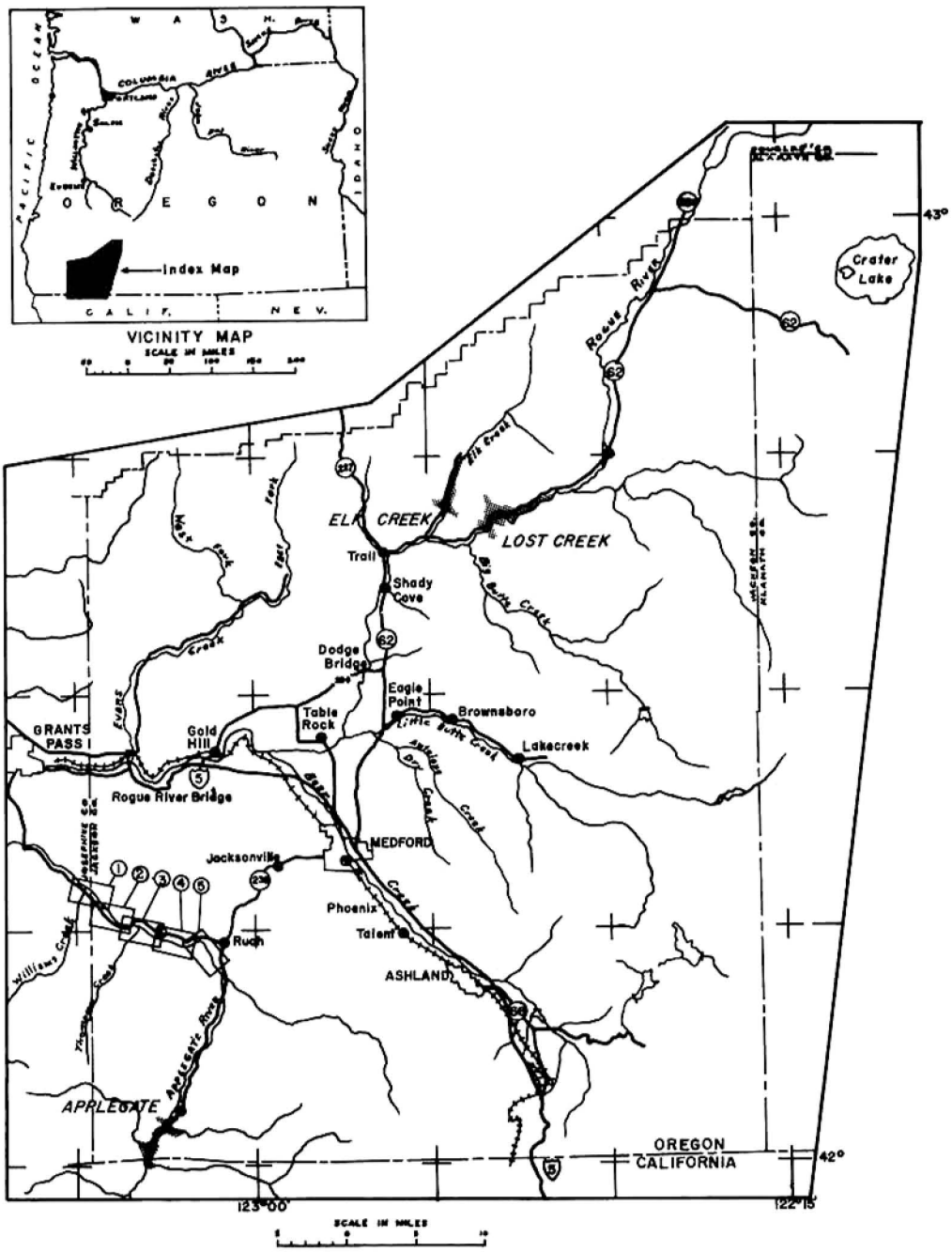


Figure 1. Index map to the geologic map sheets of the Applegate River area in Jackson County.

map of Oregon west of the 121st meridian, compiled by F. G. Wells and D. L. Peck, published in 1961 by the U.S. Geological Survey in cooperation with the State of Oregon Department of Geology and Mineral Industries at a scale of 1:500,000.

GEOLOGY OF THE APPLEGATE RIVER AREA

Topography

From the site at which the Applegate River enters Oregon, it flows generally north-northeastward for a diatance of 15 miles to its junction with the Little Applegate River, which enters from the southeast. The rivers then flow northwestward to the Josephine County line, a distance of 15 miles. Over its entire course through Jackson County the Applegate River falls at a rate of approximately 23 feet per mile.

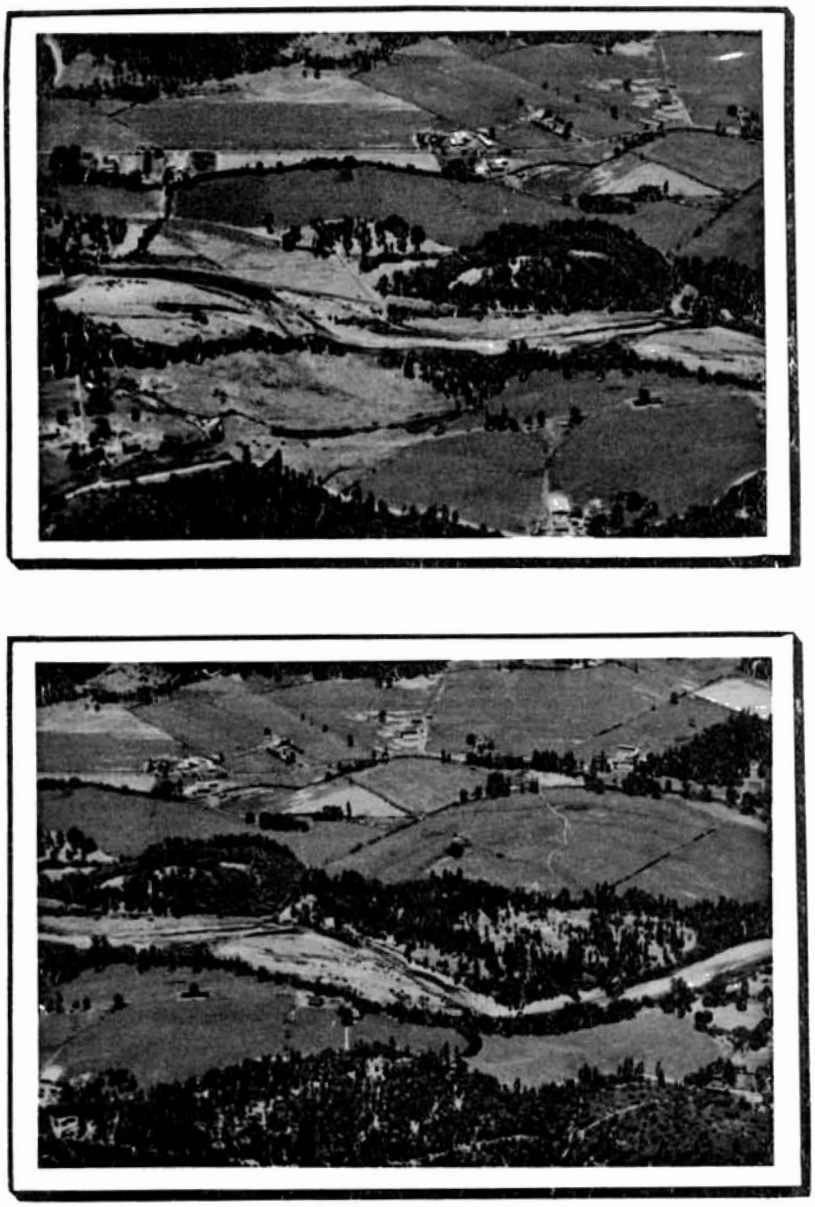
The floodplain and river terraces above the junction of the Applegate and Little Applegate average about a quarter of a mile wide. Steep ridges of the Klamath Mountains rise abruptly at about 1,000 feet per mile from either side of the river valley to elevations up to about 5,000 feet. The valley of the river below its junction with the Little Applegate averages about half a mile in width and increases to greater than a mile at Williams Creek. At several places between Ruch and Applegate, the valley is narrowed by resistant bedrock.

Where the valley is broad, it is composed of several terraces, and the river has a wide, gravel-choked channel. The upper terrace is narrow and merges with the foot slopes of the adjacent mountains. The lower terrace represents younger stream deposits and is much broader than the older. The lower terrace has been dredged for gold in a few areas and sluiced in others, especially on tributaries. Most of the dredged areas were restored for agricultural purposes, leaving little present evidence of dredging.

Stratigraphic summary

The drainage area of the Applegate River contains rocks that range in age from Paleozoic (+225,000,000) to Holocene (present time). The rock sequence, beginning with the oldest, is (1) the older schist of Paleozoic age; (2) Triassic age Applegate Group rocks composed of a metasedimentary unit, a metavolcanic unit, and a gneiss and schist unit; (3) dioritic to granitic intrusive bodies of Late Jurassic to Early Cretaceous age; (4) serpentine and ultrabasic intrusive rocks of Late Jurassic or Early Cretaceous age; and (5) Pleistocene to Holocene gravel deposits in the stream valleys.

All of the rocks older than the gravels have been grouped as bedrock units in this discussion. These bedrock units are the source for the gravels that occur along the Applegate River valley. The abundance of each rock type in the gravels depends upon the size of the area exposed to stream erosion, the distance the rock is transported, and its durability. Generally, the softer or more highly weathered rocks wear down to fines (sand and silt) or alter to clay prior to being deposited and therefore their occurrence in gravel is minor. A more detailed discussion of the gravel will follow the bedrock-unit description.



Applegate River near Ferris Gulch showing large gravel bars in channel. Floodplain and bench areas are used primarily for agriculture.

BEDROCK UNITS

The accompanying maps (sheets 1-5) show the distribution of the bedrock units along the margins of the Applegate River valley in the study area. Since the schist, granite, gneiss and serpentine units occur in the headwaters of the Applegate River and its tributaries upstream from the study area, they are not present on the maps. All of the bedrock units, however, have contributed to the gravel deposits in the Applegate River valley of Jackson County.

Older schist

Paleozoic schists crop out in the headwaters of the Applegate River along Squaw Creek for a distance of about 8 miles. They are composed of highly foliated green quartz-chlorite-epidote schists, some white sericite schist, and dark-gray graphite schist. These rocks are resistant and make up a part of the gravel found in the lower Applegate River.

Applegate Group

The Applegate Group includes a thick series of metamorphosed volcanic rocks and lesser amounts of metamorphosed sedimentary rocks of Triassic age. These rocks occur along the Applegate River from Squaw Creek downstream beyond Murphy. They are exposed over about 70 percent of the Grants Pass quadrangle and, except for a small area near Provolt, the Applegate River in Jackson County runs through Applegate Group rocks. These rocks constitute most of the gravels and are excellent quality for aggregate.

Metavolcanic rocks: The metavolcanic rocks are pale green to greenish gray, with textures ranging from fine to coarse grained. These rocks were originally porphyritic basalt, andesite, pillow basalt, flow breccia, agglomerate, and probably some fine-grained, thin-bedded tuff (Wells, 1940). Intrusive bodies too small to be mapped have been included in this unit.

Metasedimentary rocks: These altered sedimentary rocks are mainly dense, black, fine-grained argillites with interbedded layers of sandstone and grit composed of particles of quartz, chert, and volcanic rocks. Strata of chert and quartzite which grade laterally into argillite and limestone are also present as lenses about 100 feet thick and from a few hundred feet to as much as 10 miles long. The metasedimentary rocks have steep dips and strike northeastward across the Applegate River. In Jackson County they crop out from Squaw Creek downstream for about 27 miles to the Josephine County line and for at least 5 miles farther downstream in Josephine County (Wells, 1940).

Gneiss and schist (altered Applegate rocks): Gneiss and schist formed by local contact metamorphism of Applegate Group rocks by intruding granitic bodies; include plagioclase amphibolite schist, amphibole gneiss, and quartz mica schist; occur as haloes around the intrusive bodies.

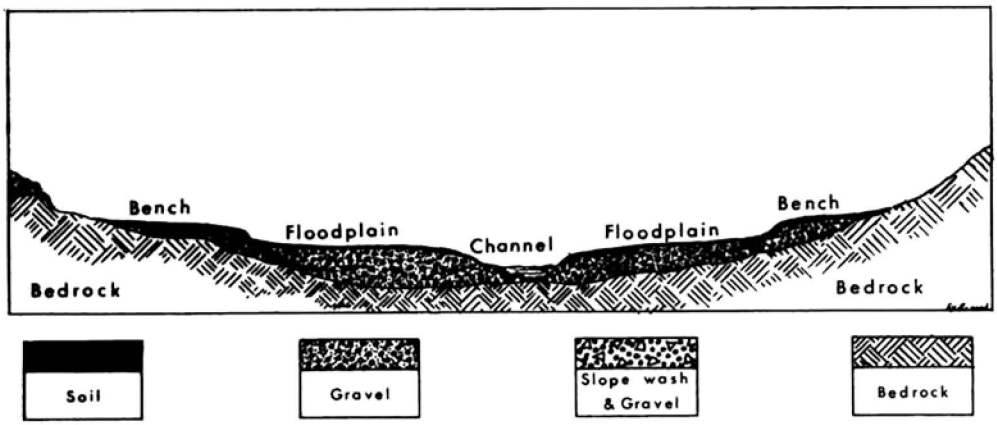
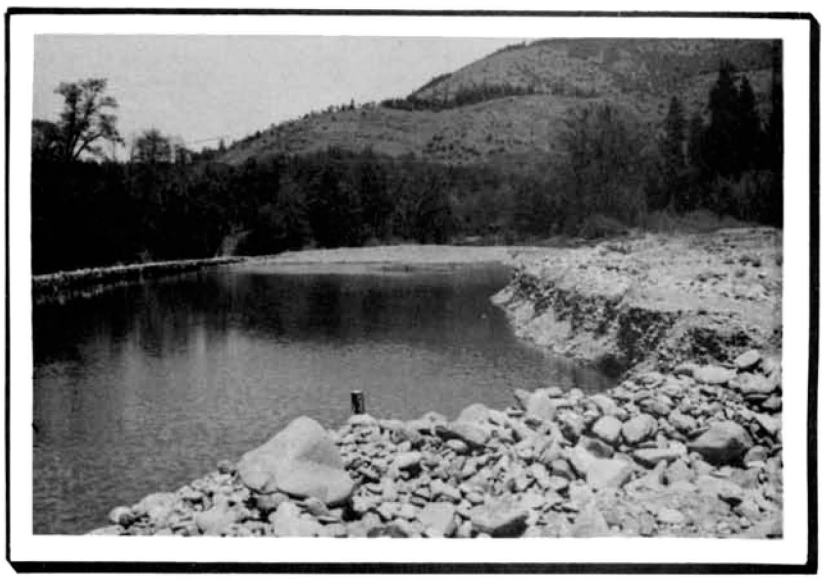


Figure 2. Typical cross section of the Applegate River valley, showing relative positions of the three gravel units and their relationship to the bedrock.

Metavolcanic Applegate bedrock cropping out
in the upper Applegate River.



Applegate River bar gravels near junction
with Little Applegate River.

Serpentine

Serpentine rocks crop out in several areas, generally less than 1 square mile in size, near the junction of upper Applegate River and Squaw Creek. These rocks have formed here from the metamorphism of pyroxenite and peridotite, both low-silica igneous rocks composed mostly of pyroxene or pyroxene and olivine. They are characteristically weak and unsuitable for aggregate. Although some serpentine can be found in the downstream gravels, the amount is low enough so that the gravel quality is not seriously affected.

Intrusive rocks

Coarse- to medium-grained, light-colored intrusive rocks having a granite-like texture include diorite, quartz diorite, granodiorite, and granite. These varieties are composed of varying amounts of quartz, feldspar, and dark minerals such as hornblende and biotite. Darker colored, coarse-grained igneous rocks such as gabbro are also present.

The intrusive rocks crop out in scattered bodies ranging in size from about a quarter of a square mile to as large as the Ashland stock, which covers an area of about 110 square miles. The Little Applegate River has its headwaters in the granitic rocks of the Ashland stock. The lower reaches of the Applegate River in Jackson County pass through small bodies of diorite.

All of the coarse-grained intrusive rocks are of equal quality as aggregate.

GRAVEL UNITS

The sand and gravel deposits have been separated into three units. From oldest to youngest they are: 1) the bench gravel, 2) the floodplain gravel, and 3) the channel and bar gravel. Figure 2 shows the general relationships of these gravel units to each other and to the bedrock. Map sheets 1-5 show their distribution on the valley floor.

Bench gravel

The bench gravel occurs within the highest terrace and is the oldest of the gravel deposits along the Applegate River. Present information indicates that in most places the gravel is only a few feet thick and is frequently covered by overburden soils and mixed with slope-wash debris. The unit is used extensively for agricultural purposes which, in addition to the thinness and impurity of the deposit, makes it of little value for sand and gravel (figure 2).

Floodplain gravel

The floodplain gravel is the largest gravel unit in the Applegate Valley. It occurs in the wide lower terrace, which begins about 8 miles upstream from Ruch and continues downstream about 17 miles to the county line and on into Josephine County. The width of the floodplain gravel unit in Jackson County ranges from a quarter of a mile to more than

half a mile. At Applegate it widens out to about three-quarters of a mile and continues at this width to the county line. The thickness of the floodplain gravel in Jackson County ranges from about 10 feet to more than 20 feet.

The gravels are composed of cobble-to-sand sizes with an abundance of 6-inch and larger cobbles which require crushing. Rock types found in the gravels are quartzite, silicified tuffs, argillite, gneiss, gabbro, granitic rocks, schist, basalt, and minor amounts of serpentine and peridotite. The gravel is of excellent quality.

Channel and bar gravel

Gravel is present in the channel and in bars of the Applegate River. These are recent deposits of gravel which are presently in transition; as the river channel migrates, the gravel is eroded from one place and redeposited in another. The gravel is of excellent quality and consists of clean, unweathered pebbles and cobbles of the types previously listed for floodplain deposits. The bar and channel deposits are generally less than 10 feet thick and frequently less than 5 feet.

Normally, channel and bar gravel are not utilized because:

1. The deposits are small in areal extent and only a few feet thick.

2. Removal of channel and bar deposits causes rapid channel changes which might result in damage to property along the river.

3. The deposits are prime spawning ground for anadromous fish.

POPULATION GROWTH AND GRAVEL NEEDS FOR THE APPLEGATE RIVER VALLEY

Population studies prepared by Jackson County in 1969 indicate the population of the Applegate River Valley in that county was 2,150 in 1965, and at the present rate of growth will reach 3,000 by 1980. A curve prepared from these data shows that the population will be more than 5,000 by the year 2000 (figure 3).

Based on the population and the per-capita use of gravel in other parts of Jackson County, it appears that 10 tons per capita per year is a reasonable figure to use in determining future needs for the Applegate River Valley. Using these data, the yearly requirement of 23,800 as of 1970 should increase to 52,500 tons by the year 2000 (figure 4).

A cumulative requirement curve designed to reveal the total amount which will be used by a specific year is shown in figure 5. This curve indicates that by 1975 a total of 125,000 tons will have been used; 440,000 tons by 1985; and by the year 2000 a total of 1,050,000 tons will be gone.

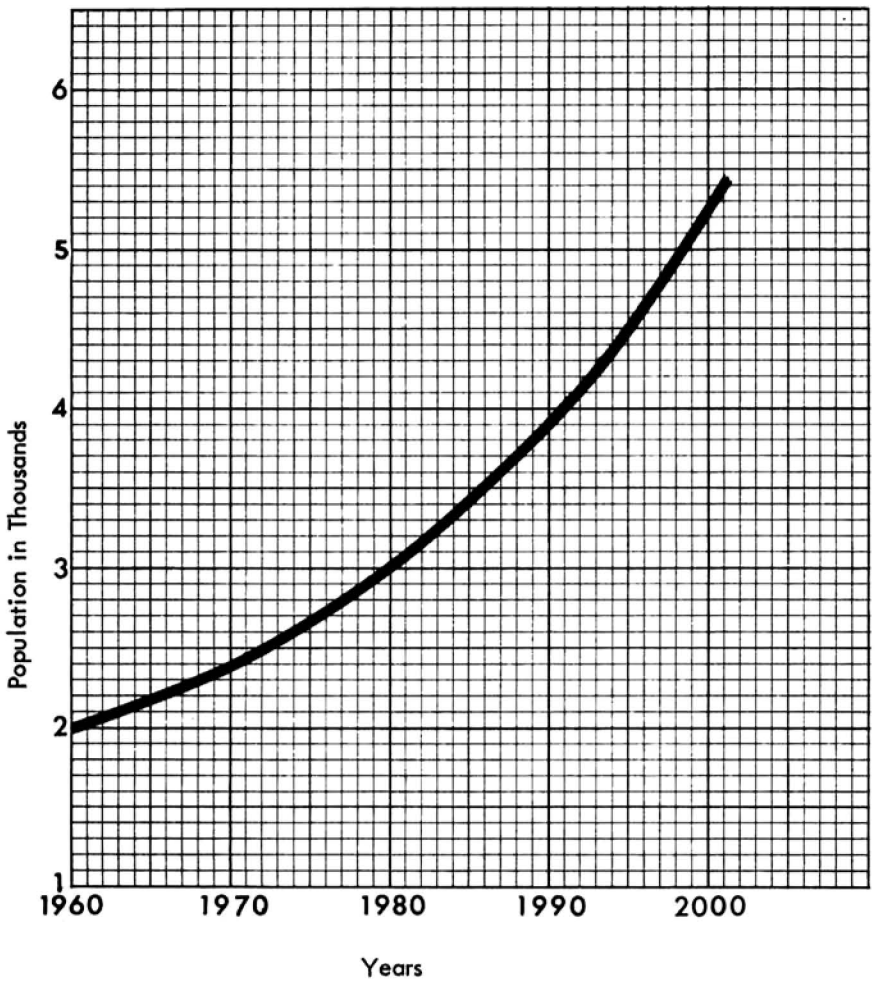


Figure 3. Graph showing the projected population growth for the Applegate River valley in Jackson County.

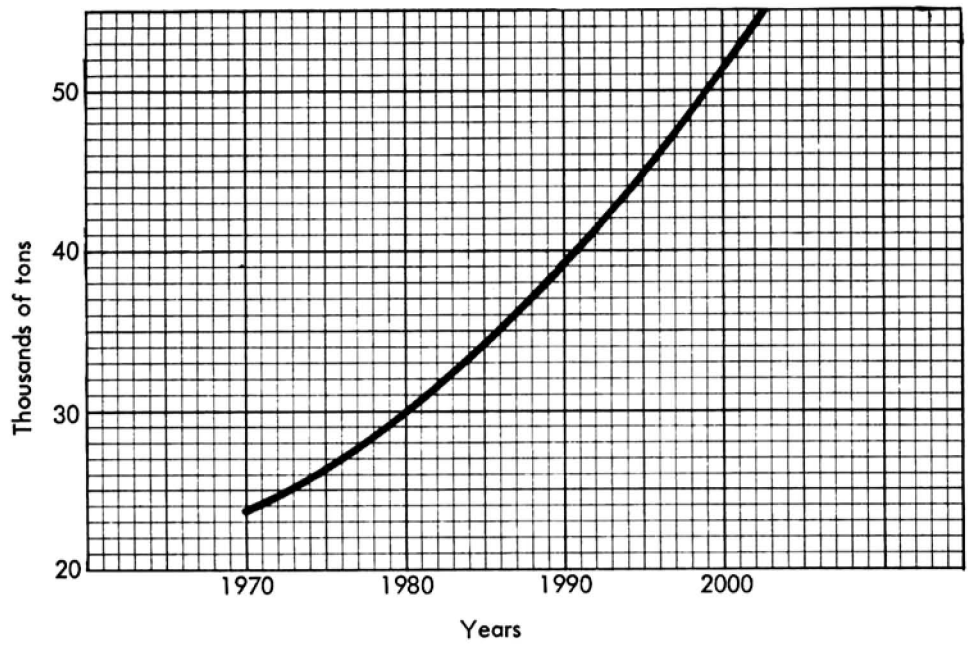


Figure 4. Graph showing the projected annual gravel production for the Applegate River valley in Jackson County.

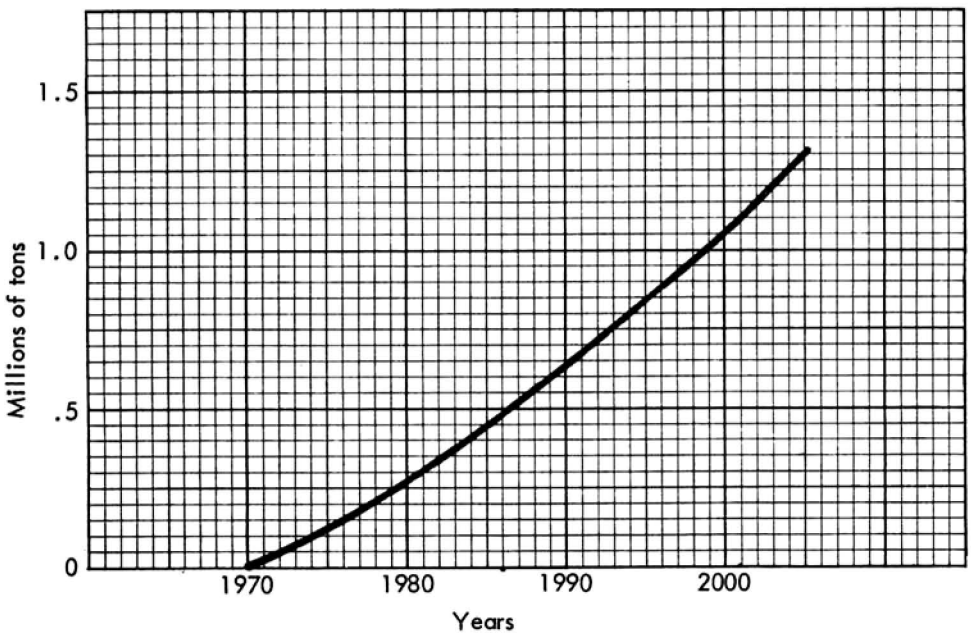


Figure 5. Graph showing the projected cumulative tonnage of gravel used locally in the Applegate River valley of Jackson County.

GRAVEL RESERVES AND FUTURE MARKETS

The Applegate River area in Jackson County contains large quantities of good quality sand and gravel which appear to be far in excess of the local requirements. The county road department is presently the major user.

Much of the gravel, however, is overlain by river silt and the land is presently used for agriculture. Since the land may, in the future, be used for housing, part of it may not always be available for gravel supplies. Nevertheless, if only a fraction of the total gravel deposits is available, it appears that this area could serve markets elsewhere in Jackson County or in Josephine County.

If the availability of Bear Creek or Rogue River gravels should become critical in the future through zoning or over-building, Applegate Valley gravels could supplement the needs in the Medford-Jacksonville areas. The excellent haul roads from the Applegate River, the short distance (15 miles or less) to market, and the good quality of the gravel could make the Applegate River deposits competitive with the present gravel resources now used in Medford. This study indicates that there are several million tons of gravel within 2 miles of Ruch.

Although the gravel deposits on the Applegate River are larger in Josephine County than in Jackson County, the population density along the river in Josephine County is greater and thus much of the floodplain area may be unavailable as a gravel resource. No study has been made regarding the gravel deposits of Josephine County or the future need. Therefore, the use of Applegate gravels outside of the county is merely suggested as a possibility.

SUMMARY AND CONCLUSIONS

The floodplain area adjacent to the Applegate River channel in Jackson County from Ruch to the Josephine County line contains about 30 million tons of sand and gravel of good quality. Land which is underlain by sand and gravel should produce about 12,000 tons per acre. Upstream from Ruch, the floodplain is narrow and the resource limited.

Sand and gravel required locally for the next 30 years (year 2000), based on 10 tons annually per capita and normal population growth, amount to only 1.05 million tons. Nearly 29 million tons of excess gravel could be exported.

Applegate gravel near Ruch could be utilized to supplement aggregate needs in the Medford-Jacksonville area.

Since the bar and channel gravel in the Applegate in Jackson County amounts to only about 300,000 tons, it is not recommended for use unless it can be shown that removal of the gravel will improve the channel or otherwise enhance the area.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Sheet 1


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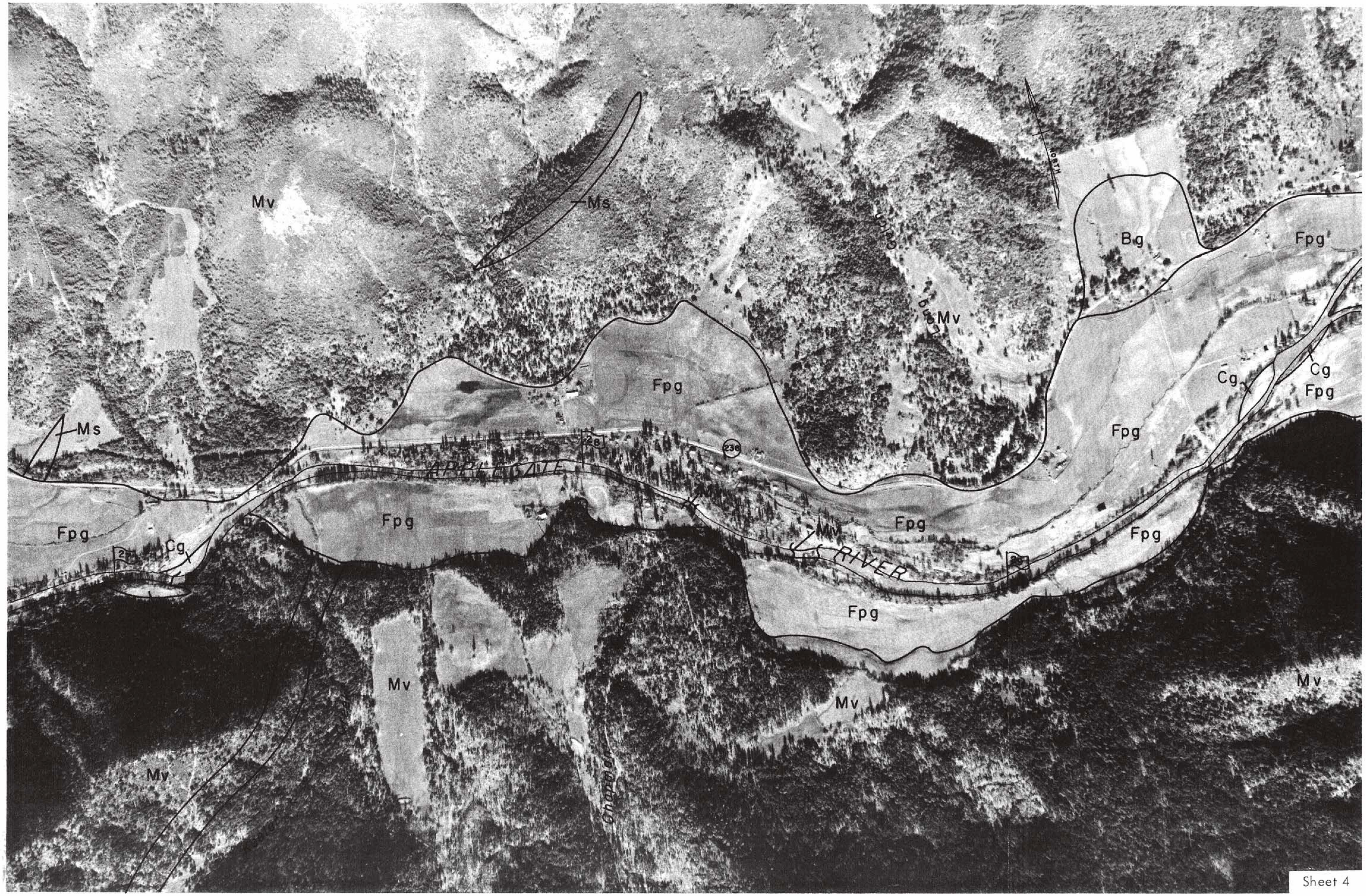
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Sheet 4


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Sheet 5