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AN EVALUATION OF THE MASTER UNIT SYSTEM
USED BY FEDERAL GOVERNMENT

By

James A. Moorhouse

M.F., University of Montana, 1968

Presented in partial fulfillment of the requirements for the degree of

Master of Forestry

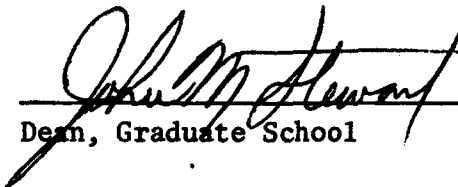
UNIVERSITY OF MONTANA

1968

Approved by:



Chairman, Board of Examiners



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FOREWARD

The following discourse evaluates the processes of one of the largest governmental administrative bodies in the United States. It is not intended to be a criticism of personnel or methods involved, but rather a constructive evaluation of a system and recommendations for its improvement.

My thanks must go to the Bureau of Land Management, Mr. John Russiff, Winnemucca District Manager, and Mr. Russ Penny, State Director of Nevada for allowing me to delve into the Master Unit System. My work as a Land Examiner for the Bureau acquainted me with this system and allowed me to explore it fully and to evaluate it closely. It is hoped that further exploration will disclose useful ideas to both the BLM and to others wishing to use this or a similar system of land and resource analysis.

The Humboldt Master Unit Initial Analysis as included here is according to Bureau criteria, and was compiled by me from BLM information and files. Other district personnel also contributed facts and figures where necessary. The analysis was part of my regular workload and has been approved as acceptable by the District Manager and State Director involved.

SECTION I

THE MASTER UNIT SYSTEM

AND ITS

OBJECTIVES

In a time when usable land is becoming scarcer, individuals, corporations, government agencies, or any other administrative unit with an interest in land are turning to intensive multiple uses and a coordinated plan of development. Many facets of the land itself -- its uses, its needs, its economic situation, and its potential -- must be probed and evaluated before any attempt at management can begin; in short, a critical, orderly analysis of available resources and their effects on each other must be made. Some systems of analysis will work where others will not, when considering a specific piece of land or area; a slight variance in the classical methods is necessary in some instances; in other cases an entirely new method must be devised in order to incorporate all the necessary information and details into a useful composite of facts and ideas.

In this specific case to be explored here, a new system of analysis was devised, altered, explored further, and finally put into practice. Its using agency, the Bureau of Land Management, is responsible for all public domain land remaining in the United States, and as such, must serve nearly 190,000,000 people. In doing so, 437,600,000 acres¹ must be wisely used, conserved as much as possible, and the resources handled in a manner which benefits the largest number of people over a period of time. This is a large order of business, and to fill it, the BLM must be appraised of all pertinent

¹Bureau of Land Management, Director's Report, 1962.

facts that will affect its management program. To meet this necessity the Master Unit System was inaugurated.

A MASTER UNIT is a distinctive geographic LAND USE STUDY AREA.²

In essence, a single Master Unit is merely a management area or planning unit. In the same manner that states are divided into counties or national forests into ranger district, BLM districts are divided into Master Units. A given Grazing District is broken down, after considerable thought, into management areas (which are easily defined), having similar characteristics and problems of management and use. This delineation is based on land status patterns, types and history of use, particular problems of management, and somewhat on easily defined natural boundaries. Each District further adjusts boundaries to conform to adjoining districts' Units and thus coordinate studies throughout the state.

Each Unit is studied independently and includes economic, historical, and physical data, and the effect of each on the other. Information is drawn from state, county and local officials, and other federal agencies, and is coordinated using data from each of the divisions within the Bureau. The result is a Master Unit Plan.

To reiterate briefly -- a Master Unit, then, is a geographical area susceptible of management as an entity. A Master Unit Plan is the collection of pertinent data relating to the particular area, and is eventually developed into a planning device in managing the Master Unit.

²Volume V, Bureau of Land Management Manual, Part 6.3.

The first step in the analysis of the Master Unit is the Initial Analysis, or Master Unit Plan. The specific purpose of the Master Unit Plan is twofold: first, to collect data pertinent to and necessary for proper management planning for the Unit; second, to identify specific areas of similar characteristics to be noted as Program Areas and studied in a more detailed manner. The detailed analysis is concerned with specifics -- exact numbers of stock in a grazing allotment, miles of fence constructed, number of springs developed, etc., while the Initial Analysis or Master Unit Plan is of a more general nature.

The end product of the initial and detailed analyses is the establishment of a basic set of data from which to plan and to establish a relationship between the public domain lands and the surrounding area. It also provides a picture of the developments needed, the management policies required, and the land tenure adjustments necessary to more fully utilize the resources of the area.

Following is an outline of one specific Master Unit Initial Analysis -- The Humboldt Master Unit. The general headings and basic breakdowns shown are those suggested by the Washington Office of BLM for use in the field, and are the basis for all Master Unit Analyses.

This particular analysis concerns 2,930,000 acres of mixed ownership land south and east of Winnemucca, Nevada. The area is a mixture of public domain and private lands that are presently used for grazing, farming, mining, and woodland products. The unit is also influenced by the city of Winnemucca, two major highways, and

two major railways. As a whole the unit provides an interesting composite of factors contributing to the economic situation in the area.

HUMBOLDT MASTER UNIT CLASSIFICATION

STUDY

INITIAL ANALYSIS

Introduction and Foreward

I. Location and Tenure

- A. Location
- B. Land Ownership and Jurisdiction

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- A. Climate
- B. Topography
- C. Watersheds
- D. Geology
- E. Soils
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- A. Population Patterns and Characteristics
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- A. Agriculture
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- C. Mining and Mineral Processing
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- V. General Economy, Trends, and Influences
 - A. Present Condition
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 - D. Forests, Woodland, Lumber, and Other Vegetative Products
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 - F. Water
 - G. Wildlife
 - H. Recreation
- VIII. General Summary
- IX. Program Areas

The Humboldt Master Unit Initial Analysis, excluding maps and other appendices, totalled 36 typewritten pages and is included in its entirety in the Appendix of this report.

SECTION II

**ANALYSIS OF THE EFFECTIVENESS
OF THE MASTER UNIT PLAN**

The Master Unit Plan has two basic goals or purposes, both of which it attains fairly well, but in a rather unwieldy fashion. As indicated previously, it is designed to (1) collect data pertinent and necessary to proper management planning, and (2) to identify areas requiring further, more detailed study.

The actual collection of data is not so difficult nor as necessary as is putting the data in one place in a usable form. Prior to the Master Unit concept the Bureau maintained and continues to do so several files of physical and economic data under various headings: Community Watershed Plans; Grazing Unit Management Plans; Grazing Allotment Analyses; Hydrology Studies; Fire Records and Fuel Types; Forest Management Plans; and the innumerable "Other Bureau" reports from River Basin Planning, SCS, U. S. Forest Service, State Agencies, etc. In order to obtain physical data concerning a certain area, one previously had to scan several or all of the mentioned sources in order to sort out that which was required. The Master Unit Plan combines the information from all these sources, separates it under several headings, and puts it all in one place, thereby reducing time and effort necessary in researching a problem.

The second goal is attained quite definitely and with little question. The Master Unit Plan, when properly executed, simply points a finger and says this area, described thus and so, has certain peculiarities and should be studied in a detailed manner to allow certain programs to take place. It then follows that a detailed analysis will be made, along lines similar to the Master Unit Plan, but in much more detail.

At this point certain disadvantages, redundancies, and ambiguities begin to appear in the Master Unit System. The overall picture involves this: a BLM District is broken into, say, four Master Units; each Master Unit requires an analysis or plan as indicated. The Master Unit is further divided into Program Areas, each also requiring a plan, but in much greater detail. Now one has about 12 different plans (analyses) to handle; but, they are not all "different" -- rather separate, since the same geographical area is covered at least twice by a general and a detailed analysis. The information contained therein is covered several times during these analyses simply because of the general nature of the data. For instance, climate does not vary significantly enough over one BLM District to require four different treatments in four separate Master Unit Plans; nor does general topography in most instances; nor does political influence, general economy, or several other items covered in each plan. There is considerable redundancy then, when one considers the additional detailed treatment of the same items in a Detailed Analysis covering the same area.

On the other side of the page, a great percentage of the information in a Master Unit Plan is derived from other reports and analyses, thereby making the Master Unit Plan just one more report in a long line of reports on the same area. In addition to the duplication of effort, the accuracy of the analysis may tend to suffer somewhat. Much of the information presented in an analysis of this type cannot be definitely substantiated, although the writer may make the best estimate possible under the circumstances. However,

repetitious use of estimates begins to take on the solidarity of facts and the estimates are soon accepted as fact.

Estimates may at times be subject to question due simply to the difficulty in making the estimate. As indicated, other BLM reports and files are gleaned for information to pull together to make the Master Unit Analysis. However, much of the data from Community Watersheds, Grazing Units, and Timber Units are for the individual Unit as a whole, and information for any one part of a unit is almost impossible to attain. Unfortunately, the boundaries of these units rarely match Master Unit boundaries, so estimates must be made, and accuracy again suffers. These boundaries are further in conflict with political subdivisions and boundaries of other agencies causing greater confusion.

The fact that the Master Unit analyses are made independently of each other is also, in my opinion, a hindrance. Each analysis is made more or less separately without full consideration of effects of those units on either side. Much of the economic growth of a unit may be the direct result of factors in an adjoining area. In the case of the Unit at hand, its largest city, Winnemucca, is a business source for other areas to the west and north, and should be considered in compiling the report.

The worth of the general nature of the information contained in the Master Unit Analyses, when balanced against the time and effort required for compilation, becomes questionable. Persons using the Master Unit Analysis for source material often find the data is too

general to be of use, and, in order to satisfy their needs, go to the Detailed Analyses of the Program Areas for pertinent information. What, then, is the worth of the Master Unit Analysis?

SECTION III

**SUGGESTIONS AND ALTERNATIVES
FOR IMPROVEMENT**

As discussed in the previous section, the Master Unit Analysis or Plan achieves its objectives, but it does so under laborious and hard-to-handle conditions. I feel that for economy, improved usefulness, and clarity, the outline could be condensed somewhat and the Master Unit Plan itself de-emphasized, with greater weight placed on the Program Areas and detailed analyses that follow.

I recommend the following changes be made in the general system and in the Master Unit Plan outline itself:

1. The Master Unit Plan be de-emphasized to a position of very general information, and the outline condensed to include:

- I. Location and General Description
- II. Natural and Physical Features (This item to contain information general to all Program Areas in the Master Unit, and not to be repeated unless the data would significantly influence programmed activities, i.e., rainfall vs. crested wheat grass seeding).
- III. Economic Status (This heading to consolidate sections III, IV, and V of the present outline -- see appendix. The comments under II above are also appropriate here).
- IV. Public Lands -- Their Character and Use (The section to combine items VI and VII of the old outline. This section would include a discussion of significant land patterns in the Unit that present peculiar problems of management).
- V. Designation of Program Areas (This section would show little change from the present intent, except to more fully identify the peculiarities of each Program Area).

2. In proceeding to the Program Area analysis, the writer should take care to include all information that might have been in the Master Unit Plan, that is significant to the area. That is he should

include all information pertinent to the Program Area, but not general information influencing the District or Master Unit as a whole.

3. The possibility of a District-wide write-up rather than of one Master Unit of a general nature should also be considered here. Information pertinent to all areas -- i.e., climate, geology, politics, and general economy -- could be covered District-wide, and only very pertinent information of these categories placed in the Program Area analyses. For instance, if rainfall were going to have a direct effect on management decisions on a particular area, then mention should be made of it in the Detailed Analysis; if it were not, why clutter the analysis with the unimportant facts?

In this way the Master Unit Plan would become nearly nonexistent; however, the Detailed Analyses may become somewhat more involved, due to increased content. I feel the increased efficiency and replacement of four Master Unit Plans with one District Summary more than balances the larger, more complex Detailed Analyses that might become necessary.

In considering the Master Unit System as a whole, three main points become evident.

First, the Master Unit Plan is primarily a combining and correlating vehicle for pertinent facts concerning a definite area. Once the sources of information available have been sifted and screened, the important points encountered can be placed in a single comprehensive file. Use of this single report represents a great saving in time and money when data for programming is needed because it is no longer

necessary to spend several hours in research. This single fact of easy reference is the greatest point in favor of the Master Unit System.

Secondly, the Master Unit Analysis is awkward to compile and use at times because of the overlapping and mismatching of other study areas, and the general nature of the data involved. Information presented is sometimes less than is desirable. Estimations necessary in such a situation do not give the degree of accuracy or detail sometimes required.

Thirdly, taking both advantages and disadvantages into account, the Master Unit System is a step forward in the complicated business of multiple-use programming and resource management. There are many adjustments needed in the system -- some easily recognized and instituted, others more difficult to determine and nearly impossible to attain. Even with its inherent disadvantages, the Master Unit System is a decided improvement over the older methods of individual study and lack of correlation. With further revisions, and familiarity with its ramifications, the Master Unit Analysis System can become a useful tool for resource managers.

APPENDIX

III.

UNITED STATES
DEPARTMENT OF THE INTERIOR
Bureau of Land Management
Nevada State Office
Post Office Box 1551
Reno, Nevada

HUMBOLDT MASTER UNIT CLASSIFICATION STUDY
INITIAL ANALYSIS

Winnemucca Administration Area

Nevada

1 9 6 3

HUMBOLDT MASTER UNIT

INITIAL ANALYSIS

ACKNOWLEDGEMENT AND APPROVAL

The Initial Analysis which follows was prepared in the Winnemucca District Office of the Bureau of Land Management. Information was developed by District personnel involved in all resource programs. Thereafter the report was reviewed and edited in the Nevada State Office of the BLM. The analysis now represents the composite efforts of all activities in the Bureau of Land Management in Nevada.

The undersigned concur in the conclusions reached and approve the designation of program areas as identified herein and endorse their utilization as a basis for the development of detailed management plans in furtherance of the Bureau's program responsibilities.

5-31-63

/s/ John N. Russiff

District Manager

Approved:

6-7-63

/s/ J. R. Penny

State Director, Nevada

HUMBOLDT MASTER UNIT INITIAL ANALYSIS

Introduction and Foreword

The Humboldt Master Unit is essentially a vast, sparsely populated range land. Its economic and population center is the city of Winnemucca, Nevada, which is situated on its western edge. Because of its location, and because it is the area's foremost locality, Winnemucca is also a center of activity for the three master units--Blue Wing, Paradise, and Jackson--which adjoin the Humboldt Unit.

This area was prominent in Nevada's early history. The first transcontinental railroad crossed the Humboldt Unit's northern sections. Along the route, the Central Pacific Railroad established many supply points, and some of these grew into booming towns. Winnemucca was originally one of these depots. It has since become the principal city in northwest Nevada. Golconda was another, and before it declined in importance it was famous for its "curative" hot spring. Such hot springs are still numerous throughout the area, but the Humboldt Unit today is largely important for its ranges and the livestock and game that graze them.

1. Location and Tenure

A. Location

The Humboldt Master Unit is an internal area lying in the northwest quadrant of Nevada. Most of the unit is south and east of the Humboldt River. The river turns at the west edge of the unit from a westerly to a southwesterly course and soon after leaving the locale of the unit, the river ends in the renowned Humboldt sinks. Winnemucca, barely within the northwest boundaries of the unit, is approximately 170 miles northeast of Reno, Nevada. The unit includes portions of Pershing, Churchill, and Humboldt counties.

B. Land Ownership and Jurisdiction

Most of the land is either unappropriated public land or is included in the original land grant made to the Central Pacific Railroad. The railroad land is a vast checkerboard of odd-numbered sections stretching 20 miles on each side of the railroad right-of-way and lying across the north one third and west one half of the unit. Some of this land has been sold to private parties, but the greater part is now held by the Southern Pacific Railroad Company. Much of the formerly public land that lies in cultivable areas and along rivers and streams has been patented to individuals. Except for approximately 46 sections--some withdrawn for reclamation purposes along the Humboldt River in the northwest, others reserved for air navigation sites and public water reserves--the remainder

of the unit is entirely public domain land and is under the jurisdiction of BLM.³

The approximate acreages below indicate how the land is presently distributed:

| | |
|-------------------------|----------------|
| Public lands | 2,261,000 |
| Reclamation withdrawals | 29,400 |
| Railroad land grants | 540,000 |
| Private and other | <u>100,000</u> |
| Approximate Total | 2,931,000 |

II. Natural and Physical Features

A. Climate

Wide local variations in precipitation and temperature are characteristic of the unit's area. The valley bottoms are semiarid, some receiving an average of less than eight inches of annual precipitation. Surrounding mountains, however, receive up to 20 inches in some locations. The mean annual temperature is about 48° F. to 50° F. in the valleys, dropping lower in the mountains. Most precipitation falls during the winter months in the form of snow. Summers are usually dry and warm. The frost-free season averages 127 days at Winnemucca and 130 days in the southern portion of the unit.⁴

B. Topography

Surfaces vary from almost level on the valley floors to steep, incised and precipitous in the rugged mountains.

³Compiled from BLM Land Office records and County Assessors' Records for Humboldt, Churchill and Pershing Counties.

⁴U. S. Weather Bureau, Annual Report, Salt Lake City, Utah.

Intermediate topography includes basins, terraces, alluvial fans and flood plains. The aspect is generally north to south, although the Humboldt Valley is exceptional in that it crosses the north one third of the unit from east to west. North of the Humboldt River stand three principal mountain ranges, separated by broad valleys. These mountains, though reaching steeply to 3,000 feet or more above the valley floors (and to 8,000 feet above sea level), are reasonably round and smooth and have good soil cover. The southern mountain ranges are less advanced geologically, being very rugged and incised and showing great amounts of exposed rock. Some parts are nearly inaccessible. Between these ranges are very wide, flat and low gradient valleys, including the Antelope, Buena Vista, and Dixie Valleys.

C. Watersheds

The Humboldt River loops through the northern portion of the unit and parallel to, but west of, the western boundary. Although it drains about two thirds of the unit, most of the river's runoff originates at its headwaters in Elko County, many miles away. Part of the remaining one third of the unit drains into Dixie Valley, a closed basin in the southeastern part, and the rest into Buena Vista and Antelope Valleys, which have a common internal drainage pattern.⁵

⁵Engineers Office of the State of Nevada, Groundwater Section.

D. Geology

Rock formations in the block fault mountains include sediments, metamorphics and intrusive and extrusive igneous types. Among the sedimentary types are shales, limestones, siltstones, mudstones, dolomites, sandstones, conglomerates and others. The metamorphics include phyllites, quartzites and various metavolcanics. Practically every known type of igneous extrusive is present: andesite, rhyolite, basalt, dacite and tufts. The igneous intrusives, those coarse-grained granitic types, are represented by diorite, quartz diorite, grandodiorite, quartz monozite, diabase, etc. The mountain rock formations are extremely thick, and the geology has been complicated by faults and thrusts created by tectonic activity.⁶

E. Soils

Soils vary in origin and texture from the mountains to the lowlands, and in quality from the north to the southeast. The mountainous areas feature stony, rocky, medium to coarse textured soils that are excessively drained. The mountain soils are more developed and quite productive in the part of the unit north of the Humboldt River. The southern mountains are very stony, and soils have not been formed or deposited in the exposed areas. The terraces and alluvial fans are highly absorptive, swallowing many mountain streams before they are

⁶State Minerals Officer, Bureau of Land Management, Reno, Nevada.

able to reach the valley floor. The valley soils of the southeast, especially in Dixie Valley, are highly saline.⁷

F. Native Vegetation

Three broad types dominate the unit. Desert shrubs and salt tolerant grasses cover the broad valley bottoms. Greasewood (Sarcobatus vermiculatus) is the most prevalent, with shadscale (Atriplex confertifolia) and budsage (Artemisia spinescens) intermixed. The grasses are mainly saltgrass (Distichilis stricta), alkali sacaton (Sporobolus airoides) and squirreltail (Sitanian histrix).

The fans or benches are less saline, and the flora changes to a sagebrush type, with bluegrass constituting the understory. Shrubs in the bench-sage areas include big sage (Artemisia tridentata) and rabbitbrush (Chrysothamnus spp.). Grasses there are sandberg bluegrass (Poa secunda), Indian rice grass (Oryzopsis hymenoides), Thurbers needlegrass (Stipa thurberianian), and cheatgrass (Bromus tectorum).

The mountain areas differ from the benchlands mainly in having a greater variety of shrubs and grass. The aspect of these areas is sagebrush with grass understory. Snowberry (Symphoricarpos spp.), mountain mahogany (Cercocarpus spp.), rose (Rosaceae spp.), currant (Ribes spp.), serviceberry (Amelanchiar aluifolia), and chokecherry (Prunus spp.) are included. The grasses include those found on the benches,

⁷Soil Conservation Service, Winnemucca District, Winnemucca, Nevada.

plus Idaho fescue (Festuca idahoensis), Nevada bluegrass (Poa sp.), sedges (Carex spp.), and spiked wheatgrass (Agropyron spicatum). Some pinyon pine and juniper occur on the southern mountain slopes.

G. Thermal Phenomenon

Thermal activity occurs throughout the east half of the unit. Half a dozen hot springs are known, with two or more of these on public land. Most of these were privately appropriated long ago, under State water laws for control of stock-water. Notable among these springs are Hyder or Dome hot springs, situated on public land in the southern portion, the Seven Devils spring and those near the old settlement of Golconda.

III. Cultural and Civil Features

A. Population Patterns and Characteristics

The Humboldt Master Unit is economically oriented toward the population center, Winnemucca, which is the Humboldt County seat. The present population of Winnemucca is estimated at 4,550, up from 3,985 in 1960. It is anticipated that the town will exceed 5,000 by 1970.⁸ The remainder of the unit is sparsely inhabited and negligible in the population count. There are a few small outlying communities along the river.

Winnemucca has exhibited a slow but steady growth based mainly on an increasing tourist trade and the agricultural

⁸The Winnemucca Area. Union Township Regional Planning Commission.

development of nearby desert lands. However, the Humboldt Unit must share some of Winnemucca's influence with the Blue Wing, Paradise and Jackson Master Units.

The urban population exceeds that of the rural by far. Some of the ranchers and farmers in the unit commute from Winnemucca to work at their farms or ranches. Others live on their ranches or farms during the summer and then move to Winnemucca for the winter. An average of one or two persons per township is probably typical of the unit away from the river valley. Vast areas in mountains and outlying valleys are uninhabited except for the periodic seasonal migration of livestock workers.

Winnemucca and a small, potentially cultivable area nearby will grow, but unless something unforeseen occurs, such as a mineral find, the rest of the unit will not support residence.

B. Transportation Patterns and Access

Highway and rail transportation to Winnemucca and the inhabited parts of the unit is excellent. The greater interior, however, is accessible only by low grade or unimproved roads that are hazardous during much of the year.

Two major highways intersect at Winnemucca. Highway 95 passes through from north to south, connecting the area with Idaho and Oregon and southern Nevada, and Highway 40 crosses the unit from east to west. In 1961, State Highway 8A was improved westward to connect with Oregon 395 and other routes

to the coast. This road, called "the highway to the sea," opens a direct route to northwest United States.

Three bus lines serve Winnemucca. They are Boise-Winnemucca Stages, Burlington and Greyhound. Greyhound has established a terminal at Winnemucca and approximately 20 drivers and their families make their home there.

The Western Pacific and Southern Pacific railroads run parallel from the east into Winnemucca. From there the Western Pacific goes directly west into California and the Southern Pacific turns south to Reno. Both terminate in San Francisco.

C. Communications

A single radio station, KWNA, operates at Winnemucca, broadcasting over the area from 7 a.m. to 7 p.m. It is able to cover the unit, except for the extreme southern end.

Reception from three television stations is possible in Winnemucca; two from Boise, Idaho, and one from Reno. However, the largest part of the unit is fortunate to receive one station, usually the one in Reno.

Telephone lines traverse the main valleys in the unit but not the more isolated and less populated ones.

The transcontinental microwave telephone system passes through the unit.

D. Energy

Power is supplied to the more populous areas in the unit by Sierra Pacific Power Company and California-Pacific

Utilities, which purchases power from Sierra Pacific Power Company. Both are privately owned and the power is brought from sources in California. This power is available to all areas, except for several in the extreme southern end.

A natural gas pipeline has been completed through the unit north of Winnemucca, and plans are being formulated to extend a line to that town. If demand warrants, these gas lines will also be extended into other portions of the unit.

E. Political Organization and Maturity

Zoning laws are not generally enacted by any of the three counties in which the unit is located. Control of building in specific areas is maintained by granting or denying permits for construction. Local subdividers do, however, attach numerous restrictions to the newer subdivisions.

There are no building codes in these counties, but the State Department of Health controls septic tank and water well conditions. Also, as stated above, the issuance of building permits allows some present control. The city of Winnemucca and the county of Humboldt have planning commissions, and both are considering building code legislation.

City and rural fire units exist throughout the more populous areas. The isolated valleys and ranches, though, have not protection in their immediate vicinity. The Bureau of Land Management has five pumpers available for fire protection on Federal ranges.

Police protection consists of city (Winnemucca), county and State officials. Since this activity is confined mainly to the populous areas, remote ranches do not receive much protection. However, the service is available to them if requested.

F. Civic Works and Programs

The county seats of the three counties involved with the Humboldt Master Unit--Humboldt, Pershing and Churchill--are Winnemucca, Lovelock, and Fallon, respectively. The Humboldt County seat, Winnemucca, falls within the unit area.

No state or other institutions are located in the unit.

Winnemucca has the only hospital within its boundaries.

IV. Business, Industrial, and Urban Affairs

A. Agriculture

In the past, crop production has been confined to hay and grain for stock feed. While this is probably still the major production, new land developments are attempting to produce cash seed crops.

Stock raising is the most important agricultural enterprise and is expected to remain so, due to the limitations of ground waters and suitable soils for extensive development of new lands. Some of these new land developments, however, are expected to succeed and boost the local economy.

Stock raising and crop production are second in economic importance to tourism. Both will probably continue at, or slightly above, the present level because so much of the unit is unsuitable for any other purpose.

B. Lumbering and Wood Products

Although the Humboldt Unit is the most forested unit in the Winnemucca district, lumbering plays a negligible role in its overall economy. The pinyon-juniper type, found on more than 100,000 acres, is commercially valuable only for posts, a few sales of which are held yearly. Pinyon pine is limited to approximately 30,000 acres and may be sold as Christmas trees. Commercial utilization of the forests, however, is severely restricted by the lack of adequate access. The Stillwater Mountain Range has the greatest Christmas tree potential, while future post sales from the Tobin Range look promising. The potential will only be realized, however, with the advent of sufficient access roads.

C. Mining and Mineral Processing

The Getchell Mine, situated in the extreme north part of the unit, within the railroad checkerboard area, is the only important mining operation in the unit. At one time the mine was underground, but it has recently been converted to open pit mining. Employment rose from about 60 to more than 100 with the conversion. Tungsten, mercury and gold are mined. Tungsten in considerable amounts has been processed and held pending better prices. Some small mines are also operative as one- or two-man operations. Many that were active in the past are now defunct.⁹

⁹Industrial Data (1962). Humboldt County Chamber of Commerce.

D. Manufacturing and other Business

Manufacturing plays a minor role in the local economy but is, nevertheless, third in importance behind tourism and agriculture. It is limited to a 7-Up Bottling Company, a printing company and a cement and asphalt mixing plant, all in or around Winnemucca. A machine plant is now being built to manufacture tools and turbine or centrifugal pumps. The new plant is being sponsored and built by a group called Nevada Industries. It will be leased to the pump and tool manufacturing company. The group also plans to promote Winnemucca as a goods storage center for interstate merchandise in transit. The tool and manufacturing plant will work into this also by furnishing facilities for repair of breakage and damage in transit. Winnemucca is ideal for such an enterprise since it is a transportation hub and has ample land for storage and development.

E. Recreation and Tourism

Tourism is the most important source of revenue in the unit. Winnemucca is an important overnight stop for travelers from the east and north.

Tourism is also important to several roadside communities along U. S. 40. The construction of limited access freeways however, is literally putting these outlying commercial stops out of business.

Recreation consists mainly of gambling and a night on the town in Winnemucca for both tourists and locals.

An extensive motel system has developed to take care of the seasonal tourists, and associated trades and businesses have grown accordingly. Available facilities are usually excellent.

Hundreds of hunters and fishermen travel through Winnemucca enroute to their seasonal sports and a great percentage stop for the night.

Local families enjoy picnics, hiking, fishing, etc. No facilities are provided for this family-type recreation, except for one picnic area. Recreation in the Humboldt Unit is limited by a lack of moisture. However, some fine streams do exist in the area, as well as some areas of interest to "rockhounds" and arrowhead hunters. Big game hunting is good. It could be increased, however, and the Nevada Fish and Game Department is encouraging nonresident hunters to come into the unit because they usually are better equipped to go into the remote areas.

F. Public

A permanent Air Force Radar Installation, employing about 200 armed service and civilian personnel, is located close to the Winnemucca city limits.

G. Promotional Activities

Several land promotions exist within the boundaries of the unit. Land is sold, for the most part, to uninformed buyers in California. No concentrated rush of new land owners or building of any type has developed, although thousands of tracts

have undoubtedly been sold. The main reason for the lack of building is that some of the land is being held for further speculation, and some buyers are disappointed upon finding exactly what they had purchased.

These promotions have served to inflate land values to the extent that lands adjacent to the city limits that sold for \$125 an acre in 40 acre parcels are now for sale at \$1,500 per 1/2 acre site.

V. General Economy, Trends and Influences

A. Present Condition

The economy of Winnemucca is good. The tremendous tourist trade has stabilized local businesses that cater to it. Employment is steady, except for a seasonal drop each fall at the end of the tourist season, but the area is accustomed to this decline. Due to the influx of Greyhound and Federal personnel (about 75 families), housing is inadequate and construction will flourish for awhile. It is reported that Pacific Intermountain Express is contemplating a terminal station at Winnemucca, similar to Greyhound's. This should bring in quite a number of drivers and their families.

The new paved highway north of Winnemucca (Nevada 8A), connecting Winnemucca to the northwestern United States, established it as an important crossroad. The warehousing complex being promoted may bring in considerable new business.

Natural gas and underground sources of water can expand the economy and bring in new industry.

The tourist trade is increasing every year, and so are the facilities. Although Winnemucca is the main recipient of all the economic benefits, a greater demand will also be put upon the public lands. Some public lands are strategically located, and classification for urban use can be made to benefit the economy. The bulk of the unit will not profit by economy rise, except for a dozen to 20 desert land entries in scattered areas and increased recreation interest from Winnemucca's population pressure.

VI. Public Land--Their Character and Extent

A. Land Patterns

Approximately 3/4 of the unit is involved in a checkerboard land pattern. The remainder is predominantly public land spotted with few private lands. The checkerboard includes all of the north portion and a wide strip along the west side. The part that is almost solid public lands lies in the southeast part. The checkerboard area involves a tenure principally shared by the Bureau, the Southern Pacific Land Company, and numerous ranchers or promoters who have obtained lands that were originally railroad grants.

Some of the checkerboard public lands are high in value as a result of population pressures and high pressure promotions. Public uses of lands in these areas are possibly greater as a result of the private ownership. Public sales, small tract auctions and recreation and public purpose classifications are imminent.

Tenure adjustments are advisable in many areas, particularly at the higher elevations where precipitation favorably influences vegetative type and growth. Generally speaking, the

valley floors are greater in public demand though they are actually lower in forage production. The Bureau should encourage exchanges with alternate section land owners in an attempt to block out desirable areas at high elevations for public use and turn the valleys to private ownership.

B. Character

The alternate section area is estimated to be 40% mountainous and 60% alluvial slopes and valley floors. The mountainous portions are the better grazing lands; the valley floors and alluvial fans afford winter grazing but their carrying capacity is low.

Basically, the valley lands are desert in character, having an average rainfall of 5 inches and less. Some of these lands are suitable for cultivation but oftentimes the soils are heavy and saline and large areas have characteristic hardpans.

The mountainous areas are scenic but extraordinary attractions are not present. The desirable features of the mountainous lands are better grazing and recreational opportunities than are found in the valleys.

VII. Use of the Public Lands and Public Resources

A. Agricultural Developments

Development has been held to a minimum for 3 reasons: Poor soils, checkered land pattern, and a pending water study that has closed two major valleys to agricultural filings.

Two valleys developing agriculturally are in private ownership. One other valley has several desert land entries subsisting but at last report no development has occurred.

Several areas do hold potential for agriculture, and limited agricultural classifications are anticipated. However, great quantities of suitable soils do not exist in the greatest part, and water is limited in the remaining parts.

The Kelly Creek-Red House area in the northeast part of the unit, along with the checkerboard area, may have underground water prospects but the soils are not very good. Jersey Valley, a solid public land area, may have underground water supplies and has reasonably good soils. Twelve to 20 desert land entries are all that is anticipated unless further underground water is found.

B. Range Livestock Operations

Much of the unit is suitable only for range livestock grazing and game use. Little change is in prospect for most of it. The northern part of the unit produces the best forage at all elevation levels, including the valleys. The mountain types and most of the alluvial intermediate slopes described in 11-F are also productive, or potentially so, in all parts of the unit. The basin lowlands in that portion south of the Humboldt River, especially in the southeast sections, are mostly too saline for good forage growth. The better sites can be improved through management and rehabilitation. The lowlands offer little prospect of improvement, except to a

degree by management and possibly some elimination of the phreatophyte greasewood.

Fifty-one operators run 18,064 cattle, 34,040 sheep, and 256 horses in the unit. The sheep operators also run cattle. The alternate intermingling of mountains, benches and valleys affords simple and economical operation in handling and moving stock seasonally. Cattle graze the benchlands in spring and fall, the higher country in summer and the valley bottoms and ranch base property during the winter. All of the sheep operators but one summer the sheep out of the unit on private range lands, national forests and on private range land in Elko County. The one exceptional operator summers in the mountains west of Buena Vista Valley. The sheep winter in the valley bottoms. The base property requirements is four months in all but one administrative unit, which has a two month requirement.

Of the nine administrative units in the master unit, four are adjudicated, one is being completed in FY '63 and four are scheduled for adjudication by FY '67.¹⁰

Livestock operations are limited by lack of water and by the tremendous annual fluctuations in forage growth because of great variations in precipitation. Water is quite good in the summer range but is short and sporadic on the benches and in the valleys. Good streams heading in the mountains sink

¹⁰BLM, Range Management Division files.

when reaching the alluvial benches. Stability of the livestock operations is uncertain because the railroad lands are leased only from year to year with no certainty of renewal. The most important need is for a constructive follow-up program to the adjudication program. This includes allotment and unit management plans under which range condition is to be improved and stable livestock operations provided from year to year. This includes season for use fencing, water development and range rehabilitation projects. This would have to be done in close cooperation with the range users.

Individual and small group grazing allotments made later will facilitate management and probably encourage exchanges to improve land patterns.

C. Range Conservation and Development

There is a great need for work in this field and opportunities for considerable accomplishment, but there are also hindrances, as will be shown. All of the unit north of the Humboldt River is in the Beowawe Project¹¹ area that was initiated in 1963. Though both the need and opportunity for wide scale rehabilitation are prevalent in the project, the checkerboard land pattern depreciates the possibilities tremendously. Large scale land exchanges or mutual cooperation are necessary to a full conservation program.

¹¹This and other areas were set up as intensive management areas to be put under complete multiple-use management within 6 years.

The current program and that of the immediate future is fencing and water development. They must be done together and both need to be greatly increased to keep up with and further the range adjudication and management programs. Much of the area can be improved only through management, and water and fencing are the prime requisites. There is a great potential for water development in developing springs, constructing reservoirs, and by piping water from the live sources in the mountains to and across the alluvial fans in which it is now lost to livestock use.

There is a definite need for soil and water control. Extensive soil loss and flood damage occurs frequently because of flash high intensity storms. Besides loss of soil, there is damage to crop lands, roads, fences and reservoirs; moisture for forage growth runs off rather than being taken into the soil. Hydrologic studies are needed before going into such work, for little is known of the hydrology today. The soil and topography is conducive over much of the unit to contour furrowing, subsoiling, ripping, check dams and water spreading. Detention dams are needed.

Aerial spraying of brush at high elevations to reduce big sage and increase desirable grasses and better shrubs is possible; better livestock and deer forage would result and soil losses would be checked. Control of greasewood in the lowlands might encourage better plant growth by reducing transpiration.

Seeding would be desirable over much of the unit but is limited under present methods and species because of low precipitation and poor soils. We should be on the lookout for more adaptable species. Halogeton is widely established in the lowlands, and other low grade plants occur. Substitution of better plants would be most desirable.

Access roads, trails for management and hunter access are also necessary. Much of the country is inaccessible for supervision, easy hunting and fire control.

All of the above practices are greatly hindered by the land pattern in the checkerboard. The programs are dependent on the concurrent similar work of the land owner. Easements must be acquired to build roads or pipelines; locating property lines is a tremendous job; the mountain areas are spotted with mining claims. Either a P.L. 167 program is necessary, or before much work can be done the claims should be checked for validity.

D. Forests, Woodland, Lumber and Other Vegetative Products

This unit contains most of the woodland types of the Winnemucca District. Pinyon and juniper are the principal species and occupy 113,000 acres, principally at the higher elevations. The woodland type is found in all of the mountains and extends north to Township 29 N. in the Humboldt Mountains and Township 25 N. in the Augusta Mountains. Some quaking aspen occur in the Sonoma range. A few post sales of juniper are and will be made each year. Pinyon nut picking is

practiced in some areas and could be promoted with better access. Christmas tree sales should also be encouraged when roads are provided.

E. Minerals

Within the Humboldt Master Unit there are some 25 known mining districts, plus several that are as yet unknown or unnamed. In years past, many of these districts were quite famous for their mineral production.

The principal minerals being produced are gold, silver, lead, mercury, manganese, copper, zinc, tungsten, iron, antimony, arsenic, and molybdenum. These minerals occur in vein, replacement, contact metamorphic and placer types, and generally in association with intrusive bodies and Tertiary volcanics.

Except for the iron deposits in the Buena Vista District (Churchill and Pershing counties), current mining activity is somewhat static. This is not, however, to be construed as a lack of interest in prospecting and developing further mineral deposits. There is considerable activity of this kind.

In addition to the Buena Vista District, some of the more important areas are Rochester (gold, silver, mercury, antimony); Unionville (silver); Start (silver, antimony, lead, zinc); Potosi (gold, tungsten); Adelaide (gold, silver, copper); Battle Mountain (lead, copper, silver, zinc, antimony, gold, turquoise); Mount Tobin (mercury); and Kennedy (silver, gold, zinc, copper). Further work in these and other regions in

the unit will no doubt receive considerable attention as mineral prices increase.

Since the unit area is remote in relation to any rapidly expanding population center, mining claim conflicts are negligible and mining claim abuse is nil.

The Bureau's work in the minerals field will continue to be principally on an application basis--material sales and examination for patent. In addition, some P.L. 167¹² work will take place for the benefit of range resource management.

F. Water

All flowing surface waters are in use. Although the State Engineer has not adjudicated all of the waters within the unit, his office feels that all surface water rights are probably vested. Numerous springs exist throughout the unit that do not flow any appreciable distance but are important stock watering places. Historical use has been for stock watering purposes. However, many of these springs are not filed upon and are subject to appropriation. Under the circumstances, the Bureau is not allowed to file upon these waters, so it is up to the Bureau to encourage the respective range users to file for their own protection.

¹²Public Law 167. An Act to amend the Act of July 31, 1947 (61 Stat. 681) and the mining laws to provide for multiple use of the surface of the same tracts of public lands, or for other purposes. Approved July 23, 1955. (H.R. 5891)

Underground sources of water are usually available for appropriation. The State Engineer is accepting water applications in all areas of the unit on private land. That office, however, is not accepting applications on public land in three valleys due to a pending water study. The Bureau is not approving agricultural applications in the same areas for the same reason, nor in an additional valley because of the findings in a water study made by the Bureau.

Of the nine watershed areas involved the State Engineer is presently conducting a study of three. The Bureau has made a study of one and it is anticipated that studies will have to be made of four more. One area is not considered important at this point, due to adverse soils. These studies will reveal the quantity of estimated recharge that can be used without mining the underground waters.

Numerous hot springs occur throughout the unit, but all except two are on privately owned lands.

G. Wildlife

The Sonoma Mountain Range south of the Humboldt River has the largest population of deer and chukar partridge. The Humboldt and Tobin ranges also have good amounts of chukar partridge and some deer. All of the mountainous areas have some game. There are a few sage grouse and some cottontail in various parts of the unit.

The winter game ranges are good, but the higher summer ranges are short of desirable browse species. Migration from

summer to winter range is local and depends on the amount of snow. During a light snow year the game stay high, thus reducing hunter success. The chukar depend primarily on cheatgrass for feed and fluctuate in numbers as the cheatgrass fluctuates. Deer were increasing until the recent drouth reducing their numbers.¹³

Access to the game ranges is limited and difficult. Some areas, especially the Sonoma Mountains, are not hunted as well as would be desirable for the range. The State Fish and Game Department encourages nonresident hunters to go into the area because in coming long distances and having higher license fees and other costs they equip themselves better to go into isolated areas. They also stay long enough to get game. The residents like to hunt accessible areas well known to them and for a day or two at a time. The Fish and Game Department is also considering antlerless hunts to control the game numbers.

Hunting will probably gain in popularity. If the summer ranges can be improved by controlling undesirable brush, the game will sustain present numbers or perhaps increase.

H. Recreation

Recreation on the public domain lands consists mainly of hunting, fishing, prospecting and picnicking. The mountain ranges receive up to 20" of rainfall and several good sized

¹³Nevada State Game and Fish Department, Sonoma District.

streams flow throughout the year. However, these streams seldom reach the valley floor as they penetrate the alluvium and seep into the ground water table. Consequently, the most desirable recreational areas are confined to the mountainous country. The Stillwater Range of mountains is quite timbered with pinyon-juniper which provides shade and scenic attractions. There are springs in the area for camp spots and people go into the area for picnics, to hunt rocks and gather pine nuts. Improved campsites are badly needed though, and if provided would increase recreation. The Humboldt and Osgood Mountains have streams, springs and suitable spots for camping at high elevations. The Sonoma Mountain Range has two very good streams in Clear Creek and Rock Creek. All of these would be used much more if improved sites were provided. Campgrounds for deer and chukar hunters are especially needed.

VIII. General Summary

Most of the Humboldt Master Unit is suitable only for livestock and wildlife grazing management.

The small area around Winnemucca and along the Humboldt River is subject to urban and diversified uses. Winnemucca is certain to grow because industrial activities are planned that will cause growth. Subdivision promotions are inflating value of outlying private lands in the checkerboard area, but whether these will continue is not known.

Two thirds of the unit is a checkerboard land pattern because of railroad grant lands. This pattern impedes good management and development.

Range conservation and development is desirable and potentially beneficial in the higher elevations, provided tenure adjustments can be made.

Before initiating full scale range development, a number of exchanges of considerable acreage are necessary to block public and railroad lands.

Game management is an important and continuing responsibility.

Land disposal pressures from bona fide urban or agricultural developments are not expected to be great. Land promotions, however, may bring such pressures.

Mining claims in the mountain areas that are not actively worked may have to be brought under a P.L. 167 program or examined for validity if they conflict with management and development.

IX. Program Areas

Stillwater-Tobin Range

Status of Lands

This program area comprises approximately 1,285,000 acres. The overwhelming bulk of the land, 1,188,180 acres, is public land under Bureau of Land Management jurisdiction. Some 38,550 acres of the total are in private ownership.

Boundaries and Location

The Stillwater-Tobin Range includes the greater portion of the south and east parts of the Humboldt Unit. It is bounded on

the west by the Humboldt-Sonoma Program Area, on the north by the Humboldt River, and on the east by a portion of the Bloody Run-Osgood Program Area and the Battle Mountain District line.

Basis for Delineation

The part of the unit that is almost free of land pattern complications is in this program area. The area is 95 percent or more public land. With only very limited acreage destined for private ownership or diversified use, its future lies in public use and management. Except for the mountainous part, the program area contains a great amount of low value, extremely saline land.

Programs

1. Intensive grazing and wildlife management to make such improvements as proper grazing practices can bring about.
2. Range facility program of water development, fence construction and road improvement.
3. Studies and trials aimed at substituting better, salt tolerant forage plants for the present low value phreatophytes.

Humboldt-Sonoma

Status of Lands

Of a total 969,000 acres in the program area, 486,540 are in private ownership and 471,452 are public land.

Boundaries and Location

The area is bounded on the south by the Carson City District line, on the west by the Blue Wing Unit, and on the north by

the Humboldt River. The eastern boundary is a staggered line situated approximately 20 miles east of the western boundary and extending south to the Carson City District line. The program area comprises the south three-quarters of the west one half of the Humboldt Unit.

Basis for Delineation

This area, containing the city of Winnemucca, is all within the railroad grant under which odd-numbered sections in a 20-mile belt on each side of the right-of-way was deeded to the Central Pacific Railroad. The Southern Pacific Railroad later acquired the assets. The checkerboard pattern brings up complications in management and development which can only be resolved by large-scale exchanges. The area is not as productive as the rest of the railroad grant land within the master unit.

Programs

1. Exchanges to consolidate public and private lands.
2. Prepare some of the lands near Winnemucca for urban expansion.
3. Study the validity of mining claims under P.L. 167 or the general mining laws to determine surface rights.
4. As land tenure is adjusted, initiate accelerated program of range rehabilitation and development.
5. Manage consolidated public lands intensively for range livestock, game and recreation.

Bloody Run-Osgood

Status of Lands

Approximately 771,600 acres are included in the program area. This is divided into 402,580 acres of private land and 368,020 acres of public land.

Boundaries and Location

This program area is situated north and east of Winnemucca. It comprises the northern portion of the Humboldt Unit and is bounded on the west by the Blue Wing Unit and a portion of the Jackson Unit. On the east its boundary is the Elko District line. The southern border is the Humboldt River, except for an area about 2 1/2 townships wide that extends along the Elko District line, south across the river and to the Battle Mountain District line.

Basis for Delineation

Like the Humboldt-Sonoma area, this program area is a railroad grant checkerboard region with the same land pattern complications. This area, however, is more productive and generally better rangeland in both the valleys and mountains. It is also within the Beowawe Project.

Programs

1. Exchanges to consolidate public and private lands.
2. Large-scale range rehabilitation and improvement in the Beowawe Project area as land tenure can be adjusted.
3. Intensive range management.
4. Develop recreation potential in timbered, mountainous localities.

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