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Hygiene Hogback Natural Area Study
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Study



Geography Department, Universi

HYGIENE HOGBACK Natural Area Study



Department of Geography / University of Colorado

HYGIENE HOGBACK
NATURAL AREA STUDY

Robert E. Key, John L. Harper
and Scott Mernitz
Editors

DEPARTMENT OF GEOGRAPHY
UNIVERSITY OF COLORADO

Boulder, Colorado

1970

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FOREWORD

This report is one of six undertaken this year in the Department of Geography at the University of Colorado. It has become almost a tradition for the graduate seminar in land use to initiate a project in the local area in cooperation with an agency of the Boulder community on either the municipal or county level, sometimes both.

These studies achieve a number of objectives. The participating students undertake a realistic project which they are able to plan, execute and publish within the brief span of one semester. Also, these studies provide new information for municipal and county officials and citizen groups concerned with planning and guiding the growth and development of the City of Boulder and Boulder County. In short, these are professional training exercises for graduate geographers and are a serious effort in providing new planning perspectives in the interest of public service.

In response to a suggestion by the Natural Areas Committee of the University of Colorado, the land use seminar elected to study and analyze a number of natural sites in the Boulder Valley. The group was also joined in the endeavor by the graduate field seminar of the Department of Geography.

The cooperative base within the Boulder community was wider than usual this year. The sites chosen for study seemed to have potential for a variety of uses beyond their present development. These included instruction of public school and university students, scientific research, recreation, greenbelt, and open space. The graduate students involved worked in cooperation with the resident property owners, the Parks and Recreation Department and the Planning Office of the City of Boulder, the Department of Development and the Parks and Open Space Advisory Committee of Boulder County, the Boulder and Longmont Offices of the Soil Conservation Service, the Science Director of the Boulder Valley RE-2 School District, the Planning Office and the Natural Areas Committee of the University of Colorado, and the Denver Regional Council of Governments.

Sometimes the graduate researchers felt that they would have liked to pursue certain themes in greater depth if there had been more time available. Nonetheless, they join me in expressing the hope that this report provides informative insights on a fascinating part of Boulder County.

The various chapters which appear in this study were originally submitted as special reports by the individuals indicated. They represent the endeavors and views of the authors and in no way should be interpreted as the official views of the Department of Geography or any other cooperating agency of organization previously mentioned. Because of this independence from official views, the participants in this project are especially grateful to the Graduate School of the University of Colorado, the City of

Boulder, the Boulder County Commissioners, the Boulder Valley RE-2 School District, and the University of Colorado Foundation for sharing the costs of printing this report.

This is the collective and individual effort of a group of dedicated geographers concerned about the quality of the local environment and its attendant stresses. Boulder County residents, students, and local officials may gain understanding from this report that will assist them in their efforts to perpetuate the Boulder area as a pleasant and attractive place to live.

Donald D. MacPhail, Ph.D.
Professor of Geography

Boulder, Colorado
June, 1970

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CHAPTER I. INTRODUCTION

Robert E. Key, John L. Harper, and Scott Mernitz

The Hygiene Hogback natural area is situated approximately 10 miles north of Boulder and 7 miles west of Longmont in northern Boulder County, Colorado (See Figure 1). The site is in the zone of transition from live-stock grazing on grassy pediment surfaces, which extend east from the Rocky Mountain front, to more intensively managed, irrigated farmland on low-lying gently undulating topography to the east.

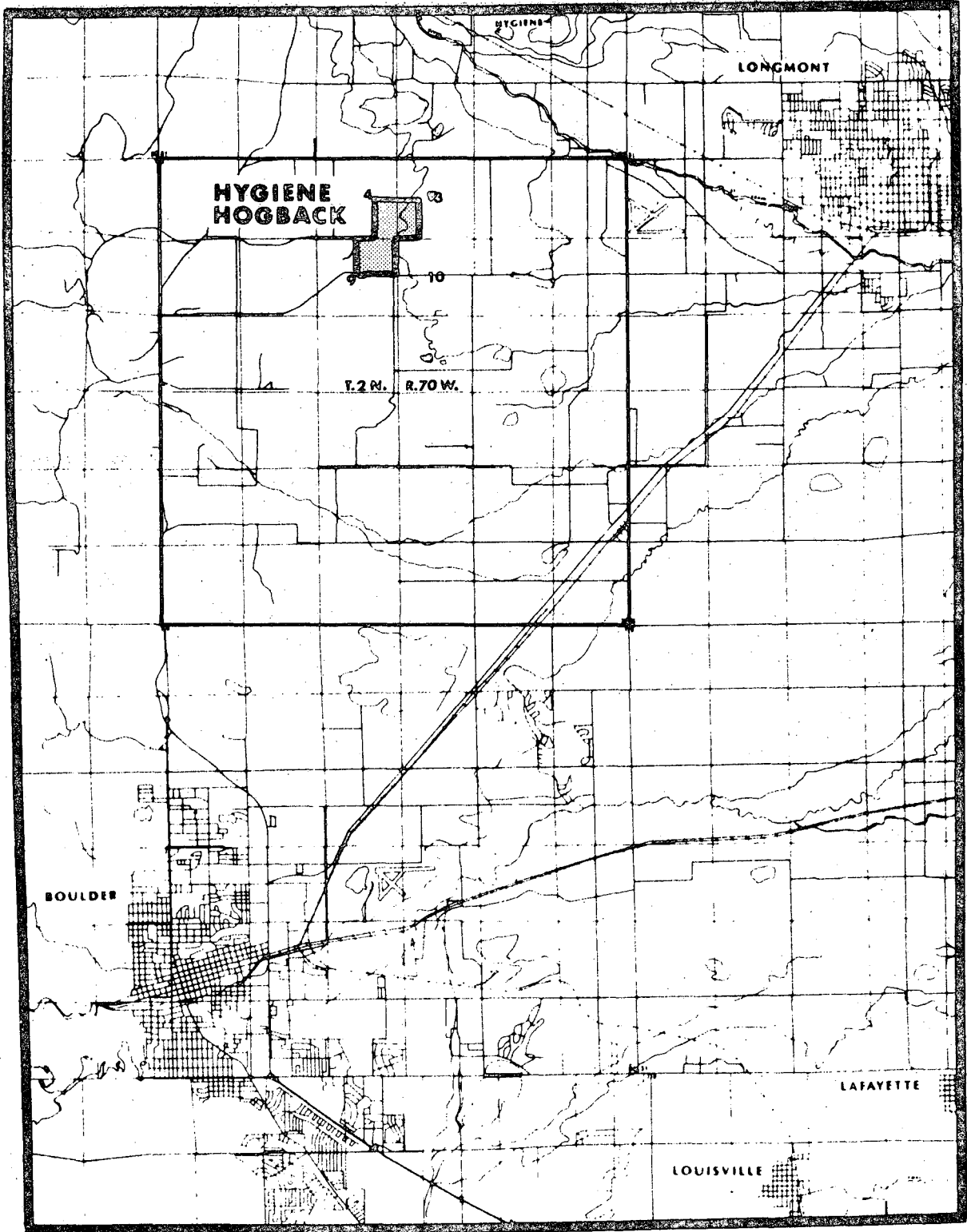
The study area proper encompasses some 200 acres in Section 3, 4, and 9 of Township 2 N R 70 W. Trending diagonally northeast-southwest through the study area is the hogback, a resistant ridge of Cretaceous Hygiene sandstone that rises prominently between expanses of rolling pastureland. Total relief in the study area is about 175 feet with the highest point, at 5,375 feet above sea level, in the southwest corner. The general slope inclination is northeastward at about 250 feet per mile.

The potential natural vegetation at the site is the short-grass prairie community which, in turn, is a function of the mid-latitude steppe (Köppen system Bsk) climate prevailing there. The preponderance of a mean annual precipitation of about 15 inches falls as rain from principally convectional storms in spring and summer months. Heavy late spring and early fall snowstorms contribute significantly to the total, but heavy snow accumulation during the winter is rare.

Basically, the region is quite dry with a relatively large diurnal temperature range, abundant sunshine, and low humidity. Since the prevailing westerly winds lose much atmospheric moisture in the transit over the high Rockies to the west, grassland predominates at the study area in spite of its location just 22 miles east of the Continental Divide.

Access to the area from Boulder is provided from the Foothills Highway (U.S. Highway 36) on surfaced Nelson Road which runs along the southern edge of the study site. An unsurfaced county road parallels the west edge while the northern and eastern boundaries are less well-defined (See Figure 2).

The Hygiene Hogback is one of six areas studied by students of the land use seminar in the Department of Geography at the University of Colorado. The seminar members were grouped into small teams that rotated through five of the six sites so that each member was exposed to every site and to every topic of investigation (the topics were standardized for all sites). Each chapter in this report represents the efforts of a given team to secure and analyze the information appropriate to that particular topic.



HYGIENE HOGBACK NATURAL AREA SITE

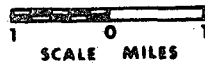
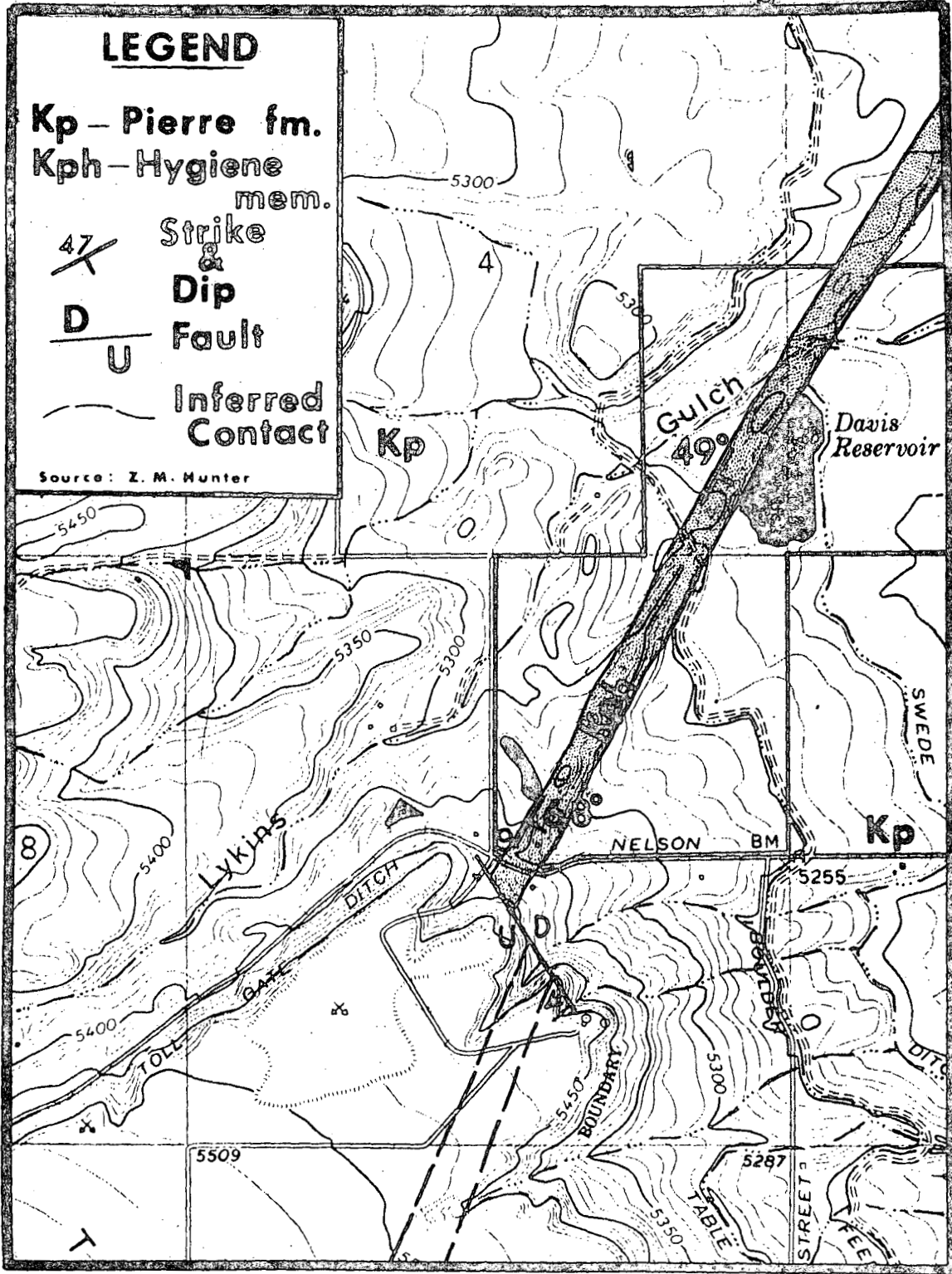
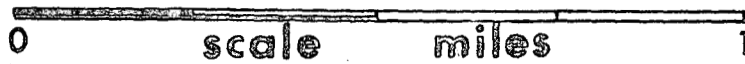


Figure 1

Figure 2



BEDROCK GEOLOGY



CHAPTER II. THE ENVIRONMENTAL SURVEY

Gary A. Heaslet, Max H. Dodson, and Manik Hwang

The Boulder area contains a number of unusual geological features. Some of these features are related to the folding of sedimentary rocks during the uplift of the Rocky Mountains to the west. As a result of the variable resistance of the different sedimentary strata, weathering and erosion have helped create a series of hogbacks and strike valleys. These landscape features have a north-south orientation and lie along the east front of the Rocky Mountains.

One such feature, of relatively small scale, caused by differential weathering and erosion is the Hygiene Hogback, north of Boulder. This prominent outcrop is formed by the Hygiene sandstone, one of five sandstone units included within the Pierre formation (See Figures 3, 4, and 5). North and south of the hogback area the Hygiene sandstone has an obscured contact with surficial materials and does not occur as a ridge. However, in the study area the yellow-gray to buff-colored sandstone is exposed as a mile-long outcrop, giving a rather distinctive appearance to the topography.

The terrain of the study area is, for the most part, typical of the flat to gently rolling lands on the Colorado Piedmont. Amidst this gentle topography is the Hygiene Hogback, the crest of which stands approximately 160 feet above the surrounding terrain. The hogback first appears just north of Table Mountain, in the vicinity of Nelson Road, and can be traced one mile to the northeast with a strike of about N. 17°E. (magnetic) and a dip from 49° to 68° East.

The hogback separates grazing and pasture areas on either side. Small intermittent drainages parallel the hogback on its west side. A number of wind gaps are found along the ridge, as well as one large water gap. The water gap is now occupied by the Boulder Feeder Canal which supplies Big Thompson River water to Boulder Reservoir to the south. A second water gap has been filled to make a small basin for irrigation storage along the southwest edge of the hogback.

Geologic Description

The Hygiene Hogback is the surface expression of the Hygiene zone, one of five zones of the Pierre formation. The Pierre consists of some 5,000 feet of gently dipping shales and interbedded sandstones which are exposed well out into the plains of eastern Colorado (Hunter, 1947).

Overlying the Niobrara formation, black fissile shales form the lowest Sharon Springs zone of the Pierre. Next in ascending order, the Rusty zone is a sequence of dark shales which contains large, rusty, lentil-



Figure 3 - The crest of the Hogback, view north-easterly along strike.

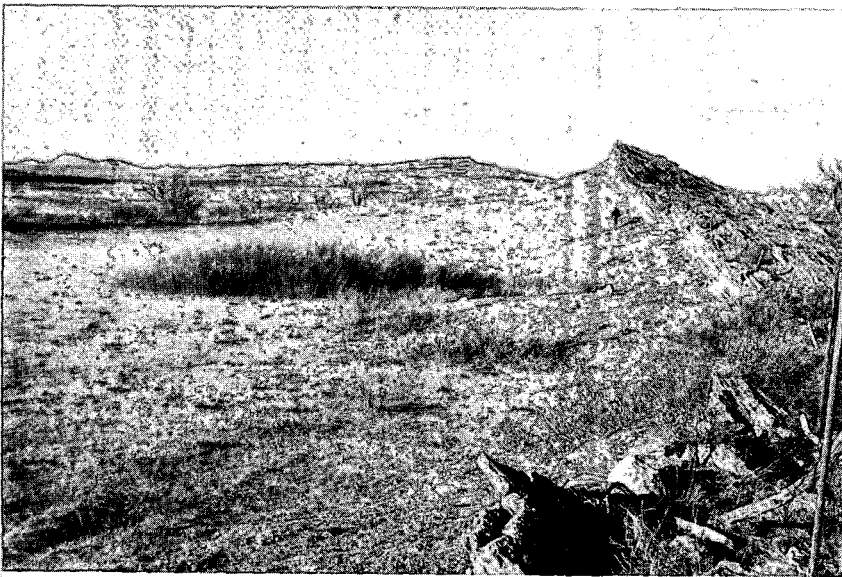


Figure 4 - The Hogback and the willow zone on its northwest slope.

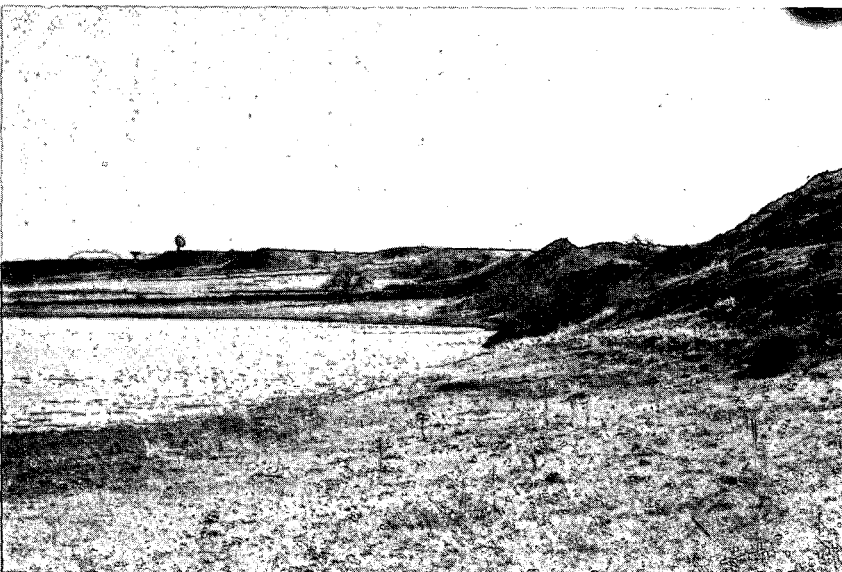


Figure 5 - The dip slope of the Hogback; Davis Reservoir, left foreground; ESSA antennas on Table Mountain, background.

shaped concretions. Above the Rusty zone, the hard shale in the narrow Baculites zone bears abundant Baculites remains. The Hygiene zone above is composed of buff to yellow sandstones and sandy shales. This zone contains characteristic concretions and the greatest faunal assemblage in the Pierre formation. The fauna are predominantly pelecypods, cephalopods, and gastropods. Above the Hygiene zone, the Transition zone is a thick succession of alternating shales and shaly sandstones. The zone grades vertically upward through an indefinite contact into the overlying Fox Hills formation.

Fenneman, in discussing the stratigraphy of the Pierre formation in the Boulder area (Fenneman, 1905), notes the ridge-forming sandstone which could be traced for many miles (Dunn, 1955). He named it the Hygiene sandstone, after a town to the north of Boulder and 3 miles northeast of the study area. The sandstone can be followed in the subsurface as far north as Fort Collins and as far south as Coal Creek Canyon.

The sandstone that Fenneman named and described is actually the lowest member of a group of sandstones found in the Hygiene zone. The other members are the Richard, Larimer, Rocky Ridge, and Terry, in descending order.

The sandstones are, by most definitions, fine to medium-grained graywacke sandstones. According to Dunn (Dunn, 1955), Krumbein and Sloss in 1951 define a graywacke as having the following composition: "Quartz, 30 to 40 per cent; feldspar, 10 to 50 per cent; rock fragments and detrital chert, 5 to 10 per cent; chlorite, sericite matrix, greater than 20 per cent. Minor amounts of carbonate and pyrite."

The Pierre sandstones, because of the abundance of matrix material and relatively immature condition, are thought to be the result of mass transport. The agent of transport is believed to be shelf-type turbidity currents. The sediments were deposited in a shallow, unstable shelf environment and were derived from sources to the west of the depositional site during late Cretaceous times.

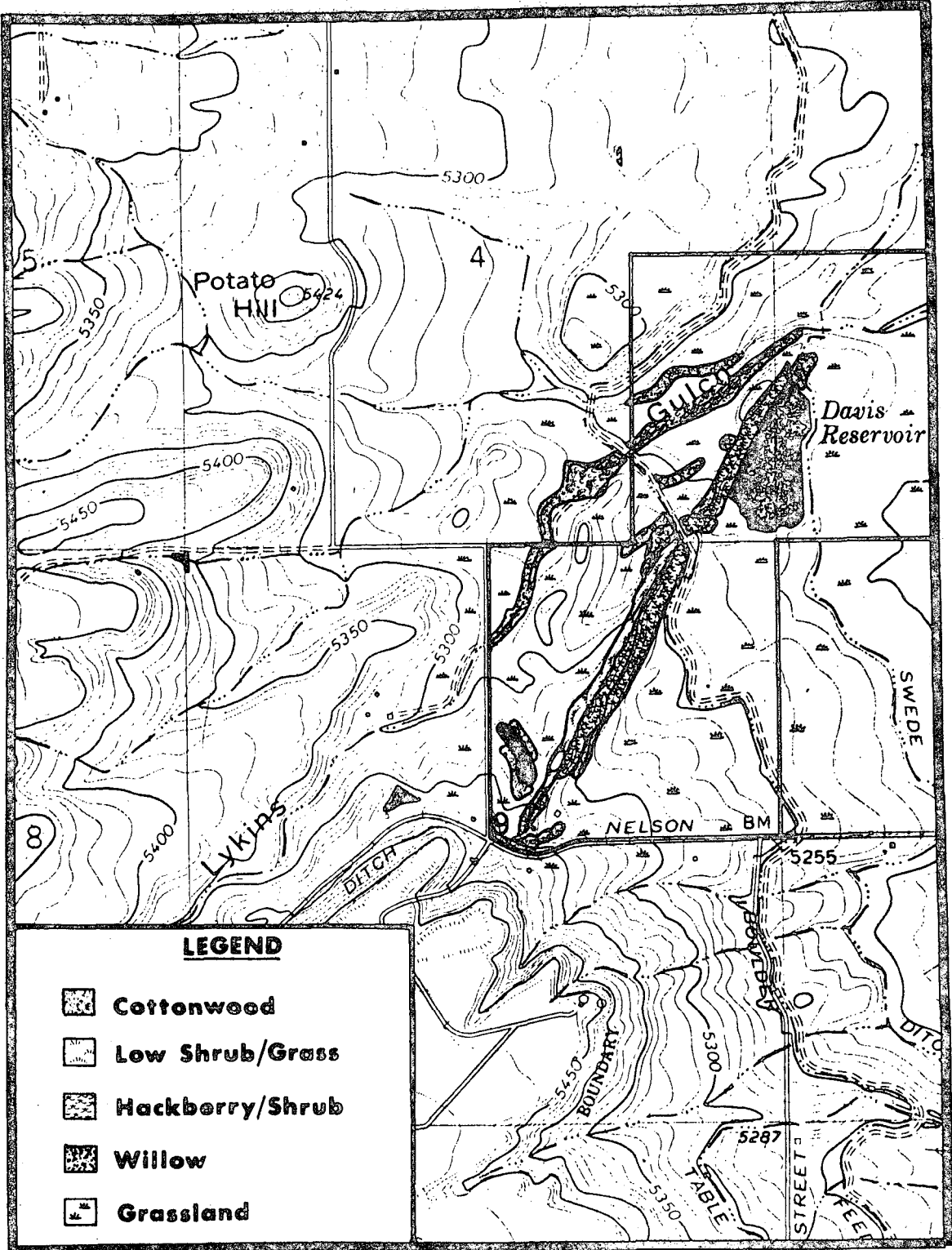
Fossils

The Hygiene sandstone member is approximately 600 to 800 feet thick in its location near Hygiene. The hogback itself consists of a lower soft sandstone separated from an upper hard, glauconitic, ridge-forming sandstone by shale that contains ironstone concretions. "Baculites perplexus is found sparingly in the basal beds of the Hygiene" (Dunn, 1955). Baculites gregoryensis is rare in the lower 140 to 250 feet of the Hygiene, and the lowest range of this Baculites zone is about the base of the Hygiene. This zone of B. gregoryensis also contains a species of Didymoceras. This is the earliest appearance of that spirally-coiled ammonite in the Western Interior. In the southern part of the Hygiene Hogback area Baculites scotti is common in the upper part of the Hygiene sandstone and in the overlying 100 to 200 feet of sandy shale.

Vegetation

The Hygiene Hogback and its immediate surroundings lie in what Weber refers to as a "Plains" plant community (Weber, 1967). Such a community

Figure 6



VEGETATION



is developed on level or rolling grassland with fringes of trees existing along the watercourses, below 5,800 feet elevation.

Along the drainages, patches of willows and cottonwood are encountered. The natural vegetation appears to be modified by over-grazing, as is indicated by plots of open ground and the presence of cactus in the grassy pastures east and west of the hogback. Shrub vegetation has been heavily browsed by cattle, resulting in hedged and stunted plants. Skunkbrush, hackberry, yucca, and prickly-pear cactus are seen scattered along the rocky surface of the hogback. A variation in species abundance is notable on the eastern and western sides. Three small Ponderosa pine dot the ridge at short intervals. In addition, brightly-colored lichens spot the sandstone rocks along both sides of the ridge.

Grassland vegetation aptly describes the dominant floral character of the hogback area. It should be borne in mind, however, that the distribution of the predominating short grasses and other associated species rarely is found as distinct, well-demarcated stands. Patterns can be mapped, as on Figure 6, but the boundaries should be considered to be gradational between vegetative types.

The grassland category mapped consists of grazed, improved pastures and represents a mixture of herbage--small isolated patches of blue grama grass (Bouteloua gracilis (H.B.K.) Lag.), low mats of buffalo grass (Buchloe dactyloides (Nutt.) Engelm.), certain unpalatable grasses, and forbs, Prickly-pear cactus (Opuntia rafinesquei Engelm.) and yucca (Yucca glauca Nutt.) intermingle with the grasses on the west side of the hogback where over-grazing has been extreme.

Over most of the grassland area the ground cover ranges from 50 to 75 per cent, but only slight erosion has taken place. At no place is there a vegetative stand that suggests stable, climax conditions. Most of the vegetation is closely hedged, and it is assumed that grazing has been the most significant land use for a long period of time (See Chapter III).

In the ravines and along the few watercourses, plains cottonwood (Populus sargentii Dode) and willows (Salix spp.) are common. Many cottonwood trees exceed 4 feet in diameter. There are sites where willows dominate the tree layer, but for simplicity of mapping they are included in the cottonwood category.

A hackberry (Celtis reticulata Torr.) zone is found on the eastern dip slope of the hogback (See Figure 7 and Figure 8). The hackberries are very sporadic in occurrence and are quite scrubby, ranging in height from near ground level to approximately 8 feet. The east side of the hogback, in places barren sandstone outcrop, supports little vegetation of any consequence other than hackberry. Some skunkbrush (Rhus trilobata Nutt.) and a few mountain mahogany specimens (Cercocarpus montanus Raf.) are present. Prickly-pear cactus and several colorful lichens are found. Grass is restricted to small pockets where soil has been formed on the bare rock.

The low shrub/grass area is located on the west side of the hogback and is transitional between the hackberry zone on the east slope of the hog-



Figure 7 - A
single Ponderosa
pine and Hackberry
on the Hogback
dip slope.



Figure 8 - Close
view of the trees
in figure 7.



Figure 9 - Waterfowl on Davis Reservoir.

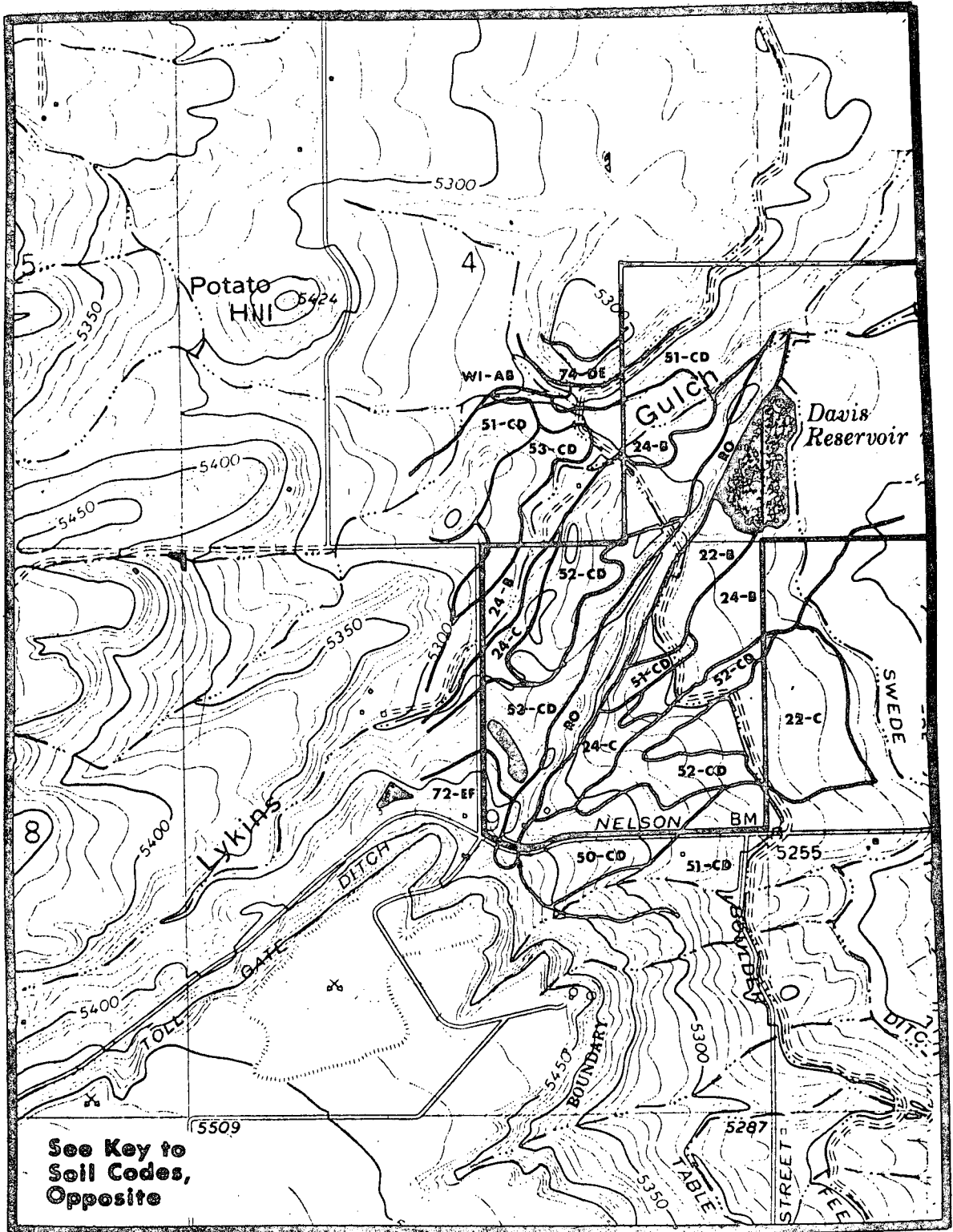
KEY TO SOIL CODES

<u>Designation</u>	<u>Name</u>
22-C, 22-B	Valmont clay loam
24-B, 24-C	Nunn clay loam
50-CD	Renohill silty clay loam
51-CD	Samsil clay
52-CD	Hargreave fine sand loam
53-CD	Kutch clay loam
72-EF	Terrace Escarpment
74-DE	Valmont cobbly clay loam
W1-AB	Hygiene clay
RO	Rock outcrop

Slope

<u>Designation</u>	<u>Per cent of slope</u>
A	0 to 1
B	1 to 3
AB	0 to 3
C	3 to 5
D	5 to 9
CD	3 to 9
E	9 to 25
CE	3 to 25
DE	5 to 25
DF	5 to 55
EF	9 to 60
F	over 25

Figure 10



See Key to Soil Codes, Opposite

SOILS



back and grassland to the west. Skunkbrush, prickly-pear cactus, and yucca constitute the common shrub flora; buffalo and grama grass patches are scattered along the slope. Ground cover is approximately 60 per cent, and over-grazing is quite apparent.

The willow category, shown on Figure 6 only along the northwest flank of the hogback in one location, indicates a marshy area where a stand of willows reaches 10 feet in height (See Figure 4). Willows are also found in concentrated cottonwood stands along some of the ravines west of the hogback.

At its low water mark, Davis Reservoir is skirted on its southwestern end by a small stand of cocklebur (Xanthium strumarium L.), a feature too restricted in scale to include on the vegetation map.

Fauna

Wildlife is found in this area, including white-tailed jackrabbits and coyote. Squirrel nests can be seen in trees along one of the marshy stream beds, and a number of rodent burrows can be seen among the cracks and crevices of the hogback. Immediately northeast of the ridge on Davis Reservoir about 150 mallard ducks and nearly 50 greater Canadian geese were seen feeding (See Figure 9). Other faunal indications included a number of different species of birds and numerous ant hills.

Soils

The dominant zonal soil within the study area is the brown soil, characterized by a light to medium-dark A horizon with a relatively low organic-matter content above an alkaline, carbonate-rich C horizon. Generally, a limited supply of moisture is the chief controlling factor in the genesis and resulting morphology of the soils (See Figure 10). Low temperature in winter and periods of summer drought combine to limit the soil-forming processes for a substantial portion of the year. The soils are generally productive, however, when modern irrigation methods are employed.

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CHAPTER III. LAND USE

Wil. Ulman, Wm. G. Callahan and Manik Hwang

An Historical Setting

When the first settlers arrived in the valleys of Left Hand and St. Vrain creeks (ca. 1850), the locale was a distant portion of the Nebraska Territory. The Federal Surveyor did not reach the area until August of 1863. Consequently, these first settlers were squatters with no legal means of securing their claims.

Because these valleys were conveniently located in relation to the mining communities in the mountains, it has been reasoned that many of the original settlers in the vicinity of the Hygiene Hogback were unsuccessful miners who found it easy and natural to follow the creeks down from the mountains in search of tillable land (Large, 1932). Their first occupation was harvesting wild hay, which was hauled to the various mining camps for sale or trade. Because these farmers originally had to depend on outside sources for most of their food and supplies, they probably engaged in mining or freighting to supplement their incomes. A few years would elapse before the development of sufficient local markets and before the preparation of the land for more intensive cultivation would allow these settlers to maintain permanent residence on the land.

Usually the bottom lands were taken first, but the bottoms became narrower and the slopes became steeper to the west. The need for irrigation was soon realized:

"We, in '60, '61, and '62, considered these little valleys-- Boulder, St. Vrain, Thompson, and Cache la Poudre--of more real value for farming purposes than all the high, dry land between these streams. . . . We expected, or many people did, that these between lands would be useful as a stock and game range, but we did not anticipate a time when there would be people enough in this country and with capital enough to construct irrigation ditches. . . . to irrigate high land though we soon learned the soil was alright if it had water"
(Coffin, 1914).

The number of ditches multiplied rapidly. Nearly all were small; most were partnerships in which a few neighbors cooperated. The first ditch constructed in the vicinity of the Hygiene Hogback was named the Toll Gate Ditch (May, 1870). One year later the Swede Ditch was completed. Both names still appear on current U.S.G.S. topographic quadrangle maps of the area. Irrigation encouraged the taking of what the surveyors would later classify as "rolling, second rate land" farther away from the streams.

Here, short buffalo grass, which was deemed excellent for grazing, flourished, and herds of antelope were frequently reported (Coffin, 1914). Irrigation farming gained an early foothold in the area.

Speculation was also evident. Prior to 1870, no land had been legally secured in the four sections under study. An 1871 cadastral map shows property holdings by six individuals. By 1880, however, five of these six holdings had changed hands, showing the effects of the heavy colonization which had occurred between 1870 and 1880.

This colonization was due to the advent of the Chicago-Colorado Company whose representatives, in January of 1871, visited northern Colorado in search of good, irrigable farming land on which to establish a colony. On the second of February, land was purchased for this purpose at what is now Longmont, Colorado. This date marks the transition from an era of agricultural prominence in the region. As the population grew and the land was settled, an expanding local market was provided for the farmers in the area. A short list of average farm yields at the time will show the capability of the land to support this expansion:

Wheat	26 to 28 bushels per acre
Oats	40 to 80 bushels per acre
Barley	30 to 60 bushels per acre
Potatoes	100 to 300 bushels per acre
Cabbage	10 to 20 tons per acre.

The fertile soils and "unequaled pasture lands" of the area would assure continued growth (Chicago-Colorado Colony Constitution, 1871). By the turn of the century a strong agricultural foundation had already been laid.

Although change occurred frequently during the various stages of development in the area, an absence of change was typical afterwards. A review of aerial photographic coverage of the area beginning in 1955 and continuing through 1969 reveals a remarkable degree of continuity.¹ The only significant alteration of land use patterns was due to the residential development along North 75th Street.² With this exception, variation between the two vintages of the photos was minimal. Areas used for cropland in 1950 were under the same usage in 1969. The same can be said for irrigated pasture land, and those areas which were unused due to stoniness, slope, or poor drainage. In general, therefore, it can be said that within the immediate vicinity of the hogback changes in land use were rare and insignificant after an initial era of development had passed.

¹Three sets of serial photographs were examined, the dates of which were September, 1955; August, 1963; and August, 1969. All three sets are available at the Longmont Soil Conservation Service (SCS) and/or the Longmont Agriculture Stabilization Conservation Service (ASCS), Longmont, Colorado.

²This residential development presents a deep contrast to the more static character of land use patterns further to the west. In the period between 1955 and 1963 twenty-one dwellings were constructed along North 75th Street. By 1969 the number had increased to 35.

Current Land Use

Although the bulk of Hygiene Hogback lies within the northeast quarter of Section 9, T 2 N R 70 W, land use activities in the immediate vicinity may be employed as a barometer for changes within the foreseeable future. Current land use combined with recent trends provide a mechanism for extrapolating future changes on this rural landscape. For the current land use investigation, Section 3 and parts of Sections 2, 4, 9, 10, and 11 have been reviewed (See Figure 11).

This area of Boulder County lies in an agricultural transition zone. The rolling land extending westward to the foothills is devoted almost totally to grazing. Cropping predominates on the flattened piedmont to the east. Agriculturally, stock grazing appears to dominate land use in the study area itself. Dry-land farming consists of wheat and/or barley cultivation, while irrigated cropland produces hay and a few acres of corn. Off-season grazing of stock on cropped lands was evidenced in some of the area by the actual presence of stock, and elsewhere by scattered fecal droppings. Livestock are predominantly cattle, but also include horses and hogs.

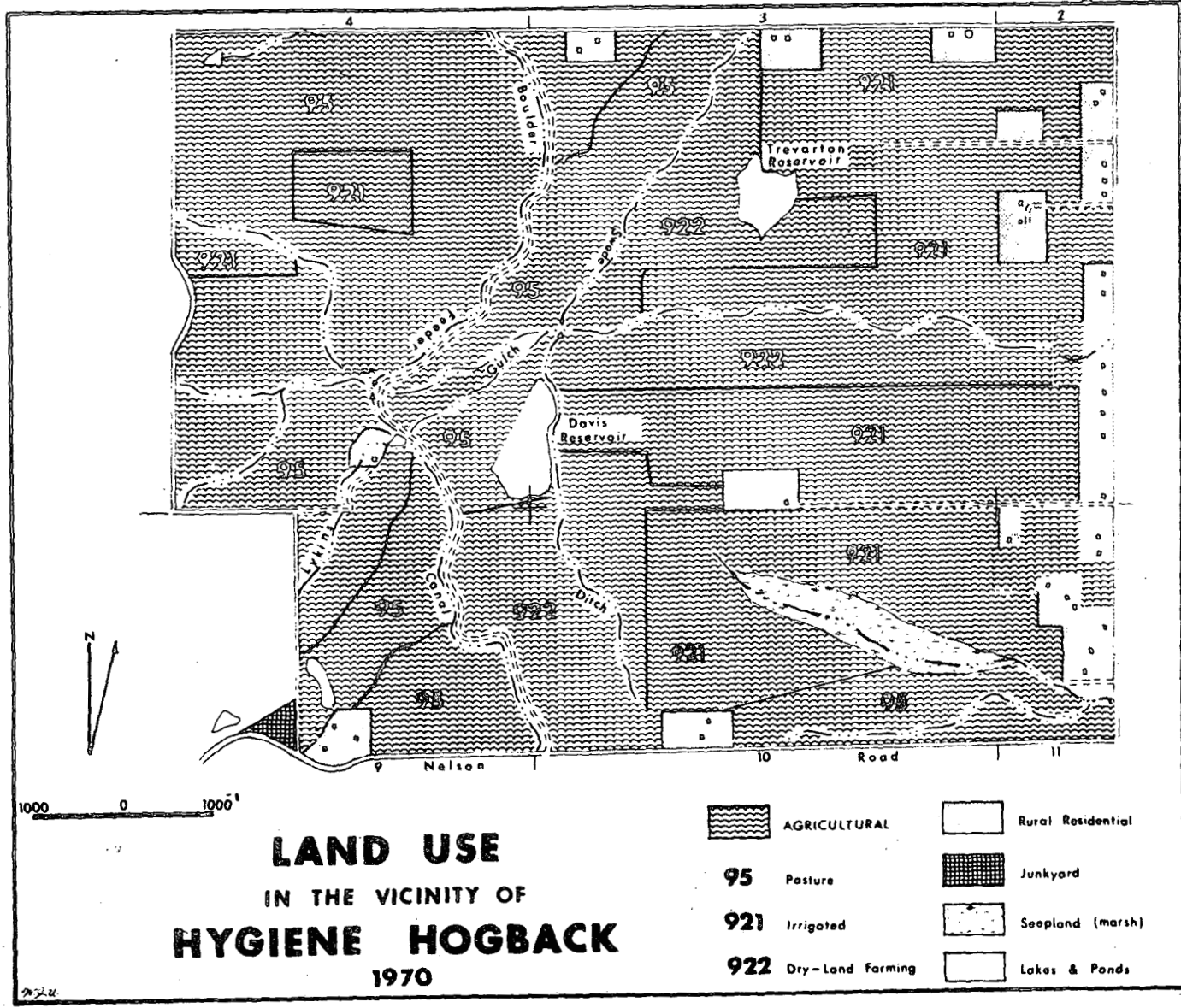
Crossing the study area from north to south is the Boulder Feeder Canal, which supplies water to the Boulder Reservoir. Paralleling this canal is the Swede Ditch, a secondary irrigation ditch which feeds numerous small lateral ditches lacing the study area. Two small reservoirs and four small farm ponds are also included within the area. The reservoirs provide water storage and, in addition, serve as a natural habitat for wild ducks and geese and as a water source for other small game. Farm ponds serve mainly for stock watering and, in at least one case, for irrigation. Some of the irrigation ditches in areas marked (See Figure 11) as predominantly pasture appear to be in a state of neglect, and are possibly no longer in use.

The study area is primarily a typical pastoral landscape. However, signs of man's influence are readily visible. A series of telecommunication antennas, both tower and saucer shaped, occupy the eastern end of Table Mountain, a flat pediment surface rising approximately 100 feet above the general elevation of the study area. This equipment is operated by the Environmental Science Service Administration (ESSA) of Boulder. In this same general vicinity an automobile junkyard fronts on Nelson Road. Many old cement block silos no longer in use still dot the landscape. Their presence usually marks the site of old farmsteads.






Evidence of development pressure is most visible along the eastern edge of the study area, defined by a 1.5 mile section of paved road extending north from Nelson Road. Although some of the houses along this portion of the road are older farm dwellings, the majority are of recent construction with all the earmarks of rural non-agricultural living. Included in the residential development along this road are moderate homes as well as expensive, custom-built homes having attractive stables.

Diffusion of similar residential development is a possibility throughout this area. The aesthetic quality of Hygiene Hogback, with its profusion of rock outcrops and very desirable views of both mountains and

Figure 11



LAND USE
 IN THE VICINITY OF
HYGIENE HOGBACK
 1970

- | | |
|--|---|
|  AGRICULTURAL |  Rural Residential |
| 95 Pasture |  Junkyard |
| 921 Irrigated |  Seepland (marsh) |
| 922 Dry-Land Farming |  Lakes & Ponds |

plains, gives this immediate area a quality high in demand among land developers. The quarter-section on which much of the hogback is located is presently for sale. Van Schaack and Company in Denver carries the listing, and is asking \$1,000 per acre. Interest in the purchase of this quarter-section was expressed to the investigation team by a Mr. Jack Pate of Boulder. While Mr. Pate's main interest in this acreage is to build a home for himself, he also concluded that if he purchased this land he would subdivide it into 10- to 15-acre plots for custom residential development. Although reluctant to elaborate on his particular interest in this area, Mr. Pate does recognize the ideal nature of the area for homesite development, especially near Davis Reservoir. Any potential developer should be aware, however, of the provisions of the Telecommunications Research Facilities Protection Act of 1969 (see Appendix B).

Future Land Use

Since the early development of the area around Hygiene Hogback, few changes have occurred. Crop yields have remained nearly the same (MacPhail, 1965), and those areas originally used for pasture have generally remained under that usage. Transitions from cropland to irrigated pasture have occurred, and some pasture areas have been severely overgrazed. In general, land use in the area has been static.

At first glance, there may be reason to believe that this trend will continue. The Beech Aircraft Corporation and IBM are the only industrial facilities near the Hogback employing a substantial number of people. A land use study of the area around the IBM plant was prepared in 1965 by The Boulder County Department of Development. Future land use in the area is projected to 1990. Even by this distant date little change is expected around the Hogback due to IBM influence. The area under study seems to be located just far enough north of Boulder, west of Longmont, and northwest of the Boulder-Longmont Diagonal to be immune from urban-industrial encroachment in the immediate future.

A second glance, however, reveals some contradictions. Many potential building sites in the study area would be "view lots" (estate-residential). Unlike the lands along the floodplains, few problems exist for residential development because elevations are higher in the vicinity of the Hogback, the water table is lower and the danger from floods is minimal. Furthermore, the area does not coincide with prime agricultural land. A transition to residential use is, therefore, more easily negotiated. Water is available (the Davis and Trevarton Reservoirs are located immediately to the west of the Hogback), and access via Nelson Road from either the Boulder-Longmont Diagonal or the Foothills Highway offers sufficient convenience to support residential development. Evidence of this type of development is already seen along the north-south arteries west of the Hogback. In 1955, most of the dwellings located here did not exist.

The idea of living rural and working urban is aesthetically pleasing and a common philosophy in this age of the commuter. As families continue to sacrifice proximity to their place of work for the sake of large, semi-rural sites on which to raise horses, perform limited farming or simply escape the urban syndrome, it can be expected that the Hogback environs will

offer prime settings. The usual side-effects can also be expected once this process is substantiated; the formation of neighborhoods eventually implies shopping outlets, service stations and highway extensions.

In terms of land use, the past is generally a key to the future. Past trends, once identified, can usually be used in interpreting the direction future land use will take. The Hygiene Hogback area, however, may be viewed as an exception to this rule. Although change has not occurred to any great degree since the turn of the century, it should not be assumed that this trend will continue. This study area cannot be expected to urbanize as rapidly as points directly between Boulder and Longmont, but it will not remain untouched. People in search of aesthetically pleasing homesites will certainly be drawn to this locale.

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CHAPTER IV. LAND OWNERSHIP AND TENURE

Dean G. Wilder and Helen Louise Young

Introduction

The area selected for the study of land ownership and tenure in the vicinity of Hygiene Hogback includes the following: $W\frac{1}{2}$, $W\frac{1}{2}$, Section 2; all Section 3; all Section 4; $N\frac{1}{2}$, Section 9; $N\frac{1}{2}$, Section 10; $W\frac{1}{2}$, $NW\frac{1}{4}$, Section 11; T 2 N, R 70 W. Because of the small number of holdings in 1870, all of Sections 2, 3, 4, 9, 10, and 11 were mapped to better indicate significant ownership changes between 1870 and 1880.

The sources used for data on land ownership in 1870 and 1880 were a Master's thesis by Marjorie Large (Large, 1932) and a wall map from the Western Historical Collection in Norlin Library at the University of Colorado. Land ownership from 1902 until the present time was determined from entries in the Boulder County Land Books. Land tenure for the study area was determined from interviews with residents of the area.

Land ownership as determined from the above sources was gathered. From this data a series of cadastral maps was compiled (see Figures 12 through 15). The years portrayed on the maps were selected because they best depict significant changes in ownership patterns. Current land tenure is also presented and tenure patterns plotted (see Figure 16).

Land Ownership Patterns: An Historical Perspective

The pattern of land ownership in 1870 was one of few owners with large areas of unclaimed land. By 1880, the pattern had changed drastically, with very little of the land left unclaimed (see Figure 12). Five of the original six holdings had changed hands by that time. The major influence for this change was the settlement by members of the Chicago-Colorado Colony. The growth of nearby Longmont in 1871 is indicative of the settlement of the surrounding lands. In April, 1871, nearly 200 colonists had arrived in Longmont, and by November, 1871, there were 500 people in the town (Willard, 1926). By 1902, the land had changed owners several times, and the size and shape of the holdings had been re-defined (see Figure 13).

From 1902 until 1940, the pattern of land ownership was one in which individual holdings remained unchanged in size and shape despite a turnover of owners (see Figures 13 and 14). A significant change of owners was noted between 1920 and 1930, with nearly all of the holdings changing hands. This large change in ownership may be attributed to the economic depression which affected all of the United States in the late 1920s and early 1930s.

Figure 12

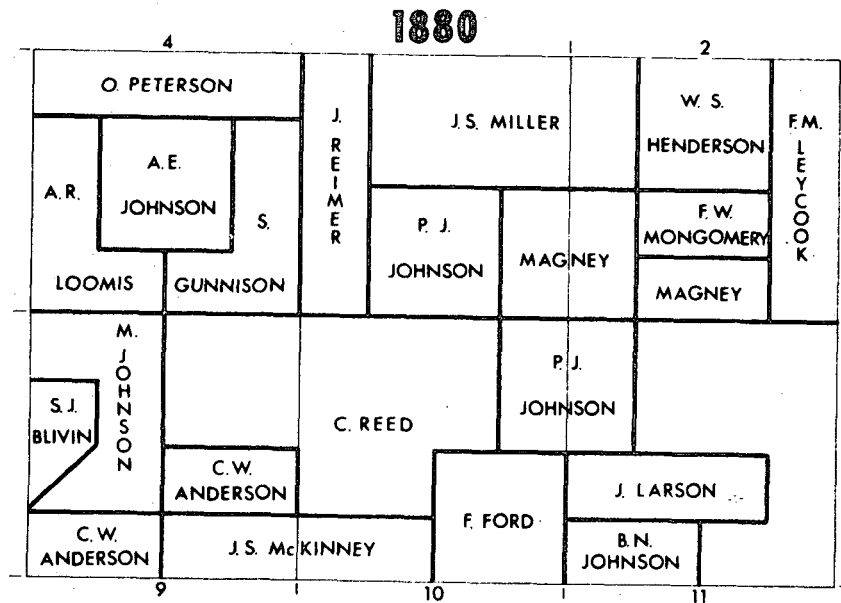
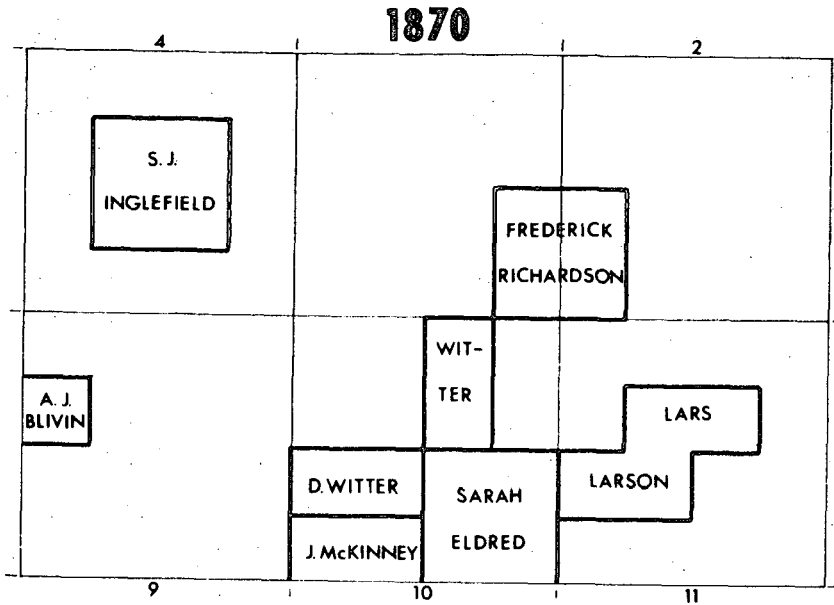


Figure 13

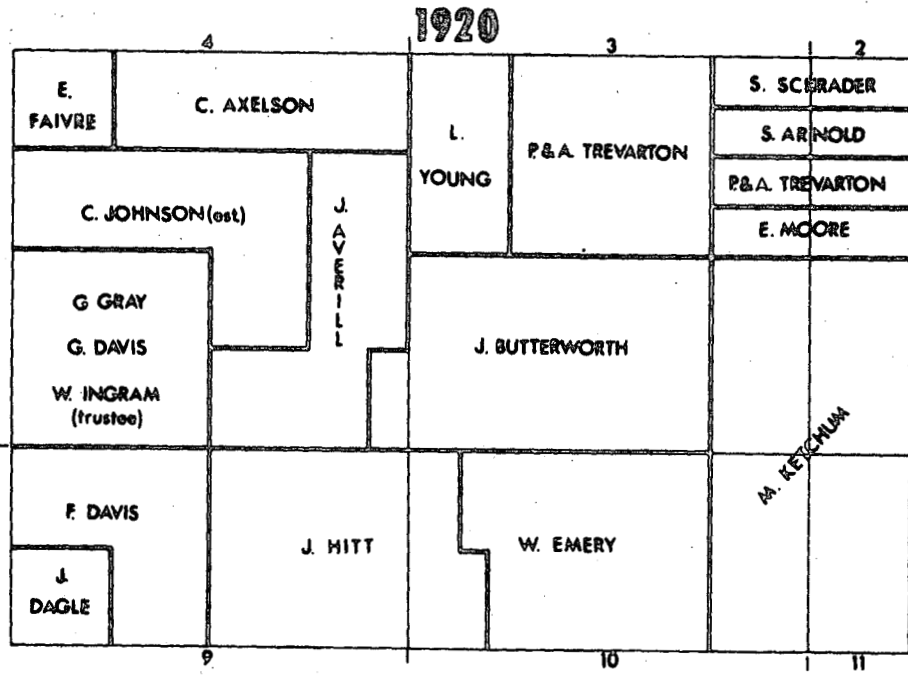
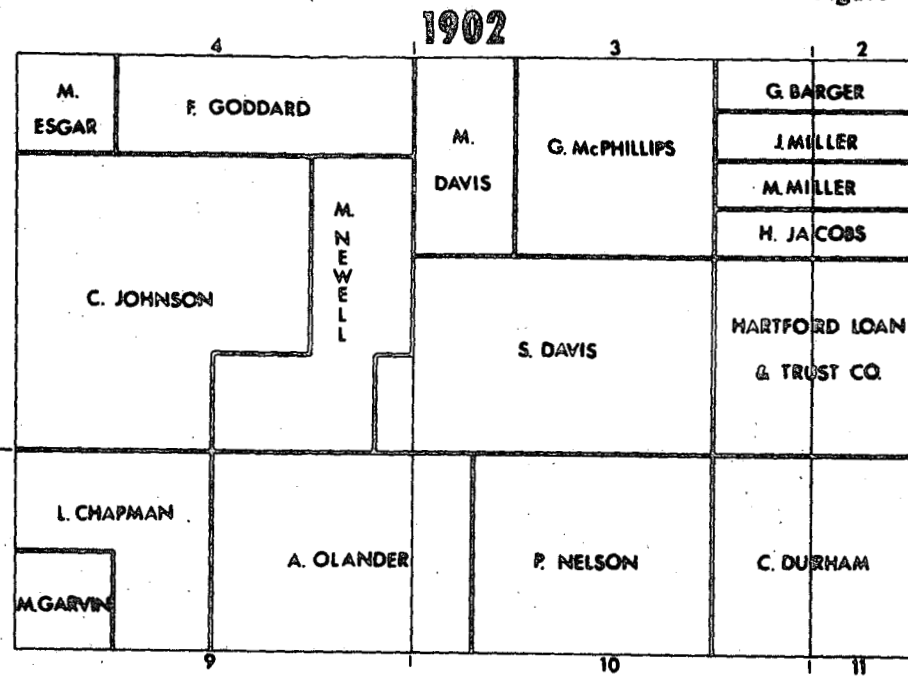


Figure 14

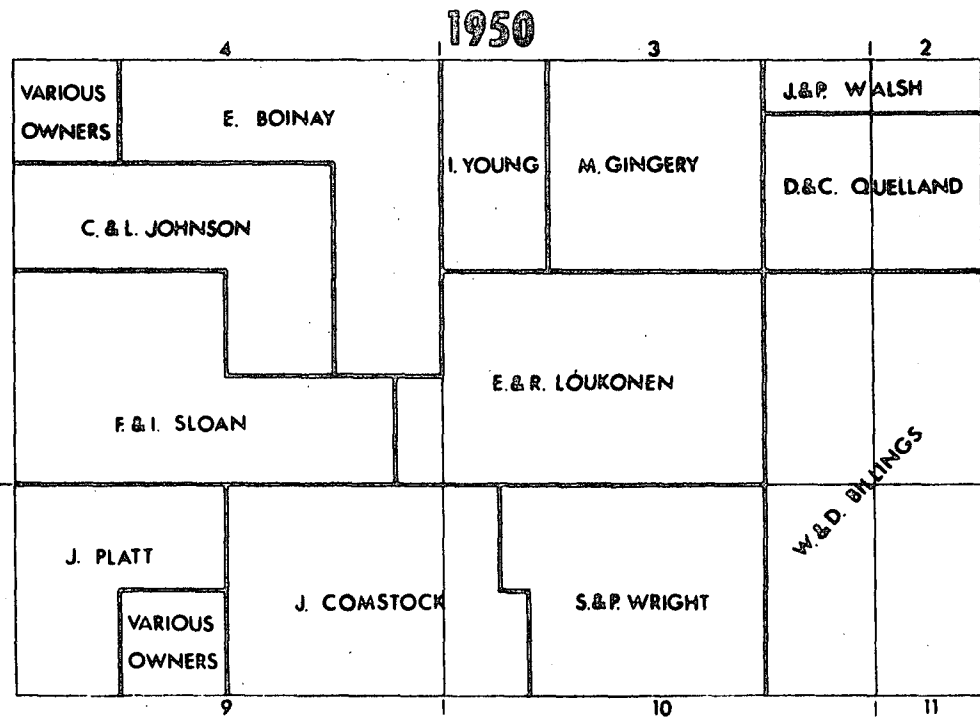
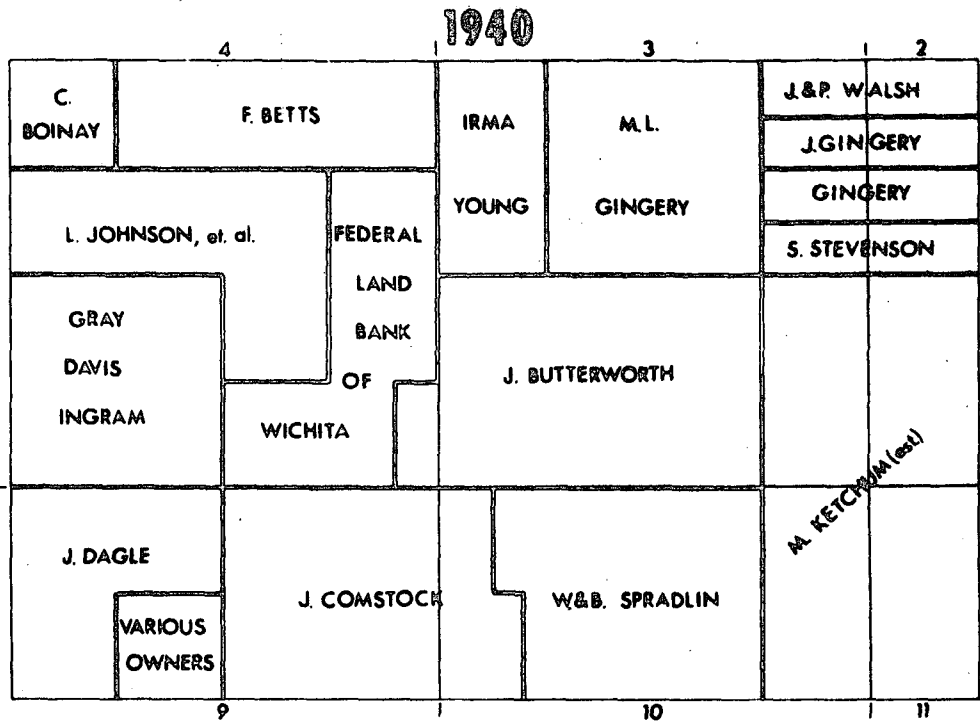


Figure 15

1960

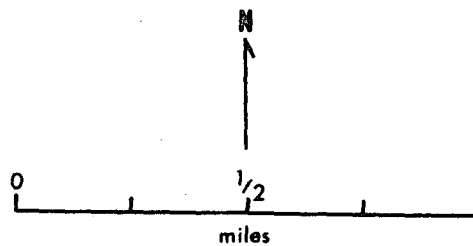
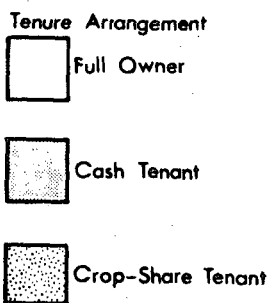
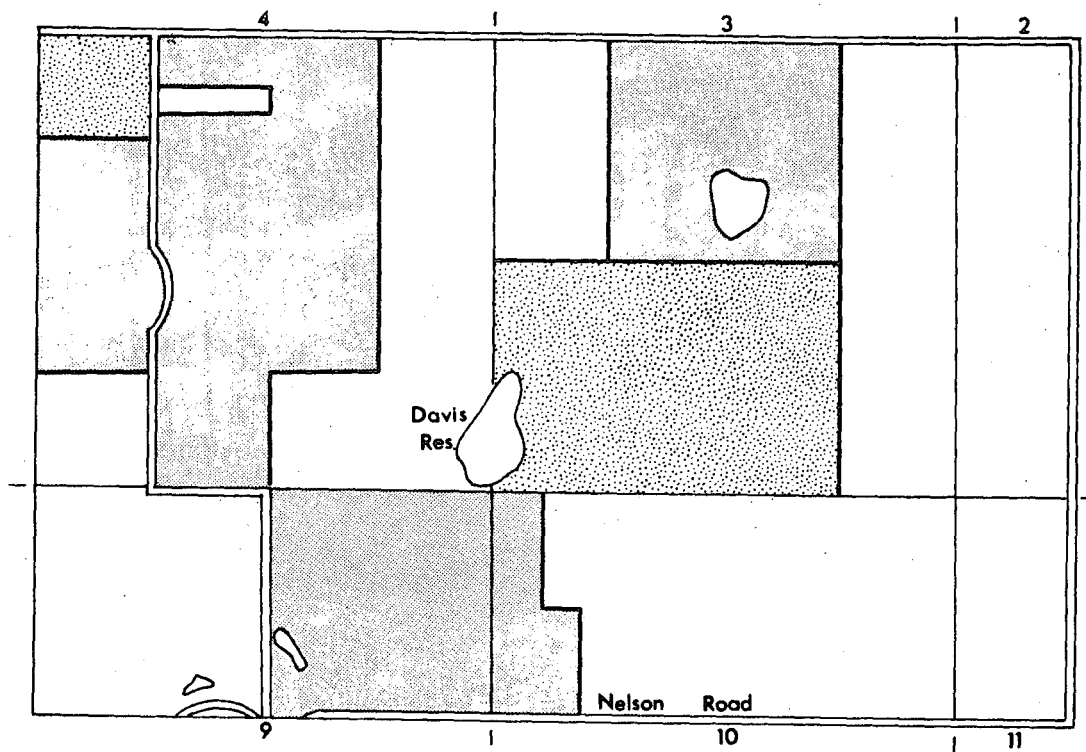
4		3		2	
VARIOUS OWNERS	E. FAIVRE	IRMA DOBLER	M.&B. GINGERY		P. WALSH
A. JOHNSON, et. al.					R. ARM-STEAD
				R. ARNETT	
A. & H. TODENHOFT		E. & R. LOUKONEN		H.&L. CHANCE	
J. PLATT			ALLEN DISCOUNT CORP.		
VARIOUS OWNERS	J. & F. GILBERT			F. & J. WEBER	
9		10		11	

1970

4		3		2	
VARIOUS OWNERS	E. & E. LAMBETH MacKenzie	VARIOUS OWNERS	VARIOUS OWNERS	J. WOOD Sr.	
L. JOHNSON, et. al.			E. SHUMAKER	CIRCLE C RANCH SUB.	G. EC HOLS V. O.
C. & N. MITCHELL		H. & H. BOLTES			R. ARNETT
VARIOUS OWNERS	W. BURKS (trustee)	VARIOUS OWNERS	D. & B. WHITE		VARIOUS OWNERS
W. PLATT				H. & L. CHANCE	
VARIOUS OWNERS	F. GILBERT	E. & E. SANDERSON		VARIOUS OWNERS	
9		10		11	

Figure 16

LAND TENURE HYGIENE HOGBACK AND VICINITY



April, 1970

Location: Town 2 north; Range 70 west

Between 1940 and the present, the pattern of land ownership has shown significant change. The trend has been toward a greater division of land among many more owners. From 1940 to 1950, there were only minor changes (Figure 14). By 1960, the trend towards further division of the land among several owners had established itself, and at the present time the pattern has become well-established (see Figure 15). Although land has changed hands and boundaries have shifted, proprietorships have remained fairly stable.

Land Tenure

Land tenure in the vicinity of Hygiene Hogback falls into three distinct groups: owner-operators, cash tenants and crop-share tenants. The majority of cash renters lease the land to graze cattle or horses, although one cash renter does farm the land. Crop-share tenants in the NWA₄, NWA₄, Section 4 and the SW₄ and W₂, SE₄, Section 3 farm the land and pay a share of the crop as rent. Along the eastern edge of the study area several non-farm rural residences are to be found. Significant tenure patterns for this area are indicated (see Figure 16). From this map, it can be seen that owner-operators and cash tenants are almost equally divided in total area, with sharecroppers being less important.

Summary

Land ownership in the vicinity of Hygiene Hogback has been characterized by three periods. In the late 1800s the land was rapidly divided among various owners into distinct holdings. By 1900, these holdings had changed shape as well as owners, and a new pattern had been established which remained essentially the same until 1940. From 1940 to the present time, the pattern of land ownership has changed with individual holdings changing in both size and shape. The present trend appears to be one of many more owners with smaller land holdings, but with a relatively high percentage of absentee ownership. Thus, the beginning stage of transition from rural to suburban occupancy has begun.

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Maps

Wall Map, "Compiled in part from official data and in part from actual surveys made for the purpose, by Samuel Freeze, in October, November, December, and January, A.D. 1880-1881." Western History Collection, Norlin Library, University of Colorado, Boulder, Colorado.

CHAPTER V. LAND ECONOMICS

George R. Greenbank and James Biggins

The following figures were compiled to aid in comparing assessments made in 1950 and 1970, and to enable cross-reference with cadastral information. These maps were prepared from assessment data obtained from the office of the Boulder County Assessor. Increase in assessment was calculated by determining the assessed values per acre in 1950 and 1970.

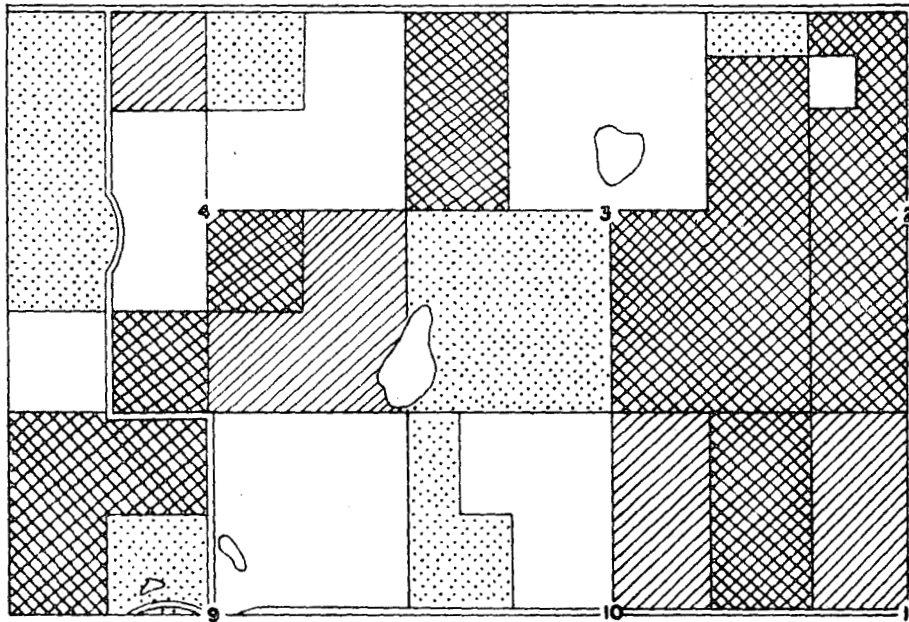
The purpose of the maps is to show distributions in time and space. Assessment has increased over the whole vicinity except for 160 acres in the center of the north one-half of Section 3. This acreage represents only about seven per cent of the area shown on the maps. It should be noted that current assessment, assumed at 30 per cent of market value, is five per cent greater than the average 25 per cent in 1950. Some of the areas mapped as having an assessment increase of less than 25 per cent probably reflect this change in policy, as well as an increase in land value. This may be at least partly true in the Hygiene Hogback area (the northeast quarter of Section 9) where the 1950 to 1970 increase was about 8.5 per cent. (Figure 17). Nevertheless, about one-third of the acreage in the vicinity of Hygiene Hogback has increased more than 100 per cent in assessed values in the last 20 years. Significantly, this increase is peripheral to the hogback.

The higher estimated land values are not as widespread as distinct increases in assessment (Figure 18). These highest values are in the subdivided parts of Section 2 and are more than one mile from Hygiene Hogback. Although a directional trend cannot be predicted from the information in this report alone, it can be seen that estimated values of \$50 to \$250 per acre are somewhat peripheral to the hogback.

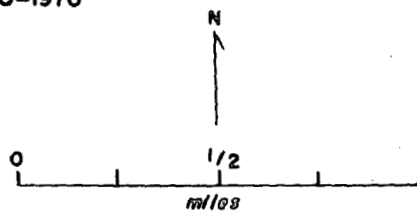
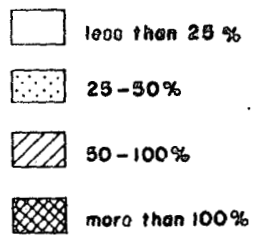
Mr. Harold Copeland of the Boulder County Assessor's Office estimated current land prices in the vicinity at approximately \$1,000 to \$1,500 per acre. Speculative values and greenbelt (protective) designations which have been assigned to particular land parcels may have a direct effect on current values, and Mr. Copeland noted this trend when interviewed. These values will generally be much higher than those of simply productive (agricultural) significance assigned to the land when assessed by the County. Mr. Copeland believed that the three different values which land may have (productive, speculative, and protective) in Boulder County causes the assignment of a current fair market value to be a difficult task.

Figure 17

INCREASE IN ASSESSMENT, 1950-1970
HYGIENE HOGBACK AND VICINITY



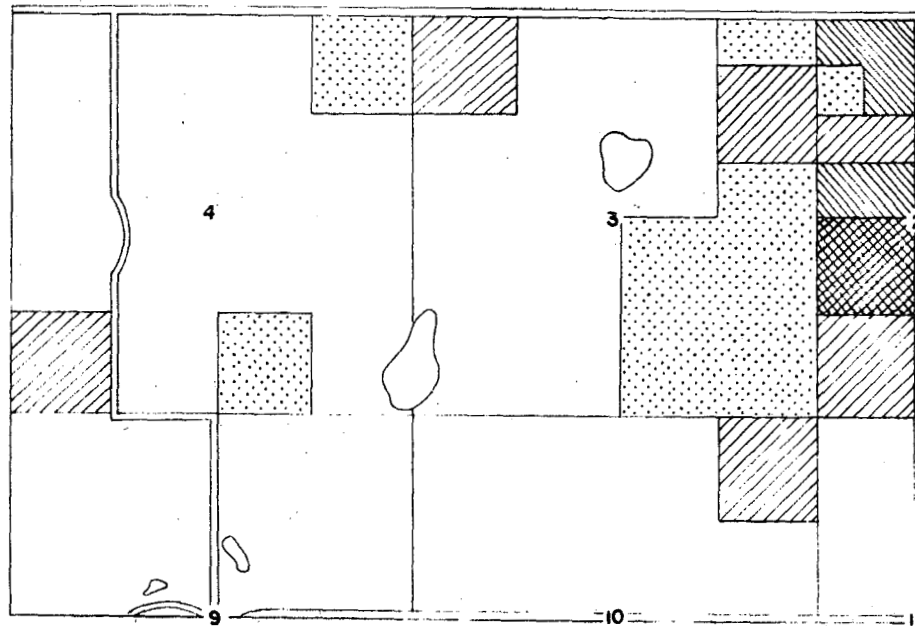
INCREASE IN ASSESSED VALUES, 1950-1970



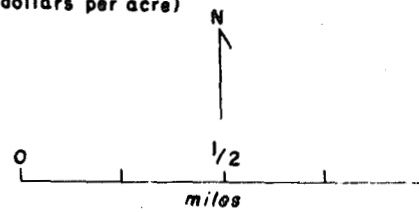
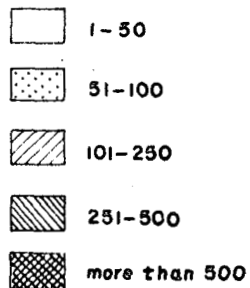
Township 2 North, Range 70 West

Figure 18

ESTIMATED LAND VALUES IN 1970
HYGIENE HOGBACK AND VICINITY



ESTIMATED APPRAISAL, 1970 (dollars per acre)



Township 2 North, Range 70 West

CHAPTER VI. CONCLUSIONS AND RECOMMENDATIONS

Robert E. Key, John L. Harper, and Scott Mernitz

The Hygiene Hogback presently seems relatively secure from immediate residential or industrial development. A number of factors point to the perpetuation of this security. These opinions were gathered from personal and telephone interviews and other factual data, and will be discussed briefly here.

Mr. N. W. Stiewig of Environmental Science Services Administration (ESSA) of Boulder, Colorado, was interviewed to determine the extent of that agency's interest in the area surrounding Table Mountain. ESSA operates an extensive telecommunications research facility located on Table Mountain, immediately south of and adjacent to the hogback. According to Mr. Stiewig, ESSA has considerable interest in what occurs on all of the property within a 2-mile radius of its operation on Table Mountain. The reason for this interest is protection of the highly sensitive equipment from anything which would produce radio interference. This includes heavy auto traffic, commercial or industrial development, overhead electric transmission lines, or residential development exceeding one dwelling unit per acre in density. Mr. Stiewig singled out heavy auto traffic, industrial development, and overhead wires as having the most potential for causing difficulty.

ESSA is highly desirous of the property surrounding Table Mountain, including Hygiene Hogback, being developed in such a manner as to preclude radio interference to its facilities there. State legislation giving ESSA the power to review any further action of this type in the immediate vicinity, supports this interest strongly (see Appendix B). Mr. Stiewig expressed enthusiastic support for greenbelt or academic study area designation for the site in particular.

Interviews with city and county officials seemed to provide added protection for the hogback area. The City of Boulder is not considering planning in the area for approximately 10 to 20 years, according to Mr. William Lamont, Boulder City Planner. Boulder County officials Mr. Robert Trenka and Mr. Art Palmer have heard no reports of further development or continuance of programs other than agricultural ones. The philosophy of the county offices appears in favor of maintaining the present 5-acre agricultural zoning. They also are in favor of doing all within their power to prevent changes in this zoning. At worst, 5-acre "residential" sites could be established by those wishing to supply their own utility services. This would also involve an additional expense for paving 300 feet of county road (approximately \$2,300 according to Flatiron Paving Company, Boulder) in order to satisfy county regulations. These sites would not harm the scientific value of the hogback unless located on the feature itself, and would satisfy the requirements of the previously mentioned legislation. These and other "blocks" to a change in zoning appear formidable.

Mr. Jon Pope, Longmont City Planning Director, expressed a definite interest in the area. Control over the site, however, is the responsibility of Boulder County (Longmont having no direct jurisdiction). Longmont presently has services only within the city proper, and very little beyond. The city is at present expanding to the northwest, north of the St. Vrain. Mr. Pope would like to see the hogback area become park or open space.

Comments by residents of the immediate locale were not useful in determining current feelings concerning the natural feature itself. Most of these residents occupy their land on a non-owner basis, and are not aware of the existence or concerned with the future of the hogback. This general feeling was conveyed in three telephone conversations with these residents. The actual owners of the land were not available for comment, since many reside elsewhere. It is believed that they would have the same feeling of unawareness and unconcern about the significance and future of the site.

The site characteristics and unusual quality of Hygiene Hogback and environs are described in the foregoing report, accompanied by appropriate tables and maps. It is the recommendation of the editors that all of the northeast quarter of Section 9, the eastern half of the southeastern quarter of Section 4, and the western half of the southwestern quarter of Section 3 be protected by any possible means. This would bring the entire area of Davis Reservoir within the study area and would also provide a buffer zone to help maintain and perpetuate the natural ecology of the reservoir and hogback.

For academic purposes, the area can best be used for the study of geology and geomorphology with field trip access to both the Geology and Geography Departments of the University. It is conceivable that the area would also be of interest to high school study groups. Davis Reservoir has some potential interest to those wishing to pursue biological studies at the site.

From a public standpoint, the area has good visual qualities and would be attractive to residential developers. There is undoubtedly a number of prime building sites on both sides of the hogback. While low density residential development would not be in the best interest of preserving the hogback, it is certainly preferable to allowing excavation and removal of the outcrop for commercial purposes.

Because of the interesting characteristics of the outcrop and its pleasing visual appearance, preservation through a potential county greenbelt program would be desirable but probably not possible within the foreseeable future. Boulder County is not involved in a park or greenbelt program at this time. Other techniques of protection and preservation should be explored. Among these are:

- 1) Continuation of agricultural zoning or establishment of "Special Agricultural Districts" to relieve or waive land taxes, thus permitting its continued agricultural use. This would be conditioned upon the landowners' permission for access to the site.

2) Under the covenant restricting residential density to one dwelling unit per acre, the County Department of Development might permit more dense grouping of structures far enough away from the hogback to ensure protection while transferring the increased density to the open space surrounding the hogback. The overall average density would still not exceed the maximum limit. If this technique does not result in sufficient acreage, the remaining portion of the study area could be leased or purchased outright by the University.

3) A long-term lease with an option to purchase might be negotiated with the present owners. This would result in immediate protection of the study site and would buy time for the agency most interested in acquiring the property to gather the necessary financial resources.

In the meantime, the Telecommunication Research Facilities Protection Act of 1969 may provide a degree of protection to the site by discouraging heavy traffic arteries and intensive development that could lead to serious radio interference locally.

APPENDIX A

SPECIAL SOIL INTERPRETATIONS, BOULDER SOIL SURVEY AREA, COLORADO

March 8, 1969

by

D. C. Moreland, Soil Conservationists

52-CD Hargreave fine sand loam

Moderately deep, well-drained soils with fine sand loam surface soils and fine sand clay loam subsoils. The soils are underlain by sandstone at 20 to 40 inches. Water intake rate is moderately rapid and water holding capacity is medium. The soils are used for irrigated and dry cropland and pasture. Erosion control is necessary to prevent wind erosion.

W1-AB Hygiene clay

These are deep, poorly drained soils with clay surface soils and subsoil. These soils have high water tables and high alkalinity. The soils are in upland valleys and terraces. Used for pasture and range. Water intake rate is slow and water holding capacity is high.

53-CD Kutch clay loam

These are moderately deep, well-drained soils with clay loam surface soils and clay subsoils. They are underlain by shale at 20 to 40 inches. These soils are on uplands. Water intake rate is slow and water holding capacity is medium. These soils are used for irrigated and dry cropland, but are better suited for dryland pasture than crops. Careful irrigation is needed to avoid water logging the soils.

24-B, 24-C Nunn clay loam

These are deep, well-drained soils with clay loam surface soils and clay loam or clay subsoils. These soils are on terraces and uplands. Water intake is slow. Water capacity is high. These are good irrigated soils and capable of producing good yields with good management.

50-CD Renohill silty clay loam

These are moderately deep, well-drained soils with silty clay loam surface soils and silty clay or clay subsoils. These soils are underlain by shale at 20 to 40 inches. These soils are on uplands. Water intake rate is slow. Water holding capacity medium. These soils are used for irrigated and dry cropland. They are better suited for close growing crops and pasture to help control erosion.

R0 Rock outcrop

These are areas of nearly bare rock outcrop. They include some areas of shallow soils and moderately deep soils that are on such steep slopes as to be unsuitable for anything but very limited grazing or for wildlife and recreation.

51-CD Samsil clay

This is a shallow, well-drained soil with clay or clay loam surface soil and underlain by shale at less than 20 inches. These soils are on uplands. Water intake is slow and water holding capacity is low. These soils are best suited for pasture. If irrigated, frequent light irrigation will probably be necessary to maintain sufficient available moisture and wind erosion.

72-EF Terrace Escarpment

This is land type consisting of a thin layer of cobble material over shale. These occur mainly on the side slopes of old high terraces and pediment surfaces. Water intake rate is slow although the cobble on the surface may help. Water holding capacity is low. The soils are best suited for range or pasture.

22-B, 22-C Valmont clay loam

These are moderately deep, well-drained soils with clay loam surface soils and clay or clay loam subsoils. These soils are underlain by cobbly and gravelly layers at 20 to 40 inches. These soils are on terraces and high pediments or outwash fans. Water intake rate is moderately slow. Water holding capacity is medium. These soils are used for irrigated and dry cropland and pasture. Erosion control is important.

74-DE Valmont cobbly clay loam

These soils are like Valmont clay loam, except that there are large amounts of cobble and gravel on the surface and throughout. Cultivation is difficult because of cobble and stone, and most areas are used for pasture or rangeland.

APPENDIX B

TELECOMMUNICATIONS RESEARCH FACILITIES OF
THE UNITED STATES ACT OF 1969.

It is worthwhile to note that the telecommunications research facility near Hygiene Hogback is now protected by state legislation concerning zoning. This act, known as the "Telecommunications Research Facilities of the United States Protection Act of 1969" provides as follows:

- 1) When considering requests for rezoning or variances from existing zoning on property within 2 miles of the perimeter of telecommunications research facilities (TRF), the local governing body must consider the effect of any resulting interference caused to the facilities by the emanation of electrical impulses from electrical equipment.
- 2) If approval of a request for rezoning, zoning variance, or change in land use which will permit hospitals, industrial, business, or commercial uses is sought within a distance of 2 miles from the perimeter of a TRF, the governing body may request reasonable information concerning the proposed use to be made from the applicant, including a summary of the kinds of industrial electrical equipment to be installed.
- 3) If residential development through subdivision is sought, a covenant limiting density to a maximum of one dwelling unit per acre is imposed.

¹State of Colorado: Telecommunications Research Facilities of the United States Act of 1969. General Assembly, State of Colorado.